Landscape Ecological, Phytosociological and Geobotanical Study of Eu-Mediterranean in West of Syria

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Presented by
Abdullah Ghazal
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Vice Dean and Head of the Committee:	Prof. Dr. R. Doluschitz
Supervisor and Reviewer:	Prof. Dr. R. Böcker
Co-reviewer:	Prof. Dr. Sauerborn
Co-reviewer:	Prof. Dr. K. Stahr
Date of examination:	24 April 2008

University of Hohenhiem (320), 70593 Stuttgart, Germany.
E- mail: abghazal@yahoo.com, abghazal@gmail.com

(وَقُلِ أعمَلُوا فسَيَرى اللّهُ عَمَلكُم ورسولُهُ والمؤمنونَ وستُرَدُّون إلى عالمِ الغيبِ والشهادةِ فيُنَبّئُكُم بما كنتم تَعمَلُونَ)

القرآن الكريم: أية 105-سورة التوبة

(And say (O Muhammad SAW) "Do deeds! Allâh will see your deeds, and (so will) His Messenger and the believers. And you will be brought back to the All-Knower of the unseen and the seen. Then He will inform you of what you used to do.")

Al-Quran Al-Kareem: Toubah (105)

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Preface:

Syria occupies an important area of the east Mediterranean; its vegetation reflects a wide diversity in climate, geology, topography, soil and floristic. Historical, archeological and botanical sources show that the forest cover in Syria was once much more substantial than its current condition. Various degradation factors have reduced the area of forests to a mere 2.5% of the total land area (annual agricultural static abstract 2003).

Syrian vegetation is classified into different types, they are: Thermo-Mediterranean, Eu-Mediterranean, Supra-Mediterranean, Mountainous-Mediterranean and Oro-Mediterranean. The Eu-Mediterranean vegetation is one of the most important types in Syria; it covers a large area from Syria especially in the western part. The Eu-Mediterranean vegetation presents the Quercetea ilicis sclerophyllous forests and it is dominated by *Quercus calliprinos* vegetation.

Forest landscapes in the Eu-Mediterranean in Syria are usually the critical climax vegetation except for the Mediterranean conifers (Quezel 1981b). It is an important part in the eastern Mediterranean alongside *Quercus ilex* and *Quercus calliprinos* (Barbero et al. 1991). *Pinus brutia* has a rather restricted range of distribution. It is limited mainly to the East Mediterranean countries, and it covers an important portion of the Syrian vegetations. (Zohary 1973, Houerou 1981, Tomaselli 1981, Quezel 1981, 1985).

The Syrian vegetation has been affected for long time by human impact during last decades. It was destroyed by cutting, grazing and fire and finally tourism which showed a boost in the last decades. Most of the forest landscapes were changed to crop fields and fruit trees groves. The degradation of the vegetation has changed most of it to a rocky desert where the vegetation was cut and the soil eroded leaving the landscape finally in an irreversible situation.

The phytosociological studies of the vegetation present good tools for understanding the vegetation as well as ecosystems and provide an important method to produce a map of the country (Bharucha and DeLeeuw 1957). The good programs for landscape planning need a description of high quality of the actual vegetation.

Ecosystem classification and mapping has recently received a renewed attention, either from a theoretical viewpoint or in usage for case-specific applications (Blasi et al. 2000). This is due to the fact that, as a precursor to land management and biodiversity conservation, ecosystems need to be described, characterized and spatially located (Sims et al. 1996).

For the manager it is often impossible, or at least very difficult, to translate results of vegetation research into practical uses. In this regard, the vegetation ecologist should deem interpreting the research results to be the task in which ecologist will help the land manager in agriculture, forestry, and range management (Mueller-Dombois & Ellenberg 1974).

Maps are helpful for an understanding of the spatial relations of plant communities or vegetation units. It provides the opportunity for a fair distribution of sampling in sense of geographical distribution and vegetation variation (Mueller-Dombois & Ellenberg 1974).

This study concerns on the Eu-Mediterranean vegetation in Syria and studied the following points:

1. Study all the environmental variables and the ecosystems types of the landscape in Eu-Mediterranean.
2. Geobotanical description of the Eu-Mediterranean vegetation for all regions.
3. Identification of the Eu-Mediterranean flora and preparation of flora list.
4. Analysis of the vegetation from the phytosociological view point to identify new associations and their relationship to the current phytosociological units.
5. Preparation of a potential vegetation map for the Eu-Mediterranean vegetation including all classified landscape units.

1. Syria, an outline:

1.1. Location and Land use:

The Syrian Arab Republic (SAR) lies on the eastern edge of the Mediterranean Sea, with an area of 185,180 km^2. It is situated between the latitudes 32° 19' and 37° 30' N and the longitudes 35° 45' and 42° E.

The bordering countries of Syria are Turkey in the north, Iraq in the east, Jordan and Palestine in the south, and the Mediterranean Sea and Lebanon in the west. The major cities of Syria are Damascus, the capital; Aleppo, Homs and Hama, as well as Lattakia and Tartous on the Mediterranean coast.

Syria occupies a relatively long coast of about 183 km on the Mediterranean Sea. The National Census of 1999 estimated the population to be 16.1 million; about half of them live in rural areas.

The land usage distribution in Syria is as follows: 32.5% for cultivation, 45% as plains and pastures, 20% as uncultivated lands and 2.5% as forests. Therefore, the plains occupy the biggest part of the area, which are used for grazing of sheep and less frequently for camels. The second major part is an arable area that is cultivated by the private sector. The forests are mostly concentrated in the western region of the country and are represented by a Mediterranean vegetation.

1.2. Major topographical features:

There are two mountain ranges: the first is situated in the western part of the country parallel to the coast with an altitude ranging from 1100 – 1500m; and the second extends from the south west towards the north east of the country with an altitude of 900 – 2800m. Mount Haramoun is the highest point with an altitude of 2814 m. However, there are some other peaks that reach an altitude of more than 2000m. These peaks play an effective role in the distribution of vegetation.

On the other hand, there are some areas mainly along the Mediterranean coast with an altitude of 0-200m, which constitute about 3-4% of the whole area of the country,

The areas that have an altitude ranging from 200-600m cover about 60% of Syria, and these lie in the northern plains. The other remaining parts, which have an altitude range from 600-1000m, cover the southwestern of the country (fig 1).

1.3. Geology:

Considering rock types and age, Syria can be divided into seven groups (Technoexport 1966; Ajjil 1974) which are the following (fig 2):

1. **Quaternary deposits**: Cover the terraces and valleys of the rivers of which the Euphrates is the most obvious. They are also found in the Ghotah of Damascus and in some of the depressions of steppe area.

2. **Neogene rocks** are mainly located in the northeastern part of the country. From the pedological point of view, gypsum is the most useful rock of the kind group, affecting the processes of soil forming in the area. Other rocks usually include marl and sandstone.

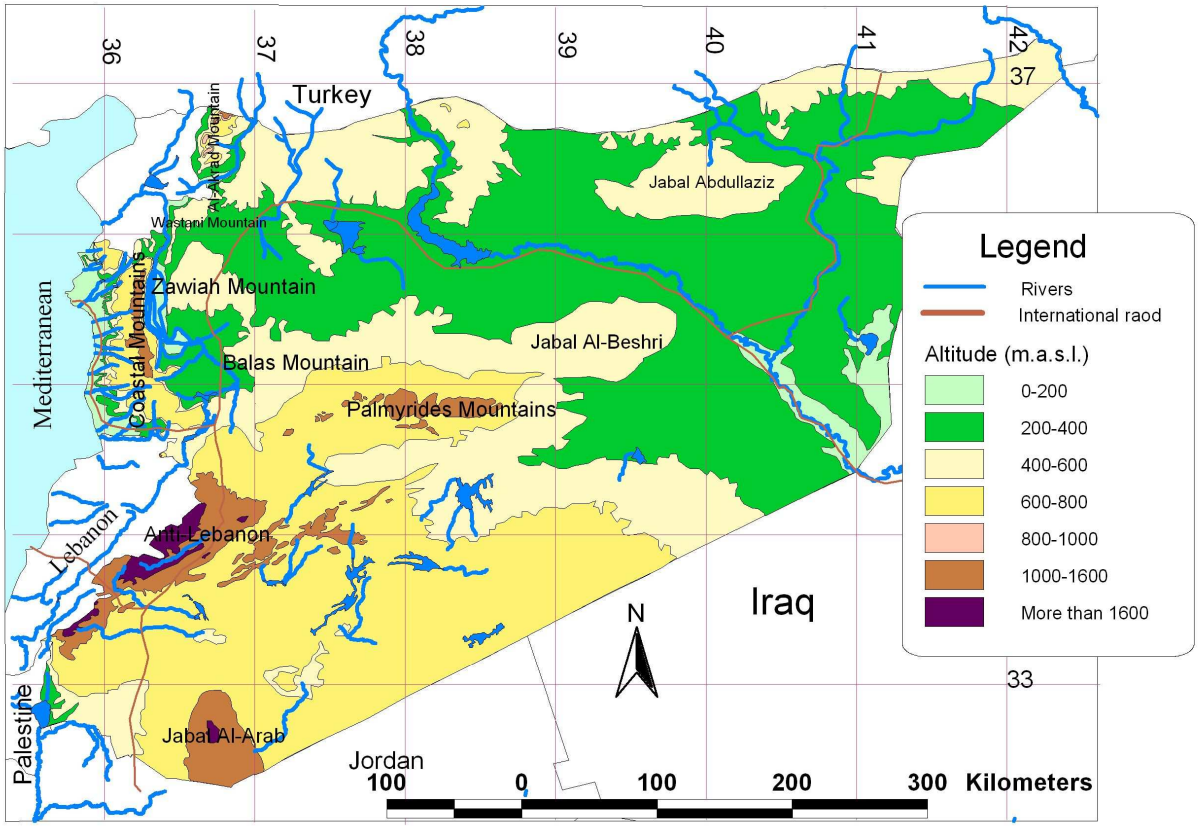


Fig 1: Topographical map of Syria.

3. **Paleocene rocks** are extensively spread in the central and southeastern parts of the country as well as in Aleppo plateau and Anti-Lebanon. The major rocks among them are limestone, marl and sandstone.
4. **Cretaceous rocks** are widely known in the mountainous areas of Syria, such as the Coastal Mountains, Anti-Lebanon, Palmyrides Mountains, Al-Akrad Mountain[1], as well as a small area in the southeastern part of the country. The cretaceous sequence is composed of various rocks such as limestone, marl, dolomite, clay, sandstone, phosphate and flint.
5. **Jurassic rocks** are rather widely present in Syria. They crop out only in the Anti-Lebanon, the Coastal Mountains, Al-Akrad Mountain, Palmyrides Mountains and Qara-Douran. The major rocks of these areas are limestone, dolomite, and marl.
6. **Mesozoic metamorphic green rocks** are found only in a limited encampment in the Coastal Mountains, the Bayer-Bassit and Al-Akrad Mountain.

[1] The new name of Al-Akrak Mountian is Jabal Halap.

7. **Volcanic rocks** are from different ages. They are mainly located in the southwestern part of the country as well as some locations in the central, northern and northeastern parts.

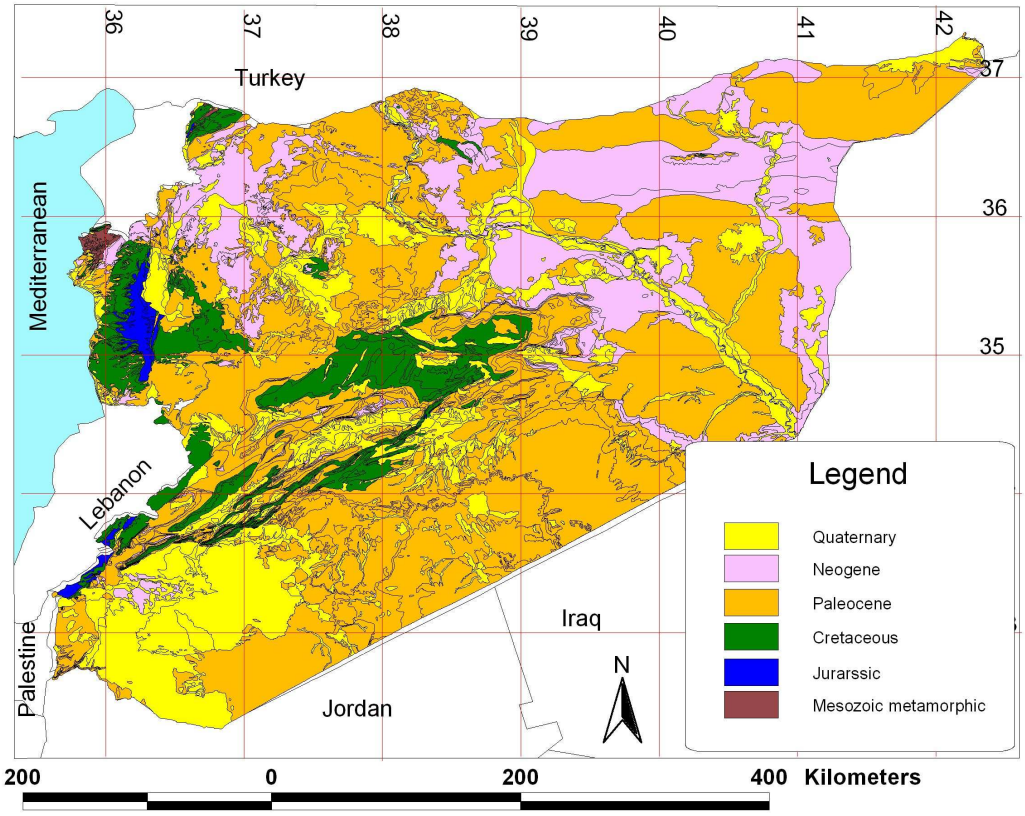


Fig 2: Geological map of Syria (after Technoexport 1966).

1.4. Major Soil Types:

The soils of Syria are classified into 6 major orders and 13 great groups (Ilaiwi, 1982) (fig 3). However, Steeg and Pauw (2002) used FAO-Unesco system to overview the soil resources of Syria depending on all previous works:

1. Aridisols (in FAO system Solonchaks, Solonetz; Gypsisols, Calcisols, (Yermosols), and (Xerosols)) cover 47.5 % of the country soils. They generally occur where the annual rainfall is below 250 mm, and are thus the dominant soils in the Badia. However, they can also be found around Damascus. They are mostly characterized by Calcic or Gypsic horizons close to the soils surface, and accumulation of salts. The soil structure is weak. There is a relatively light texture and low deposits of organic matter, which predisposes them to erosion. The soils are mainly classified as:

Soil Taxonomy	FAO System
Typic Gypsiorthids	Haplic Gypsisols
Calcixerollic Xerochrepts,	Calcaric Cambisols
Typic Calciorthids,	Haplic Calcisols
Calcic Gypsiorthids,	Calcic Gypsisols

Lithic Xerorthents and rock outcrops	Eutric Leptosols

2. Inceptisols (in FAO system Andosols, Cambisols, Leptosols (Rankers), (Fluvisols), (Solonchaks), and (Gleysols)) are the second most extensive soils covering about 21.7 % of the country. They are the prevailing soils in the humid areas in the north of the country and in the eastern areas of the Coastal Mountain around Homs, Hama and Idleb. They are mostly characterized by a Calcic subsoil horizon, heavy texture and moderate to strong structure. In Soil Taxonomy these soils are classified as Lithic Xerorthents, Lithic Xerochrepts, Typic Xerochrepts, and rock outcrops. The FAO equivalents are Eutric Leptosols, Calcaric Regosols, and Calcaric Cambisols, respectively.
3. Entisols are relatively young soils, occupying about 16.9 % and found mainly as shallow soils over the coastal and central mountains or as alluvial soils on the river terraces.

Soil Taxonomy	FAO System
Typic Torrifluvents	Calcaric Fluvisols
Lithic Torriorthents	Eutric Leptosols, Calcaric Regosols
Typic Xerofluvents	Calcaric Fluvisols
Typic Xerorthents	Calcaric Regosols
Typic Salorthids	Haplic Solonchaks
Typic Gypsiorthids	Haplic Gypsisols
Typic Torriorthents	Calcaric Regosols
Aquollic Salorthids	Mollic Solonchaks

4. Mollisols (in FAO system Chernozems, Greyzems, Kastanozems, Phaeozems, Leptosols (Rendzinas), (Solonchaks), (Planosols), and (Gleysols)) have a mollic horizon >25cm with dark surface layer and well-developed structure and cover only 1.2 % of the country. These are mainly enclosed in Ghab between the Coastal Mountains in the west and Jabal al Zawiyeh in the east, the Orontes River runs through the unit from south to north. Some of these soils are very shallow and with no association with Entisols, while others are not dark enough to meet the requirements of the mollic epipedon and are thus associated with Inceptisols. The soils of the Ghab valley are classified

Soil Taxonomy	FAO System
Typic Haploxerolls	Haplic Kastanozems
Typic Xerochrepts	Calcaric Cambisols
Pachic Haploxerolls	Haplic Kastanozems
Aquic Haploxerolls	Gleyic Phaeozems

5. Vertisols are heavy textured cracking soils, which occur in only 2.1 % of Syria's landmass. They mainly occur as associated soils with the Inceptisols and are commonly found in the north of the country between Aleppo and the Turkish border, Jindiress area, and northeast corner near Iraq.

Soil Taxonomy	FAO System

Chromoxererts	Vertisols (Mediterranean climate)
Torrerts	Vertisols (Desert climate)

6. Andisols (Andosols) are belonging to volcanic area and some time shared with rock land. These soils can be seen in the south between Damascus and the Jordanian border.

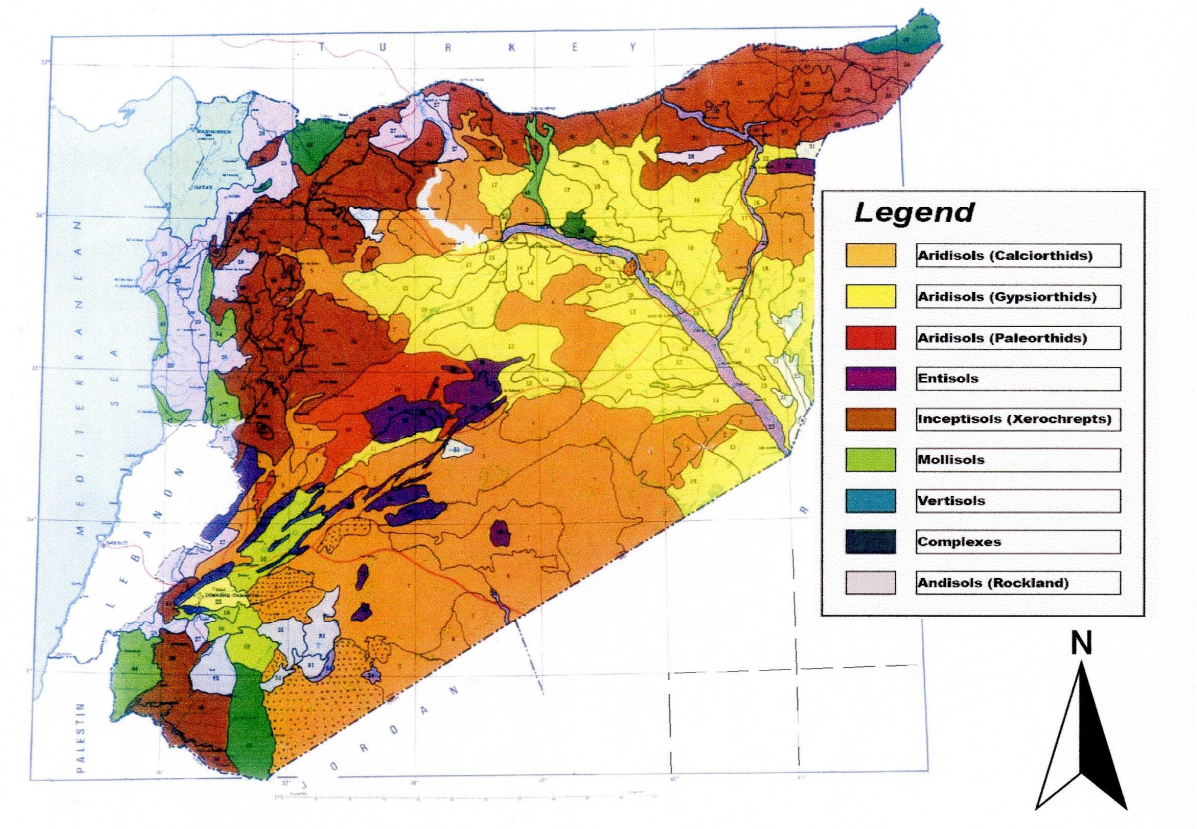


Fig 3: General soil map of Syria (Iliwi 1985).

1.5. Climate:

The climate, in general, is a modified Mediterranean type. The modification is mainly due to the change in the microhabitat as a result of man's misuse of natural resources.

There are four distinct seasons in the year: a cool and rainy winter with occasional snow, a hot and dry summer, and short and moderate spring and autumn. The coastal areas have a mild climate, while the interior areas are rather continental with cold winters where the temperatures drop to subzero ^{o}C and hot summers of above 40^{o}C.

The long period of drought is one of the most important ecological factors dominating the natural vegetation in the Mediterranean region. The geographical latitude, altitudinal variation, the blocking effect of mountain ranges and the distance from the Mediterranean Sea are among the factors that modify and have an effect on the climate in Syria.

1.5.1. Rainfall:

The most characteristic of the annual variation of this factor is the irregular distribution of precipitation over the year.

Ghazal (1994) distinguished the major characteristic of rainfall in Syria:

1. The annual precipitation decreases the further we move away from the sea.
2. The precipitation decreases gradually from Taurus Mountains towards the south.
3. The annual rainfall increases with the altitude, and it drops sharply in the eastern parts of the country.
4. The rainy season starts in Syria early in September and ends in June.
5. The month with the highest precipitation is January. However, it is expected to get the highest monthly rainfall in the internal mountains in December and in Badia region in February.
6. During July and August, rainfall is completely not observed if meteorological observations are carried out.
7. The seasonal distribution of rainfall is pluviometric patterns indicating that all stations in Syria are of WPAS (winter, spring, autumn, and summer) type.

The effect of latitude manifests itself by the north to south sharp decrease of the annual rainfall. Hence, within a range of about five latitudinal degrees, the annual rainfall drops from about 1000 mm in the north and northwest to less than 100 mm in the southeastern parts of the country. Hence, the largest part of the country receives less than 250 mm as an average annual rainfall (Agro-climatological 1989).

1.5.2. Temperature:

Syria is a warm country. The mean annual temperature does not fall below 11°C even on the mountain peaks. The temperature increases from north towards South, where the mean annual temperature rises from just below 13°C in the N-NW to approximately 19°C in the S-SE of the country.

The coldest month in Syria is January (Chalabi 1980; Ghazal 1994) when the lowest mean and absolute values are usually recorded.

The hottest month is August in the coastal area and July in the inner areas (Birot 1955; Delbes 1956; Gombier 1933; In Chalabi 1980). However, Chalabi (1980) pointed out that the longitude 38° divides Syria into two sections: eastern and western sections in respect to this line where July and August is the hottest month, respectively, with few exceptions in some stations. Ghazal (1994) observed in his study of 60 stations that the longitude is 37°, except for Anti-Lebanon, and Ghab Plain where July is the hottest month, and the stations which occur in longitude 37° that month causes change between July and August.

On the one hand, the main air temperature may drop below zero in the coldest month with frost formation at some isolated peaks of the highest mountains. On

the other hand, the temperature also may rise up in the hottest month reaching 41°C as mean of the hottest month in the eastern part of the country.
There are two areas in Syria, namely the seashore and the Golan Heights, where due to the moderating influence of the sea, the mean air temperature remains above 10°C throughout the year. In the rest of the country, the durable beginning of 10°C goes in two directions: the first one is from the sea to the inland, which is comparatively smaller than the other and more tangible heat that comes from the southwest.
The maximum temperature of 40°C occurs for the first time in May. In July and August, there are about 15-17 days per month in which the maximum temperature occurs in the most eastern regions.
The temperature is highly affected by the topography and the latitude in different parts of the country. The mean annual temperature is affected by the altitude, and decreases gradually upon rising above the sea level. It can be observed by comparing five stations located on different altitudes on the western slopes of the Coastal Mountains. These stations are Banias 20°C (7m), Safita 17.8°C (350m), Mashta Al-Holw 15.4°C (500m) Qadmous 14.3°C (750m) and Slenfah 12.6°C (1100m).

1.5.3. Air Humidity:

In the prevailing part of the country, the highest values of the relative humidity are during the wintertime (December and January), whereas the lowest values are in June, July and August. It could be that the annual variation of the relative humidity, in general, is the reverse to the variation of temperature.
However, the variation of relative humidity in the coastal area is quite different. During summer, the prevailing winds blow from the sea with positive affection of the humid air. Besides this, the air temperature in the area is not too high. Because of this, the relative humidity in the coastal area has quite high values even during the summer season.
In the lowland, the maximum humidity is in July and August, whereas the minimum is in November.
In the mountains, the maximum humidity is in January and February, with a secondary maximum in July and August. The minimum humidity is in October and November, with a secondary minimum in May and June. In the remote southwest of the country, the sea influence is felt. The maximum of the relative humidity is in January and February, with a secondary maximum in August and September, while the minimum is in June with a secondary minimum in October.
The annual values of air humidity predominates the tendency of increasing the humidity by moving from the east-southeast towards the west-northwest. The relative humidity in the southeastern and the eastern regions is about 45%. By reaching Aleppo, Hama and Damascus, the relative humidity increases up to 50 to 60%. The highest air humidity is in the coastal area and on the tops of

Haramoun and Anti-Lebanon mountains, where the relative humidity reaches 60- 70%.
The mean annual number of days with the relative humidity of 30% is about 20-100 days in areas under the influence of the sea, about 200 days in the central and northeastern parts, and approximately 200-205 days in the southeast regions.

1.5.4. Snowfalls:

During winter, snow falls over all the regions where the altitude exceeds 1100m above sea level. The regions with an altitude of 800-1100m above sea level are subject to both rain and snow. Regions of a lower altitude are rarely subject to snowfalls as well as in the desert regions where rain itself seldom falls.

1.5.5. Wind:

During winter, the prevailing winds in the eastern part of the country are eastern, whereas in the northern and northwestern parts they are northern winds. However, other parts of the country are subject to the western and southwestern winds. During summer, the winds in the northeastern part of the country are northern, and the remaining parts are subject to the western and southwestern winds.

1.6. Bioclimatic sub-divisions:

According to the pluviothermic quotient of Emberger[2], Syria has the entire range of the Mediterranean climate from the supra-humid to the very arid .The country had been divided into several sub-divisions of different bioclimatic stages (table 1) (Chalabi 1997).

Table 1: Bioclimate sub-division areas in Syria (Chalabi 1997).

Bioclimate sub-division	**Area**	**Dominant forest**
Upper humid stage cold	The highest area of the Coastal Mountains	*Abies cilicica* and *Cedrus libani*
Upper humid stage fresh	From Slenfah to 1250m.	*Quercus cerris* subsp. *pseudocerris*
Upper humid stage temperate	Baer and north Lattakia	*Quercus cerris* subsp. *pseudocerris*
Humid fresh and temperate	Qadmous	*Quercus infectoria*
Lower humid stage temperate	The lower area of the	*Quercus calliprinos, Pinus*

[2] $Q = 2000P/M^2\text{-}m^2$
P: is the annual rainfall of the site (mm)
M: is the mean maximum temperature of the hottest month (in degree absolute).
m: is the mean minimum temperature of the coldest month (in degree absolute).

and upper sub-humid stage temperate and warm	Coastal Mountains.	*brutia*
Upper sub-humid stage fresh and temperate	Western slopes of the Coastal Mountains as in Qadmous and Messiaf.	*Cupressus sempervirens*
Upper sub-humid stage warm	Coastal plains	*Ceratonia siliqua, Pistacia lentiscus*
Lower sub-humid stage fresh and temperate and upper semiarid stage	Northern and western slopes of the Coastal Mountains, Jiser Al-Shoghour, Afreen.	*Quercus calliprinos, Pinus brutia*
Lower sub-humid stage fresh and cold	High areas of Jabal Al-Arab	*Quercus cerris* subsp. *pseudocerris* and *Quercus look*
Upper arid and semiarid stages cold and fresh.	High areas of Jabal Al-Arab, eastern and north-eastern slopes of Jabal el-Sheikh (Haramoun)	*Quercus calliprinos*
Semiarid stage in all variables	Inner region	*Pistacia atlantica*
Upper semiarid stage and lower sub-humid stage cold and very cold	Anti-Lebanon Mountain.	*Juniperus excelsa*
Arid cold and fresh	Inner mountains	*Pistacia atlantica, Tamarix* sp.
Very arid		Non forest vegetation

1.7. Water source:

There are few big rivers in Syria. The biggest and the longest river crossing the country is the Euphrates and the second most important being Al-Khabour, and then the Asi (Orontes) River. Furthermore, there are several small rivers in Syria such as: Barada (in Damascus), Al-Kabeir Shemali (North and near Lattakia), Afreen (near Jendires), Jaja (near Hasakeh), Al-Kabeir Janoubi (South of Tartous, near Arida), Yarmouk (south of Dara'a), A'awaj southwest of Damascus) and Sajour (near Manbej).

These rivers do not dry up during the summer; however, some may dry up for short periods during some years but not every year. In the mountains, there are a good number of small rivers, for example, in the Coastal Mountains; there are at least 20 rivers (Agro-climatology 1989). Moreover, Syria has a considerable number of rivers, which frequently appear during winter and spring, but dry completely during summer.

Few natural lakes exist in Syria, like Qattineh lake. However, Syria has a considerable number of dams. The biggest being the Euphrates Dam, followed by the Rastan and Mharde Dams. In addition, there are some salty lakes, which dry up during summer such as Jaboul Lake in the southeast of Aleppo with an area of about 250 km^2, and the southern lake of Palmyra with an area of about

80 km^2, as well as, several lakes along the Iraqi boundaries with a total area of about 300-400 km^2.

Syria has many springs in several regions (Agro-climatology 1989):

1- On the eastern slopes of Haramoun and Anti-Lebanon Mountains, there are some springs in Barada, Fidje, Mnin, Ras El- Ain (near Yabroud), Mserip, etc.
2- The Ghab valley has a considerable number of springs from both sides of the Asi River.
3- The coastal region has also a large number of springs.
4- In the northern boundaries of the country, the following springs can be mentioned: Ain el Arab, Ain Diwar and Ras El- Ain. The latter one (Ras El-Ain spring) has a flow rate of about 40 m^3/sec, and thus it is considered among the biggest springs in the world.

1.8. Flora of Syria:

In spite of the geographical presence of three types of vegetation around Syria, i.e. Euro-Siberian, Sub-tropical, and tropical, the flora of Syria does not make a clear connection zone between them. This can be attributed to the presence of two barriers preventing species of these vegetations from penetrating and spreading from the north through Mount Amanus and from the south through the Dead Sea (Mouterde 1966).

The general features of the Syrian flora according to Zohary (1973) are as follows:

- Lack of tropical plants, even in the warmer parts of the country.
- Presence of a fairly large number of forest trees.
- Presence of a considerable number of northern (Euxinian) species, which may be considered as remnants of a more humid vegetation.
- Presence of a sub-alpine tragacanthic flora in the higher mountain areas, like that of the eastern Anatolia and Iran.
- Occurrence of a nival-alpine flora on the mountain peaks such as that of the Euro-Siberian region.
- Presence of a considerable number of trees and shrubs growing in the dry mountainous habitats.
- The Saharo-Arabian plants are rare in Syria, but the Syrian Desert has a very large number of Irano-Turanian plants.

The total number of species in the Syrian flora is about 3077. They belong to 133 families and 919 genera (Mouterde 1966-1983).

The flora species are classified into the following groups:

- *Pteridophyta* 22 species, most of which are threatened of extinction. They are grouped into 9 families and 19 genera.
- *Coniferae* 17 species in three families and seven genera.
- *Angiospermae* around 3100 species, which are classified into 130 families and 900 species.

In addition, 30 families of these families contain more than 80% of the vascular flora species as shown in the table (2). Other families have only one genus *Cuscutaceae* or one species like *Styracaceae*, *Acanthaceae* (Chikhali1999).

Table 2: The major families recorded in Syria with their total genus and species numbers.

Family	Genus	Species	Family	Genus	Species
Fabaceae	50	402	*Iridaceae*	5	41
Compositae	106	331	*Polygonaceae*	8	36
Gramineae	104	222	*Papaveraceae*	8	34
Cruciferae	71	189	*Cyperaceae*	10	33
Lamiaceae	31	191	*Orchidaceae*	11	32
Umbelliferae	74	164	*Malvaceae*	7	25
Liliaceae	24	149	*Crassulaceae*	5	25
Scrophulariaceae	15	115	*Campanulaceae*	5	24
Boraginaceae	29	101	*Convulvolaceae*	4	21
Ranunculaceae	12	77	*Solanaceae*	10	17
Chenopodiaceae	30	71	*Cistaceae*	5	16
Rubiaceae	11	55	*Amaryllidaceae*	5	9
Euphorbiaceae	5	51	*Primulaceae*	7	7
Rosaceae	19	44	*Oleaceae*	5	7
Caryophyllaceae	11	21			

1.9. Vegetation regions in Syria:

The vegetation in Syria changes sharply from the west near the sea to the east after passing the Coastal Mountains. The change is less obvious from north towards the south, and it stops slowly by the appearance of some trees, shrubs, and herbs like *Carpinus orientalis*, *Euonymus latifolia*, and *Hellebourus vesicarius* in the northern parts of the Coastal Mountains, and *Abies cilicica* in Ihden in western Lebanon Mountains (Mouterde 1966).

Four vegetation types are found in Syria: Mediterranean, Irano-Turanian, Euro-Siberian, and Saharo-Arabian, but most of the vegetation belongs to the Mediterranean and Irano-Turanian. In addition, hygrophyte vegetation is also found near the watercourses in all previous regions.

The Mediterranean vegetation of Syria is classified into five zones (Nahal et al. 1997): Thermo-Mediterranean, Eu-Mediterranean (Meso-Mediterranean), Supra-Mediterranean, Mountain-Mediterranean and high mountainous.

A dry continental vegetation is dominant in the eastern part of Syria. This can be divided into three types: The steppe plains, semi-desert and desert (Badia) which comprises more than 55% of the country, where the annual rainfall is less than 200 mm occurring mainly during the winter. This climate extends, in addition to the Palmyra desert, into the south of the upper AI-Jazzira, the

eastern borders of Jabal El-Arab and the eastern non-irrigated steppes of Damascus with less distinctive climate.

1.10. Agro-ecological zones:

Syria is divided into five agro-ecological zones according to the annual precipitation (annual agricultural statistical abstract 2003):

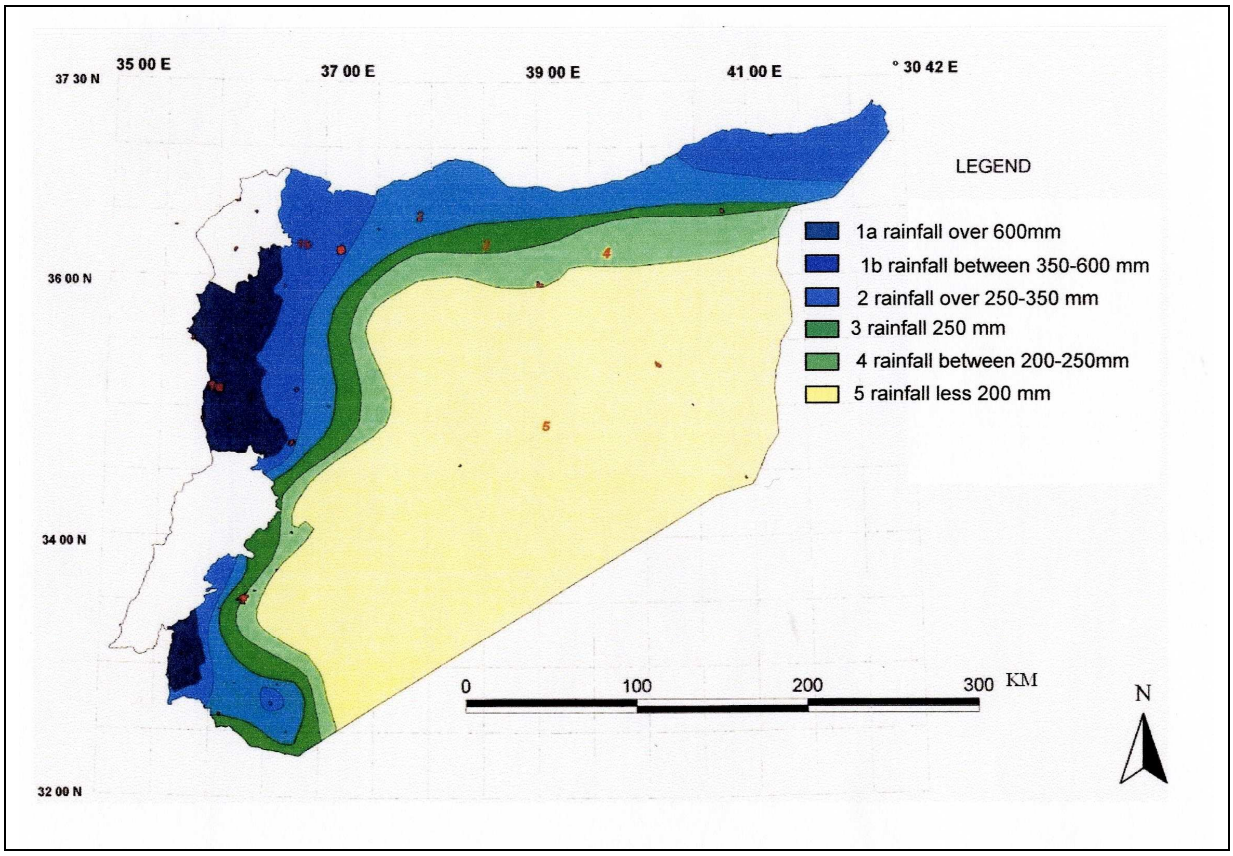


Fig 4: Generalized map of the agro-ecological zones of Syria (annual agricultural static's abstract 2003, modified).

1.10.1. The First zone: With an annual rainfall over 350 mm. This zone is divided into two areas:

a) An area of an annual rainfall of more than 600 mm, where field crops can be successfully grown without irrigation.

b) An area of an annual rainfall between 350-600 mm whose main output crops are: wheat, legumes and summer crops.

1.10.2. The Second zone: With an annual rainfall of 250-350 mm. This zone can be planted with wheat, cereals and summer crops.

1.10.3. The Third zone: With an annual rainfall of 250 mm. The main crops of this zone are barley and legumes. The area of this zone constitutes 7.1% of the country area.

1.10.4. The Fourth zone: With an annual rainfall of 200-250 mm. This area is suitable for barley and for permanent grazing crops, and it constitutes 9.9% of the country area.

1.10.5. The Fifth zone: (Desert and steppe): This area covers the rest of the country forming 55.1% of the country area. This area is not suitable for agricultural uses like field and crop production.

The Irrigated areas: The irrigated areas spread all over the country where surface and ground water is available. The main crops in these areas are cotton, sugar beet and wheat. Vegetables, fruit trees and forage crops for cattle, are planted in areas near the cities.

2. The study area:

Study area is located to the west of the longitude 37˚ E, where the Eu-Mediterranean vegetation dominates at an altitude range from 200-1000m.

Abdalsalam (1990) divided Syria into many regions as their geographical, ecological and economical characteristics (fig 5); five major regions of them were covered by the study area.

1- Aleppo hills region in the north of Syria.
2- Asi (Orontes) valley region along with its following areas:
   a- Al-Akrad Mountain.
   b- Zawiah Mountain.
   c- Barisha, Al-A'ala and Wastani mountains, all of them were referred to in this study by Wastani Mountain.
   d- Ghab Plain.
3- Coastal region with its following constituents:
   a- Coastal plains covering the seashore upto 300m height.
   b- The Coastal Mountains.
   c- Baer and Bassit Mountains.
4- High Mountain region and Anti-Lebanon Mountains consisting of:
   a- Al Qalamoun Mountain.
   b- Zabadani.
   c- Jabal Al-Sheikh.

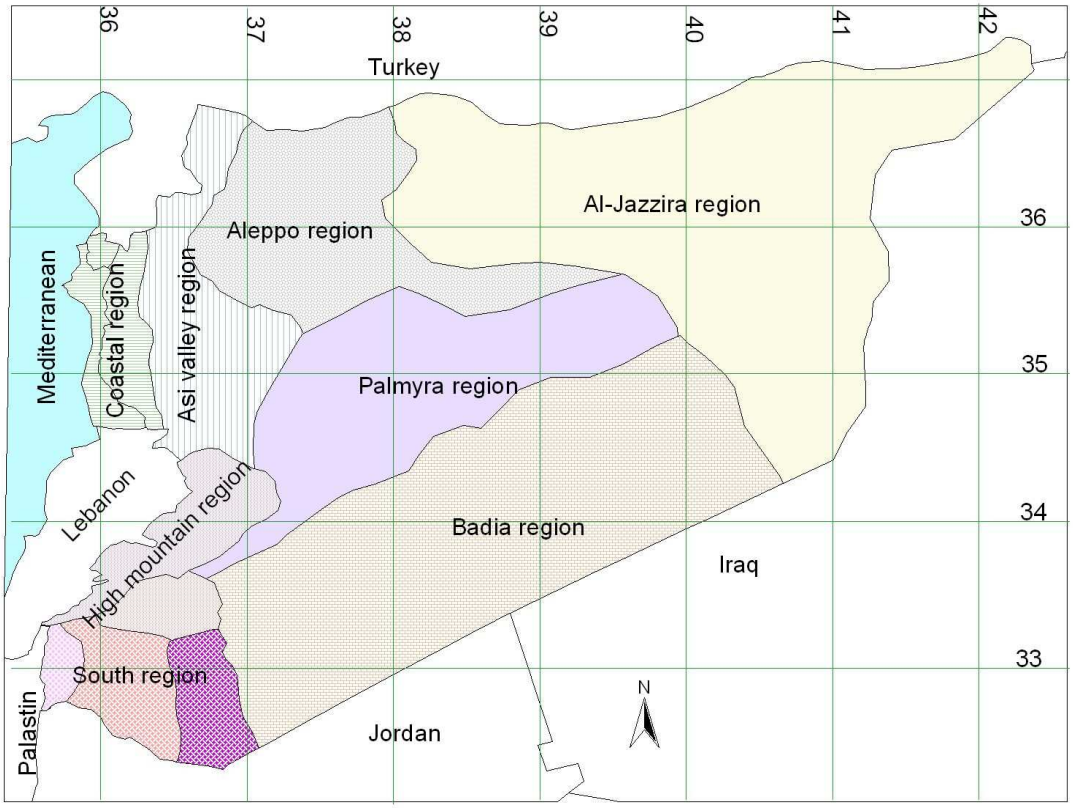


Fig 5: Major regions and sub-regions of Syria (after Abdalsalam 1990).

5- The Southern region consisting of two sub-regions:
   a- Jabal Arab
   b- Horan plain.

2.1. Geology:

The geological features of the study area have been described previously with the geological map of Syria (Section 1.3), and seven major formations were observed in the study area.

2.2. Climate:

The Mediterranean climate dominates over the whole of the study area. Fifty-six climate stations have been studied (table 3). The data shows more than 40 years record of the climate.
All the climate stations data have been analyzed and computed.

Table 3: The climate data of all stations in the study area.
Table 3 legend: Lat: latitude, Log: Longitude, Alt: Altitude, W: winter, SP: spring, SU: summer. A: Autumn, P: Precipitation, M: maximum temperature, m: minimum temperature, Q_2: Emberger's pluviometric quotient, period of data collection.

Station		N.	E.	Alt.	Season Rainfall				P	M	m	Q2	Period
		Lat.	Long	(m)	W.	SP.	SU.	A.	Mm	℃	℃		
1	Tel Abiad	36 42	38 57	355	162	92	2	43.2	299.2	39.3	1.3	26.8	55-69
2	Jarablous	36 49	38 00	350	144.3	77.5	18	73.8	313.6	38.9	1.8	28.8	86-96
3	Ain Arab North				183	92	1	41	317	38.7	0.7	28.5	55-69
4	Aleppo	36 11	37 13	392	200.3	80	3.6	79.6	363.5	36.1	1.5	36.0	46-88
5	Meselmiah	36 20	37 13	425	203	100	4	39	346	36	1.2	34.1	55-69
6	Izaz	36 35	37 03	355	256.1	139.8	4.3	128.5	528.7	34.9	1.5	54.3	57-84
7	Jandeeres	36 21	36 41	231	246.4	129.5	3.9	77.2	457	33.6	2.7	50.8	60-84
8	Idleb	35 36	36 39	446	286.5	124.7	4.3	74.2	489.5	33.6	2.7	54.4	57-83
9	Rouge Bala	35 55	36 26	220	321.2	151.4	6.3	100.7	579.6	34.2	3.3	64.2	57-84
10	Rouge Research	35 52	36 31	240	304	152.3	5.9	100.8	563	35.3	2	57.9	62-84
11	Mina Al Beida	35 33	35 45	8	400.2	170.8	12.1	188.2	771.3	31	7.9	114.1	55-90
12	Al Sen	35 15	35 58	40	505	186	7	166	864	30.8	9.3	137.0	55-69
13	Tartus	34 35	35 53	15	515	176	2	169	862	30.2	9.1	139.5	55-69
14	Kassab	35 56	36 59	730	771.3	182.2	36.3	500.2	1113	26.8	3.4	165.0	55-90
15	Kastal Maif	35 49	35 57	657	568.7	301.7	26.7	229.8	1127	29.1	5.5	164.4	55-90
16	Qadmous	35 06	36 09	750	719	419	15	234	1387	26	3.4	213.2	55-69
17	Sheikh Bader	34 59	36 05	200	722.3	315.7	12.3	157.1	1215	29.4	5.3	173.6	65-91
18	Safita	34 49	36 08	350	605.2	288.5	8	231.8	1134	29.8	6.6	167.7	59-84
19	Al Arida	34 40	36 19	240	486.9	208.7	4.5	168.6	868.7	31.5	5.1	112.9	59-83
20	Mashtalholw	34 53	36 16	500	657.8	362.2	15.4	224.3	1260	28.7	2.9	168.9	59-84
21	Banias	35 13	35 57	5	384.1	191	3.2	183	761.3	29.9	9.1	125.0	74-84
22	Jableh	35 22	35 57	45	467.6	215.1	13.5	209.6	905.8	30.7	6.1	126.3	76-84
23	Jisrr el-shoghour	35 49	36 19	200	399.3	179.6	8.4	118.1	705.4	34	3.8	80.0	57-88
24	Kalat Al Madiq	35 25	36 23	250	312.2	154.6	5.7	94	566.5	33.8	3.7	64.5	61-84
25	Al Karim	35 26	36 20	180	406	172	6	114	698	35.1	4.3	77.4	55-79
26	Howran Amourin	35 19	36 22	175	306.8	125.2	1.6	63.5	497.1	35.4	3.4	53.1	58-84
27	Messiaf	35 04	36 20	530	748.4	309	6	147.7	1245	30.8	3.9	159.3	59-75
28	Marrat El Nouman	35 39	36 40	496	229	103	6	54	392	35.6	1.4	39.3	55-69
29	Hama	35 08	36 45	316	192	80	2	51	325	37.1	3.5	33.0	55-69
30	Salamiyeh	35 00	32 02	480	173	86	2	53	314	36	2	31.6	55-69
31	Al Jaid	35 33	36.2	165	407.3	202.1	15.8	144.5	769.7	34.8	2.8	82.4	66-84
32	Mouhardeh	35 15	36 35	270	225.5	93.7	0.9	62.2	382.3	35.7	2.2	39.1	60-84
33	Moms	34 45	36 43	457	274	111	2	63	450	33.2	2.9	51.0	55-69
34	Kusseir	34 31	36 35	525	127	43	0	38	208	31.1	2.7	25.2	55-69
35	Qaryatain	34 14	37 14	750	49	36	0	34	119	33.1	1.2	12.8	55-69
36	Hassia	34 15	36 46	1120	85.3	52.8	0.5	31.6	170.2	30.4	1.5	20.4	57-84
37	Nabek	34 02	36 43	1325	58.8	45.4	0.6	25.1	129.9	29.8	-1.3	14.5	46-84
38	Maloula	33 51	36 33	1500	134	45	0	46	225	32.1	0.2	24.4	55-69

	Station	N.	E.	Alt.	Season Rainfall				P	M	m	Q2	Period
		Lat.	Long	(m)	W.	SP.	SU.	A.	Mm	℃	℃		
39	Dana	36 12	36 46	750	232	111	2	64	409				55-78
40	Rankos	33 45	36 23	1400	152	51	0	53	256	28.9	0	30.8	55-69
41	Zabadani	33 43	36 07	1200	328.6	140.5	0.6	90.9	560.6	32	0.1	60.8	46-88
42	Madaya	33 41	36 06	1100	287.5	119.4	0.5	75	482.4	31.2	-1	52.0	59-84
43	Maysalon	33 36	36 03	1160	220.6	86.7	1.2	72.2	380.7	31.2	-0.3	41.9	59-92
44	Katana	33 26	36 40	875	173.5	57.5	0.2	45.1	276.3	34.7	1.9	28.9	46-84
45	Damascus	33 29	36 14	729	131	45	0	37	213			21.7	55-69
46	Kharabo	33 30	36 28	620	96	33	0	28	157	36.7	1.3	15.2	55-69
47	Sanameen	33 04	36 12	750	164	54	0	31	249	34.6	2.5	26.6	55-69
48	Konaiterra	33 07	35 49	941	512	174	1	107	794	29.1	2.7	104.0	55-69
49	Sweida	32 42	36 35	1010	203.3	75.4	0.5	44.4	323.6	31.8	3.5	39.3	55-96
50	Izra	32 15	36 15	575	177	59	0	38	274	34.3	3.2	30.2	55-69
51	Salkhad	32 29	36 42	1447	192	87	0	42	321	29.9	1.5	39.1	55-69
52	Ain Arab South	32 43	36 38	1510	293	112	1	75	481	27.6	0.7	62.2	55-69
53	Tal-Shahab	32 42	35 59	399	188	76	0	42	306	33.8	3.3	34.4	55-69
54	Hasakeh	36 30	40 45	300	145	101	1	32	279	40.4	1.5	24.4	55-69
55	Al Hall	36 23	41 09	450	109	88	0	26	223	39.1	2.6	20.8	55-69
56	Qamishli	37 03	41 13	467	223.8	169.6	2.2	54.3	449.9	40	2.4	40.6	52-84
57	Palmyra	34 33	38 18	404	59	47	1	21	128	41.9	2.3	10.9	55-78

2.2.1. Baunous-Gussan diagrams:

The Baunuos-Gussan diagrams have been assessed for all stations (fig 6) to get information of the dry periods. The annual dry period for the climate stations ranges from less than four months in the coastal region to eight months in the inland area as in Damascus.

It is five months and 15 days in Wastani Mountain (Idleb and Ruoge stations), while it lasts for 6 months and 10 days in Al-Akrad Mountain (Izaz and Jendires stations) and Zawiah Mountain (Ma'aret Al-Noaman station). In the high mountain region, it is between 5-7 months and 15 days (Hasia and Zabadani station).

The shortest periods are in the coastal region especially in Qadmous station for three months and 20 days, Baer-Bassit three months and 27 days (Qastal Maaf), and around 5 months and 15 days in the coastal stations.

The dry period starts in April or May in most stations in the study area, but it can also be observed during March or February in high mountains and within the south regions. Similarly, it is also in June in Kasab, Qastal Maaf and Qadmous in the Coastal region.

2.2.2. Emberger's pluviometric quotient Q_2:

Q_2 was calculated for all stations within the study area (Fig 7).The highest value of Q_2 was more than 150 in Qadmous, Sheikh Bader, Safita, Mashta Al-Holw, Kassab, Qastal Maaf and Messiaf. All of them were in the humid stage.

In general, all stations in the coastal region were in humid and sub humid stages with fresh, temperature and warm variants.

Two stations were similar to Saharian zone, Kharabo and Qaryatain with the fresh variant.

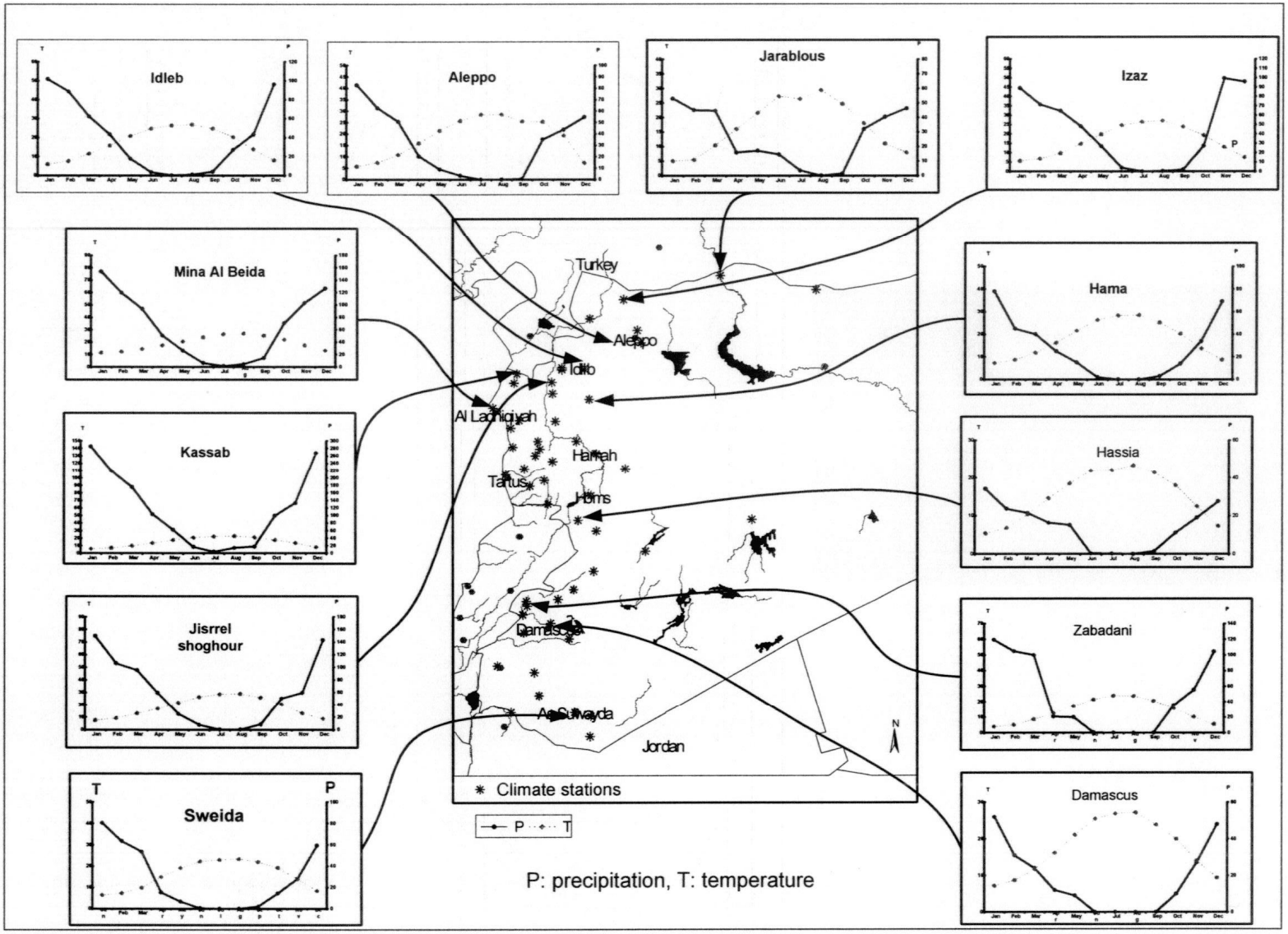


Fig 6: Baunous-Gussan diagrams for some climate stations in the study area.

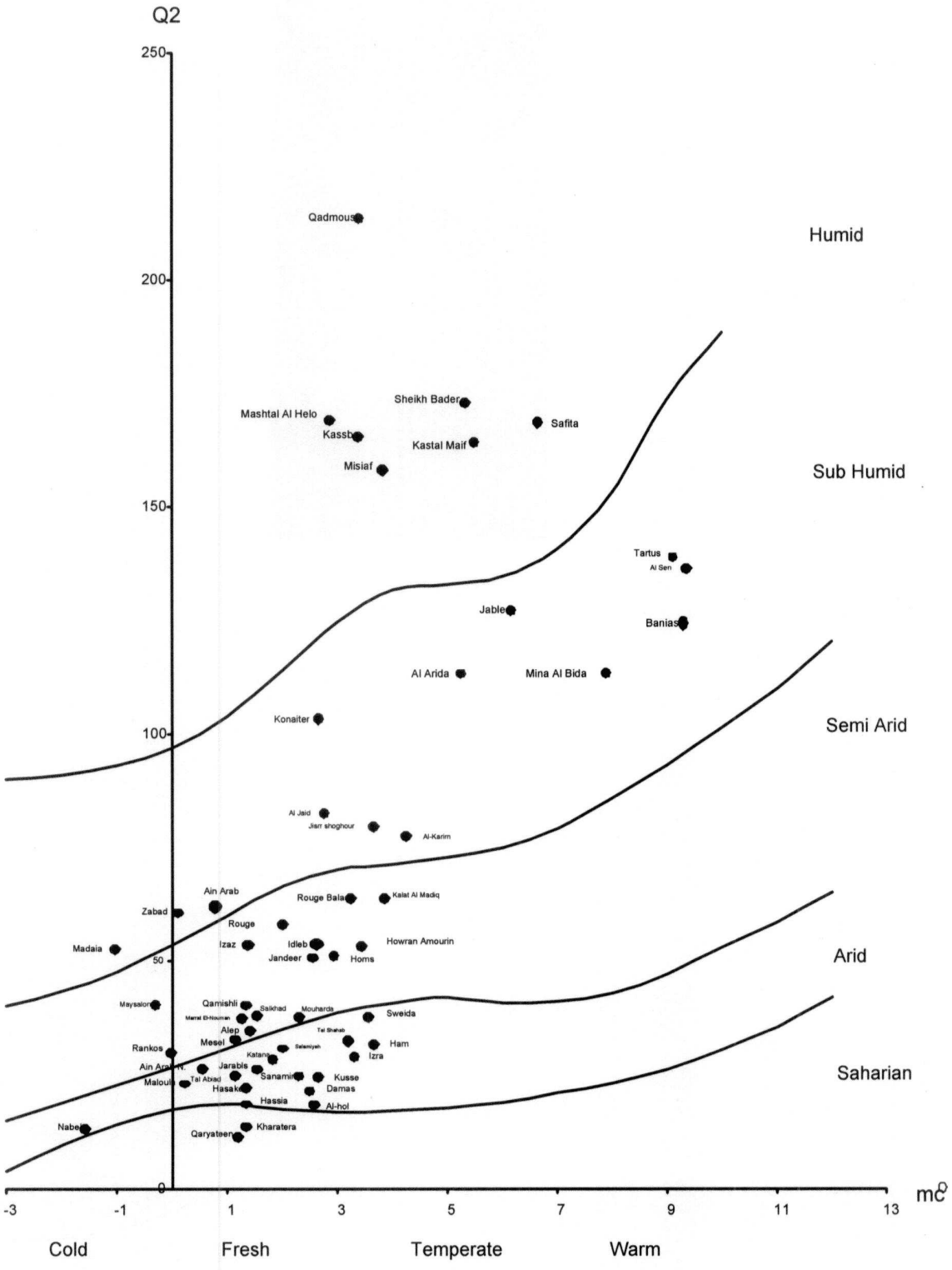


Fig 7: The pluviometric quotient of the Emberger Q_2 .

The other regional stations were falling in the semi arid or arid stages with fresh and temperate variants. The stations of high mountain regions were in the arid, semi arid and sometimes sub humid stages with the cold variant.

2.3. Soil:

The pedological investigation in Syria, including the study area, has been carried out by Ilawi (1981).

More works that are detailed have been done in the study areas by Nahal (1982), Ghazal (1994), Karzon (1996), Ghazal Asswad (1998), Martini (1999), Chikhali (2000). Furthermore, many soil samples were tested and analyzed for several places in the study area (Table 4).

The structure of soil samples in north of Jiser Shoghour were between sandy-clay-loam to sandy-loam. Moreover, in Al-Akrad Mountain the soil structure was clay loam, loam and clay with a high percentage of $CaCO_3$ that was clearly observed in Al-Akrad Mountain's soil samples (45%) and in those from north of Jiser Al-Shoghour (22.5-32.5%).

The organic matter in all samples collected from the top profile (0-25cm) was more than 5% and less than 2% in the deep section of the soil samples (25-40cm). However, the content of organic matter in Arafit samples was less than 3% in the top soil.

The pH was neutral in all samples between 6.69 to 7.51, and the electrical conductivity EC was less than 2.25 mS cm^{-1}.

Two different types of soil were classified by Nahal (1962) in the Coastal Mountains, which are belonging to Leptosols in FAO system (Steeg and Pauw 2002):

1- The brown Mediterranean soil (Typic Xerochrepts in FAO system (Steeg and Pauw 2002)) which was distributed from 200m to 800m in the sub-humid bioclimate zone, this type of soil has A1, A2, C, and D horizons. It is found with the climax vegetation. The destruction of that vegetation leads to the disappearance of A1 horizon.

2- The Rendzina red soil that has high quantity of organic matter, which decreases towards the deeper horizons, the C/N is 10-15%, the iron oxide is plenty and the free iron is about 2.8%.

Table 4: The data of soil samples analysis in many sites in the study area.

Table 4 legend: Relevés code will be described in relevés tables for phytosociologic analysis.

Relevés code	depth	Parent rocks	exerted		1g/100g soil			ppm		Texture
	cm		EC	pH	Ca CO3	Active Ca	Organic matter	K	P	
H02	0-30	Cal	1.9	7.46	7.5	3.72	6.5	315	5.08	sandy clay loam
H02	30-60	Cal	1.2	7.44	10	1.86	5.41	157	1.97	sandy clay loam
H21	0-25	Marl	1.55	7.42	25	2.79	6.05		1.9	sandy clay loam
H21	25-40	Marl	1.1	7.34	35	1.86	4.12	186	2.05	sandy clay loam
J22	0-20	Cal	2.05	7.11	7.6	1.86	6.05	665	100.27	clay loam
J20	0-20	Cal	1.55	7.24	47.5	21.3	6.31	267	9.81	clay loam
J19	0-20	Cal	1.4	7.19	17.5	16.7	6.31	612	67.61	clay loam
J24	0-20	cal	2.25	6.95	7.5	1.86	6.05	392	25.91	clay loam
J25	0-20	Cal	1.15	6.69	7.5	4.65	6.31	207	101.13	clay loam
C14	0-20	Cal	1.5	7.24	30	2.79	6	720	10.13	clay loam -clay
H07	0-20	Marl	1.15	7.25	22.5	12.9	2.84	76	2.71	sandy clay loam

Relevés code	depth cm	Parent rocks	exerted EC	exerted pH	1g/100g soil Ca CO3	1g/100g soil Active Ca	1g/100g soil Organic matter	ppm K	ppm P	Texture
H09	0-20	Marl	1.1	7.51	32.5	13.95	2.84	267	2.12	sandy clay loam
H03	0-20	Marl	1.2	7.3	32.5	11.16	1.55	130	1.99	sandy loam
B10	0-20	Cal	2	7.11	6.25	1.86	6.3	700	102.21	sandy clay loam
A08	0-20	Marl	1.39	7.11	47.5	39.06	4.12	62	5.77	clay loam
A09	0-20	Marl	1.09	7.03	42.5	20.46	6.05	580	4.07	sandy clay loam
A17	0-20	Marl	1.3	7.43	47.5	23.25	5.41	142	1.95	sandy clay loam
A23	0-20	Marl	1.25	7.42	47.5	33.48	3.48	72	2.98	clay loam--clay
A17	0-20	Marl	1.35	7.46	47.5	33.48	4.12	115	2.32	clay loam
A18	0-20	Marl	1.35	7.35	47.5	22.11	6.05	240	1.97	loam
A16	0-20	Marl	1.25	7.45	47.5	40.9	4.77	90	5.15	clay

In Nahal's description, many soil samples were analyzed from western slopes of Coastal Mountains. Martini (1999) found that the soil is brown in different sites in the Mediterranean region, and the Calcium rate was high and the pH was alkaline, the organic matter is also high about 9% and C/N is 7-15. Furthermore, Ghazal (1994) studied many soil samples in *Quercus aegilops* regions and found that the soil was (Sol Brun Fersiallitique Lessive & Sol Rouge Fersiallitique brunifie´) in Al-Akrad Mountain, Wastani Mountain, the south parts of the Coastal Mountains with calcareous base rocks. In addition, it was (Sol Brun Eutrophe vertique) in the southern parts of the Coastal Mountains and in Jabal Arab mountain with basaltic base rocks. Both types of soil belong to Leptosols from Typic Xerochrepts according to FAO system (Steeg and Pauw 2002).

The texture in south of the Coastal Mountains was sandy clay-loam. The clay was noted in the Ghab Plain border. Martini (1999) recorded that the texture has changed in Al-Akrad Mountain from sandy clay-loam to clay, and in Wastani Mountain from clay to silt-clay.

The organic matter was high in the top soil of many places especially under forest and it decreased with depth.

In Baer and Bassit Mountain, Ghazal Asswad (1998) classified some profiles on serpentine, gabbros and peridodite base rocks as (Bruni sols saturés) (Typic Xerochrepts according to FAO system (Steeg and Pauw 2002)). The texture was clay, clay loam and it has changed also with the depth. The pH was between 6.56 and 7.76 and the organic matter has decreased with the depth.

3. Previous Studies:

3.1. The Flora:

The early explorers and botanists paid special attention to investigate the flora of Syria as part of the Middle East; Zohary (1973) did a compiled review for the history of botanical investigations in the Middle East and Syria (Geobotanical foundations of the Middle East 1973). Here is a summary of important publications of many botanists who traveled and explored Syria and wrote about flora and vegetation like Tournefort (1702), J.J.H. de Labillardiere (1791-1812), A. Russell and P. Russell, G. A. Olivier and J. G. Bruguiere (1796-1797), U. J. Seetzen (1810), J. L. Burckhardt (1810-1812), P.M.R. Aucher-Eloy (1830), T. Kotschy (1835-1860), H. K. Haussknecht (1864-1866), A. Aronsohn (1905-1915), Meinertzhagen (1906-1913), Gombault (1930-1935), G. Samuelsson (1949-1959).

Some other botanist gave more attentions to the Syrian flora, which was intensively investigated during the end of the nineteenth through the beginning of the twentieth centuries, and their publications are very important until now. They are:

P. E. Boissier in (1846) made his great journey in the Near East, through the Nile Valley to Assouan, then to Mt. Sinai and through Arabia Petraea to Gaza, Jerusalem and the Dead Sea. He also went to Damascus, Lebanon, Anti-Lebanon, Antiochia, and Aleppo and back to southern Lebanon. The results of these journeys were published in his monumental work (Flora Orientalis) in five volumes accompanied with a supplementary volume (1867-1888). This great flora has remained for a long time as a principal source of knowledge on the Middle-Eastern floras.

Post (1838-1909) carried out extensive investigations in the area and set up a large herbarium partly conserved in the American College of Beirut. Post visited most of the Middle East countries. On his way to Syria, he passed through Mt. Haramoun, Anti-Lebanon, Palmyra and Hauran. The accounts of his travels were published in (Flora of Syria, Palestine and Sinai 1883-1896). It is considered to be the first standard Flora for the region since Flora Orientalis of Boissier.

J.F.N. Bornmueller is one of the eminent explorers of the oriental flora. In 1892 he traveled almost across the whole of the Near East up to Turkistan. His contributions to the field of the Middle-Eastern flora were obvious. One of his important works was the publication of the collections of H.K. Haussknecht and T. Strauss.

J.E. Dinsmore of the American Colony in Jerusalem was active in Palestine and Syria in the first half of the 20th century. He has revised the edition of Post's Flora (1932-1933) and further included relevant data published since 1896.

An important contribution to the research on the Syro-Lebanese flora was published in 1930, which is the publication of the (Flore du Liban et de la

Syrie) by Père L. Bouloumony, the second volume of which contains photographs of herbarium specimens of most of the plants of these countries.
Père P. Mouterde, one of the leading botanists of Syria and Lebanon, has intensively herbarised all parts of these two countries and has made numerous contributions to their flora. Besides "La Flore du Djebel Druz" in 1953, the three volumes of his "Nouvelle Flore du Liban et de la Syrie" have already appeared in 1966 and 1970 while the third one appeared later in 1983 after the war in Lebanon.
In the last three decades of the 20th century, Syrian botanists have carried out numerous studies.
Y. Barkoudeh, a famous taxonomist in the Middle East, who has worked for ACSAD (Arab Centre for Studies in the Arid areas and Dry lands) for about 15 years, herbarised in the Arab Central Herbarium of ACSAD and published, along with Audat M., a book on the vegetation of Syria (Barkoudeh & Audat, 1983).
Chalabi (1980) classified the genus *Quercus* in Syria and recognized several subspecies. Saddat H. (1983) studied the leguminous in the semiarid region of Syria, while Ghazal A. (1994) worked on the taxonomic of the *Quercus aegilops* in Syria and defined many subspecies.
Chikhali, M. (1994) also studied the ecology and distribution of the *Tulipa* species in Syria. Hoalni A. (2000) studied the *Iris* species in Syria, as well as many other researches that have studied the flora of Syria.
In addition to such individual works, there are three main international centres, in Syria. They are the Arab Centre for the Studies of Arid Zones and Dry Lands (ACSAD), the International Centre for the Agricultural Research in Dry Areas (ICARDA), and the regional office of the International Plant Genetic Resources Institute (IPGRI).

3.2. The vegetation studies:

Furthermore, one of the famous Syrian botanists, Nahal, I., has performed several studies on the vegetation and plant ecology in Syria. He focused on the Eu-Mediterranean vegetation of the Coastal Mountains, e.g. *Pinus brutia*, *Quercus pseudocerris* (Nahal 1962).
Chalabi's contribution in the studies of the Syrian flora and vegetation was initiated in 1980. He concentrated on the forest formations in Syria (Chalabi, 1980, 1982, 1986, 1993, 1991).
In addition, there were some further studies and researches concerning the vegetation of Syria. They have been done in Syrian Universities in 1990s. Ghazal A. (1993, 1994) studied the geobotanical, ecological, taxonomical, and phytosociological features of *Quercus aegilops* L. Karzon S. (1996) studied the ecological and geographical distribution of *Castanea sativa* Mill. in Syria. Ghazal Asswad N. (1998) studied the vascular flora in the Al-Forouluk humid

forest, North of Lattakia. Chikhali M. (2000) studied the vegetation of Jabal Arab. Martini (1989, 1999) studied the eastern slopes of the Coastal Mountains.

3.3. Ordination of the phytosociological data by (factor analysis of correspondences) FAC analysis:

Ordination has been defined by Goodall (1954) as (an arrangement of entities (generally sample, or species) in a uni-or multidimensional order (Mueller-Dombois & Ellenberg 1974). Ordination can be applied to phytocoena (or syntaxa), with each phytocoenon treated as a composite sample with its species composition summarized as presence percents or mean important values. The detection of ecological groups has been particularly developed by phytosociologists using factor analysis and principal component analysis (Whittaker 1973).

Factor analysis used for establishing sociological groups and the use of joint species and environmental factor for establishing ecological groups. However, factor analysis of correspondences FAC used in which combinations of floristic and environmental variables were analyzed in order to achieve ecological-sociological groups through applying FAC to relevés assigned to various sub-alpine associations and sub-associations (Whittaker 1973).

The FAC method, which was established by Cordier during the 1960's and it was developed by Benzécri and his team in 1973 (Chalabi 1980).

Correspondence analysis (CA) is an extension of the method of weighted averaging used in direct gradient analysis of Whittaker (1973). Moreover, the FAC is a statistical descriptive method that depends on a large amount of homogenous mathematical data represented by graphic. These data consist of a number of measurements distributed on two groups: The first group is represented by rows while the second in columns (e.g, the existence of a group of plant species in different locations). The expression "congruous" is used to show the level of congruity (or to show the mutual characteristics) between the two groups (Jongman et al. 2001).

3.4. The classifications of landscape ecosystems in the study area:

Many authors organized ecosystems classification and mapping. Zohary (1973) summarised this work in his book (Geobotanical foundations of the Middle East) by the outline map of the vegetation of the Middle East.

Quezel & Barbero (1985) concluded all previous studies of their teamwork for the East Mediterranean including Syria and produced a vegetation map for the area (Carte de la végétation potentielle de la région Méditerranéenne-Méditerranéenne orientale, 1985). They described the most important phytosociological units and their relationships in the area with a summary of the recent researchers' works. They recognized all phytosociological units that had been recognized until that time and described many ecosystems in Syria.

Another important work was carried out by Sankary (1982), who produced a complete vegetation map for plant communities in semi-arid and arid land in Syria. He applied the potential vegetation or climax plant associations to complete his map depending on his long time works and some references. He gave a short explanation for all ecosystems in the east of Syria.

4. The Method applied in the present study:

The Eu-Mediterranean vegetation has been investigated through field excursions covering all regions of the study area.

4.1. The vegetation analysis:

A wide study has been carried out on all forest sites in all regions and sub regions with recording the ecological features and human interference of the vegetation types.

4.1.1. The vegetation layers:

In the description of vegetation, three layers were distinguished:
The trees' layer of more than 3m high, which consists of the species dominating clearly over the bushes' layer (fig 8).
The second layer is the shrubs' layer (50-300cm high) which contains chamaephytes, nanophanerophytes and macro-phanerophytes that were cut down and were growing on several stems.
The third layer is the herbaceous layer and ground cover (less than 50 cm high) which is dominated by therophytes and hemicryptophytes. It is also characterized by the dwarf shrubs and ecotonic complexes of Cisto-Micromerietea associations of the phrygana, consisting largely of chamaephytes (Oberdorfer 1954, Kehl 1998).

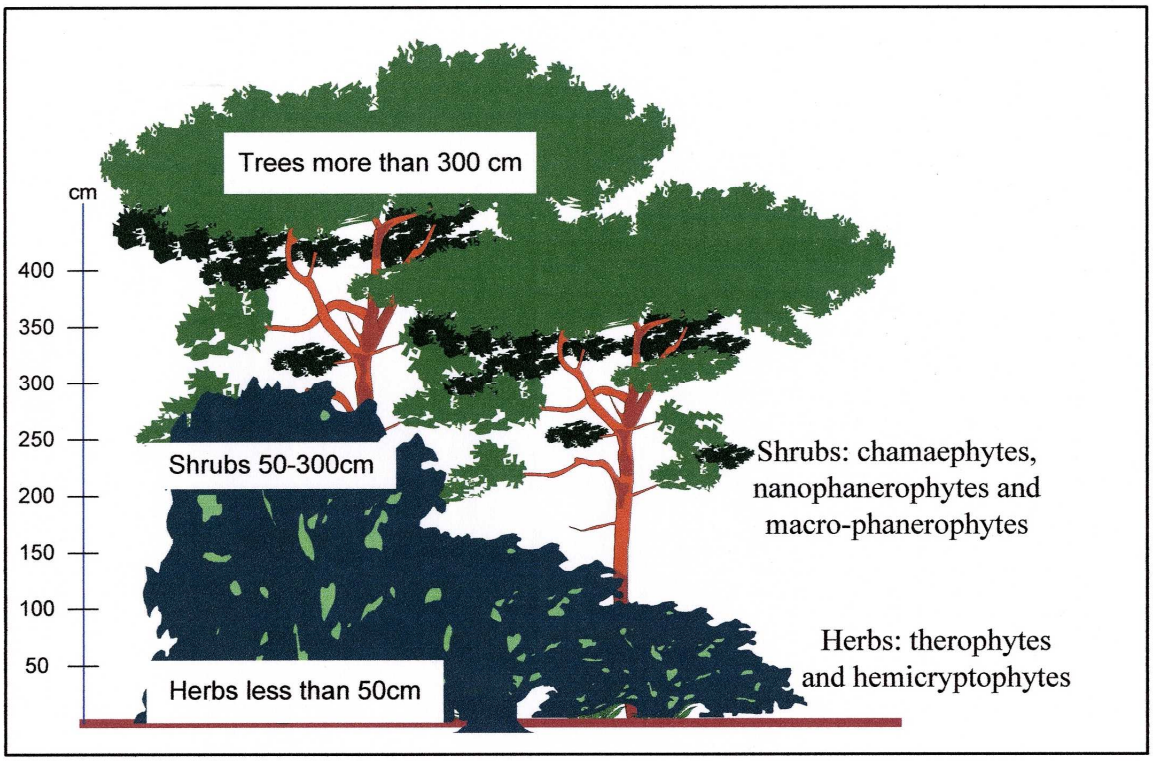


Fig 8: The vegetation layers form used in the study.

The overlapping of the three layers indicates that the total coverage is more than 100%, which indicates a high density of vegetation.

4. 2. The relevés method:

The vegetation of the study area has been classified according to Braun-Blanquet (1928, 1964) which was developed by S.I.G.M.A. (Station Internationale De Géobotanique Méditerranéenne et Alpine, Montpellier) (Whittaker 1973; Mueller-Dombois & Ellenberg 1974; Chalabi 1980; Nader 1985). 163 relevés were carried out in the study area covering all vegetation types. These relevés were performed during different seasons.

The area size of the relevé in the study area was defined according to the homogeneity of the studied location to be 100m^2 to 400m^2; with respect to the characterized ecology and vegetation of the locations. Therefore, the following points regarding the surrounding ecological conditions were defined (Chalabi, 1980):

- The geographical coordinates according to the world system (longitude and latitude, with a date WGS84).
- The altitude above sea level (in meters).
- The slope (%).
- The exposure.
- The parent rock and soil parameters.
- The date of the relevé.

The character of forest type was estimated by defining the total coverage and the percentage of each of the three afore mentioned layers (trees, shrubs and herbs). The average height and diameter of trees were also recorded (Carles, 1973).

To evaluate the dominance and abundance of each species in the site a numerical scale was used. This scale is based on numbers within the range of 1 to 5 where each number specifies a level that is defined as follows (Braun-Blanquet 1964; in Mueller-Dombois & Ellenberg 1974):

5 = the species covers more than 3/4 of the relevé area (more than 75%).
4 = covers from 1/2 to 3/4 the relevé area.
3 = covers from 1/4 to 1/2 the relevé area.
2 = covers 1/20 to 1/4 the relevé area.
1 = numerous individuals, but less than 1/20 of the relevé area, or scattered individuals with a cover of up to 1/20 of the relevé area.
+= [Pronounced plus] few individuals <1%

In addition, the sociability tendency factor was based on another numerical scale consisting of five levels as follows: (Mueller-Dombois & Ellenberg 1974; Chalabi, 1980) .

5 = species is growing in large, almost pure population stands.
4 = species is growing in small colonies or forming larger carpets.

3 = species is forming small patches or cushions.
2 = species is forming clumps or dense groups.
1 = species is growing solitarily.
A synthesis table was prepared for all relevés to be studied and resolved by adding all the floristic information. The constancy was calculated for all species and these were listed from high to low constancy.

4. 3. Analysis of vegetation according to the FAC method:

The importance of this method is that it reveals how individuals within the study area are organized as opposed to emphasizing the individual characteristics. Therefore, this method aims to present all elements included in the data list in one or more chart. In order to fulfill this aim, two main stages are required:

1- The similarity between the rows and columns is shown by computing the distance that separates different elements.
2- The FAC (Factor Analysis of Correspondence) projection is not drawn starting from the original variables, although this method is used for searching successive new compound relations (Laaidi 1997) for which the maximum separation of the elements is sought, and thus consequently allows these elements to be seen more distinctly.

The chart shows how many of these elements and variables are connected to the new compound factors and demonstrates how the individuals and variables are organized to each other within 2D-space.
The original FAC method depends on two points (Al-Kadi 1993, Jongman et al 2001):

1- Chi^2 was used to calculate the distance between two points instead of biometric distance being used in Principal Component Analysis (PCA). The Chi^2 distance was calculated by moderation for each value by dividing it on the sum of the line and the column as shown in the following equation:

$$d^2(i,i') = \sum_{j=1}^{p} \left(X_{ij} / X - X_{i'j} / X_{i'} \right)^2 / X_j$$

Where : i and i' are two rows and j is column varying from 1 to p.
X_i= sum of the row i in each column.
X_j= sum of the column j in each row.

In this case, the absolute value of the character is not important, but their percentage value is. In other word, the Chi^2 value is reevaluated with the lowest value of row and column.

2- The PCA projects the column or the row and so produces two maps, one for each, but in the FCA both of them are projected simultaneously and on the same map (Jongman et al. 2001). In other word, the row and column play the same role in the FAC analyzed.

In the FAC method any number of variables can be analyzed when a variable is described as multi-dimensional with the analysis of all factors at one time.

This method was used in ecological, taxonomical and genetic research (Benzecri 1973, Chalabi 1980, Bouroche & Saporta 1983, Sliai 1991, Al-Kadi 1993, Ghazal 1994, Karzon 1996, Ghazal Asswad 1998, Chikhali 2000).
Depending on the FAC method and using a computer with a Biomeco software enabled defining species distribution and performing multi-dimensions analyses. The tabulated data were organized in advance so that the relevés were considered as the variables on columns and the plant species were considered as the variables on rows, with values ranging between 1 and 6, depending on the abundance of the species in the relevés.
According to the density of these points in the chart-space, the axis is extrapolated and by organizing these axes in a dual way, factorial charts 1×2, 1×3, 1×4, 2×3, 2×4, 3×4 can be constructed.
The group related to relevés and species is represented on the diagram with large botanical relations. On the other hand, near the relevés points, there are species points that are more representative on such relevés. There are many species which appear as characteristic species, after taking into consideration the sociability units.
Finally, the characterized table is rearranged by listing the characteristic species first followed by the remaining species within the descending phytosociological units according to their fidelity and constancy and the species frequency from high to low.

4.4. Soil sample:
Multiple soil samples have been collected from the relevés sites. The soil analysis was carried out at the laboratories of the Soil and Land Department of the Directorate of Agriculture and Agrarian Reform in Aleppo regarding the following parameters: texture, organic matter, pH, EC, $CaCO_3$, Ca, K and P. The results of this analysis are listed in table (4).

4.5. The flora of the study area:
A floristic list of the species of the study area has been compiled concerned with the geobotanical description of the sites.
The following floras were used in the taxonomic work: Post (1932, 1934), Mouterde (1966, 1970, and 1983), Davis (1965-1985), Zohary and Feinbrun (1966-1985), and Towndsend et al. (1966-1980).

4.5.1. Floristic list:
The following data were recorded in the floristic list:
The scientific names and synonyms have been recorded from the floras and corrected according to the Med-checklist of Greuter et al. (1984-1989).
A code and serial number have been defined for each plant species.
The phytogeographical region (Phytogeo) has been determined for most of the species based on: Post (1932, 1934), Mouterde (1966, 1970, and 1983), Davis

(1965-1985), Zohary and Feinbrun (1966-1985), Ghazal (1994), Ghazal Asswad (1998), Chikhali (1998). A sizable number of the species were defined according to their inherited regional distribution by this study.

The distribution of species in Syria has been also defined through many references: Mouterde (1966, 1970, and 1983), Pabot (1957), Nahal et al. (1989, 1997), Chalabi (1980, 1991), Ghazal (1993, 1994 and 1995), Karzon (1996), Ghazal Asswad (1998), Chikhali (1998), and Holani (2000). Records of new sites were added in this study.

The life form of the species has been described through a standardized terminology and classified according to Raunkiaer (1934). This classification of the categories depends on the position of the growing points of the shoots over the dormant season.

The life form according to Raunkiaer's classical system was supplemented by field observations. The following classes have been separated (Zahran 1989):

- Ph: phanerophyte (woody plant with buds more than 250 mm above the soil surface).
- N: nanophanerophytes (woody plant with buds more than 250 mm above the soil surface, less than 2m height).
- Ch: chamaephyte (herbaceous or woody plant with buds not in contact with soil but less than 250 mm above the soil surface).
- H: hemicryptophyte (herb with buds at soil level).
- G: geophyte (herb with buds below the soil surface).
- Th: therophyte (plant passing the unfavorable season as seeds).
- E: epiphytes (plant that germinate and root on other plants).

Phytosociological and phytogeographical relations were identified for many species according to several references and sometime were suggested depending on relevés tables, which have been used.

The dynamic status (Dyn) has been suggested for all species depending on field observations. The change that was noticed during the study period and before it refers to the human interference and the type of land use (ACSAD & IDRC 1989; Chikhali et al. 1989; Davis et al. 1994; Chalabi & Ghazal 1995). The following categories were adopted:

- Common C: the species often exist in large numbers.
- Stabilized S: when the species are not changing.
- Increased I: the species are getting bigger in amount of their availability.
- Decreased W: the species are getting less during the last ten years, due to the destruction of their habitats.
- Endangered D: the species that will not exist because there are very few alive individuals now and most habitats are destroyed.
- Rare R.: the species are rare and not easy to find in Syria.
- Endemic E.: the species are found just in one geographical area, east Mediterranean endemic species were considered.

4.6. A method for classifying and mapping ecosystems:

Ecosystems are usually recognizable because of their relative homogeneity when compared with their surroundings. This homogeneity is a function of the scale of observation. The key problem in organizing an ecosystem classification is thus to develop the criteria for identifying homogeneity at different spatial scales (Blasi et al. 2000).

Although all ecological components are relevant, their relative importance varies with different scales. As a general guideline, classification characteristics at any spatial scale can be derived from those factors, which become ecologically relevant by causing the observed environmental mosaic or pattern (Klijn & Udo de Haes 1994). However, the factors controlling the pattern might not be the most suitable for mapping process. In practice, in order to produce useful and comprehensive maps, all ecologically relevant factors, which are easily recognized, can be used, whether these factors are causing the spatial pattern of ecosystems or simply reflecting it (Klijn et al. 1995).

Typically, the relevant land attributes for classifying landscapes are climate, lithology, geomorphology, human activities, soil, vegetation and fauna (Forman & Godron 1986). This order of attributes reflects their hierarchy in both time and space, because it moves from relatively stable factors controlling larger ecological scales to more dynamic factors operating at local levels.

Intermediate scale maps for regional orientation. These include maps in the range from 1:100,000 to about 1:1,000,000 (1 cm on the map = 1 to 10 km in the field). However, at this scale range the vegetation units are often generalized to show the vegetation rather than the actually existing vegetation boundaries. The actual vegetation or in other words the currently existing vegetation mosaic of an area can only be represented on maps with large scales, with scales of approximately 1:100,000 and larger (Mueller-Dombois & Ellenberg 1974). These maps may already permit the representation of floristically defined vegetation units such as alliances or dominant communities, or structurally defined communities (Mueller-Dombois & Ellenberg 1974). The alliance is therefore more a qualitative than a quantitative vegetation type concept. Alliance can be identified rather easily by several criteria. Thus, it is more or less a natural unit. However, a hierarchical scheme becomes very desirable where the emphasis lies on developing a vegetation synopsis at a more extensive geographical scale (Mueller-Dombois & Ellenberg 1974). Different individual associations may correspond at these scales to the same general type of forest.

Following these guidelines for ecosystem classification and integrating plant sociology, a hierarchical framework for land classification and mapping, whose nomenclature refers mainly to Blasi et al. (2000) have been designed. From a

higher to a lower level of abstraction, land facets, land units and land elements are identified.
Regions are defined at broad ecological scales (>1:1,000,000). They are determined by macroclimatic features, which are the main factor influencing landform processes as well as vegetation and soil distributions at bigger scales (Naveh 1990). Within each region, land systems are distinguished according to significant lithological and geographical differences.
Land facets are separated at intermediate ecological scales (1:1,000,000-1:250,000). They are delimited according to morphological and bioclimatic types, which include precipitation and temperature regimes as well as other climatic factors (Blasi et al. 2000). Hence, main vegetation series and most widespread land cover types further characterize these mapping units.
Land units on maps are defined at medium to small ecological scales (1:100,000- 1:50,000). They are determined by vegetation series, major groupings of soil and main land cover types. Land cover is defined and mapped in detail. Vegetation series are named after the association which represents the final successional stage (top) in the dynamic sequence. These units are named with reference to indicative phytosociological alliances.
Finally, land elements which are represented at a detailed scale (1:10,000-1:5000), attention focuses on the spatial mapping of individual components of the dynamic pattern of land units. Land elements, which correspond to the individual successional stages of the vegetation series characterizing the higher hierarchical level, can be distinguished. These units are described by indicative units (associations) and further characterized by soil, landform and substrate (Naveh 1990).

Table 5: Map scales used for spatial diagnostic mapping (Blasi et al. 2000).

Scale	Diagnostic land attributes
> 1:1,000,000	describes and maps to the level of regions
1:250,000-1:100,000	describes and maps to the level of land facets
1:50,000-1:10,000	Defines and maps to the level of land units
1:10,000-1:5,000	Defines and maps to land elements.

An intuitive, divisive approach based on generally available data with superimposed maps was mainly used. The divisive approach has been chosen to develop a classification scheme, which limits the requirements for field data collection. Furthermore, both procedures seem to include arbitrary elements, certain subjectivity is retained when choosing the initial variables and various aspects of samples (Bunce et al. 1996).
Land regions and facets have been derived from the combination of a phytoclimatic situation, a land cover distribution, lithomorphological maps and the distribution of geographical regions (table 6).

Table 6: Proposal hierarchy of land classification and references data for the study area.

Units and	**Diagnostic land and attribute**	**scales**	**References (maps)**
Land regions	Bioclimate	1:2,500,000	Quezel 1985
Land systems and Land facets	Geographical features, Main land use, Lithological and Soil	1:1,000,000-1:250,000	Abdulsalam (1990) Technoexport (1986) Ilaiwi (1982) and Steeg and Pauw (2002).
Land units	landscape ecosystems, vegetation, soil, climate and land cover types of the Eu-Mediterranean in the study area: chapter 5	1: 100,000	This study. (Final print out scale of the vegetation map of west Syria (fig. 40)).
Land element	Vegetation components	< 1:10.000	This study by ecological sections

The various physiognomical types were sampled by 163 phytosociological relevés from this study and other authors, and plant communities that were identified in this study and from other earlier researches.
The legend of the vegetation maps and habitats classification refers to the EUCORINE land cover project (2003) which described various habitats in the Mediterranean region focusing on forest habitats of natural woodland vegetation (fig 9).
However, a more detailed level of information has been added for the natural and semi-natural vegetation according to the larger scale considered. Finally, the geomorphologic characteristics of facets and elements have been derived from literature and field observations.
All maps were digitized as vector files, rasterized with a 5-m pixel size and then overlaid using the grid based GIS Ilwis 3.2; the projection of the map is (long/lat) WGS84. A detailed presentation of the results is beyond the scope of this study.
In order to show the legend structure and the environmental variability of case studies, the land facets, land units and land elements of the whole of the study area are briefly described in the map legend. However, heterogeneity of map legends depends also upon environmental variability between case studies. Nevertheless, a preliminary land classification has been presented to show the general validity of the classification system when considering different landscapes.
Finally, the methodology of map overlaying has caused problems, which were solved based on a subjective judgment. For instance, when overlaying different maps at the same scale, patches that are too small to be considered as mapping

units can be generated. This problem was overcome by assigning those patches to the most similar neighboring classes. Furthermore, when maps at different scales are superimposed, boundaries of the same attribute might not coincide on different maps. When this was the case, the map at the scale under investigation has been used to adjust the boundaries of the higher units (at smaller geographical scales) for that attribute.

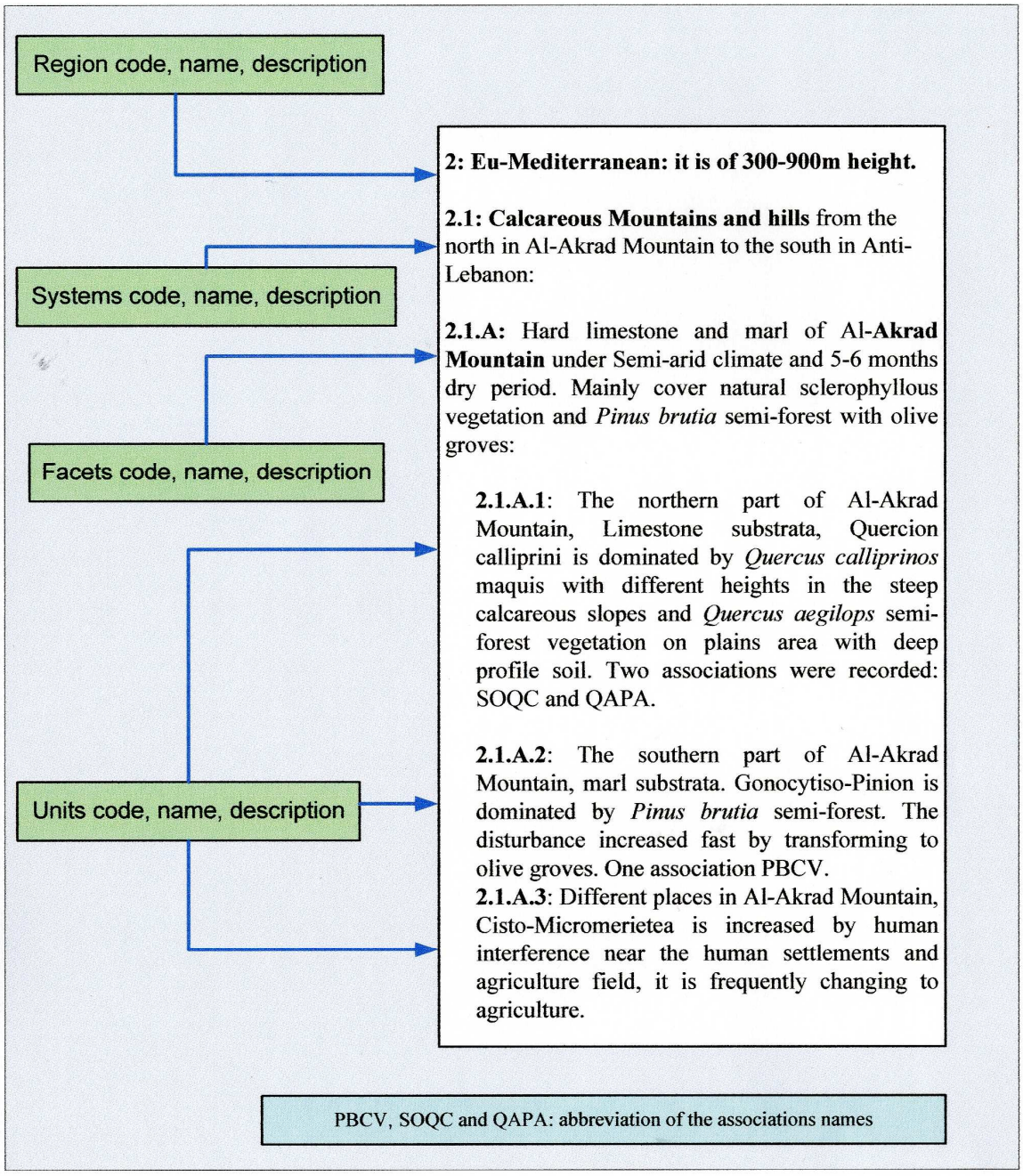


Fig 9: Explanatory notes for the map legend.

5. Geobotanical Description of the Eu-Mediterranean in the study area:

Syria occupies an important area of the east Mediterranean; its vegetation reflects a wide diversity in climate, geology, topography, soil and floristic features. Historical, archeological and botanical sources show that the forest cover in Syria was once much more substantial than its current condition. Various degradation factors have reduced the area of forest to a mere 2.5% of the total land area. The entire area of the Syrian natural forests is estimated to be 232,840 ha (Annual agricultural statically abstract, 2003).

A complete field surveying for the vegetation was carried out for all regions in the study area based on a previous classification (Abdulsalam 1990) (fig5) as following:

5.1. Asi region:

This region is located in the North Western part of Syria, as an elongated strip extending in a north-south direction. The Asi region is in harmony with the Asi river valley. It consists of many other sub-regions, which are as follows:

5.1.1. Al-Akrad Mountain:

Al-Akrad Mountain is located in the north of Syria. It is considered as one of the southern hills of Taurus Mountains. The eastern and western boundaries of this mountain consist of two rivers, Afreen and Asswad. The eastern and southern slopes are moderate, while the western one declines rapidly towards the Asswad River. The medium height is around 800m, and the highest peak has an elevation of 1160 m (fig 10).

Al-Akrad Mountain is about 50km away from the sea, separated by the Amanus mountain chain (1939 m) which appears as a natural barrier (fig 11), which diminishes any direct effect of the sea on the Al-Akrad Mountain. Therefore, the precipitation does not exceed 650 mm/year, where the dry period lasts for five to six months a year (as shown in Azaz and Jendires climate stations in table 3).

On the one hand, most of the parent rocks in the Al-Akrad Mountain are sedimentary such as calcareous, marl, and dolomite from the Jurassic, Cretaceous, Paleogene and Neogene. On the other hand, there are large areas originated from volcanic and metamorphic rocks (basalt, serpentine and amphibolite). The dominating soils in the mountain are Terra-Rossa and Rendzina.

The Eu-Mediterranean vegetation is abundant in most parts of the mountain, but the Supra-Mediterranean vegetation also appears in the northern part of the mountain like Bolbol area. It is extended from 900 m above the sea level up to the mount summit (Chalabi 1980, Chalabi et al. 1993) as both *Quercus infectoria* and *Q. cerris* subsp. *pseudocerris* can be found growing higher than 900 m altitude of the mountain. However, there are no distinct borders between the Supra and the Eu-Mediterranean vegetation.

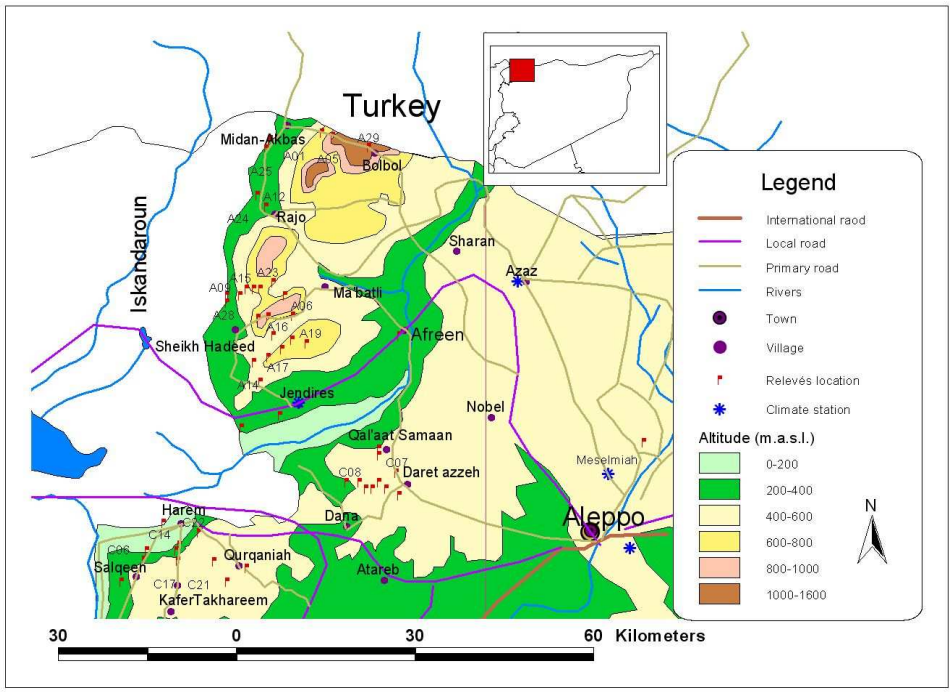


Fig 10: The study sites and relevés' places in Al-Akrad Mountain

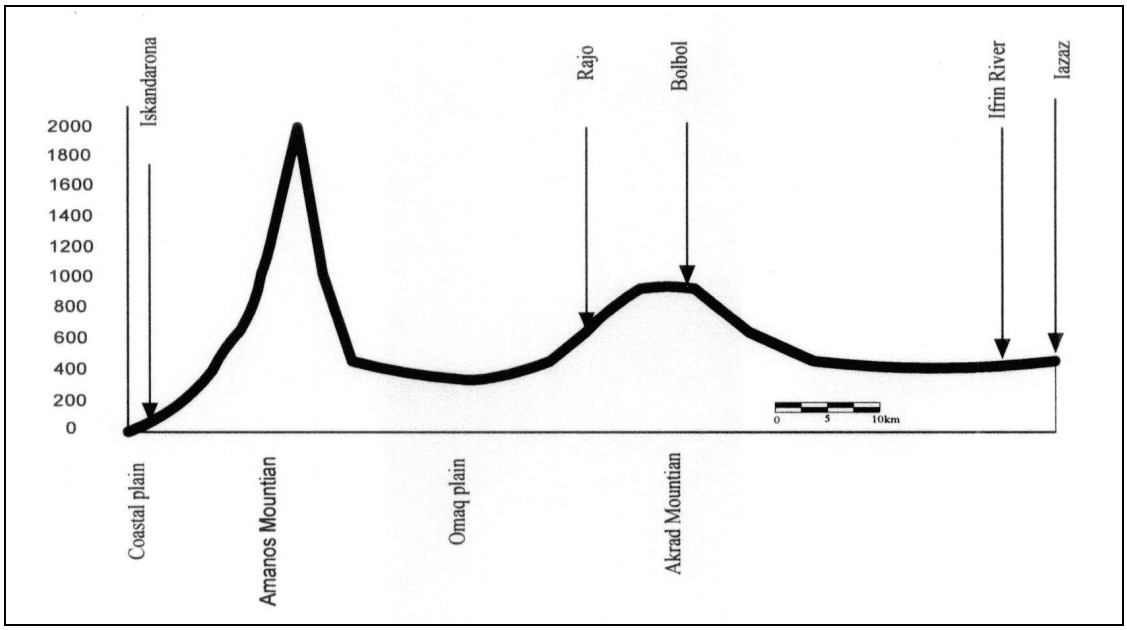


Fig 11: Topography profile cross section of Al-Akrad Mountain of Syria

The Eu-Mediterranean vegetation in Al-Akrad Mountain includes two main patterns of forest depending on soil type. The first one is the coniferous forest that exists on soil originating from marl in the southern part of the mountain at more than 780 m altitude. It is represented by *Pinus brutia* with its traditional vegetation. The tree layer in *Pinus brutia* forest was of 6-12 m height, 25-60 cm in diameter with coverage of 30-65%.

The second pattern is covered by maquis of *Quercus calliprinos* with its vegetation that exists on Terra-Rossa, which originates from the hard limestone

parent rocks especially found in the northern parts of the mountain. However, areas with soil derived from the volcanic and metamorphic rocks (basalt and serpentine) are field of competition between *Quercus calliprinos* and *Pinus brutia* (Chalabi et al. 1993).

In spite of the difference between the two types by their parent rocks and associated vegetation types, *Quercus calliprinos* vegetation can be found occupying sites on soils derived from marl with relatively high ADS as in Hajj Hasanli (relevés A16, A17, A18, A19 and A26), Sa'oul (A09, 620 m) and Ma'saret Jekki (A07, 700 m). Similarly, *Pinus brutia* forest can be seen growing on the Terra-Rossa like in Merkanli (A06, 670 m) (Table 13).

Quercus aegilops is also abundant in Al-Akrad Mountain either in patches or as individuals on various substrata (marl, limestone, basalt). It is mainly found in the plains with deep soil. The landscape of these plains consists of a semi-pure steppe forest. Ghazal (1994) recorded the Querco (aegilops)-Pistacietum atlanticae[3] that belongs to Quercion calliprini. The main records of *Quercus aegilops* vegetation are traceable in the Asswad river valley (A04, 370 m), near Rajo (A24, 520 m), or as number of trees like Satyanli valley (580 m) and Ma'batli plains (480 m) (Ghazal 1994).

Both species, *Quercus aegilops* and *Quercus calliprinos*, occupy separate areas. *Quercus aegilops* is mainly found on plains with deep soil, while *Quercus calliprinos* grows on the slopes and on shallow stony soil (Ghazal 1994). However, *Quercus aegilops* is considered as one of the main species in *Pinus brutia* and *Quercus calliprinos* forests.

From the phytosociological point of view, two classes are recorded in the Eu-Mediterranean vegetation of Al-Akrad Mountain. The first one is Quercetea ilicis with two main alliances Gonocytiso-Pinion and Quercion calliprini. The first alliance, Gonocytiso-Pinion, includes all the forests on the southern slopes, while Quercion calliprini contains the maquis of *Quercus calliprinos* and the patchy forests of *Quercus aegilops* (fig 12).

The second class is Cisto-Micromerietea, which is widely distributed in the area particularly in suburban areas near the public settlements and agriculture fields. The height does not exceed more than 1m.

The hygrophilous vegetation exists in Al-Akrad Mountain adjacent to water sources as the case in Afreen and Asswad rivers. The vegetation is dominated by various tree species such as *Plantanus orientalis* (Qara Jan and Ain Al-Atrash), *Fraxinus syriaca* (Asswad river), *Salix alba* (Afreen and Asswad rivers) as well as *Ulmus campestris* which was recorded in Qara-Jan and Aswad river. However, among other species also recorded near water streams are *Nerium oleander*, *Vitex agnus-castus* and *Tamarix* spec.

[3] The author used Querco (aegilopsei)-Pistacietum atlanticae

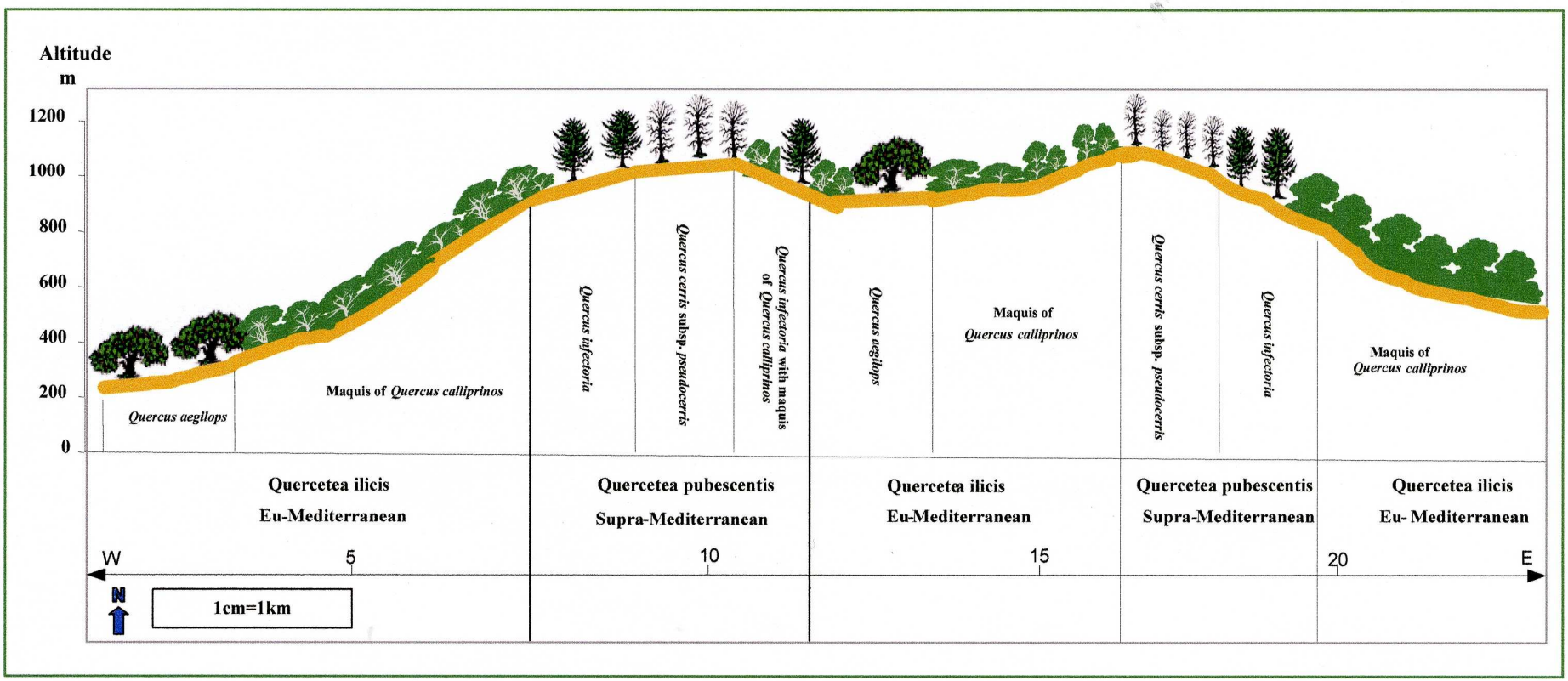


Fig 12: Cross section of the northern slopes of Al-Akrad Mountain from Asswad River in the west to Afreen River in the east

The vegetation of Al-Akrad Mountain suffered from a severe degradation in the past. Vast areas of the forests has been deteriorated or been transformed into a farmland near the settlements and fertile plains. Sometimes, lines of natural forest vegetation were kept along field borders leaving some individual trees for providing shade for peasants.
The most severe damage was clearly observed in *Quercus aegilops* forest vegetation. Moreover, large areas of pine forests in Hajj Hasanli and Jendires have been replaced by Olive farms even on the hilly slopes especially after they have been destroyed and degraded by fire. Furthermore, oak forests also suffered from excessive cutting for charcoal, fuel firewood and other uses.

5.1. 2. Samaan Mountain:

Samaan Mountain is located in the northern part of Syria and to the west of Aleppo. It is a part of Barisha and A'ala. The highest point is Skeikh Barakat summit of 870 m. The medium elevation did not exceed 600 m. Similar to the situation with Al-Akrad Mountain, the southern hills of the Amanos Mountain prevent it to be beneficially affected by the sea influence. The western slopes are very rugged, while the eastern ones are comparatively easy and plain (fig 13).

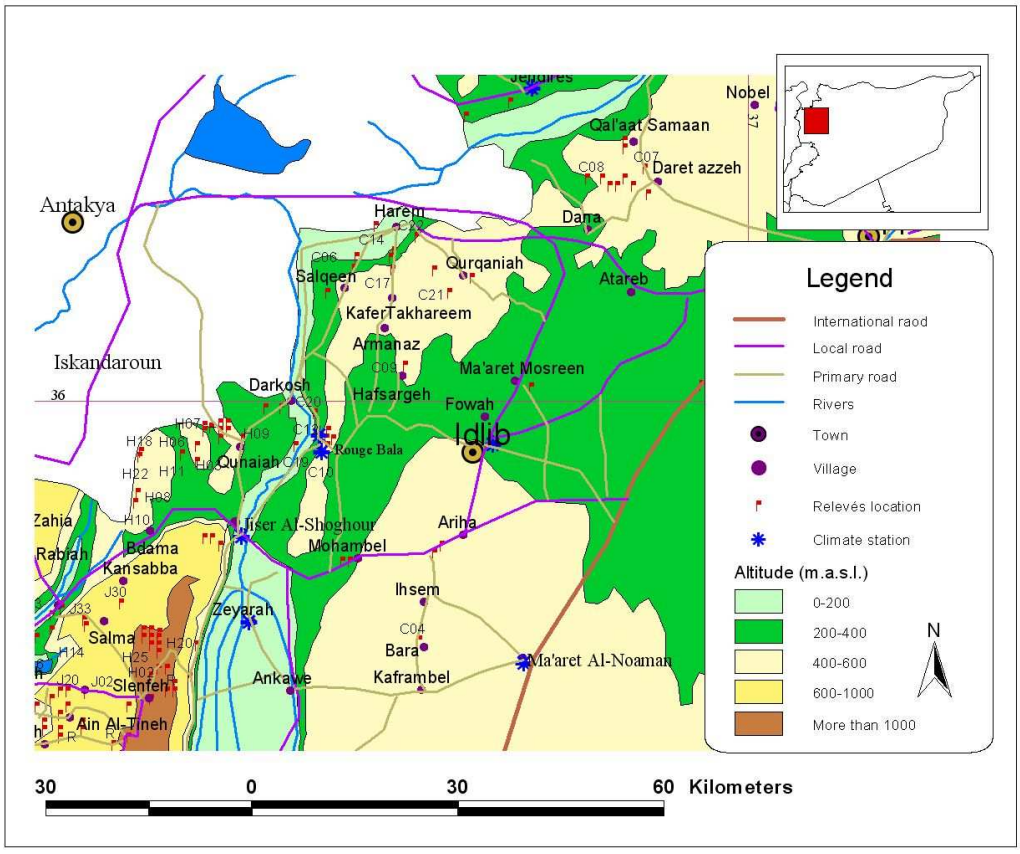


Fig 13: The study sites and relevés' places in the Samaan, Wastani Mountains and Jiser Al-Shoghour hills.

Hard limestone is the main type of rocks in most of the mountain adherent to lower Neogene. Terra-Rossa soil covers most of the mountain, which has been eroded in the past. The precipitation can reach up to 400 mm/year according to the nearest situated climate station, Dana (750 m) (Table 3).
The parent rock is widely exposed due to erosion, and the plains in the highlands were completely changed into farmland without having any natural vegetation.
From a phytosociological viewpoint, the vegetation in the mountain belongs to Quercion calliprini and Cisto-Micromerietea could also be noted on the southern slopes or near the settlements. A maquis of *Quercus calliprinos* covered the whole mountain, as a maquis 2-3 m in height and with 2.2 ADS (relevés No. C22, C14, table 16 and C08 many others).
Many individual trees have been observed near the town of Daret-azzeh, which are kept for usage by the inhabitants. *Crataegus azarolus* have also been noted like trees spreading around ancient buildings on the top of the mountain. Their height reaches 4-5 m and with a diameter of up to 40 cm. Many trees of *Pyrus syriaca* were also kept and grafted for multiple uses.

5.1.3. Wastani Mountains:
This chain consists of three adjacent mountains: Barisha, Dweila'h and A'ala. The height does not exceed 620 m. Two plains separate them: Rouge plain (210 m) and Sardin plain (430 m) (fig 13). They are inland mountains separated from the sea by the southern part of the Amanos and Cassius Mountain. The precipitation is about 550-600 mm/year. The dry period does not last more than six months a year according to Rouge-Bal'aa and Rouge climate stations (fig.6).
The Neogene calcareous rocks occupy most of the region covered by Terra-Rossa. However, marl appears in some locations particularly of the southern parts of the mountains. The Terra-Rossa soil eroded from the slopes when the vegetation had suffered from a severe degradation leaving the parent rocks bare.
The Eu-Mediterranean vegetation occupies all these mountains, with some exceptions of individual trees of *Ceratonia siliqua* on the route between Ghafar and Sheikh-Isa (380 m) and *Quercus infectoria* in Hafsargeh (500 m).
Low maquis, which appears as patches, is dominating in most of the sites. It is 1m height on the eastern slopes of Barisha and Wastani, but sometimes its height reaches 2-4 m. *Quercus calliprinos* is rarely noticed as an individual tree with a clear trunk.
From the phytosociological viewpoint, the maquis belongs to Quercion calliprini and in many times to Cisto-Micromerietea as noted near the settlements.
The climax or semi-climax vegetation could not be found in the area except in some sites such as: Ghafar (500 m), Hafsargeh (400 m), Skeikh-Isa (170 m), along the road between Darkosh-Ain Zarga, south Harem (500 m; 7 m height;

15-30 cm diameter), Bal'aa (210-420 m), Maryameen (460 m), and Nabhan village (Sheikh Mohammed tomb) (370 m; 8 m) .
Special cases of maquis vegetation were observed close to Harem (190 m). The dominant species was *Styrax officinalis* growing to 2-3 m height (Relevé C06 in table 16).
Quercus aegilops is also available mainly on the edge of Rouge and Sardin plains where the flat topography is available
The coniferous forests are available in just a limited area occupied by *Pinus brutia* on the southwest slopes. The region is supposed to be an extension of the forest patches of *Pinus brutia* in Jiser Al-Shoghour which will be described in the next section.
The hygrophilous vegetation is also seen in this concerned area notably in Harem as one of these sites. Big trees of *Platanus orientalis* (more than 15 m tall) were noticed in this area. In Asi River, trees of *Salix alba* are found in abundance along its sides.
Local inhabitants preserve a number of isolated trees from *Quercus aegilops* in order to use their edible fruits and benefit from the extended shade that these trees provide as in Iraqiah 220 m, and Qulai'ayah 210 m (Ghazal 1994). They also protect some tree species for their economical benefits such as: *Pyrus syriaca*, *Rhus coriaria*, *Crataegus azarolus*, *Amygdalus orientalis*, *Vitis sylvestris*, *Pistacia palaestina*, *Pistacia atlantica*, and *Olea europaea*. It was difficult to distinguish the wild olive stock within the cultivation varieties. Such cases were recorded in Armanaz, Kafer Takhareem, Harem, and Salqeen.
The maquis, near to Harem shows many patches containing trees of *Olea europaea* with coefficients of ADS 2.2 (relevés C15). It is believed that humans interfered by selecting to grow *Olea europaea* trees more than any other species.

5.1.4. North Jiser Al-Shoghour hills:

This sub-region consists of many hills with height between 400 and 600 m but not less than 200 m (fig 13). The parent rocks are almost marl. They relate to Neogene (lower and middle Neocene) with a small outcrop of green rocks (serpentine peridotites) in the north-west (Technoexport et al. 1966).
Eu-Mediterranean vegetation covers almost all the region where the vegetation accompanied *Pinus brutia* forest already exists. The pine trees may be higher than 12 m with diameters of about 30-50 cm. Many relevés were carried out in different places and altitudes (table 15). The ADS coefficients for *Pinus brutia* were recorded 3.4 to 3.3 with main total cover of 90%.
From the phytosociological viewpoint, Gonocytiso-Pinion covers most of the sub-region, whereas Ptosimopappo-Quercion occupies part of the area where serpentine is located.
Some individuals of *Cupressus sempervirens* grow also with the vegetation in the area. It may occurred with the plantation works that were carried out in

several parts of the region to restore sites following fires as was observed in west of Sa'ad Ass'oud sanctuary through planting *Pinus brutia, Cupressus sempervirens* and *Pinus pinea*.
The forests have been removed from several important parts of the sub-region. The plains around several springs and slopes have been changed to farmland causing soil deterioration.
Various habitats of rare species disappeared, especially near water springs and streams such as: *Tussilago farfara, Malus trilobata, Equisetum maximum.*
The hygrophytes are represented mainly by *Salix alba* and *Platanus orientalis*, which reaches 15 m tall as in the Abiad river.

5.1.5. Al-Zawiah Mountain:

Al-Zawiah Mountain is located in the central part of the western half of Syria. It forms an inland chain parallel to Coastal Mountains but with a lower height (fig 14), where the influence of Mediterranean climate remains effective. The mean elevation is between 750 and 850 m. The highest summit is in Nabi Ayoub (940 m) (fig 15).

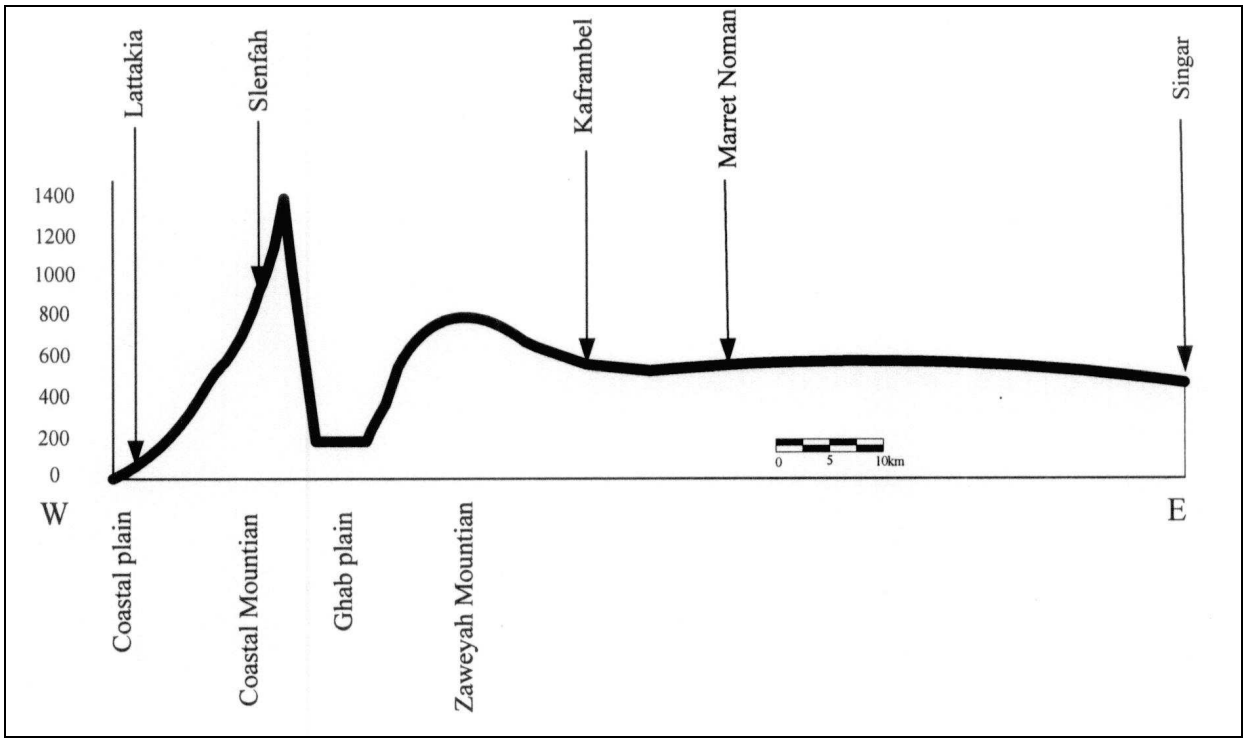


Fig 14: Topography profile cross section of middle of Syria

Both of marl and hard limestone rocks are found in this mountain. They belong to Neogene and Cretaceous. Moreover, there are 25 volcanic cones from Paleocene at the northern part of the mountain. Terra-Rossa soil is widely spread in the mountain. However, it changes in volcanic areas. The soil erodes from the slopes into the plains in most sites of Al-Zawiah Mountain.

The Eu-Mediterranean vegetation is represented in Al-Zawiah Mountain by maquis of *Quercus calliprinos.* A few patches with individual trees of *Quercus aegilops* or *Quercus infectoria* are traceable in the northern highest parts of the mountain. These trees are accompanied sometime by some other species such as *Styrax officinalis, Tamus communis* and *Umbilicus erectus* that are related to the lower Supra-Mediterranean.

It is worth mentioning that despite the fact that conifers cover great area of the eastern slopes of the Coastal Mountains, which is separated from Al-Zawiah Mountain by Ghab plain, conifers do not appear naturally in Al-Zawiah Mountain.

The maquis of *Quercus calliprinos* is destroyed and turned into small patches with height not exceeding 1m especially on the slopes, which turned out to be an infertile land even for grazing

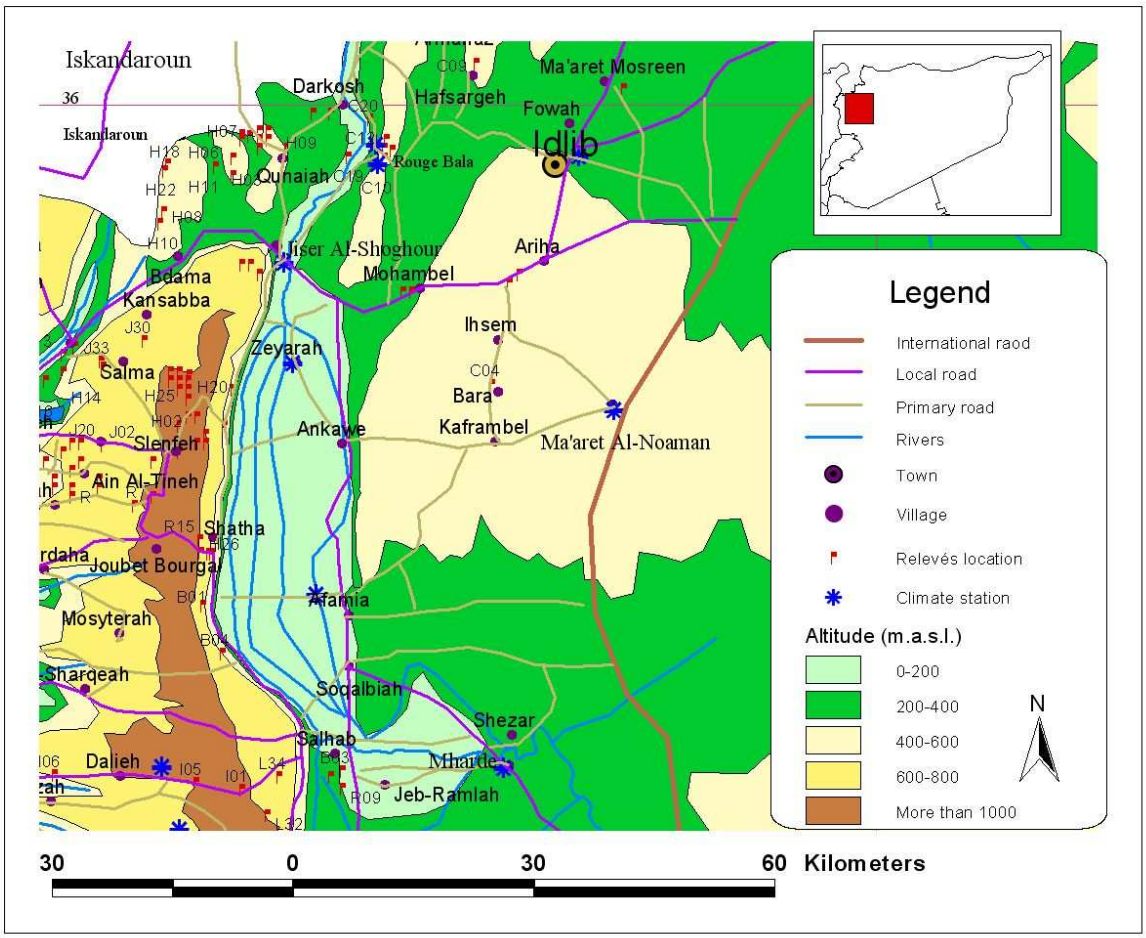


Fig 15: The study sites and relevés places in Al-Zawiah Mountain, and Ghab plain.

The soil has eroded in most of the region after removing the natural vegetation leaving the limestone rock exposed, but when the soil was protected between the rocks, the maquis present as small spots. Moreover, few spots of the maquis

grow up to 1-2 m, as in Ihsem (650 m), Sheikh Ayoub (920 m), Tal'at (830 m), Sergealla (550 m), Deir-Loseh (820 m), and Bara (ancient palace relevé C24).
In addition, individual specimens of *Quercus aegilops* are spreading near Kafer Owayed and Hlouby. Their diameter reaches 80 cm while their height exceeds 10 m (Ghazal 1994).
In the southern hills of Al-Zawiah Mountain, the natural vegetation disappears and the lands are changed to agricultural farms or grazing landscape.

5.1.6. Western Lebanon Mountain:

There is a small area, located to the west of Qsair in the Western Mountains of Lebanon, that is on the Syrian territories (fig 16). There is not any available climate data for that area as the Qsair climate station (208 mm/year, m=2.7C˚) is not suitable to give a good description especially in the high land of the area, which could get more than 600 mm/year.

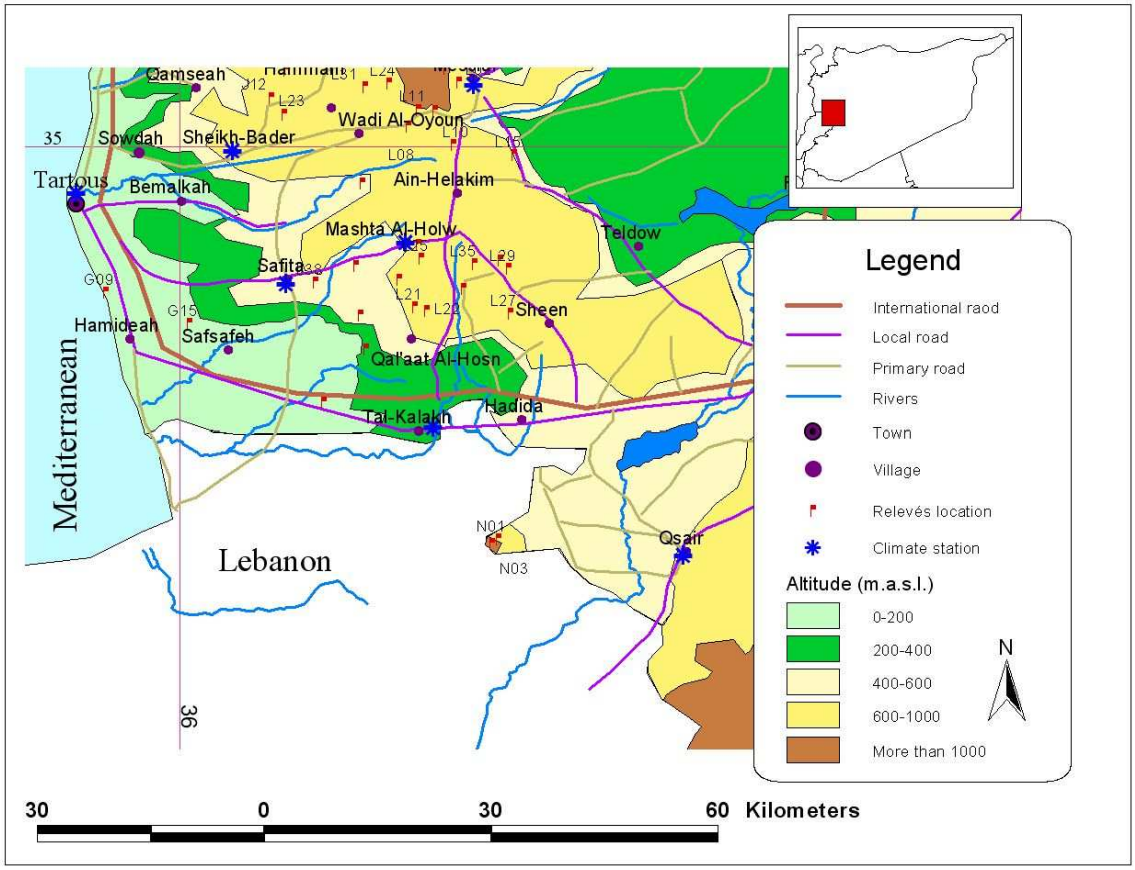


Fig 16: The study sites and relevés' places in the western Lebanon Mountain.

According to the altitude, the vegetation in the area changes rapidly from maquis in the lower areas to a very special vegetation in the high land. The vegetation is described by the following transect:

- 500-850 m, short maquis (1-3 m height) of *Quercus calliprinos* covers the lower slopes from the Qattineh Lake to 850 m altitude.

- 850-900 m, many trees of *Pinus brutia* share the maquis and individuals of *Juniperus excelsa* start to appear (relevés N01 and N03).
- 900-1100 m, mixed forest of *Juniperus excelsa* and *Pinus brutia* occupies the area and the vegetation reaches 6-8 m.
- 1100-1280 m, high-quality forest containing *Juniperus excelsa* mixed with other tree species of the vegetation that covers the area mainly with trees of *Pinus brutia* up to the top.

The vegetation of the area, which extends also into the Lebanese side, needs more investigation and analysis in the future. The records in this research are not enough to complete the study.

5.2. Coastal region:

This region contains the most important forest portion in Syria. It contains three major sub-regions: Baer-Bassit, the Coastal Plains and the Coastal Mountains.

5.2.1. Baer-Bassit Mountain:

This sub-region consists of two masses: the Bayer in the east and the Bassit in the west. The major axis of the mountain is northeast southwest, and the heights reach to 1130 m in Zeyarah peak but the mean height is 500-700 m (fig 17).

The precipitation reaches 1200 mm/year, and the dry period does not exceed 130 day/year according to the data from Kasab climate station (fig 6).

The sub-region is covered geologically by the massive heap of green rocks (serpentine, amphibolites and gabbros) (Technoexport et al. 1966). Other types of rocks including limestone, marl and sandstones are also available. These ecological characteristics give the area a special vegetation, which is related also to the altitude; the ecological transect that was carried out for this area is as follows:

- Altitude 0-100 m: small patches of Thermo-Mediterranean appear near the seashore, which consist of Olea-Ceratonion with its characteristic species *Ceratonia siliqua*, *Olea oleaster* and *Pistacia lentiscus* as well as many other species that were listed in relevés F24, F22, F23 and F25. These patches combine sometimes with the vegetation of Quercion calliprini especially by *Pinus brutia* and *Quercus calliprinos*, but the vegetation was mostly of short height.
- Altitude 100-450m: The Eu-Mediterranean vegetation that is dominated by three alliances from Quercetea ilicis which are as the following:
  - ❖ Ptosimopappo-Quercion**:** covers most of the area where serpentine rocks (peridotites and pyroxenite) are distributed (Nahal et al. 1997). In general, the vegetation does not grows taller than 1-2 m for some trees in some sites.
  - ❖ Gonocytiso-Pinion: occupies the gabbros and marl rocks, in the southern parts of the area and in Qara-Douran area.

❖ Quercion calliprini: dominates and spreads on marl and calcareous parent rocks with the widespread of *Pinus brutia, Cupressus sempervirens and Quercus calliprinos* as in Qara-Douran and the southern parts.

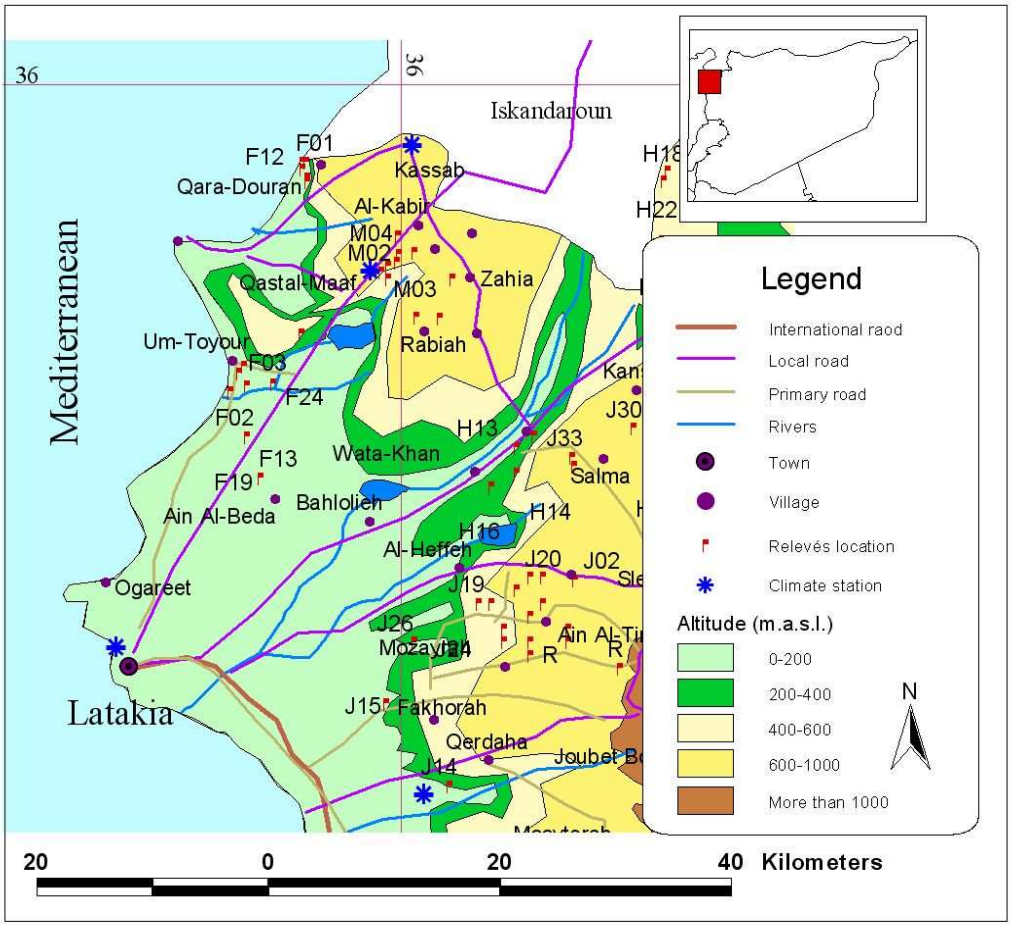


Fig 17: The study sites and relevés' places in the Baer -Bassit Mountain.

- Altitude from 450 m up to the top**:** the Supra-Mediterranean vegetation is dominant by *Quercus cerris* subsp. *pseudocerris* and *Pinus brutia* with many other species as in Forouluk forest (550 m) and Nabe'a Morr (630 m).

Chalabi (1980) and Ghazal Asswad (1998) have conducted two important phytosociological and geobotanical studies in this area. The results confirmed the hypothesis that Syria was subjected to humid climate until the 8th Millennium B.C. The humid Euro-Siberian forests and their vegetation had declined northwards except on few enclaves of special topography, which contained some of the Euro-Siberian vegetation as in Forouluk.

Regarding endemism, Ghazal Asswad (1998) mentioned that there are 26 endemic East-Mediterranean species in the area and near the mountains. The area also contains a large number of rare and endangered species (more than 40 species) which have obviously decreased from the pervious studies. Moreover, the disappearance of an Euro-Siberian species *Anthoxanthum odoratum* from the Syrian flora was mentioned therein.

The vegetation involves other vegetal association, i.e. Alysso (crenulatum)-Quercetum pseudocerridis [4] from Ptosimopappo-Quercion, Chaerophyllo (libanoticum)-Quercetum pseudocerridis, Cerco (siliquastrum)-Ferulagetum autumnalis from sub-alliance Trifolio-Cytisenion cassii and Ostryo-Quercion pseudocerris (Chalabi 1980), and Pino (brutia)-Quercetum pseudocerridis[5] and Pyrethro (cilicium)-Quercetum pseudocerridis [6] from Ostryo-Quercion pseudocerris (Ghazal Asswad 1998).

5.2.2. Coastal plains:

The Coastal plains extend from north to south in addition to many gulfs. The height increases gradually towards the east (from seashore to 300 m), then the altitude starts rising up to 1650 m in Coastal Mountains (fig 18).
The sedimentary rocks are dominated by conglomerate, calcareous and marl; the metamorphic rocks in the north (serpentine) and volcanic rocks (basalt) in the south. The soil is almost shallow and is relating to entisols (xerochrepts) or inceptisols (xerofluvents in Al-Kabeir Shemali River north Lattakia)
Small patches of Oleo-Ceratonion maquis were recorded at the seashore, with a height (1-2 m) as in Um-Toyour and Wadi Qandil.
The Quercion calliprini was also recorded in the middle and southern parts of the Coastal plains mainly by two species *Quercus calliprinos, Quercus aegilops* which forms high trees (7-10 m) as near Tartous and Banias (G09) (table 14). However, *Quercus aegilops* occupies the southern plains and it is distributed as patches or individuals specimen (Ghazal 1994).
There are many rivers along Coastal plains; the hydrophytes vegetation occupies all of them by different species such as *Alnus orientalis* in Wadi Qandil and Um-Toyour, *Platanus orientalis* in Abrash River and sometimes by rare species such as *Ulmus campestris* in Sanobar Jableh.
In fact, the vegetation of the Coastal Plains has mainly changed during last long period. The natural vegetation in this area was destroyed by the agricultural and human activities, as can be noticed by the existence of small patches between the fields and farmlands that are close to the seashore.

5.2.3. Coastal Mountains:

It is the major area in the Coastal region. It extends north - south between Al-Kabeir Shemali and Al-Abiad rivers in the north, and Al-Kabeir Janobi in the south, which separates it from the Anti-Lebanon chain. Many peaks are available, as Halabco 1387 m, Khalifeh 1434 m, but the summit of the TV. Tower 1562 m, is the highest one (fig 18). The width of the chain is 25-30 km. The western slopes are descending gradually towards the Coastal plains, whereas the eastern slopes are steeply descending toward the Ghab plain (170-

[4] The author used Alysso (crenulatae)-Quercetum pseudocerridi
[5] The author used Pineto (brutia)-Quercetum pseudocerridis
[6] The author used Pyrethro (ciliciae)-Quercetum pseudocerridis

200 m). The western slopes have many deep valleys, short rivers and springs that are flowing down to the sea (fig 18).
The sedimentary rocks that were formed in the Jurassic and Cretaceous periods exist in most of the chain and comprise of marl, dolomite, limestone, and sandstone. The volcanic rocks (basalt), which were formed in Neogene (Pliocene and upper Neocene) and Pleistocene, spread in the southern part of the chain.
The soil is distributed into two major types: Inceptisols (haploxerolls) in the eastern and southern slopes and Entisols (Xerorthants) in the northern and western slopes (Ilaiwi 1982). Nahal (1962) classified two different types of soil in the Coastal Mountains: Brown Mediterranean in the sub-humid bioclimate zone, and Rendzina red soil with high quantity of organic matter elsewhere. The first one has changed to Rendzina also under forest sites on the eastern slopes (Martini 1999).

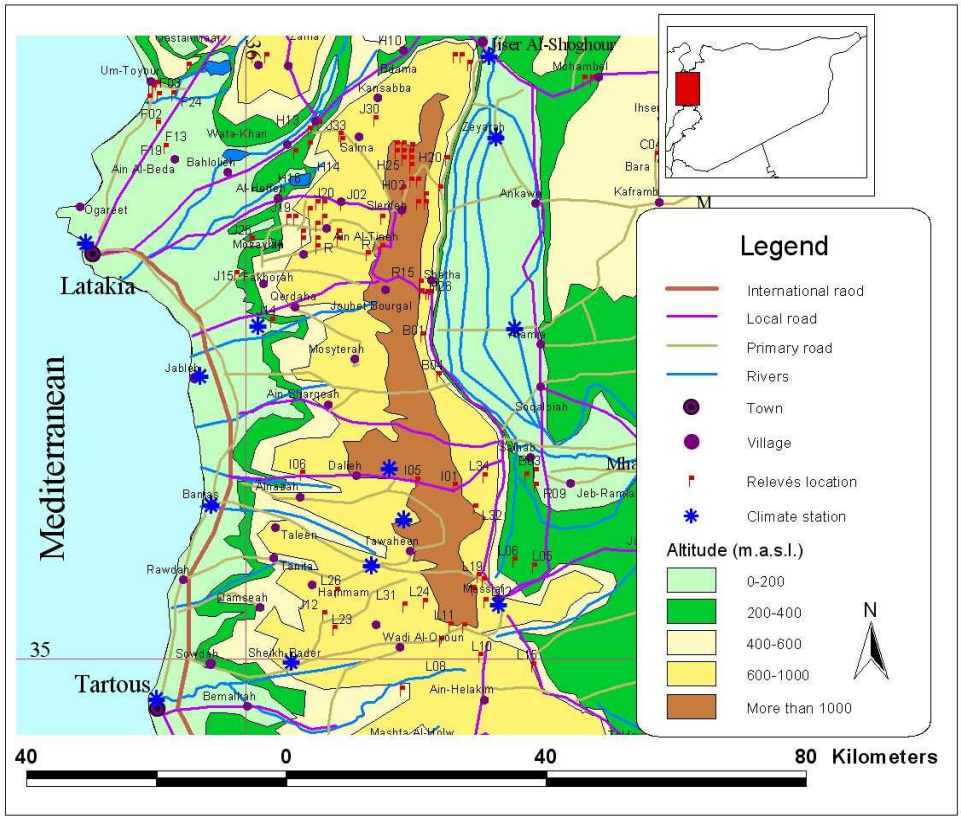


Fig 18: The study sites and relevés' places in the Coastal Mountains

The Mediterranean climate influences the whole chain. The shading effect of the western slopes of the mountains on the eastern slopes modified the gradient of the annual rainfall and the altitudinal influence of the temperatures.
The precipitation in the chain is the highest of all parts of Syria like Slenfah (1310 mm), Jobet-Barghal (1530 mm), Qadmous (1387 mm), and Safita (1134 mm). It does not drop below 800 mm and 500-800 mm on the western and eastern slopes, respectively. Humid and sub-humid bioclimate occupy all of the

sub-region and the dry period ranges from three months and 20 days to five months and 12 days. Sometimes, the lower sub-humid and higher semi-arid bioclimate zones, with a dry period of 4-5 months, are also recorded on the eastern slopes (Fig. 6).

A clear zoning system of vegetation appeared by the change of altitude, from the sea level to the summits of the chain.

Four zones are distinguished on both the western and eastern slopes of the chain, which are Thermo-Mediterranean, Eu-Mediterranean, Supra-Mediterranean and Mount-Mediterranean. The altitude of each zone is varying between the western and eastern slopes of the chain (Nahal et al. 1989, Ghazal 1994, Nahal et al. 1997) as shown in the table given hereunder:

Zone	Western slopes	Eastern slopes
Thermo-Mediterranean	0-300m	This zone does not appear clearly because the altitude starts from 170m.
Eu-Mediterranean	300-700 m	190-850 m
Supra-Mediterranean	700-1250 m	850-1100 m
Mount-Mediterranean	1250-1500 m	1100-1300 m

On the other hand, the altitude of each zone is not constant but it is changing.

The Thermo-Mediterranean is not presented on the eastern slopes due to its limited altitude. Therefore, some trees of *Ceratonia siliqua* were recorded in the height 170 m. However, on the western slopes it is very difficult to observe forest patches in the Thermo-Mediterranean due to transformation of land into agricultural fields and urban areas. The maquis of Thermo-Mediterranean consist of Oleo-Ceratonion vegetation where species of this alliance were recorded as follows: *Ceratonia siliqua*, *Pistacia lentiscus, Olea oleaster*, and *Myrtus communis*. The sites concerned are Um-Toyour, Wadi Qandil and Borj-Islam between sea level and 100 m.

Supra-Mediterranean zone is distributed between 700-1250 m on the western slopes and 850-1100 m on the eastern slopes. These high deciduous areas are dominated by some species like: *Quercus cerris* subsp. *pseudocerris, Cercis siliquastrum, Carpinus orientalis, Ostrya carpinifolia, Fraxinus ornus, Sorbus aria, Sorbus torminalis, Rubus sanctus, Silene amana, Neottia nidus-avis, Lonicera orientalis*.

Quercus cerris subsp. *pseudocerris* is the major species, which spreads into a wide forest in this zone. Two associations were recorded in Slenfah between 1000-1200 m heights Rubo (sanctus)-Quercetum pseudocerridis[7] and Daphno (lebanotica)-Quercetum pseudocerridis (Chalabi 1980).

Quercus infectoria plays an attractive role in this zone. It exhibits a narrow strip between *Quercus cerris* subsp. *pseudocerris* vegetation and Eu-Mediterranean zone (700-850 m) on the western slopes along with some patches on eastern slopes (Chalabi 1999).

[7] The author used Rubo (sancti)-Quercetum pseudocerridis

A narrow strip of the Mount-Mediterranean vegetation is available at the top of the chain, where the altitude increases more than 1100 m and 1250 m on the eastern and western slopes, respectively. These forests occupy about 1000 hectares of *Cedrus libani* and *Abies cilicica* that belong to Querco-Cedretalia libani communities. On the one hand, *Cedrus libani* occupies the eastern slopes and consists of the association Cytiso (drepanolobus)-Cedretum libani which leads on hard limestone (Chalabi 1980). On the other hand, *Abies cilicica* occupies the western slopes and contains two associations Anthrisco (lamprocarpa)-Abietum cilicicae (Chalabi 1980) and Abieto-Rhamnetum catharticae (Martini 1989), where both of them are developed on dolomite. *Juniperus drupacea* is also traceable here. It occupies the northern parts of the Coastal Mountains by a discontinuous vegetation near Slenfah 970-1200 m (fig 19 and 20).
The Eu-Mediterranean vegetation zone plays an important role on both slopes of the Coastal Mountains. It extends between 200-700 m on the western slopes; and between 190-850 m on the eastern slopes. Often, this vegetation extends to take the possession of new areas in both the Thermo-Mediterranean and Supra-Mediterranean, where the conditions are suitable due to human activities like cutting, grazing and fire incidents.

5.2.3.1. Eu-Mediterranean forest in the Coastal Mountains

Many ecosystems were recorded for the Eu-Mediterranean forest in the Coastal Mountains.

5.2.3.1.1. Dry Coniferous forests:

Dry coniferous forests consist of many species (*Pinus brutia, Cupressus sempervirens* and *Pinus halepensis*). However, *Pinus brutia* is the most important and abundant one of them, followed by *Cupressus sempervirens*, and lastly *Pinus halepensis.*
Pinus brutia forests formed arborescent landscape communities on marl parent rocks, but the height and density of these forests are varying between sites. The same occurrences were also constantly recorded in different slopes of the mountains, for example: Istabraq to Jouren slopes, Jouren-Slenfah road, Shatha-Jobet Barghal road, Bared-Beyt Yashoot road, Abo Qbais-Dalieh road and around Messiaf on the eastern slopes (fig 18). On the western slopes, it could be observed around Qal'aat Salahdeen, Arafit area, Banias-Barmaya road in Sheikh Bader area near Barmanat-Mashaikh and in Jiser Al-Shoghour-Bahlolieh road where some trees were left as a sample with apparent trunk. The same situation could be seen in the road of Jiser Al-Shoghour-Lattakia as in Bdama 520 m (relevé H10), Zeineh, Ain Eido, Qasatel and Jabal Al-Nubah. This is common in all valleys of the western slopes like Al-Kabeir Shemali river, Ain Al-Tineh and Hzerin valleys.

Cupressus sempervirens was recorded in a number of sites on the eastern slopes which was spread intermittently on marl rocks as in other places like Messiaf - Qadmous road in Healeen, Zeineh (relevés L19 and L30) and Fandara (relevé L10) (table 32). All these sites were recorded as a distinguished narrow clear strip at an elevation of 500-700 m (fig 19).
Pinus halepensis was observed on the road Banias-Qadmous. It was sharing with *Pinus brutia* and *Cupressus sempervirens* to form an unusual forest in the region.

5.2.3.1.2. Sclerophyllous oak forests:
The main vegetation type of these forests is a maquis of *Quercus calliprinos*, which spreads largely in the mountains. Pistacio-Quercetum calliprini association represents that maquis in the Coastal Mountains. It appears in the humid, sub-humid and semi-arid bioclimatic zones in diversifying temperatures (Nahal 1962, 1981 and Zohary 1973). However, it is mostly prevalent on hard limestone covered by Terra-Rossa. The maquis changes a little by height and density. It is frequent 2-4 m in various records like in Jiser Al-Shoghour-Lattakia road, Istabraq-Jouren (190-250 m), and in most of the roads branching from Messiaf up to 1000 m height including Sheikh Bader.
Many forest patches of climax and semi-climax vegetation were discovered through careful field investigation in the area with oak forests in cemeteries and tombs where one can find the form of high trees of *Quercus calliprinos*. These sites are recorded in table (14).
More discussion and phytosociological analysis for these sites will be carried out in chapter 8.

5.2.3.1.3. Semi-deciduous Remains:
The main species of these types is *Quercus aegilops*. It consists of small patches in the mountain. This vegetation is commonly spreading in flat areas with deep soils on limestone, marl and basalt parent rocks. The structure of these patches has mainly a group of big trees with ground cover vegetation. Ghazal (1994) recorded the association of Crataego (azarolus)-Quercetum aegilopsii[8].
The patches were destroyed frequently by human activities that can be seen in many sites on the eastern slopes adjacent to Ghab plain as in: Kanfo (240 m), Rabo (Sheikh Mohammed At-Tall cemetery) (350 m), Sheikh Saeed Tomb (220 m), Dar Shmayel (160 m), Ain borah (420 m) and Sheiha west of Messiaf (540 m). The same case was recorded in the southern hills of the Coastal Mountains where soils derived from the basalt cover the area like in Tal-Kalakh, Safita, Safsafeh, Marmarita, Biada and Metras (Ghazal 1994).

[8] The author used Crataego (azarolo)-Quercetum aegilopsii

5.2.3.1.4. Running water banks vegetation:

Hygrophytes are covering small rivers banks in the area. There are springs, streams, permanent and temporary watercourses where vegetation is existing. Many traditional hygrophytes species appear in different places such as *Platanus orientalis* (in Abo Qbais, Hzerin, Kansabba, and Beyt Shakkohi) and *Salix alba* (in Al-Bared River, Abrash River, Maroniat and Istabraq). However, when the watercourses become semi-permanent other species would appear to be associated with such as *Nerium oleander* as in the stream east of Messiaf.

The watercourses in some valleys and springs increase the number of rare and endangered species like in Hzerin valley: *Phyllitis scolopendrium, Adiantum capillus-veneris, Pteris longifolia, Asplenium trichomanes, Asplenium adiantum-nigrum, Polypodium vulgare, Ceterach officinarum, Equisetum ramosum* and *Equisetum maximum*, which were observed in the concerned area.

5.2.3.1.5. Selective dominant species ecosystems:

Many patches in the forests of the Coastal Mountains have special ecosystems with species like: *Laurus nobilis, Pyrus syriaca* and *Olea oleaster*.

Humans played a major role to form these ecosystems with the aim to benefit from the trees through collecting their fruits. The trees of these species grew and become groups of individual trees.

Olea oleaster was recorded in many sites as a selective vegetation like Sekarieh (570 m) on the eastern slopes on the road from Jouren to Slenfah and near Messiaf (960 m). *Laurus nobilis* has the same status like in Hzerin valley (340 m), while *Pyrus syriaca* dominates in Jub-Ghar (1080 m).

5.2.3.1.6. Degraded vegetation:

This vegetation is usually type of Cisto-Micromerietea (Chalabi 1989), which appears after cutting, grazing and fire. There are two landscapes consisting of maquis and phrygana. The phrygana consists mainly of hemispherical shrubs, which are generally deciduous during the dry season (Quezel 1981). The characteristic species in this group are: *Spartium junceum, Calycotome villosa, Salvia grandiflora, Carex falcata, Fumana arabica, Cistus villosus, Origanum syriacum, Teucrium polium, Cistus salviifolius, Hypericum serpillyfolium, Fumana scoparia, Scutellaria sibthorpii, Dorycnium hirsutum, Asperula stricta, Lavandula stoechas, Convolvulus scammonia, Salvia judaica, Euphorbia thamnoides* and *Euphorbia apios* var. *lamprocarpa.*

The area suffers from reduction in forest vegetation in many parts; some of them are completely lacking of any vegetation.

In general, this vegetation is recorded widely in urban and suburban landscape areas and near the settlements particularly at the edges of Ghab plain and near the Coastal plains.

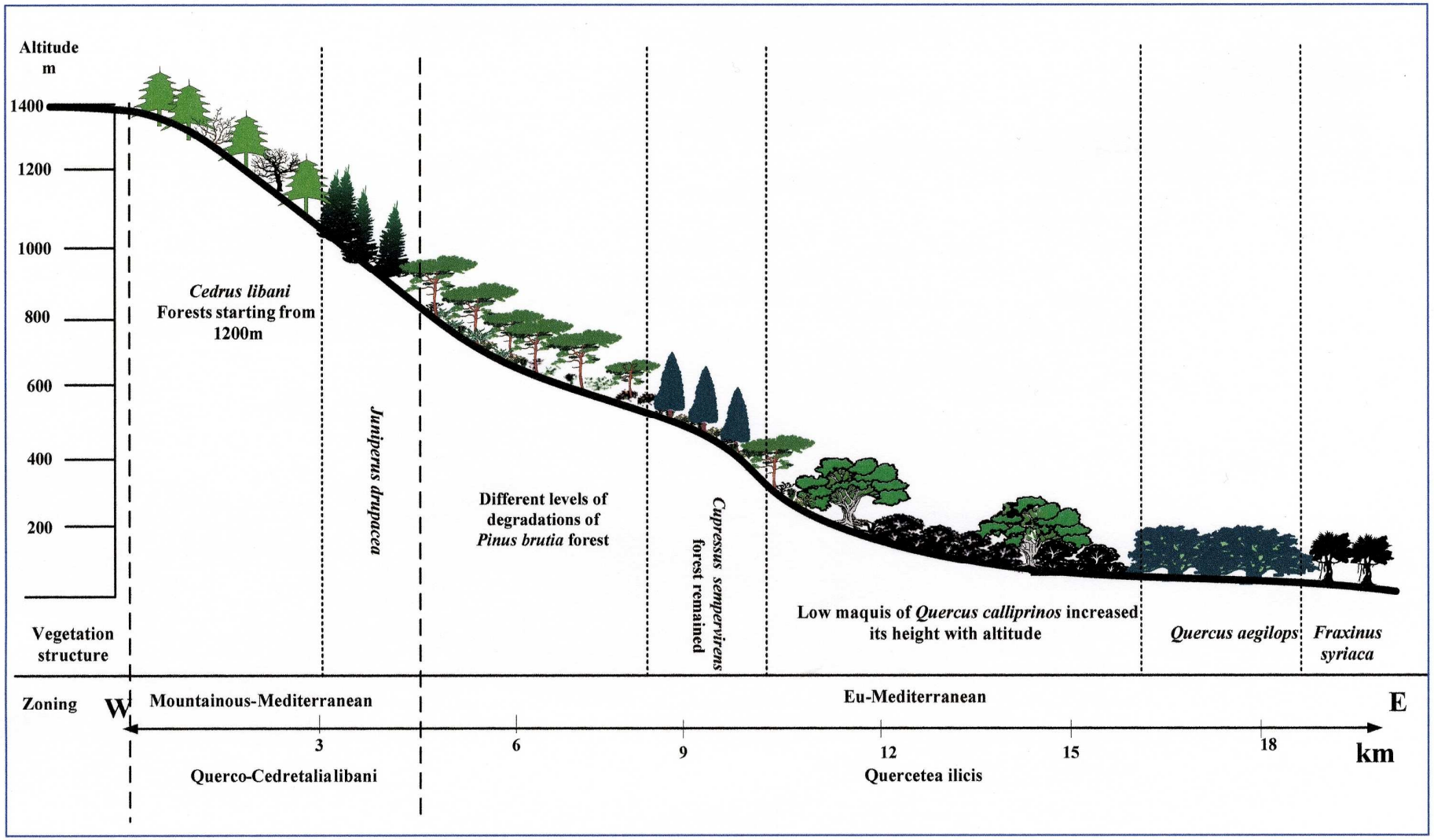


Fig 19: Cross-section of the eastern slopes of the Coastal Mountain from Shatha to Jobet-Barghal.

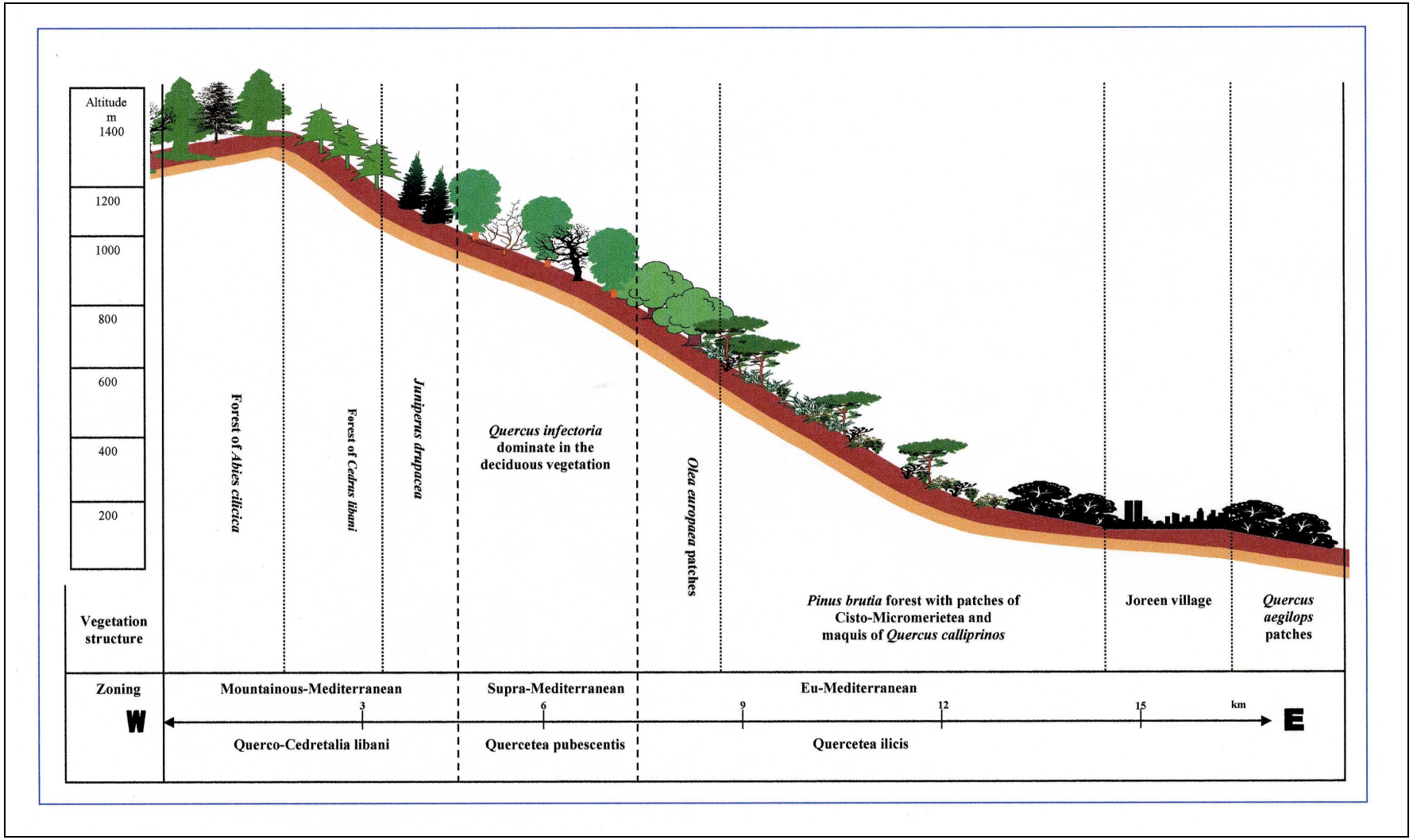


Fig 20: Cross-section of the eastern slopes of the Coastal Mountain from Jouren to Matta

5.2.3.1.7. Forestation works in the Coastal Mountains:

It is very important to refer here to the forestation works in the Coastal Mountains during the last five decades, to compensate for the damage that happened to the forest, and to support the natural vegetation. There are many examples, leading to the recovery of natural vegetation in a relatively short period.

In spite of choosing the wrong species for those sites, the results were very good concerning the protection of the soil and redeveloping the vegetation structure to get high trees for the forest and to encourage the natural return of the original vegetation as in Shardob, Barmaya, Kasafeh and many others.

5.3. High Mountains Region:

The high mountain regions consist mainly of Anti-Lebanon, Qalamoun and Jabal Al-Sheikh Mountains. The altitude is more than 1000 m in all the chain (fig. 21). The rainfall is low ranging between 130-270 mm/year (Nabik and Hasia climate stations, respectively), increasing to 560 mm/year as in Zabadani, and reaching 1000 mm/year in Jabal Al-Sheikh. The dry period is too long (more than 8 month/year) as in Hasia (fig. 6).

There are two main phytogeographical regions: The Mediterranean and the Irano-Turanian region. The bi-regional species of the Irano-Turanian-Mediterranean draw the representatives of the meeting-point position of the area.

The vegetation in these areas is affected significantly by the harsh ecological conditions.

5.3.1. Al-Qalamoun Mountain:

An important part in Anti-Lebanon chains is located on the borders of Syria and Lebanon. It consists of three parallel mountain chains with many peaks, the highest one is Tal'at- Mousa (2616 m) (fig. 21).

The dry climate dominates in the area, which belongs to a Mediterranean climate type, where the rainfall is very low ranging from 170-250 mm/year. The general Mediterranean climate is cold in both autumn and winter and the summer is hot and dry (fig 6).

Quercus calliprinos disappeared from this area and the vegetation changed dramatically to semi-desert and steppes belonging to Artemisietea herba-albae that is dominated by Irano-Turanian species (Zohary 1973). Quezel (1985) described the vegetation of most of this area as to be belonging to the steppes in the Irano-Turanian *Artemisia herba-alba* vegetation.

The list below shows some characteristic species, which were recorded in Marah site near the main road of Damascus-Homs at 1070 m altitude:

Artemisia herba-alba, Crataegus azarolus, Prunus tortuosa, Olea oleaster, Lactuca orientalis, Nonea caspica, Amygdalus spartioides, Capparis spinosa,

Ephedra alata, Poterium spinosum, Asphodelus microcarpus, Rhamnus palaestina, Stipa barbata, Teucrium polium, Tamarix spec.
On the other hand, several other important species were recorded in this area as trees or shrubs. *Pistacia atlantica* and *Amygdalus orientalis* make the borderline for the steppe vegetation (Quezel 1985). In spite of the shallow soil in different sites of the area, *Amygdalus orientalis* is dominating as individual shrubs on the slopes of the hills west of Hasia (Homer-Tahta). *Pyrus syriaca* and *Pistacia atlantica* are recorded in plains and valleys or dry watercourses as in Marah area. The vegetation was shared by more species particularly from Rosaceae like *Crataegus* spec., *Prunus* spec. and *Rosa* spec.

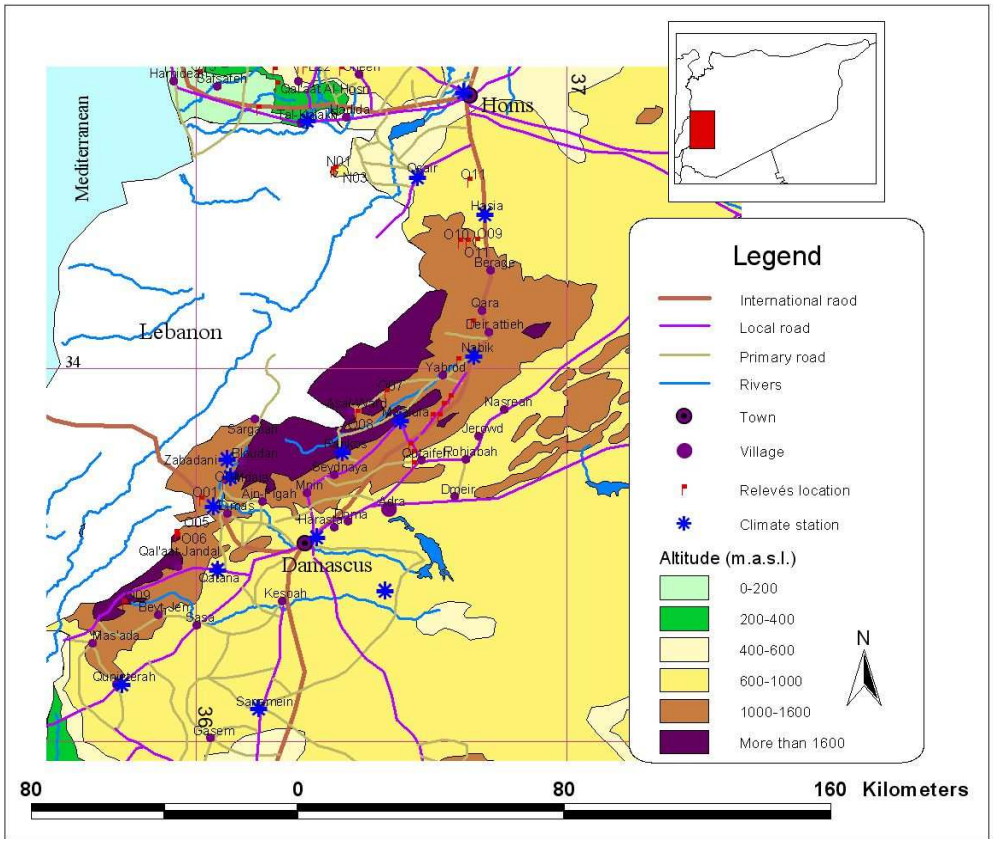


Fig 21: The study sites and relevés' places in the high mountain region.

The area is experiencing an intensive human pressure. The main activities of the local inhabitants are animals grazing, cutting and the growing rain fed crops that have produced this type of vegetation structure and diminished the chamaephytes in it. Furthermore, many species have usually been used as fruit trees, which could be recognized as flavorsome fruit trees, which encouraged a selective steppe vegetation structure with few other types of trees, shrubs, herbs or grasses.
The elevated areas of the mountains were occupied by *Juniperus excelsa*, covering tens of hectares starting from west of Halimet-Qara to the south of Asal-Ward, along with their most important similar groups.

5.3.2. Zabadani area:

It is located in the western part of Anti-Lebanon chains between altitudes of 1400 to 2000 m with the Zabadani plain between 1400-1600 m (fig 21). The rainfall is 560 mm/year with a short dry period that lasts for 6 months and has improved the vegetation structure.

Quercus calliprinos communities appear once more here with its traditional associated vegetation contributing to an Irano-Turanian vegetation (relevés O01 and O04 table 12).

Quercus infectoria also appears at 1180 m altitude with other associated species such as *Prunus ursina, Acer monspessulanum,* and *Crataegus monogyna*.

With increasing altitude, the vegetation is changing to *Crataegus azarolus, Crataegus sinaica, Celtis australis,* and *Paliurus spina-christi,* being used as hedges around the orchards.

Other species have also been recorded at 1700 m altitude. They are *Prunus ursina, Rosa canina, Anthyllis maura, Prunus prostrata, Ononis spinosa, Linaria damascena.*

New species can be seen at 2020 m elevation on a brown soil derived from calcite: *Origanum libanoticum, Euphorbia* spec.*, Ferula hermonis, Crataegus sinaica, Prunus ursina.*

During the last few decades, the area vegetation was severely affected by increasing the tourist pressure and lack of maintenance.

5.3.3. Jabal Sheikh:

It is the highest mountain in Syria (2814 m), with many peaks (fig 21). The vegetation appeared as maquis whose height is 2-6 m with a total cover of 50-60% (relevés O05&O06 table 12). The Irano-Turanian species share the Mediterranean vegetation by many tree from *Rosaceae,* which were used as fruit trees by the local inhabitants.

At 1500 m in Arneh , *Quercus infectoria* dominated by trees of height (5m) and diameter 5-20 cm and the ADS. 2.2 *Crataegus azarolus* appeared by ADS. 2.2, where the following species were also observed:

Crataegus sinaica	+	*Rhus cotinus*	1.1
Prunus ursina	+	*Centranthus longifolia*	+
Lygia aucheri	+	*Quercus calliprinos*	+

The vegetation deteriorated because of the inhabitants' activities like tree cutting and changing land into agriculture fields as the case in Beyt-Jen, Rakhleh and Arneh but it is still having a relatively good quality maquis.

5.4. Jabal Al-Arab and Horan plains:

Jabal Al-Arab is located in the southern part of the country at the Jordanian border. It is a huge basaltic mass with an altitude of up to 1803 m (fig 22).

The Mediterranean climate has a big influence on the mountain, the precipitation (300-450 mm/year) and the dry period (6-7 months) of Sweida, Salkhad, southern Ain-Arab and Tal Shhab climate stations.
The basaltic rocks are widespread in the mountain. The soil developed from basaltic parent rocks and the lithic xerothents type is widespread in the mountain (Chikhali 2000).
The most important ecological factor affecting the vegetation of Jabal Al-Arab is the climatic influence in relation to the topography and geography of this area.
The western slopes of the mountain have a shading effect on the eastern one causing a change to the gradient of the annual rainfall and the altitudinal influence of the temperatures, and the Irano-Turanian vegetation starts to dominate. Due to this, three of the main phytogeographical regions meet each other here; those are the Mediterranean and the Irano-Turanian, and Saharian region, on the other hand the bi-regional species of the Irano-Turanian-Mediterranean appears here.
The Mediterranean vegetation especially of the Eu-Mediterranean in the shape of a fragmented forest steppe of *Quercus calliprinos-Crataegus azarolus*, with high presence of tree species like *Pistacia atlantica*, *Pyrus syriaca*, *Amygdalus korschinskii*, *Rhus coriaria* and *Crataegus sinaica*, dominates in most of the mountain.

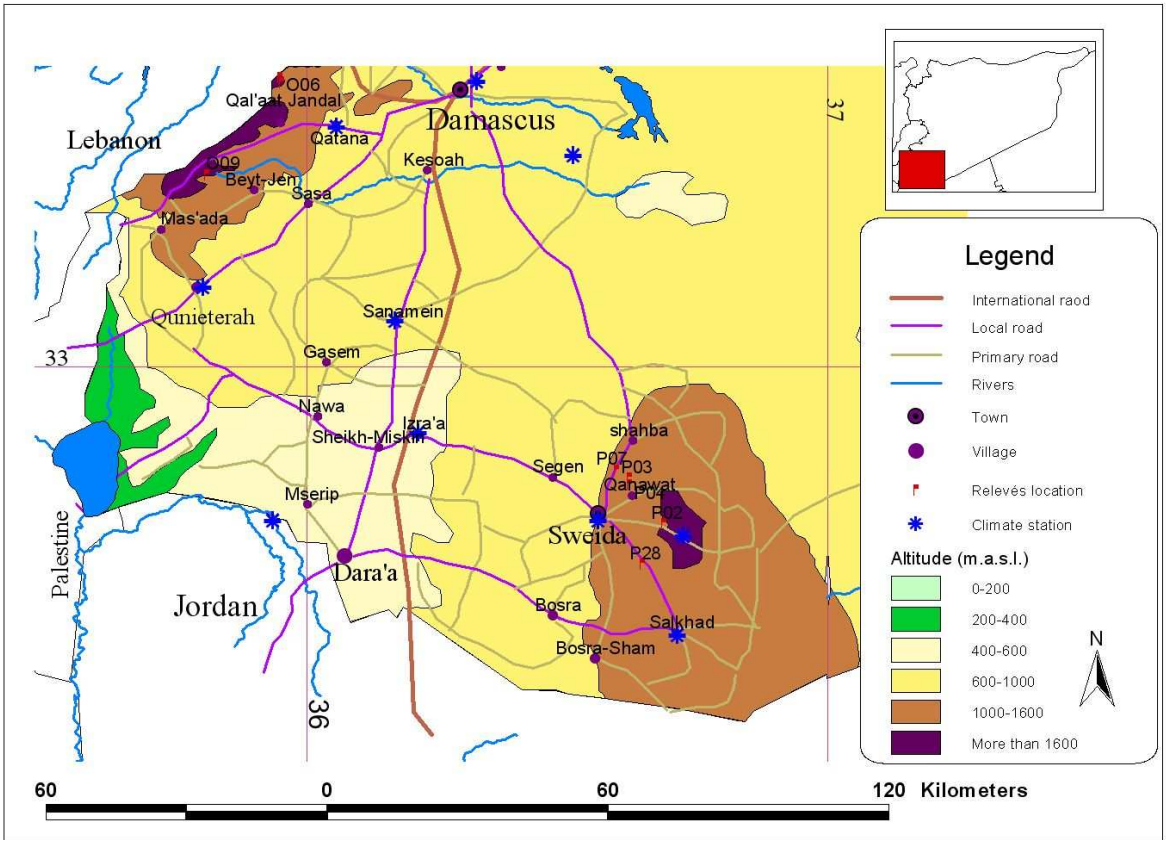


Fig 22: The study sites and relevés' places in the south region.

The herbaceous components of this formation comprise a very rich mixture of *Poaceae* and *Fabaceae* and others (Chikhali 2000).

Qanawat maquis forest is the one of the most important sites in Jabal Al-Arab. It contains the vegetation of Quercion calliprini alliance. The vegetation, which is up to 5 m tall, comprises a mixture of Eu-Mediterranean and Irano-Turanian species with the association of *Pistacia atlantica*, (relevés P03, P04 and P07 in table 6). Another important site in Jabal Al-Arab is Kafer southeast of Sweida (relevé P08 in table 6) which contains maquis of *Quercus calliprinos* of 4 m tall and total cover of 80%.

Supra-Mediterranean vegetation appears as a narrow strip in the highland where the altitude is more than 1400 m, and the precipitation increases to more than 450 mm/year. The vegetation of this zone has a formation of a non-developed climax of the sub-alpine formation like Daher-Jabal site (relevé P02 in table 6) where three species of *Quercus* appeared together, these are *Quercus cerris* subsp. *pseudocerris*, *Quercus look*, and *Quercus calliprinos*.

The Irano-Turanian vegetation of the study area is represented by three associations which are the *Artemisia herba-alba-Poa sinaica, Artemisia herba-alba, Achillea fragrantissima* and *Salsola vermiculata-Haloxylon articulatum* associations. These associations have been distributed on different altitudinal belts in Jabal Al-Arab, where the first is found in the lowlands of the dry sub-zone of the study area, the second is extended on the higher dry sub-zone, while the last one is located in the lower part of the dry sub-zone. The floristic components in the dry sub-zone are very limited if compared with other parts of Jabal Al-Arab (Chikhali 2000).

Due to the high annual rainfall of the forest-like zone, a few temporary streams and watercourses were found and the hydrophytes draw an outline of a *Typha australis-Butomus umbellatus* formation (Chikhali 2000).

Horan plains are part of basaltic massive covered by soils derived from basaltic rocks. Their altitude is (600-700 m) with a precipitation of (250-300 mm/year) and a dry period of 7.5 months a year, related to Ezra and Sanamein climate stations. The precipitation increases to 800mm/year and the dry period decreases to 5 months a year in the west at Qunieterah climate station.

No forest vegetation was generally noticed in Horan because it was extensively changed to farmlands. On the other hand, the vegetation in Al-Laga area has many vegetation patches among the rocky areas. Shrubby vegetation dominates by *Pistacia atlantica* and *Amygdalus korschinskii*, growing from many stems like bushes, with other grazing species, (relevé P07 in table 12).

In fact, the vegetation in Jabal Al-Arab is facing destruction that starts during the near past when a large number of forest areas were changed into agricultural fields, being liable for over-grazing, cut down for road construction, residential, industrial development and other human related activities, which are the main threats to the wildlife and natural habitats. Therefore, it is difficult

to encounter large patches of natural forest vegetation, but individual trees and some plants on the border of fields are still available as an indication of the past status of the area.

Finally, From all the previous geobotanical description, the Eu-Mediterranean zone distributes as follows:

1. Al-Akrad Mountain: it is dominant on most of it except the areas with an altitude of 900m up to the summit for Supra-Mediterranean.
2. Wastani Mountains (Barisha, Dweila'h and A'ala): it prevails in all of these mountains, apart from individual samples of Supra-Mediterranean.
3. Sheikh Barakat (Samaan Mountain).
4. North Jiser Al-Shoghour highlands.
5. Jabal Al-Zawiah Mountain, however, most of it is destroyed.
6. Baer and Bassit Mountain: Eu-Mediterranean is distributed from 100-450 m altitude, but it is extends up to 900 m and down to the sea where other vegetations were deteriorated.
7. The Coastal Mountains chains and Coastal plains:
    - 7.1. Northern slopes: from lower altitude up to 1100 m altitude.
    - 7.2. Eastern slopes: from Al-Ghab valley up to 900 m altitude.
    - 7.3. Western slopes and coastal plain: 200-700 m altitude, but it can be extending to 900 m or to the sea level when other vegetation types had disappeared.
    - 7.4. Southern Hills of the Coastal Mountain chain:
        - 7.4.1. The Hills adjoining Messiaf: up to 800 m elevation.
        - 7.4.2. The eventuated Basalt Hills: up to 600 m elevation.
8. Western Lebanon Mountain: up to 1100 m elevation.
9. Anti-Lebanon Mountain chains:
    - 9.1. Al-Qalamoun Mountain: in all the chain until 1800m elevation.
    - 9.2. Zabadani area: up to 1200 m elevation.
    - 9.3. Jabal Al-Sheikh: up to 1500 m elevation.
10. Jabal Al-Arab and Horan plains: up to 1400 m elevation.

6. The flora of Eu-Mediterranean:

In his Flora, Mouterde (1966-1983) recorded 3077 species that belong to 919 genera and 133 families. The Structure of the current study is concentrated on the flora of the Eu-Mediterranean as specific vegetation that occupied a large area of Syria was studied and listed.

Plant samples were collected and registered from the sites which were visited and investigated for the phytosociological studies. Many characteristics about the species were recognized and listed in the flora list (appendix 1).

6.1. The floristic aspects of the study area:

The main aspects of the Eu-Mediterranean flora list are related to the following factors:

1. The area lies between three different phytogeographical regions: Mediterranean, Irano-Turanian, and Euro-Siberian, where each of them is characterized by its typical flora.
2. The variety of habitats is affected by climate transition from relatively humid in Safita, Messiaf, and Qastal-Maaf to dry in Hassia and Qatana.
3. In a similar way, other topographical and geographical features such as the highland and lowland have an influence on the local climate. It increases the habitat variation of the study area as well as the plant species diversity.
4. Although the number of geomorphologic structures is relatively small, but the number of rock types is high. As a result, many soil types developed in a small area increasing the variation of habitats that are available for plants as the case in Baer-Bassit Mountain (Ghazal Asswad 1998).
5. The human activities of cultivation and grazing by domestic animals led to a big stress on the existing flora and the appearance of alien species in these habitats.

6.2. Components of the study area flora:

The total numbers of species which are listed in the study area are 685 species that belong to 376 genera and 104 families. By comparing the flora of the study area with the most recent flora of Syria (Mouterde 1966-1983), the following major issues have been recorded in the flora list of the study area:

- Thirty-two families in the flora list of this study are containing the most species and genera which are recorded in the flora of Syria, they are:

Araliaceae	*Anacardiaceae*	*Berberidaceae*	*Caesalpiniaceae*
Caprifoliaceae	*Celastraceae*	*Cornaceae*	*Crassulaceae*
Elaeagnaceae	*Ephedraceae*	*Equisetaceae*	*Ericaceae*
Globulariaceae	*Lauraceae*	*Mimosaceae*	*Moraceae*
Myrtaceae	*Oleaceae*	*Oxalidaceae*	*Paeoniaceae*
Periplocaceae	*Phytolaccaceae*	*Platanaceae*	*Polygalaceae*
Polypodiaceae	*Rafflesiaceae*	*Salicaceae*	*Selaginellaceae*

Smilacaceae *Sparganiaceae* *Styracaceae* *Vitaceae*

- There are about 12 families in the flora list of this study, which contained all the genera available in the flora of Syria, they are:

Acanthaceae *Aceraceae* *Aspleniaceae* *Cistaceae* *Cupressaceae* *Dioscoreaceae* *Hypericaceae* *Juncaceae* *Plantaginaceae* *Typhaceae* *Verbenaceae* *Violaceae*

- There are eight orders in the flora list of this study, which involved all families, genera, and species in flora of Syria, the orders are *Salicales, Equisetales, Celastrales, Lepidospermales, Oleales, Ericales, Chlamydospermales* and *Ebenales.*
- Moreover, three orders in the flora list of this study contained all families and genera that are listed in the recent Syrian flora; these are *Pandanles, Juncales* and *Cupressales*.

6.3. Life-form spectrum of the Eu-Mediterranean flora:

Many investigators have used life-form spectra in attempts to correlate prevailing climates with plant physiognomy. These studies indicate that the life-form spectrum of a region or an area is an expression of the climatic factors and, therefore, it can be used as a rough measure in relation to general climate.

The life-form classes of the constituent species have been determined, according to the method of Raunkiaer (1934), in the field while collecting the vegetation data.

The life-form classes of the species in the study are represented in (appendix 1) by therophyte (Th), geophyte (G), hemichamaephyte (H), phanerophyte (Ph), Chamaphyte (Ch) and Epiphyte (E).

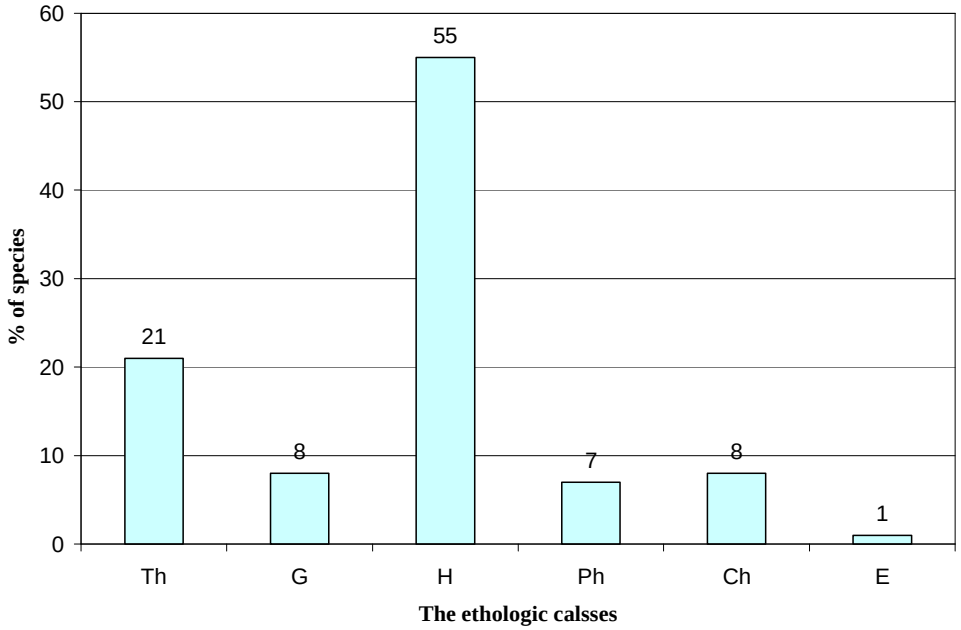


Fig 23: The percentage of the life form species according to the life form in the Eu-Mediterranean.

The figure (24) represents the percentage average of the life forms of species in the flora list of the study area.
Figure 24 indicates that 56% of the species are hemicryptophytes, 21% therophytes and less than 10% for each of the chamaephytes, phanerophytes and cryptophytes.

6.4. Phytogeographical analysis of the Eu-Mediterranean flora:

436 species from the flora of the study area has been phytogeographically classified according to Mouterde (1966-1983), Davis (1965-1985), Zohary (1973), Chalabi (1980). The percentage of the species of the flora was calculated from the flora list (appendix 1) and is presented in fig (25).
The flora species is belonging to five groups as the following: (fig 25)

1. Mediterranean species are widely distributed in the study area by 77% of the species and most of them (37% of the total number) belong to the East-Mediterranean region.
2. Irano-Turanian species, which inhabit Syrian Desert and many other sites in the study area, account for 8% of the species.
3. Euro-Siberian species, which are growing mainly in the wet and cold habitats, represented by 8%.
4. Cosmopolite and semi-Cosmopolite species are represented by 7% species.
5. Bi-region species that grow in two regions Mediterranean-Irano-Turanian are less than 2% of the species.

These distributions are normal, because most of the species of the study area follows the Mediterranean region.

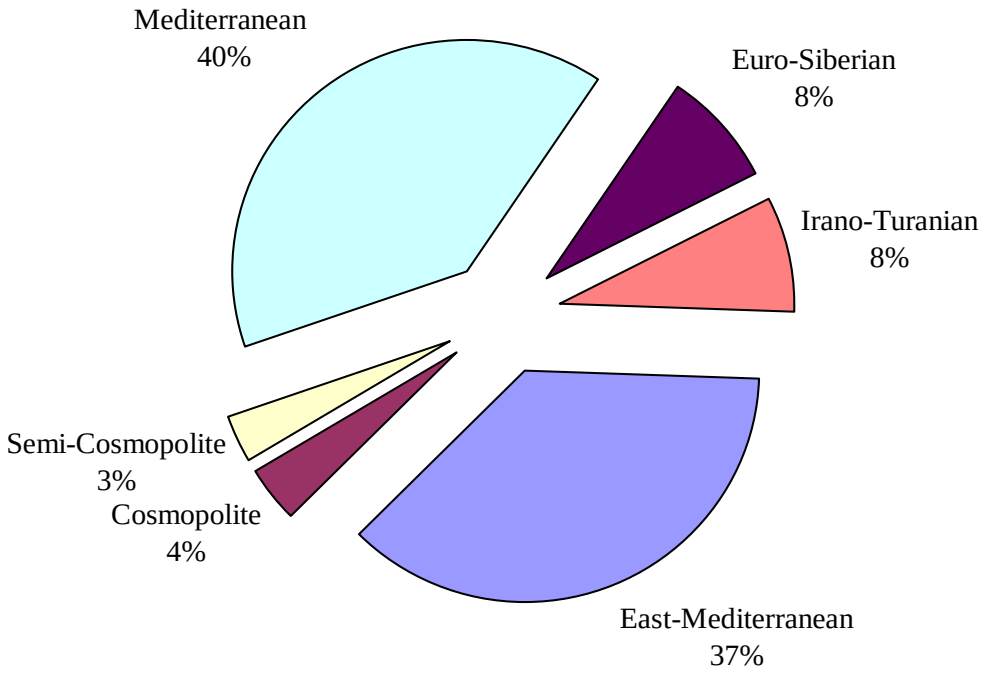


Fig 24: The species distribution according to phytogeographical regions.

6.5. Phytosociological analysis of the Eu-Mediterranean flora:

Phytosociological relation was distinguished for 228 species corresponding to each phytosociological indicative unit; depending on the phytosociological tables in the current study and from Quezel (1973, 1979), Chalabi (1980), Ghazal (1994) and others, all of that was recorded in appendix (1). The result hereunder shows (table 7):

Table 7: The number of species in each phytosociological unit depending on the flora list in appendix (1).

Class & Order	*Alliance*	Total	
Quercetea(etalia) ilicis		25	69
	Oleo-Ceratonion	5	
	Quercion calliprini	18	
	Gonocytiso-Pinion	10	
	Ptosimopappo-Quercion	11	
Quercetea(etalia) pubescentis		45	110
	Ostryo-Quercion pseudocerridis	26	
	Quercion infectoriae	1	
Querco-Cedretalia libani		38	
Astragalo-Brometea		5	8
	Helleboro-Juniperinion drupaceae	3	
Querco-Fagetea		3	3
Cisto-Micromerietea		38	38

Six phytosociological classes were recorded in the flora list. 69 species follow to Quecetea (etalia) ilicis and its alliances and 38 species to Cisto-Micromerietea. The Quercetea (etalia) pubescentis contains the highest number of species (110) because plants of this class spread in the humid bioclimatic zone.

6.6. The dynamic of the flora species in the study area:

Long-term monitoring of the vegetation in the field was done during and before the current study. The information made it possible to suggest an analysis of this flora and vegetation dynamic and all data was recorded in appendix (1). The information of dynamic status of the species was summarized in the table (8).

The total number of the endemic species in Syria is 243 species or 7.8% from the total number of the Syrian flora (3077) (Chikhali 1990), but Davis et al. (1994) increased the number to 395species. The endemic species recorded in

the study area represents 31species which form 13% of the total endemic species of the Syrian flora.

Table 8: The dynamic classification of the species according to flora list appendix (1).

Dynamic	Category		Total	Dynamic	Category		Total
Common	C	C	172	Rare	R	R	72
		W	18			W	2
		I	20			E	2
		D	1			D	1
Endemic	E	E	28	Endangered	D	D	17
		W	3			W	3
Increasing	I	I	15	Stabilized	S	I	6
Decreasing	W	W	51			S	47
						W	4

There are two main areas in Syria for the endemism: the first one is in the high mountains like Jabal Al-Sheikh, Anti-Lebanon and the Coastal Mountains, the second one is in the isolated high area in the Badia where the Irano-Turanian species are dominating (Chikhali 1990). In the study area, the endemic species were recorded in three regions: high region, south region and coastal regions e.g., in the high region *Agropyron libanoticum, Iris antilibanotica*, *Aristolochia paecilantha* var. *scabridula* and *Delphinium virgatum*, and in the Coastal Mountains especially in the Baer-Bassit Mountain *Glycyrrhiza flavescens*, *Chamaecytisus cassius, Alyssum crenulatum* and *Quercus infectoria* subsp. *microphylla* and in Jabal Al-Arab *Iris auranitica.*

There are 72 rare species and 17 endangered ones (table 8). The most species of them are located in the Coastal Mountains and the high region, where the forests are dominating in the Eu-Mediterranean. It can be clearly seen from this table that the most flora species in the study area are decreasing in all categories, especially endemic and endangered species, which face the danger of extinction by destroying their habitats mainly by unbalanced human activities.

7. The vegetation of the study area:

7.1. The vegetation regions:

In general, four vegetation regions in the study area were recognized in the geobotanical survey (fig 23), and these are:

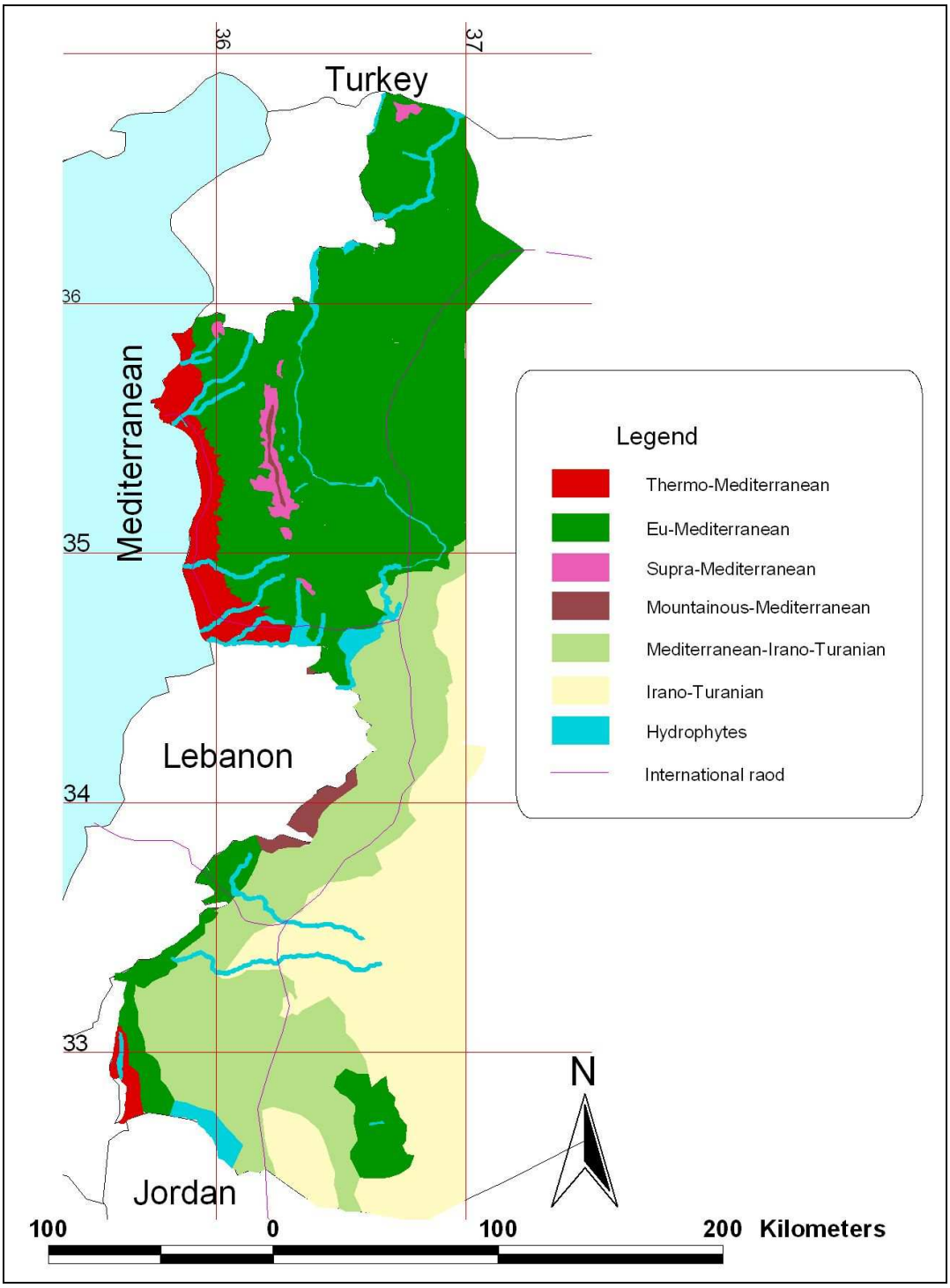


Fig 25: The Eu-Mediterranean locations with the other vegetation types in the study area.

7.1.1. Mediterranean vegetation:

This portion covers the whole of circum-Mediterranean region, of Syria. The Quercetea ilicis sclerophyllous forests dominated by *Quercus calliprinos* represent this vegetation.

It is distinguished by periodic daily and annual small changes in the temperature and the complete absence of frost at sea level. The rainy season lasts from October until the end of April. The precipitation is over 700 mm/year, but reaches more than 1000 mm on the higher altitudinal belt of the coastal area.

This region comprises: the coastal plains of Syria with a large part of the western penetrations of the Coastal Mountains up to a height of 1400 m in the forest areas to the North of Lattakia, the volcanic plateau around Homs, and the southwestern parts of Syria (Banias and Hemmah in the Golan Heights).

The Mediterranean vegetation of the western region of Syria can be classified into the following stages:

7.1.1.1. The Thermo-Mediterranean:

In the thermo-Mediterranean stage, forest landscapes are uncommon, the arborescent matorral and garrigue predominate (Quezel 1981) with many forest communities, which comprise *Olea oleaster, Pistacia lentiscus* and *Ceratonia siliqua* (Nahal et al. 1997).

The thermo-Mediterranean forest is very rare in Syria; it consists from short maquis 1-2 m height as the case in Um-Toyour, Qara-Douran and Al-Ya'ssobiah. In general, this vegetation spreads from sea level up to 300 m in the coastal plains with warm sub-humid, and temperate semi-arid bioclimatic stages (Nahal et al. 1997). However, it is very difficult to be clearly noticed because it has disappeared from the Coastal Plains, but its elements especially *Ceratonia siliqua, Pistacia lentiscus* and *Myrtus communis* were recognized sharing other vegetation such as the pine forest in Um-Toyour or noticed as individual trees of *Ceratonia siliqua* from Lattakia to south of Tartous, Darkosh in Wastani mountain and on the edge of the Ghab plain near Jouren.

7.1.1.2. The Eu-Mediterranean (Meso-Mediterranean):

Forest landscapes in the Eu-Mediterranean in Syria are usually the critical climax vegetation except for the Mediterranean conifers (Quezel 1981b). It is an important part in the eastern Mediterranean alongside *Quercus ilex* and *Quercus calliprinos* (Barbero et al. 1991).

This is the dominating vegetation in the western part of Syria, it is extending from Al-Akrad Mountain in the north to Jabal Al-Arab in the south. From the altitude point of view, it ranges from sea level up to 1200 m above sea level. The rainfall ranges from 300-1200 mm/year. The average for the minimum and the maximum annual temperature ranges from 1-9°C and from 12-25°C, respectively. It exists in warm and temperate sub-humid to fresh and temperate

semi-arid bioclimate stages (Nahal et al. 1989). The long dry period and the shortage of light are the common climate conditions which characterize the vegetation (Barbero et al. 1991).

Based on previous surveys and observation on defining of plant associations, a vegetation map is presented for the study area indicating that the Eu-Mediterranean vegetation can be organized in three types which are:

7.1.1.2.1. Humid and sub-humid Eu-Mediterranean vegetation type:

This type can be found along the sea in the Coastal Mountains and Baer-Bassit chains, it supports the best natural vegetation presented by the climax community of forest stands of either an evergreen oak forest of *Quercus calliprinos*, a semi-deciduous oak forest of *Quercus aegilops* and a forest of *Pinus brutia* especially on the western slopes of the Coastal Mountains.

7.1.1.2.2. Semiarid Eu-Mediterranean vegetation type:

It can be divided into two types:

- **Non cold**: This type occupies Al-Akrad Mountain and extends southward across Wastani Mountain to Jabal Al-Zawiah. It ranges from 200-900 m above sea level, and the rainfall ranges from 400-550 mm/year and the annual minimal temperature averages between 1 and 4°C.
- **Cold:** It is represented by an evergreen oak forest of *Quercus calliprinos* that can be found in the High Mountain region, in Zabadani and Rakhleh areas, it ranges from 800-1250 m above sea level, and the rainfall ranges from 250-600 mm/year and the annual minimal temperature averages between -1and +1°C.

7.1.1.2.3. Arid Eu-Mediterranean vegetation type:

This vegetation represents the very dry stands of forests in all Eu-Mediterranean vegetation, not only in the study area but also in the whole east Mediterranean region. It can be found in Jabal Al-Arab and Lajah area in the south and ranges from 900-1200 m above sea level. The rainfall ranges from 300-500 mm/year, and the annual minimal temperature averages between 0.5 and 4°C. The vegetation is represented by either evergreen or deciduous oak forest, which is mostly dominated by Mediterranean phanerophytes and chamaephytes of trees and shrubs.

The Irano-Turanian elements are found by many plant species: chamaephytes, cryptophytes and therophytes, but the Saharo-Arabian elements appeared by only few species especially from therophytes.

An interesting output of this classification is that altitudinal range of Eu-Mediterranean vegetation changes by three directions (fig 26):

1- From west to east region.
2- From north to south region.
3- From western to eastern slopes in mountain areas.

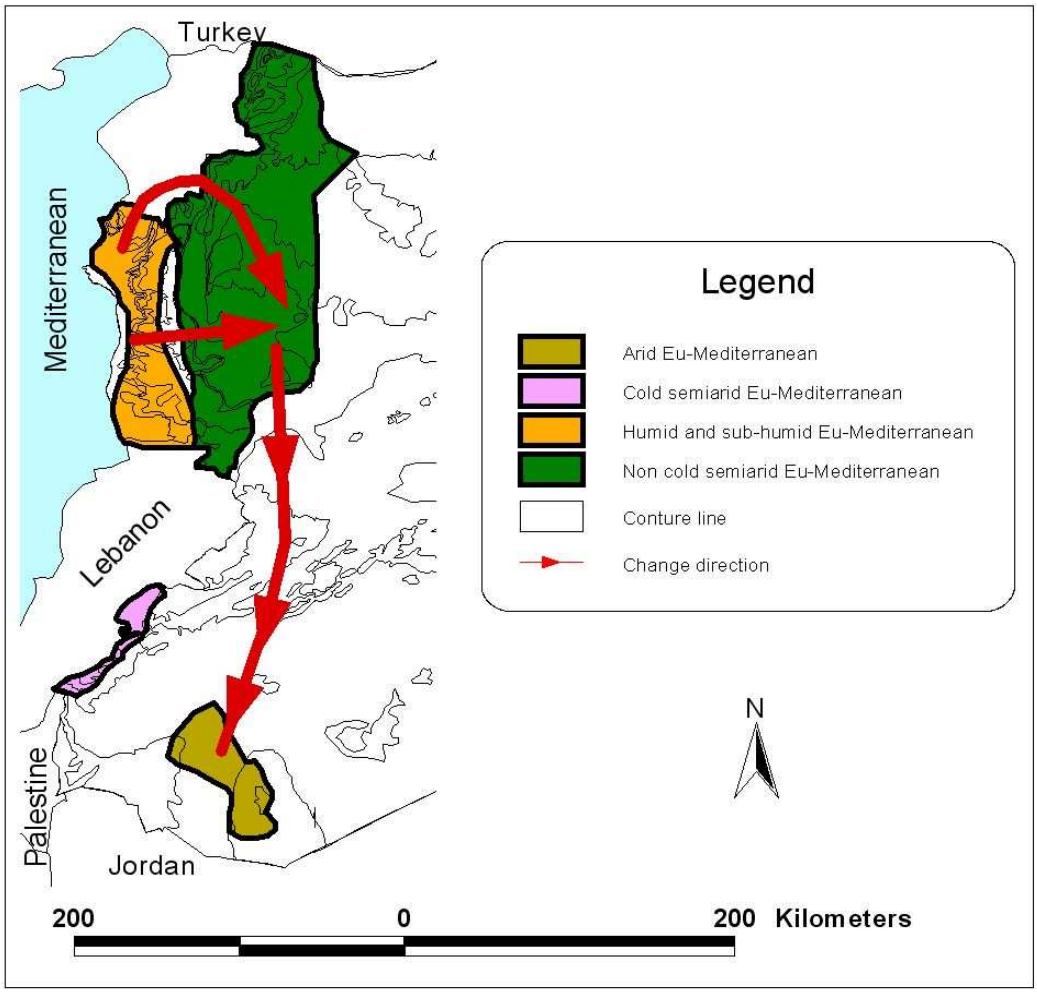


Fig 26: The distribution types of the Eu-Mediterranean vegetation in the study area.

The soil is dominated by red Mediterranean soil (Terra-Rossa) developed on hard limestone parent rocks and yellow Mediterranean soil (Rendzina) of soft limestone parent rocks. The brown soil is derived from basaltic, serpentine, and gabbros parent rocks.
Mediterranean elements comprise the majority of the study area flora where arboreal species are the most important ones.
The vegetation is dominated not only by conifers such as *Pinus* and *Cupressus* but also by sclerophyllous hard wood such as *Quercus calliprinos*, *Arbutus* spp. and *Phillyrea* spp. (Nahal et al. 1989).

7.1.1.3. The Supra-Mediterranean:
It consists of deciduous trees mainly *Quercus cerris* subsp. *pseudocerris* and *Quercus infectoria* (Nahal et al. 1997). Sometimes it is shared by brutia pine as the case in Baer-Bassit. It ranges from 500-1100 m height in the study area. It occupies the top of Al-Akrad Mountain, but in the Coastal Mountains it starts from 700 m on the western slopes and from 800 m on the eastern slopes. In

Baer-Bassit it appears at 500 m to the top and consists an important forest in Syria.
It dominates in temperate and fresh humid bioclimate stages (Nahal et al. 1997). Both have a relative long dry period of (1 to 2 months) and the higher rainfall make the litter change possible with the development of species from Quercetea pubescentis, such as *Quercus cerris* subsp. *pseudocerris,*

7.1.1.4. The Mountainous-Mediterranean:
This is common with an altitude of more than 1100 m in the western region of Syria, which is characterized by a cold humid bioclimate stage. Its vegetation includes cold resistant coniferous species such as *Cedrus libani* and *Abies cilicica* in the high altitudes of the Coastal Mountains and *Juniperus excelsa* in the high altitudes of the Anti-Lebanon Mountains of more than 1200 m.

7.1.1.5. The high mountainous (Oro-Mediterranean):
It is only seen in Syria in the Anti-Lebanon Mountains at an altitude of 2000 m and more, the low temperature and the snow with the long period of frost result in a zone of poor tragacanthic vegetation of the sub-alpine to alpine type (Zohary 1973).
The vegetation of this sub-section consists of grass species that tend to cluster beside rocks. They have the shape of thorny blocks such as many species of *Astragalus*, *Acantholimon* and *Noaea*. The maquis of this stage is dominated by many species such as *Juniperus excelsa*, *Pyrus syriaca* and *Amygdalus orientalis* (Nahal et al. 1997).

7.1.2. Irano-Turanian vegetation:
This vegetation spreads to the east of the Mediterranean vegetation and in southern Syria; it surrounds the Mediterranean regions in Jabal Al-Arab from all sides. It is characterized by being a timber less land since it has no forest cover.
It usually occurs at an altitude of less than 1000 m especially in the southern and Mountain regions. The rainfall does not exceed more than 300 mm/year and the average annual minimum temperature ranges from 1 to 5°C in the study area.
The vegetation is mostly dominated by chamaephytes of low shrubs and bushes (timber less land) and referred to as steppe vegetation.
Many plant species of both the Mediterranean and the Irano-Turanian vegetation can intermix in their distribution; however there are still some purely typical Irano-Turanian elements.
This region is widely affected by human activities such as overgrazing, rural development and imitations of industrial areas on the expense of the rangelands and biodiversity.

7.1.3. Euro-Siberian vegetation:

It shares the study area by some floristic elements especially on the north western slopes of Baer-Bassit Mountain and in the height of mountains where the rainfall reaches up to more than 1000 mm/year. It is never found as a pure vegetation of a forest.

7.1.4. Saharo-Arabian vegetation:

This vegetation appears just in a small land in the south eastern part of the Syria where the precipitation is less than 100 mm/year where the aridity is the highest. Some of its elements share the other vegetation types in many sites in the study area but it did not occupy any of these sites.

7.2. The vegetation types of the study area:

The vegetation types of the study area will be described in relation to the natural vegetation without dealing with the cultivated land.
The following types were recognized and cited on a map of distribution:

7.2.1. Evergreen oak forest:

This vegetation is classified as Mediterranean maquis, and comprises the major part of the forest vegetation in Syria. The main element of these forests is *Quercus calliprinos*.

7.2.1.1. *Quercus calliprinos* forests:

Quercus calliprinos is one of the most important elements of the maquis in the eastern and south-eastern part of the Mediterranean region (Nahal et al. 1989). Together with few other evergreen shrubs or trees, such as *Phillyrea media*, *Rhamnus alaternus*, *Laurus nobilis*, etc. and a few summer green (deciduous) trees, such as *Pistacia palaestina*, *Styrax officinalis*, *Cercis siliquastrum* and others, it forms the maquis in Syria, Lebanon, Palestine and southern Turkey, which is the most outstanding vegetal feature of landscape in these countries.
It is a true East-Mediterranean species. The most southernly stations of *Quercus calliprinos* in Palestine is also the southern boundary of the Mediterranean maquis in the Middle East (Zohary 1973, Nahal et al. 1989). It approaches closely to the eastern boundaries of the Mediterranean territory.
Quercus calliprinos is capable to extend far beyond its primary altitudinal zone and to inhabit sites of destroyed summer-green deciduous forests (Zohary, 1973). Sometimes, it extends up to 1000 m and 1300 m in the Coastal Mountains and Anti-Lebanon Mountains, respectively. *Quercus calliprinos* is extremely polymorphic and was therefore subject to excessive splitting by some authors, but Chalabi (1980) recorded three varieties of this oak in Syria: *Quercus calliprinos* var. *eucalliprinos* DC., *Quercus calliprinos* var. *fenzlii* A.Camus and *Quercus calliprinos* var. *dispar* Ky.

When the *Quercus calliprinos* permanently grazed as is the case everywhere in the Middle East, it takes the form of a low shrub less than one metre height as in many sites in Al-Akrad, Wastani, Al-Zawiah and Coastal Mountains. When unmolested as in cemeteries or other inaccessible sites to humans and goats, it takes a tree habit and attains a high age and considerable dimensions (as in many sites in the Coastal Mountains). This indicates that the shrubby appearance of maquis is not a primary reflection. Under certain conditions, the maquis may grow to form an oak forest (Zohary 1960, Nahal 1981).

Quercus calliprinos grows in poor and rocky areas on different parent rocks marl, calcareous, basalt and green rocks (Nahal et al. 1989), and it is found on Terra-Rossa, Rendzina, sandy loam, and even on some podzolic soil (Zohary 1960).

It survives in the humid, sub humid and semi-arid bioclimatic stages and in all their variants, cold, fresh, warm, and hot climates (Nahal et al. 1989).

Quercus calliprinos spreads widely in Syria from Al-Akrad Mountain in the north to Jabal Al-Arab in the south and it reaches to 37˚ longitude in the east. This type of vegetation occurs at an altitudinal range from sea level to 1450 m in Jabal Al-Arab.

Maquis is one of the commonest types in all the Syrian regions, subject to Mediterranean climate; this type constitutes an integral part of the natural vegetation.

The *Quercus calliprinos* vegetation could be classified into two main types, these are:

7.2.1.1.1. Inland vegetation type:

It occurs in the southern parts (Jabal Al-Arab) and the High Mountains region (Zabadani area and Jabal Al-Sheikh). This type grows at high altitudes of more than 1000 m. This vegetation is far away from the sea where it grows on the eastern slopes of Anti Lebanon and Jabal Al-Sheikh as well as the high altitudes of Jabal Al-Arab, which is similar to the vegetation of north Jordan where it grows at altitudes more than 700 m (Al-Eisawi, 1996). This vegetation type coincides with the semi-arid and the upper part of the arid bioclimatic stage with cold, fresh and temperate variants.

7.2.1.1.2. Humid and sub-humid vegetation type:

It occurs in the middle and northern areas of Syria (Akrad, Wastani, Zawiah and Coastal Mountains) at height ranges from sea level up to 1100 m, it grows in humid, sub humid and semi arid bioclimatic stages with fresh, temperate and warm variants.

7.2.1.2. Semi-deciduous oak forest:

This vegetation consists of *Quercus aegilops* vegetation, but some studies indicate that *Quercus infectoria* forms a semi-deciduous oak forest that occurs in the lower parts of the Supra-Mediterranean (Nahal et al. 1997). However, it

shares widely the Eu-Mediterranean vegetation especially in climax and semi-climax forests.

7.2.1.2.1. The *Quercus aegilops* semi-forest vegetation:

Ghazal (1993- 1994) studied *Quercus aegilops* in Syria. This vegetation occurs in many sites in Syria from Al-Akrad Mountain in the north to Jabal Al-Arab in the south and it is found in Wastani, Zawiah and Coastal Mountains, wherever the land is flat. Altitude ranges from 50 m in southern Coastal Plains to 1450 m in Jabal Al-Arab in the south, but it did not extend to a height more than 800 m in the middle Mountains (fig 27).

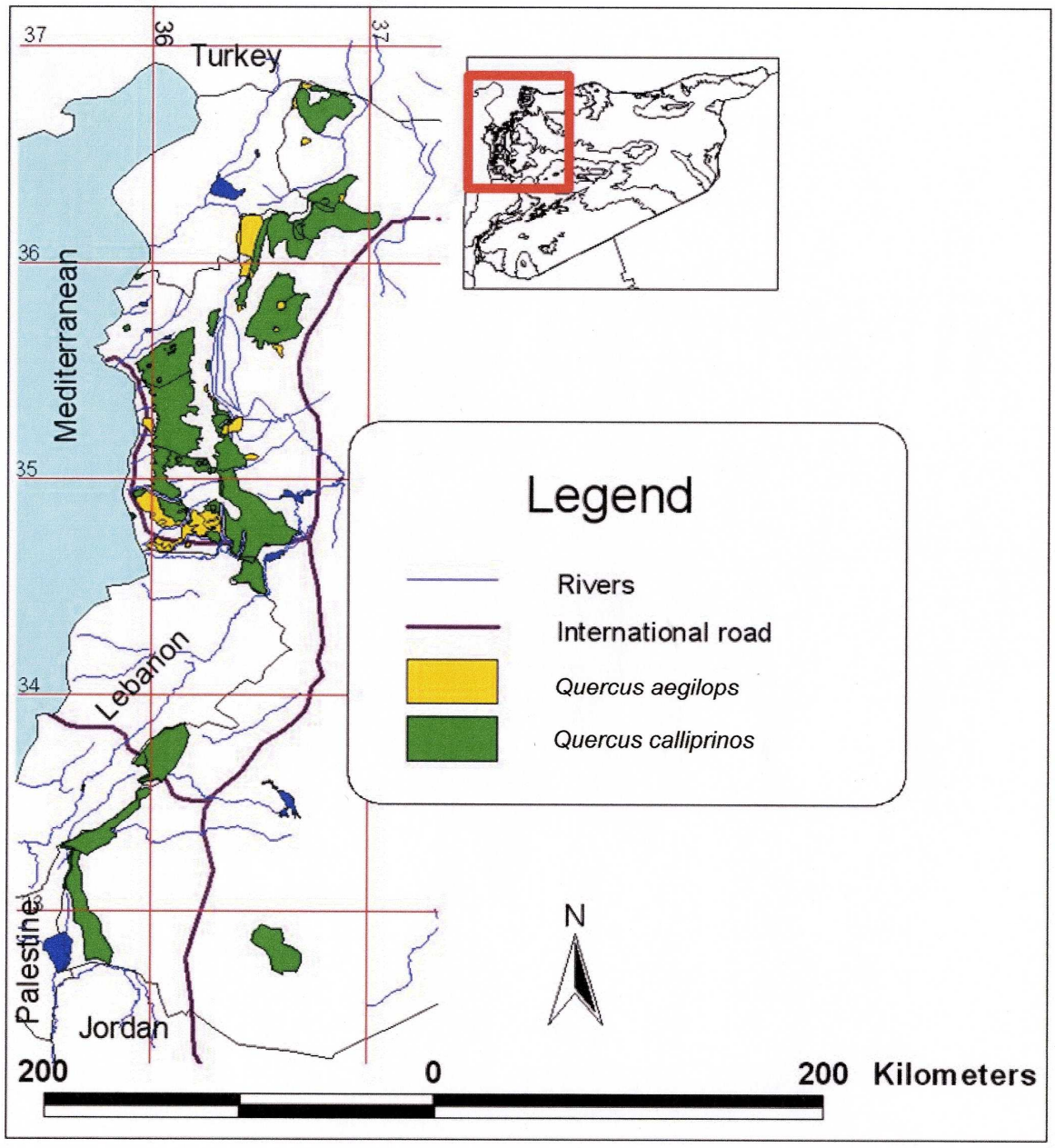


Fig. 27: *Quercus calliprinos* and *Quercus aegilops* in Syria

In general, it shares all *Quercus calliprinos* locations, but the relation between them is very clear. The sites are divided between them where *Quercus calliprinos* occupies sites with shallow and rocky soil in the slopes, while the *Quercus aegilops* occupies the sites with deep soil and flat topography.
This vegetation grows on different types of soils, red and brown derived from hard limestone, marl and basalt parent rocks.
In this vegetation three strata can be recognized in all protected forests:
Tree stratum: This consists of *Quercus aegilops* and sometimes *Quercus calliprinos* and *Quercus infectoria*. The *Quercus aegilops* grows up to 15 m height with a diameter that reaches 100 cm.
Shrub stratum: It groups *Quercus calliprinos, Pistacia palaestina, Crataegus azarolus, Pyrus syriaca* and *Phillyrea media* and sometimes *Amygdalus korschinskii*.
Herbaceous stratum: *Jasminum fruticans, Clematis cirrhosa, Ephedra campylopoda, Bryonia syriaca, Hypericum cuneatum, Tamus communis, Asparagus acutifolius, Smilax aspera, Bryonia multiflora,* and *Lavatera punctata.*
This vegetation type is being the most affected forest vegetation by human impact through both the reduction of the forest into agricultural land, and the cutting of trees for wood collection. The degradation has taken place in the *Quercus aegilops* forest destroying the under story vegetation and the soil.

7.2.2. Coniferous forest:

Typical Mediterranean vegetation forms, with the dominance of trees of brutia pine (*Pinus brutia*) mainly as well as a small area of Aleppo pine (*Pinus halepensis*) or (*Cupressus sempervirens*).

7.2.2.1. *Pinus brutia* forests:

Pinus brutia has a rather restricted range of distribution. It is limited mainly to the East Mediterranean countries, from Greece to southern Lebanon (Zohary 1973, Houerou 1981, Tomaselli 1981, Quezel 1981, 1985). Hybrid forms of this pine occur in places where its area is overlapping with *Pinus halepensis* (e.g. northeastern Greece) (Zohary 1973). Even its occurrence on the western slopes of the Kurdistan Mountains in northern Iraq, most probably as a relic, does not efface its Mediterranean character (Zohary 1973).
Pinus brutia plays a very considerable role in the vegetation of the East-Mediterranean. It is most indicative of Mediterranean conditions. It plays an important role, notably in western Anatolia, Syria and Lebanon (Quezel 1981) because it is as highly invasive as *Pinus halepensis.* It is also the predominant coniferous species in both Syria and Lebanon. It reaches its southern most limits in the south of Lebanon, at the latitude of Saida (Mouterde 1966).
It inhabits some mountains of Syria, Lebanon, Cyprus, Crete, Anatolia and mountain slopes in the Euxinian territory wherever the conditions are favorable,

and extends to replace the destroyed original forest vegetation. It is sometimes found in the destroyed beech forest climax vegetation. However, the most extensive forests of this pine are limited to the south and west of Anatolia (Zohary 1973).

Pinus brutia is found in Eu-Mediterranean and Thermo-Mediterranean zones but without forming a clear forest landscape in the latter. Therefore, *Pinus brutia* is considered, in parallel with *Pinus halepensis*, so invasive that one cannot delineate with certainty its primary sites within the Mediterranean zone.

In the forests of *Pinus brutia* in Greece and the middle south of Turkey this pine is dominating in the upper stratum as a dense and middle height tree with evergreen sclerophyllous vegetation and the other coniferous species, like *Pinus halepensis*, in the lower stratum (Tomaselli 1981). This case was recognized in several sites in the study area.

The vegetation of *Pinus brutia* forests in Syria occupies a wide area especially in the western region where the study area is located. This vegetation occurs naturally as pure stands in altitude that ranges from sea level in Bassit area up to 1100 m height in the Coastal Mountains, but in Turkey and the Aegean Islands, its forest reaches an altitude of up to 1700 m (Zohary 1973).

Forests of *Pinus brutia* have a rather wide range of ecological requirements. They are relatively found in the humid, sub-humid and semi arid bioclimatic stages. Nahal (1977) classified *Pinus brutia* forests in the East Mediterranean region into three types depending of their bioclimatic stage humid, sub-humid and semi-arid forest vegetation types.

In Syria, all these types were recognized except those in the semi-arid cold stage (fig 28).

Based on the previous geobotanical surveys and on the habitats in this study, all the forest types could be specified by their locations, they are:

1- **Humid forest types** of *Pinus brutia* are found in two locations, in Baer-Bassit Mountains and on the western slopes of the Coastal Mountains.
2- **Sub-humid forest types** of *Pinus brutia* are found in Jiser Al-Shoghour hills, small spots in Wastani Mountain and many locations on the eastern slopes of the Coastal Mountains.
3- **Semi-arid forest types** are concentrated in southern part of Al-Akrad Mountain.

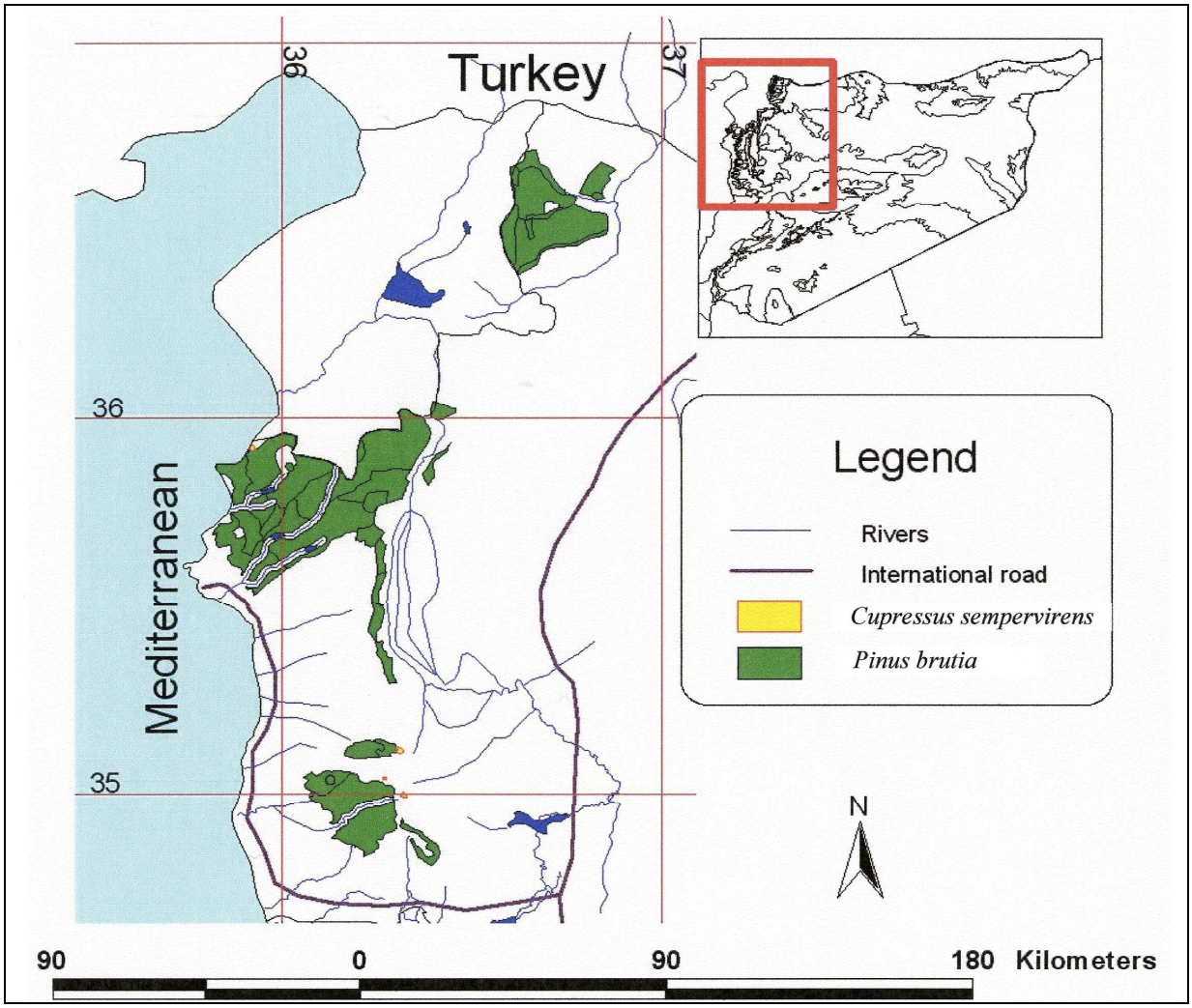


Fig 28: *Pinus brutia* and *Cupressus sempervirens* distribution in Syria.

Pinus brutia forests prefer chalky, marl and sandy rocks on Rendzina soils (Nahal 1981, Quezel 1981). On the one hand, Rendzina and calcareous soils are present in Al-Akrad Mountain, the Coastal Mountains and Jiser Al-Shoghour hills. On the other hand, brown soil derived from green rocks (serpentine, amphibolites and gabbros) in Baer-Bassit Mountains plays a major role in spreading *Pinus brutia* in this area which represents the most important forest in Syria. In this area, the brutia pine trees are shared by *Quercus cerris* subsp. *pseudocerris* as a result of the degradation of the primary vegetation, forming a secondary succession (Chalabi 1980, Ghazal Asswad 1998).
Three strata could be recognized in this forest, they are:

- First stratum: The high trees represented by *Pinus brutia* which can reach up to 30 m (Chalabi 1980, Nahal et al. 1997) in a humid forest type, but in a sub-humid forest it reaches up to only 12 m and just to 8 m in a semi-arid forest. The tree canopy is usually not dense especially in the sub humid and semi arid forests, while it is denser in a humid forest.
- Second stratum is represented by the low trees, which are observed as an under-storey like *Quercus calliprinos, Juniperus oxycedrus, Arbutus*

andrachne, Pistacia palaestina and *Phillyrea media*. Sometimes shrubs and bushes are represented by *Gonocytisus pterocladus, Calycotome villosa* and others. This stratum grows up to 6 m especially in a form of low trees which were cut by man or as naturally outlook like *Juniperus oxycedrus*.

- Third stratum: Herbaceous and ground cover species, which do not have a height of more than 100 cm, consisting of *Cistus villosus, Cistus salviifolius, Smilax aspera, Thymus syriaca, Asparagus acutifolius, Origanum syriacum*. The flora of this stratum is poor in a semi arid forest, but becomes richer in sub humid and richer in forests.

7.2.2.2. *Pinus halepensis* forest:

This represents a typical Mediterranean vegetation form, it spreads widely in western part of the Mediterranean region as a dominant coniferous species, but in Syria, the natural occurrence of Aleppo pine forest is restricted just to small spots in the southern part of the Coastal Mountains around Safita, 150-250m and Qadmous 600m (Nahal et al. 1989).

Therefore, *Pinus halepensis* forest observed in many locations in Syria are not natural, but a result of the national afforestation projects. The Ministry of Agriculture and Agrarian Reform represented by the Department of Forestry has been carrying out a program or reforestation for more than fifty years. Most of the trees used for this reforestation project in different regions are mostly Aleppo and brutia pine trees.

7.2.2.3. *Cupressus sempervirens* forest:

Cupressus sempervirens is an evergreen tree, which has a very peculiar distribution pattern in the Middle East. It is native in Greece, Crete, Rhodes, Armenia, Cyprus, Lebanon, Syria, Palestine and Turkey (Townsend et al. 1966-1980, Zohary 1973). However, its most eastern station is found in the Hyrcanian sector of Iran with few locations. This cypress forms a kind of mixed forest and is associated with *Acer monspessulanum, Quercus iberica, Crataegus monogyna, Cerasus microcarpa, Carpinus orientalis.* Sometimes it has a very rich herbaceous cover consisting of many Mediterranean species but rather weedy components and also of *Artemisia herba-alba*.

In Turkey, the cypress is limited to south-western Anatolia and to some of the Aegean islands. In Anatolia (where it is very abundant, but not dominant) it is often accompanied by *Pinus brutia* or *Pinus nigra* forests and even *Cedrus* forest. In the Aegean Islands, it occurs in Kos, Rhodos, Karpathos and Crete. In the latter, it is a very important element in the vegetation of the *Cupressus-Acer orientale* association, especially in the Lefca Ori sector and around it where it shows a very wide altitudinal range (0-1600 m) (Zohary 1973). In Cyprus, it is very common, forming dense forests on the northern mountain range.

In Lebanon, the cypress occurs in several locations between 300-1400 m (as in Ihden, Jobail, Gorer and elsewhere). It shares pine species on marl and

calcareous substrata and sometimes the *Quercus calliprinos*, but it plays a weak role with this oak (Abi Saleh 1978).
In Palestine, there are only very poor remnants of cypress forest in the form of few scattered trees in Gilead, among the Aleppo pine forest near Kufrinje as well as a stand and some individual aged trees in the highlands of Edom (Zohary 1973).
In Syria, it is naturally known only in several locations near Messiaf in the southern part of the Coastal Mountains and in Qara-Douran near Kasab in the north. In some of these areas, there are almost pure stands of this tree, while in others it is mixed with *Pinus brutia* (Nahal et al. 1989).
It can grow in poor and shallow soils and it can resist the high level of calcium in the soil. It is considered one of the Eu-Mediterranean elements (Nahal et al. 1989).
From a phytosociological point of view, it is considered among the components of Gonocytiso-Pinion in Lebanon (Abi Saleh 1978), southern Anatolia (Akman et al. 1978) and Syria (Chalabi 1980), but Martini (1999) registered one association that follows the Quercion calliprini.

7.2.3. Mediterranean non-forest vegetation (degraded vegetation):

The Mediterranean region which is not covered by forests contains some shrubs and bushes. Such region is referred to as garigue and batha Mediterranean vegetation. These low thorny formations are composed mainly of hemispherical shrubs which are generally deciduous in the dry season.
This type of vegetation is considered as a degradation forest for many associations of Cisto-Micromerietia.
In the study area, the forest fire, grazing and cutting transferred most of the forest area in Syria into this type of vegetation.

7.2.4. Running Water banks vegetation:

This vegetation occurs around streams, riverbanks and water pools in several locations in the study area. The leading species are: *Salix* spp., *Tamarix* spp., *Platanus orientalis, Alnus orientalis, Typha* spp., *Cyperus* spp., *Carex* spp. and *Mentha* spp.
The species richness of this region is in conflict with the human activities, since moors and lakes have been drained and reclaimed to be transformed into farming fields, e.g. Ghab and Rouge plains in the Orontes (Asi) River valley north west of Syria.

7.2.5. Steppe vegetation:

This vegetation is confined to the Irano-Turanian region and may intrude either into the Mediterranean and Saharo-Arabian regions.
The bioclimate of the steppe vegetation corresponds to semi-arid, arid and saharian stages with rainfall generally less than 250 mm/year. This type of

vegetation is appearing in Anti-Lebanon mountains and Jabal Al-Arab. The vegetation of those areas comprises scattered formations of shrubs (*Anabasis*, *Salsola*, *Artemisia* and *Haloxylon*) with penetrations of some trees such as *Pistacia atlantica, Pyrus syriaca, Amygdalus orientalis, Crataegus azarolus, Amygdalus korschinskii*. The common feature of this vegetation is the presence of herbs, bushes and shrubs and the absences of the tree vegetation.

7.3. Phytosociology of the Eu-Mediterranean vegetation:

From a phytosociological point of view, the vegetation of the study area belongs to the Quercetea ilicis, which comprises all the vegetation types of the study area and Cisto-Micromeriteia which composes the degraded vegetation.
Here is a description of those units in Mediterranean vegetation with focusing of the study area:

7.3.1. Quercetea ilicis (Br.-Bl. 1947):

All the arborescent matorral landscape belongs to this unit in east Mediterranean (Quezel 1981). It covers the whole Eu-Mediterranean region in Syria.
However, Zohary (1973) considered that the Quercetea calliprini to be the most typical vegetation unit of the East Mediterranean region, and divided this class into four orders: Quercetalia calliprini, Sarcopoterietalia spinosi, Ballotetalia undulatae and Hyparrhenietalia hirtae. Quezel (1981) considered that both of them are synonym.
The most important characteristic species of this class were listed by Chalabi (1986): *Clematis flammula, Phillyrea angustifolia*, *Myrtus communis, Arbutus unedo, Quercus coccifera, Laurus nobilis, Asplenium adiantum-nigrum, Rubia tenuifolia, Smilax aspera, Asparagus acutifolius, Rubia peregrina, Juniperus oxycedrus, Eryngium falcatum, Oryzopsis miliacea, Lathyrus etrusca, Olea europaea* var. *sylvestris.*

7.3.1.1. Quercetalia ilicis (Br.-Bl. 1947):

The forest formations of this order extend throughout the circum-Mediterranean region. They are corresponding to the theoretical climax of vegetal communities. They also make up a meta-stable closed canopy structure with significant sylvagenetic floristic environment, developed on evolved soils. For ecological and anthropogenical reasons, this stage of maturation is not reached, and in fact, it can only be obtained in per-humid, humid or sub-humid bioclimates (Quezel 1985).
It is the main order in Quercetea ilicis, which covers most areas of Syria. The characteristic species are given below (Chalabi 1986):
Quercus calliprinos, Rhamnus palaestina, Ruscus aculeatus, Carex distachya, Quercus canariensis, Quercus rotundifolia, Phillyrea latifolia, Aristolochia

altissima, Arbutus andrachne, Pinus halepensis, Prasium majus, Pyrus syriaca, Viburnum tinus, Pinus brutia and *Clematis cirrhosa.*
This order contains several alliances in the study area as follows:

7.3.1.1.1. Quercion ilicis (Br.-Bl. 1931, 1936):
The formations of this alliance are not only present in the Eu-Mediterranean, but also available at the Supra-Mediterranean stage, and the dispersed remnants of the semi-deciduous *Quercus aegilops* group. They are made up of the potential climax in the wide alluvial valleys of western Anatolia especially in the southern parts as *Quercus macrolepis* is associated with *Quercus pseudocerris*, while in the northern parts it is associated with *Quercus trojana* (Quezel 1985). This alliance is characterized by species of Quercetalia ilicis.
The common bioclimate stage is fresh sub-humid with a dry period of 1 to 3 months. The following associations are recorded under the concerned alliance (Quezel 1985):

1. Andrachno-Quercetum ilicis (Oberdorfer 1948): in Greece and Anatolia.
2. Orno-Quercetum ilicis (Horvatic 1957): in Greece.
3. Quercetum frainetto-brachyphyllae (Horvatic, Glavac & Ellenberg 1970) in Greece and Anatolia.
4. Aristolochio creticae-Quercetum coccifereae (Barbero & Quezel 1980) in Crete.
5. Erico arboreae-Quercetum ilicis (Barbero & Quezel 1980) in Anatolia.
6. Carpino-Quercetum cocciferae (Akman, Barbero & Quezel 1978) in Anatolia.

7.3.1.1.2. Cyclameno creticae-Quercion (Barbero & Quezel 1980):
This alliance is spread in Crete with the following characteristic species:
Cyclamen creticum, Hypericum empetrifolium, Chamaecytisus creticus Aristolochia altissima, Melissa officinalis subsp. *altissima, Aristolochia altissima, Quercus brachyphylla*.

7.3.1.1.3. Quercion calliprini (Zohary 1955, 1973; Abi-Saleh et al. 1976):
This alliance in the eastern Mediterranean is the vicarious unit of Quercion ilicis of the western Mediterranean and Pistacio-Rhamnion of Greece. It is largely widespread in south-western Anatolia, Syria (Nahal 1962), Lebanon (Chouchani, Khouzami & Quezel 1972; Abi-Saleh 1976), Palestine and Jordan (Zohary 1962, 1973).
Many phanerophytes or nanophanerophytes play a noticeable role in this unit.
This alliance grows on different parent rocks especially on calcareous substrata. Several forest systems could be mentioned under this alliance: *Olea europaea* and *Pistacia lentiscus* with or without *Ceratonia siliqua*; the sclerophyllous oaks (*Quercus ilex, Quercus coccifera, Quercus microphylla*); the semi-deciduous oaks (*Quercus infectoria, Quercus boissieri, Quercus aegilops*); and

the Mediterranean conifers (*Pinus halepensis, Pinus brutia, Cupressus sempervirens*). However, most of these forest species also widely occur on non-calcareous substrata (Quezel 1981). The characteristic species of this alliance are: *Quercus calliprinos, Rhamnus palaestina, Aristolochia phillyreoides, Melica rectiflora, Acer syriacum, Crataegus aronia, Eryngium falcatum, Cyclamen persicum, Fontanesia phillyreoides, Rubia tenuifolia, Arbutus andrachne, Pistacia palaestina, Rhamnus punctata.*

Many associations were recognized in this alliance by Zohary (1960, 1962 and 1973). They are made up with *Quercus calliprinos* on compact substrates, *Quercus infectoria* subsp. *boissieri*, *Quercus ithaburensis* on colluviums, even with conifers (*Pinus halepensis*, *Cupressus sempervirens, Juniperus phoenicea*), which are not always of phytosociological obvious significance.

The main associations of Quercion calliprini that were recorded in Syria are:

1. Pistacio-Quercetum calliprini (Zohary 1960). It is recognized in the eastern Mediterranean regions, shrub land dominated by *Quercus calliprinos* and *Pistacia palaestina*. It is one of the most characteristic and widespread plant formations which was described in Syria by Nahal (1962).
2. Rubio (aucheri)-Quercetum infectoriae (Chalabi 1980) which is found in Qadmous (700-1000 m).
3. Querco (calliprini)-Phillyreetum mediae (Martini 1999) on the eastern slopes of the Coastal Mountains.
4. Association *Quercus calliprinos-Crataegus azarolus* (Zohary 1973, and Chikhali 2000) the latter has recognized it in Jabal Al-Arab on soils derived from basaltic rocks. This association comprises also many species from the Irano-Turanian region.

Furthermore, two associations of *Quercus aegilops* vegetation were recognized in Syria. They are:

5. Crataego azaralo-Quercetum aegilopsi (Ghazal 1994).
6. Querco aegilopsi-Pistacietum atlanticae (Ghazal 1994).

7.3.1.1.4. Cupression sempervirentis:

Zohary (1973) recorded this alliance and listed the following associations that belong to this alliance:

1. Cupressetum sempervirentis libanoticum: Based on a description in Lebanon, this association is fairly common but without forming pure stands. The concerned association is not only located within the evergreen maquis zone, but also comprises maquis elements as undergrowth. A sample of this association, recorded in northern Lebanon, 720 m height, on a Rendzina soil with a southwest exposure and a total coverage of 80%, comprises from the following species: *Cupressus sempervirens, Quercus calliprinos, Ceratonia siliqua, Pinus brutia, Juniperus excelsa, Arbutus andrachne, Pistacia palaestina, Cistus creticus, Cistus salviifolius, Hypericum serpyllifolium, Rubia tenuifolia, Rhamnus palaestina, Fumana arabica, Clematis flammula,*

*Micromeria myrtifolia, Fibigia clypeata, Teucrium divaricatum, Origanum libanoticum,*and *Erica verticillata*.

2. When *Cupressus sempervirens* is shared with *Pinus brutia*, the association can be called *Cupressus sempervirens-Pinus brutia* association, a sample recorded from northern Lebanon at 700 m height on a soft whitish limestone with southeasterly exposure and a coverage of 90% contained the following species: *Cupressus sempervirens, Quercus calliprinos, Pinus brutia, Erica verticillata, Cistus salviifolius, Hypericum serpyllifolium, Cytisopsis pseudocytisus, Thymbra spicata, Asperula* spec., *Helianthemum fasciculi, Fumana thymifolia, Melica minuta, Gonocytisus pterocladus*.

3. In Palestine, Zohary (1973) recorded the Cupressetum sempervirentis that climbs up to an altitude of 900 m and grows on hard limestone. This community is a Eu-Mediterranean one. Cypress is accompanied here by a number of maquis associates such as: *Rhamnus alaternus, Quercus calliprinos*, *Quercus boissieri* and *Arbutus andrachne*

4. In Turkey, forests of cypress are not very common. They are confined exclusively to the warm region of Anatolia, but mostly in association with other trees such as *Juniperus excelsa, Abies cilicica* and even *Cedrus libani.*

5. In the south of Jordan, Zohary (1973) suggested a different association which is: *Cupressus sempervirens-Juniperus phoenica.* The coverage of tree storey is 70% and the following species were recorded as components of this association: *Cupressus sempervirens, Juniperus phoenicea, Pistacia atlantica, Daphne linearifolia, Osyris alba, Rhamnus palaestinus, Sarcopoterium spinosum, Artemisia herba-alba, Noaea mucronata, Echinops polyceras*. The presence of *Artemisia, Noaea, Echinops* and other such species clearly indicates that this association is existing here at the edge of the Mediterranean. This locality would have been colonized by vegetation from high elevation of Irano-Turanian or Saharo-Arabian regions.

Other associations of this alliance were recorded also by Zohary (1973) in Cyprus, Turkey and Iran, which are:

1. *Cupressus sempervirens-Acer obtusifolium* ass. In Cyprus, cypress forests occupy a rather broad belt of the northern mountain range of the island, but some of *Cupressus* also occur in the south. *Cupressus sempervirens* var. *horizontalis, Cupressus sempervirens* var. *sempervirens, Ceratonia siliqua, Pinus brutia, Acer obtusifolium, Olea europaea* var. *oleaster, Crataegus aronia, Genista fasselata, Sarcopoterium spinosum, Cistus creticus, Cistus salviifolius, Styrax officinalis*.
2. Cupressesso-Aceretum orientalis. This association was included within a different class, the Aceretea orientalia.
3. Cupressetum sempervirentis iranicum.
4. Association of *Cupressus sempervirens-Carpinus orientalis*, from northern Iran.

New sub-association, Cupressetosum sempervirentis; which follows the association Querco (calliprini)-Phyllyreetum mediae under Quercion calliprini and Quercetea (etalia) ilicis, was recorded on the eastern slopes of the Coastal Mountains in Syria by Martini (1999). It is existing on a marl parent rock at a height of 540-850 m, with 90% total coverage. The characteristic species are *Cupressus sempervirens, Erica verticillata, Juniperus oxycedrus, Arbutus unedo, Thymus hirsutus, Tecurium polium, Rhus cotinus, Frankenia hispida, Myrtus communis, Poterium spinosum, Osyris alba, Pinus brutia, Ruscus aculeatus* and *Cupressus arizonica.*

7.3.1.1.5. Junipero-Quercion (Barbero & Quezel 1979):
This alliance contains *Juniperus phoenicea* and *Quercus calliprinos*. It was noticed in Syria and Lebanon (Abi-Saleh 1978) and it is characterized by the following species: *Quercus calliprinos, Amygdalus korschinskii, Acer hermoneum, Pyrus syriaca*.
There are three sub-alliances that belong to this alliance:
7.3.1.1.5.1. Pistacienion atlanticae: which contains two associations:
Pistacia atlantica-Rhamnus graecus ass. (Quezel, Barbero & Akman, 1980).
Pistacia atlantica-Asparagus albus ass. (Quezel, Barbero & Akman, 1980).
7.3.1.1.5.2. Juniperon excelsae: contains one association which is:
Juniperus excelsa-Pistacia palaestina ass. (Quezel, Barbero & Akman, 1980).
7.3.1.1.5.3. Quercenion sispyrensis: contains only one association which is: Quercus sispyrensis-Crataegus orientalis ass. (Quezel, Barbero & Akman, 1980).

7.3.1.1.6. Quercion alnifoliae (Barbero & Quezel 1979):
It is an endemic alliance on ultra-alkaline substrates in Cyprus. It shows the following characteristics: *Quercus alnifolia, Teucrium kotschyanum, Astragalus lusitanicus, Helichrysum microphyllum, Sedum cyperum, Cyclamen cyprium.*
Barbero & Quezel (1979) described many associations under this alliance such as Querco alnifoliae-Pinetum brutiae and Querco alnifoliae-Crepidetum frasii which are dominated by *Quercus alnifolia, Acer sempervirens, Pinus brutia*, and even *Cedrus brevifolia*.

7.3.1.1.7. Andrachno-Quercion cocciferae (Barbero & Quezel 1979) :
This alliance is characterized by the following species: *Arbutus andrachne Quercus pseudococcifera, Rhamnus punctata, Pistacia palaestina, Teucrium flavum, Juniperus foetidissima, Quercus coccifera, Juniperus phoenicea* subsp. *phoenicea, Teucrium chamaedrys* subsp. *pinnatifidum.*
In Cyprus, this alliance is widespread in the altitudes 650-800 m and reaching up to 1400 m.

7.3.1.1.8. Gonocytiso-Pinion (Barbero, Chalabi, Nahal & Quezel 1976):
This unit is found on marl, calcareous-marl and gabbro parent rocks and covers a large area in Lebanon, Syria and Anatolia (Akman et al. 1979) where the *Pinus brutia* vegetation appears.
This alliance is characterized by *Pinus brutia*, *Gonocytisus pterocladus, Cytisopsis dorycniifolia, Lithospermum hispidulum, Putoria calabrica, Dorycnium haussknechtii, Onobrychis kotschyana, Linum aroanium, Tymbra spicata, Anarrhinum orientale, Lygia aucheri.*
Various associations were integrated under this alliance in both Lebanon and southern Anatolia, but in Syria no association was recognized for brutia pine under this alliance.

7.3.1.1.9. Ptosimopappo-Quercion microphyllae (Barbero, Chalabi, Nahal & Quezel 1976; Akman et al. 1979):
This alliance occurs on green rocks and contains *Pinus brutia* in the Amanus in southern Anatolia particularly around the gulf of Alexandrite in Turkey and Baer-Bassit Mountains in Syria where in the latter it spreads from the sea level up to the altitude of 800-1000 m, under a cover of *Pinus brutia* that is associated with *Quercus infectoria* subsp. *microphylla.*
The vegetation types are maquis and garrigue (Quezel 1981). They are floristically very unusual.
It is characterized by several endemic species:
Ptosimopappus bracteatus, Quercus infectoria subsp. *microphylla, Salvia aramiensis, Genista cassia, Centaurea cataoniea, Scorzonera kotschyi.*
Two associations have been described for this alliance (Quezel 1985):

- Ptosimoppapo-Pinetum brutiae in the lower altitudes.
- The association of *Pinus brutia* and *Glycyrrhiza flavescens* in higher altitudes, penetrating to the base of the Supra-Mediterranean.

In Syria, two more associations were recorded under this alliance, they are:

1. Alysso (crenulatae)-Quercetum pseudocerridis (Chalabi 1980): the characteristic species are: *Centaurea arifolia*, *Alyssum crenulatum, Euphorbia cassia, Thymus cilicicus, Convolvulus pentapetaloides* and *Scutellaria heterophylla*.
2. Pino (brutia)-Quercetum pseudocerris (Ghazal Asswad 1998): the characteristic species are: *Pinus brutia*, *Quercus cerris* subsp. *pseudocerris, Aster amani, Fumana oligosperma*, *Spiranthes autumnalis, Genista analotica, Erica verticillata* and *Styrax officinalis*.

7.3.1.1.10. Oleo-Ceratonion (Br.-Bl. 1936):
Most vegetation in the thermo-Mediterranean belongs to this alliance, and the characteristic species of which are: *Ceratonia siliqua, Pistacia lentiscus, Myrtus communis, Olea europaea* var. *oleaster, Clematis cirrhosa*, and many others (Abi-Saleh 1978).

This unit almost does not exist anymore in Syria and is never seen as a clear vegetation. However, the characteristic species are recognized in many locations in the study area at an altitude that ranges from seashore to 300 m in the Coastal Plains, the eastern slopes of the Coastal Mountains and the western slopes of Wastani Mountain.

7.3.2. Pistacio-Rhamnetalia alaterni (Rivas-Martinez 1975):
This order has limited importance in Syria. It is probably represented only by one single alliance, the Ceratonio-Pistacion lentisci which is very similar to the Oleo-Ceratonion (Quezel 1981).
The characteristic species of this order are: *Renaria montana* subsp. *intricata, Asparagus stipularis, Bupleum fruticosum, Ceratonia siliqua, Chamaerops humilis, Clematis cirrhosa, Clematis flammula, Ozyris alba, Pistacia lentiscus, Pistacia terebinthus, Prasium majus, Rhamnus alaternus, Rhamnus lycioides, Rubia peregrina* subsp. *peregrina.*

7.3.3. Cisto-Micromerietea (Oberdorfer 1954):
This class was first defined in Greece. It contains the garrigue and batha landscape with the short formations of vegetation in the East-Mediterranean (Quezel 1981). It contains one order that has poor floristic components.
These short thorny formations are mainly composed of hemispherical shrubs, which are generally deciduous during the dry season. These formations may be divided into various associations not completely known belonging to the Cisto-Micromerietea (Barbero & Quezel 1989).
The characteristic species are: *Salvia grandiflora, Carex flacca, Fumana arabica, Cistus villosus, Origanum syriacum, Teucrium polium, Cistus salviifolius, Hypericum serpillyfolium, Fumana scoparia, Scutellaria sibthorpii, Spartium junceum, Calycotome villosa, Dorycnium hirsutum, Asperula stricta, Lavandula stoechas, Convolvulus scammonia, Salvia judaica, Euphorbia thamnoides, Euphorbia apios* var. *lamprocarpa.*

7.3.3.1. Cisto-Micromerietalia (Oberdorfer 1954):
This order is the only one in the class and it is also characterized by garrigue and batha landscape.
The same types of landscape in Palestine were recorded in a different order Sarcopoterietalia spinosi Zohary (1973), which contains seven alliances belonging to it. That description was depended on physiognomic method (Barbero & Quezel 1989) the floristic analysis for that unit was not completed in Syria and Lebanon (Nader 2000). At present, it is difficult to prepare an approximate list of the associations that are found in these types of vegetation (Quezel 1981).
The degraded form of vegetation landscape, which comes from forests in all soils and altitudes, followed to Cisto-Micromerietea in Greece (Oberdorfer

1954). The order is also spread on all soils and altitudes in Syria, but it reduced from marl to calcareous then green parent rocks and from the medium altitude to high altitude especially on the calcareous soil (Nader 2000).
Two alliances that belong to this order were recorded in Syria, they are:

7.3.3.2. Hyperico-Micromerion graecae (Barbero & Quezel 1989):
It contains phrygana on calcareous, marl and schist soil in Greece, Crete, Cyprus and south western parts of Turkey. The characteristic species of the alliance did not disappear on calcareous and marl soil in Syria and Lebanon, but it is available with a low presence (Nader 2000).

7.3.3.2.1. Helichryso-Origanion syriaci (Barbero & Quezel 1989):
This alliance contains the phrygana on calcareous, marl, gabbro, and serpentine in Syria, Lebanon, the eastern Mediterranean slopes in Turkey and some sites in Cyprus (Barbero & Quezel 1989).
The alliance grows very well in all altitudes and soils, but it becomes richer in species in calcareous then in marl then in serpentine (Nader 2000). Two associations following it which are:

- Hyparrhenio-Thymbretum spicatae (Barbero & Quezel 1989), which is found on the southern and western slopes of the Coastal Mountains on calcareous soils less than 200 m height (Nader 2000).
- Spartio-Genistetum acanthocladae (Nader 2000), which grows on the calcareous soil more than 200 m in height of the Coastal Mountains.

Two sub-alliances were recognized in Syria:

7.3.3.2.1.1. Serratula-Putorienion (Barbero & Quezel 1989):
It spreads on marl soil in Syria and it could be seen in Turkey and Cyprus, but it disappears in Lebanon.

- Ferulago-Globularietum trichosanthae (Barbero & Quezel 1989) it grows on marl on the southern slopes from 150 to 700 m height.
- Genisto fruticosi-Convolvuletum lineatae (Barbero & Quezel 1989) in Kasab and Wadi Qandil north Lattakia.

7.3.3.2.1.2. Cisto-Lavandulenion stoechidis (Barbero & Quezel 1989):
It is noticed on soils derived from serpentine rocks and it is found in Syria, Lebanon and Turkey.
Two associations, which differ in soil and altitude, were recorded under this alliance in Syria:

- Fumano-Chryzopogonetum grillis (Barbero & Quezel 1989), which is found in low altitudes less than 250 m on the southern slopes of the Coastal Mountains (Nader 2000).

- Salvio-Hypericetum triquetrifolii (Barbero & Quezel 1989), which grows between 300 m and 800 m height on the southern slopes of the Coastal Mountains (Nader 2000).

8. The FAC of the vegetation of the study area:

The main output from the geobotanical investigations in the study area was the recognition of four different forest types dominated by *Quercus calliprinos, Quercus aegilops, Pinus brutia* and *Cupressus sempervirens*. Each of the vegetation types were analyzed using the Braun-Blanquet method. 167 relevés, covering all those types, were carried out. The FAC method was adopted for the analysis of all relevés and the results were as follows:

8.1.The FAC of *Quercus calliprinos* vegetation:

From all main locations of *Quercus calliprinos* and *Quercus aegilops* in Syria, 111 relevés were studied and analyzed statistically using the FAC method. Six charts were studied, each of which was composed from the combination of two axes sequence from the first four axes (1×2, 1×3, 1×4, 2×3, 2×4, 3×4) which have high effect of the relevés distribution.

The first axis has the highest inactivity (4.64%) and correlation (0.82) (table 9) which causes more effect of the relevés distribution especially on the relevés points of the southern and high mountain regions.

Table 9: The correlation and inactivity data for 10 axes of the FAC analysis for all relevés of *Quercus calliprinos* vegetation.

Axis	1	2	3	4	5	6	7	8	9	10
Correlation	0.82	0.74	0.70	0.67	0.65	0.61	0.60	0.60	0.60	0.57
Inactivity %	4.64	3.71	3.33	3.11	3.06	2.92	2.51	2.46	2.22	2.21

In all charts, two groups of points were relevant (chart 1) which are as follows:

A) The first group of relevés (central group) in chart (1) is situated densely in the intersection point in all charts. Sometime they expand or shrink but remain together. These relevés are related to Al-Asi, Aleppo and the Coastal regions.

B) The second group of relevés is dispersed without congregation with the first group. The relevés points are distributed in all parts of the first axis (1) and the negative side of the second axis (2) of all charts. The relevés of this group are: O01, O04, O05, O06 and O09 (Anti-Lebanon group) P02, P03, P04, P07 and P08 (Jabal Al-Arab group).

In addition, many species, which belong to this group of relevés in the charts, are as follows:

Amygdalus orientalis, Acanthus mollis, Amygdalus spartioides, Crataegus azarolus, Acer monspessulanum, Anchusa hybrida, Cotoneaster nummularia, Galium aparine, Hypericum triquetrifolium, Malva parviflora, Arum dioscoridis, Iris sisyrinchium, Geranium purpureum, Avena sterilis, Cutandia dichotoma, Hyoscyamus aureus, Fibigia clypeata, Galium canum, Galium tricornutum, Noaea mucronata.

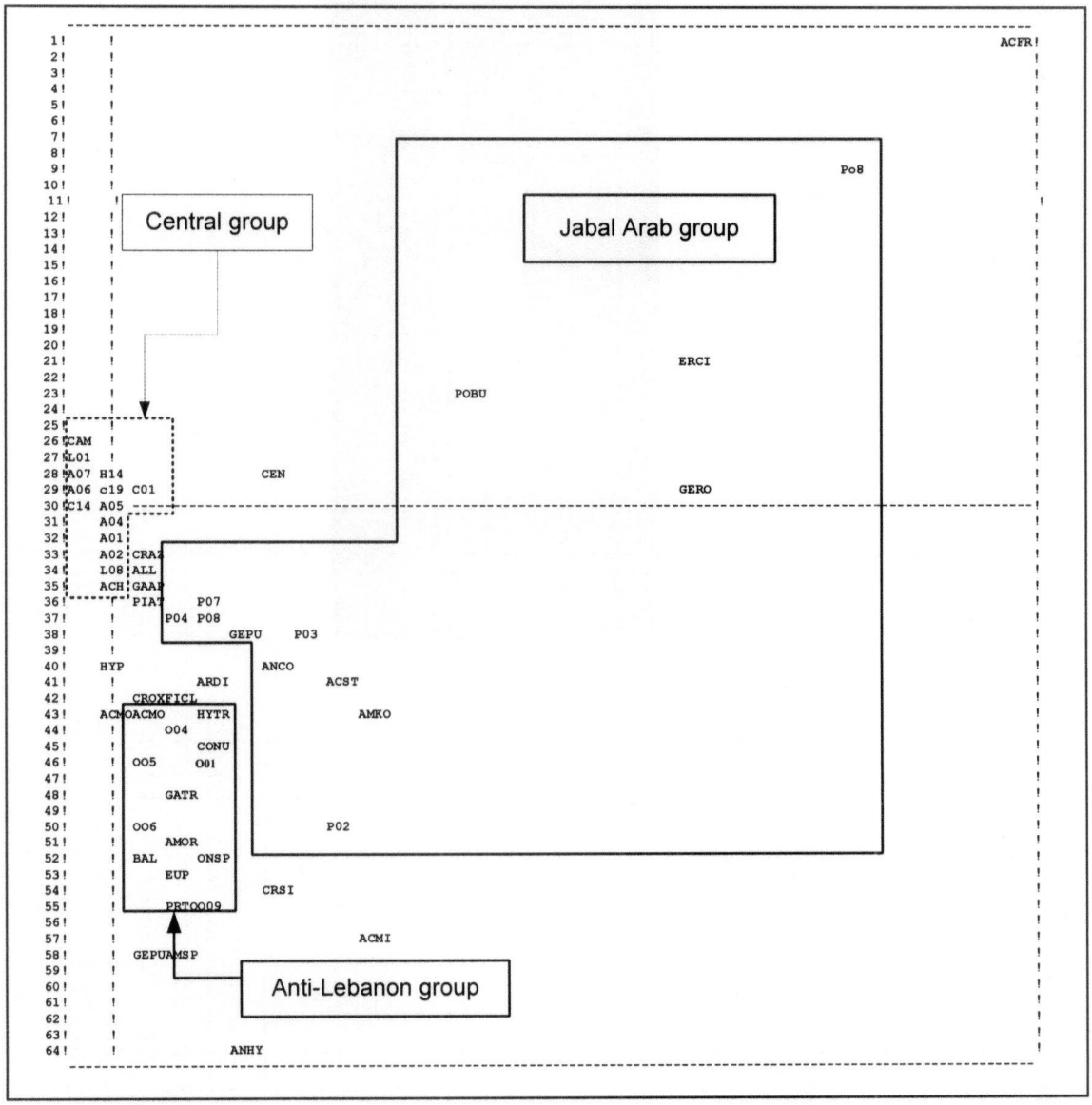


Chart 1: Cluster of the relevés and species distribution of *Quercus calliprinos* vegetation of the FAC analysis on Axis 1×2

Key of Chart (1): The letters are abbreviation of the species names and the relevés codes are letter and number (table 12). The central group were presented clearly in chart 2.

The correlation value for relevés and species of the southern region is high in all axes, but it is a very low value for the central group.

The climate factors, altitude and parent rocks were very effective concerning the distribution of the relevés points of the first axis (1) (table 10).

The second axis also has a high correlation (74%) which is clear in the chart 1×2, where the relevés points are distributed along this axis as follows: the southern region then Aleppo region followed by the coastal region.

The central group was analyzed for a second time by FAC without the second group to get a clear view for the relevés distribution.

Table 10: The distribution type of the relevés depending on axis 1.

Axis 1	Negative side →		Positive side
	Central group	Anti-Lebanon group	Jabal Al-Arab group
Altitude	less than 900 m	1130-1300 m	540-1450 m
Dry period	less than 5 months	more than 7 months	6-7 months
Precipitation	More than 400 mm	380-560 mm	300-480 mm
Parent Rock	Sedimentary		Basalt

The first and second axes (1 and 2) have a high percentage of inactivity (5.04% and 4.74%, respectively) and a high value of correlation (0.67 and 0.65, respectively) (table 11). Therefore, the chart 1×2 (chart 2) gives an excellent view of the distribution for the relevés and species.

Table 11: The correlation and inactivity data for axis of the FAC analysis for central relevés group of *Quercus calliprinos* vegetation.

Axis	1	2	3	4	5	6	7	8	9	10
Correlation	0.67	0.65	0.61	0.58	0.53	0.53	0.52	0.50	0.49	0.48
Inactivity %	5.04	4.74	4.08	3.71	3.14	3.10	3.00	2.76	2.61	2.54

Six new groups of relevés were distinguished by the FAC analysis for the central group (chart 2). These are:

1. The group A: A02, A24, B03, C04, C10, C15, L06, C20, C09, C11, L05, L08, L22, R08 and R09. The relevés are relating to the *Quercus aegilops* associations.
2. The group B: A04, A12, A27, C07, C08, C12, C18 and C23. The relevés are also relating to the *Quercus aegilops* associations
3. The group C: J14, J15, J18, J19, J20, J21, J22, J23, J24, J25, L24, L25, L26, L31, L33, F13 and G09. All these relevés are located on the western slopes of the Coastal Mountains, and the abundance dominance and sociability for *Quercus calliprinos* is high (3.3-5.5), and this oak grows in a tree shape.
4. The group E: A01, A05, A25, A28, A29, C06, C14, C19, C22 and L01. These relevés are situated in Al-Akrad and Wastani Mountains.
5. The group D: L09, L27, J10, J12, J26, F01, F12, R11, C01 and B04. These relevés are spread on the eastern slopes of the Coastal Mountains.
6. The group F: N01, G01, A16, A18, J27, J11, R01, R04, R05, R10, L03, L10, L11, L29 and L32. They are spreading in different regions.

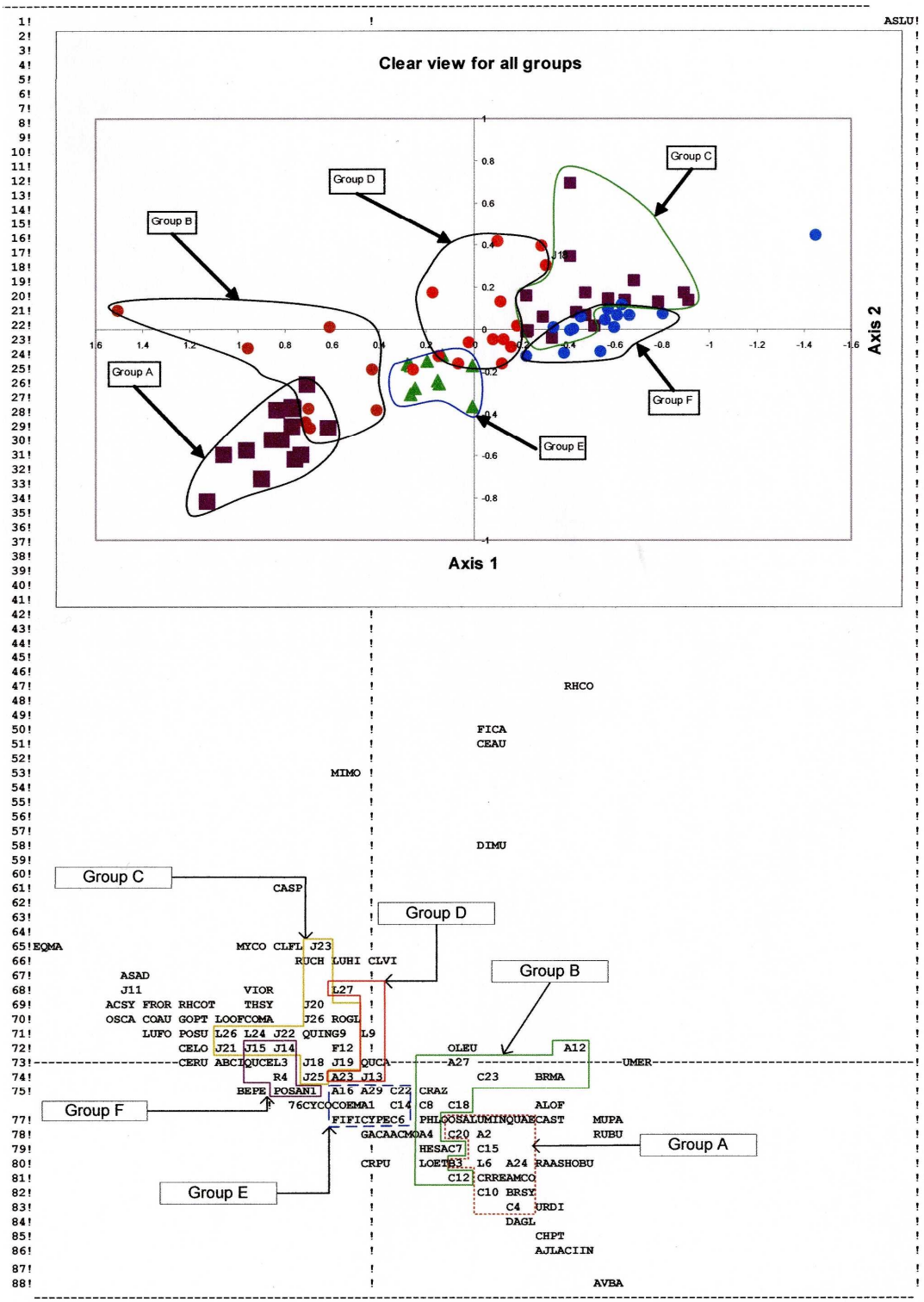


Chart 2: Cluster of the distribution of the *Quercus calliprinos* vegetation for central relevés of FAC analysis on axes 1×2

Key of chart (2): The letters are abbreviation of the species names and the relevés codes are letter and number (tables 14 and 16).

The important points were not represented in the chart in all groups:

Relevés: A23=B04; A16=C01; A29=A28, L01; C22=C19, A25; J18=L25, L29, R01; L03=L33, L10; J15=R05, J27, R10, L31; J14= A18, F13, J24; J18=G01; J19=J10; C20=L22, R08; C07=C11; C15=L05; A01=A05.

Species: J21= RUAU; J22= ERFA; J27= JUOX, ARAL; J14= LANO; A01= RHPA, A04= JAFR, DAOL; COEM= PUUR; F12= STOF; A29= PHME, POSP; J18=SMAS, CUSE, CAVI ; A16= PYSY, HYHI, POSP, SCHE; R04= CIVI, HYTH, TEPO; RHAL=COMA; L03= ACMO, CISA, DRLI, FUTH, ORSY, RUAC.

8.1.1.*Quercus calliprinos* associations:

Depending on what has been mentioned earlier, the FAC analysis of *Quercus calliprinos* vegetation was used to rearrange the phytosociological relationship, and several associations were recorded:
From chart (1), the relevés of the southern and high mountain regions, which are isolated from the central group, could be arranged in table (12) by two associations:

- Crataegus azarolus-Quercus calliprinos (Zohary 1972; Chikhali 2000).
- Pruno (tortuosa)-Quercetum calliprini (ass. nov.)

From chart (2), the following associations were recognized:

1. The relevés of group C identify the new association Querco (infectoria)-Quercetum calliprini (ass. nov.), which is registered in table (14).
2. The relevés of group D identify the association Querco (calliprinos)-Phillyreetum mediae (Martini 1999).
3. The relevés of group E identify another new association Styraco (officinalis)-Quercetum calliprini (ass. nov.) and these are registered in table (16).
4. The relevés of group F identify the association Pistacio (palaestina)-Quercetum calliprini (Zohary 1960, Nahal 1962).

8.1.1.1.The association Crataegus azarolus-Quercus calliprinos (Zohary 1972; Chikhali 2000):

This association belongs to the Quercion calliprini. It is recorded in Jabal Al-Arab on basaltic substrata with an altitude of 550-1200 m, the precipitation is about 330 mm/year, the average minimum temperature is 3.5°C, and the value of Q_2 is 40. The association grows in temperate both semi-arid and arid bioclimatic stages (Chikhali 2000).
From FAC analysis the relevés number: P02, P03, P04, P07and P08, which were recorded in Jabal Al-Arab, describe this association as shown in table (12).

8.1.1.2. Pruno (tortuosa)-Quercetum calliprini (ass.nov.)

The relevés (O01, O04, O05, O06 and O09) characterize this association as shown in table (12).

8.1.1.2.1. The phytogeographical relations of the association:

It is distributed in Zabadani area of the Anti-Lebanon Mountain. The altitude is more than 1100 m, and the substratum is calcareous. The climate data, which are collected from four main stations in the area: Qatana, Maysaloun, Mdaia, and Zabadani, is corresponding to the association. The precipitation range is 300-550 mm/year. The average minimum temperature is 0 to -1°C while the Q_2 value is 30-60. Thus, this association is situated in the cold and fresh variants of both arid and semi-arid bioclimatic stages.

In spite of the aridity and coldness at the Anti-Lebanon Mountains, the precipitation in this area is higher than in others, which gives this association a better chance to occupy this area than other associations.

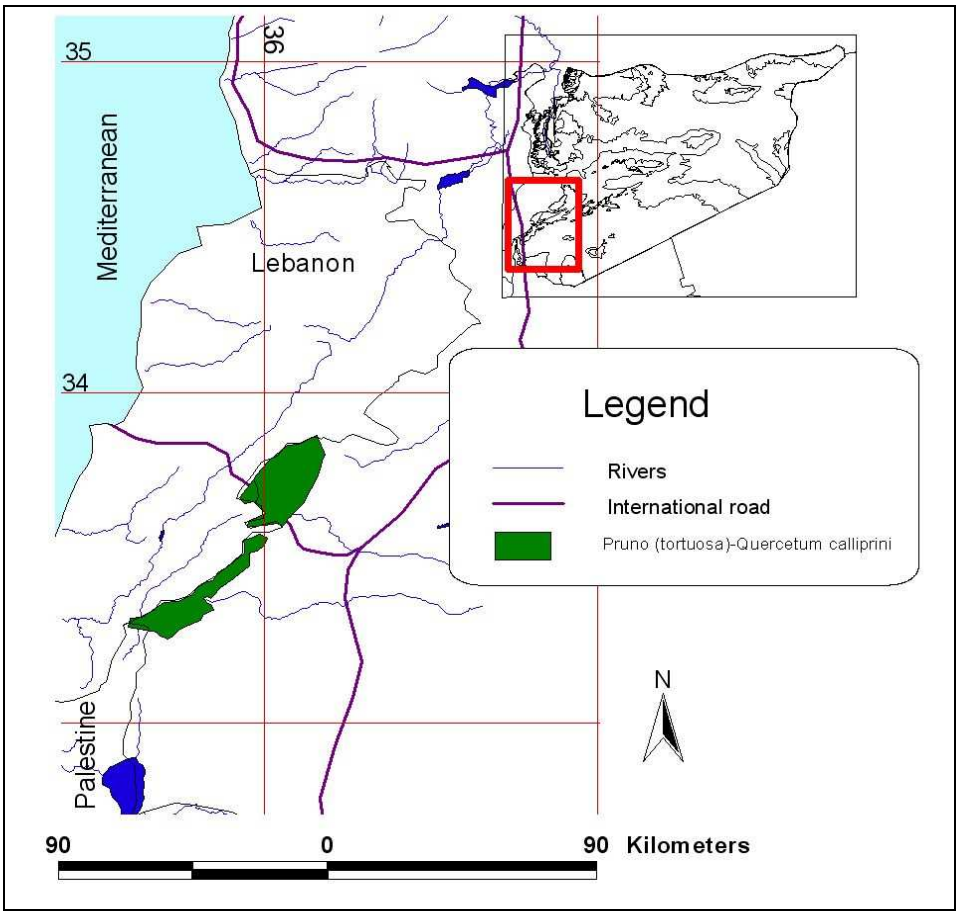


Fig 29: The distribution of the Pruno (tortuosa)-Quercetum calliprini (ass. nov.).

8.1.1.2.2. Floristic features and phytogeography:

The human interference is largely responsible for the composition of the maquis. However, the association is not rich with species where the table (12) shows 75 species from all relevés, with an average of 15 species. Nevertheless, some of these relevés contain 20 species.

The life form spectrum of these species consists of 34% hemicryptophytes, 18% nanophanerophytes, 11% phanerophytes, 5% geophytes and 16% for each of chamaephytes and therophytes.

The maquis of this association is not completely occupied by evergreen species, but it is rich of deciduous ones, which gives it a clear view in winter.

A phytogeographical analysis to the components of table (12) shows that the Mediterranean species dominate by 50% (34 species of the total number) , the East-Mediterranean species comprise 15%, but the Irano-Turanian species are 21%, while 9% of the total species are considered Irano-Turanian-Mediterranean species with few species left from other phytogeographical regions.

Table 12: Pruno (tortuosa)-Quercetum calliprini (ass.nov.).

Species codes	Relevés number	O04	O01	O09	O05	O06	P07	P03	P04	P02	P08	Constancy
	Altitude m	1260	1160	1300	1200	1130	540	1250	1100	1450	1220	
	Exposition	W	N	-	-	NNW	NW	N	-	W	W	
	Slope %	15	25	-	-	25	20	20	-	10	30	
	Total cover %	30	50	40	60	50	80	45	80	45	85	
	Trees cover %	20	50	30	50	40	60	40	60	40	40	
	Shrubs cover %	10	40	10	30	20	35	20	30	10	70	
	Ground cover %	5	10	5	10	50	60	20	30	5	25	
	Parent rock	Cal	Cal.	Cal	M	Cal	B	B.	B.	B.	B	
	Surface m^2	400	400	400	400	400	400	400	400	400	400	
QUCA	*Quercus calliprinos*	1.2	2.2	+	1.1	+	2.3	1.1	2.2	1.2	3.3	10
	Pruno tortuosa-Quercetum calliprini											
PRTO	*Prunus tortuosa*	+	1.1	+	2.2	+	.	.	.	.	.	5
AMOR	*Amygdalus orientalis*	+	+	1.1	2.2	1.2	.	.	.	.	.	5
POSP	*Poterium spinosum*	+	.	+	3.3	1.2	.	.	.	.	.	4
AMSP	*Amygdalus spartioides*	.	.	+	+	+	.	.	.	.	.	3
CRMO	*Crataegus monogyna*	+	.	.	2.2	1.2	.	.	.	.	.	3
ACMO	*Acer monspessulanum*	.	.	.	2.2	+	.	.	.	.	.	2
	Quercus calliprinos-Crategus azarolus ass.											
CRAZ	*Crataegus azarolus*	+	+	1.1	+	.	.	+	+	+	+	8
AMKO	*Amygdalus korschinskii*	1.1	+	+	.	.	.	1.1	1.1	1.1	+	7
PYSY	*Pyrus syriaca*	+	+	.	.	.	2.1	1.1	+	+	.	6
PIAT	*Pistacia atlantica*	.	.	.	.	+	1.1	1.1	+	.	.	4
	Quercion calliprini											
ERFA	*Eryngium falcatum*	.	.	+	.	.	1.1	.	.	.	.	2
PIPA	*Pistacia palaestina*	.	.	+	.	.	1.1	.	.	.	.	2
	Quercetea ilicis											
	Cisto-Micromerietea											
TEPO	*Teucrium polium*	+	.	.	1.1	.	.	.	.	.	.	2
	Querco-Cedretalia libani											
UMIN	*Umbilicus intermedius*	.	.	.	.	.	+	+	+	.	.	3
CONU	*Cotoneaster nummularia*	.	.	+	.	.	.	.	.	1.1	.	2
	Companion species											
	Galium spec.	.	.	.	2.2	+	+	.	.	.	.	3
CRSI	*Crataegus sinaica*	.	.	1.1	.	.	+	.	.	+	.	3
FICL	*Fibigia clypeata*	.	.	.	.	+	+	.	+	.	.	3
ANCO	*Anemone coronaria*	.	.	.	.	.	1.1	+	.	.	.	2
	Centaurea spec.	.	.	.	.	.	1.1	.	.	.	+	2
POBU	*Poa bulbosa*	.	.	.	.	.	1.2	.	.	.	2.2	2
	Euphorbia spec.	+	.	.	2.2	+	.	.	.	.	.	3
ERCI	*Erodium cicutarium*	.	.	.	.	.	.	+	.	.	+	2
GERO	*Geranium rotundifolium*	.	.	.	.	.	.	.	.	+	+	2
HYTR	*Hypericum triquetrifolium*	+	.	.	.	+	+	.	.	.	.	3
MUCO	*Muscari comosum*	.	.	.	.	.	+	+	.	.	.	2
GEPU	*Geranium purpureum*	.	.	.	.	+	+	.	.	.	.	2
MALO	*Mathiola longipetala*	.	.	.	.	.	.	.	.	+	+	2
		14	10	17	14	19	20	14	9	16	15	

One time record species (table 12):

Ajuga orientalis (P03:1.1), *Ballota* spec. (O05:1.1), *Umbilicus* spec. (P03:1.1), *Achillea fragrantissima* (P08:+), *Achillea micrantha* (P02:+), *Achillea santolina* (P02:+), *Achillea stamineum* (P03:+) *Achillea trifoliatum* (P03:+), *Anchusa hybrida* (O09:+), *Arum hygrophilum* (P07:+), *Astragalus spinosus* (P08:+), *Avena sterilis* (O09:+), *Bromus alopecuros* (P08:+), *Bromus sterilis* (P08:+), *Bryonia lasiocarpa* (P02:+), *Cutandia dichotoma* (O09:+), *Dactylis glomerata* (O04:+), *Ferula armandi* (P08: +), *Galium canum* (O01: +), *Galium spurium* (P02:+), *Galium tricornutum* (O04:+), *Hyoscyamus aureus* (O09:+), *Iris sisyrinchium* (O06: +), *Malva parviflora* (O09:+), *Marrubium vulgare* (P07: +), *Mathiola* spec. (O05:+), *Micromeria* spec. (O06:+), *Noaea mucronata* (O06:+), *Ononis* spec. (O06:+), *Ononis spinosa* (O01:+), *Phlomis pungens* (P04: +), *Quercus look* (P04: +), *Salvia pinardi* (P08:+), *Serratula pusilla* (O01:+), *Silene siderophila* (P07:+), *Tragopogon buphthalmoides* (P07:+), *Ziziphora capitata* (P08:+), *Arum dioscoridis* (P04:+), *Quercus cerris* subsp. *pseudocerris* (P04:+), *Quercus infectoria* (O01:+), *Thymus syriacus* (O05: 1.1),

Acanthus mollis (O09: +), *Asphodelus microcarpus* (O06: +), *Quercus aegilops* (O04:1.1), *Galium aparine* (P04:+), *Rhamnus palaestina* (O06: +), *Rhus coriaria* (P03:2.2).

Description of the relevés' sites in table (12):

Relevé Code	Name	Lat.	Long.	Site location and description
O04	Nabi-Habeel	33.41.24	36.03.36	Qalamoun mountain west Damascus on the road to Zabadani. The maquis is 4-6 m high. (Chalabi et al.2000)
O09	Bet-Jen	33.22.12	35.49.12	Jabal Al-Sheikh near the spring of a small stream. The maquis is 1-2 m high. (Chalabi et al.2000)
O05	Rakhleh	33.33.36	35.57.03	Jabal Al-Sheikh on the eastern hills around Rakhleh plain. The maquis is 6-8 m high. (Chalabiet al.2000)
O06	Rakhleh	33.33.05	35.57.08	Jabal Al-Sheikh on the eastern hills around Rakhleh plain. The maquis is 6-8 m high. (Chalabi et al.2000)
O01	Wadi-Qaren	33.39.09	36.01.12	Qalamoun mountain on the slopes of the valley near the Zabadani bridge. The maquis is 3-4 m high. (Chalabi et al.2000)
P02	Daher-Jabal	32.42.04	36.41.24	Jabal Al-Arab in the flat area of the top mountain. The maquis is 6 m high. (Chalabi et al.2000)
P03	Qanawat	32.47.24	36.37.12	Jabal Al-Arab in the Qanawat forest. The maquis is 6 m high. (Chalabi et al.2000)
P04	Qanawat	32.46.12	36.37.12	Jabal Al-Arab in the Qanawat forest. The maquis is 6 m high. (Chalabi et al.2000)
P07	Salem	32.48.05	36.36.08	Jabal Al-Arab in the western part of the Qanawat forest. The maquis is 6 m high. (Chalabi et al.2000)
P08	Al-Kafer	32.37.12	36.39.09	Jabal Al-Arab south of Sweida. The maquis is 8 m high. (Chalabi et al.2000)

A synthesis table, which was prepared for each forest type, contains all relevés to be studied and resolved by adding all the floristic information. The constancy was calculated for all species and these were listed from high to low constancy (Mueller-Dombois & Ellenberg 1974). Finally, the characterized table was rearranged by listing the characteristic species first, then the remaining species in descending phytosociological units according to their constancy from high to low. A summary table was prepared for all associations for further discussions (Wittig & Guinko 2005).

8.1.1.2.3. Stratification of the association:

The vertical stratification of the association shows the existence of three strata. The first one is the trees, which has a total average coverage of 50%, with a height from 4-8 m. The most dominant or co-dominant species of this stratum is *Quercus calliprinos* and sometimes are *Acer monspessulanum, Quercus aegilops, Quercus infectoria,* and *Pyrus syriaca*. The tree shape of *Quercus calliprinos* was noticed in Nabi-Habeel site near the tomb through several individuals.

The second stratum is the shrubs layer that has a height of 1-3 m with an average coverage of 40%, but sometimes up to 60%. The dominant species in this stratum are *Prunus tortuosa, Amygdalus orientalis, Amygdalus spartioides, Crataegus monogyna, Crataegus azarolus* and *Amygdalus korschinskii.*

The third stratum is the ground layer with an average cover of 50-60% comprising of species such as *Poterium spinosum, Teucrium polium, Hypericum triquetrifolium* and *Euphorbia* spec.

8.1.1.2.4. Phytosociological relationships of the components:

The analysis of the association from a phytosociological viewpoint shows five species that belong to Cisto-Micromerietea like *Poterium spinosum, Teucrium polium, Thymus syriacus, Acanthus mollis* and *Asphodelus microcarpus*.

Furthermore, the species of the Quecetea pubescentis are also available through six species *Quercus infectoria, Umbilicus intermedius, Cotoneaster nummularia, Quercus cerris* subsp. *pseudocerris, Arum discorioidis,* and *Crataegus monogyna*.

This new association belongs to Quercion calliprini and Quercetea (etalia) ilicis which is presented by 13 species that are considered of the most important species in this association and emphasizing the attribution of this association to it.

8.1.1.2.5. Characteristic structure of the association:

Six characteristic species are distinguished in the association (table 13).

Table 13: The characteristic species of the Pruno (tortuosa)-Quercetum calliprini (ass. nov.).

Legend of table 13: Ph: phanerophytes, Med: Mediterranean, E-Med: east-Mediterranean , I-T: Irano-Turanian.

characteristic spices	**Altitude m.**	**Life-Form**	**Height m.**	**Phytogeo graphical relations**	**Phytosocio Logical relations**	**Distribution in Syria**
Prunus tortuosa	0- 1300	Ph	2	Med. but spreading up to Russia	Quercion-calliprini	most regions from the northern to the southern mountains
Poterium spinosum	700	Ph	1.5	E-Med	Cisto-Micromerietea	Coastal and Al-Akrad mountains
Crataegus monogyna	100 to 1200	Ph	2-3 in sites	Med.	Quecetea pubescentis	Al-Asi and Anti-Lebanon regions
Amygdalus orientalis	250-1200	Ph	2-3 in sites	Med.	Quercion-calliprini	Al-Asi, high and southern regions also Bal'aas, Beshri, and Jabal Abdullaziz
Acer monspessulanum	100 to 1200	Ph	10	Med.	Quecetea pubescentis	Al-Asi and Anti-Lebanon regions
Amygdalus spartioides	200 to 1100	Ph	2	I-T	Quercion-calliprini	Anti-Lebanon and Palmyra

Naming the association was done using *Prunus tortuosa* and *Quercus calliprinos*. It is noticed from all relevés that the first indicative species *Prunus tortuosa* is available with ADS + to 2.2, and the FAC analysis shows that it is located on the chart near the location of the relevés of Anti-Lebanon (chart 1). It is distributed generally at a high altitude in the Anti-Lebanon on calcareous

substrata. Furthermore, this association is geographically the highest in the distribution for *Quercus calliprinos* in Syria.

8.1.1.3. Pistacio (palaestina)-Quercetum calliprini (Zohary 1960, Nahal 1962):

This association is largely widespread over a large geographical area. It also exists in Lebanon (Chouchani et al. 1972), Syria (Nahal 1962), and most of the south of Turkey. Zohary (1960) called it Quercus calliprinos–Pistacia palaestina association.

It is dominated in Anatolia locally by *Quercus calliprinos, Quercus brachyphylla, Quercus infectoria,* and associated with *Arbutus andrachne, Acer syriacum, Fontanesia phillyroides, Aristolochia altissima, Cyclamen persicum, Eryngium falcatum* (Akman et al. 1978; Barbero & Quezel 1979).

The degraded sclerophyllous forest formations are often colonized by *Pinus brutia* and hence are replaced by another formation in the Andrachno-Quercetum coccifereae containing *Arbutus andrachne, Myrtus communis, Quercus coccifera, Styrax officinalis, Cercis siliquastrum, Pistacia palaestina* (Zohary 1973). It is found on all east Mediterranean fronts. This vegetation has also been found in Cyprus. This type of vegetation appears at the beginning at an altitude of 600-800 m up to 1100-1400 m. It also exists on the margins of the Anatolian steppes, where it is represented by a degraded matorral. This type of vegetation is developed not only on limestone substrata, but also on ultra-alkaline metamorphic rocks, as well as on Terra-Rossa.

It spreads in the humid, sub-humid and semi-arid bioclimatic stages with all their variants, cold, fresh, temperate, and warm climates. However, it is most prevalent in the sub-humid and semi-arid stages (Nahal 1981). Precipitation ranges between 700 and 2000 mm/year with strong seasonal concentrations because the dry period lasts at least for five to six months (Zohary 1973).

Other formations are traceable in Jordan, Syria and Palestine, as well as on the eastern bank of the Jordan River (Zohary 1962). They are found on the cultivated alluvial plains with remnants of *Quercus ithaburensis*. Zohary (1962) defined them as components of the association of *Quercus ithaburensis* and *Pistacia atlantica*; and including Mediterranean and Irano-Turanian species.

The FAC analysis in this study has recognized this association in group F relevés which were carried out in the Coastal Mountains and shared the following species: *Acer syriacum, Arbutus andrachne, Cercis siliquastrum, Clematis flammula, Dryopteris libanotica, Gonocytisus pterocladus, Hedera helix, Laurus nobilis, Pistacia palaestina, Rhamnus alaternus, Scilla maritima,* and *Spartium junceum*. Depending on that, it is sufficient to prove that these species are among the characteristic species of this association in Syria.

8.1.1.4. Querco (infectoria)-Quercetum calliprini (ass. nov.):

From the relevés of group C in the FAC analysis and from the points of the centre group (chart 2) a new association can be recognized. The descriptions of which are listed below:

8.1.1.4.1. Phytogeographical relations:

This association is distributed in the Coastal region along the western and northern slopes of the Coastal Mountains as well as in the Coastal plains, from sea level up to 900 m. In spite of the wide distribution of the association, it can be found as spots where cemeteries are located in addition to few other places.

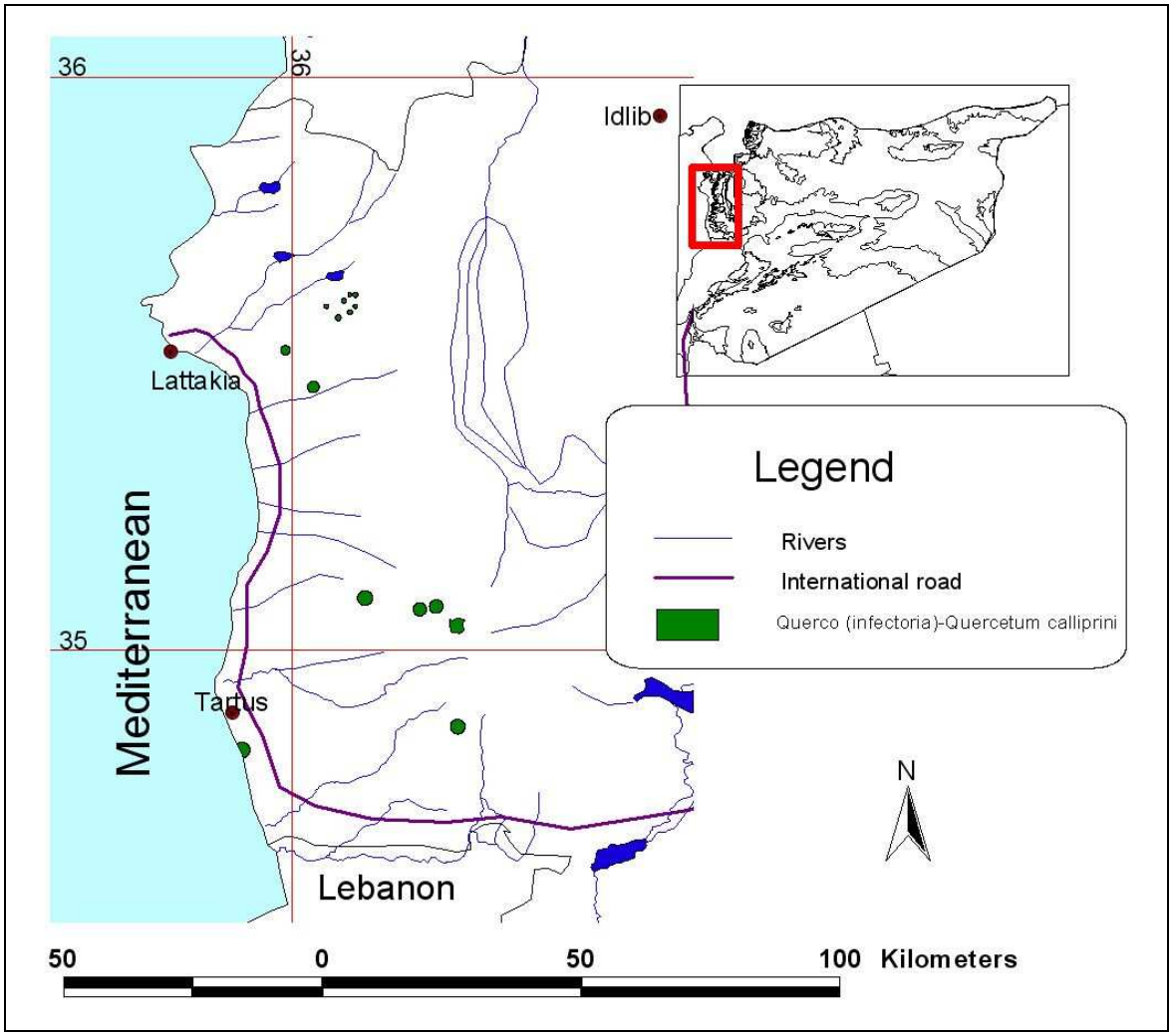


Fig 30: The distribution of the Querco (infectoria)-Quercetum calliprini (ass. nov.)

This association is characterized by favourable climate conditions. It can be recognized through the climate data collected from many stations (Mina al-Beida, al-Sin, Tartous, Qadmous, Sheikh Bader, Safita, Qastal Maaf, Messiaf, Jableh, Banias, Mashta al-Holw). These stations are representing the association and its range of distribution; the precipitation is 800-1300 mm/year,

the average minimum temperature ranges between 2.5 and 7°C, and Q_2 value is 100-215. In other words, the association is located in the humid and sub-humid bioclimatic stages with fresh, temperate and warm variants.
The parent rocks are marl, hard limestone and basalt. The soil is Terra-Rossa with a depth of 20- 50 cm, the B horizon of the soil profile is not recognized in most relevés' sites, but in general it is of AC structure, the organic horizon is 2-5 cm with high quantity of organic matter in the top horizon of the soil.

8.1.1.4.2. The floristic analysis of the association:
This association is exceptionally rich in species that count to 88 species as shown in table (14). This fact, at first glance, could be attributed to the favourable climate conditions of the habitat, but the number of species has considerably changed from one site to another. This number of species in places that have a high pressure from visitors is lower than that in the protected ones; for example in relevés J18, J19 and J22 the vegetation of shrubs and ground cover layers is very low or completely disappeared due to the heavy access from the local public because the sites are tourist areas. On the contrary, the relevés J12, J24, L24 and L31 are rich in species because these sites are protected from human interference.
The spectrum of the life form in this association consists of 26% chamaephytes, 22% hemicryptophytes, 12% phanerophytes, 17% nanophanerophytes, 8% geophytes and only 2% therophytes.
The phytogeographical relationship of the association species shows that the Mediterranean species are the dominant by 83%, with only few species that belong to other phytogeographic regions such as the Irano-Turanian and Euro-Siberian regions.

8.1.1.4.3. Stratification of the association:
Three strata are characterized in this association with a total cover of 90-100%. The first stratum is the tree layer, which can amount to 100% cover with a height of 6-14 m, and tree diameters from 10-50 cm. The most dominant species of this stratum are *Quercus calliprinos*, and *Quercus infectoria* with many others such as: *Pistacia palaestina, Phillyrea media, Pyrus syriaca, Arbutus andrachne,* which can reach up to 6-8 m.
The second stratum is the shrubs layer, which reaches a height of 2-3 m with an average cover of 20-40% but can cover sometimes up to 60%. The most dominant species in this stratum are *Styrax officinalis, Phillyrea media, Juniperus oxycedrus, Laurus nobilis, Crataegus azarolus, Crataegus monogyna, Prunus ursina* and *Rhus cotinus.*
The third stratum is the ground cover layer that has an average cover of 5-20%, but sometimes of 50%.

The total number of species in all relevés is 88 as mentioned earlier with an average of 18 species, but some of these relevés contain 34 species (relevé no L26).

The most important factor concerning this association is to protect it from cutting which allows *Quercus calliprinos* and other species to grow up to a tree shape in the appropriate climate conditions.

Table 14: Querco (infectoria)-Quercetum calliprini (ass. nov.).

Code species number	Relevé code number	J18	J19	J20	J21	J22	J23	J24	J25	L26	L24	L31	F13	J15	L33	J14	L25	G09	Constancy
	Altitude m	600	610	630	690	870	400	450	590	650	630	630	150	170	850	200	340	20	
	Exposition	NNW	-	WS	W	W	S	SW	W	W	-	-	-	N	SSW	NW	-	N	
	Slope %	10	-	10	10	10	40	7	10	40	-	-	-	20	40	20	-	10	
	Total cover %	100	100	100	70	100	100	100	100	100	90	85	100	100	100	90	90	100	
	Trees cover %	100	100	90	60	90	90	90	100	80	10	100	100	90	85	90	80	100	
	Shrubs cover %	5	5	40	50	60	60	60	40	30	5	10	30	10	20	40	30	20	
	Ground cover %	20	10	20	20	50	40	30	30	30	20	10	20	20	20	30	10	20	
	Parent rock	Cal	Cal	Cal	Cal	Cal	Cal	Cal	Cal	M	B	B	M	Cal	M	Cal	Cal	Cal	
	Surface m^2	200	200	100	100	100	100	200	100	100	100	200	200	200	200	200	200	100	
QUCA	*Quercus calliprinos*	5.5	5.5	4.4	3.3	4.4	4.4	4.4	5.5	3.3	4.4	5.5	4.4	4.4	4.4	4.4	3.3	3.3	17
	Querco (infectoria) Quercetum calliprinii																		
QUIN	*Quercus infectoria*	+	+	.	+	1.1	+	+	.	+	1.1	1.1	.	+	+	.	+	2.2	13
RUAC	*Ruscus aculeatus*	1.1	+	+	.	+	.	+	.	+	+	1.1	1.1	2.2	+	2.2	+	.	13
RUAU	*Rubia aucheri*	+	.	.	+	+	.	+	+	2.2	1.2	1.2	.	2.2	2.2	1.1	+	.	12
ERFA	*Eryngium falcatum*	.	.	.	+	+	.	.	+	2.2	+	1.1	1.1	.	1.1	1.1	+	.	10
JUOX	*Juniperus oxycedrus*	.	.	.	+	.	.	.	.	2.2	.	+	.	.	1.2	.	.	.	4
ARAL	*Aristolochia altissima*	.	.	+	.	+	.	+	.	.	1.1	1.1	.	+	.	+	.	.	7
SMAS	*Smilax aspera*	1.1	+	+	1.1	1.1	+	2.2	+	+	2.2	2.2	1.1	3.3	+	1.1	+	1.2	17
LANO	*Laurus nobilis*	.	.	.	.	1.1	+	.	.	.	.	.	2.2	.	.	.	.	.	3
MYCO	*Myrtus communis*	.	.	.	.	.	+	.	.	+	.	.	.	3.3	.	2.2	.	1.1	5
	Quercion calliprini																		
PIPA	*Pistacia palaestina*	+	+	+	+	.	+	1.1	+	1.1	1.1	.	1.1	1.1	2.2	1.1	2.2	1.1	15
PHME	*Phillyrea media*	+	+	+	.	.	.	+	.	.	1.1	1.1	1.1	1.1	2.2	1.1	1.1	.	11
ASAC	*Asparagus acutifolius*	+	+	+	.	.	+	+	+	.	.	.	1.1	+	.	1.1	.	1.1	10
TACO	*Tamus communis*	+	.	.	.	+	.	+	.	.	+	.	1.1	+	.	+	.	+	8
RHPA	*Rhamnus palaestina*	.	.	.	+	+	.	.	+	.	+	.	.	.	.	+	1.1	.	6
RHAL	*Rhamnus alaternus*	+	.	+	+	.	+	+	.	.	.	.	.	.	.	.	+	.	6
CRAZ	*Crataegus azarolus*	.	.	.	.	+	.	+	.	.	.	.	.	.	.	+	1.1	.	4
	Gonocytiso - Pinion																		
CYDO	*Cytisopsis dorycniifolia*				+											+			2
	Quercetea ilicis																		
ARAN	*Arbutus andrachne*						1.1			2.2									2
LOET	*Lonicera etrusca*					+	+												2
	Querco-Cedretalia libani																		
PRUR	*Prunus ursina*	.	+	.	.	.	.	.	+	.	.	.	.	.	1.1	.	.	.	3
FROR	*Fraxinus ornus*									+			1.1						2
QUCE	*Quercus cerris* subsp. *pseudocerris*					+				+									2
OSCA	*Ostrya carpinifolia*				+					+									2
LOOF	*Lonicera officinalis*										+		1.1						2
	Quercetea pubescentis																		
STOF	*Styrax officinalis*	+	+	+	.	+	+	1.1	+	1.1	1.1	1.1	2.2	2.2	1.1	2.2	1.1	2.2	16
HEHE	*Hedera helix*	.	.	1.1	+	1.1	.	+	.	.	+	.	.	.	.	.	.	.	5
CELO	*Cephalanthera longifolia*	.	.	.	+	.	.	.	.	+	.	1.1	.	+	+	.	.	.	5
RUSA	*Rubus sanctus*	.	.	.	.	+	.	2.2	.	.	+	.	.	.	+	.	.	.	4
CRMO	*Crataegus monogyna*	.	.	.	.	+	.	.	.	.	.	.	+	.	.	.	1.1	.	3
CLFL	*Clematis flammula*	+	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	1.1	3
COMA	*Cornus mas*	.	.	1.1	.	+	.	.	.	.	+	.	.	.	.	.	.	.	3
CESI	*Cercis siliquastrum*												1.1				1.1		2
PTAQ	*Pteridium aquilinum*												1.2				1.1		2
CLVI	*Clematis vitalba*					2.2					1.1								2

	Relevé code number	J18	J19	J20	J21	J22	J23	J24	J25	L26	L24	L31	F13	J15	L33	J14	L25	G09	
CACL	*Calamintha clinopodium*										+	1.1							2
POSU	*Polygala supina*										+								2
	Astragalo-Brometea																		
DIST	*Dianthus strictus* subsp. *multipunctatus*					+		+											
	Cisto-Micromerietea																		
CAVI	*Calycotome villosa*	.	.	.	+	.	.	.	+	+	+	.	.	+	.	+	.	.	6
ORSY	*Origanum syriacum*	.	.	.	.	+	.	.	.	.	.	.	.	+	1.1	.	+	.	4
POSP	*Poterium spinosum*	.	.	.	.	.	.	.	+	.	+	.	.	.	1.2	.	.	.	3
HYPE	*Hypericum perforatum*	.	.	.	.	.	.	.	.	2.2	.	.	2.2	2.2	.	+	.	.	4
CIVI	*Cistus villosus*	.	.	.	.	.	.	.	.	.	+	1.2	.	.	1.1	.	.	.	2
CISA	*Cistus salviifolius*	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	3
HYHI	*Hyparrhenia hirta*	.	.	.	+	.	.	.	.	+	.	.	.	.	.	+	.	.	3
GEAC	*Genista acanthoclada*	.	.	.	.	.	.	.	+	2.2	1.2	.	.	.	.	.	.	.	3
SAGR	*Salvia grandiflora*				+										1.1				2
SPJU	*Spartium junceum*				+		+												2
MIMY	*Micromeria myrtifolia*									+							+		2
	Companion species																		
FICA	*Ficus carica*			+			+												2
ROSP	*Rosa* spec.											+	+						2
TUSP	*Teucrium* spec.									+					+				2
ASSP	*Asperula* spec.										+						+		2
PHSP	*Phlomis* spec.								+										2
		12	9	13	19	23	15	16	15	34	26	16	23	17	19	19	18	11	

One time record species (table 14):

Hypericum lydium (J15: +), *Ceratonia siliqua* (J20:+), *Luzula forsteri* (J21:+), *Astragalus* spec. (J21:+), *Arum dioscoridis* (J22:+), *Lamium truncatum* (J22:+), *Galium* spec.(J22:+), *Scutellaria* spec. (J25:+), *Orchis* spec.(J24:+), *Pistacia atlantica* (L26:+), *Cornus australis* (L26:+), *Coronilla emeroides* (L26:+), *Teucrium polium* (L26:+), *Dorycnium hirsutum* (L26:+), *Phlomis* viscosa (L26:+), *Thesium bergeri* (L26:+), *Thymus syriacus* (L26:+), *Asperula* spec. (L24:1.1), *Paliurus spina-christi* (G09:1.1), *Hypericum thymifolium* (J23:+), *Milium montanum* (J23:+), *Viola alba* (L24:+), *Viola* spec.(L31:1.1), *Pyrus syriaca* (G09: 1.2), *Jasminum fruticans* (F13: 1.1), *Pinus brutia* (F13: 1.2), *Gonocytisus pterocladus* (F13: 1.1), *Asplenium adiantum-nigrum* (L24: +), *Vitis orientalis* (F13: +), *Osyris alba* (L26: +), *Lonicera orientalis* (F13: 1.1), *Phlomis longifolia* (L33: 1.1), *Rhus cotinus* (L26: 3.3), *Eupatorium cannabinum* (F30: 1.1).

Description of the relevés' sites (table 14):

Relevés Code	**Site Name**	**Lat.**	**Long.**	**Site location and description**
F13	Makhos	35.42.10	35.53.24	North Lattakia near of Ain-Beida. Trees are 10-12 m high with diameter of 15 cm
G09	Hishah	34.49.48	35.54.36	12km South Tartous on the seashore. Trees are 6-8 m high with diameter of 15-20 cm
J14	Kheder	35.27.36	36.01.48	Near Qerdaha in the Coastal Mountains. Trees are 10-11 m high with diameter of 15-40 cm
J15	Sultana	35.31.48	35.58.48	Near Qerdaha in the Coastal Mountains. Trees are 10-12 m high with diameter of 12-20 cm
J18	Al-Amoud	36.06.36	35.36.03	North side of the road between Hafeh and Slenfah in the Coastal Mountains. The site has almost changed to a restaurant. Trees height is 10-12 m with diameter of 20-50 cm
J19	Hosamo	36.05.24	35.36.36	North side of the road between Hafeh and Slenfah in the Coastal Mountains. The site has almost changed to a restaurant. Trees height is 10-12 m with diameter of 30-50 cm
J20	Kheder timber	36.06.03	35.37.12	North side of the road between Hafeh and Slenfah near Sorna in the Coastal Mountains. Trees height is 10-11 m

Relevés Code	Site Name	Lat.	Long.	Site location and description
				with diameter of 15-40 cm
J21	Sheikh-Hasan	36.06.36	35.37.12	North side of the road between Hafeh and Slenfah near Sorna in the Coastal Mountains. Trees height is 8-10 m with diameter of 10-40 cm
J22	Deir Droma	36.06.06	35.37.12	North side of the road between Hafeh and Slenfah near Sorna in the Coastal Mountains. Trees are 12-14 m high with diameter of 30-60 cm.
J23	Sheikh-Isa	36.06.10	35.35.32	South side of the road between Hafeh and Slenfah near Shardob in the Coastal Mountains. Trees height is 6 m with diameter of 10 cm.
J24	Al-madinah forest	36.03.36	35.36.07	East of Qal'aat Salahdeen in the Coastal Mountains. Trees height is 10-12 m with diameter of 10-40 cm
J25	Sheikh-Abdullah	36.04.48	35.36.48	East of Ain Al-Tineh in the Coastal Mountains. Total area is 900m^2 with 34 trees that are 10-12 m high with diameter of 80-120 cm
L24	Road to Bshamah	35.04.48	36.15.00	East of Sheikh-Bader in the Coastal Mountains. Trees height is 10-12 m with diameter of 15-20 cm
L25	Kafroun	34.52.12	36.16.48	Near of Mashta Al-Holw in the Coastal Mountains. Trees height is 8-10 m with diameter of 15-30 cm
L26	Bshamah	35.05.24	36.07.48	East of Sheikh-Bader in the Coastal Mountains. Trees height is 10-12 m with diameter of 15-30 cm.
L33	Wadi Al-Oyoun	35.01.48	36.15.06	East of Sheikh-Bader in the Coastal Mountains. Trees height is 8-10 m with diameter of 15-20 cm
L31	Bshamah	35.04.48	36.13.12	East of Sheikh-Bader in the Coastal Mountains. Trees height is 10-12 m with diameter of 10-30 cm

8.1.1.4.4. Phytosociological characteristic:

The phytosociological structure of the association concentrates on the climax or semi-climax stage in the dynamic succession of the *Quercus calliprinos* maquis. On the one hand, the association contains 32 species of the Quercetea-ilicis and its alliances (table 14); most of these species are from Quercion calliprini. On the other hand, the association contains 36 species from Quecetea pubescentis where most of these species belong to Qureco-Cedretalia libani. Furthermore, the Cisto-Micromerietea also exists but only with few species in some relevés of sites, which suffer from high human interferences that have led to the disappearance of the ground cover layer and therefore to the existence of the Cisto-Micromerietea species.

8.1.1.4.5. Characteristic structure of the association:

Eight characteristic species distinguish the association (table 15).

Quercus infectoria is used for indicatively naming the association with *Quercus calliprinos* and it is spread in all relevés with ADS ranging from + to 4.4, but in spite of being from Qureco-Cedretalia libani, it can still be seen near the sea. Moreover, it can be emphasized that this association is a very developed one probably due to the climax situation of the region.

Table 15: The characteristic species of the Querco (infectoria)-Quercetum calliprini (ass. nov.).

Legend of table 15: Ph: phanerophytes, H: hemicryptophytes, G: geophytes, Med, Mediterranean.

characteristic species	Altitude m.	Life-Form	Plant Height m.	Phytogeo graphical. relations	Phytosocio Logical relations	Distribution in Syria
Quercus infectoria	seashore to 1200	Ph	10	Med	Querco-Cedretalia libani	Coastal , Al-Akrad, Wastani, Anti-Lebanon Mountains and Jabal Al-Arab
Ruscus aculeatus	200-1000	G	0.5-0.7	Med	Querco-Cedretalia libani	Northern and central Coastal Mountains
Rubia aucheri	150– 950	H	0.2	Med.	Querco-Cedretalia libani	Coastal Mountains
Eryngium falcatum	150- 650	H	0.3	Med.	Quercion-calliprini	Coastal Mountains
Juniperus oxycedrus	100 - 1000	Ph	1-2	Med	Quercetea pubescentis	Coastal and Al-Akrad Mountains
Aristolochia altissima	200-950	H	0.5	Med	Quercion-calliprini	Coastal Mountains
Smilax aspera	seashore-to 900	Ph	0.5	Med	Quercion-calliprini	Coastal, Al-Akrad, Wastani, and Barakat Mountains
Myrtus communis	50 -700	Ph	3	Med	Oleo-Ceratonion	Coastal and Al-Akrad Mountains

8.1.1.5. Querco (calliprinos)-Phillyreetum mediae (Martini 1999):

It spreads on the eastern slopes of the Coastal Mountains between 180 to 1250 m height. In general, it is found on Terra-Rossa soils that are derived from hard limestone parental rocks.

It extends in semi-arid, sub-humid and humid bioclimatic stages with temperate and fresh variants where the Q_2 value is 53- 183 and the precipitation is 550-1200 mm/year.

Martini (1999) suggested 18 characteristic species which are: *Quercus calliprinos, Phillyrea media, Pistacia palaestina, Osyris alba, Cupressus sempervirens, Ononis viscosa, Thymus hirsutus, Lamium truncatum, Marrubium libanoticum, Chrysanthmum segetum, Fraxinus syriaca, Rhamnus palaestina, Thesium bergeri, Gladiolus segetum, Teucrium chamaedrys, Lathyrus digitatus, Erica manipuliflora, Colutea cilicica*.

The association is recognized from the FAC analysis in this study (chart 2) by the relevés of group D. These relevés spread on the eastern and southern slopes of the Coastal Mountains and some of them are recorded in Al-Zawiah and Wastani Mountains.

The characteristic species, which shared all the relevés, are *Cupressus sempervirens, Galium aparine, Lamium truncatum, Ononis viscosa, Osyris alba, Phillyrea media*, but the other species which were suggested earlier by Martini (1999) were not distinguished from the chart.

8.1.1.6. Styraco (officinalis)-Quercetum calliprini (ass. nov.):

From the FAC analysis, the relevés of group E of the centre group points are presented in the chart (2) and another new association can be recognized (table 16).

8.1.1.6.1. Phytogeographical relations:

This association is distributed on different slopes of Al-Akrad and Wastani Mountains on a height range of 170-900 m, and on hard limestone and marl substrata. The climate data corresponding to the association were collected from Azaz, Jendires, Idleb and Rouge-Bal'aa stations. The precipitation is 450-600 mm/year, the average minimum temperature is 1.5-3.3°C, Q_2 value is 50-65 and therefore the association is located in the humid and sub-humid bioclimatic stages with fresh and temperate variants.

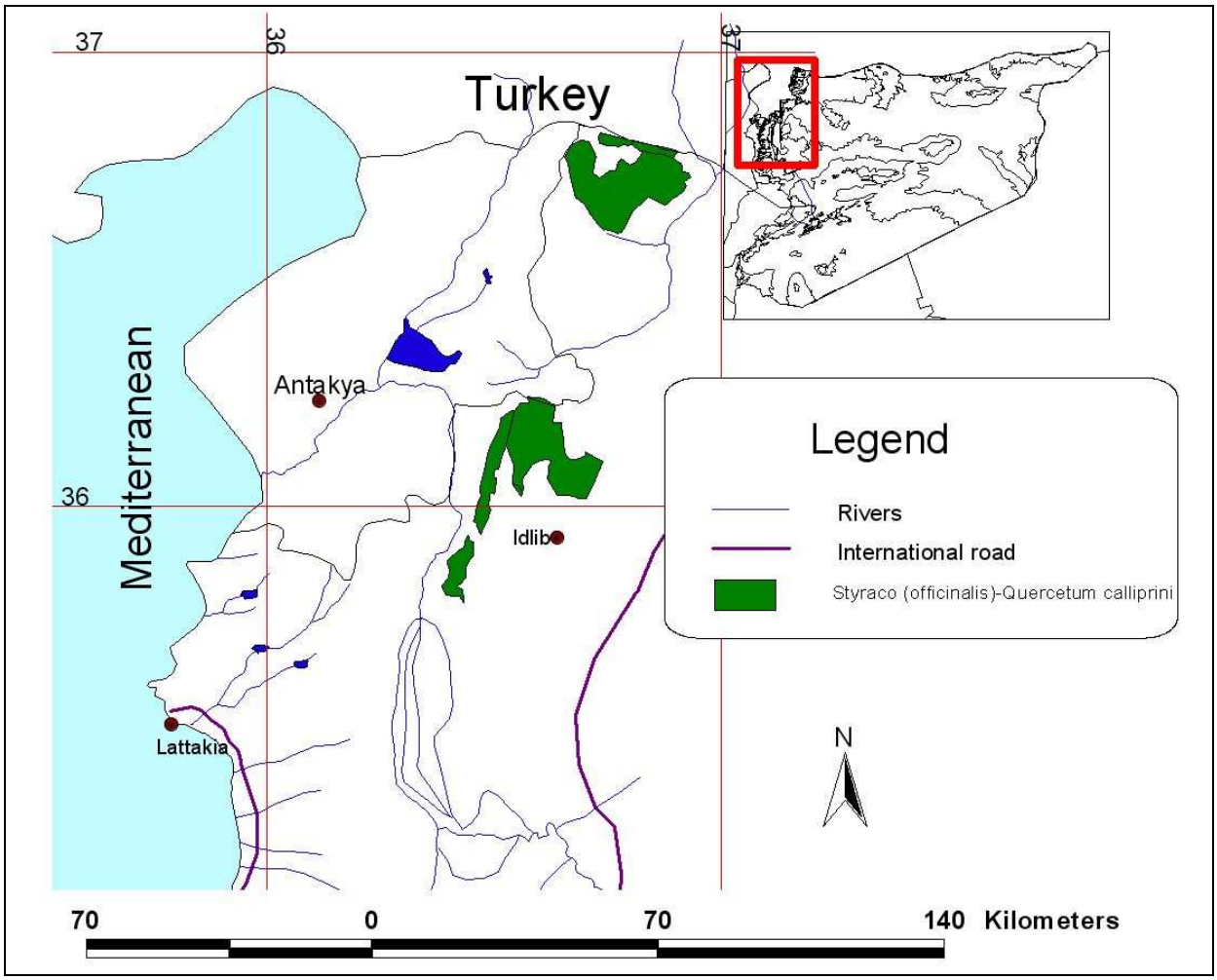


Fig 31: The distribution of the Styraco (officinalis)-Quercetum calliprini (ass. nov.)

8.1.1.6.2. The floristic analysis of the association:

The total number of species in all relevés is 72 species (table 16), with an average of 15 species, but this total number increases to more than 20 species when the climate or the soil conditions become better such as in relevés A05, C19 and C06.

Table 16: Styraco (officinalis)-Quercetum calliprini (ass. nov.)

Code species number	Relevés number	A01	A05	A25	A28	A29	C14	C19	C22	C06	L01	Constancy
	Altitude m	730	790	350	910	880	500	170	500	365	480	
	Exposition	-	-	W	W	-	-	NW	-	NW	S	
	Slope %	-	-	20	20	-	-	60	-	35	20	
	Total cover %	100	70	80	70	30	90	70	90	70	30	
	Trees cover %	90	60	80	60	-	80	10	90	15	-	
	Shrubs cover %	10	10	30	20	30	20	30	20	65	30	
	Ground cover %	20	20	20	10	20	10	40	5	20	20	
	Parent rock	Cal	Cal	Cal	Cal	Cal	Cal	Cal.	Cal	Cal.	Cal.	
	Surface m^2	200	400	100	400	400	200	200	200	200	400	
QUCA	*Quercus calliprinos*	3.3	1.1	2.2	2.3	2.2	2.2	2.2	3.3	1.1	2.2	10
	Styraco (officinalis)-Quercetum calliprini											
STOF	*Styrax officinalis*	2.2	1.1	1.1	+	1.1	2.1	1.1	1.1	2.2	+	10
RHPA	*Rhamnus palaestina*			1.1	1.1	+	+	1.1	+	1.1	+	8
JAFR	*Jasminum fruticans*		1.1	1.1	+	2.2			+	+		6
PRUR	*Prunus ursina*	1.1	+	+		1.1						4
CIVI	*Cistus villosus*			+	1.2					+		3
DAOL	*Daphne oleifolia*				1.1			+				2
	Quercion calliprini											
PHME	*Phillyrea media*	1.1	1.1	1.1	1.1	1.1	1.1	1.1	+	+		9
PIPA	*Pistacia palaestina*	+	1.1	+	1.1	1.1	1.1	2.2		1.1		8
CRAZ	*Crataegus azarolus*	+	1.1			1.1		1.1	+		2.1	6
PYSY	*Pyrus syriaca*	+						+		+	2.2	4
CLCI	*Clematis cirrhosa*	1.1			+		+	1.1				4
TACO	*Tamus communis*	1.1		2.2		+		+				4
ASAC	*Asparagus acutifolius*		+	1.1			+					3
SMAS	*Smilax aspera*						+	1.1	+			3
ARAL	*Aristolochia altissima*	+	1.1									2
LANO	*Laurus nobilis*						1.1	+				2
PIAT	*Pistacia atlantica*			1.1		1.1						2
	Oleo-Ceratonion											
OLEU	*Olea europaea* var. *oleaster*				1.2		1.1		+	+		4
	Quercetea ilicis											
QUAE	*Quercus aegilops*	2.2		1.1				2.2				3
PRMI	*Prunus microcarpa*								+	+		2
	Querco-Cedretalia libani											
QUIN	*Quercus infectoria*	1.1	1.1			2.2					2.1	4
FIFI	*Ficaria ficaroides*		1.1	+			+					3
LOOR	*Lonicera orientalis*					+		+				2
LATR	*Lamium truncatum*						1.1		+			2
LECR	*Lecoquia cretica*	1.1	2.1									2
	Quercetea pubescentis											
CLFL	*Clematis flammula*					+				1.1		2
PHLO	*Phlomis longifolia*							1.1		1.1		2
	Cisto-Micromerietea											
ASMI	*Asphodelus microcarpus*						+			1.1		2
		17	19	15	13	14	17	24	10	21	7	

One time record species (table 16):

Arbutus andrachne (A28,+), *Acanthus mollis* (A01:5.5), *Ajuga chia* (C19: +), *Althaea officinalis* (C6:+), *Briza maxima* (C6:+), *Bryonia multiflora* (A05:+), *Calycotome villosa* (C19: +), *Campanula strigosa* (C19:+), *Ceterach officinarum* (C14:+), *Crataegus monogyna* (A28:+), *Crepis pulchra* (A05:1.1), *Crepis reuteriana* (A05:1.1), *Dryopteris libanotica* (C19: +), *Ephedra campylopoda* (C14:+), *Eryngium falcatum* (A25:1.1), *Helichrysum*

sanguineum (C19: 1.1), *Hypericum cardiophyllum* (C19:1.1), *Hypericum thymifolium* (A28:+), *Loranthus europaeus* (A01:+), *Malus trilobata* (A29:+), *Micromeria myrtifolia* (C19: +0), *Micromeria serpyllifolia* (C14:+), *Ononis viscosa* (C6:1.1), *Osyris alba* (C6: 3.2), *Paliurus spina-christi* (C19:+), *Papaver rhoeas* (C6:+), *Poterium spinosum* (C6:1.1), *Quercus cerris* subsp. *pseudocerris* (A05:1.1), *Rosa sicula* (A05:+), *Ruscus aculeatus* (C14:+), *Salvia grandiflora* (C6: +), *Trifolium physodes* (A05: 3.3), *Veronica leiocarpa* (C6:+), *Vicia tenuifolia*(A05:1.2), *Zizyphus spina-christi* (A01:+) *Anagyris foetida* (A25, +), *Cistus salviifolius* (C19,+), *Juniperus oxycedrus* (C06,+).

Site description of the relevés (table 16):

Relevés Code	Site Name	Lat.	Long.	Site location and description
A01	Kawanda	36.49.12	36.45.10	Between Midan-Akbas and Bolbol in Al-Akrad Mountain.
A05	Shinkel	36.46.12	36.48.36	Between Midan-Akbas and Bolbol in Al-Akrad Mountain.
A25	Qara-Baba	36.48.36	36.46.12	5 km south of Bik-Obeci in Al-Akrad Mountain.
A28	Hajj -Jekly	36.33.36	36.36.36	5 km north of Sheikh Al-Hadid in Al-Akrad Mountain.
A29	Bik-Obeci	36.47.24	36.49.12	Near to Bolbol in Al-Akrad Mountain.
C14	Yanael	36.12.00	36.32.24	South of Harem in the Wastani Mountain.
C19	Hammam Sheikh Isa	35.56.24	36.24.36	South of Darkosh in the Wastani Mountain.
C22	Harem	36.12.36	36.33.00	3 km east of Harem in the Wastani Mountain.
C06	Jadeen	36.10.12	36.29.24	8 km south of Harem in the Wastani Mountain.
L01	Hafsargeh	36.02.24	36.32.24	20 km south of Harem in the Wastani Mountain.

The spectrum of the species life form in the association consists of the following percentages: 36, 20, 20, 10, 10, and 4% for the hemicryptophytes, chamaephytes nanophanerophytes, phanerophytes, geophytes, and therophytes, respectively.

The phytogeographic spectrum of the association species shows the dominance of the Mediterranean species by 86%, with only few species (14%) from all other geographic regions.

8.1.1.6.3. Stratification of the association:

The average total coverage of vegetation in this association is 70% with some exceptions as in relevés A01, C14 and C22 where the cover percentage has increased to 90-100% or in relevés A29 and L01 where the vegetation was very sparse and the coverage has decreased to only 30%.

The most important stratum in this association is the trees, which comprises 75% in most relevés, but it completely disappears in some others. The trees height ranges between 6 and 8 m and the dominant species are *Quercus calliprinos* and *Phillyrea media* in most relevés and sometimes they are shared with *Pistacia palaestina*, *Pinus brutia*, *Cupressus sempervirens*, *Quercus infectoria*, *Pyrus syriaca*, and *Olea europaea* which can reaches 6 m high, however those co-dominant species in general, are growing like shrubs with height of 2-4 m.

The second stratum is the shrubs and this layer reaches 2-3 m high with an average coverage of 25%. The most dominant species in this stratum are *Styrax officinalis, Crataegus azarolus, Crataegus monogyna* and *Arbutus andrachne*. However, this layer becomes the dominant stratum sometimes when the tree stratum has disappeared and its species grows in shrub like shape as the case in relevés L01 and A29.
The third stratum is the ground cover with coverage of 10-30% and this layer contains many species of different heights as some of them grow up to be 60-100 cm tall.

8.1.1.6.4. Phytosociological characteristic:

Quercetea-ilicis and its alliances are compiling the most dominant species in this association. It is represented by 22 species and most of these are from the Quercion-calliprini. Moreover, Quecetea pubescentis and its alliances are also equally available through 21 species. On the other hand, many species from Cisto-Micromerietea are available in all the relevés but with a low existence with a share rate of 1-4 species for each relevé.

8.1.1.6.5. Characteristic structure of the association:

Six characteristic species are distinguished in this association as shown in table (17). These are:

Table 17: The characteristic species of Styraco (officinalis)-Quercetum calliprini (ass. nov.).
Legend of table 17: Ph: phanerophytes, H: hemicryptophytes, G: geophytes, Med, Mediterranean E-Med: east Mediterranean.

characteristic species	**Altitude m.**	**Life-Form**	**Height m.**	**Phytogeo graph**	**Phytosoci ology**	**Distribution in Syria**
Styrax officinalis	100 - 1100	Ph	2-3	E-Med	Quercetea-ilicis	Coastal, Al-Akrad, Wastani, and Barakat mountains
Cistus villosus	seashore to 700	H	1	E-Med	Cisto-Micromerietea	Northern and central Coastal mountains and Al-Akrad mountain
Daphne oleifolia	50-900	Ph	1.5	E-Med	Cisto-Micromerietea	Northern and central Coastal mountains, Wastani and Al-Akrad mountains
Rhamnus alaternus	seashore to 700	Ph	6	Med.	Quercion calliprini	Coastal and Al-Akrad mountains
Prunus ursina	400-1100	Ph	2-4	E-Med	Qureco-Cedretalia libani	Northern and central Coastal mountains, Al-Akrad and Qalamoun Mountains
Jasminum fruticans	0-900	Ph	0.5- 1	Med	Quercion calliprini	Coastal, Al-Akrad, Wastani, and Barakat mountains

The *Styrax officinalis* is used as an indicative species to name the association with *Quercus calliprinos* because it has been recorded in most relevés with

ADS + to 3.3, and the FAC analysis shows high relationship with the group of relevés of the association.

8.1.2.Discussion:

The vegetation of *Quercus calliprinos* in the western part of Syria belongs to the following phytosociological units: Quecetea (etalia) calliprini (Zohary 1970; Quezel 1980; Nahal et al. 1997) and Quercion calliprini, so all associations that were recorded are following the same superior units.

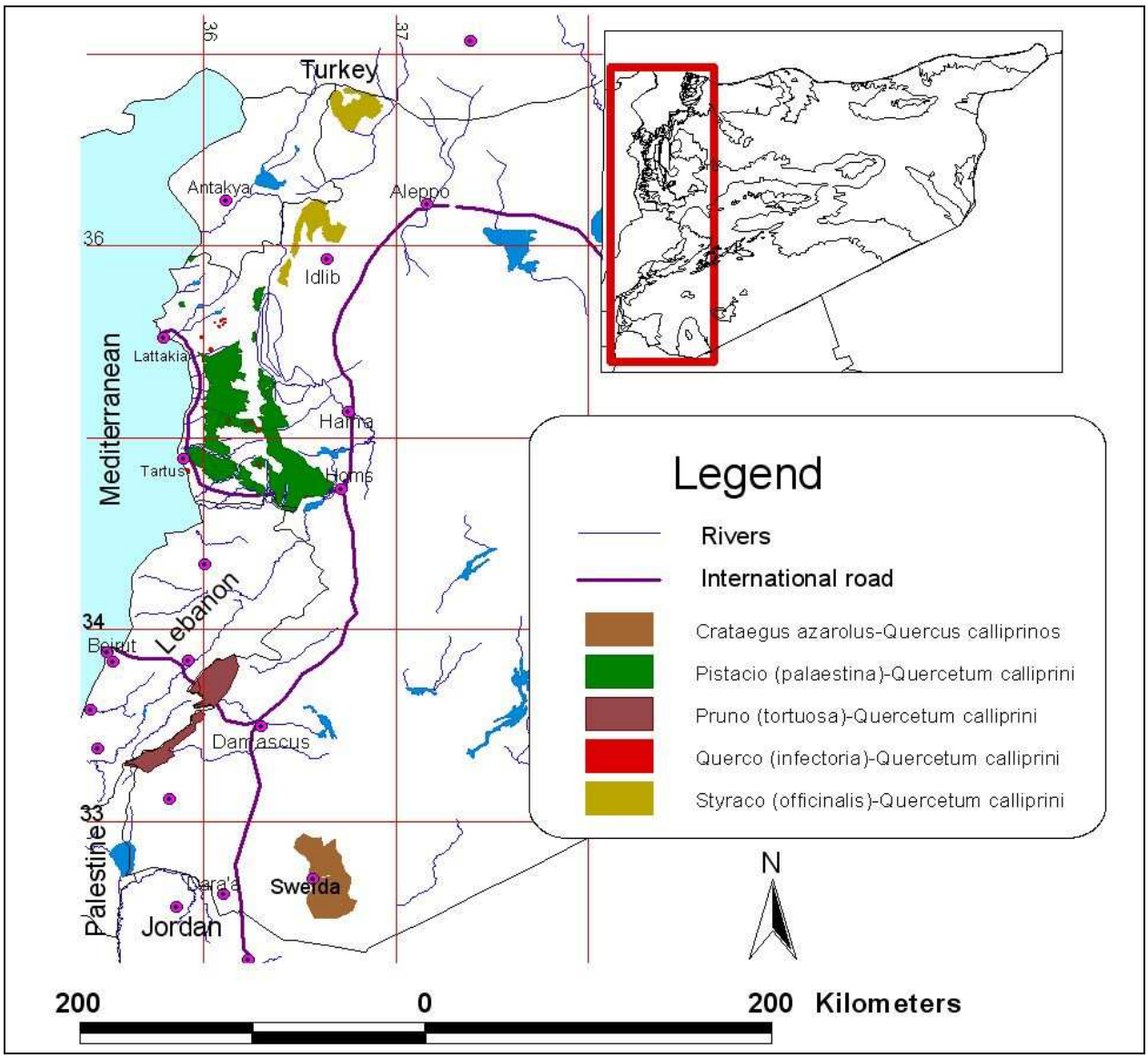


Fig 32: the *Quercus calliprinos* associations in the study area.

All maquis formations in the East-Mediterranean were said to belong to the Pistacio (palaestina)-Quercetum calliprini (Zohary 1962, Nahal 1982), but Martini (1999) has recorded another new association Querco (calliprinos)-Phillyreetum mediae on the eastern slopes of the Coastal Mountains. In this study further new associations were recorded for maquis formations, the

Querco (infectoria)-Quercetum calliprini on the western slopes of the Coastal Mountains and the Styraco (officinalis)-Quercetum calliprini in the inland mountains, Al-Akrad and Wastani Mountains.
The afore classification in this study for *Quercus calliprinos* maquis, which was explained earlier, shows two vegetation types which are the humid and inland vegetation. These two vegetation types were recognized by different associations depending on the FAC analysis.
The inland vegetation, which spreads in the south, is recognized in two main sties Jabal Al-Arab and the highland of Anti-Lebanon, but each of them has a different association which are: Quercus calliprinos-Crataegus azarolus (Chikhali 2000) and Pruneto (tourtuosa)-Quercetum calliprini, in Jabal Al-Arab and the highland of Anti-Lebanon, respectively. The main difference between them is the type of the parent rocks which is either basalt or limestone, respectively (table 18).

Table 18: The relationship between *Quercus calliprinos* associations

associations	**Bioclimatic stage**	**Minimum temperature °C**	**Precipitation mm/year**	**Altitude m**	**Substrata**	**Reference**
Crataegus azarolus-Quercus calliprinos ass.	Semi-arid and arid with cold and fresh variants	3.5	330	550-1250	Basalt	Chikhali 2000
Querco (calliprinos)-Phillyreetum mediae	Humid, sub humid and semi-arid with temperate and fresh variants	3.6	550-1300	180-1200	Hard-limestone	Martini 1999
Pistacio-Quercetum calliprini	Humid, sub humid and semi-arid with fresh, temperate and warm variants	1-7.5	700-2000	600-1400	Hard-limestone and marl	Zohary 1962
Pruno (tortuosa)-Quercetum calliprini	Semi-arid and arid with temperate variant	-1 – 0	300-550	> 1100	Calcareous	
Querco (infectoria)-Quercetum calliprini	Humid and sub humid with fresh, temperate and warm variants	2.6- 7	800-1300	0-900	Hard-limestone and basalt	
Styraco (officinalis)-Quercetum calliprini	Humid and sub humid with fresh and temperate variants	1.5-3.3	450-600	170-900	Hard-limestone and marl	

On the other hand, the vegetation of the Quercus calliprinos-Crataegus azarolus contains more Irano-Turanian species (26%) than the other association, Pruno (tortuosa)-Quercetum calliprini, which contains more Mediterranean-Irano-Turanian species (18%). In general, the number of the Irano-Turanian and the Mediterranean-Irano-Turanian species were high in the inland associations (fig 33).

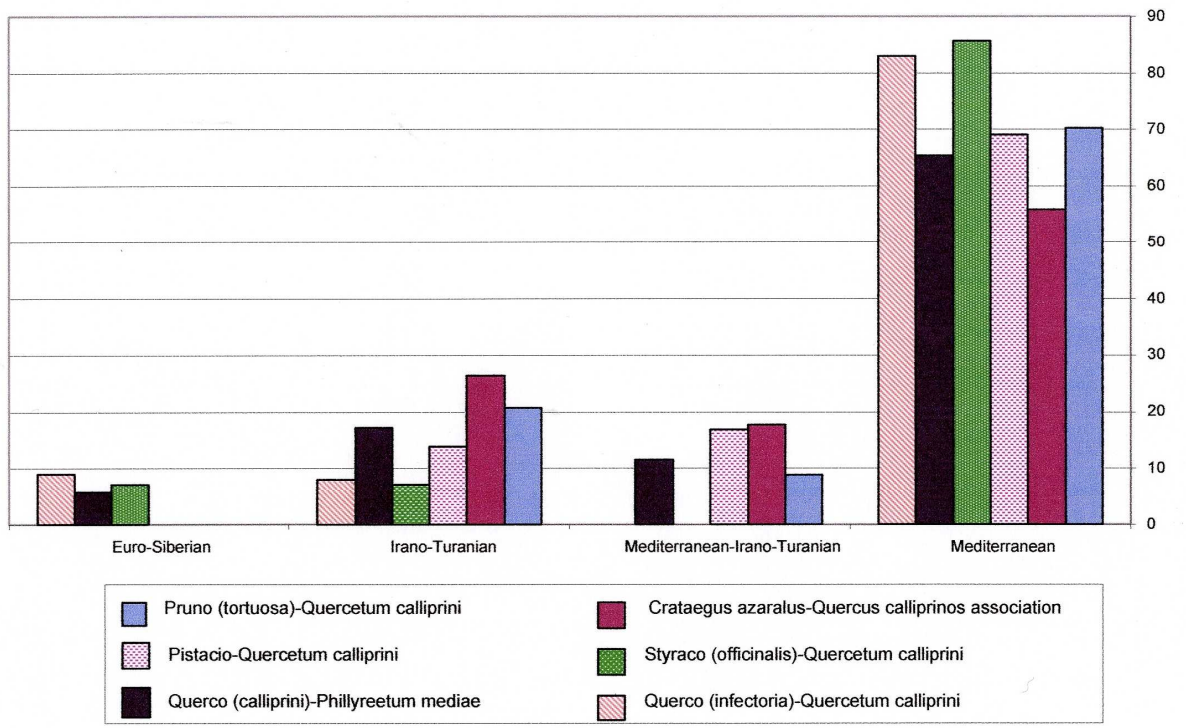


Fig 33: The Phytogeographical relation of *Quercus calliprinos* associations.

The relation between these associations in the study area is very week in two directions: the first direction contains Mediterranean species in the northern associations more than in the southern ones. The second direction represents the change from the west towards the east where the Mediterranean species are decreasing with this direction. The dominant species in the vegetation has changed from *Quercus infectoria* on the seashore and towards the inner areas into *Phillyrea media* on the eastern slopes of the Coastal Mountains or into *Styrax officinalis* in Al-Akrad Mountain.

However, those relations were strong among the northern associations especially between the Pistacio (palaestina)-Quercetum calliprini and the Querco (infectoria)-Quercetum calliprini which indicates that they are in a different stage of the succession toward the climax (table 19).

However, if the maquis were kept extensively protected from human activities and were allowed to grow spontaneously, their composition will change from a stand with a rich mixture of species to an almost pure stand of *Quercus calliprinos*.

Upon describing the regressive succession of the *Quercus calliprinos* formations, Nahal (1981) considered the climax forests in the East-Mediterranean to be the association Quercetum calliprini. This association formed when the *Quercus calliprinos* maquis was protected from the effects of human activities.

In this study, the climax of the *Quercus calliprinos* in the protected stands in Syria my followed to a new association which was suggested. This association

is the Querco (infectoria)-Quercetum calliprini, which grows as a few small spots on the western slopes of the Coastal Mountains where the bioclimatic stage is humid or sub-humid.

Table 19: The associations of *Quercus calliprinos* in the study area.
The abbreviations of table 19: A: Quercus calliprinos-Crataegus azarolus ass. (Table 12); B: Pruno (tortuosa)- Quercetum calliprini (Table 12); C: Querco (infectoria)-Quercetum calliprini (Table 14); D: Querco (calliprinos)-Phillyreetum mediae(Appendix 3 and 5); E: Styraco (officinalis)-Quercetum calliprini (Table 16); F: Pistacio (palaestina)-Quercetum calliprini (Appendix 3).

Association code	**A**	**B**	**C**	**D**	**E**	**F**
Number of relevés	**5**	**5**	**17**	**11**	**10**	**11**
Quercus calliprinos	V, 1.1 - 3.3	V, + - 1.2	XVII, 3.3, 5.5	X, 1.1 - 3.3	X, 1.1- 3.3	XVI, + - 3.3
Quercus calliprinos-Crataegus azarolus ass.						
Crataegus azarolus	IV, +	IV, + - 1.1	IV, +	X, + 2.2	VI, + - 2.1	V, +
Amygdalus korschinskii	IV, + - 1.1	III, + - 1.1				
Pistacia atlantica	III, + - 1.1	+			II, 1.1	
Pyrus syriaca	IV, + - 2.1	+		IV, +	IV, + - 2.2	VI, + - 2.2
Pruno (tortuosa)- Quercetum calliprini						
Prunus tortuosa		V, + - 2.2				
Acer monspessulanum		II, + - 2.2				
Amygdalus orientalis		V, + - 2.2				
Amygdalus spartioides		III, +				
Crataegus monogyna		III, + - 2.2	III, + - 1.1	I, 2.2		IV, + - 1.1
Poterium spinosum		IV, + - 3.3	III, + - 1.2	V, + - 1.1		IV, + - 2.2
Querco (infectoria)- Quercetum calliprini						
Quercus infectoria			XIII, + - 2.2	IV, + - 1.1	IV, 1.1- 2.2	X, + - 1.1
Aristolochia altissima			VII, + - 1.1		II, + - 1.1	
Eryngium falcatum	I, +	I, 1.1	IX, + - 2.2			
Juniperus oxycedrus			IV, + - 2.2	III, +	I, +	
Myrtus communis			V, + - 3.3	V, + - 2.2		III, + -2.2
Rubia aucheri			XII, + - 2.2			VI, + - 2.2
Ruscus aculeatus			XIII, + - 2.2			VIII, + - 2.3
Smilax aspera			XVII, + - 3.3		III, + - 1.1	
Querco (calliprinos)-Phillyreetum mediae						
Phillyrea media			XI, + - 2.2	X, + - 2.2	IX, + - 1.1	
Cupressus sempervirens				II, 1.1- 2.3		
Galium aparine				III, +		
Lamium truncatum				I, +	II, + - 1.1	
Ononis viscosa				I, 2.2		
Osyris alba				V, +		II, +
Styraco (officinalis)- Quercetum calliprini						
Styrax officinalis			XVI, + - 2.2		X, + - 2.2	
Cistus villosus			III, + - 1.2	III, + - 3.3	III, + - 1.2	V, + - 2.2
Daphne oleifolia					II, + - 1.1	
Prunus ursina			III, + - 1.1	II, 1.1	IV, + - 1.1	V, +
Rhamnus palaestina			VI, + - 1.1	III, +	VIII, + - 1.1	VI, + - 1.1
Jasminum fruticans				V, + - 1.1	VI, + - 2.2	VI, + - 1.2
Pistacio (palaestina)-Quercetum calliprini						
Acer syriacum						II, +
Pistacia palaestina	I, +	I, 1.1	XV, + - 2.2	X, + - 2.2	VIII, + - 1.1	XVI, + - 2.2
Arbutus andrachne			II, + - 1.1	II, +	I, +	IV, +
Cercis siliquastrum			II, 1.1	I, 1.1		II, + - 1.1
Clematis flammula			III, + - 1.1	III, +	II, + - 1.1	I, +
Dryopteris libanotica						V, + - 1.1
Gonocytisus pterocladus						II, +
Hedera helix			VI, + - 1.1			V, + 3.3
Laurus nobilis			III, + - 2.2	III, +	II, + - 1.1	IX, + - 1.1
Rhamnus alaternus			VI, + - 1.1	III, +		II, +
Scilla maritima						I, +
Spartium junceum						III, +

On the other hand, this association can also be seen elsewhere on the eastern slopes of the Coastal Mountains as in Tahwnet Al-Halawah, which contains big mature trees of both *Quercus calliprinos* and *Quercus infectoria*. The microclimate in this site is affected with a permanent spring and stream, but the human interference was concealing that association to be clearly noticed.
The richness of climax species in this association, which were used as phytosociological indicators for a climax forest, are emphasizing that this association is the climax in the East-Mediterranean region.

8.2. The *Quercus aegilops* associations:

The relevés of groups A and B, which were reorganized by the FAC analysis, correspond to an earlier recognised two associations:

8.2.1. Querco (aegilops)-Pistacietum atlanticae (Ghazal 1994):

Depending on data of FAC, the characteristic relevés are A04, A12, A27, C07, C08, C12, C18 and C23.
This association is distributed in Al-Akrad, Al-Wastani, Deir-Samaan, and Al-Zawiah Mountains (fig 34), with a height of 150-800 m above sea level.
Climate data of this association shows that the rainfall is 450-700 mm/year, the average minimum temperature is 1-3°C, and Q_2 value is 50-75. Hence this association is found in the semi-arid and the lower sub-humid bioclimatic stages with fresh and temperate variants.
The characteristic species of this association are *Pistacia atlantica, Quercus calliprinos, Rhamnus palaestina, Jasminum fruticans, Clematis cirrhosa, Ephedra campylopoda, Pyrus syriaca, Bryonia syriaca* and *Hypericum cuneatum.*

8.2.2. Crataego (azarolus)-Quercetum aegilopsii (Ghazal 1994):

Based on the FAC data; the group A: A02, A24, B03, C04, C10, C15, L06, C20, C09, C11, L05, L08, L22, R08 and R09 are the characterizing relevés.
This association is found in the Coastal Mountains, the Ghab plain and in sometimes in Al-Akrad and Wastani mountains (fig 34), between 150 and 650 m above sea level. Climate data for this association shows a precipitation range of 450-1200 mm/year, the average minimum temperature is 2-7°C m, and Q_2 value is 60-130. This association, in conclusion, is found in the humid and sub-humid bioclimatic stages with fresh, temperate and warm variants.
The characteristic species of this association are *Crataegus azarolus, Pistacia palaestina, Phillyrea media, Tamus communis, Asparagus acutifolius, Smilax aspera, Bryonia multiflora, Lavatera punctata.*

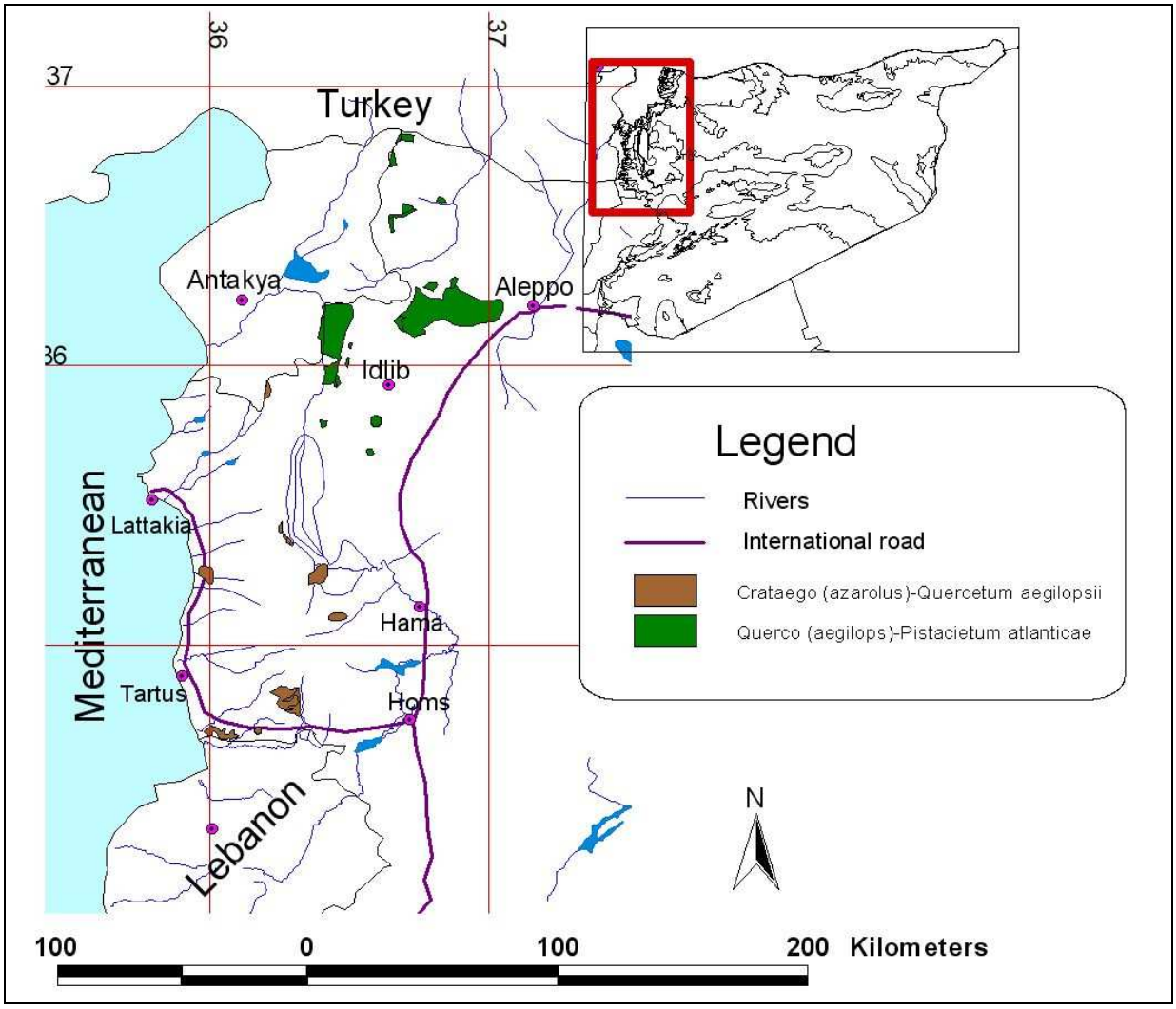


Fig 34: The geographical distribution of the *Quercus aegilops* associations

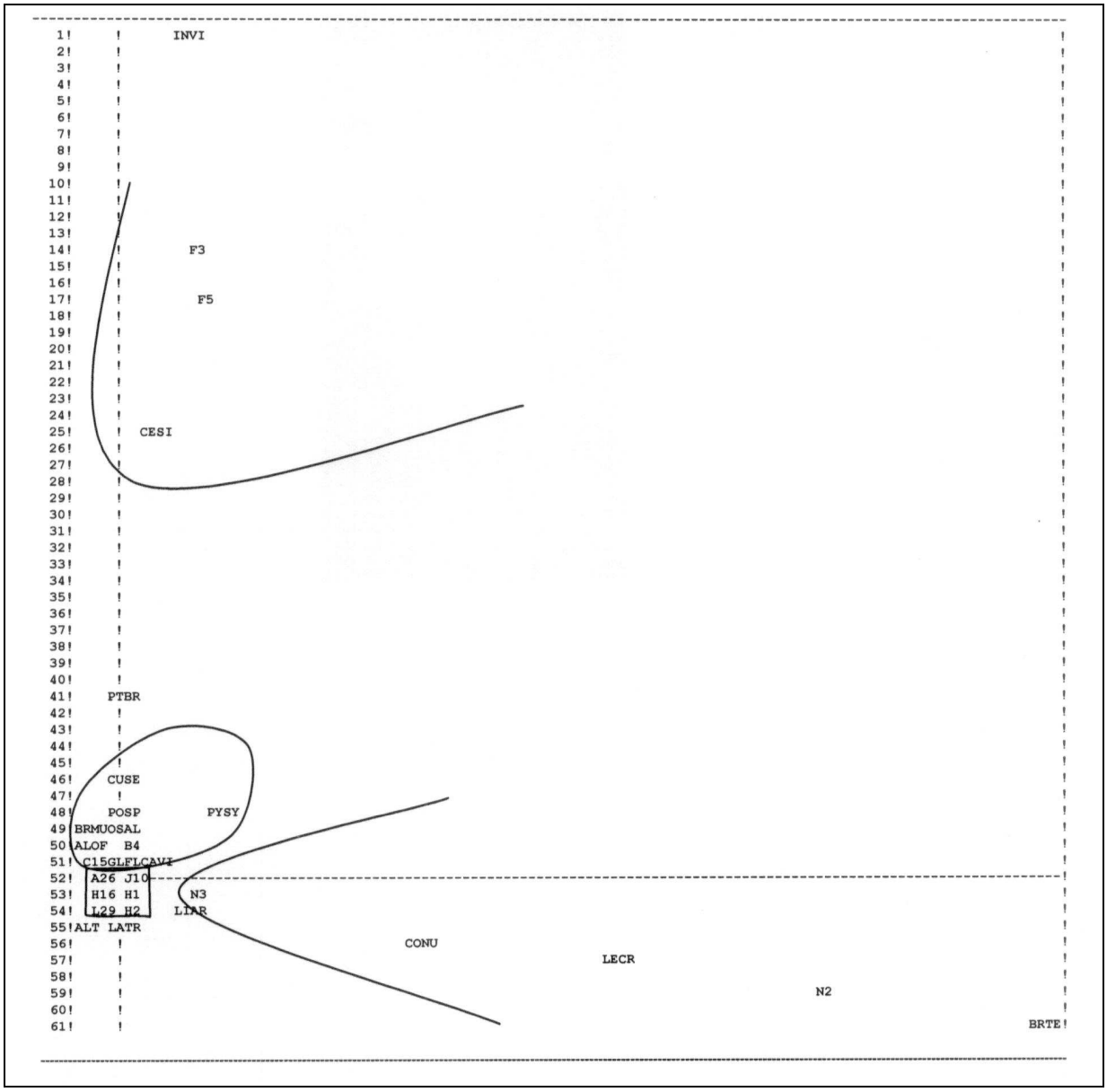
8.3.The FAC of *Pinus brutia* forest:

Forty seven relevés were carried out in stands of *Pinus brutia* formations in the study area. These relevés were analyzed also using FAC method and the resulted six charts of the first four axes have been studied (charts 3, 4 and 5).
The first axis has the highest inactivity (7.82%) and correlation (0.77); it shows an excellent distribution for relevés depending on their altitude as in N01, N02, H01, H02, and H20, which are concentrated on the positive side of the axis. Furthermore, many climatic factors such as the precipitation and the minimum temperature have increased by transferring from the negative to the positive side of this axis. The second axis, which has 7.34% and 0.75 for inactivity and correlation, respectively, organizes the relevés according to the parent rocks. All relevés which were recorded on serpentine substrata take the positive side of this axis, whereas the relevés on hard calcareous and marl parent rocks are located along its negative side.

Table 20: The correlation and inactivity data for the axes of the FAC analysis for all *Pinus brutia* forests relevés.

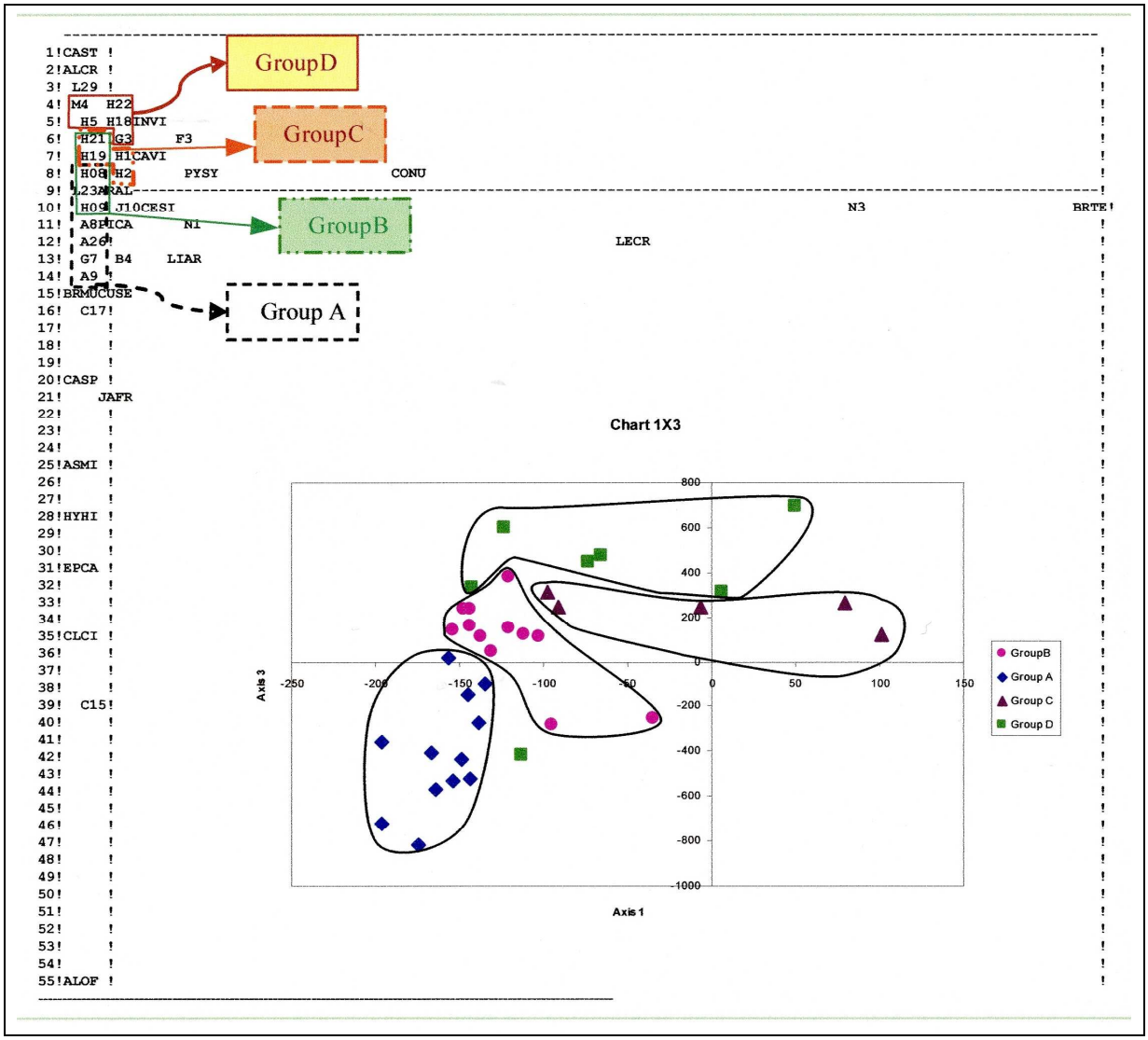
Axes	1	2	3	4	5	6	7	8	9	10
Correlation	0.77	0.75	0.65	0.63	0.58	0.57	0.56	0.54	0.53	0.51
Inactivity%	7.82	7.34	5.58	5.28	4.47	4.26	4.07	3.83	3.70	3.45

Many different positions were recognized in chart (3) as follows:
1. The relevés N02 and N03 that were recorded in Akoum were isolated by the first axis as in charts (1×2, 1×3 and 1×4). Many other species such as *Cedrus libani, Juniperus excelsa, Cotoneaster nummularia, Lecoquia cretica* and other species of chart 3, which were recorded with these relevés, are related to Supra-Mediterranean and Mountain-Mediterranean.
Akoum site is located in the Western Mountains of Lebanon (the Western Lebanese Mountains) with an altitude of more than 1000 m. From a phytosociological viewpoint, it is difficult to give a good description from only two relevés, and hence more analysis is needed to satisfy further results of the area.
2. Another special case could be recognized by isolating the relevés F05 and F10 in an additional chart. These relevés were recorded in the Coastal plains near to the seashore.
3. The relevés C15, C17 were isolated by the first axis (chart 3). ADS for *Pinus brutia* in these relevés was (+) and the dominated species belonged to Quercion calliprini
4. All other relevés were accumulated near the centre cross in chart (3).



The relevés points were not represented in the chart: B04= M03; C15= C17; J10=H22; the other relevés points were presented with relevés points: A26, H16, H01, L29.

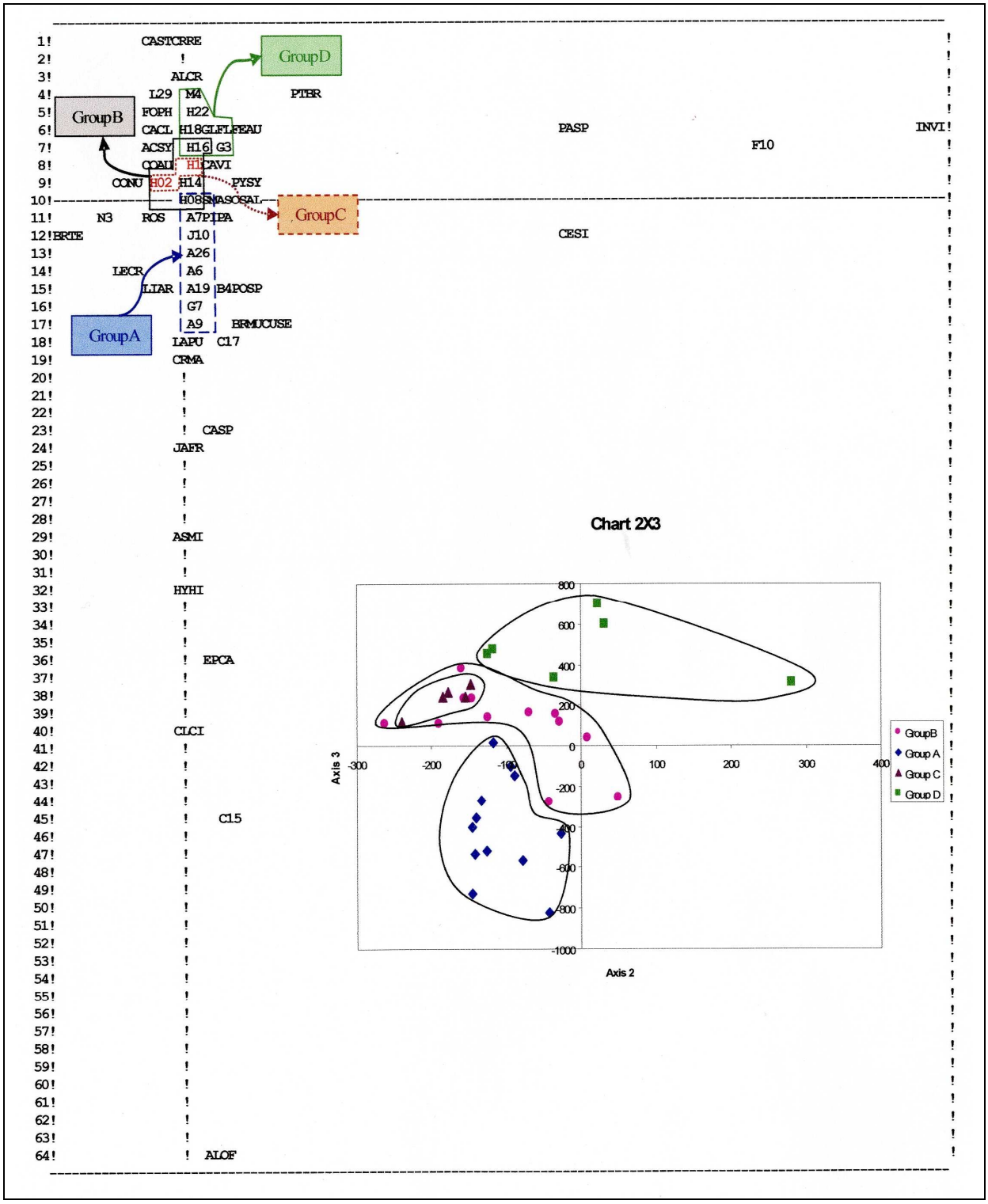
Chart 3: Cluster of the distribution of the *Pinus brutia* vegetation of FAC analysis on axis 1×2



The relevés points were not represented in the chart: H21= M03, H16, H10; H19=H03, H04, H06, H11; H01= H20, H25; A09= A14; A26= A06, A19, A17, A21; A08= A15; F10= F03; A07= A16, H09; L23= A18; H08= H14, A23, H15, H12, H07, H13, H22.

The important species points were not represented in the chart: H02= RUAU; G03= SAGR, ROPH, CERU; ARAL= QUCA; H13= JUOX, THBE, ARAN; H16= RHCO, IRUN, ONSU, CYDO, GOPT, DOHA, MATR, DOHI; A08= ORAY, RHCO; A26= ASAC, RHPA; A07= THSY; L23= CIVI, STOF, PHME; J10= PIBR; G07= ANFO.

Chart 4: Cluster of the distribution of the *Pinus brutia* vegetation of the FAC analysis on axis 1×3



The relevés points were not represented in the chart: H01=H03, H19, H20, H21, H11, H09; H14= H04, H15, H12, H06, H07, H22; H02= H13, H25; H18= H05; H08= A23, L23; J10= A16, H09; H16= H10, M03; A26= A08, N01, A15; A06= A17; G07= A14.

The important species points were not represented in the chart: H14= RUAU, ARAN, THBE; G03= SAGR; H16= CERU, RHCO, IRUN, ONSU, CYDO, GOPT, DOHA; L23= QUCA, JUOX, CIVI; A26= QUCA, RHCO, ORSY; H01= MATR, DOHI; A06= ASAC, RHPA; J10= THSY; ACSY= ROPH; A07= STOF, PHME, PIBR; G07= ANFO.

Chart 5: Cluster of the distribution of the *Pinus brutia* vegetation of the FAC analysis on axis 2×3.

However, in charts four and five, when the third axis intersects with the first and second axes, respectively, the previous cases were still recognizable but the previously accumulated points of relevés in chart 3 were clearly viewed and four groups of points were defined with productive results. These groups are:

1-Group A: with relevés A06, A07, A08, A09, A14, A15, A16, A17, A18, A19, A21, A23 and A26, which were all situated on the negative side of all axes, was very clear in charts (4 and 5). These relevés were recorded in Al-Akrad Mountain.

2-Group B: with relevés H03, H04, H06, H07, H08, H09, H10, H11, H12, H22 and H16 were clearly occupying the negative side of both the first and second axes and the positive side of the third axis in charts 4 & 5. These relevés were recorded in Jiser Al-Shoghour region.

3-Group C: with relevés H01, H02, H19, H20, H21 and H25 were occupying the negative side of the second axis and the positive side of the third axis in relevant charts (5 and 4). These relevés were located in Arafit area on the northern slopes of the Coastal Mountains.

4-Group D: The relevés M03, M04 and H18 took a concentrated and isolated place by chart (5) and in the chart of axis 2×4. These relevés were recorded in the Baer-Bassit on serpentine substrata.

A *t* test was done for groups A, B and C in FAC data to show their significance and their due separation by using same group data projection for all axes (Sliai, 1991). High significance of 99% has been found between them especially on the second axis (*t*=0.56**).

8.3.1.The associations of *Pinus brutia* vegetation:

According to the FAC analysis data and previous studies, four alliances were recognized:

1. Oleo-Ceratonion from relevés F05 and F10, The dominant species in these relevés are the elements of Oleo-Ceratonion which are *Olea europaea*, *Ceratonia siliqua, Pistacia lentiscus,* and *Myrtus communis*. Quezel (1980) explained that the thermo-Mediterranean forest landscape can make a formation from *Olea europaea* and *Pistacia lentiscus* in the east Mediterranean.
2. Junipero-Quercion from relevés N01 and N03.
3. Quercion calliprini from relevés C15 and C17.
4. Gonocytiso-Pinion is the most important one in this study and it is recognized by three new associations which are:
    5. Group A of relevés identifies the association Pino (brutia)-Cistetum villosii (ass. nov.), table (21).
    6. Group B of relevés identifies the association Pino (brutia)-Iridetum unguicularis (ass. nov.), table (23).
    7. Group C of relevés identifies the association Pino (brutia)-Arbutetum andrachnii (ass. nov.), table (25).

8.3.1.1. Pino (brutia)-Cistetum villosii (ass. nov.):

Based on the relevés of group A, this association was distinguished from table (21), as described below:

Table 21: Pino (brutia)-Cistetum villosii (ass. nov.):

species code	Relevés code	A21	A06	A07	A08	A09	A14	A15	A16	A17	A18	A19	A23	A26	Constancy
	Altitude m	750	670	700	710	620	560	530	580	610	650	670	600	625	
	Exposition	W-S	S	SE	W	W	S	NW	NW	N-NW	NW	W	ESE	SE	
	Slope %	30	15	25	25	45	45	45	40	40	45	15	40	15	
	Total cover %	70	60	65	40	70	60	80	70	80	60	85	75	60	
	Trees cover %	60	50	50	30	60	40	60	60	60	30	30	65	30	
	Shrubs cover %	20	20	40	10	60	30	30	20	50	50	60	35	50	
	Ground layer cover %	10	10	50	5	10	20	5	5	20	20	20	10	10	
	Parent rock	M	M	M	M	M	M	M	M	M	M	M	M	M	
	Surface m^2	400	400	400	400	400	400	400	400	400	400	400	400	400	
PIBR	*Pinus brutia*	4.4	2.3	2.3	2.2	2.2	3.3	4.3	3.4	3.3	2.2	3.3	3.3	3.3	13
	Pino (brutia)-Cistetum villosii														
CIVI	*Cistus villosus*	+	1.1	+	1.1	+	1.1	1.1	.	1.1	1.1	+	+	1.1	12
STOF	*Styrax officinalis*	1.1	1.1	+	+	.	.	1.1	1.1	1.1	+	+	+	.	10
PHME	*Phillyrea media*	+	+	.	.	.	.	+	+	2.2	1.1	1.2	+	1.1	9
THSY	*Thymus syriacus*		+	.	.	.	1.1	+	.	+	.	+	1.1	1.1	8
ANFO	*Anagyris foetida*		1.1	+	+	.	2.2	2.2	.	.	+	.	.	.	7
ASAC	*Asparagus acutifolius*		.	.	.	+	.	+	+	+	.	+	.	+	7
ORSY	*Origanum syriacum*		+	.	+	.	+	+	+	1.1	.	.	.	.	7
RHPA	*Rhamnus palaestina*		+	.	+	.	+	+	.	.	.	.	.	.	4
RHCO	*Rhus coriaria*		.	.	.	+	+	+	.	.	.	.	.	.	3
	Quercetea (etalia) ilicis														
ARAN	*Arbutus andrachne*		.	1.2	.	.	.	+	1.1	1.1	2.2	1.2	2.2	+	9
SMAS	*Smilax aspera*		.	+	.	+	+	+	.	.	+	+	+	+	9
RHAL	*Rhamnus alaternus*		+	.	.	.	+	+	.	+	.	.	.	.	4
OSAL	*Osyris alba*		.	.	.	.	.	1.1	.	.	.	.	.	+	2
CLFL	*Clematis flammula*		.	.	.	.	.	1.1	+	.	.	.	.	.	2
CRAZ	*Crataegus azarolus*	+	.	.	.	+	+	.	.	.	.	.	.	.	2
	Quercion calliprini														
PIPA	*Pistacia palaestina*		1.1	1.1	1.1	+	+	1.1	.	.	1.1	+	2.2	1.2	11
QUCA	*Quercus calliprinos*	1.1	1.1	2.2	.	2.2	1.1	+	1.1	2.3	.	1.2	+	1.1	11
	Oleo-Ceratonion														
OLEU	*Olea europaea* var. *oleaster*	+	.	.	.	.	+	+	+	.	.	+	.	.	4
	Quercetea (etalia) pubescentis														
JUOX	*Juniperus oxycedrus*	+	1.1	+	+	.	+	1.1	2.2	2.2	1.2	1.2	2.2	1.2	12
	Querco-Cedretalia libani														
QUIN	*Quercus infectoria*		+	+	.	.	.	.	.	+	.	.	.	.	3
LOOR	*Lonicera orientalis*		.	.	.	.	+	+	.	.	.	.	.	.	2
	Cisto-Micromerietea														
DAOL	*Daphne oleifolia*	+	+	+	.	+	.	1.1	+	+	.	.	+	+	9
TEPO	*Teucrium polium*		+	.	+	+	+	+	.	.	.	.	.	.	5
THBE	*Thesium bergeri*		.	.	.	.	+	+	.	.	.	.	.	.	2
ASMI	*Asphodelus microcarpus*		.	.	.	.	.	.	.	.	.	+	.	1.1	2
	Companion species														
OHSP	*Ophrys* spec .		.	.	.	.	.	.	.	.	.	+	+	1.1	3
GASP	*Galium* spec.		.	.	.	.	.	.	+	.	.	+	.	.	2
CARI	*Catapodium rigidum*	+					+								
EUER	*Euphorbia erinacea*		.	.	.	.	.	+	.	.	.	+	.	.	2
		12	21	15	12	14	28	27	15	20	12	20	20	18	18.5

One time record species table 21:

Phillyrea media (A21,+), *Crataegus monogyna* (A06:1.1), *Rhus cotinus* (A07:1.1), *Cytisopsis dorycniifolia* (A23:+), *Iris unguicularis* (A07:+), *Clematis cirrhosa* (A17:+), *Quercus aegilops* (A14:+), *Ephedra campylopoda* (A09:+), *Eryngium falcatum* (A14:+), *Jasminum fruticans* (A06:+), *Gonocytisus pterocladus*(A23:+), *Lygia aucheri*(A15:+), *Rubus sanctus* (A15:+), *Phlomis longifolia* (A17:+), *Cistus salviifolius* (A23:+), *Dorycnium hirsutum* (A23:+), *Salvia grandiflora* (A17:+), *Micromeria myrtifolia* (A09:+), *Fumana thymifolia* (A14:+), *Hyparrhenia hirta* (A14:+), *Astragalus* spec. (21:+), *Rosa* spec. (A15:+),

Cytinus hypocistis (A15:+), *Cytisus drepanolobus* (A15:+), *Iris fumosa* (A14:+), *Thymus* spec. (A15:+), *Arenaria tremula* (A08:+).

Site description of the relevés table 21:

Relevés code	Site name	Long.	Lat.	Site location and description
A21	Hajj - Belal	36.37.48	36.34.12	4 km north of Sheikh Al-Hadid in Al-Akrad Mountain, the trees height is 6 m with diameter of 20 cm.
A06	Merkanli	36.42.36	36.32.24	8 km from Ma'batli on the road to Sheikh Al-Hadid in Al-Akrad Mountain, the trees are 12 m high with diameter of 30-40 cm.
A07	Ma'saret Jekki	36.40.12	36.32.24	12 km from Ma'batli on the road to Sheikh Al-Hadid in Al-Akrad Mountain
A08	Ma'saret Jekki	36.39.36	36.32.24	14 km on the road from Ma'batli to Sheikh Al-Hadid in Al-Akrad Mountain
A09	Sa'oul	36.36.36	36.34.12	5 km north of Sheikh Al-Hadid in Al-Akrad Mountain
A14	Satyanli	36.39.00	36.28.12	10 km north of Jendires in Al-Akrad Mountain
A15	Ikyakhor	36.39.00	36.34.12	11 km west of Ma'batli in Al-Akrad Mountain
A16	Korkan	36.40.48	36.30.36	North of Jendires in Al-Akrad Mountain. The trees height is 12 m with diameter of 30-40 cm and the shrubs are 3-4 m high.
A17	Hajj Hasanli	36.39.36	36.28.48	North of Jendires in Al-Akrad Mountain. The trees height is 8 m with diameter of 25 cm and the shrubs height is 2-3 m.
A18	Hajj Hasanli	36.41.24	36.29.24	North of Jendires in Al-Akrad Mountain. The trees are 10 m high with diameter of up to 60 cm
A19	Hajj Hasanli	36.43.12	36.30.00	North of Jendires in Al-Akrad Mountain
A23	Amaro	36.38.24	36.34.48	8 km west of Ma'batli in Al-Akrad Mountain
A26	Hajj Hasanli	36.42.36	36.30.50	North of Jendires in Al-Akrad Mountain

8.3.1.1.1. Phytogeographical relations:

The association is distributed in Al-Akrad Mountain, at height of 560-750 m above sea level on marl soil. This association has been represented by two climate stations which are Rajo and Jendires (fig 35).

The precipitation is 500-650 mm/year, the average minimum temperature is 2.7°C, and Q_2 value is 50-60, which means that the association is located in the fresh variant of both the sub-humid and upper semi-arid bioclimatic stages.

8.3.1.1.2. The floristic analysis of the association:

The analysis of the association's species (table 21) of both life forms and the phytogeographical origins indicates that, more than 50% of the total species were perennial and 30% were shrubs. The remaining species are 2% for annuals and 16% for trees.

The spectrum of life forms of such species in the association consists of 38% chamaephytes, 19% hemicryptophytes, 12% phanerophytes, 17% nanophanerophytes, 11% geophytes and 4% therophytes.

The total number of species in all relevés is 60 and the average is 20 species, but some of these relevés contain only 12 species.

The phytogeographic spectrum of the association species shows a dominance of the Mediterranean species by 93%, with only few species from different phytogeographic origins such as the Irano-Turanian and Euro-Siberian regions.

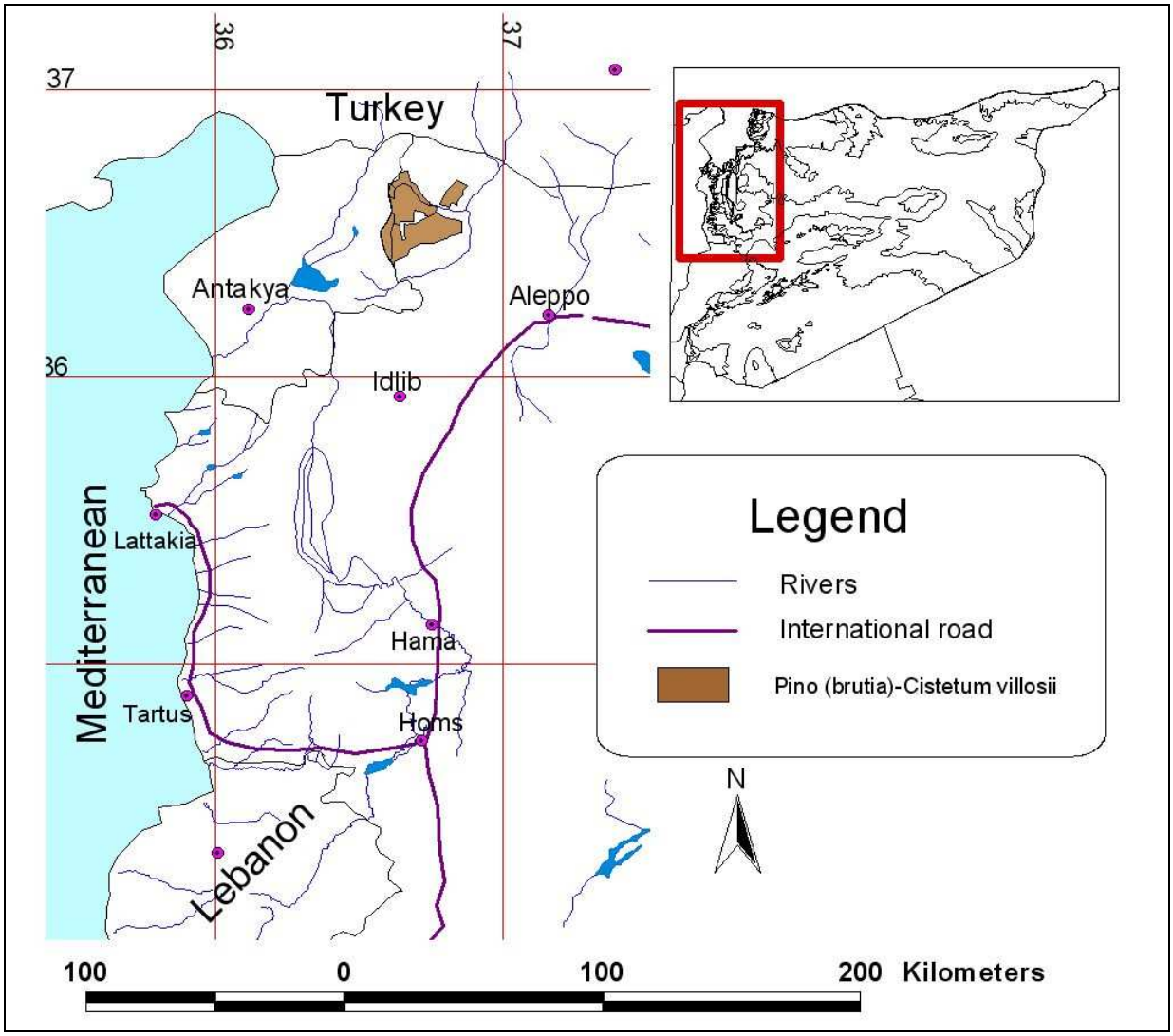


Fig 35: The distribution of the Pino (brutia)-Cistetum villosii (ass. nov.)

On marl substrata, there is little vegetation, especially of the annuals, when compared to that on Terra-Rossa (Danin & Orshan 1999). Furthermore, the precipitation is less than 500 mm/year in many relevés sites and the period of dry season is 6-6.5 months. The entire conditions of sites prevent the shrubs and the ground cover stratum to increase.

8.3.1.1.3. Stratification of the association:

Three strata are distinguished in this association, the average total of which covers 67%. The tree stratum is the first, occupying about 50% of the coverage with a height of 6-8 m and diameter of 30-75 cm. The most dominant species of this stratum is *Pinus brutia*, but sometimes *Quercus calliprinos*, and *Arbutus andrachne* co-dominate by growing up to 6 m high.

The second stratum is the shrubs, which reach a height of 2-3 m with an average coverage share of 40-60%. The most dominant species in this stratum are *Juniperus oxycedrus, Quercus calliprinos, Arbutus andrachne, Phillyrea media, Rhus cotinus,* and *Pistacia palaestina*.

The third one is the ground cover that has an average cover of 20% but it does not exceed 50% in most relevés and this stratum is dominated by *Cistus villosus, Smilax aspera, Thymus syriacus, Anagyris foetida, Asparagus acutifolius* and *Origanum syriacum.*

8.3.1.1.4. Phytosociological characteristic:

The analysis of the association from the phytosociological viewpoint gives more details about it (table 21). Twenty species are related to Cisto-Micromerietea with high abundance for several of them such as: *Daphne oleifolia, Anagyris foetida, Teucrium polium, Thesium bergeri, Asphodelus microcarpus.* Furthermore, Quecetea pubescentis is also available through nine species such as *Juniperus oxycedrus, Quercus infectoria, Clematis flammula*, and *Crataegus monogyna*.

On the other hand, Quercetea (etalia) ilicis and its alliances are the most obvious in this association and this class is represented by 19 species.

8.3.1.1.5. Characteristic structure of the association:

There are nine distinguished characteristic species in this association (table 22). *Pinus brutia* and *Cytisus villosus* are used for indicatively naming the association because it was found in all relevés with ADS + to 1.1; generally, it is distributed on marl substrata and gives an idea about the level of dryness for the association. Furthermore, this species gives an idea of the degradation stage within the forest formations.

Table 22: The characteristic species of the Pino (brutia)-Cistetum villosii (ass. nov.).

Legend table 22: Ph: phanerophytes, H: hemicryptophytes, G: geophytes, Med: Mediterranean, E-Med: East Mediterranean, I-T: Irano-Turanian, Med-TI: Mediterranean-Irano-Turanian.

characteristic species	Altitude m.	Life-Form	Height m.	Phytogeographical relations	Phytosociological relations	Distribution in Syria
Cistus villosus	0-700	H	1	E-Med	Cisto-Micromerietea	Coastal and Al-Akrad mountains
Origanum syriacum	150- 700	H	0.6-1	E-Med	Cisto-Micromerietea	Coastal and Al-Akrad mountains
Asparagus acutifolius	0-600	G	1	E-Med	Quercion calliprini	Coastal, Al-Akrad , Wastani, and Barakat Mountains
Rhus coriaria	0-1300	Ph	2-4	Med. and continuing until to Russia	Quercion calliprini	North to south Mountains
Phillyrea media	0-1100	Ph	2-3	Med.	Quercion calliprini	Coastal, Al-Akrad , Wastani, and Barakat Mountains
Styrax officinalis	100-1100	Ph	2-3	E-Med	Quercetea ilicis	Coastal, Al-Akrad , Wastani, and Barakat Mountains
Rhamnus palaestina	100- 1200	Ph	1-2	E-Med	Quercion calliprini	Coastal, Asi and high regions, as well as

characteristic species	Altitude m.	Life-Form	Height m.	Phytogeographical relations	Phytosociological relations	Distribution in Syria
						Bal'aas and Beshry Mountains
Anagyris foetida	200-1100	Ph	2	Med-TI	Cisto-Micromerietea	Coastal, Al-Akrad , Wastani, and Barakat Mountains
Cytisopsis dorycniifolia	150-650	H	0.6	E-Med	Cisto-Micromerietea	Coastal and Al-Akrad Mountains

8.3.1.2. Pino (brutia)-Iridetum unguicularis (ass. nov.):

Based on the relevés of group B, a new association was distinguished as shown in table (23).

8.3.1.2.1. Phytogeographical relations:

The association spreads in Jiser Al-Shoghour area on marl substrata with altitudes between 300-650 m (fig 36). The climate data corresponding to this association (Jiser Al-Shoghour station) shows that the precipitation is 700 mm/year, the average minimum temperature is 3.8°C, and Q_2 value is 75-85, therefore it is located in the sub-humid bio-climatic stage with the fresh and temperate zone (fig36).

8.3.1.2.2. The floristic analysis of the association:

The spectrum of the life-form of the species in this association contains 23%, 17%, 12%, 16%, 19%, and 8% of chamaephytes, hemicryptophytes, phanerophytes, nanophanerophytes, geophytes and therophytes, respectively.
The Mediterranean species are dominating in the table of the association by 55 species of the total number where most of them furthermore are considered East Mediterranean, while the number of species that belong to different phytogeographic areas is only represented by 9% and 5% for the Euro-Siberian and Irano-Turanian regions, respectively.

8.3.1.2.3. Stratification of the association:

The association forms almost a complete coverage of about 100% in many relevés, but in some of these relevés the vegetation coverage decreases to 80% or even 60% as in H22, H11 and H08.
The tree stratum covers 30-80% with a height of 10-12 m. The most dominant species of this stratum is *Pinus brutia*, which reaches up to 8-10 m high, but sometimes other species such as: *Quercus calliprinos, Pistacia palaestina,* and *Arbutus andrachne* share it as co-dominant species in this stratum.
The second stratum is the shrub layer with a height of 2-4 m and coverage of 50%. The most dominant species in this stratum are *Quercus calliprinos*, *Arbutus andrachne*, *Phillyrea media, Rhus cotinus*, *Juniperus oxycedrus*, and *Pistacia palaestina*.

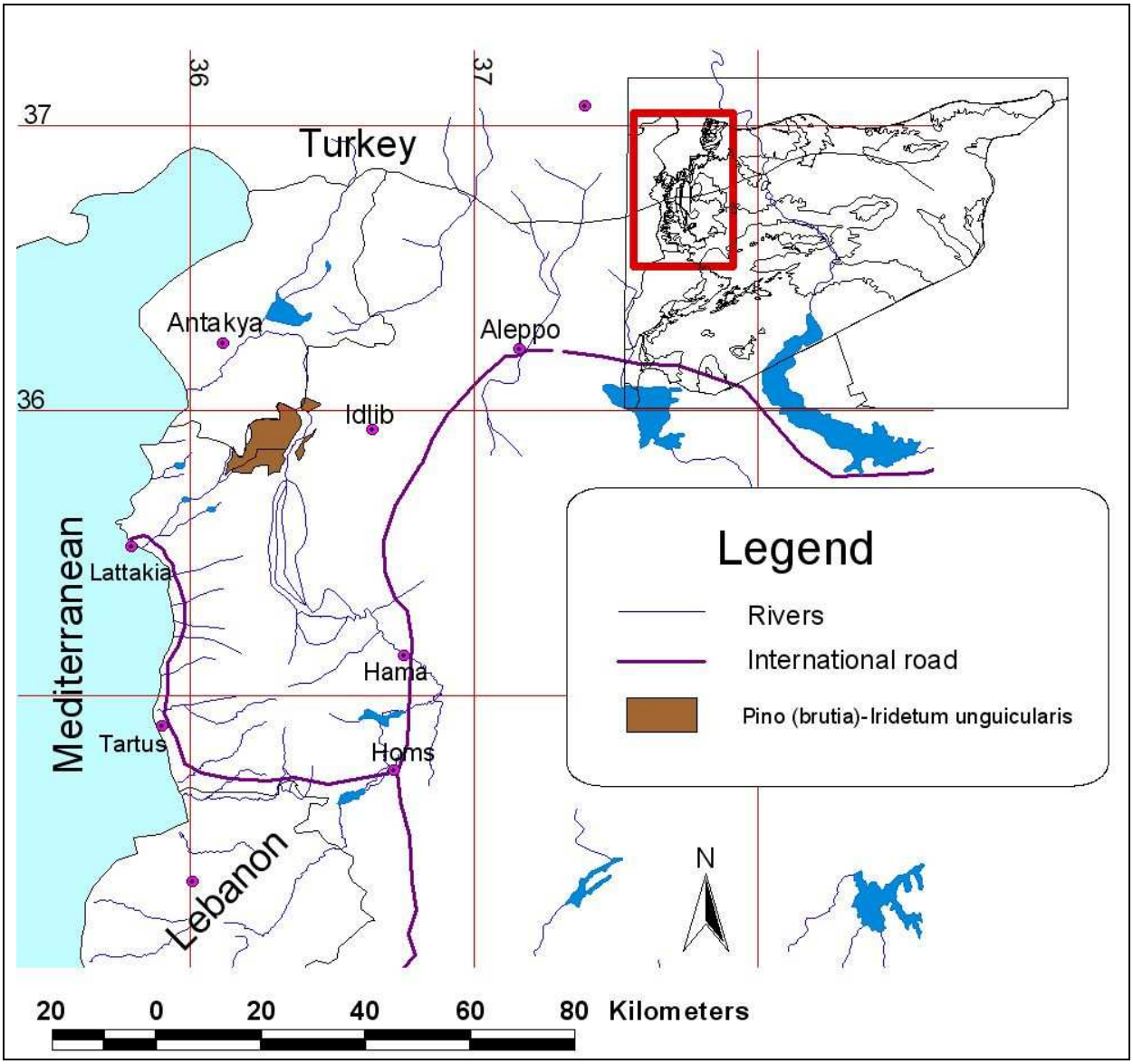


Fig 36: The distribution of the Pino (brutia)-Iridetum unguicularis (ass. nov.)

The ground cover in this association has an average coverage of 40% reaching a height of 100 cm and it is represented by: *Iris unguicularis, Cistus salviifolius, Calycotome villosa, Eryngium falcatum* and *Smilax aspera*.

The total number of the species in the relevés is 76 species. This number is affected by humidity on the slopes, and this is clearly noticed from the relevés on the northern aspects where the number of species is more than 45 species as the case in H04 and H07.

The total vegetation cover is affected by the precipitation, which may rise up to 700 mm/year. This gives the shrubs and ground cover strata more favourable conditions of water availability.

Table 23: Pino (brutia)-Iridetum unguicularis (ass. nov.):

Species code	Relevés code	H22	H03	H16	H04	H06	H07	H08	H09	H10	H11	H12	constancy
	Altitude m	420	450	370	445	480	445	460	270	520	640	540	
	Exposition	E	S	S	NE	W	N	E	E	E	-	W	
	Slope %	15	35	50	20	20	20	10	45	25	-	45	
	Total cover %	80	90	100	100	100	100	60	95	100	80	90	
	Trees cover %	30	50	60	20	80	30	30	70	30	40	50	
	Shrubs cover %	20	30	70	70	30	70	40	50	80	60	40	
	Ground cover %	60	40	25	30	50	30	55	40	25	30	70	
	Parent rock	M	M	M	M	M	M	M	M	M	M	M	
	Surface m^2	200	200	200	400	200	400	400	200	400	400	400	
PIBR	*Pinus brutia*	3.3	2.2	2.3	2.3	4.3	2.3	2.3	3.3	3.3	2.3	2.3	11
	Pino (brutia)-Iridetum unguicularis												
IRUN	*Iris unguicularis*	2.2	1.1	.	+	+	+	1.1	+	+	+	2.2	10
RHCO	*Rhus cotinus*	+	+	1.1	+	+	+	+	.	2.2	2.3	1.1	10
JUOX	*Juniperus oxycedrus*	+	1.1	.	1.1	+	1.1	1.1	1.1	+	1.1	1.1	10
ONSU	*Onobrychis supina*	+	+	.	1.1	+	1.1	1.1	.	+	+	+	9
CYDO	*Cytisopsis dorycniifolia*		.	+	+	+	+	+	.	1.1	.	1.1	8
GOPT	*Gonocytisus pterocladus*	+	1.1	1.1	.	1.1	1.1	1.1	.	.	+	+	8
THBE	*Thesium bergeri*		.	.	1.1	.	1.1	.	.	+	+	+	5
DOHA	*Dorycnium haussknechtii*		.	.	+	+	+	.	.	+	+	.	5
MATR	*Malus trilobata*		.	.	1.2	.	2.1	1.1	.	.	.	.	3
	Quercetia (etalia) ilicis												
ARAN	*Arbutus andrachne*	+	2.2	+	1.2	1.1	2.1	1.1	1.1	2.3	1.1	3.3	11
RHPA	*Rhamnus palaestina*	+	+	.	+	.	+	+	+	+	+	+	9
CLFL	*Clematis flammula*		.	.	+	.	+	.	.	1.1	.	.	3
OSAL	*Osyris alba*		.	.	+	+	+	+	+	.	.	.	5
SMAS	*Smilax aspera*	+	+	+	+	+	+	1.1	+	.	.	+	9
CRAZ	*Crataegus azarolus*		+	.	.	.	.	.	+	.	+	.	3
	Quercion calliprini												
PIPA	*Pistacia palaestina*	+	1.1	+	1.1	1.2	1.1	1.1	1.2	+	+	+	11
PHME	*Phillyrea media*		1.1	1.2	+	1.1	+	1.1	1.1	+	.	+	9
ERFA	*Eryngium falcatum*	+	1.1	+	+	+	+	+	.	+	+	+	10
QUCA	*Quercus calliprinos*	+	1.1	+	2.2	+	+	.	2.2	.	.	2.1	8
RHCO	*Rhus coriaria*		.	.	+	.	+	.	.	.	.		2
ARAL	*Aristolochia altissima*		.	.	.	.	.	.	+	+	.	.	2
	Gonocytiso-Pinion												
CUSE	*Cupressus sempervirens*		.	.	1.1	1.1	1.1	+	.	.	.	.	4
	Oleo-Ceratonion												
OLEU	*Olea europaea* var. *oleaster*		.	.	+	.	+	+	1.1	.	.	.	4
MYCO	*Myrtus communis*		.	2.2	.	.	.	.	.	+	.	.	2
	Quercetea (etalia) pubescentis												
CESI	*Cercis siliquastrum*		.	.	+	+	+	+	.	1.2	.	.	5
POSU	*Polygala supina*		.	+	.	.	.	.	.	1.1	+	.	3
STOF	*Styrax officinalis*	+	.	1.1	.	.	.	.	+	.	.	.	3
COEM	*Coronilla emeroides*		.	+	.	+	.	.	.	.	.	.	2
PYSY	*Pyrus syriaca*		.	.	+	.	+	.	.	.	.	.	2
TACO	*Tamus communis*		.	.	.	+	.	.	+	.	.	.	2
	Querco-Cedretalia libani												
QUIN	*Quercus infectoria*		+	1.1	+	1.1	+	+	+	+	+	.	9
QUCE	*Quercus cerris* subsp. *pseudocerris*		.	1.1	.	.	.	.	.	2.2	.	.	2
	Querco-Fagetea												
NENI	*Neottia nidus-avis*		.	.	.	+	.	.	.	.	.	+	2
	Cisto-Micromerietea												
CAVI	*Calycotome villosa*	2.2	1.2	1.1	+	+	+	+	1.1	1.1	+	+	11
CISA	*Cistus salviifolius*	+	1.1	1.1	+	+	+	1.1	1.1	1.1	+	+	11
CIVI	*Cistus villosus*	2.2	2.2	.	1.1	.	1.1	+	+	1.1	+	+	9
THSY	*Thymus syriacus*		.	.	+	+	+	+	.	1.1	+	+	7
TEPO	*Teucrium polium*		.	.	.	.	.	.	+	+	1.1	+	4
DOHI	*Dorycnium hirsutum*		.	.	+	.	+	.	.	+	+	.	4
POSP	*Poterium spinosum*		.	.	+	.	+	+	+	.	.	.	4
DAOL	*Daphne oleifolia*	+	.	+	+	.	+	.	.	.	.	.	4
SPJU	*Spartium junceum*		.	+	.	.	.	.	+	1.1	.	.	3
ERCE	*Erythraea centaurium*		.	.	+	.	+	.	.	+	.	.	3
MIMY	*Micromeria myrtifolia*		+	.	.	.	.	.	1.1	.	.	.	2
	Companion species												
ASSP	*Astragalus* spec.	+	+	+	.	+	.	.	.	+	+	.	6
CAHA	*Carex halleriana*		.	.	+	1.2	+	.	.	1.1	.	1.2	5
ONAU	*Onobrychis aurantiaca*		.	.	+	.	+	1.1	.	.	+	+	5
SECE	*Serratula cerinthifolia*		.	.	1.1	.	1.1	+	.	+	.	.	4

	Relevés code	H22	H03	H16	H04	H06	H07	H08	H09	H10	H11	H12	
TRPU	*Trifolium purpureum*		.	.	.	+	.	.	+	.	.	+	3
AESP	*Aegilops* spec.		.	.	+	+	+	.	.	.	.	.	3
GLSE	*Gladiolus segetum*		.	.	.	.	.	.	.	+	+	.	2
CYEC	*Cynosurus echinatus*		.	.	+	.	+	.	.	.	.	.	2
CASE	*Calystegia sepium*		.	.	+	.	+	.	.	.	.	.	2
PEMU	*Peucedanum mucronatum*		.	.	+	.	+	.	.	.	.	.	2
TRSP	*Tripleurospermum* spec.		.	.	+	.	+	.	.	.	.	.	2
GASP	*Galium* spec.	+	.	.	+	.	.	.	.	.	.	.	2
		19	25	25	49	31	46	28	30	39	27	30	0

One time record species table 23:

Sideritis perfoliata (H12:+), *Orchis* spec. (H10:1.1), *Salvia viridis* (H07:+), *Rubia* spec. (H12:+), *Psoralia bituminosa* (H07:+), *Polygala monspeliaca* (H03:+), *Onobrychis* spec. (H03:1.2), *Helichrysum conglobatum* (H12:+), *Bellardia trixago* (H03:+), *Anthemis* spec. (H03:+), *Helichrysum plicatum* (H12:+), *Trifolium* spec. (H12:+), *Salix alba* (H16:+), *Dactylis glomerata* (H04:+), *Galium* spec. (H04:+), *Hyparrhenia hirta* (H09:+), *Genista acanthoclada* (H11:1.1), *Asperula stricta* (H10:1.1), *Erica verticillata* (H16:+), *Salvia grandiflora* (H10:1.1), *Helichrysum sanguineum* (H07:+), *Genista lydia* (H04:+), *Prunus ursina* (H06:+), *Rubia aucheri* (H16:+), *Euphorbia cassia* (H10:1.1), *Phlomis longifolia* (H04:+), *Cephalanthera rubra* (H04:+), *Crataegus monogyna* (H09:+), *Linum aroanium* (H04:+), *Acer syriacum* (H16:+), *Fontanesia phillyreoides* (H10:+), *Rhamnus alaternus* (H06:+).

Description of the relevés sites table 23:

Relevés code	**Sites name**	**Long.**	**Lat.**	**Site location and description**
H22	Sa'ad Ass'oud	36.18.36	35.57.36	Between Qunaiah and Jiser Al-Shoghour. The trees height is 10 m with diameter of 30 cm and shrubs height of 2 m.
H03	Sa'ad Ass'oud	36.18.36	35.57.06	Between Qunaiah and Jiser Al-Shoghour. The trees are 12 m high with diameter of 35 cm.
H04	Dar-Osman	36.18.06	35.59.24	North of Qunaiah north of Jiser Al-Shoghour
H06	Salhab	36.17.24	35.58.12	North of Qunaiah north of Jiser Al-Shoghour. The trees height is 12 m with diameter of 40 cm.
H07	Dar-Osman	36.18.36	35.58.12	North of Qunaiah north of Jiser Al-Shoghour
H08	Kherbet El-Joz	36.10.48	35.53.24	North of Bdama north of Jiser Al-Shoghour
H09	The Dam of Dar-Osman	36.19.12	35.57.36	East of Qunaiah north of Jiser Al-Shoghour. The trees height is 11 m with diameter of 40 cm and shrubs height of 2 m.
H10	Bdama	36.10.12	35.52.48	North of Bdama west of Jiser Al-Shoghour. The trees height is 10 m with diameter of 40 cm and shrubs height of 3 m.
H11	Maland	36.15.36	35.55.48	West of Qunaiah north of Jiser Al-Shoghour. The trees height is 9 m with diameter of 30 cm.
H12	Salhab	36.17.24	35.57.36	West of Qunaiah north of Jiser Al-Shoghour. The trees are 10 m high with diameter of 30 cm.
H16	Jabal Al-Nubah	36.04.12	35.41.24	Near Qasatel in the Coastal Mountains.

8.3.1.2.4. Phytosociological characteristic:

From the phytosociological viewpoint, three classes are recorded in the association. 15 species are attributed to Cisto-Micromerietea with a high cover for many of them such as *Calycotome villosa, Cistus salviifolius, Cistus villosus, Teucrium polium*, and *Thymus syriacus*. The second class is Quecetea pubescentis which is also available through 17 species like *Rhus cotinus, Juniperus oxycedrus, Cercis siliquastrum, Polygala supina, Quercus infectoria, Malus trilobata* and *Neottia nidus-avis*. On the other hand, Quercetea ilicis and

its alliances are represented by 24 species which emphasize that this association belongs to this last class.

8.3.1.2.5. Characteristic structure of the association:

Nine characteristic species are considered to be distinguishing this association as shown in table (24).

The *Iris unguicularis* is used as an indicative species to name the association with *Pinus brutia* because it has been recorded in most relevés with ADS of + to 2.2, and the FAC analysis shows a high relationship with the group relevés of the association.

Table 24: The characteristic species of Pino (brutia)-Iridetum unguicularis (ass. nov.).

Legend table 24: Ph: phanerophytes, H: hemicryptophytes, Ch: chamaephytes, G: geophytes, Med: Mediterranean, E-Med: East Mediterranean.

characteristic species	Altitude m.	Life-Form	Height m.	Phytogeographical relations	Phytosociological relations	Distribution in Syria
Iris unguicularis	100-1000	G	0.6	E-Med	Quercion calliprini	The Coastal Mountains
Rhus cotinus	50 – 1100	Ph	4	Med	Quecetea pubescentis	The Coastal Mountains
Juniperus oxycedrus	100 -1000	Ph	1-2	Med	Quecetea pubescentis	Coastal and Al-Akrad mountains
Onobrychis supina	150-650	Ch	0.6	E-Med	Gonocytiso-Pinion	The Coastal Mountains
Cytisopsis dorycniifolia	150-950	Ch	0.6	E-Med	Gonocytiso-Pinion	The Coastal Mountains
Gonocytisus pterocladus	100-700	Ph	3	E-Med	Gonocytiso-Pinion	The Coastal Mountains
Thesium bergeri	150-950	H	0.4	E-Med	Cisto-Micromerietea	The Coastal Mountains
Dorycnium haussknechtii	600-1100	H	0.6-0.8	Med	Gonocytiso-Pinion	The Coastal Mountains
Malus trilobata	450-1100	Ph	6	Med	Querco-Cedretalia libani	The Coastal Mountains

8.3.1.3. Pino (brutia)-Arbutetum andrachnii (ass. nov.):

On the basis of group C relevés, this association was distinguished as shown in table (25):

8.3.1.3.1. Phytogeographic relations:

This association was recorded on limestone and marl substrata in the Arafit area in the northern part of the Coastal Mountains at an altitude of 900-1100 m above sea level (fig 37).

The climate data for Jiser Al-Shoghour and Slenfah stations, which correspond to the site of this association, shows a precipitation of 850-1100 mm/year, an average minimum temperature of 1.3-2°C, and a Q_2 value of 80-120. Therefore, it is located in the sub-humid bio-climatic stage with fresh and temperate variants.

The soil is Rendzina with a depth of 70- 90 cm; a clear sequence of horizons was recognized A (B) C with a depth of 30 and 25 cm, respectively, the organic horizon was 7 cm and many roots have appeared in all horizons. Stones and

pebbles with diameter of 1-2 cm were found in the B horizon, but this diameter has increased to 5-10 cm in the C horizon.

8.3.1.3.2. The floristic analysis of the association:

The spectrum of the life form of species in this association contains a high percentage of both chamaephytes and hemicryptophytes by 22% and 32%, followed by phanerophytes and nanophanerophytes (12 & 17%) and finally geophytes and therophytes by 10 and 4%, respectively.

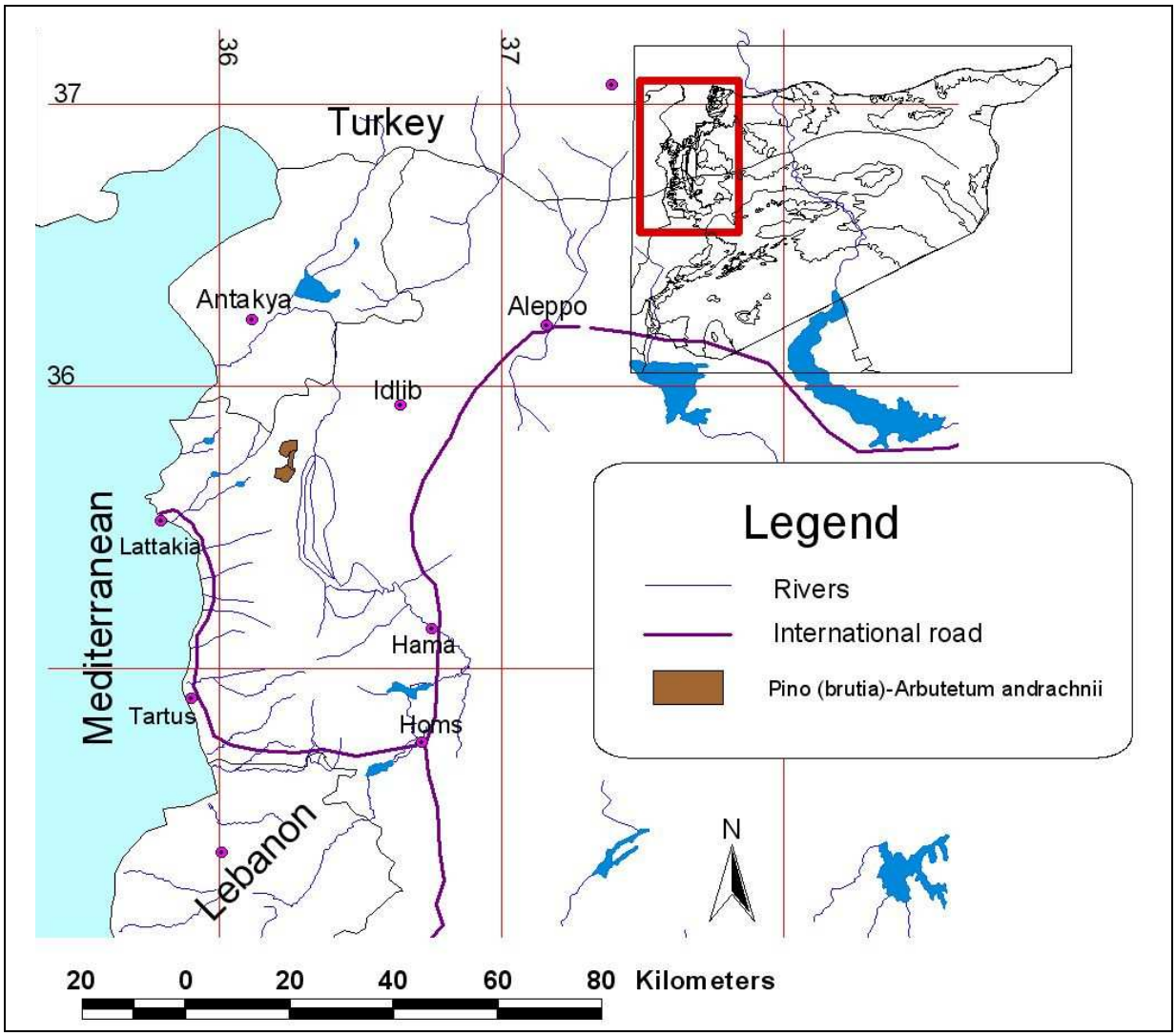


Fig 37: The distribution of the Pino (brutia)-Arbutetum andrachnii (ass. nov.)

The phytogeographic spectrum of species in the association shows the dominance of the Mediterranean species represented by 85%. The remainder of the species was from other regions especially the Euro-Siberian one.

The total number of species in all relevés is 82 species with an average of 32 species as shown in table (25). However, the number of species in the relevés sometimes rises to 54 species as in relevé H02 and decreases to only 17 species as in relevé H25.

Table 25: Pino (brutia)-Arbutetum andrachnii (ass. nov.):

Species code	Relevés code	H01	H02	H19	H20	H21	H25	Constancy
	Altitude m	1015	1050	930	1030	1080	1000	
	Exposition	S	NW	W	N	SW	S	
	Slope %	20	40	35	20	25	20	
	Total cover %	90	80	90	90	90	70	
	Trees cover %	30	20	10	30	20	40	
	Shrubs cover %	70	60	70	70	60	50	
	Ground cover %	30	20	20	40	20	20	
	Parent rock	Cal.	Cal.	Cal	Cal	Cal	Cal	
	Surface m^2	200	400	200	200	200	200	
PIBR	*Pinus brutia*	1.2	+	2.1	2.2	2.2	2.2	6
	Pino (brutia) - Arbutetum andrachnii							
ARAN	*Arbutus andrachne*	+	+	1.1	2.2	+	+	6
QUCA	*Quercus calliprinos*	2.2	2.2	2.2	1.2	2.3	2.2	6
SAGR	*Salvia grandiflora*	+	+	+	+	+	+	6
RUAU	*Rubia aucheri*	1.1	+	+	1.2	+	+	6
ROPH	*Rosa phoenicia*	+	+		+	+		4
DOHI	*Dorycnium hirsutum*			+	+	+		3
CERU	*Cephalanthera rubra*			+	+	+		3
CONU	*Cotoneaster nummularia*		+		+			2
	Quercion calliprini							
PIPA	*Pistacia palaestina*	+	+	1.1	1.1	1.1	+	6
PHME	*Phillyrea media*	+	1.1	+	1.1		+	5
SMAS	*Smilax aspera*	+	+		+			3
ERFA	*Eryngium falcatum*		+	+		+		3
PYSY	*Pyrus syriaca*	+	+					2
ARAL	*Aristolochia altissima*		+		+			2
	Oleo-Ceratonion							
OLEU	*Olea europaea var. oleaster*		+	+				2
	Quercetia (etalia) ilicis							
OSAL	*Osyris alba*				+	+		2
	Querco-Cedretalia libani							
QUIN	*Quercus infectoria*	1.1	+	+	+	1.1		5
QUCE	*Quercus cerris* subsp. *pseudocerris*	1.1	+	+	+	+	1.1	6
MATR	*Malus trilobata*	+		1.1	1.1	+		4
LOOR	*Lonicera orientalis*	+	+		+			3
PRUR	*Prunus ursina*	+	1.1		+			3
FROR	*Fraxinus ornus*			+	+		+	3
	Quecetea (etalia) pubescentis							
JUOX	*Juniperus oxycedrus*	1.1	+	1.1	+	+	+	6
STOF	*Styrax officinlais*	1.1	+	+	1.1	1.1	+	6
RHCO	*Rhus cotinus*		+	+	+	+		4
CRMO	*Crataegus monogyna*	+	+		+		+	4
RUAC	*Ruscus aculeatus*		+		+		+	3
COEM	*Coronilla emeroides*		+		1.1			2
POSU	*Polygala supina*			+	+			2
SIIT	*Silene italica*		+				+	2
	Cisto-Micromerietea							
DAOL	*Daphne oleifolia*	+	+	+	1.1	1.1	+	6
SPJU	*Spartium junceum*	+	1.1	+	1.1			4
CAVI	*Calycotome villosa*	+		1.1		+	+	4
DOHA	*Dorycnium haussknechtii*	+		+				2
TEPO	*Teucrium polium*	+		+				2
ORSY	*Origanum syriacum*		+	+				2
SECE	*Serratula cerinthifolia*			1.2		+		2
CIVI	*Cistus villosus*	2.2	.				+	2
	Companion species							
SISP	*Silene* spec.	+	+	+		+		4
ONSP	*Onosma* spec.	+	.	+		+		3
ASSP	*Astragalus* spec.		+	+				2
DAGL	*Dactylis glomerata*	+	+					2
TRSP	*Trifolium* spec.	1.2	+					2
		34	54	36	31	24	17	

One time record species table 25:

Legousia falcata (1.1: H01), *Tamus communis* (+:H20), *Crataegus azarolus* (+:H02), *Jasminum fruticans* (+:H02), *Laurus nobilis* (+:H02), *Rhamnus palaestina* (+:H02), *Cornus*

australis (+:H20), *Doronicum caucasicum* (+:H02), *Lamium truncatum* (+:H02), *Cyclamen coum* (+:H02), *Dryopteris libanotica* (+:H02), *Sorbus torminalis* (+:H02), *Cercis siliquastrum* (+:H19), *Rubus sanctus* (+:H01), *Calamintha clinopodium* (+:H02), *Hedera helix* (+:H19), *Cephalanthera longifolia* (+:H19), *Geum urbanum* (+:H02), *Luzula forsteri* (+:H01), *Thesium bergeri* (+:H21), *Micromeria myrtifolia* (+:H19), *Phlomis viscosa* (+:H19), *Galium* spec. (+:H02), *Bellis perennis* (+:H02), *Cynosurus echinatus* (+:H02), *Fumana thymifolia* (+:H19), *Catapodium rigidum* (+:H01), *Cytinus hypocistis* (+:H21), *Valeriana* spec. (+:H02), *Acer monspessulanum* (+:H02), *Asperula* spec. (+:H01), *Campanula rapunculus* (+:H02), *Hordeum bulbosum* (+:H01), *Johrenia porteri* (+:H02), *Medicago* spec. (+:H02), *Physospermum aquilegifolium* (+:H02), *Sambucus ebulus* (+:H02), *Trifolium stellatum* (+:H02), *Veronica leiocarpa* (+:H19).

Description of the relevés sites table 25:

Relevés code	**Sites name**	**Long.**	**Lat.**	**Site location and description**
H01	Arafit	36.13.48	35.41.24	11 Km from Slenfah on the road to Kansabba in the Coastal Mountains. The trees are 9 m high with diameter of 15-50 cm and the shrubs height is 2 m.
H02	Arafit	36.13.48	35.40.48	10 Km from Slenfah on the road to Kansabba in the Coastal Mountains. The trees are 10 m high with diameter of 30 cm.
H19	Arafit	36.13.12	35.42.04	12 Km from Slenfah on the road to Kansabba in the Coastal Mountains. The trees are 10 m high with diameter of 50 cm.
H20	Arafit	36.13.48	35.41.24	13 Km from Slenfah on the road to Kansabba in the Coastal Mountains. The trees are 7 m high with diameter of 15-40 cm and the shrubs height is 170 cm.
H21	Arafit	36.13.12	35.40.48	8 Km from Slenfah on the road to Kansabba in the Coastal Mountains. The trees are 10 m high with diameter of 30 cm.
H25	Besharefah	36.12.36	35.42.10	14 Km from Slenfah on the road to Kansabba in the Coastal Mountains. The trees are 8 m high with diameter of 30 cm.

8.3.1.3.3. Stratification of the association:

The total coverage of vegetation in the association exceeds an average of 90% in three different layers: The first one is the tree stratum, which has 10-30% from the total average cover with height of 10-12 m. The most dominant species of this stratum is *Pinus brutia* but this stratum also includes *Quercus cerris* subsp. *pseudocerris*, *Quercus infectoria*, *Fraxinus ornus* and *Pyrus syriaca*. These can reach a height of 8-10 m.

The second stratum is the shrubs with a height of 2-4 m. The most dominant species in this stratum are *Quercus calliprinos, Arbutus andrachne, Rosa phoenicia, Phillyrea media, Styrax officinalis, Rhus cotinus, Juniperus oxycedrus, Spartium junceum, Daphne oleifolia,* and *Pistacia palaestina*. They may cover up to 60-70%.

The ground layer in this association has an average cover of 20-40%. It rises further to 100 cm, through *Dorycnium hirsutum, Salvia grandiflora, Rubia aucheri, Lonicera orientalis* and *Smilax aspera.*

8.3.1.3.4. Phytosociological aspects of the association:

The analysis of the association from a phytosociological viewpoint (table 25) shows 13 species from Cisto-Micromerietea but with low existence. However, the species of Quecetea pubescentis and its alliances have a high presence in most relevés through 31 species such as *Juniperus oxycedrus*, *Styrax officinalis*, *Rhus cotinus*, *Quercus infectoria*, *Quercus cerris* subsp. *pseudocerris*, *Malus trilobata*, *Rubia aucheri*, and *Cephalanthera rubra.* On the other hand, Quercetea ilicis and its alliances are represented only by 17 species.

8.3.1.3.5. Characteristic structure of the association:

Eight characteristic species are distinguished in the association with *Pinus brutia* (table 26).

Table 26: The characteristic species of the Pino (brutia)-Arbutetum andrachnii (ass. nov.)

Legend table 26: Ph: phanerophytes, Ch: chamaephytes, G: geophytes, Med: Mediterranean, E-Med: East Mediterranean

characteristic species	Altitude m.	Life-Form	Height m.	Phytogeographical relations	Phytosociological realtions	Distribution in Syria
Arbutus andrachne	200-900	Ph	2-4	Med	Quercion calliprini	The Coastal and Al-Akrad Mountains
Quercus calliprinos	0-1400	Ph	2-4	E-Med	Quercion calliprini	All eastern regions
Salvia grandiflora	300-800	Ch	0.6-1	Med	Cisto-Micromerietea	The Coastal Mountains
Rubia aucheri	500-1400	Ch	0.1-0.2	Med	Quecetea pubescentis	The Coastal Mountains
Rosa phoenicia	300-800	Ph	1-2	Med	Quercion calliprini	The Coastal Mountains
Dorycnium hirsutum	300-700	Ch	0.3-0.7	Med	Cisto-Micromerietea	The Coastal Mountains
Cephalanthera rubra	500-1200	G	0.3	Med	Quecetea pubescentis	The Coastal Mountains
Cotoneaster nummularia	800-1600	Ph	1-2	Med	Querco-Cedretalia libani	The Coastal and anti-Lebanon Mountains

The *Arbutus andrachne* is used as an indicative species to name the association with *Pinus brutia* because it has been recorded in most relevés with ADS of + to 2.2. It is distributed generally on hard limestone substrata, and the FAC analysis shows high relationship with the group relevés of the association.

8.3.1.4. Alysso (crenulatum)-Quercetum pseudocerris (Chalabi 1980):

Based on the group D in FAC, this association could be recognized. This association follows to the endemic alliance Ptosimopappo-Quercion (Barbero et al. 1976) which was recorded in Baer-Bassit (Chalabi 1980).

The association has a total cover of 75%, with trees height of 8-15 m and a diameter of 20-25 cm.

The characteristic species of this association are *Alyssum crenulatum*, *Euphorbia cassia*, and *Centaurea arifolia*.

8.3.1.5. Pino (brutia)-Quercetum pseudocerris (Ghazal Asswad 1998):

The association, which was recognized on serpentine parent rocks in Baer-Bassit Mountains in the Frenloq site, was not recognized from the FAC analysis of this study.

The association has a total cover not less than 75% with trees of 70-80%, shrubs of 60-70% and the ground cover of 40-50% but sometimes reaches 80%.

The characteristic species are: *Pinus brutia, Quercus cerris* subsp. *pseudocerris, Aster amani, Fumana oligosperma, Spiranthes autuminalis, Genista anatolica, Erica verticillata, Styrax officinalis.*

This association follows the endemic alliance Ptosimopappo-Quercion.

8.3.2. The relation between *Pinus brutia* associations :

Pinus brutia is one of the important species of the Syrian forests. It covers a large region in the northern part of the study area as it spreads from northeast of Al-Akrad Mountain to the southern end of the Coastal Mountains. It extends from the seashore in the west towards the interior areas, but does not go beyond the eastern slopes of Wastani Mountain and Al-Akrad Mountains.

All forests of Pinus brutia follow for two alliances:

1. Ptosimopappo-Quercion (microphyllae): Two associations belong to it in Syria, they are:
   - Alysso (crenulatum)-Quercetum pseudocerris (Chalabi 1980):
   - Pino (brutia)-Quercetum pseudocerris (Ghazal Asswad 1998):
2. Gonocytiso-Pinion which is the most important alliance in the study area; three new associations were identified to belong to it. They are (table 27):
   - Pino (brutia)-Cistetum villosii (ass. nov.)
   - Pino (brutia)-Iridetum unguicularis (ass. nov.)
   - Pino (brutia)-Arbutetum andrachnii (ass. nov.)

Table 27: The associations of the *Pinus brutia* in the study area

Legend of table 27: A: Pino (brutia)-Iridetum unguicularis, B: Pino (brutia)-Cistetum villosii, C: Pino (brutia)-Arbutetum andrachnii.

Species Code	Associations	A	B	C
	number of relevés	10	11	5
PIBRU	*Pinus brutia*	X, 2,2 - 4,3	XI, 2,2 - 4,3	V, + - 2,2
	diagnostic species of the Pino (brutia)-Iridetum unguicularis			
IRUNG	*Iris unguicularis*	IX, + - 2,2	I, +	
RHCOT	*Rhus cotinus*	X, + - 2,3	1,1	IV, +
JUOXY	*Juniperus oxycedrus*	IX, + - 1,1	XI, + - 2,2	V, + - 1,1
ONSUP	*Onobrychis supina*	VIII, + - 1,1		
CYDOR	*Cytisopsis dorycniifolia*	VII, + - 1,1	I, +	
GOPTE	*Gonocytisus pterocladus*	VII, + - 1,1	I, +	
THBER	*Thesium bergeri*	V, + - 1,1	II, +	
MATRI	*Malus trilobata*	III, 1,1 - 2,1		IV, + - 1,1
	diagnostic species of the Pino (brutia)-Cistetum villosii			
CIVIL	*Cistus villosus*	III, +- 2,2	XI,+ - 1,1	I, 2,2

STOFF	*Styrax officinalis*	II, + - 1.1	IX + - 1,1	V, + - 1,1
PHMED	*Phillyrea media*	IX, + - 1,2	VIII, + - 2,2	IV, + - 1,1
THSYR	*Thymus syriacus*	VII, + - 1,1	VII, + - 1,1	
ANFOE	*Anagyris foetida*		VI, + - 2,2	
ASACU	*Asparagus acutifolius*		VI, +	
ORSYR	*Origanum syriacum*		VI, + - 1,1	II, +
RHPAL	*Rhamnus palaestina*	VIII, +	IV, +	I, +
RHCOR	*Rhus coriaria*	II, +	IV, +	
	diagnostic species of the Pino (brutia)-Arbutetum andrachnii			
ARAND	*Arbutus andrachne*	X, + - 3,3	VII, + - 2,2	V, + - 2,2
QUCAL	*Quercus calliprinos*	VII, + - 2,2	X, + - 2,2	V, 1,2 - 2,3
SAGRA	*Salvia grandiflora*	I, 1.1	I, +	V, +
RUAUC	*Rubia aucheri*			V, + - 1,2
ROPHO	*Rosa phoenicia*			IV, +
DOHIR	*Dorycnium hirsutum*	IV, +	I, +	III, +
CERUB	*Cephalanthera rubra*	I, +		III, +
CONUM	*Cotoneaster nummularia*			II, +
	Characteristic species of the superior units			
OSALB	*Osyris alba*	V, +	II, + - 1,1	II, +
OLEUR	*Olea europaea* var. *oleaster*	IV, + - 1,1	IV, +	II, +
CUSEM	*Cupressus sempervirens*	VI, + - 1,1		
PIPAL	*Pistacia palaestina*	X, + - 1,2	X, + - 2,2	V, + - 1,1
SMASP	*Smilax aspera*	VII, + - 1,1	VIII, +	III, +
ERFAL	*Eryngium falcatum*	IX, + - 1,1	I, +	III, +
TACOM	*Tamus communis*	II, +		I, +
CRAZA	*Crataegus azarolus*	III, +	II, +	I, +
ARALT	*Aristolochia altissima*	II, +		II, +
DOHAU	*Dorycnium haussknechtii*	V, +		II, +
MYCOM	*Myrtus communis*	II, + - 1,2		
CESI2	*Cercis siliquastrum*	V, + - 1,2		I, +
POSUP	*Polygala supina*	III, + - 1,1		IX, + - 1,1
CLFLA	*Clematis flammula*	III, + - 1,1	II, + - 1,1	
CRMON	*Crataegus monogyna*	I, +	I, 1.1	III, +
COEME	*Coronilla emeroides*	II, + - 1,1		II, + - 1,1
QUIN1	*Quercus infectoria*	IX, + - 1,1	III, +	V, + - 1,1
QUCER	*Quercus cerris* subsp. *pseudocerris*	II, 1,1 - 2,2		V, + - 1,1
CAVIL	*Calycotome villosa*	X, + - 1,2		III, + - 1,1
DAOLE	*Daphne oleifolia*	III, +	VII, + - 1,1	IV, + - 1,1
CISAL	*Cistus salviifolius*	X, + - 1,1	I, +	
SPJUN	*Spartium junceum*	III, + - 1,1		IV, + - 1,1
TEPOL	*Teucrium polium*	IV, + - 1,1	V, +	II, +
SECER	*Serratula cerinthifolia*	IV, + - 1,1		II, + - 1,2
MIMYR	*Micromeria myrtifolia*	II, + - 1,1	I, +	I, +
ASMIC	*Asphodelus microcarpus*		II, + - 1,1	
	Companion species			
EUCAS	*Euphorbia cassia*	I, 1,1		
CAHAL	*Carex halleriana*	V, + - 1,2		
ONAUR	*Onobrychis aurantiaca*	V, + - 1,1		

Additional species:

With + in column A: *Pyrus syriaca, Rhamnus alaternus, Phlomis longifolia, Poterium spinosum, Neottia nidus-avis, Erythraea centaurium, Prunus ursina, Hyparrhenia hirta,*

Trifolium purpureum, Gladiolus segetum, Cynosurus echinatus, Calystegia sepium, Peucedanum mucronatum.
With + in column B: *Rhamnus alaternus, Ruscus aculeatus, Phlomis longifolia, Jasminum fruticans, Hyparrhenia hirta, Rubus sanctus, Fumana thymifolia, Lonicera orientalis, Catapodium rigidum, Euphorbia erinacea.*
With + in column C: *Pyrus syriaca, Jasminum fruticans, Fraxinus ornus, Prunus ursina, Rubus sanctus, Cynosurus echinatus, Lonicera orientalis, Fumana thymifolia, Catapodium rigidum, Dactylis glomerata.*
With 1.1 in column A: *Genista acanthoclada.*

All the associations in the aforementioned two alliances grow in areas with precipitation of more than 500 mm/year. However, Pino (brutia)-Cistetum villosii occupied the fresh variant of both the sub-humid and upper semi-arid bioclimatic stages, which are the driest areas of *Pinus brutia* forest.
The parent rocks of Gonocytiso-Pinion are usually marl but sometimes limestone especially in Pino (brutia)-Arbutetum andrachnii (table 28).

Table 28: the relationship between *Pinus brutia* associations.
Legend of table 28: m°C :Minimum temperature c̊, P mm: Annual Precipitation; A m: Altitude asl.

Associations	Bioclimatic stage	m°C	P mm	A m	Substrata	reference
Pino (brutia)-Cistetum villosii	fresh in sub-humid and upper semi-arid	2.7	500-650	560-750	marl	This study
Pino (brutia)-Iridetum unguicularis	fresh and temperate sub-humid	3.8	700	650-300	marl	This study
Pino (brutia)-Arbutetum andrachnii	fresh and temperate sub-humid	1.3-2	850-1100	900-1100	limestone and marl	This study
Alysso (crenulatum)-Quercetum pseudocerris	humid	5.5	1100-1250	500-650	serpentine	Chalabi 1980
Pino (brutia)-Quercetum pseudocerris	humid	5.5	1100-1250	520-730	serpentine	Ghazal Asswad 1998

The total coverage in the sites of the associations varies form 100% in the Pino (brutia)-Iridetum unguicularis, to 90% in Pino (brutia)-Arbutetum andrachnii and to 67% in Pino (brutia)-Cistetum villosii which is the most degraded association among these.
The shrub stratum for all associations is almost similar (50%), but the tree stratum is 50, 60%, and 20% in the Pino (brutia)-Cistetum villosii. Pino (brutia)-Iridetum unguicularis, and Pino (brutia)-Arbutetum andrachnii, respectively, while the ground cover vegetation share is only 20, 40 and 30%, respectively (table 29).
Pino (brutia)-Iridetum unguicularis makes a good combination between the different strata and the tree layer which is dominated by the brutia pine. Contrary to that is the case of the Pino (brutia)-Arbutetum andrachnii where the trees of *Pinus brutia* are sparsely growing up to 10-12 m high with a low coverage of 20%, but the shrubs coverage increases to 50% which contributes to the high total coverage of this association sites.

The low total coverage of the Pino (brutia)-Cistetum villosii refers to all strata because this association represents a degradation status of the *Pinus brutia* forests with a low annual precipitation which denotes the driest pine brutia forest in the study area.

Table 29: The coverage percentage of the new associations.
Legend of table 29: A: Pino (brutia)-Iridetum unguicularis, B: Pino (brutia)-Cistetum villosii, C: Pino (brutiea)-Arbutetum andrachnii.

Associations	B	A	C
total coverage	67	100	90
trees	50	60	20
shrubs	50	50	50
ground cover	20	40	30

Regarding the phytosociological structure of these associations, Pino (brutia)-Arbutetum andrachnii has the lowest number of Quecetea pubescentis elements that was just 8 species, but these elements have increased gradually in other associations and reached 39 species in Pino (brutia)-Quercetum pseudocerris which is more related to that class.
Moreover, the Quercetea ilicis elements have the same level of presence in all of these associations, which range between 17-30 species. In addition, the Cisto-Micromerietea elements are presented by 13-21 species in a degraded stage for *Pinus brutia* communities (Chalabi 1980; Ghazal Asswad 1998) which indicate that all the associations are in a degraded stage.

Table 30: The occurrence of the higher phytosociological units in the associations.
Legend of table 30: A: Pino (brutia)-Cistetum villosii, B: Pino (brutia)-Iridetum unguicularis, C: Pino (brutia)-Arbutetum andrachnii, D: Alysso (crenulatum)-Quercetum pseudocerris, E: Pino (brutia)-Quercetum pseudocerris.

Alliances	Gonocytiso-Pinion			Ptosimopappo-Quercion	
Associations	A	B	C	D	E
Quercetea pubescentis	8	18	31	24	39
Quercetea ilicis	22	24	17	22	30
Cisto-Micromerietea	16	20	13	15	21
Total number of species in the relevés	60	76	82	124	148

The total number of species in the associations increased dramatically by transferring from east to west and hence the phytosociological structure was affected (fig 38).

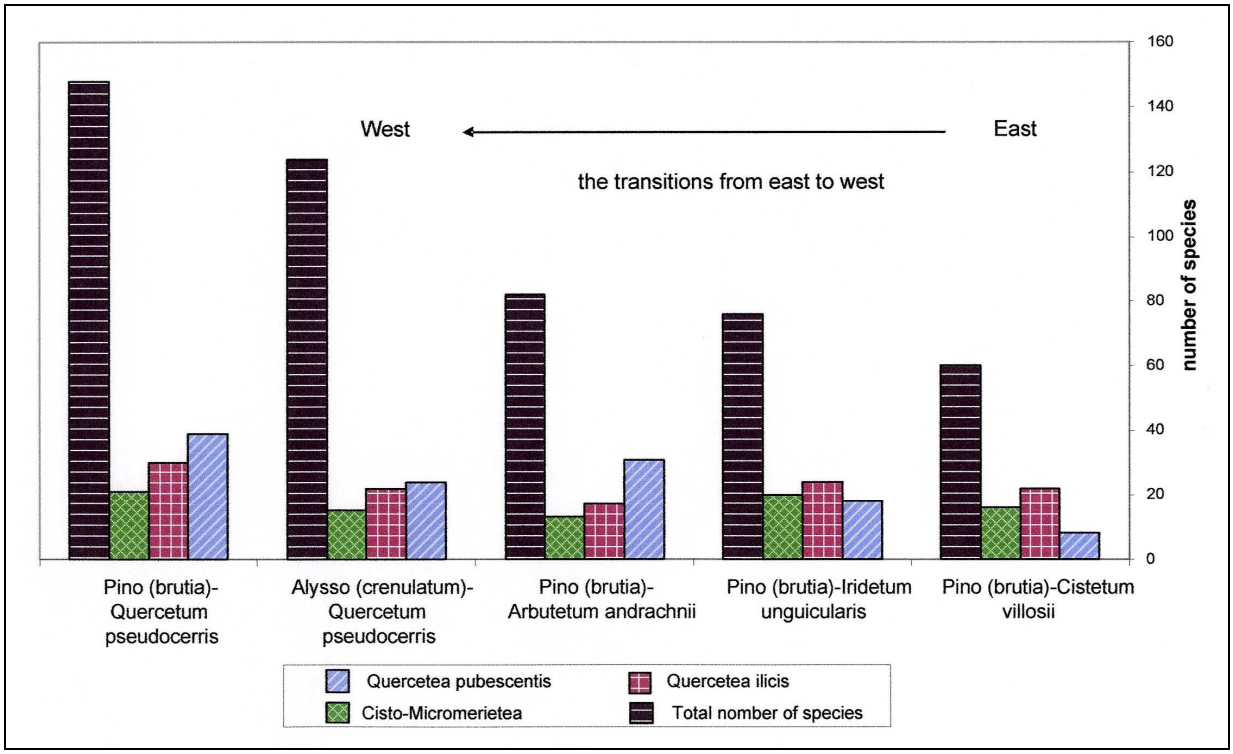


Fig 38: The frequency of phytosociological units in *Pinus brutia* associations in the study area

Many climate factors are changing with transition from east to west, such as precipitation, and absolute minimum temperature. The changing dryness period, is the reason for changing the phytosociological structure and the diversity richness.

On other hand, in the associations of Gonocytiso-Pinion the species have also changed for example the following species (*Juniperus oxycedrus, Rhus cotinus, Crataegus monogyna, Styrax officinalis, Quercus infectoria*) are present in Pino (brutia)-Cistetum villosii and all of them can be noticed in Pino (brutia)-Iridetum unguicularis. Many other species will also appear like *Cercis siliquastrum, Polygala supina, Pyrus syriaca, Malus trilobata, Tamus communis, Cephalanthera rubra, Phlomis longifolia, Quercus cerris* subsp. *pseudocerris, Rubia aucheri, Prunus ursina,* and *Genista lydia*.

The same case can be mentioned with the associations of Ptosimopappo-Quercion as they have changed by that type of transition from Alysso (crenulatum)-Quercetum pseudocerris to Pino (brutia)-Quercetum pseudocerris. Here, the structure of associations and the species composition has changed by that transition; for example *Phlomis chrysophylla, Viola alba, Melica uniflora, Calamintha clinopodium, Epipactis latifolia, Polygala supina,* differentiating by the species, *Fraxinus ornus, Primula acaulis, Pyrethrum cilicium, Lecoquia cretica, Hedera helix*.

Barbero et al. (1976) recognized the alliance Gonocytiso-Pinion on marl, calcareous-marl and gabbro substrates and characterized by *Gonocytisus*

pterocladus, Cytisopsis dorycniifolia, Lithospermum hispidulum, Putoria calabrica, Dorycnium haussknechtii, Onobrychis kotschyana, Linum aroanium, Tymbra spicata, Anarrhinum orientale and *Lygia aucheri.*

In this study, more species can be added to the characteristic species of the alliance Gonocytiso-Pinion especially when it covers semi-arid and sub humid forest. These species are: *Iris unguicularis, Juniperus oxycedrus, Onobrychis supina, Cytisopsis dorycniifolia, Thesium bergeri, Malus trilobata, Thymus syriacus, Origanum syriacum, Rhamnus palaestina, Salvia grandiflora, Dorycnium hirsutum.*

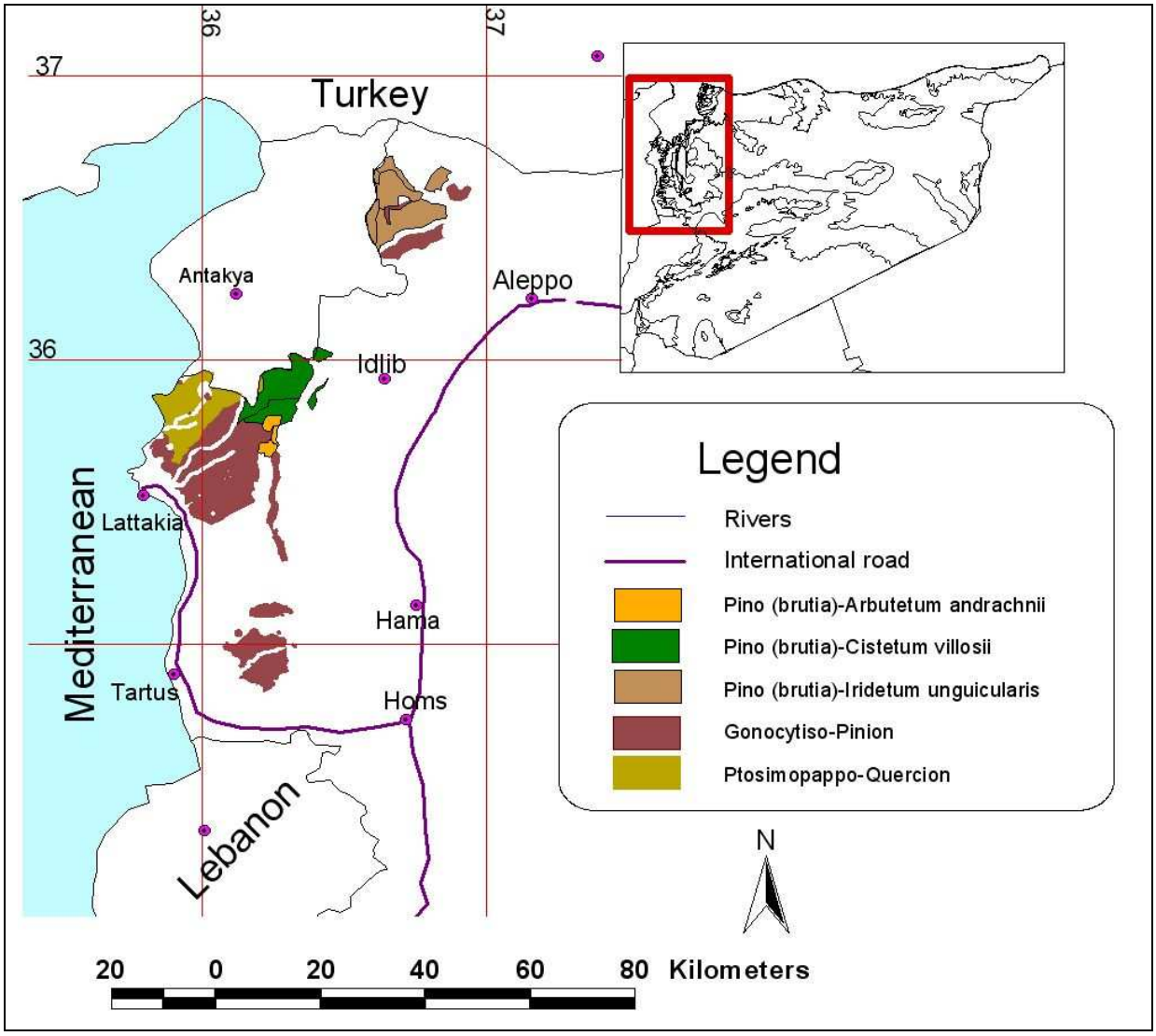


Fig 39: The distribution of *Pinus brutia* associations in the study area.

8.4. The FAC of *Cupressus sempervirens* vegetation:

Cupressus sempervirens has a very peculiar distribution pattern in Syria. It is widely used as an important species in plantation works carried out by the Forestry Department of the Ministry of Agriculture in most Syrian areas. However, it is also found as natural vegetation in three locations in the study area. These locations are: the Coastal Mountains, Baer-Bassit Mountain and Wastani Mountain.

The phytosociological relationships between those sites were studied by 21 relevés of *Cupressus sempervirens* five of them used with *Pinus brutia* FAC analysis. All of them were analyzed statistically by the FAC method. Four axes were chosen being having a high correlation and inactivity, the first axis has the highest inactivity (10.47%) and correlation (0.68) (table 31).

Table 31: The correlation and inactivity data for axes of FAC analysis for all relevés of *Cupressus sempervirens* vegetation.

Axis	1	2	3	4	5	6	7	8	9	10
Correlation	0.68	0.67	0.64	0.59	0.56	0.52	0.51	0.50	0.49	0.47
Inactivity %	10.47	9.95	9.15	7.96	7.21	6.08	5.89	5.49	5.34	5.03

Charts (6 and 7) for the first two axes are showing several groups:

1. Group A: The distribution of those relevés (group A) in all charts was very complicated. A kind of grouping can be recognized for some relevés F01, F11,F10 and F12, which were recorded in the Qara-Douran and Um-Tuoyor area in the north west of Syria. This grouping can effectively be shown by axes 1, 2 and 4 like in charts 1×2 and 1×4 (charts 6&7) (table 32).
2. Group B: The group contains two relevés C15 and C17 in Wastani Mountain; which appeared in completely different positions on the charts. It is clear from the distribution of the relevés that *Cupressus sempervirens* has entered to the sites from the adjacent plantation works.
3. Group C: This group contains the relevés L30, L23, L19, L10, L02, H30, H26, H24, R05 and B04. They were accumulated in the central point of axis coordinates in charts 1×2 and 1×4. They were recoded near Messiaf and on the eastern slopes of the Coastal Mountains, and they could be related to sub-association cupressetosum sempervirentis (Martini 1999) (table 32), which is recorded in the same area of the location of the relevés. All the aforementioned characterized species of this sub-association were recorded in the relevés.
4. Group D: It contains relevés H04, H06, H07 and H08. They were recorded in the Jiser Al-Shoghour where the association Pino (brutia)-

Iridetum unguicularis is recognized with *Pinus brutia* FAC analysis in this study (table 23). The occurrence of *Cupressus sempervirens* in the relevés can be attributed to the plantation works that were carried out in large areas of the mountain.

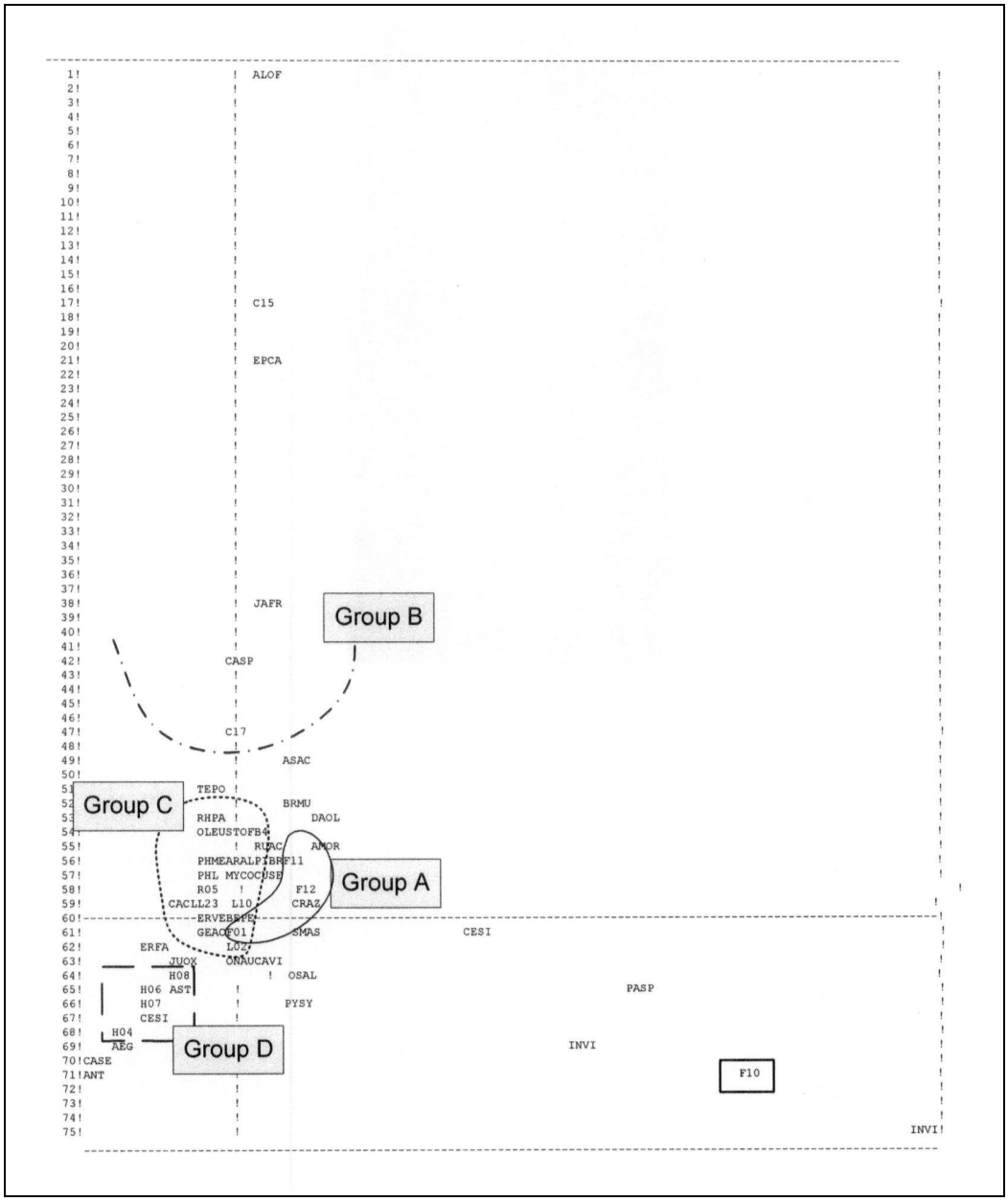


Chart 6: Cluster of the distribution of the *Cupressus sempervirens* vegetation of the FAC analysis on axis 1×2.

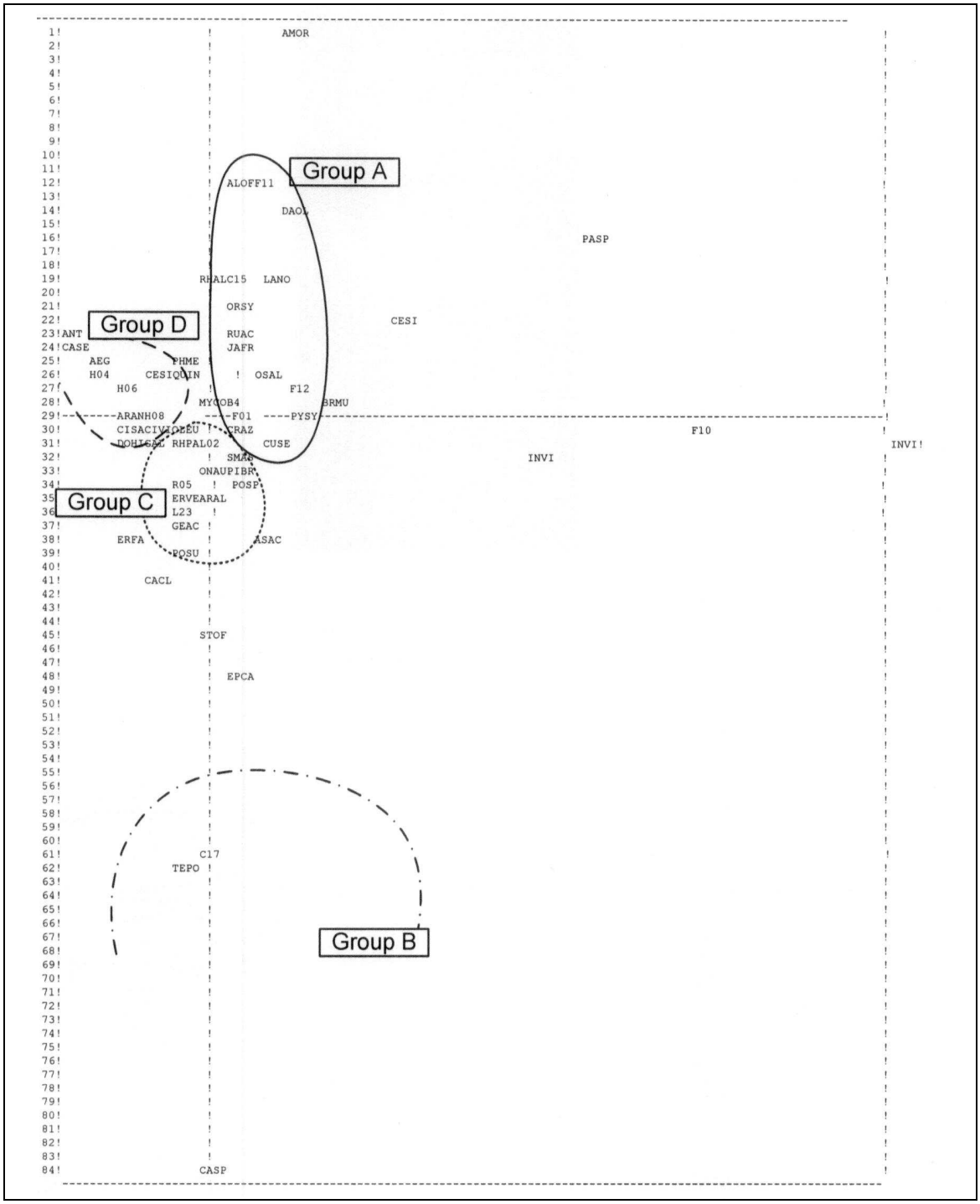


Chart 7: Cluster of the distribution of the *Cupressus sempervirens* vegetation of the FAC analysis on axis 1×4.

5. One relevé, F10 which was accomplished in Um-Toyour to the north of Lattakia, was presented in an isolated place in all charts. This relevé is on a serpentine substrata at the seashore on a short maquis 1-2 m high that

contains many species of Olea-Ceratonion and Cisto-Micromerietea. *Cupressus sempervirens* was found in the relevé site as small number of individuals which may also be originated from the plantation works, but it also can be seen with native vegetation in rocky places and rough terrain which are difficult to reach and where the sites are away from plantation works. The relevé F10 follows to the alliance Olea-Ceratonion.

From another point, some species took an extreme position with axes 1, 2 and 3 such as *Pyrus syriaca, Lonicera etrusca, Bryonia multiflora, Paliurus spina-christi, Scilla maritima, Centranthus longiflorus, Inula viscosa, Asparagus acutifolius,* and *Ficaria ficarioides*, but some other species took an extreme position only in relation to axis 4 like *Hedera helix, Laurus nobilis, Rhamnus alaternus, Ceratonia siliqua, Daphne oleifolia,* and *Origanum syriacum*.

In general, groups A&C were very closer to each other than the other groups in all charts, and both of them have a high presence of *Cupressus sempervirens* as a natural case.

8.4.1. *Cupressus sempervirens* vegetation:

Based on the FAC, *Cupressus sempervirens* can be noticed and classified into two main different vegetation groups: C and A as well as the relevé F10. Group C was registered by Martini (1999) as a sub-association under Querco (calliprinos)-Phyllyreetum mediae, while the second group A must be isolated with a different association.

8.4.1.1. Querco (calliprinos)-Phyllyreetum mediae (Martini 1999):

The association follows to the Quercion calliprini. It was recorded on the eastern slopes of the Coastal Mountains and it contained all the sclerophyllous maquis. It spread from 180-1250 m height in the fresh semi-arid and the temperate and fresh sub-humid bioclimate stages. The dominated rock is limestone and marl with Terra-Rossa and Rendzina soils.

The charactertistic species of the association are: *Quercus calliprinos, Phillyrea media, Pistacia palaestina, Cupressus sempervirens, Osyris alba, Ononis viscosa, Thymus hirsutus, Lamium truncatum, Marrubium libanoticum, Chrysanthemum segetum, Fraxinus syriaca, Rhamnus palaestina, Thesium bergeri, Gladiolus segetum, Teucrium chamaedrys, Lathyrus digitatus, Erica verticillata, Colutea cilicica.*

8.4.1.1.1. Sub-association cupressetosum sempervirentis (Martini 1999):

This sub-association follows the association Querco (calliprinos)-Phyllyreetum mediae. It was recorded in sites with a marl parent rock at a

height of 540-850 m, with 90% total coverage. The characteristic species are: *Cupressus sempervirens, Erica verticillata, Juniperus oxycedrus, Arbutus unedo, Thymus hirsutus, Teucrium polium, Rhus cotinus, Frankenia hispida, Myrtus communis, Poterium spinosum, Osyris alba, Pinus brutia, Ruscus aculeatus* and *Cupressus arizonica.*

However, much discretion could be noticed here for this sub-association; the characteristic species contain *Arbutus unedo* and *Cupressus arizonica* which were not recorded naturally in Syria at all. But if it considered the species *Arbutus unedo* is *Arbutus andrachne* it could be possible, and *Cupressus arizonica* never could be one of the character species because it comes by plantation works.

Table 32: *Cupressus sempervirens* vegetation.

Species codes	Relevés number	L30	L23	L19	L10	L02	R05	B04	H30	H26	H24	F12	F11	F01	F10	Constancy
	Altitude m	620	675	660	540	590	850	500	530	450	900	90	30	50	70	
	Exposition	ESE	N	E	E	E	SSW	NE	SES	S	S	N	W	NW	-	
	Slope %	20	30	20	40	20	35	20	40	40	50	40	30		-	
	Total cover %	55	80	90	70		80	60	70			100	90		80	
	Trees cover %	40	70	30	20		70	50	40				30		-	
	Shrubs cover %	20	40	90	60		40	30	60				60		60	
	Ground layer cover %	20	20	30	30		30	20	34				50		30	
	Parent rock	M	M	M	M	M	M	Cal	M	M	M	M	Cal	Cal	S	
	Surface m^2	400						400					200	400	400	
CUSE	*Cupressus sempervirens*	3.3	1.2	2.2	2.2	1.1	1.1	2.3	2.2	2.2	2.2	2.2	2.2	1.1	+	14
	cupressetosum sempervirentis (Martini 1999).															
RHCO	*Rhus cotinus*	2.2	1.1	1.1		+			1.1	1.1	+	2.2	1.2	+		10
MYCO	*Myrtus communis*	2.1	2.2	3.3	3.3	.	+	+	1.1	1.1		2.2	1.1	1.1		10
JUOX	*Juniperus oxycedrus*	1.1	+	1.1	+	.	1.1	+	1.1	1.1	1.1	1.1		.		9
OSAL	*Osyris alba*	1.1	1.1			+		+				+	+		+	7
PIBR	*Pinus brutia*	1.1	4.4	2.2		.		+	2.2	2.2	1.1			.	+	6
POSP	*Poterium spinosum*		1.1	1.1	1.2	5.5	+	1.1		1.1					3.2	6
ARAN	*Arbutus andrachne*	1.1	+	+		+			2.1	2.2	+	1.1		.		6
RUAC	*Ruscus aculeatus*		1.1					1.1	1.2	+		1.1	+			6
ERVE	*Erica verticillata*	2.2	1.1	3.2	+	1.1			1.1	3.2	2.2	4.3		.		5
TEPO	*Teucrium polium*	+	+	+					1.1							4
CESI	*Ceratonia siliqua*					.						+	+	2.1	1.1	4
PILE	*Pistacia lentiscus*													+	3.2	2
OLEU	*Olea europaea* var. *oleaster*		+			+		+					+	1.1		5
NEOL	*Nerium oleander*													+	1.1	2
	Quercion calliprini															
PHME	*Phillyrea media*	+	2.2	+	1.2		+	1.1	1.1	+	+	+	1.1	1.1		12
QUCA	*Quercus calliprinos*	1.1	2.2	1.1	2.2		2.1	2.2	2.2	2.2	1.1	2.2	+	2.1		12
SMAS	*Smilax aspera*		2.2	+	+		+	1.1	1.1			+	1.1	+	2.1	10
PIPA	*Pistacia palaestina*		1.1			+		+					1.1	2.2	2.1	8
PYSY	*Pyrus syriaca*				+	+								+	+	4
JAFR	*Jasminum fruticans*					1.1		+	1.1	+						4
LANO	*Laurus nobilis*							+		+			+	+		4
ARAL	*Aristolochia altissima*		1.1			.	+	+						.		3

	Relevés number	L30	L23	L19	L10	L02	R05	B04	H30	H26	H24	F12	F11	F01	F10	
CRAZ	*Crataegus azarolus*					1.1		+						+		3
ERFA	*Eryngium falcatum*		1.1			.			1.1							2
RHCO	*Rhus coriaria*		+			.								1.1		2
ASAC	*Asparagus acutifolius*							1.1					+	.		2
TACO	*Tamus communis*		+					1.1								2
CYPE	*Cyclamen persicum*								1.1	1.1						2
	Gonocytiso-Pinion															
GOPT	*Gonocytisus pterocladus*		+			.				+				.		2
	Ptosimopappo-Quercion															
	Quercetea ilicis															
RHPA	*Rhamnus palaestina*		1.1		1.1	.	+			+			+			5
RHAL	*Rhamnus alaternus*				+	.						+	+	.		3
ASAD	*Asplenium adiantum - nigrum*											1.1	+			2
VISY	*Vitis sylvestris*					.				+				1.1		2
	Quercetea pubescentis															
STOF	*Styrax officinlais*		1.1		.			+	2.1	1.1	+	+		1.1		7
MEUN	*Melica uniflora*		1.1						+	+						3
CLFL	*Clematis flammula*					.						1.1		+		2
HEHE	*Hedera helix*					.		+					+	.		2
POSU	*Polygala supina*		+				+									2
	Querco-Cedretalia libani															
QUIN	*Quercus infectoria*	+	1.1		.		2.2		1.1	+		1.1	+			7
RUAU	*Rubia aucheri*		2.2				+	+								3
	Cisto-Micromerietea															
CAVI	*Calycotome villosa*	+	1.1	+	+	1.1	+	1.1	+	+		+	+	3.3	3.2	13
CIVI	*Cistus villosus*	2.2	1.2	2.2	2.2	1.1			1.1	1.1	1.1			.		8
CISA	*Cistus salviifolius*	1.1	1.2	2.2		+	1.1			1.1	1.1			.		7
DAOL	*Daphne oleifolia*					.		1.1	1.1	1.1	+	1.1	+	1.1		7
THSY	*Thymus syriacus*	1.1		+		1.2			1.1	+	+			.		6
DOHI	*Dorycnium hirsutum*	2.2	+	+		+			1.1					.		5
GEAC	*Genista acanthoclada*	1.1	2.3	+		2.1								.		4
ORSY	*Origanum syriacum*		+							1.1	+		+			4
SPJU	*Spartium junceum*		1.1			+			1.1					3.3		4
ASMI	*Asphodelus microcarpus*					.			+					.		2
MIMY	*Micromeria myrtifolia*		+			.			2.1					.		2
PASP	*Paliurus spina-christi*												+		+	2
SAGR	*Salvia grandiflora*								1.1	1.1						2
	Companion species															
INVI	*Inula viscosa*	+				+				+				.	+	4
ASSP	*Astragalus* spec.	+				1.1								.		3
GASP	*Galium* spec.		+			.								+		3
HESP	*Helichrysum* spec.	1.1		1.1					1.1							3
HYSP	*Hypericum* spec.								1.1	1.2		2.2				3
PHSP	*Phlomis* spec.				.		1.1		1.1							2
RUSP	*Rubus* spec.					.				1.1				+		2
PTCH	*Ptilostemon chamaepeuce*											+	1.1			2
ACSY	*Acer syriacum*								+	1.1						2
FROR	*Fraxinus ornus*								+			+				2
	Total number of Relevés species	27	38	24	13	17	8.7	13	48	35	13	30	10	24	22	

One time record species (table 32):

Rhamnus punctata (F12, 1.1), *Cytisopsis dorycniifolia* (L19, +), *Lygia aucheri* (F12, 1.1), *Ptosimopappus bracteatus* (F10, +), *Scilla maritima* (B04, +), *Bryonia multiflora* (B04, +), *Lonicera etrusca* (B04, +), *Cercis siliquastrum* (F01, 1.1), *Calamintha clinopodium* (L23, 1.1), *Rubus sanctus* (L23, +), *Rubus tomentosus* (F10, 2.1), *Silene italica* (R05, +), *Brachypodium sylvaticum* (H24, +), *Ficaria ficarioides* (L19, +), *Lonicera orientalis* (F10, 2.1), *Milium montianum* (F10, 2.1), *Ostria carpinifolia* (F12, 1.1), *Erythraea centaurium* (L19, +), *Serratula cerinthifolia* (H22, 1.1), *Thesium bergeri* (L30, 2.1), *Cephalanthera rubra* (L19, +), *Ceterach officinarum* (H23, 2.2), *Dactylis glomerata* (H24,+), *Centranthus longiflorus* (B04, +), *Colutea ensifolia* (F11,1.1), *Onosma aucherana* (L02, +), *Ruta chalepensis* (F01,+), *Tragopogon buphtalmoides* (L02,+), *Vitex agnus-castus* (F10, 1.1), *Xanthium spinosum* (F10,+), *Cornus australis* (H22, +), *Selaginella denticulata* (H24, 1.2), *Pteridium aquilinum* H24, 2.2), *Galium constrictum* (F11, +), *Hypericum thymifolium* (f11, +), *Micromeria libanotica* (F11, +), *Micromeria serpyllifolia* (F12, 1.1), *Poa bulbosa* (L30, +), *Globularia trichosantha* (L19, 1.1), *Fumana arabica* (L19, 1.1), *Briza maxima* (L30, +), *Coronilla emeroides* (F12, 1.1), *Staehelina lobelia* (F12, 1.1), *Dryopteris libanotica* (H23, 1.2), *Ononis viscosa* (F10, 1.1), *Ampelopsis orientalis* (F11, +), *Milium* spec. (F01, 1.1), *Rubia* spec. (H22, 1.1), *Salvia* spec. (H24, +), *Onosma* spec. (H22, 1.1), *Convolvolus* spec. (H22, 1.1), *Ajuga* spec. H22, 2.1), *Linum* spec. (l30, 1.1), *Teucrium* spec. (L19, 1.1).

Description of the relevés sites (table 32)

Relevés code	**Sites name**	**Lat.**	**Long.**	**Site location and description**
L30	Zeineh	35.1163	36.3391	On the Messiaf -Qadmous road in the Coastal Mountains
L23	Al-Tall	35.0452	36.1258	North east of Sheikh-Bader in the Coastal Mountains
L19	Healeen	35.1141	36.3264	West of Messiaf in the Coastal Mountains
L10	Fandara	35.0091	36.3332	South of Messiaf 3 km near Fandara in the Coastal Mountains
L02	Messiaf	35.0837	36.3317	Near Messiaf in the Coastal Mountains
H30	Shatha	35.5065	36.2636	Near Shatha on the eastern slopes of the Coastal Mountains
H26	Shatha	35.5018	36.2699	Near Shatha on the eastern slopes of the Coastal Mountains
H24	Shatha	35.5096	36.2441	Near Shatha on the eastern slopes of the Coastal Mountains
R05	Gowikhat	36.3047	35.0493	On the Messiaf -Wadi al-Oyoun road in the Coastal Mountains
B04	Hatan	35.3933	36.2652	Near Ain Al-Korom on the Coastal Mountains' eastern slopes
F12	Qara-Douran	35.9378	35.9242	West of Kasab in the Baer-Bassit Mountain
F11	Qara-Douran	35.9302	35.9282	West of Kasab in the Baer-Bassit Mountain
F01	Qara-Douran	35.9326	35.9251	West of Kasab in the Baer-Bassit Mountain
F10	Um-Toyour	35.7949	35.8734	Near Um-Toyour in the Baer-Bassit Mountain

The relevés of group A and F10 were different from the sub-association Cupressetosum sempervirentis by location, climate factors, and the substrata. Group A and relevé F10 are located in the north west of Syria in Qara-Douran, at the southern slopes of Mount Cassius on a hard limestone, and in Um-Toyour, north Lattakia on serpentine, respectively, at an altitude of 0-

100 m with a precipitation range of 800-1200 mm/year, indicating that these sites belong to the humid and sub-humid bioclimate stage.
The relevés of group A were carried out in the rocky area with highly steep slopes 30-50% at the north and west aspects facing the maritime humid wind.
That difference of the ecological factors was reflected on the vegetation structure of group A and F10 relevés which contain many species from Oleo-Ceratonion (table 32) such as: *Ceratonia siliqua, Pistacia lentiscus, Nerium oleander, Asplenium adiantum-nigrum, Onosma aucherana, Micromeria libanotica, Dryopteris libanotica, Ampelopsis orientalis, Ptosimopappus bracteatus, Scilla maritima* and *Rhamnus punctata.*
Based on these preliminary results, it is concluded that these two sites need a further study to define if there is a new association / sub-association in Qara-Douran and Um-Toyour areas and whether this unit follows the Quercion calliprini or another alliance.

8.5. Concluding discussion of the Eu-Mediterranean vegetation:
The vegetation of the Eu-Mediterranean consists of three main forest types *Quercus calliprinos, Pinus brutia* and *Cupressus sempervirens*. This vegetation belongs to one class and order Quercetea (etalia) ilicis and three alliances (table 33).

Table 33: Syntaxonomic survey of the Eu-Mediterranean in Syria:

Class	Quercetea ilicis (Br.-Bl. 1947)
Order	Quercetalia ilicis (Br.-Bl. 1947)
Alliance	Ptosimopappo-Quercion (microphyllae) (Barbero et al. 1976)
Ass.:	Alysso (crenulatae)-Quercetum pseudocerridis (Chalabi 1980)
Ass.:	Pino (brutia)-Quercetum pseudocerridis (Ghazal Asswad 1998)
Alliance	Gonocytiso-Pinion (Barbero et al. 1976)
Ass.:	Pino (brutia)-Cistetum villosii (ass. nov.)
Ass.:	Pino (brutia)-Iridetum unguicularis (ass. nov.)
Ass.:	Pino (brutia)-Arbutetum andrachnii (ass. nov.)
Alliance	Quercion calliprini (Zohary 1955, 1973; Abi-Saleh et al. 1974)
Ass.:	Quercus calliprinos-Crataegus azarolus (Zohary 1973, Chikhali 2000)
Ass.:	Pistaco (palaestina)-Quercetum calliprini (Zohary 1960)
Ass.:	Querco (calliprinos)-Phillyreetum mediae (Martini 1999)
Sub-ass.	cupressetosum sempervirentis (Martini 1999)
Ass.:	Querco (aegilops)-Pistacietum atlanticae (Ghazal 1994)
Ass.:	Crataego (azarolus)-Quercetum aegilopsii (Ghazal 1994)

Ass.: Pruneto (tortuosa)-Quercetum calliprini (ass. nov.)
Ass.: Querco (infectoria)-Quercetum calliprini (ass. nov.)
Ass.: Styraco (officinal)-Quercetum calliprini (ass. nov.)

9. Ecosystem classification and mapping of the study area :

Mapping for ecological purposes usually involves the graphic portrayal, in two dimensions, regarding the patterns or mosaics of plant/animal communities or habitats or sites of a given area. For certain purposes, mapping process may involve the plotting and recording species populations or individuals.

Maps are helpful for an understanding of the spatial relations of plant communities or vegetation units. They provide the opportunity for a fair distribution of sampling in sense of geographical distribution and vegetation variation (Mueller-Dombois & Ellenbreg 1974).

Ecosystem classification and mapping has recently received a renewed attention, either from a theoretical viewpoint or in usage for case-specific applications (Blasi et al. 2000). This is due to the fact that, as a precursor to land management and biodiversity conservation, ecosystems need to be described, characterized and spatially located (Sims et al. 1996).

For the manager it is often impossible, or at least very difficult, to translate results of vegetation research into practical uses. In this regard, the phyto-ecologists should deem interpreting research results to be their task to help the land manager in agriculture, forestry, and range management (Mueller-Dombois & Ellenbreg 1974).

Direct mapping of an existing vegetation must be clearly distinguished from mapping of a potential vegetation that may never come into existence.

A map aids in classifying the vegetation by serving as a test of a classification because it forces the investigators to accommodate all variations in their scheme (Sankary 1982). The mapping process may result in corrections and thereby aid in deriving a realistic classification. It gives a detailed representation of spatial structure to the pattern of mosaic of vegetation. It also shows the geographical distribution of a specific vegetation unit. Moreover, it aids in casual analytical research of plant communities (Mueller-Dombois & Ellenbreg 1974).

Most classifications rely on a scale-independent concept of ecosystem as a volume of land and air plus organic content extended over a particular part of the Earth’s surface for a certain time (Rowe 1961). In this view, the whole Planet Earth can be conceived as a unified functional ecosystem, which can be progressively considered on smaller ecological scales (Blasi et al. 2000). This enables the establishment of a hierarchical framework, in which the pattern and function of ecosystems at each level depend on both the potentiality of lower levels and the constraints imposed by higher levels (O’Neill et al. 1989). The recognition of such a hierarchy of nested

ecosystems provides a rational base for many-scaled problems in the fields of nature conservation and sustainable development (Rowe 1996).
Tüxen (1956) suggested basing the concept of “potential natural vegetation” on the current existing vegetation and site mosaic. He defined the concept of “potential natural vegetation of today” as the vegetation structure that would become established if all successional sequences were completed without any human interference under the present climatic and edaphic conditions (including those created indirectly by human). A potential natural vegetation map provides a mirror-image of the current state of knowledge with respect to the present vegetation potential of a region. Such a map can be used to the advantage, either for practical purposes or as starting base for other researches (Mueller-Dombois & Ellenbreg 1974; Sankary 1982).
However, where the emphasis lies on developing a vegetation synopsis at a more extensive geographical scale, a hierarchical scheme becomes very desirable (Mueller-Dombois & Ellenbreg 1974).
Within this context, this chapter presents a hierarchical approach, which has been specifically designed for describing and mapping the Eu-Mediterranean landscapes of western Syria in different scales, on behalf of environmental policy and landscape planning.
This system integrates existing information from well-developed environmental disciplines, such as geology, bioclimatology, vegetation science and soil science (Blasi et al. 2000), but in particular, it incorporates concepts from plant sociology and its latest developments (Rivas-Martinez 1976; Gehu 1986). Plant sociology has formalized the approach for sampling and hierarchically classifying vegetation (Blasi et al. 2000). In a landscape-ecological context, dynamically related vegetation types are grouped into vegetation series while mosaics of these series occurring in homogeneous bio-geographical and geo-morphological units are united in catena or geosigmeta (Blasi et al. 2000).
Although, in a holistic land classification, the vegetation represents merely one of the ecologically relevant aspects, the hierarchical approach of plant sociology allows the integration of different types of vegetation information into a wider hierarchical environmental framework.

9.1. The classifications of landscape ecosystems in the study area:

Overall, 79 units belonging to 55 land facets, was recognized in this study (table 34). They follow to seven land regions vegetation:
Thermo-Mediterranean, Eu-Mediterranean, Supra-Mediterranean, Mount-Mediterranean, Mediterranean-Irano-Turanian, Irano-Turanian and Running water banks vegetation.

Within the study area, the land elements were registered which then assigned to the land units.

9.2. The main features of the landscape ecosystems in the study area:

The characters of the Syrian landscape ecosystems are:

Three regions have appeared in the study area, the first one is the vegetation of the Mediterranean region, which extends to the longitude 37° in the north and middle of the study area (towards the southern end of the Coastal Mountains) and it has appeared for another time in the heights of Anti-Lebanon and Jabal Al-Arab. The second vegetation type is Mediterranean-Irano-Turanian region that is considered a transition area appearing in the south of the study area where anti-Lebanon and Horan plain are situated. The third vegetation is the Irano-Turanian region, which has appeared in the south of the study area where the dry Saharan climate prevails.

The Mediterranean region consists of four zones, they are:

A) The Mountainous-Mediterranean occupying the peaks with three vegetation types:
   - The highest peaks of the Coastal Mountains occupied by *Cedrus libani* and *Abies cilicica*.
   - The high lands of the western Lebanon Mountains covered by *Juniperus excelsa* and *Cedrus libani*.
   - The summits of anti-Lebanon Mountains covered by *Juniperus excelsa.*

B) Supra-Mediterranean which is present in small areas in the mountain's heights:

- In the top of Al-Akrad Mountain, from 900 m to the top.
- The high areas of the eastern slopes of the Coastal Mountains between 900 m and 1100 m and on the western slops between 1000 m and 1300 m.
- In the Baer-Bassit chain from 500 m to the top.

C) The Thermo-Mediterranean which is occupying the Coastal plains up to a height not exceeding 300 m.

D) The Eu-Mediterranean which is the most widespread in the Mediterranean region of the study area from north to south.

The dominant parent rock in the study area is calcareous which spread widely by limestone, marl and dolomite. The vegetation is changing between Quercion calliprini, Gonocytiso-Pinion and sometimes Oleo-Ceratonion. The alluvial soils appear in many spots that were dominated by hydrophytes vegetation and sometimes by others. The green rocks appear only in one spot in the Baer-Bassit by a special type of vegetation that belongs to Ptosimopapo-Quercion.

The important alliance in the study area is Quercion calliprini which is presented by a maquie of *Quercus calliprinos* with sclerophyllous vegetation like *Phillyrea media, Arbutus andrachne, Rhamnus alaternus, Ceratonia siliqua, Pistacia lentiscus* and *Olea europaea*. However, Gonocytiso-Pinion represents the coniferous vegetation, which consists of forest from *Pinus brutia, Pinus halepensis* and *Cupressus sempervirens.* This alliance appears in patches of different sizes, but it has disappeared from the southern parts of the Coastal Mountains. Oleo-Ceratonion is exposed to a high level of disturbance leading it to appear only in small patches in the Thermo-Mediterranean.
The units in the north and middle of the study area were small and complex, but they were simpler in the south.
The effect of human activities has caused high level of disturbance in all units, leading to the disappearance of many forest types.

Table 34: **The legend of the vegetation map:**

Abbreviation in the map legend table 34:

ACQP	Alysso (crenulatum)-Quercetum pseudocerridis (Chalabi 1980).
PBQP	Pino (brutia)-Quercetum pseudocerris (Ghazal Asswad 1998).
PBCV	Pino (brutia)-Cistetum villosii (ass. nov.).
PBIU	Pino (brutia)-Iridetum unguicularis (ass. nov.).
PBAA	Pino (brutia)-Arbutetum andrachnii (ass. nov.).
CRAZ	Quercus calliprinos-Crataegus azarolus (Zohary 1973, Chikhali 2000).
PPQC	Pistacio (palaestina)-Quercetum calliprini (Zohary 1960).
QCPM	Querco (calliprinos)-Phillyreetum mediae (Martini 1999).
CuSm	Subass.: cupressetosum sempervirentis (Martini 1999).
QAPA	Querco aegilopsi-Pistacietum atlanticae (Ghazal 1994).
CAQA	Crataego azarolo-Quercetum aegilopsii (Ghazal 1994).
PTQC	Pruno(tortuosa)-Quercetum calliprini (ass. nov.).
QIQC	Querco (infectoria)-Quercetum calliprini (ass. nov.).
SOQC	Styraco (officinal)-Quercetum calliprini (ass. Nov.).
PCQC	Pyrethro (cilicicum)-Quercetum pseudocerridis (Karzon 1996).
SVSL	Salsoletum (vermiculatum)-Stipetum lagascae (Sankary 1988).
SVHA	Salsoletum (vermiculatum)-Halogetoetum alopecuroides (Sankary 1988).
FSMC	Fraxino (syriaca)-Myrtetum communi (Martini 1999).
SLSE	Salico (libani)-Smilacetum excelsae (Ghazal Asswad 1998).

1: Thermo-Mediterranean: it is extending from sea level to 300 m.

1.1: Calcareous promontories and plains in **the Coastal plains.**

1.1.O: The Coastal plains along the coast**,** under thermo-Mediterranean, sub-humid warm climate with five-months dry period are characterized by sclerophyllous or coniferous vegetation.

1.1.O.1: The limestone and dolomite of the **Coastal plains**. Quercion calliprini is found by *Quercus calliprinos* and *Quercus aegilops* as maquis with different heights and sometimes by climax or semi-climax forest near holy sites and tombs. Three associations were recorded in the facet. PPQC: makes maquis with height of 2-6 m. QCQI: appears as small forest patches near holy sites and makes a climax or semi-climax forests. QACR: in plains and flat sites.

1.1.O.2: Small patches of coniferous forests of *Pinus brutia* from Gonocytiso-Pinion in marl substrata.

1.1.O.3: High disturbance vegetation from Cisto-Micromerietea. It appears adjacent to cultivated fields and settlements.

1.1.O.5: Many sites of the **Coastal plains.** Complex cultivation patterns, irrigated fruit trees. Potential vegetation is Oleo-Ceratonion as patches near the seashore. It consists of *Ceratonia siliqua* and *Pistacia lentiscus* with significant appearance of *Pinus brutia*.

1.1.Q: Calcareous promontories of the Baer-Bassit, under thermo-Mediterranean, sub-humid warm climate and five-months dry period. Sclerophyllous vegetation.

1.1.Q.1: Quercion calliprini in the north-west in Qara-Douran, maquis with different heights that appears as small forest patches in the flat areas, QACR.

1.1.Q.5: Small area in the **Baer-Bassit. The** vegetation is Oleo-Ceratonion which appears as patches near the seashore. It consists of *Ceratonia siliqua* and *Pistacia lentiscus* with significant appearance of *Pinus brutia*.

1.2: Basaltic plains in both the south part of the coast and Horan plain sub-humid climate and 5-6 months dry period.

1.2.O: The basaltic area of the s**outhern Coastal plains** sub-humid warm climate and 5-6 months dry period, complex cultivation patterns, irrigated fruit trees with significant patches of sclerophyllous natural vegetation.

1.2.O.1: The basaltic area of the southern end of seashore. The potential vegetation is Quercion calliprini represented by *Quercus calliprinos* and *Quercus aegilops* as a maquis or climax or semi-

climax forest near holly sites. Two associations were recorded PPQC in rocky and shallow soils and QACR in plain and flat sites.

1.2.L: Horan basaltic **plain** with sub-humid fresh climate and more than five months dry period. Complex cultivation patterns.

1.2.L.1: Horan basaltic **plain,** complex cultivation patterns, potential vegetation is Oleo-Ceratonion.

1.3: Green rocks dominated by (serpentine and amphibolite).

1.3.Q: The green rock area in Baer-Bassit mountain on serpentine Under sub-humid climate and 5-6 months dry period.

1.3.Q.4: The forest occupies the green rocks (serpentine) by Ptosimoppapo-Quercion microphyllae. It is dominated by *Quercus infectoria* subsp. *microphylla* by one association ACQP.

1.3.Q.5: The green rock area from **Baer-Bassit mountain.** Potential vegetation is Oleo-Ceratonion as small patches near the seashore with significant appearance of *Pinus brutia*.

1.4: Alluvial, lacustrine and coastal sediments of the Coastal plain.

1.4.O: Plain area from Quaternary era by conglomerate and pebble beds, under thermo-Mediterranean, sub-humid warm climate and 5-6 months dry period. Complex cultivation patterns, irrigated croplands with small patches of natural forest vegetation. Potential vegetation is Oleo-Ceratonion appearing as small patches near the seashore and sometimes as Quercion calliprini or even Cisto-Micromerietea.

1.4.O.1: Few places from the **Coastal plains**. Quercion calliprini is found by *Quercus calliprinos* and *Quercus aegilops* as a maquis with different heights and sometimes by climax or semi-climax forest near holly sites. QCQI. QACR.

1.4.O.3: High anthropogenic impact, it is appearing near the fields and settlements. It consists of Cisto-Micromerietea.

1.4.O.5: The plain and flat areas from the seashore, Land use is mainly by complex cultivation patterns. Potential vegetation is Oleo-Ceratonion appearing as small patches near the seashore. The vegetation consists of *Ceratonia siliqua* and *Pistacia lentiscus*.

2: Eu-Mediterranean: it is of 300-900 m height**.**

2.1: Calcareous Mountains and hills from the north in Al-Akrad Mountain to the south in Anti-Lebanon Mountains.

2.1.A: Hard limestone and marl of Al-**Akrad Mountain** under semi-arid climate and 5-6 months dry period. Mainly cover natural sclerophyllous and coniferous vegetation with olive groves.

2.1.A.1: The northern heights of Al-Akrad Mountain, limestone substrata, Quercion calliprini is dominated by *Quercus calliprinos* maquis with different heights on the steep calcareous slopes and *Quercus aegilops* semi-forest vegetation in the flat and plain areas with deep profile soil. Two associations were recorded: SOQC and QAPA.

2.1.A.2: The southern heights of Al-Akrad Mountain, marl substrata. Gonocytiso-Pinion is dominated by *Pinus brutia* semi-forest. The disturbance increased fast by transforming to olive groves. One association was recorded, PBCV.

2.1.A.3: Different places in Al-Akrad Mountain, Cisto-Micromerietea is increased due to human interference near the human settlements and agriculture fields, it is frequently transforming to agriculture.

2.1.B: Aleppo and Idleb calcareous plains under semi-arid climate and 6-7 months dry period.

2.1.B.1: Irrigated and non-irrigated cropland, complex cultivation patterns, non-irrigated arable, small natural vegetation patches with high disturbance. The potential vegetation is Quercion calliprini.

2.1.C: Calcareous mountains, **Wastani, A'ala, Barisha and Samaan Mountains** under semi-arid climate and 5-6 months dry period. The natural vegetation is sclerophyllous and sometimes accompanied by *Pinus brutia* forest with irrigated and non-irrigated orchards of fruit trees and olive groves.

2.1.C.1: The natural vegetation comprises from Quercion calliprini. It is dominated by *Quercus calliprinos*. The maquis has a height of 2-4 m or less on the rocky slopes. *Quercus aegilops* vegetation occupies the flat and deep soil area. Two associations recognized SOQC, QAPA.

2.1.C.2: Gonocytiso-Pinion is occupying small area by *Pinus brutia* vegetation with one association PBCV.

2.1.C.3: High disturbance areas, Cisto-Micromerietea is appearing in many sites near human settlements and cultivation land.

2.1.D: Jiser Al-Shoghour hills were dominated by coniferous cover mainly *Pinus brutia* vegetation on marl substrata, under sub-humid climate and five-months dry period.

2.1.D.1: Irrigated and non-irrigated fruit trees orchards and olive

groves have rapidly increased. The natural vegetation of Gonocytiso-Pinion is occupying the unit by *Pinus brutia* vegetation with one association PBIU.

2.2.C.3: High disturbance areas, Cisto-Micromerietea is appearing in many sites near human settlements and cultivation land.

2.1.E: Calcareous substrata of **Zawiah** mountain under semi-arid climate and 6-7 months dry period.

2.1.E.1: Complex cultivation patterns, non irrigated cropland and fruit trees, with significant area of natural vegetation, sclerophyllous maquis. Quercion calliprini is dominated by small patches of *Quercus calliprinos* maquis with a height of 2-6 m but sometimes even less. In flat lands, *Quercus aegilops* vegetation appears in small areas or as individual specimen QAPA.

2.1.G: Calcareous plain in **Hama and Homs under** semi-arid and arid climate and 6-7 months dry period.

2.1.G.1: Complex cultivation patterns, irrigated and non-irrigated cropland, fruit trees and pistachio grove. The potential vegetation is Quercion calliprini.

2.1.H: Calcareous substrata in the Western Lebanon Mountains under semi-arid climate and more than six-months dry period. Mainly contains natural sclerophyllous vegetation.

2.1.H.1: Small area on the western Lebanon Mountains. Quercion calliprini is dominated by *Quercus calliprinos* maquis with a height of 2-4 m.

2.1.I: Anti-Lebanon Calcareous mountain under semi-arid and arid climate and 6-7 months dry period. The natural vegetation is sclerophyllous.

2.1.I.1: High anthropogenic land use and complex cultivation patterns. Irrigated and non-irrigated cropland and fruit trees orchards, with significant areas of natural vegetation. Quercion calliprini is dominated by *Quercus calliprinos* maquis with a height of 2-4 m. PTQC.

2.1.M: The eastern and northern slopes of the Coastal Mountains were dominated by limestone and marl, with sub-humid temperate and fresh climate with 5-6months dry period. Sclerophyllous and coniferous

vegetation were widespread.

2.1.M.1: Sclerophyllous vegetation of Quercion calliprini is dominated by *Quercus calliprinos* maquis with different heights in the steep land. *Quercus aegilops* semi-forest vegetation patches have occupied the flat areas with deep soil. Many other patches of vegetation has appeared and dominated by: *Laurus nobilis, Pyrus syriaca* and *Olea oleaster*. Several associations were recorded: QACA, PPQC, PMQC and CuSm.

2.1.M.2: Steep calcareous slopes with anthropogenic influence. Mainly semi-forest land use. Gonocytiso-Pinion is dominated by *Pinus brutia* and sometimes by *Cupressus sempervirens*. PBUI and PBAA.

2.1.M.3: Extensively damaged vegetation exposed to human impact. Cisto-Micromerietea appears near the cultivated fields and settlements.

2.1.N: The western and southern slopes of the Coastal Mountains were dominated by limestone and marl, in humid climate and 5-6 months dry period. Very important sclerophyllous vegetation consists mainly of *Quercus calliprinos* with different heights.

2.1.N.1: Sclerophyllous vegetation of Quercion calliprini widely spread by maquis of *Quercus calliprinos* with different heights and sometimes by climax or semi-climax forests near the holly sites. Complex cultivation patterns, irrigated cropland and fruit trees orchards. Three associations were recorded in the facet on plains and flat sites. PPQC, QCQI, QACR:

2.1.N.2: Steep calcareous slopes with anthropogenic influence. Mainly semi-forest land use. Gonocytiso-Pinion is dominated by *Pinus brutia* and sometimes *Pinus halepensis*. PBUI and PBAA .

2.1.Q: The Calcareous area of Bayer-Bassit, humid climate and four-months dry period:

2.1.Q.1: small area located in the northwestern slope of Baer-Bassit in Qara-Douran. Quercion calliprini is represented by maquis of *Quercus calliprinos.*

2.1.Q.2: The natural vegetation consists of coniferous vegetation and is represented by Gonocytiso-Pinion which is dominated by *Pinus brutia* on the eastern slops of Baer-Bassit and sometimes *Cupressus sempervirens* on the western rocky slopes of Qara-Douran.

2.2: Basaltic substrata from Neogene and Quaternary era have appeared in special areas with different sizes.

2.2.A: Small area on the north-westerly slopes of the **Al-Akrad Mountain**, natural sclerophyllous vegetation with complex cultivation patterns

2.2.A.1: Quercion calliprini is dominated by *Quercus calliprinos* maquis with different heights in the steep land SOQC.

2.2.A.2: High anthropogenic impact. Main use as arable land with significant natural vegetation. Potential vegetation is Gonocytiso-Pinion which is dominated by *Pinus brutia*.

2.2.C: Small spot of Basaltic substrata in the south of Wastani Mountain, with semi-arid climate and more than six-months dry period.

2.2.C.1: Complex cultivation patterns with small patches of natural vegetation. Quercion calliprini is dominated by small patches of *Quercus calliprinos* with a height of 2-6 m and sometimes less. *Quercus aegilops* vegetation has also appeared as individual specimen QAPA.

2.2.E: Zawiah Mountain basaltic substrata, with semi-arid climate and 6-7 months dry period. Complex cultivation patterns, with small areas of natural sclerophyllous vegetation.

2.2.E.1: Complex cultivation patterns, non-irrigated cropland and fig groves, with small patches of natural vegetation. Quercion calliprini is dominated by small patches of *Quercus calliprinos* maquis with a height of 2-6 m and sometimes less. *Quercus aegilops* vegetation appears in small areas and frequently as individual specimen QAPA.

2.2G: Basaltic plain in **Homs and Hama,** with arid and semi-arid climate and 6-7 months dry period. Complex cultivation patterns.

2.2.G.1: Complex cultivation patterns, irrigated and non-irrigated cropland and fruit trees orchards. The potential vegetation is Quercion calliprini.

2.2.L: Basaltic substrata in the **Horan plain and Jabal Al-Arab** in sub-humid and semi-arid climate with more than 5 months dry period. Complex cultivation patterns with small patches of natural sclerophyllous vegetation.

2.2.L.1: Basaltic areas, high anthropogenic influence. Land use is

mainly arable fruit trees and complex cultivation patterns. Potential vegetation is Quercion calliprini, which appears as a maquis of *Quercus calliprinos* with height of 6-8 m. *Quercus aegilops* vegetation was noticed in many sites as a semi-forest. Two associations were recorded: QCCA, QAPA or CRAZ.

2.2.N: The southern slopes of the Coastal Mountains were dominated by basalt, in humid and sub-humid climate and 4-5 months dry period. Sclerophyllous vegetation consists mainly of *Quercus calliprinos* and *Quercus aegilops*.

2.2.N.1: Complex cultivation patterns, irrigated cropland and fruit trees orchards. Significant sclerophyllous vegetation of Quercion calliprini spread by maquis of *Quercus calliprinos* with different heights and sometimes by climax or semi-climax forests of *Quercus aegilops* in flat areas near the holly sites. Three associations were recorded: PPQC, QCQI, QACR.

2.3: Green rocks from Mesozoic Ophiolite series (serpentine, radiolarites and diabases) and Precambrian era (amphibolite and gabbro).

2.3.D: Jiser Al-Shoghour hills were dominated by conifers mainly *Pinus brutia* vegetation on green rocks, under sub-humid climate and five-months and six days dry period.

2.3.D.4: Small areas of Ptosimoppapo-Quercion (microphyllae) is occupying small area from the facet by one association ACQP.

2.3.Q: Baer Bassit Mountain humid climate and four months dry period, coniferous forest and significant cultivation areas.

2.3.Q.2: Small spots of gabbro are occupied by Gonocytiso-Pinion. It is dominated by *Pinus brutia*. PBQP.

2.3.Q.4: One of the important forest occupied the green rocks (serpentine) by Ptosimoppapo-Quercion (microphyllae). It is dominated by *Quercus infectoria* subsp. *microphylla* with one association ACQP.

2.4: Terrace alluvial **conglomerate** and pebble beds area

2.4.B: Terrace alluvial in **Idleb plain**, with semi-arid climate and 6 months dry period.

2.4.B.1: Complex cultivation patterns, irrigated and non-irrigated cropland, fruit trees and olive groves, with small areas of natural vegetation. Potential vegetation is Quercion calliprini.

2.4.C: Terrace alluvial in **Al-Rouge plain**, semi-arid climate and 5

months dry period.

2.4.C.1: Complex cultivation patterns, irrigated and non-irrigated cropland, fruit trees and olive groves, with small areas of natural vegetation. Potential vegetation is Quercion calliprini.

2.4.G: Terrace alluvial areas in **Hama plain** under semi-arid climate and 6-7 months dry period.

2.4.G.1: Complex cultivation patterns, irrigated and non-irrigated cropland and fruit trees. Potential vegetation is Quercion calliprini.

2.4.F: Flood plains and terrace **alluvial areas of El-Ghab plain** under sub-humid and semi-arid climate and 5-6 months dry period.

2.4.F.1: El-**Ghab plain,** complex cultivation patterns, irrigated cropland, with small areas of natural vegetation. *Fraxinus syriaca* and hydrophytes vegetation have appeared as patches in the western sites of the plains.

3: Supra-Mediterranean: of 900-1200 m height

3.1: Calcareous substrata from Cretaceous and Jurassic era.

3.1.A: in Al-Akrad Mountain under sub-humid and humid climate and 4-5 months dry period.

3.1.A.1: Small areas of the peak (more than 800 m) of **Al-Akrad Mountain** on limestone from Cretaceous were occupied by broadleaves forest, under humid climate with less than four months dry period. *Quercus cerris* subsp. *pseudocerris* from Quercetea pubescentis is the dominated species.

3.1.N: The heights of the Coastal Mountains on limestone, marl and dolomite from Jurassic (more than 1100 m) with sub-humid and humid climate and 4-5 months dry period.

3.1.N.1: it is dominated by broadleaves forest. *Quercus cerris* subsp. *pseudocerris* from Quercetea pubescentis.

3.2: Basaltic substrata from Neogene and Quaternary era.

3.2.N: Small areas of the southern heights of the **Coastal Mountains** under humid climate with less than four months dry period.

3.2.N.1: The dominated forest is *Quercus cerris* subsp. *pseudocerris*. It is following to PCQC from Quercetea pubescentis.

3.2.N.2: The dominant forest is a small natural patches of *Castanea sativa* from Quercetea pubescentis. Many plantation works by *Castanea sativa* were carried out during the last three-four decades.

3.3: Green rocks series (serpentine, peridotites and amphibolites) substrata from Mesozoic and Precambrian.

3.3.Q: small areas of the Baer-Bassit under humid climate with less than four months dry period.

3.3.Q.1: the dominant vegetation is *Quercus cerris* subsp. *pseudocerris* from Quercetea pubescentis ACQP.

4: Mountainous -Mediterranean: exceeding 1200 m above sea level.

4.1: Limestone, marl and dolomite substrata from Jurassic era.

4.1.N: The top summits of the Coastal Mountains, humid climate with a less than four months dry period.

4.1.N.1: The dominant vegetation is a coniferous forest which consists of *Cedrus libani* on the eastern slopes Querco-Cedretalia libani.

4.1.N.2: The dominant vegetation is a coniferous forest consists of *Abies cilicica* on the western slopes Querco-Cedretalia libani.

4.1.H: Small area of the **Western Lebanon Mountain** sub-humid climate with less than six months dry period.

4.1.H.1: Coniferous forests consist of *Cedrus libani* and *Juniperus excelsa*, from Junipero-Quercion.

4.2.I: The heights of the **Anti-Lebanon Mountain** sub-humid and semi-arid climate with less than six months dry period.

4.2.I.1: Coniferous forest consists of *Juniperus excelsa* vegetation.

5: Mediterranean-Irano-Turanian vegetation on different elevations**:**

5.1: Calcaroues plain from Cretaceous, Paleocene and Neogene era with complex cultivation patterns and high anthropogenic impact.

5.1.G: The Limestone, marl and chalky substrata in Homs plain semi-arid and arid climate and 6-7 months dry period. Mainly used for grazing as well as complex cultivation patterns, non-irrigated cropland and fruit trees, with significant areas of natural vegetation.

5.1.G.1: High anthropogenic impact with complex cultivation patterns. It is appeared in some sites like valleys and watercourses. It is dominated by dry steppic vegetation with the appearance of *Pyrus syriaca*, *Amygdalus orientalis* and *Pistacia atlantica*. It shares with many species from Irano-Turanian. Potential vegetation is Quercion calliprini.

5.1.I: Anti-Lebanon Calcareous mountain semi-arid and arid climate

and 6-7 months dry period. Main usage is grazing and complex cultivation patterns, non-irrigated cropland and fruit trees orchards, with significant areas of natural vegetation.

5.1.I.1: High anthropogenic impact with complex cultivation patterns. It is appeared in some sites like valleys and watercourses. It is dominated by dry stepped vegetation with *Pyrus syriaca*, *Pistacia atlantica* and *Amygdalus orientalis* which are recorded in the heights of Hasia. It shares with many species from Irano-Turanian. Potential vegetation is Quercion calliprini.

5.2: Basalt substrata from Quaternary.

5.2.L: Horan plain arid climate and more than seven months dry period. Complex cultivation patterns with grazing, non-irrigated cropland and fruit trees, with significant areas of natural vegetation.

5.1.L.1: High anthropogenic impact with complex cultivation patterns. The natural vegetation spread in small patches and used for grazing.

5.2.L.2: The natural vegetation consists from many trees with a height not exceeding 2-6m like *Pyrus syriaca*, *Amygdalus orientalis* and *Pistacia atlantica*. They occupied the rocky areas. Potential vegetation is Quercion calliprini, with complex cultivation patterns.

5.4: Terrace alluvial plain from the Pleistocene era with complex cultivation patterns and high anthropogenic impact.

5.4.G: The Homs plain semi-arid and arid climate and 6-7 months dry period. Mainly use for grazing and some complex cultivation patterns.

5.4.G.1: Piedmont formed. Mainly used for urban with high anthropogenic impact and complex cultivation patterns. The natural vegetation is very rare. Potential vegetation is Quercion calliprini

5.4.I: Piedmont formed in the **Anti-Lebanon,** semi-arid and arid climate with 6-7 months dry period. Mainly used for graze and complex cultivation patterns with significant areas of natural vegetation.

5.4.I.1: High anthropogenic impact with complex cultivation patterns, non-irrigated cropland and fruit trees. The natural vegetation appears in valleys and watercourses by trees of *Pyrus syriaca*, *Amygdalus orientalis* and *Pistacia atlantica*. It shares with many species from Irano-Turanian. Potential vegetation is Quercion calliprini

6: Irano-Turanian vegetation on different elevations**:**

6.1: Calcareous hills and plains substrata from the Neogene era.

6.1.G: Limestone, marl and chalky substrata from **Homs plain** under arid climate and more than seven months dry period.

6.1.G.1: Mainly usage is grazing and sometimes for rain-fed cultivation, with significant areas of natural vegetation. *Artemisia herba-alba* vegetation is widespread.

6.1.I: Anti-Lebanon under arid climate and more than eight months dry period. Mainly used for grazing or non-irrigated cultivation.

6.1.I.1: The *Artemisia herba-alba* vegetation is widespread with many trees of *Pyrus syriaca* along the valleys and the temporary watercourses.

6.1.S: Piedmont formed of the **Mountains of Palmyra** under arid and Saharan climate with more than eight months dry period.

6.1.S.1: The *Artemisia herba-alba* vegetation is dominated. Sankary (1988) recognized SVSL .

6.2: The Basaltic dry area in the south substrata from Quaternary.

6.2.L: the eastern slopes of Jabal Arab and southern area of Horan plain, under arid climate and more than 8 months dry period.

6.2.L.1: The natural vegetation consists of *Artemisia herba-alba* vegetation where grazing is frequent. Sankary (1988) recognized SVSL.

6.2.S: Piedmont formed of the **Palmyra** mountains under arid and saharo climate and more than eight months dry period.

6.1.S.1: *Artemisia herba-alba* vegetation is widespread in this habitat, Sankary (1988) recognized SVHA.

6.3: Flood plains, conglomerate substrata from the Neogene era.

6.4.I: Anti-Lebanon Mountains under arid climate and more than eight months dry period.

6.4.I.1: Complex cultivation patterns. *Artemisia herba-alba* vegetation is widespread. *Pyrus syriaca Amygdalus* spec. spread along the valleys and dry watercourses.

6.4.T: Piedmont formed at the Damascus plain in arid and Saharan climate and more than eight months dry period.

6.4.T.1: All the plain of Damascus were used for urban purposes. High anthropogenic impact with complex cultivation patterns. The natural vegetation has disappeared.

7: Running water banks vegetation: it shares the watercourse, springs and rivers in different elevations.

7.1: Mostly sand, pebble or loams deposits from recent Quaternary era, calcareous and sometimes green rock substrata.

7.1.A: Al-**Akrad Mountain** under semi-arid climate and 5-6 months dry period.

7.1.A.1: Afreen and Asswad rivers, the vegetation extends along the rivers by different densities, the dominant trees are *Salix* spec.

7.1.A.2: Some watercourses flow to Afreen river like in El-Atrash watercourse, the dominated tree species is *Platanus orientalis* with hydrophytes vegetation.

7.1.B: Watercourses in the **Wastani, Al-A'ala, Barisha and Samaan Mountain** under semi-arid climate and 5-6 months dry period.

7.1.B.1: Some watercourses follow to Asi river like in Abo-Obaida, the dominated tree species is *Platanus orientalis* with hydrophytes vegetation.

7.1.B.2: Along Asi river, the dominant trees are *Salix* spec. with hydrophytes vegetation.

7.1.C: Ghab plain under sub-humid climate and 5 months dry period.

7.1.C.1: Along the Asi river from the south near Qattineh Lake to the north in Jiser Al-Shoghour along El-Ghab Plain. The dominated trees are *Salix* spec. with hydrophytes vegetation.

7.1.C.2: *Fraxinus syriaca* recorded in many places as patches in Ghab Plain. Many hydrophytes share the river. An association was recognized here FSMC.

7.1.D: Many watercourses in Jiser Al-Shoghour hills, under sub-humid climate and 5 months dry period.

7.1.D.1.: Along Asi river, the dominated trees are *Salix* spec. with hydrophytes vegetation.

7.1.E: Many rivers along the **Coastal plains and the Coastal Mountains**, humid and sub-humid warm climate and 4-5 month dry period

7.1.E.1: Abrash, Dreakish, Al-kabeer Al-Shimali, Al-kabeer Al-Janoubi and Al-Sin, The dominated trees are *Salix* spec. with hydrophytes vegetation. In Baer-Bassit one association was recognized SLSE.

7.1.E.2: Wadi Qandil and Um-Toyour the dominated trees are *Alnus orientalis* with hydrophytes vegetation.

7.1.E.3: Sanobar-Jableh river, the dominated trees are *Ulmus*

canescens with hydrophytes vegetation.

7.1.E.4: Abu-Qubais river, the dominated tree species is *Platanus orientalis* with hydrophytes vegetation.

7.1.I: Anti-Lebanon Mountain, **under** semi-arid and arid climate and 6-7 months dry period.

7.1.I.1: A'awaj and Barada Rivers and several water resource, the vegetation consists of hydrophytes species.

7.2: Mostly deposits sand, pebble or loams from recent Quaternary basaltic substrata.

7.1.L: In many permanent and non-permanent watercourses **on Jabal Al-Arab, Horan plain and Mserip Lake**.

7.1.L.1: in the **Jabal Al-Arab** the hydrophytes vegetation comprises of *Typha australis-Butomus umbellatus* association (Chikhali 2000) with *Mentha aquatica, Vitex agnus-castus, Ranunculus* spp. and others.

7.1.L.2: **Mserip Lake and Yarmouk river,** the dominated trees are *Salix* spec. with the hydrophytes vegetation comprises of *Mentha aquatica, Vitex agnus-castus, Ranunculus* spp. and others.

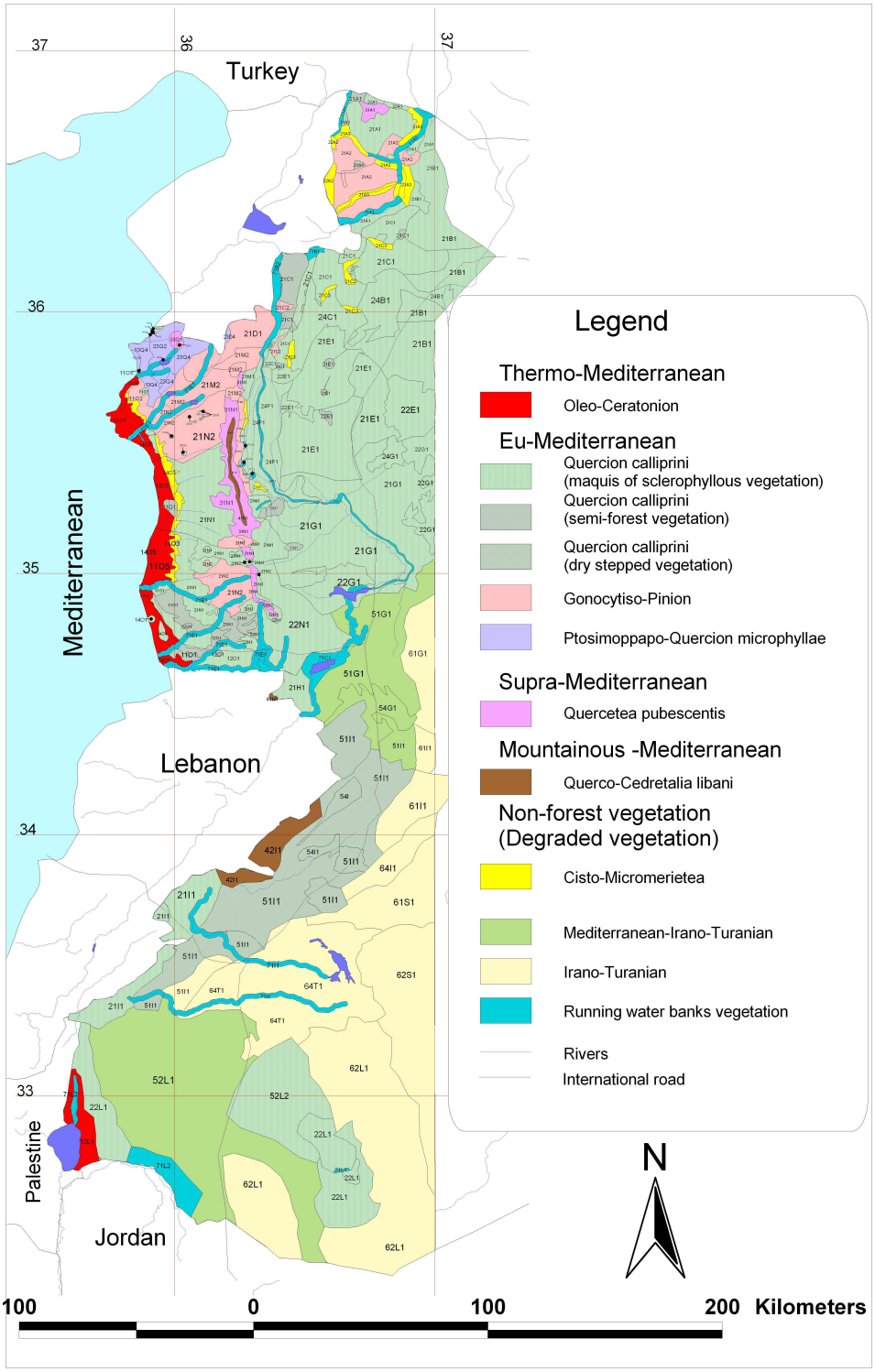


Fig 40: The vegetation map of the study area.

10.Conclusions and recommendations:

The study was prepared to give a full geobotanical description and phytosociological analysis for the western part of Syria and to produce a potential vegetation map for the Eu-Mediterranean vegetation which will complete the understanding of the Mediterranean vegetation in the east Mediterranean region.

The recent study shows that Eu-Mediterranean vegetation, which dominates in the western part of Syria, is present through three major different vegetation types: evergreen oak forest (*Quercus calliprinos*), semi-deciduous oak forest (*Quercus aegilops* and *Quercus infectoria*) and coniferous forest (*Pinus brutia, or P. halepensis* or *Cupressus sempervirens*). Moreover, two special vegetation types the non-forest Mediterranean vegetation (degraded vegetation) and the running water banks vegetation that occurs around streams, riverbanks and water pools are also recognised within this Eu-Mediterranean vegetation.

From a geobotanical point of view, the Eu-Mediterranean vegetation is organized in different types: humid, sub-humid, semiarid and arid Eu-Mediterranean, but it never goes to the east of longitude 37°or higher than 900 m in the humid and sub-humid types but it can reach up to1450 m in the semiarid vegetation type.

Various degradation factors during the recent few decades have reduced the area of forests to a mere 2.5% of the total land cover of Syria, and this was stabilized by enforcing many new laws from the government.

However, the Syrian forests are still suffering from degradation in the phytosociological structure as most of the climax vegetation has disappeared. The past and recent human interferences by fire, cutting and grazing still have a huge effect on the forest. Moreover, more recent factors such as tourism, which affects forest sites especially by unorganized tourism programs that allow everyone to reach anywhere, are destroying the forest areas. In addition, recent projects of services and arbitrary acts of those to improve the infrastructure such as creating, improving or maintaining roads, and new constructions of governmental projects which mostly exist on forest land have lead to cut more land from forest.

The exploitive behaviour of local inhabitants of collecting the organic matter from the ground layer of the forest and fruits or medicinal plants causes the rapid disappearance of several endangered and rare plant species from the Syrian flora and changes the structure of vegetal communities.

The phytosociological result in this study shows that the vegetation in the study area is belonging to three alliances: Quercion calliprini, Ptosimopappo-Quercion (microphyllae) and Gonocytiso-Pinion. New

associations recorded by the phytosociological analysis are: Quercus calliprinos-Crataegus azarolus association, Pruno (tourtuosa)-Quercetum calliprini, Querco (infectoria)-Quercetum calliprini, Styraco (officinalis)-Quercetum calliprini, Querco (calliprinos)-Phillyreetum mediae and Pistacio (palaestina)-Quercetum calliprini are belonging to Quercion calliprini. Moreover, a further three new associations: Pino (brutia)-Cistetum villosii, Pino (brutia)-Iridetum unguicularis and Pino (brutia)-Arbutetum andrachnii are belonging to Gonocytiso-Pinion.

The phytosociological studies which are considered the first step to understand the vegetation pattern were necessary to protect the biodiversity for sustainable goals. On the other hand the phytosociological studies were the significant tools to produce the vegetation map which is important for planning and managing the forest area. Mapping landscape will be the basis for carrying out more detailed phytosociological studies to reach a complete picture of the vegetal communities in the forest areas and the indicative phytosociological alliances.

The result of this study shows that 79 land units belonging to 55 land facets were recognized. The land facets in the north and middle of the study area are small and complex, but the facets are simpler in the south. The effect of human activities causes high level of disturbance in all units, leading to the disappearance of many forest types.

The relationship between landscape ecology and phytosociology is very strong and it is applied in this study to reach for high level of exploitation of the result by producing a potential vegetation map which is considered as an important step to start high level of management for the landscape ecosystem and put strategic programs for sustainable development.

Based on all of these mentioned points and findings many important recommendations were suggested in the study:

1. From the phytosociological point of view, it is necessary to complete the following studies:
    a. The vegetation of *Cupressus sempervirens* needs more studies to recognize the associations in its both main areas in northwest of Syria and in the Coastal Mountains near Messiaf.
    b. The vegetation of the widespread running water banks in the Eu-Mediterranean which is affected by many degradation factors.
    c. The ecosystems of selective dominant species which are recognized in different regions and grow as forest patches in the

study area like: *Laurus nobilis, Pyrus syriaca* and *Olea oleaster*.

d. The degraded vegetation which has increased dramatically in all the Syrian forest and occupied more land forests from the dominate associations.

2. This study uses a landscape ecological point of view which has not received much attention in Syria for complete mapping of the landscape units depending on a phytosociological analysis. However, it is necessary to complete more studies about the ecological units of the landscape as basic for understanding the ecosystems.
3. The vegetation mapping is a very important tool for landscape planning. This mapping is recommended for the following points:
    a. Based on the potential vegetation map of western Syria which are produced in this study, it is necessary to complete the work for the rest of Syria.
    b. The land units and land elements in the potential vegetation map of the study area and all of Syria which require more studies to be completed. This will enable the understanding of the vegetation on the local scale and helps to assess the environmental impacts which have critical effects on the management and planning programs.
4. Increasing the consciousness of local people especially young generations awareness of the importance of the preserving the ecosystem in the forest areas by long terms programs and educate them of accessing new income resources from the forest to achieve more effective conservation for the ecosystems and saving the biodiversity and establishing a sustainable development in the forest areas.
5. It is necessary for the government to extend the current forestry laws and establish more and modern laws to reduce the dangers on the forests by protecting those areas especially those containing a climax or semi-climax associations. These modern laws will focus on organizing tourism activities in the forest areas and making the way to establish eco-tourism actions to benefit the forest and both the tourist and local people.

11.Summary:

Landscape Ecological, Phytosociological and Geobotanical Study of Eu-Mediterranean in West of Syria

Presented by

Abdullah Ghazal

The Eu-Mediterranean vegetation in Syria is widespread over a large geographical area, occupying an altitudinal zone mainly from 300 to 900 m asl., but can be also found outside this range. The study area is located to the west of the longitude 37˚E, where this vegetation dominates.

A complete field surveying of the landscape for all regions in the study area was carried out. The environmental variables of the landscape (climate, soil, geology, land use, flora and vegetation) were analyzed in order to achieve landscape ecology grouping. The vegetation surveying was carried out according to the Braun-Blanquet method to classify the vegetation according to the phytosociological relationships through applying the ordination method of Factor Analyses of Correspondences (FAC).

Integrating plant sociology with other environmental factors enabled compiling a hierarchical framework for landscape classification and mapping from a higher to a lower level of abstraction. Land units were named with reference to indicative phytosociological alliances.

That mapping system uses the potential vegetation for studying areas from the national to the local scale of landscape. The legend of the map refers to the EUCORINE land cover project (2003).

The Eu-Mediterranean vegetation is organized in three types: Humid and Sub-humid; Semi-arid; and Arid. The second type can be further divided into two sub-types: cold and non-cold.

The following forest types can be recognized in the Eu-Mediterranean vegetation:

1. Evergreen oak forest: this is classified as Mediterranean maquis, and comprises the major part of the forest vegetation in Syria. The main element of this forest is *Quercus calliprinos*. This vegetation is classified into two main types: the inland vegetation type, and the humid and sub-humid vegetation type.
2. Semi-deciduous oak forest: it consists of *Quercus aegilops* vegetation and occurs in many sites in Syria.

3. Coniferous forest: dominated mainly by *Pinus brutia* as well as few small locations of natural forests of either *Pinus halepensis* or *Cupressus sempervirens*. The vegetation of *Pinus brutia* forests occupies a wide area especially in the western region. These forests are distinguished into three types: humid, sub-humid and semi-arid forests.
4. Non-forest Mediterranean vegetation.
5. Running water banks vegetation.
6. Steppe vegetation.

The results of the current study show that the inland *Quercus calliprinos* vegetation is organized in two different associations, Quercus calliprinos-Crataegus azarolus and Pruneto (tourtuosa)-Quercetum calliprini (ass. nov.) in Jabal Al-Arab and the Anti-Lebanon, respectively.

The *Quercus calliprinos* vegetation in the humid, sub-humid and non-cold semi-arid types is organized into four associations: Querco (infectoria)-Quercetum calliprini (ass. nov.), Styraco (officinalis)-Quercetum calliprini (ass. nov.), Querco (calliprinos)-Phillyreetum mediae and Pistacio (palaestina)-Quercetum calliprini. However, those relations were strong among the northern associations especially between the Pistacio (palaestina)-Quercetum calliprini and the Querco (infectoria)-Quercetum calliprini indicating that they are in different stages of the succession.

However, if the maquis were kept extensively protected from human activities and were allowed to grow spontaneously, the composition of the maquis will change from a stand with a rich mixture of species to an almost pure stand of *Quercus calliprinos*. The richness of climax species in the Querco (infectoria)-Quercetum calliprini, which are used as phytosociological indicators for a climax forest, emphasizes that this association is the climax in the East-Mediterranean region.

The *Pinus brutia* is one of the important species of the Syrian forests. Its forests belong to either of the two alliances: Ptosimopappo-Quercion (microphylla) and Gonocytiso-Pinion. The latter is more important in the study area; three new associations were identified to belong to it. These are: Pino (brutia)-Cistetum villosii, Pino (brutia)-Iridetum unguicularis and Pino (brutia)-Arbutetum andrachnii.

Overall, 79 land units belonging to 55 land facets were recognized in this study. The dominant parent rock in the study area is calcareous which spread widely by limestone, marl and dolomite. The green rocks appear only in one area, the Baer-Bassit, by a special type of vegetation that belongs to Ptosimopappo-Quercion.

The most important alliance in the study area is Quercion calliprini, which is presented by a maquis of *Quercus calliprinos* with sclerophyllous vegetation. However, Gonocytiso-Pinion represents the coniferous vegetation and spreads in different sizes of patches, but it has disappeared from of southern Coastal Mountains. Oleo-Ceratonion is exposed to a high level of disturbance leading it to exist only in small patches in the Thermo-Mediterranean.

The effect of human activities causes high level of disturbance in all units, leading to the disappearance of many forest types.

12. Zusammenfassung:

Die Eu-Mediterrane Vegetation Syriens umfasst ein großes Areal, in welchem sie sich von 300 bis 900 m über dem Meeresspiegel und darüber hinaus erstreckt. Das Gebiet wird von verschiedenen Waldgesellschaften geprägt, die sich durch eine hohe Biodiversität auszeichnen. Das Untersuchungsgebiet liegt innerhalb dieser Region, westlich des 37. Breitengrades. Hier wurde im Rahmen der Feldstudien die Landschaft der gesamten Region des westlichen Syrien bearbeitet. Erfasst und untersucht wurden Klima, Böden, Geologie, Landnutzung, Flora und Vegetation.
Ziel war es, eine landschaftsökologische Übersicht der Region zu erhalten. Zu diesem Zweck wurde die Vegetation nach der Methode von BRAUN-BLANQUET erfasst. Pflanzensoziologische Fragestellungen wurden mittels der "Ordination Method of Factor Analyses of Correspondences" (FAC) bearbeitet.
Mit Hilfe der "Ecosystem Classification of Integrating Plant Sociology" wurde unter Einbezug verschiedener Umweltfaktoren ein hierarchisches Grundgerüst zur Klassifizierung der Landschaft erstellt. Hierbei wurden unterschiedliche Aspekte der Landschaft, einzelne Landschaftseinheiten und Landschaftselemente berücksichtigt.
Die Benennung der einzelnen Einheiten erfolgte basierend auf den charakteristischen Gesellschaften, die das aktuelle Endstadium der Sukzessionsreihe innerhalb der Vegetation darstellen. Das Kartiersystem berücksichtigt die potentielle Vegetation des Untersuchungsgebietes von nationaler bis auf lokale Ebene. Die Legende der erstellten Karte basiert auf dem "EUCORIONE Land Cover Project" (2003).

Die den Westen Syriens dominierende Eu-Mediterrane Vegetation bildet den Schwerpunkt der vorliegenden Arbeit. Innerhalb dieser Eu-Mediterranen Vegetation wurden drei Typen unterschieden: die humid und sub-humide die semiaride und die aride.

Innerhalb der Eu-Mediterranen Vegetation können die folgenden Waldtypen unterschieden werden:

1. Immergrüner Eichenwald: er wird als mediterrane Maquis bezeichnet und stellt den größten Teil der Waldvegetation Syriens. Diese Wälder werden von *Quercus calliprinos* dominiert. Man unterscheidet zwei Ausprägungen: Einen Binnenland-Vegetationstyp und eine humid und sub-humide Vegetationstyp.
2. Halbimmergrüner Eichenwald: Dieser in Syrien weit verbreitete Waldtyp wird durch das Auftreten von *Quercus aegilops* charakterisiert.
3. Nadelwald: Diese Wälder werden von *Pinus brutia* dominiert, vereinzelt auch von natürlichen Waldresten aus *Pinus halepensis* oder *Cupressus sempervirens*. *Pinus brutia*-Wälder bedecken große Flächen im Westen Syriens.
   Auch innerhalb dieser Wälder werden verschiedene Ausprägungen unterschieden. Feuchte , Sub-humide und semi-aride Wälder.
4. Unbewaldete mediterrane Vegetation.
5. Ufervegetation.
6. Steppenvegetation.

Im Rahmen der vorliegenden Studie wurde gezeigt, dass die Quercus calliprinos-Binnenvegetation aus zwei verschiedenen Assoziationen besteht, der Quercus calliprinos-Crataegus azarolus Ges. und dem Pruno (tourtuoso)-Quercetum calliprini in Jabal Al Arab und dem Hochland des Anti-Libanon.

Innerhalb der *Quercus calliprinos*-Vegetation der humiden, sub-humiden und der wärmeren Ausprägungen der semi-ariden Eu-mediterranen Vegetation wurden vier Assoziationen unterschieden: Das Querco (infectoriae)-Quercetum calliprini, das Styraco (officinalis)-Quercetum calliprini, das Querco (calliprinos)-Phillyreetum mediae sowie das Pistacio (palestina)-Quercetum calliprini.

Unter der Voraussetzung, diese Maquis-Gesellschaften würden vor menschlichem Einfluss geschützt und blieben der spontanen Sukzession überlassen, würde sich die Zusammensetzung der Maquis von einer artenreichen Gesellschaft in einen von *Quercus calliprinos* dominierten Wald verändern. Der hohe Anteil von Klimaxarten innerhalb des Querco (infectoria)-Quercetum calliprinii, die ihrerseits als Indikatorarten der Klimax Waldvegetation angesehen werden, legt die Vermutung nahe, dass es sich hierbei tatsächlich um die Klimax-Vegetation der ost-mediterranen Region handelt.

Pinus brutia stellt eine der wichtigsten Waldbaumarten Syriens dar. Innerhalb der Wälder werden zwei Verbände unterschieden: Das Ptosimopappo-Quercion (microphyllae) und das Gonocytiso-Pinion. Innerhalb des Untersuchungsgebietes spielt vor allem das Gonocytiso-Pinion eine entscheidende Rolle. Innerhalb dieses Verbandes wurden drei neue Assoziationen beschrieben. Das Pino (brutia)-Cistetum villosii, das Pino (brutia)-iridetum unguicularis und das Pino (brutia)-Arbutetum andrachnii.

Insgesamt wurden im Rahmen der Studie 79 Landeinheiten innerhalb von 55 Landschaftstypen herausgearbeitet.
Das Grundgestein des Untersuchungsgebietes ist kalkhaltig, je nach Standort in Form von Kalkstein, Mergel oder Dolomit.
Serpentin (Grünstein) findet sich ausschließlich in einem Gebiet bei Baer-Bassit mit einem besonderen Vegetationstyp, der zum Verband des Ptosimopappo-Quercion gehört.
Wichtigster Verband des Untersuchungsgebietes ist das Quercion calliprini, welches in Form einer Maquis von *Quercus calliprinos* und anderen sklerophyllenArten auftritt.
Die von Nadelbäumen dominierte Vegetation wird durch das Gonocytiso-Pinion vertreten, welches unterschiedlich große Flächen bildet. Im Süden des Küstengebirges ist es nicht mehr anzutreffen. Der Verband des Oleo-Ceratonion sieht sich einem hohen Grad an Störung ausgesetzt. Demzufolge tritt er nur noch kleinflächig im Thermo-Mediterranen Bereich auf.

Die durch den menschlichen Einfluss verursachte Störung betrifft das gesamte Gebiet. Sie ist auch für den Rückgang der unterschiedlichen Waldtypen verantwortlich.

13. **الملخص:**

النظم البيئة الطبيعية والاجتماعية النباتية والجغرافيا النباتية، للطابق المتوسطي الحقيقي في غرب سورية.

إعداد: د./عبدالله غزال

ينتشر نبت الطابق المتوسطي الحقيقي بشكل واسع في سورية فهو يحتل نطاق ارتفاعي يمتد من 300-900م عن سطح البحر، وفي الحقيقة هو كثيراً ما يتجاوز هذه الحدود صعوداً وهبوطاً ليحتل مناطق أوسع. إن الطابق المتوسطي الحقيقي غني جداً بالأنواع النباتية والتي هي بدورها تميز العديد من النظم الغابوية.
لقد ركزت هذه الدراسة على الطابق المتوسطي الحقيقي بدء من شاطئ البحر وحتى خط طول °37، وقد تم تنفيذ مسح حقلي كامل لجميع مواقع الدراسة بما يشمل النصف الغربي من سورية حيث مما تطلب دراسة وتحليل جميع عناصر النظام البيئي (المناخ، التربة، جيولوجية، استعمالات الأراضي، الفلورا والغطاء النباتي) وكان ذلك وفق منهجية تؤدي إلى تصنيفها وفق مجموعات من النظم البيئية وفق مفاهيم بيئة اللاندسكيب Landscape ecology.
لقد تم اعتماد طريقة Braun-Blanquet لتصنيف دراسة وتحليل الأغطية النباتية بحسب انتمائها الاجتماعي النباتي ومن خلال انجاز تحليل إحصائي عاملي استخدمت فيه طريقة التحليل العاملي للمتطابقات Factor Analyses of Correspondences (FAC).
أما النظم البيئية فقد صنفت بالاعتماد على انتمائها الاجتماعية النباتية وعلاقتها بعناصر الوسط البيئي وفق إطار من الترابط المنهجي لإنتاج خرائط تصنيفية كاملة للنظم البيئية السائدة انطلاقاً من المقاييس الكبيرة إلى الأصغر فالأصغر. لقد تم تصنيف النظم البيئية إلى ما يسمى مظاهر أرضية Land facets و وحدات أرضية Land units وعناصر أرضية Land elements وتم تعريفها وتحديدها، وقد تم الاعتماد في تسمية الوحدة الأرضية Land unit وهي الأهم على مسمى التحالف كوحدة اجتماعية نباتية ذات دلالة بيئية وتمثل المرحلة التطورية النهائية لتتالي الحركية النباتية. لقد استعمل في إنتاج الخريطة الغطاء النباتي للنصف الغربي من سورية على مفهوم الغطاء النباتي الكامن انطلاقاً من المقياس الإقليمي إلى المحلي.
تم إعداد مفتاح تفصيلي للخريطة بالاعتماد على مشروع EUCORINE land cover project (2003) بهدف ربط الغطاء النباتي في سورية مع خريطة النبت الأوربي والممثلة لمنطقة شمال المتوسط.

لقد رصدت في منطقة الدراسة عدة نماذج من الأنظمة الغابية ضمن الطابق المتوسطي الحقيقي وهي:
1- غابة سنديانية جلدية الأوراق: والتي تسمى بالماكي وتكون الجزء الأهم من الغطاء النباتي في سورية ويعد السنديان العادي *Quercus calliprinos* العنصر الرئيسي فيها، وقد صنف هذا النبت في نطاقين اثنين الأول نبت المناطق الداخلية ويشاهد في الإقليم الجنوبي وإقليم أعالي الجبال، والثاني هو نبت المناطق الرطبة وشبه الرطبة والذي يشاهد في المناطق الوسطى والشمالية من سورية.
2- غابة سنديانية نصف متساقطة الأوراق: وتتكون أساساً من *Quercus aegilops* ويصادف في مناطق عديدة من سورية.
3- غابات مخروطيات الأوراق: يشكل الصنوبر البروتي *Pinus brutia* الشجرة المهيمنة على هذه الغابة مع بعض البقع الغابية الأخرى التي تضم نبت طبيعي يشارك فيه *Pinus halepensis* و *Cupressus semperverins*. وتحتل الغابة الصنوبرية نطاق واسع من سورية وخاصة في النصف الغربي من سورية وقد جرى تصنفها إلى ثلاث نماذج: الأول الغابة الرطبة التي توجد في منطقة الباير والبسيط وعلى السفوح الغربية لسلسلة الجبال الساحلية، والثاني هو الغابة شبه الرطبة والتي توجد على الهضاب شمال جسر الشغور

والعديد من المواقع في جبل الوسطاني وكذلك على السفوح الشرقية لسلسلة الجبال الساحلية، أما النموذج الأخير فهو الغابة نصف الجافة والمنتشرة في جبال الأكراد.
4- النبت المتوسطي غير الغابي.
5- النبت الضفي المساير للمجاري المائية.
6- النبت السهبي.

لقد أظهرت نتائج التحليل الاجتماعي النباتي لهذه الدراسة أن نبت المناطق الداخلية والذي يسود فيه ماكي السنديان العادي *Quercus calliprinos* يمكن أن يصنف إلى مجتمعين اثنين هما *Quercus calliprinos-Crataegus azarulus* والمسجل في جبل العرب ومجتمع Pruneto (tourtuosa)-Quercetum calliprini (ass.nov.) والذي تم تسجيله في هذه الدراسة في سلسلة لبنان الشرقية.

أما الغطاء النباتي للسنديان العادي *Quercus calliprinos* في المناطق الرطبة وشبه الرطبة والمعتدلة (غير الباردة) وكذلك نصف الجافة، فقد أظهرت النتائج أمكانية تصنيفها إلى أربع مجتمعات نباتية توافق كلاً من هذه المناطق وهي:
Querco (infectoria)-Quercetum calliprini (ass.nov.), Styraco (officinalis)-Quercetum calliprini (ass.nov.), Querco (calliprinos)-Phillyreetum mediae, Pistacio (palaestina)-Quercetum calliprini
لقد كانت هناك علاقة قوية نسبياً بين مجتمعي Pistacio (palaestina)-Quercetum calliprini و Querco (infectoria)-Quercetum calliprini مما يشير إلى إمكانية اعتبارهما مرحلتين تطورتين للنبت الغابي هناك. أن مبدأ حماية ماكي السنديان من التعديات الإنسانية والممثل بالمجتمع الأول سوف تؤدي إلى وتحوله إلى حالة يسود فيه وبشكل نقي *Quercus calliprinos* والممثل بالمجتمع الثاني والذي يصبح أكثر غنى بالأنواع الأوجية و يمكن اعتباره نموذجاً حقيقياً للمجتمع الدال على حالة الأوج الغابي للنبت المتوسطي الحقيقي في شرق المتوسط.

أما غابات الصنوبر البروتي *Pinus brutia* واحد والتي تعد من أهم النظم الغابية في سورية، ومن وجهة نظر اجتماعية نباتية فإن غاباته تتبع أحد التحالفين:-Ptosimopappo (microphylla)Quercion و Gonocytiso-Pinion ويشكل التحالف الأخير الوحدة الاجتماعية النباتية الأكثر أهمية في منطقة الدراسة حيث سجلت فيه ثلاث أنواع جديدة هي:
Pino (brutia)-Cistetum villosii (ass.nov.), Pino (brutia)-Iridetum unguicularis (ass.nov.), Pino (brutia)-Arbutetum andrachnii (ass.nov.).

لقد أظهرت الخريطة النباتية للنبت الكامن في النصف الغربي من سورية وجود 79 وحدة بيئة تتبع 55 مظهر بيئي، وقد كانت الصخرة الأم الأكثر سيادة فيها فهي الصخور الكلسية وخاصة الصخر الكلسي القاسي والمارني والدولوميتي. ويغطي الصخور الخضراء والتي تظهر في منطقة الباير والبسيط نبت التحالف Ptosimopappo-Quercion .
أما من وجهة النظر الأجتماعية النباتية فإن التحالف الأكثر أهمية كان Quercion calliprini والذي يتكون أساساً من ماكي من *Quercus calliprinos* مع نبت من جلديات الأوراق المستديمة، في حين أن التحالف Gonocytiso-Pinion يمثل نبت مخروطيات الأوراق والذي ينتشر بشكل بقع مختلفة الأحجام في المناطق الشمالية والشمالية الغربية ويختفي تماماً اعتباراً من السفوح الجنوبية لسلسلة الجبال الساحلية. أما تحالف Oleo-Ceratonion الذي تعرض لمستويات عالية من الاضطراب والتدهور فقد تحول إلى بقع صغيرة ومحدودة ضمن حدود الطابق النباتي المتوسطي الحراري.

لقد أظهرت الخريطة النباتية أن الوحدات البيئة في الأجزاء الشمالية والوسطى من منطقة الدراسة تعد المناطق الأكثر صغراً وتعقيداً مما سواها، وهذا إنما يعود إلى شدة تأثيرها

المباشر بالأنشطة الإنسانية الذي أحدث هذا المستوى من الاضطراب وأدى إلى اختفاء العديد من النظم الغابية في سورية.

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Appendix (1): Flora of the study area.

Abbreviations for appendix (1):

Life form		Life cycle	
Ch.	Chamaephytes	T.	Tree
H.	Hemicryptophytes	S.	Shrubs
Th.	Therophytes	P.	Perennial
Ph.	Phanerophytes	A.	Annual
N.	Nanophanerophytes	Rh.	Rhizome
G.	Geophytes	Bul.	Bulb
E.	Epiphytes	Tu.	Tuber
		Co.	Corm
		Ss.	Small Srubs

Dyn: Dynamic Category		Phytog: Phytogeographical region	
Increasing	I	Med.	Mediterranean
Decreasing	W	E-Med.	East-Mediterranean
Stabilized	S	IT.	Irano-Turanian
Rare	R	ES.	Euro-Siberian
Endangered	D	Com.	Cosmopolite
Common	C	Scos.	Semi-Cosmopolite
Endemic	E	Sh-Ar.	Saharo-Arabian

Phytos: Phytosiciology units

Q.C.l.	Querco-Cedretalia libani	O.Q.p.	Ostryo-Quercion pseudocerris
Q.pub.	Quercetea(etalia) pubescentis	Pto.Q.	Ptosimopappo-Quercion microphyllae
QI	Quercetea(etalia) ilicis	G.P.	Gonocytiso-Pinion
C.M	Cisto-Micromerietea	O.C	Oleo-Ceratonion
Q.F.	Querco-Fagetea	Q.inf	Quercion infectoriae
A.B.	Astragalo-Brometea	Q.ca.	Quercion calliprini

No.	Scientific name	Life cycle	Life form	Phytog	Distribution in Syria	Phyto.	Dyn
1	***Equisetaceae***						
1	*Equisetum palustre* L.	P	H		Harem		R
2	*Equisetum ramosissimum* Desf. *Equisetum ramosum* Schleich.	P	H	Scos	Ras Al-Bassit, Wadi Qandil, Ghab.		R
3	*Equisetum telmateja* Ehr. *Equisetum maximum* Lam.	P	H	Med	Al-Kabeir river, N-E-Lattakia , Hzerin, Qasatel, Sa'ad Ass'oud,Doureen, Shokaran.	Q.pub. (O.Q.p.)	R
2	***Polypodiaceae***						
4	*Adiantum capillus-veneris* L.	P	H		E-Aleppo, Karatchok, TalAbiad, Damascus, Jabal Al-Beshri, Azaz, Rakhleh, Mashta Al-Holw.	Q.C.l.	WC
5	*Asplenium adiantum-nigrum* L.	P	H	Med	Kasab, Qara-Douran,Akrad Mountain , Hzerin.	O.Q.p.	W
6	*Asplenium ceterach* L. *Ceterach officinarum* Willd.	P	H	ES/Med / IT	Slenfah, Harem, Jabal Samaan, Jabal Abo Ata, Jabal Qassion, Sweida, Akrad Mountain, Jabal Al-Zawiah.		ḌW
7	*Asplenium scolopendrium* L. *Phyllitis scolopendrium* L. *Scolopendrium vulgare* Sm.	Rh	G		Hzerin.		R
8	*Asplenium trichomanes* L.	P	H	COS	Slenfah, Rowaedif, Tal Qulaib, Hzerin.	Q.C.l.	ḌW
9	*Cheilanthes pteridioides* (Reich.) Christ. *Cheilanthes fragrans* (L.) Webb et Berth. *Polypodium pteridioides* Reich.	P	H	(ES) Med	Jabal Samaan ,Tal Aqebrin, Jabal Qassion ,Jabal Abo Ata ,Adra ,Qaryatin ,Ghab ,Jabal Barisha.		ẈḌ
10	*Dryopteris libanotica* Rosenstock *Aspidium libanoticum* Bull. *Dryopteris rigida* var. *libanotica* (Rosenstock) Dinsm.	Rh	G	E Med	Qal'aat Al-Hosn ,Slenfah, Jubet Barghal , Frenloq, Kbarah.	Q.C.l	R
11	*Polypodium vulgare* L.	Rh	G		Ras Al-Bassit, Kezil Dagh ,Hzerin.		D
12	*Polystichum setiferum* (Froskål) *Dryopteris aculeata* (L.)O.Kuntze. *Polypodium aculeatum* L. *Polystichum aculeatum* (L.)Roth.	Rh	G		Barshin.		R
13	*Pteridium aquilinum* (L.)Kuhn. *Pteris aquilina* L.	P	H	Cos	Slenfah, Ras Al-Bassit, Barshin, Hzerin, Qadmous ,Al-Btar .	Q.pub.	I
14	*Pteris vittata* L. *Pteris longifolia* L.	P	H		Mashta Al-Holw, Badrosieh, Hzerin ,Sanobar Jableh.		R
3	***Selaginellaceae***						
15	*Selaginella denticulata* (L.) *Lycopodium denticulatum* L.	P	H	Med	Shatha, Qal'aat Salahdeen.	G.P.	R
4	***Cupressaceae***						
16	*Cupressus sempervirens* L.	T	Ph	Med	Messiaf , Kasab, Deir Osman,Ain Al-Korom , Healeen, Ashiq Omar, AZ-Zeineh	Q.I.	R
17	*Juniperus oxycedrus* L. *Juniperus rufescens* link.	S	Ch	Med	Qadmous, Nabi Yunus, Kasab, Cassius, Kotchok Darmik, Barshin, Qasatel, Balloran , Akrad Mountain.	Q.pub.	C
18	*Juniperus excelsa* M.B. *Juniperus macropoda* Boiss.	S	N	Med/ IT	Anti Lebanon, Tal'at Mousa,Jabal Halimeh,Zabadani,Jabal Abo Al-Hada ,Haramoun.	Q.pub.	ÇW
5	***Ephedraceae***						
19	*Ephedra campylopoda* C.A.Meyer	P	H	E Med	Tartous ,Lattakia ,Harem ,Sarmada,Coastal mountain ,Daret azzeh.	Q.ca.	C
20	*Ephedra aphylla* Froskål *Ephedra alte* C.A.Meyer	P	H		Dummar , Adra , Jabal Dmair , Palmyra , AboKamal ,Deir-ez Zour – Hasakeh		R
21	*Ephedra alata* Decaisne.	P	H		Khan Dimas , Jabal Qassion , Yabroud , Maarabah , Palmyra, AboKamal , Jaba , Jabal Abiad ,TalAteed , Jabal AboKoush , Qaryatin ,		R

No.	Scientific name	Life cycle	Life form	Phytog	Distribution in Syria	Phyto.	Dyn
					Snou Fadeel , Kaser Al-Heer , Jabal Abeed		
6	***Pinaceae***						
22	*Pinus brutia* Ten. *Pinus halepensis* subsp. *brutia* (Ten.)	T	Ph	E Med	Coastal mountain, Bayer & Basset, Akrad Mountain , Akoum	G.P	W
23	*Pinus halepensis* Mill.		Ph	Med	Qadmous-Messiaf.	Q.I.	R
7	***Typhaceae***						
24	*Typha latifolia* L.	Rh	G		Wadi Barada ,Midanki ,Ghab .Deir Osman.		
8	***Potamogetonaceae***						
25	*Potamogeton nodosus* Poir. *Potamogeton fluitans* Roth.	P	H	Scos	Damascus ,Kesoah ,Ataibeh ,Lattakia ,Aleppo , Qamishli.		C
26	*Potamogeton crispus* L.	P	H	Scos	Ghotah , Ain Al-Hroush , Rabweh , Damascus , Qanawat,Homs.		
27	*Potamogeton panormitanus* Biv.	P	H	Scos	Wadi Arad ,Ain Sefsaf.		
9	***Alismataceae***						
28	*Alisma lanceolatum* With.	P	H		Tartous , As-Sin River , Lattakia , Bhamrah , Ain Hroush , Naqqabiah , Homs , Qunaytra , Qanawat, TalDwair , TalKotchak		R
10	***Butomaceae***						
29	*Butomus umbellatus* L.	Rh	G	Med IT	Wadi Al-Qaren, Homs , Damascus , Rabweh , Nashabieh, Kfareen , Krees, Wadi Al-Oyoun , Izra'a, Nmarah		R
11	***Graminaceae* (*Poaceae*)**						
30	*Panicum repens* L.	P	H		The Coast Banias		
31	*Pennisetum divisum* (C.C.Gmel.) Henrard *Panicum divisum* Gmel.	P	H		Cassius ,Wadi Qandil ,Ain Al-Haramieh, Qastal Maaf, Akrad Mountain ,Frenloq.		
32	*Sorghum halepense* (L.) Pers. *Holcus halepensis* L.	P	H		Ain Helakim, Ain Al-Haramieh, Idlib , Anser , Afreen, Damascus , Ras El-Ain , Derbassieh		
33	*Andropogon distachyus* L. *Pollinia distachya* (L.) Spreng.	P	H		Safita, Tartous, Hafeh, Wadi Qandil		
34	*Hyparrhenia hirta* (L.) Stapf. *Andropogon hirtus* L.	P	H	Med	Tartous, Banias, Safita, Hafeh, Bhamrah, Jabal Abo Ata, Balloran, Hzerin, Salma.	C.M	C
35	*Phalaris minor* Retz.	P	Th		Jabal Qassion , Jabal AboAta , Dmeir, Jabal AboKoush , Qaryatin , Palmyra, Aleppo , Sanamin, Dara'a		
36	*Anthoxanthum odoratum* L.	P	H		Frenloq, Kezil Dagh.		
37	*Aristida caerulescens* Desf.				Banias, Lattakia ,Ras Al-Bassit, Hemmah.		
38	*Aristida plumosa* L.	P	H		Palmyra, Rawdah , Malkiah.		C
39	*Stipa capensis* Thunb. *Stipa tortilis* Desf. *Stipa retorta* Cav.	A	Th		Safita, Aleppo, Dmeir, Kesoah ,Jabal Qassion , Raqqah ,Qaryatin ,Palmyra.		C
40	*Stipa parviflora* Desf.	P	H	Med	Jabal Qassion ,Dummar ,Kesoah, Hemmah, Maalola, Qaryatin ,Palmyra.		
41	*Stipa bromoides* (L.) Dorfl. *Agrostis bromoidis* L. *Stipa aristella* L.	P	H		Ain Helakim, Safita, Cassius ,Kezil Dagh ,Hama.		
42	*Stipa fontanesii* Parl.	P	H	Med	Tal'at Mousa, Jabal Halimeh , Ain Al-Tal , Aleppo , Homs , Kesoah ,Deir Attieh, Sanamin, Jabal Al-Balas, Jabal Al-Beshri, Deir-ez Zour		
43	*Stipa barbata* Desf.	P	H	Med	Jabal Halimeh , Yabroud , Wadi Al-Qaren, Wadi Barada , Misalwn, Damascus , Jabal Qassion , Qunaytra , Tal Qulaib, Shahba, Ras El-Ain , Jabal Abdullaziz, Qaryatin		C
44	*Oryzopsis miliacea* (L.) Asch. Et Schw. *Agrostis miliacea* L. *Piptatherum miliaceum* (L.) Coss.	P	H	Med	Messiaf, Al-Kabeir river ,Bhamrah, Slenfah, Qara Douran, Ras Al-Bassit, Balloran, Hzerin, Salhiyeh.	O.C.	I

No.	Scientific name	Life cycle	Life form	Phytog	Distribution in Syria	Phyto.	Dyn
45	*Oryzopsis caerulescens* (Desf.) Richt. *Milium caerulescens* Desf. *Piptatherum caerulescens* (Desf.) P.B.	P	H	Med	Bhamrah , Ain Helakim, Wadi Qandil , Kezil Dagh , Lattakia, Jiser Al-Shoghour	Q.I.	
46	*Phleum arenarium* L.	A	Th		Slenfah		
47	*Milium montianum* Parl. *Milium vernale* var. *montianum* (Parl.) Coss.	A	Th	Med	Ain Al-Haramieh, Nabi Yunus	Q.C.l	I
48	*Polypogon monspeliensis* (L.) Desf. *Alopecurus monspeliensis* L.	A	Th		Aleppo ,Homs, Raqqah, Damascus , Shahba, Sweida , Qaryatin , Palmyra, Deir-ez Zour		I
49	*Cynodon dactylon* (L.)Pers *Panicum dactylon* L.	P	H	Scos	Tartous , Dmeir, Wadi Arad , Yabroud , Shahba, Jabal Al-Beshri,		I
50	*Phragmites australis* (Cav.) Trin.ex steud. *Arundo phragmites* L.	P	H	Cos	Homs, Jiser Al-Shoghour, Rabweh , Damascus , Ghotah , Palmyra		C
51	*Avena clauda* Dur.	A	Th		Jabal Qassion , Khabour river , Raqqah, Deir-ez Zour , Aleppo , Jabal Abiad		
52	*Avena pilosa* M.B.	A	Th		Jabal Qassion ,Raqqah , Deir-ez Zour , Aleppo , Jabal Abiad		
53	*Avena alba* Vahl *Avena barbata* Potter	A	Th		Aleppo, Kaser El-Banat, Doma.		
54	*Avena sterilis* L.	A	Th		Afreen, Homs, Hama, Aleppo, Bloudan, Ghotah, Jabal Qassion, Damascus, Masada ,Sweida, Banias.		
55	*Koeleria phleoides* (Vill.) Pers. *Festuca phleoides* Vill. *Lophochloa phleoides* (Vill.) Pers	A	Th		Abrash river, Maalola , Damascus , Dummar , Hama, Jabal Samaan , Aleppo , Khatonieh , Jabal Abdullaziz, Masada , Qunaytra , Sweida , Shahba, Tal Shehan , Palmyra, Kaser Al-Heer , Jabal Abiad , Maskanih , Jabal Al-Beshri, Abo Shamat		C I
56	*Aira elegans* Willd. *Aira capillaris* Host	A	Th	Med	Homs, Kafer		
57	*Schismus arabicus* Nees *Schismus barbatus* subsp.*arabicus* (Nees) Maire & Weiller	A	Th		Aleppo ,Jabal Qassion ,Damascus ,Qunaytra , Sweida ,Palmyra, Qaryatin ,Jabal Al-Beshri.		C
58	*Melica angustifolia* Boiss.& Blanche. *Melica minuta* L.,var. *eligulata* (Boiss.) Bnm.	P	H	E Med	Bhamrah, Jubet Barghal, Slenfah, Wadi Qandil, Ain Al-Haramieh, Cassius, Qara Douran, Hzerin .		C
59	*Melica uniflora* Retz.	P	H	E Med	Frenloq.	Q.pub	
60	*Melica ciliata* var. *laxiflora* (Boiss.& Blanche.) Papp. *Melica cretica* Boiss. & Heldr. *Melica ciliata* subsp. *nebrodensis* (Parl.) Husnot var. *villigera* Bornm.	P	H		Wadi Al-Qaren ,Bloudan, Yabroud, Tal'at Mousa, Masada, Jabal Matta, Ain Al-Khadra, Hemmah.		
61	*Sphenopus divaricatus* (Gouan) Reichb. *Poa divaricata* Gouan.	A	Th		Shahba, Qaryatin ,Palmyra.		
62	*Cutandia memphitica* (Spreng.) Benth. *Dactylon memphiticum* Spreng. *Scleropoa memphitica* (Spreng.) Parl.	A	Th		Palmyra, Tal Daba		
63	*Cutandia dichotoma* (Forsk.) Trabut. *Scleropoa dichotoma* Parl. *Festuca dichotoma* Forsk. *Scleropoa memphitica* var. *dichotoma* Bonn.&Barr.	A	Th		Qaryatin ,Palmyra, Tal Daba, Jabal Al-Beshri.		
64	*Cynosurus echinatus* L.	A	Th	Med	Tartous, Bhamrah, Messiaf, Slenfah, Lattakia, Qara Douran.		I

No.	Scientific name	Life cycle	Life form	Phytog	Distribution in Syria	Phyto.	Dyn
65	*Dactylis glomerata* L.	P	H		Bhamrah, Messiaf , Kezil Dagh, Qatma, Ain Al-Khadra, Masada, Salkhad, Kafer, Jabal Al-Hass, Qara Douran, Beyt Jen.		IC
66	*Aeluropus littoralis* (Gouan) Parl. *Poa littoralis* Gouan.	P	H		Abrash river, Khatonieh ,Dummar ,Damascus , Qaryatin ,Palmyra ,Khabour river, Adra.		I
67	*Poa bulbosa* L.	P	H		Damascus , Homs, Tal Kalakh, Dara'a , Sweida		IC
68	*Poa sinaica* Steud.	P	H		Adra ,Jabal Qassion, Nabik, Qaryatin, Jabal Abiad ,Palmyra, Dmeir, Abo Kamal.		C
69	*Briza maxima* L.	A	Th	Med	Tartous, Safita, Bhamrah, Sweida Masada, Jabal Samaan, Homs, Hama, Ghab.		W
70	*Briza minor* L.	A	Th		Lattakia ,Homs, Karatchok.		
71	*Briza spicata* Sibth. & Smith. Br. *Briza humilis* M.B.	A	Th		Zabadani, Wadi Al-Qaren, Wadi Barada , Kotchok Darmik.		
72	*Catapodium rigidum* (L.) C. Hubb. *Festuca rigida* L. *Scleropoa rigida* (L.) Griseb.	A	Th		Cassius, Hama, Maaret Al-Noaman, Khan Sheikhon, Tiger Wadi al-Qaren, Damascus, Jabal Qassion Sweida, Qanawat, Kafer ,Qara Douran, Mashta Al-Holw.		I
73	*Bromus syriacus* Boiss. & Blanche *Bromus erectus* Huds. var. *syriacus* (Boiss. & Blanche.)	P	H	E Med	Banias Masada ,		
74	*Bromus tectorum* L.	A	Th		Tartous, Aleppo , Hama, Kurd dagh , Jabal Abdullaziz, Yabroud , Jabal Qassion , Kesoah , Masada , Sanamin, Sweida , Qanawat, Maskanih , Rosafa , Palmyra, Jabal Abiad , Tal Daba.		
75	*Bromus sterilis* L.	A	Th		Wadi Al-Qaren, Masada, Ghotah, Homs, Midan Akbas, Rajo.		
76	*Bromus madritensis* L.	A	Th		Lattakia , Aleppo , Damas , Doma , Masada , Tal Qulaib , Kafer.		
77	*Bromus rubens* L.	A	Th		Aleppo ,Jabal Qassion, Damascus, Masada ,Ain Al-Beda, Abo Shamat, Qaryatin.		
78	*Bromus alopecuros* Poiret. *Bromus contortus* Desf. *Bromus alopecuroides* Poiret.				Wadi Al-Qaren, Kafer, Qanawat		
79	*Brachypodium sylvaticum* (Huds.)P.deB. *Festuca sylvatica* Huds.	P	H		Anti Lebanon, Zabadani, Wadi Barada, Hemmah, Arneh, Nabik.	Q.pub	
80	*Trachynia distachya* (L). Link *Brachypodium distachyum* (L).Beauverd	A	Th		Tartous, Ras Al-Bassit, Ain Al-Haramieh, Qamishli, Deir-ez Zour,Maalola, Jabal Qassion , Sweida , Qaryatin , Palmyra.		
81	*Brachypodium pinnatum* (L.) P.de B. *Bromus pinnatus* L.	P	H	Es	Ain Helakim, Kezil Dagh, Wadi Qandil, Ain Al-Haramieh, Qara Douran, Qadmous, Ain Dewar.	Q.pub.	IC
82	*Lolium rigidum* Gaud.	A	Th		Wadi Maalola, Wadi al-Qaren, Slenfah, Hafeh, Qatana ,Masada , Dmeir, Wadi Arad, Barada, Snou Fadeel Abo Shamat , Qanawat,		C
83	*Lolium multiflorum* Lam. *Lolium gaudini* Parl.	A	Th		Abrash river, Aleppo, Homs, Doma , Kesoah , Sanamin, Ain Sefsaf.		
84	*Agropyron repens* (L.) P. de B. *Triticum repens* L. *Elytrigia repens* (L.) Desv.	P	H		Damascus,Doma, Yabroud.		
85	*Agropyron libanoticum* Hack. *Elytrigia libanotica* (Hack.) Meld.	P	H		Bloudan, Wadi Al-Qaren, Jabal Halimeh, Yabroud, Deir Attieh.		E
86	*Eremopyrum buonapartis* (Spreng.) Nevski *Triticum buonapartis* Spreng. *Triticum squarrosum* Roth. *Agropyrum buonapartis* (Spreng.) Durd.& Schinz *Agropyrum squarrosum* (Roth.) Link	A	Th	IT	Aleppo,Raqqah,Ras El-Ain, TalKotchak, Seydnaya, Adra, TalHadeed ,Raqqah, TalAbiad, Deir Attieh, Dummar, Jabal Abiad, Snou Fadeel, Qaryatin, Dummar, Deir-ez Zour, Maskanih , Dmeir, Homs		
87	*Triticum dicoccoides* (Körnicke.) Aar. *Triticum vulgare* var. *dicoccoides* Körnicke.	A	Th	E Med	Arneh, Zabadani, Euphrates.		C

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88	*Aegilops ovata* L.	A	Th	Med	Wadi Al-Qaren, Bloudan, Maalola , Qassion , Dmeir, Homs, Aleppo , Karatchok Dagh, Ain Sefsaf , Masada , Sweida , Qtaifeh ,Qaryatin.		C
89	*Hordeum spontaneum* C. Koch. *Hordeum ithaburense* Boiss.	A	Th		Jdaidet Yabous,Wadi al-Qaren, Qal'aat Jandal, Homs, Hama, Ras El-Ain , Jabal Abdullaziz, Sweida , Izra'a, Aleppo , Qal'aat Salahdeen, Jabal Qassion , Maalola , Maskanih , Qaryatin , Palmyra, Dmeir, Khnaseir , Jabal Abiad.		C
90	*Hordeum bulbosum* L. *Hordeum nodosum* Ucria.	P	H	Med	Bloudan, Jabal Samaan, Homs, Hama, Jabal Qassion , Kesoah, Tal Qulaib , Sweida , Ras El-Ain , Qamishli ,Derick , Jubet Barghal , Slenfah.		C
12	***Cyperaceae***						
91	*Cyperus longus* L.	Rh	G	Med: IT	Abrash river, Banias , Lattakia ,Jiser Al-Shoghour, Aleppo , Afreen, Jabal Samaan , Homs, Derick , Tiger, Ghotah , Dummar , Rabweh , Tal Qulaib.		
92	*Cyperus rotundus* L.	P	H	Cos	Afreen, Ras El-Ain, Damascus, Deir-ez Zour, Hemmah, Mayadeen.		I
93	*Scirpus holoschoenus* L. *Holoschoenus vulgaris* Link.	P	H		Ain Helakim, Frenloq, Homs, Karatchok, Ain Sefsaf ,Qaryatin, Sweida Al-Abyed river, Sa'ad Ass'oud.		C
94	*Schoenus nigricans* L.		H	Cos	Khatonieh, Qadmous .		C
95	*Carex phyllostachys* C.A.Mey.	Ph	G		Slenfah, Jubet Barghal	Q.C.l.	
96	*Carex halleriana* Asso *Carex gynobasis* Vill.	Ph	G				
97	*Carex distans* L.	P	H		Lattakia , Messiaf , Ain Helakim, Kasab, Ain Al-Haramieh, Kezil Dagh , Kesoah , Homs, Maalola , Qaryatin		
98	*Carex flacca* Schreb. *Carex gluca* Scop. *Carex diversicolor* Auct.	P	H	Med	Safita, Qadmous, Ain Helakim, Slenfah, Ain Al-Haramieh, Al-Kabeir river, Frenloq, Ras Al-Bassit, Kasab, Wadi Barada, Qara-Douran .	C.M.	IC
99	*Carex pendula* Huds. *Carex maxima* Scop .	P	H	Es	Ain Helakim, Frenloq, Hzerin.		C
13	***Araceae***						
100	*Arum dioscoridis* Sibth. et Sm.	Tu	G	E Med	Frenloq, Ghab, Qara Douran.	Q.C.l.	C
101	*Arum hygrophilum* Boiss.	Tu	G	Med	Damascus , Ghotah , Hemmah ,		
102	*Arum elongatum* Stev. *Arum rupicola* Boiss. (Diagn.) *Arum orientale* M. , subsp. *elongatum* (Stev.) Engler *Arum hygrophilum* Boiss. Var. *rupicola* Boiss.	Tu	G	Med IT	Zabadani, Wadi Al-Qaren, Jabal Abo-Ataa ,		
14	***Lemnaceae***						
103	*Lemna minor* L	P	H	Cos	Wadi Barada ,Jiser Al-Shoghour, Homs, Qanawat, Wadi Al-Oyoun , Qunaytra		C
15	***Juncaceae***						
104	*Luzula forsteri* (Sm.) D.C. *Juncus forsteri* Sm .	P	H	Es	Slenfah, Ain Al-Haramieh, Kezil Dagh, Kasab, Barshin.	Q.pub.	S
105	*Juncus inflexus* L. *Juncus glaucus* Ehrh.	P	H		Bhamrah, Jabal Samaan, Homs, Derick, Damascus, Dummar, Qanawat, Hzerin, Sa'ad Ass'oud .		I
106	*Juncus effusus* L.	P	H	Cos	Damascus.	C.M.	S
107	*Juncus acutus* L.	P	H		Damascus , Ain Al-Haramieh, Rastan , Qaryatin		
108	*Juncus maritimus* Lam.	P	H	Scos	Lattakia , Adra , Khatonieh , Palmyra		C
16	***Liliaceae***						
109	*Colchicum haussknechtii* Boiss.	Bul	G	E Med	Jiser Al-Shoghour , Aleppo , Lattakia		
110	*Colchicum byzantinum* Park.	Bul	G	E Med	Sarmada, Frenloq, Kasab, Barshin.	C.M.	W
111	*Colchicum fasciculare* (L.) Boiss. *Hypoxis fascicularis* L. *Colchicum halepense* Freyn	Bul	G	E Med	Aleppo , Hama , Homs, Zeidal , Dara'a Bousra, Zeidal		

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112	*Asphodelus microcarpus* Salzman et Viv.	Rh	G	Med	Aleppo, Tal Qulaib, Maysaloun, Coastal mountain, Bayer, Cassius, Jabal Al-Hass, Shahba, Akrad Mountain, Jabal Barakat, Messiaf.	C.M.	CW
113	*Asphodeline lutea* (L.) Rchb. *Asphodelus luteus* L.	Bul	G	Med IT	, Homs, Hama, Kafer , Tal Qulaib, Kasab, Ain Al-Haramieh	C.M	C
114	*Asphodeline taurica* (Pall.) Kunth. *Asphodelus tauricus* Pall.	A	Th		Tal'at Mousa.		
115	*Asphodeline globifera* J.Gay	Bul	G	E Med	Cassius, Ras Al-Bassit, Ain Al-Haramieh, Kezil Dagh, Kasab, Qastal Maaf.		R
116	*Gagea arvensis* (Pers.) Dumort. *Ornithogalum arvense* Pers.	P	H		Bloudan, Aleppo		
117	*Tulipa aleppensis* Regel. *Tulipa oculus-solis* var. *aleppica* Baker.	Bul	G		Ain Al-Tal, Salamieh		E
118	*Tulipa praecox* Ten.	Bul	G		Qadmous ,Slenfah, Nabi Yunus ,Aleppo ,Maaret Al-Noaman ,Kasab.		R
119	*Tulipa montana* Lindley . *Tulipa systola* Stapf .	Bul	G	E Med IT	Bloudan, Dara'a , Jabal Abdullaziz, Palmyra , Jabal Al-Beshri		R
120	*Fritillaria elwesii* Boiss.	Bul	G	E Med	Slenfah, Ain Al-Haramieh, Qara Douran, Qadmous.	Q.C.l.	E
121	*Fritillaria pinardi* Boiss.	Bul	G	IT	Slenfah ,Jiser Al-Shoghour.		W
122	*Fritillaria libanotica* (Boiss) Boker. *Theresia libanotica* (Boiss.)	Bul	G	E Med	Kasab, Sanamin, Banias , Jabal Al-Zawiah .	C.M	R
123	*Ornithogalum narbonense* L.O	Bul	G	Med	Bhamrah, Safita, Qadmous, Shatha, Slenfah, Banias, Aleppo, Qal'aat Al-Madiq, Bab Al-Hawa, Damascus, Kisoah, Sweida ,Jabal Samaan.	Q.pub.	C
124	*Ornithogalum neurostegium* Boiss et B1 *Ornithogalum ulophyllum* Hand. – Mazz. *Ornithogalum fimbriatum* Willd. var. *atrichocaulon* Gb.	Bul	G	E Med	Slenfah, Jabal Al-Qalamon, Homs, Midan Akbas, Rajo, Kesoah , Adra , Dmeir, Jabal Abdullaziz, Jabal Al-Beshri, Qaryatin		
125	*Hyacinthus orientalis* L.	Bul	G	Med	Lattakia, Kasab, Kezil Dagh.		R
126	*Muscari comosum* (L.) Mill. *Hyacinthus comosus* L.	Bul	G	Med	Kasab, Ain Al-Haramieh, Akrad Mountain, Sweida, Qanawat, Shahba, Aleppo, Ariha, Karatchok, Yabroud		C
127	*Muscari longipes* Boiss. *Muscari albicaule* Post *Muscari deserticolum* Rech.	Bul	G	IT	Jabal Abdulaziz, Aleppo, Maaret Al-Noaman, Ras El-Ain, Khatonieh, Dummar, Tal Qulaib, Shahba, Dmeir, Palmyra, Maskanih, Mayadeen, Deir-ez Zour.		CW
128	*Muscari parviflorum* Desf.	Bul	G	Med	Lattakia, Qara-Douran.		
129	*Allium ampeloprasum* L.	Bul	G	Med IT	Lattakia, Damascus, Doma, Seydnaya, Arneh.		W
130	*Allium emarginatum* Rech.	Bul	G	IT	Kezil Dagh, Yabroud, Dmeir.		E
131	*Allium bassitense* Thieb.	Bul	G	E Med	Ras Al-Bassit, Ain Al-Haramieh, Qara-Douran.		C
132	*Allium trifoliatum* Cyr. *Allium sub hirsutum* L. var. *graecum* (Dum. d'Urv.) Regel	Bul	G	Med	Safita, Tartous, Messiaf, Qadmous, Homs,.Ain Al-Khadra ,Kafer, Sweida, Qanawat.	Q.inf	
133	*Allium nigrum* L.	Bul	G	Med	Slenfah, Kasab, Wadi Barada, Jiser Al-Shoghour, Aleppo, Damascus.		W
134	*Asparagus acutifolius* L.	Rh	G	Med	Bdama, Messiaf , Harem, Jabal Samaan, Qara Douran, Om Al-Toyour, Qasatel,.Akrad Mountain, Jabal Barakat, Wastani mountain, Coastal mountain, Messiaf.	Q.ca.	C
135	*Asparagus aphyllus*	Rh	G	Med	Banias , Hemmah.		
136	*Ruscus aculeatus* L.	Rh	G	Med	Messiaf, Qadmous, Jabal Samaan, Barshin, Qara Douran, Om Al-Toyour, Shatha, Al-Kabeir river.	Q.pub.	C
137	*Danaë racemosa* (L.) Moench. *Ruscus racemosus* L.	Rh	G	Es	Slenfah, Hzerin, Wadi Shikhan.	O.Q.p.	R

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138	*Urginea maritima* (L.) Baker *Scilla maritima* L. *Urginea scilla* Sternb.	Bul	G	Med	Tartous, Lattakia ,Safita, Shahba, Hemmah.		C
17	***Amaryllidaceae***						
139	*Sternbergia clusiana* Ker Gawler *Sternbergia macrantha* J.Gay *Sternbergia spaffordiana* Dinsm.	Bul	G	E Med	Nabi Yunus, Aleppo, Anti Lebanon, Cassius, Arneh, Malkieh, Kafer.		R
140	*Pancratium parviflorum* Decne.	Bul	G		Tartous, Banias		R
141	*Narcissus tazzetta* L.	Bul	G	Med	Safita, Marmarita , Kasab, Anti Lebanon , Qunaytra , Damascus , Aleppo .		R
18	***Smilacaceae***						
142	*Smilax aspera* L.	C	G	Med	Tartous, Safita, Cassius, Kezil Dagh, Ain Al-Haramieh, Jabal Samaan,Salqein, Slenfah, Barshin, Qara Douran, Om Al-Toyour, Qasatel, Wastani mountain.	Q.I.	S
143	*Smilax excelsa* L.	C	G	Eux	Frenloq, Ras Al-Bassit, Ain Al-Haramieh.	Q.F.	R
19	***Dioscoreaceae***						
144	*Tamus communis* L.	Rh CO	G		Frenloq, Masada, Midan Akbas, Akrad Mountain, Jabal Samaan, Qara Douran, Drekish, Hzerin.	Q.pub.	S
20	***Iridaceae***						
145	*Crocus ochroleucus* Feinbr.	Tu	G	E Med	Jdaidet Yabous, Hauran.		R
	Crocus graveolens Boiss. & Reuter.	Tu	G	E Med	Marmarita, Kasab, Aleppo .		W
146	*Gladiolus segetum* Ker-Gawler. *Gladiolus communis* L . Pr. P.	Tu	G	Med	Tartous, Messiaf ,Safita, Bhamrah,Kasab,Ain Al-Haramieh, Kezil Dagh, Aleppo,Hama, Sanamin, Qanawat, Kafer, Drekish, Om Al-Toyour.		S
147	*Gladiolus aleppicus* Boiss. *Gladiolus atroviolaceus* Boiss.	Tu	G	IT	Bloudan, Wadi Al-Qaren, Wadi Barada , Maalola , Aleppo , Jabal Samaan , Homs, Kafer , Hama, Rastan ,Kurd dagh , Jabal Abdullaziz		CI
148	*Gynandriris sisyrinchium* (L.) Parl. *Iris sisyrinchium* L.	Tu	G	Med IT	Bhamrah , Qadmous , Messiaf , Kesoah , Dmeir, Wadi Al-Qaren, Qal'aat Al-Hosn , Aleppo , Hama, Khan Sheikhon , Hissah, Shahba, Qanawat, Kafer , Hemmah , Jabal Abiad , Palmyra, AboKamal.		S
149	*Iris histrio* Reichb.	Bul	G		Safita, Kasab, Ariha ,Jiser Al-Shoghour, Qunaytra ,Banias.		S
150	*Iris fumosa* Boiss. & Hausskn.	Bul	G		Aleppo ,Termanin, Kaser El-Banat, Izra'a.		E
151	*Iris unguicularis* Poiret. *Iris cretensis* Janka.	Rh	G	Med	Lattakia, Bdama, Messiaf , Qadmous, Slenfah, Kasab, Ain Al-Haramieh, Frenloq, Cassius, Qara Douran, Hzerin, Qadmous.	Q.call.	S
152	*Iris pseudacorus* L.	Rh	G		Lattakia, Coastal mountain, Homs, Jabal Samaan ,Wadi Barada, Rabweh, Ghab river.		R
153	*Iris auranitica* Dinsmore.	Rh	G		Tal Qulaib , Kafer,		E
154	*Iris antilibanotica* Dinsmore.	Bul	G		Bloudan		E
155	*Iris basaltica* Dinsmore.	Rh	G		Homs, TalKalakh, Qal'aat Al-Hosn		E
21	***Orchidaceae***						
156	*Limodorum abortivum* (L.) Sw. *Orchis abortiva* L	Tu	G	Med	Ain Al-Haramieh, Kezil Dagh, Kasab, Al-Kabeir river.	Q.I.	R
157	*Cephalanthera longifolia* Fritsch *Serapias longifolia* Huds. *Serapias helleborine* var. *longifolia L.*	Tu	G	Es	Banias, Messiaf, Ain Al-Haramieh, Kezil Dagh, Kasab, Barshin, Qara Douran, Shatha, Hzerin.	Q.pub.	S
158	*Cephalanthera rubra* (L.) L.C.R. Rich. *Serapias rubra* L.	Tu	G	Es	Bhamrah , Slenfah	Q.pub	W
159	*Epipactis consimilis* Don. *Epipactis veratrifolia* Boiss. & Helder.	Tu	G	IT	Slenfah, Hemmah, Sa'ad Ass'oud ,Frenloq.	O.Q.p.	W
160	*Epipactis latifolia (*L.) All. *Epipactis helleborine* (L.) Crantz *Serapias helleborine* L.	Tu	G	Es	Safita, Bhamrah, Slenfah, Kasab ,Barshin, Qara-Douran, Frenloq.	Q.pub.	S

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161	*Platanthera chlorantha* (Custer) Reichb *Orchis chlorantha* Custer	Tu	G		Ain Al-Haramieh, Cassius.	Q.pub.	S
162	*Neotinea intacta* (Link) Reichbg. *Orchis intacta* Link	Tu	G	Med	Frenloq		R
163	*Ophrys fusca* Link.	Tu	G	Med	Harem ,Frenloq.		R
164	*Ophrys attica (*Boiss.et Orph.) Soo *Ophrys arachnites* Scop. var *attica* Boiss. & Oraph. *Ophris scolopax* Cav. Subsp. *attica* (Boiss. et Oraph) Nelson	Tu	G	E Med	Al-Rastan, Harem, Ariha, Aleppo, Akrad Mountain, Barshin, Jabal Al-Balas, Frenloq.		S
165	*Orchis anatolica* Boiss.	Tu	G	Med	Safita, Bhamrah, Sheikh Husamo, Raqqah, Slenfah, Kasab, Ain Al-Haramieh, Wadi al-Qaren, Ariha, Qara-Douran .	Q.C.l.	S
166	*Orchis laxiflora* Lam.	Tu	G	Med	Wadi al-Qaren, Homs, Al-Rastan, Wadi Barada, Ghotah, Mserip, Qunaytra, Slenfah.	Q.C.l.	S
167	*Neottia nidus-avis* (L.) L.C.M.Rich.	Rh	G	Es	Slenfah, Bekserih ,Frenloq.	Q.F.	R
22	***Salicaceae***						
168	*Salix acmophylla* Boiss. *Salix persica* Boiss. *Salix pseudo-safsaf* A Cam. & R .	T	Ph	IT	Khabour river, Ras El-Ain, Hasakeh, Hemmah.		W
169	*Salix australior* And. *Salix fragilis* L., var *australior* (And.) D.C.	T	Ph	IT	Aleppo , Jiser Al-Shoghour, TalAbiad		W
170	*Salix dinsmorei* Enander.	T	Ph		Ain Al-Tal, Salamieh		W
171	*Salix alba* L. *Salix micans* (And.) Goerz	T	Ph	Es	Homs, Aleppo , Damascus , Zabadani, Kafer		SW
172	*Salix libani* Bornm. *Salix pedicellata* Auct . Fl. Or. Non Desf. *Salix ped.*, subsp. *libani (*Bornm.) Thieb. *Salix libanotica* Boiss. *Salix variifolia* Freyn et Sint.	T	Ph	Med	Zabadani, Frenloq.		CW
173	*Populus euphratica* Oliv.	T	Ph		Euphrates river, Khabour, Raqqah, Hasakeh, Deir-ez Zour, Mayadeen ,Yarmouk river , Hemmah.		C
23	***Betulaceae***						
174	*Alnus orientalis* Decne.	T	Ph	E Med	Frenloq, Kezil Dagh, Kasab, Wadi Qandil, Ras Al-Bassit .	Q.C.l.	WC
24	***Fagaceae***						
182	*Quercus aegilops* subsp. *fruticaptus* Ghazal (1994)	T	Ph	E Med	Akrad Mountain (Maabatli,Iki-Akhor)	Q.I	D
185	*Quercus aegilops* subsp. *pyrami* Kotschy	T	Ph	E Med	Safsafh, (Akrad Mountain) Aswad river, Darkoush ,Banias.	Q.I	D
180	*Quercus aegilops* subsp. *calvo extermo-cupula* Ghazal (1994)	T	Ph	E Med	Akrad Mountain (Shinkel ,Aswad river, Iki-Akhor).	Q.I	D
181	*Quercus aegilops* subsp. *ehrenbergii* (Kotschy)Ghazal (1994)	T	Ph	E Med	Safita,Mashta Al-Holw	Q.I	D
183	*Quercus aegilops* subsp. *ithaburensis* Decaisne	T	Ph	E Med	Akrad Mountain (Maabatli,Iki-Akhor)	Q.I	D
184	*Quercus aegilops* subsp. *longicarpus* Ghazal (1994)	T	Ph	E Med	Kanfo ,Safsafeh.	Q.I	D
186	*Quercus aegilops* subsp. *vallonea* (Kotschy)	T	Ph	E Med	Hefsarjah.	Q.I	D
179	*Quercus brantii* Lidl.	T	Ph	IT	Slenfah , Nabi Yunus , Jabal Matta , Shatha	Q.C.l	D
187	*Quercus castanifolia* subsp . *wastaniana* Ghazal (1994)	T	Ph	E Med	Wastani mountain	Q.I	R

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177	*Quercus cerris* subsp. *pseudocerris* (Boiss.) Chalabi (1981). *Quercus cerris* L.	T	Ph	E Med	Bayer & Basset, Kezil Dagh, Slenfah, Barshin, Akrad Mountain, Qara Douran, Nabi Ozair.	O.Q.p.	S
178	*Quercus coccifera* L. *Quercus calliprinos* Webb.	T	Ph	Med	Wadi al-Qaren, Bhamrah, Shatha, Qadmous, Sheikh Husamo, Jubet Barghal, Jabal Samaan, Sarmada , Kafer, Qanawat, Tal Qulaib, Rakhleh, Akrad Mountain, Jiser Al-Shoghour, Bdama, Jabal Al-Zawiah .	Q.I.	S
175	*Quercus infectoria* Oliv. *Quercus lusitanica* Boiss .et Auct. *Quercus infectoria* subsp. *glabra* O.Schwarz	T	Ph	Es	, Slenfah, Qunaytra, Wadi al-Qaren, Qadmous, Qara Douran, Jabal Al-Arab, Barshin, Rakhleh.	Q.C.l.	S
176	*Quercus infectoria* subsp. *microphylla* Chalabi (1981). *Quercus microphylla* Thiéb.	T	Ph	E Med	Ain Al-Haramieh, Kasab, Kezil Dagh, Om Al-Toyour .	Pto.Q.	E
189	*Quercus ithaburansis* Decne *Quercus look* (Kotschy)	T	Ph	E Med	Jabal Al-Arab.	Q.C.l	R
188	*Quercus libani* Oliv.	T	Ph	E Med	Slenfah, Nabi Yunus, Shatha, Cassius ,Kotchok Darmik ,Jabal Al-Arab.	Q .C.l	R
25	***Ulmaceae***						
192	*Celtis australis* L .	T	Ph	Med	Qal'aat Al-Marqub , Zabadani, Seydnaya , Ain Al-Khadra, Banias		C
193	*Celtis tournefortii* Lam.				Kotchok Darmik , Slenfah		R
191	*Ulmus canescens* Melville.	T	Ph	E Med	Lattakia		R
190	*Ulmus minor* Mill. *Ulmus campestris* Auct.	T	Ph	E Med	Zabadani, Maalola , Aleppo		C
26	***Moraceae***						
194	*Ficus carica* L.	T	Ph	IT	Damascus		C
27	***Urticaceae***						
197	*Parietaria cretica* L.	P	H	Med	Jableh , Lattakia		
196	*Parietaria judaica* L . *Parietaria officinalis* subsp. *judaica* (L.) Beguinot. *Parietaria diffusa* Mert. & Koch. *Parietaria ramiflora* Moench.	P	H	ES Med IT	Zabadani, Wadi Al-Qaren, Wadi Barada , Maalola , Madaia, Yabroud , Dara'a , Sweida		C
198	*Parietaria lusitanica* L.	P	Th	Med	Tartous, Kasab, Jabal Samaan , TalEqerbrin		
195	*Urtica dioica* L.	P	H	Hol	Ghotah		
28	***Santalaceae***						
199	*Osyris alba* L.	Ss	Ch	Med	Kasab, Ariha, Jabal Samaan, Akrad Mountain, Bhamrah, Qara Douran, Hzerin, Jabal Barakat, Wastani mountain, Messiaf.	Q.I.	CW
200	*Thesium bergeri* Zucc.	P	H	E Med	Wadi Qandil, Ain Al-Haramieh, Slenfah,Kezil Dagh, Safita, Balloran, Qara-Douran.		C
29	***Rafflesiaceae***						
201	*Cytinus hypocistis* L. *Asarum hypocistis* L.	E	E	Med	Ras Al-Bassit Arafit.		W
30	***Loranthaceae***						
202	*Loranthus europaeus* Jacq.	E	E	Med	Kotchok Darmik	Q.pub	W
203	*Viscum album* L.	E	E	Med	Qal'aat Jandal , Bloudan, Wadi Al-Qaren		W
31	***Aristolochiaceae***						
204	*Aristolochia sempervirens* L. *Aristolochia altissima* Desf.	C	H	Med	Slenfah, Safita, Ain Helakim, Bhamrah, Hzerin, Qara Douran,Nabi Ozair, Arafit, Shinkel, Kawinda.	Q.ca	W
205	*Aristolochia paecilantha* var. *scabridula* Boiss . *Aristolochia scabridula* Boiss.	C	H	Med	Zabadani, Bloudan, Wadi Al-Qaren, Qal'aat Al-Hosn , Slenfah	Q.C.l	E
32	***Polygonaceae***						

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206	*Rumex pulcher* L.	Rh	G		Slenfah, Ain Al-Haramieh, Aleppo , Homs, Kalakh, Jrablus , Hasakeh , Tiger river, Sweida , Busra , Kafer.		
207	*Rumex bucephalophorus* L.	A	Th	Med	Tartous, Banias , Qal'aat Al-Marqub.	C.M	
208	*Polygonum aviculare* L.	A	Th	Cos	Aleppo, Damascus, Khabour river , Shahba, Yabroud , Qtaifeh, Akrad Mountain.		C
33	***Chenopodiaceae***						
209	*Chenopodium album* L.	A	Th	Cos	Damascus , Nashabieh		C
210	*Chenopodium murale* L.	A	Th	Cos	Rabweh , Afreen, Palmyra, Deir-ez Zour , Sweida , Al-Oyoun , Hemmah		C
211	*Atriplex halimus* L.	Ss	Ch		Hemmah		C
212	*Atriplex leucoclada* Boiss.	Ss	Ch		Palmyra, Qaryatin , Dmeir		C
213	*Arthrocnemum macrostachyum* (Moric.)Moris *Arthrocnemum glaucum* Ung. Sternb. *Salicornia glauca* Del.	P	Ch		Jableh , Lattakia		C
214	*Salicornia europaea* L. *Salicornia herbacea* (L.)L.	P	Ch		Khatonieh , Hasakeh		C
215	*Halopeplis amplexicaulis* Vahl. Cesati & al.	P	Ch		Palmyra		C
216	*Halocenemum strobilaceum* (Pall.) Bieb. *Salicornia strobilacea* Pall.	P	Ch		Palmyra, Dmeir		C
217	*Suaeda altissima* L.	A	Th		Khatonieh		C
218	*Salsola vermiculata* L.	P	Ch	Sh-Ar Ir-Tu	Homs , Nabik,Jabal Abo-Ata,Yabroud , Maarabah , Damascus ,Jabal Qassion , Dummar , Rabweh, Hasakeh , Khatonieh , Dara'a ,Sweida , TalHadeed , Hemmah , Qaryatin , Ain Al-Beda , Rawdah		C
219	*Noaea mucronata* (Forsk.) Asch. & Schwienf. *Salsola mucronata* Forsk. *Noaea spinosissima* (L.fil.) Moq.	P	Ch	Med IT	, Maalola , Aleppo , Damascus , Dimas, Palmyra, Qaryatin , Deir-ez Zour		C
220	*Anabasis setifera* Moq.	P	Ch		Kherbet Umbashi		C
34	***Amaranthaceae***						
221	*Amaranthus cruentus* L. *Amaranthus hybridus* L.	P	Th	Scos	Homs, Qanawat, Lattakia , Damascus , Rabweh , Ghotah		
35	***Thelygonaceae***						
222	*Thelygonum cynocrambe* L. *Cynocrambe postrata* Gaertn .	A	Th		Afreen, Aleppo , Kotchok Dagh , Jabal Qassion , Damascus , Wadi Barada , Sweida		C
36	***Phytolaccaceae***						
223	*Phytolacca americana* L. *Phytolacca decandra* L.	P	Ch		Shin, Matta.		R
224	*Phytolacca pruinosa* Fenzl.	P	Ch	Med	Slenfah, Qara-Douran, Cassius		R
37	***Aizoaceae***						
225	*Aizoon hispanicum* L.	A	Th	Med	Aleppo , Dummar , Maskanih, Deir-ez Zour , Palmyra, Qaryatin		
38	***Portulacaceae***						
226	*Portulaca oleracea* L.	A	Th	Scos	Tartous, Damascus , Qunaytra , Kasab, Palmyra, Deir-ez Zour		C
39	***Caryophyllaceae***						
227	*Arenaria tremula* Boiss.	A	Th	E Med	Slenfah, Cassius, Ain Al-Haramieh,Kezil Dagh, Qastal Maaf, Qara-Douran.		
228	*Cerastium dichotomum* L.	A	Th	Med IT	Aleppo, Homs, Wadi Barada, Bloda , Maalola, Jabal Qassion, Wadi al-Qaren, Sweida, Tal Qulaib, Kafer, Ariha, Hzerin .		C
229	*Stellaria cilicica* Boiss. & Balansa.	A	Th	E Med	Frenloq, Kezil Dagh, Ain Al-Haramieh, Qara Douran .	Q.C.l.	W
230	*Silene siderophila* Boiss. & Gaill.	A	Th	E Med	Wadi Al-Qaren, Damascus ,Qunaytra ,Sanamin, Busra ,Sweida ,Qanawat, Kafer, Salkhad.		S

No.	Scientific name	Life cycle	Life form	Phytog	Distribution in Syria	Phyto.	Dyn
231	*Silene aegyptiaca* (L.) L. fil. *Cucubalus aegyptiacus* L. *Silene atocion* Jacq.	A	Th	Med	Tartous, Bhamrah, Ain Al-Haramieh, Kasab, Aleppo ,Ariha, Hama, Homs, Qal'aat Al-Hosn.		C
232	*Silene italica* (L.) Pers. *Cucubalus italicus* L.	P	H	Med	Bhamrah ,Messiaf, Qadmous ,Kasab, Ain Al-Haramieh, Frenloq, Masada ,Barshin, Shatha.	Q.pub.	S
233	*Silene amana* Boiss.	P	H	E Med	Jabal Matta, Slenfah.	O.Q.p.	E
234	*Silene confertiflora* Chowdhuri	P	H	E Med	Frenloq, Ain Al-Haramieh, Qara-Douran	O.Q.p.	C
235	*Gypsophila antari* Post & Beauv.	A	Th		Yabroud , Maalola , Raqqah, Deir-ez Zour , Dmeir, Qaryatin , Palmyra,Rawdah , Ain Al-Beda , Qtaifeh, Deir Attieh		C
236	*Dianthus strictus* subsp. *multipunctatus* (Ser.) Greuter & Burdet *Dianthus polycladus* Boiss.	P	H	E Med	Jabal Matta, Qara-Douran, Lattakia , Tartous, Qal'aat Al-Hosn , Aleppo , Homs, Khatoniah, Bloudan, Tal'at Mousa, Sweida , Shahba, Qanawat, Hzerin	A.B.	C
40	***Lauraceae***						
237	*Laurus nobilis* L.	T S	Ph N	Med	Jubet Barghal , Nabi Yunus , Kasab, Qara-Douran, Maalola, Hzerin, Doureen.	Q.ca.	S
41	***Paeoniaceae***						
238	*Paeonia mascula* (L.) Mill. *Paeonia corallina* Retz.	P	H	Med	Jubet Barghal , Slenfah, Nabi Yunus , Kasab, Ain Al-Haramieh, Qara-Douran.	Q.C.l.	R
42	***Berberidaceae***						
239	*Berberis libanotica* C.K.Schneider	Ss	Ch	E Med	Anti Lebanon ,Akoum.		R
240	*Bongardia chrysogonum* (L.) Griseb. *Leontice chrysogonum* L.	Rh	G		Wadi Al-Qaren, Bloudan, Aleppo , Sweida , Shahba , Salamieh, Qtaifeh , Palmyra, Homs , Jabal Abdullaziz.		
241	*Leontice leontopetalum* L .	Rh	G	E Med	Homs, Idlib , Aleppo , Izra'a, Sweida.		
43	***Ranunculaceae***						
242	*Delphinium virgatum* Poiret	A	Th	End	Aleppo ,Damascus ,Maalola ,Yabroud, Qal'aat Jandal ,Izra'a, Dmeir ,Zabadani.		E
243	*Anemon coronaria* L.	P	G	Med	Bloudan, Slenfah, Kasab, Qara Douran, Qadmous		C
244	*Ceratocephalus falcatus* (L.) Pers. *Ranunculus falcatus* L.	A	Th	Med	Wadi Barada , Tal'at Mousa, Jabal Qassion , Damascus , Dmeir, Kesoah , Tal Qulaib , Homs, Zeidal , Qaryatin , Palmyra, Ain Al-Beda.		C
245	*Ficaria ficarioides* (Bory & Chaub) Hal.	Rh	G		Slenfah, Barshin , Hzerin	Q.C.l.	C
246	*Ranunculus peltatus* subsp. *sphaerospermus* (Boiss & Blanche) Meikle. *Ranunculus aquatilis* L. var. *sphaerospermus* Boiss & Blanche	Rh/P	G H	Med	Tartous, Wadi al-Qaren ,Aleppo ,Damas, Rabweh ,Sweida.		W
247	*Ranunculus asiaticus* L.	P	H	Med IT	Bhamrah , Messiaf , Harem , Khan Sheikhon , Maaret Al-Noaman , Hama, Aleppo , Sarmada , Kurddagh, Derick , Dmeir,Abo shamat , Palmyra.		
248	*Ranunculus paludosus* Poiret. *Ranunculus flabellatus* Desf.	P	H	Med	Safita, Messiaf, Jabal Matta, Jdaidet Yabus , Wadi Al-Qaren, Kurd Dagh, Kafer.		
249	*Ranunculus millefolius* Banks. & Solander *Ranunculus orientalis* L. *Ranunculus myriophyllus* D.C.	P/Rh	G H	Med	Nabi Yunus , Slenfah, Jubet Barghal , Kasab, Ras El-Ain , Akrad Mountain , Aleppo , Ariha , Khan Sheikhon , Maaret Al-Noaman.		CW
250	*Ranunculus bulbosus* subsp. *aleae* (Willk.)Rauy & Fouc. *Ranunculus neopolitanus* Ten. *Ranunculus* eriophyllus C.Koch.		H	Med	Ras Al-Bassit, Kasab, Frenloq, Ain Al-Haramieh, Zabadani, Aleppo.		

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251	*Adonis dentata* Delile	A	Th	E Med	Aleppo , Homs , TalKotchak , Khatonieh , Shahba, Qunaytra , Hemmah , Wadi Barada ,Jabal Abo-Ata, Damas, Jabal Qassion , Adra , Dmeir, Damascus , Ain Al-Beda , Qaryatin , Palmyra , Maskanih, Raqqah.		C
252	*Clematis cirrhosa* L.	C	Ch		Kasab, Bdama ,Kurd Dagh, Masada, Jabal Samaan.	Q.ca	S
253	*Clematis vitalba* L.	C	Ch		Damascus ,Rabweh ,Slenfah, Qara-Douran, Wadi Qandil.	Q.pub.	S
254	*Clematis flammula* L.	C	Ch		Kasab , Qasatel, Hzerin	Q.I.	S
44	***Nymphaeaceae***						
255	*Nuphar luteum* (L.)Sm. *Nymphaea luteum* (L.)Link. *Nymphaea lutea* L.	Rh	H	Med	Homs, Ghab ,Wadi Barada.		RD
45	***Papaveraceae***						
256	*Glaucium aleppicum* Boiss. & Hausskn.	P	H	IT	Aleppo ,Hama, Qtaifeh, Izra'a, TalHadeed , Kafer, Qaryatin.		CI
257	*Papaver rhoeas* L.	A	Th	IT	Qal'aat Al-Marqub ,Lattakia ,Damas, Sweida , Palmyra.		CI
258	*Fumaria officinalis* L.	A	Th	Med	Homs, Aleppo ,Qal'aat Al-Hosn ,Qadmous , Qunaytra ,Sweida ,Tal Qulaib.		CI
46	***Capparidaceae***						
259	*Capparis spinosa* L.	Ss	Ch	Med (cont)	Banias ,Raqqah, Hasakeh ,Shahba, Aleppo , Damas, Dummar ,Damascus, Marret Al-Nuaman, Qatana.		CI
47	***Cruciferae* (*Brassicaceae*)**						
260	*Thlaspi annuum* C. Koch.	A	Th		Safita, Slenfah, Ain Al-Haramieh,Kasab, Hzerin		CI
261	*Sisymbrium officinale* (C.) Scop. *Erisymum officinale* L. *Chamaeplium officinale* (L.) Wallr.	A	Th		Tartous, Coastal mountain, Slenfah, Jabal Samaan , Homs, Damas.		C
262	*Capsella bursa-pastoris* (L.) Med. *Thlaspi bursa-pastoris* L.	A	Th	Scos	Damas, Homs, Hama.		CI
263	*Alyssum cassium* Boiss.	P	H	E Med	Slenfah, Qastal Maaf, Wadi Qandil ,Ain Al-Haramieh, Frenloq, Kasab.		R
264	*Alyssum murale* Waldst. & Kit. *Alyssum argenteum* sensu.	P	H	E Med	Jdaidet Yabus ,Wadi Al-Qaren, Maalola ,Jabal Halimeh ,Ain Helakim, Slenfah, Jabal Matta .	A.B.	C
265	*Alyssum crenulatum* Boiss.	P	H	E Med	Qandel river , Cassius , Ain Al-Haramieh, Frenloq, Kezil Dagh, Qara-Douran.	Pto.Q	E
266	*Fibigia clypeata* (L.) Med. *Fibigia rostrata* (Schenk) Boiss. *Fibigia obovata* Boiss. *Alyssum clypeatum* L.	P / A	H /Th	Med IT	Bloudan, Arneh.		C
267	*Mathiola longipetala* (Vent.) D.C. *Mathiola oxyceras* D.C.	A	Th	Med IT	Yabroud , Seydnaya , Zabadani , Salhiyeh , Maarabah , Dummar , S-Jabal Qassion , Tiger river, Homs, Hama , Afreen, Aleppo , Azaz , KaferAleppo , Khan Sheikhon , Maaret Al-Noaman , Qtaifeh , Dmeir, Nabik, Jabal Al-Beshri , Palmyra, Deir-ez Zour, Ain Dewar , Karatchok Dagh , Sweida , Khnaseir , Rawdah .		CI
48	***Crassulaceae***						
268	*Umbilicus erectus* D.C. *Cotyledon umbilicus-veneris* Sensu.	P	ChS	Med	Kotchok Darmik ,Slenfah, Nabi Ozair, Qara-Douran.	O.Q.p.	CW
269	*Umbilicus intermedius* Boiss. *Cotyledon intermedia* (Boiss.) Bornm.	P	ChS	Med IT	Tartous , Ain Al-Khadra , Jabal Qassion , Jabal Abdullaziz, Ain Sefsaf , Izra'a, Shahba, Qanawat, Jabal Abiad.	Q.C.l	SW
270	*Sedum steudelii* Boiss.	P / A	ChS		Aleppo ,Jubet Barghal.	O.Q.p	C
49	***Saxifragaceae***						
271	*Saxifraga scotophila* Boiss.	A	Th	Med	Tal Eqerbrin, Ain Helakim, Nabi Yunus Cassius, Slenfah, Abo-Qubais, Hzerin, Nabi	O.Q.p.	CW

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					Ozair		
50	***Grossulaceae***						
272	*Ribes orientale* Desf.	Ss	N		Anti Lebanon, (Tal'at Mousa).		R
51	***Platanaceae***						
273	*Platanus orientalis* L.	T	Ph	Med	Damascus ,Qatma ,Kezil Dagh, Barshin, Akrad Mountain ,Qara-Douran, Hzerin ,Wadi Al-Qaren, Abo-Qubais.	Q.C.l.	SW
52	***Rosaceae***						
274	*Rosa sicula* Tratt. *Rosa thureti* Burnat et Gremli.						
275	*Rosa phoenicia* Boiss.	S	Ch N	Med	Jubet Barghal ,Slenfah, Bloudan ,Zabadani , Dimas ,Qatana.	A.B.	W
276	*Rosa sicula* Tratt. *Rosa thureti* Burnat & Gremli.	Ss	Ch	Med	Jubet Barghal ,Slenfah.	A.B	W
277	*Rosa glutinosa* Sibth.& Smith. *Rosa libanotica* Boiss. Diagn.	Ss	Ch		Bloudan, Haramoun ,Slenfah.	O.Q.p	W
278	*Rubus tomentosus* Borckh.	Ss	Ch	Es	Qunaytra , Messiaf , Qadmous , Slenfah, Kezil Dagh, Kasab , Ain Dewar	Q.pub.	C
279	*Rubus sanctus* Schreb. *Rosa discolor* Boiss. non Weihe & Nees.	Ss	Ch		Tartous, Slenfah, Ghotah Doma, Rabweh, Hasakeh, Qanawat, Yabroud , Bloudan, Hzerin, Qara Douran,Akrad Mountain, Om Al-Toyour	Q.pub.	CI
280	*Prunus ursina* Ky.	S	N	E Med	Yabroud, Bloudan, Wadi Al-Qaren, Arneh, Slenfah, Messiaf, Hzerin, Akrad Mountain, Qara-Douran.	Q.C.l.	S
281	*Prunus mahaleb* L. *Cerasus mahaleb* (L.) Mill.	S	N	Es/ Med IT	Ras Al-Maara.	Q.pub	C
282	*Prunus prostrata* Lab. *Cerasus prostrata* (Lab.) Ser in D.C.	Ss	Ch	Med	Bloudan.		R
283	*Prunus microcarpa* C.A. Mey. *Cerasus microcarpa* (C.A. Mey.) C.Koch.	Ss	Ch	IT	Wadi Barada ,Zabadani, Afreen, Qatma ,Jabal Abdullaziz, Jabal Abiad ,Palmyra.		C
284	*Prunus tortuosa* (Boiss. & Hausskn.) & Hensl. *Cerasus tortuosa* Boiss. & Hausskn. *Cerasus antilibanotica* Post.	Ss	Ch	IT	Wadi Al-Qaren, Wadi Barada, Ain Al-Khadra , Rabweh ,Kurd Dagh, Jabal Samaan ,Aleppo.		C
285	*Amygdalus communis* L. *Prunus amygdalus* (L.) Stokes.	S	N	Med IT	Zabadani, Jabal Al-Arab, Homs, Aleppo, Idleb.		R
286	*Amygdalus korschinskii* (Hand.-Mazz.) Bornm. *Prunus korschinskii* Hand.-Mazz. *Amygdalus communis* var. *microphylla* Post.	S	N	I-T -E Med	Zabadani, Bloudan.		R
287	*Amygdalus orientalis* Mill.	S	N	IT	Bloudan, Yabroud, Qanawat, Dimas, Qatana, Tal Qulaib, Laja, Beit Jen, Ain Hour, Arneh. Miamas.		C
288	*Amygdalus arabica* Oliv.	Ss	Ch	IT	Palmyra		R
289	*Amygdalus spartioides* Spach.	Ss	Ch	IT	Souq Wadi Barada, Rakhleh, Halleh, Jabal Qassioun.		R
290	*Amygdalus lycioides* Spach.	S	N	IT	Al-Baida		R
291	*Pirus syriaca* Boiss.	T	N	Med Ir-Tu IT	Wadi Al-Qaren, Messiaf , Hzerin, Akrad Mountain, Qara-Douran, Bolbul, Midanki, Harem, Hafsarjeh, Darkoush, Deir Osman, Frinloq, Arafit, Salma, Akoum, Qanawat, Ain Dewar.		D
292	*Malus trilobata* (Lab) C.K. Schneider *Crataegus trilobata* Lab. *Eriolobus trilobatus* Roem. *Pyrus trilobata* (Lab.) DC.	T	N	E Med	Biq-Obaissi, Deir Osman, Arafit, Jabal Matta.	Q.C.l.	RE

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	Sorbus trilobata (Lab.) Boiss.						
293	*Cotoneaster nummularia* Fisch. & Mey. *Cotoneaster racemiflora* var. *nummularia* (Fisch. & Mey.) Dipp.	S	N	Med	Slenfah, Nabi Yunus ,Madaia, Arneh , Haramoun , Tal Qulaib.		R
294	*Crataegus azarolus* L.	S	N	Med IT	Wadi al-Qaren , Tal'at Mousa, Ghotah , Qanawat, Kafer, Jabal Abdullaziz, Akrad Mountain, Jabal Al-Zawiah, Coastal mountain , Wastani mountain, Jabal Barakat, Messiaf .	Q.ca	S
295	*Crataegus sinaica* Boiss.	S	N	IT	Bloudan ,Jabal Al-Arab.		R
296	*Crataegus monogyna* Jacqu.	S	N	Med	Tartous, Lattakia ,Frenloq, Kasab, Slenfah, Bloudan, Qatana ,Homs, Barshin, Qara-Douran, Hzerin, Barshin, Nabi Ozair, Om Al-Toyour , Akrad Mountain.	Q.pub.	S
297	*Mespilus germanica* L.	S	N	Holarctic Eux	Frenloq.	Q.F. (O.Q.p.)	R
298	*Potentilla micrantha* Ramond	P	H		Slenfah ,Kasab, Ain Al-Haramieh, Frenloq, Kezil Dagh, Qara Douran .	Q.pub.	S
299	*Geum urbanum* L.	P	H	Es	Bhamrah,Jubet Barghal, Slenfah, Zabadani, Bloudan, Damascus, Qara Douran, Hzerin, Ain Helakim, Mashta Al-Holw, Nabi Ozair, Barshin.	Q.pub.	CW
300	*Agrimonia eupatoria* L.	P	H		Damascus, Qatana , Arneh , Qara-Douran.		S
301	*Poterium spinosum* L. *Sanguisorba spinosa* (L.) Bertol. *Sarcopoterium spinosum* (L.) Spach.	Ss	Ch	E Med	Lattakia, Jabal Qassion, Hauran, Jabal Al-Qalamon, Jabal Al-Zawiah , Akrad Mountain , Coastal mountain .	C.M.	WC
302	*Poterium verrucosum* Ehrenb. *Sanguisorba verrucosa* (Eer.) A.Br.	Ss	Ch	Med	Misalwn, Damascus , Homs , Tal Qulaib, Sweida , Kafer , Jubet Barghal , Qadmous , Messiaf , Kasab, Al-Kabeir river , Deir-ez Zour , Qamishli, Drekish, Qara-Douran, Aleppo, Ariha , Sa'ad Ass'oud.		C
53	***Leguminosae* (*Fabaceae*)**						
303	*Mimosa farcta* (Banks & Sol.) Macbride *Lagonychium farctum* (Banks & Sol.) Bobr. *Prosopis stephaniana* (MB.) Sprengel	P	Ch		Lattakia , Al-Rastan, Hama, Qatma , Hemmah , Adra , Palmyra, Qaryatin.		CI
54	***Caesalpiniaceae***						
304	*Ceratonia siliqua* L.	T	Ph	Med	Bhamrah ,Ghab, Qara Douran, Wadi Qandil ,Om Al-Toyour, Jabal Barisha.	O.C	D
305	*Cercis siliquastrum* L.	S	N	Med	Ras Al-Bassit,Kasab,Qara Douran,Om Al-Toyour,Qasatel	Q.pub.	S
55	***Papilionaceae***						
306	*Anagyris foetida* L.	Ss	Ch	Med	Jiser Al-Shoghour, Harem ,Jabal Samaan ,Homs, TalKalakh, Tiger river, Wadi Al-Qaren.	C.M	S
307	*Lupinus micranthus* Guss. *Lupinus hirsutus* L.	A	Th	Med	Tartous, Kasab,Om Al-Toyour, Al-Badrosih.		S
308	*Lupinus angustifolius* L.	A	Th	Med	Tartous, Banias ,Messiaf.		
309	*Spartium junceum* L.	Ss	Ch	Med	Bhamrah ,Kasab, Masada, Salma, Hzerin, Qara Douran, Jiser Al-Shoghour, Lattakia, Barshin.	C.M.	SI
310	*Genista acanthoclada* D.C.	Ss	Ch	Med	Coastal mountain, Bhamrah , Derick ,Qadmous , Safita, Messiaf , Hafeh, Tartous, Lattakia , Kasab, Wadi Qandil , Ras Al-Bassit, Cassius.	C.M	SI
311	*Genista anatolica* Boiss. *Genista cassia* Boiss.	Ss	Ch	E Med	Kasab, Shokaran , Ain Al-Haramieh		S
312	*Genista lydia* Boiss.	Ss	Ch	E Med	Jiser Al-Shoghour, Lattakia ,Ain Al-Haramieh, Frenloq, Om Al-Toyour.	Q.C.l.	S
313	*Calycotome villosa* (Poiret) Link in Neues. *Spartium villosum* Poiret.	Ss	Ch	Med	Banias ,Hemmah ,Hzerin, Qara-Douran, Coastal mountain.	C.M.	CI
314	*Gonocytisus pterocladus* (Boiss.) Spach.	Ss	Ch	Med	Slenfah, Kezil Dagh.	G.P	SI

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	Cytisus pterocladus Boiss.						
315	*Chameacytisus drepanolobus* (Boiss.) Rothum. *Cytisus drepanolobus* Boiss.	P	Ch	Med	Slenfah, Kasab.		
316	*Chameacytisus cassius* (Boiss.) Rothum.	P	Ch	Med	Cassius ,Kasab, Ain Al-Haramieh, Frenloq, Kezil Dagh, Shokaran, Ras Al-Bassit, Kasab.		E
317	*Ononis natrix* L.	P	Ch	Med	Lattakia , Qadmous , Messiaf , Aleppo , Rastan , Wadi Al-Qaren, Wadi Barada , Sweida , Jabal Qassion , Shahba, Wadi Qandil.		SI
318	*Ononis viscosa* subsp. *breviflora* (D.C.) Consp. *Ononis breviflora* D.C.	A	Th	Med	Tartous, Bhamrah ,Safita, Damas, Wadi Qandil.		I
319	*Ononis pubescens* L.	A	Th	Med	Banias ,Lattakia ,Wadi Qandil ,Sarmada ,Harem, Azaz ,Hemmah.		W
320	*Ononis spinosa* subsp. *leiosperma* (Boiss.) Sirj. *Ononis leiosperma* Boiss. *Ononis antiquorum* Auct.	P	Ch	Med	Lattakia ,Slenfah, Idlib ,Homs ,Qunaytra , Banias ,Sweida ,Shahba.		I
321	*Trigonella spinosa* L.	A	Th	E Med	Tartous, Banias ,Lattakia.		
322	*Medicago sativa* L.	P	H		Homs, Damas ,Maalola.		C
323	*Medicago laciniata* (L.) Mill. *Medicago polymorpha* var.*laciniata* L.	A	Th		AboKamal.		
324	*Melilotus officinalis* (L.) Lam. *Trifolium officinalis* L.	P	H		Damascus.		S
325	*Melilotus albus* Desr.	P	H		Rabweh.		S
326	*Trifolium stellatum* L.	A	Th		Qadmous ,Messiaf , Aleppo ,Jabal Samaan , Jabal Qassion, Tiger river, Sweida , QanawatTalHadeed ,Kafer.		C
327	*Trifolium purpureum* Gilib	A	Th	Med	Tartous, Lattakia , Wadi Qandil , Qastal Maaf, Dara'a , Qunaytra, Sweida ,Shahba, Kafer , Hemmah , Kalakh, Tiger river, Qara Douran .		S
328	*Trifolium physodes* MB.	P	H	E Med	Al-Kabeir river, Ain Al-Haramieh,Ras Al-Bassit,Kasab, Jabal Al-Arab, Hzerin.		S
329	*Trifolium repens* L.	P	H	E Med	Damascus ,Ghotah ,Homs, Hama, Qanawat, Shahba, Barshin .		SW
330	*Trifolium campestre* Schreb. *Trifolium agrarium* L. *Trifolium procumbens* L.	A	Th		Messiaf , Bhamrah , Hafeh, Slenfah, Safita, Wadi Qandil , Ain Al-Haramieh, Aleppo , Afreen, Homs, Qunaytra , Jabal Abdulaziz , Tiger river, Izra'a, Sweida , Barshin.		CI
331	*Cytisopsis pseudocytisus* (Boiss.) Fertig *Cytisopsis dorycniifolia* Jaub. & Spach.	P	Ch	E Med	, Safita, Ain Al-Haramieh,Kasab, Salma, Qasatel, Jiser Al-Shoghour, Qara Douran, Qadmous.	G.P.	C
332	*Dorycnium hirsutum* (L.) Ser. *Lotus hirsutum* L.	P	Ch	Med	Qadmous, Messiaf , Bhamrah, Hafeh, Wadi Qandil, Ain Al-Haramieh, Jubet Barghal, Ras Al-Bassit, Shokaran, Salma, Deir Osman, Messiaf.	C.M.	I
333	*Dorycnium pentaphyllum* subsp. *haussknechtii* (Boiss.) Garms. *Dorycnium haussknechtii* Boiss.	P	H	Med	Qadmous ,Messiaf, Jubet Barghal ,Jabal Matta.	G.P.	S
334	*Dorycnium pentaphyllum* subsp. *anatolicum* (Boiss. & Heldr) Garms. *Dorycnium anatolicum* Boiss.& Heldr *Dorycnium libanoticum* Boiss.	P	H	Med	Frenloq	G.P.	S
335	*Ranunculus asiaticus* L.				Bhamrah , Messiaf , Harem , Khan Sheikhon , Maaret Al-Noaman , Hama, Aleppo , Sarmada , Kurddagh , Derick , Dmeir,Abo shamat , Palmyra.		
336	*Colutea arborescens* L.	Ss	Ch		Qara Duran		R
337	*Colutea cilicica* Boiss & Bal. Diagn.	Ss	Ch	E Med	Slenfah.		R

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338	*Astragalus eriophylloides* Rech. *Astragalus nusairiensis* Eig & Sam	P	H		Ain Al-Beda ,Nabi Yunus ,Slenfah.	Q.C.l	
339	*Astragalus spinosus* (Forssk) Muschl. *Colutea spinosa* Forssk. *Astragalus forskhalei* Boiss.	P	Ch		Jabal Abo-Ata, Damas, Jabal Qassion , TalAbiad , Qaryatin ,Abo shamat , Palmyra, Ain Al-Beda , Deir-ez Zour , Kaser Al-Heer.		
340	*Glycyrrhiza glabra* L. var. *violacea* Boiss. *Glycyrrhiza violacea* Boiss& Noe	Rh	G		Qal'aat Al-Madiq ,Ras El-Ain ,Derick ,Hasakeh , Euohrates river ,Deir-ez Zour ,Mayadeen.		C
341	*Glycyrrhiza flavescens* Diagn *Glycyrrhizopsis flavescens* (Boiss.) Boiss.	P	H	E Med	Cassius ,Kezil Dagh, Kasab, Ras Al-Bassit, Ain Al-Haramieh.	Pto.Q.	E
342	*Coronilla emerus* subsp. *emeroides* (Boiss & Sprun) Lassen. *Coronilla emeroides* Boiss. & Sprun.	Ss	Ch	E Med	Bhamrah ,Lattakia, Bdama ,Slenfah, Qara-Douran, Ras Al-Bassit ,Mashta Al-Holw, Shatha.	Q.P	W
343	*Alhagi maurorum* Medicus	Ss	Ch		Aleppo, Homs, Idlib ,Jrablus ,Nabik, Yabroud , Palmyra, Qaryatin.		C
344	*Onobrychis crista-galli* (L.) Lam.	A	Th		Bhamrah ,Izra'a ,Damas, Aleppo ,Afreen, Jabal Abiad ,Palmyra.		C
345	*Onobrychis supina* (Vill.)D.C. *Hedysarum supinum* Vill.	P	Ch		Lattakia , Bhamrah , Hafeh, Wadi Qandil , Cassius , Hama		S
346	*Onobrychis galegifolia* *Onobrychis aurantiaca* Boiss.	P	Ch	E Med	Darkoush ,Aleppo, Salqein.		E
347	*Cicer arietinum* L.	A	Th	E Med	Ain Al-Haramieh, Frenloq, Shokaran.		W
348	*Vicia galeata* Boiss.	A	Th	E Med	As-Sin River ,Lattakia ,Banias.		
349	*Vicia narbonensis* L.	A	Th	Med	Aleppo , Homs, Hama, Damascus , Sanamin, Dara'a, Bhamrah, Kasab, Ain Al-Haramieh, Frenloq, Kezil Dagh, Barshin, Qara-Douran, Izra'a.		R
350	*Vicia tenuifolia* Roth. subsp. *stenophylla* Velen	P	H	Med	Ain Al-Haramieh ,Akrad Mountain.	Q.C.l.	S
351	*Ervum ervoides* (Brign) Grande. *Ervum lenticula* Hoppe	A	Th		Hafeh, Slenfah, Al-Kabeir river , Nabi Yunus , Ain Al-Haramieh, Kasab, Frenloq, Ras Al-Bassit, Wadi Qandil.		C
352	*Lathyrus aphaca* L. *Lathyrus polyanthus* Boiss.& Blanche	A	Th		Slenfah, Wadi Al-Qaren, Homs, Jabal Samaan , TalAqebrin, Damascus , Kalakh, PalmyraSweida , Hemmah , Balloran , Qara Douran		C
353	*Lathyrus hirsutus* L.	A	Th		Frenloq.		
354	*Lathyrus erectus* Lagr. *Lathyrus inconspicus* L.	A	Th	Med	Wadi al-Qaren ,Bloudan ,Khan Sheikhon , Maaret Al-Noaman ,Homs ,Hama ,Al-Rastan , Ras El-Ain ,Tiger river.		C
355	*Orobus laxiflorus* (Desf.) O.Kuntze *Lathyrus inermis* Friv *Orobus hirsutus* L.	P	H	E Med	Slenfah, Frenloq, Ain Al-Haramieh, Kezil Dagh, Kasab, Qara-Douran.	Q.pub.	SI
356	*Lathyrus digitatus* (Bieb.) Fiori. *Orobus digitatus* Bieb. *Orobus sessilifolius* Sibth. et Sm.	P	H	E Med	Jubet Barghal, Slenfah, Cassius, Kezil Dagh, Qara-Douran.	Q.C.l.	S
357	*Lathyrus niger* (L.) Bernh. *Orobus niger* L.	P	H	Es	Kezil Dagh, Ain Al-Haramieh, Barshin ,Frenloq.	Q.pub.	R
358	*Lathyrus basalticus* Rech.	A	Th	Med	Homs, Kalakh.		E
359	*Lathyrus libani* Fritsch. *Orobus grandiflorus* Boiss. *Lathyrus grandiflorus* Sibth.	P	H	E Med	Ras Al-Bassit ,Qara-Douran, Barshin, Barshin.	O.Q.p.	D
360	*Pisum sativum* subsp. *elatius* MB. *Pisum elatius* Bieb.	A	Th		Abrash river, Bhamrah ,Aleppo ,Qanawat, Sweida ,Jabal Al-Zawiah.		C
56	***Oxalidaceae***						
361	*Oxalis corniculata* L.	P	H	Scos	Bhamrah ,Dimas.		C
57	***Geraniaceae***						

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362	*Geranium tuberosum* L.	Rh	G	Eu, Med Ir	Slenfah, Bloudan, Wadi Al-Qaren, Tal'at Mousa , Aleppo , Sanamin, Izra'a, Banias , Hemmah , Palmyra, Homs		
363	*Geranium libani* Davis *Geranium libanoticum* (Boiss.) & Boiss.	P	H	Med	Safita, Jubet Barghal ,Banias ,Slenfah, Kezil Dagh.	Q.C.P	
364	*Geranium asphodeloides* Burm.	Rh	G	Es	Kasab, Frenloq, Qara-Douran .	O.Q.p.	C
365	*Geranium rotundifolium* L.	A	Th	Eu, Med Ir	Bloudan, Jabal Qassion ,Damascus ,Ain Al-Khadra, Hama, Homs, Sweida ,Kafer, Tal Qulaib ,Palmyra, Aleppo.		
366	*Geranium molle* L.	A	Th	Eu-Sib Med	Bhamrah ,Kasab, Slenfah, Karatchok Dagh, Sweida ,Jabal Samaan ,Homs, Jabal Abiad.		S
367	*Geranium robertianum* subsp. *purpureum* (Vill.) Nyman. *Geranium purpureum* Vill.	A/P	Th/H	Es/Med	Wadi Al-Qaren, Kasab, Masada, Qanawat, Banias.		S
368	*Geranium lucidum* L.	A	Th		Slenfah, Frenloq, Kasab, Wadi Al-Qaren, Qanawat.		
369	*Erodium acaule* (L.) Becherer & Thell. *Geranium acaule* L. *Erodium romanum* L'Her. *Geranium romanum* Burm.	P	H	Med	Aleppo , Homs, Wadi Al-Qaren, Anti Lebanon, Madaia, Wadi Barada , Damas, Misalwn, Damascus , Dummar		
370	*Erodium cicutarium* (L.)L'Her. *Geranium cicutarium* L.	A	Th	Scos	Kasab, Aleppo ,Hama, Jabal Qassion ,Karatchok Dagh, Sanamin, Sweida ,Kafer, Qanawat, Palmyra, Qaryatin ,Maskanih, Raqqah.		C
58	***Linaceae***						
371	*Linum trigynum* L. *Linum gallicum* L.	A	Th		Hafeh, Kezil Dagh, Shokaran.		
372	*Linum mucronatum* subsp. *orientale* (Boiss. & Heldr.) Davis. *Linum orientale* (Boiss. & Heldr.) Boiss.	P	H	IT	Wadi Al-Qaren, Seydnaya.		
373	*Linum aroanium* Boiss. & Orph.	P	Ch	E Med	Banias, Qadmous, Kasab, Ain Al-Haramieh.	G.P.	C
59	***Zygophyllaceae***						
374	*Zygophyllum fabago* L.	P	H		Hama, Homs, Aleppo ,Messiaf, Yabroud, Damas, Qaryatin ,Palmyra .		C
375	*Peganum harmala* L.	P	H	Cosm	Aleppo , Hama, Homs, Kaser El-Banat,Jabal Samaan ,Afreen, Ras El-Ain , Damas, Jabal Qassion , Nabik,Busra ,Shahb,TalHadeed ,Maskanih.		C
60	***Rutaceae***						
376	*Ruta chalepensis* L. var. *bracteosa* (D.C.) Boiss *Ruta bracteosa* D.C. *Ruta latifolia* Salisb.	P	Ch		Banias ,Tartous, Aleppo ,Damas, Banias.		R
61	***Polygalaceae***						
377	*Polygala monspeliaca* L.	A	Th	Med	Bhamrah		
378	*Polygala supina* Schreb.	P	Ch		Jableh,Tartous,Drekish,Bhamrah,كبير,Ras Al-Bassit, Kasab, Ain Al-Haramieh,Kezil Dagh,Om Al-Toyour , Hzerin.	Q.pub.	C
379	*Polygala anatolica* Boiss. & Heldr.	P	Ch H	Med/ IA Es	Cassius ,Kasab, Ain Al-Haramieh, Qadmous , Al-Kabeir river.		R
62	***Anacardiaceae***						
380	*Cotinus coggyria* Scop. *Rhus cotinus* L.	S	N		Tartous, Banias ,Drekish ,Qadmous, Al-Kabeir river , Jiser Al-Shoghour, Kasab, Qara-Douran, Om Al-Toyour , Qasatel .	Q.pub.	CI
381	*Rhus coriaria* L.	T	Ph	IT Med	Damascus ,Maalola, Shahba ,Tal Qulaib, Akrad Mountain, Kafer, Maaret Al-Noaman.	Q.call.	CI

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382	*Pistacia terebinthus* subsp. *palaestina* (Boiss.) Engler. *Pistacia palaestina* Boiss.	T	Ch	E Med	Akrad mountain, Jabal Barakat, Hafsarjeh, Darkosh, Shankal, Kawanda, Haj Hasanli, Iki Akhour, Midan Akbas, Bolbol, Jabal Sam'an, Jiser Al-Shoghour, Hzerin, Om Al-Toyour, Messiaf, Qadmous, Al-Bara, Qanawat.	Q.call.	C
383	*Pistacia atlantica* Desf. *Pistacia mutica* Fish & Mey.	T	Ch	IT	Shankal, Biq-Obaissi, Harem, Jabal Abdulaziz, Daret Azzeh, Hafsarjeh, Qasatel, Deir Osman, Jabal Beshri, Akoum, Wadi AlQaren, Rakhleh, Qanawat.		D
384	*Pistacia khinjuk* Stocks.	T	Ch	IT	Bal'aas, Hesia, Ain Tineh.		D
385	*Pistacia lentiscus* L.	S	N	Med	Makhous, Wadi Qandil, Om Al-Toyour, Borj Islam.	O.C	D
63	***Aceraceae***						
386	*Acer monspessulanum* subsp. *microphyllum* (Boiss.) Bornm. *Acer monspessulanum* var. *microphyllum* *Acer hermoneum* (Bronm.)	T	Ph	Med	Lattakia, Nabi Yunus, Jabal Matta, Wadi al-Qaren, Maalola ,Kafer, TalQullaib, Qara Douran, Rakhleh ,Arafit.	Q.pub.	R
387	*Acer obtusifolium* Sm. *Acer syriacum* Boiss. & Gaill.	T	Ph	E Med	Jubara, Deir Loza.	Q.I.	R
64	***Euphorbiaceae***						
388	*Euphorbia apios* L.	P	Ch	E Med	Wadi Al-Qaren , Bloudan , Damascus , Jabal Qassion , Slenfah, Kasab, Kezil Dagh, Cassius ,Deir Attieh, Salamieh , Qaryatin.		
389	*Euphorbia erinacea* Boiss. & Ky.	P	Ch	Med	Bloudan , Zabadani, Wadi Barada , Arneh .		
390	*Euphorbia hierosolymitana* Boiss. *Euphorbia thamnoides* Boiss.	P	H	E Med	Banias, Qunaytra, Slenfah, Jabal Matta, Hzerin .	C.M.	S
391	*Euphorbia cassia* Boiss.	P	H	E Med	TartousJableh, Drekish, Kasab ,Cassius.	Pto.Q.	SI
392	*Euphorbia herniariifolia* Willd.	P	H	Med	Slenfah, Shatha.	Q.I.	
393	*Euphorbia macroclada* Boiss *Euphorbia tinctoria* Boiss.	P	H	Med	Wadi Al-Qaren, Anti Lebanon,Bloudan, Yabroud , Derick , Karatchok Dagh, Ras El-Ain , Homs, Hama ,Ariha, Damascus , Jabal Qassion.		
394	*Euphorbia kotschyana* Fenzl.	P	H	E Med	Jubet Barghal, Frenloq, Kasab,Kezil Dagh, Qara Douran .	A.B.	W
395	*Euphorbia macrostegia* Boiss.	P	Ch	Es	Jabal Matta, Frenloq, Ain Al-Haramieh.	O.Q.p.	S
396	*Euphorbia rigida* MB. *Euphorbia biglandulosa* Desf.	P	H		Qadmous ,Kezil Dagh, Kasab.		
397	*Mercurialis annua* L.	A	Th		Damas, Doma , TalHadeed , Shahba, Lattakia , Shokaran , Jabal Samaan		
398	*Mercurialis ovata* Sternb. & Hoppe. *Mercurialis perennis* subsp. *ovata* (Sternb.& Hoppe) Celak	P	H	Es	Slenfah, Nabi Yunus.	Hel.ves. Ju.drup.	
65	***Malvaceae***						
399	*Althaea officinalis* L.	P	H		Damascus (Dummar).		C
400	*Althaea cannabina* L. *Althaea kotschyi* Boiss.	P	H		Wadi Barada ,Slenfah.		C
401	*Malva aegyptica* L.	A	Th	Sh-Ar Med	Kesoah ,Dmeir, Adra, Jabal Abiad ,Palmyra, Homs, Maskanih ,Qaryatin ,Tal Daba.		C
402	*Malva parviflora* L.	A	Th	Med IT	Tartous, Damas, Ghotah ,Jabal Qassion ,Kesoah , Homs, Palmyra ,Shahba, Abo shamat.		C
403	*Lavatera punctata* All.	A	Th	Med	As-Sin River, Lattakia.	Q.ca.	S
66	***Hypericaceae***						
407	*Hypericum hircinum* L. *Androsaemum hircinum* (L.) Spach.	P	H	Med	Ain Helakim, Dummar ,Rabweh.		
408	*Hypericum russeggeri* (Fenzl) R.Keller. *Triadenia russeggeri* Fenzl.	P	H	E Med	Banias , Jableh , Messiaf , Cassius.		
409	*Hypericum cardiophyllum* Boiss.	P	H	Med	Darkoush		

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410	*Hypericum pallens* Banks & Sol. *Hypericum cuneatum* Poir.	P	H	Med	Lattakia ,Sarmada ,Cassius.		
411	*Hypericum thymifolium* Banks & Sol. *Hypericum serpyllifolium* Lam.	P	H	Med	Karatchok, Cassius, Kasab, Frenloq, Shokaran, Ain Al-Haramieh.	Q.pub.	C
412	*Hypericum scabrum* L.	P	H		Anti Lebanon, Bloudan, Tal Qulaib.		
413	*Hypericum lydium* (Boiss.) Diagn. *Hypericum hyssopifolium* var. *lydium* Boiss. *Hypericum adenocladum* Boiss.	P	H	E Med	Banias ,Lattakia ,Jabal Matta ,Kaser El-Banat, Jabal Abiad.		
414	*Hypericum triquetrifolium* Turra. *Hypericum crispum* L.	P	H	Med IT	Lattakia ,Ariha ,Idlib ,Banias ,Damas, Misalwn , Kafer, Shahba, Sweida ,Qaryatin.		C
415	*Hypericum perforatum* L.	P	H	Med	Lattakia, Slenfah, Safita, Ain Helakim, Bhamrah, Ain Al-Haramieh, Frenloq, Kasab, Barshin, Al-Btar,Mashta Al-Holw, Qara Douran, Sa'ad Ass'oud .		C
67	***Violaceae***						
416	*Viola sieheana* Becker *Viola riviniana* subsp. *sieheana* (Becker) Hayek. *Viola neglecta* M.Bieb.	P	H	E Med	Ain Al-Haramieh, Frenloq, Kezil Dagh, Hzerin.	Q.pub.	CW
417	*Viola alba* Besser.	P	H	E Med	Ain Al-Haramieh, Slenfah, Hzerin, Qara-Douran.	Q.pub.	C
68	***Tamaricaceae***						
418	*Tamarix smyrnensis* Bunge. *Tamarix pallasii* Desv. Pr.	Ss	Ch	IT	Tartous, Lattakia , Damas, Dummar , Afreen, Damascus , Euphrates river, Jrablus Tiger river, TalKotchak , Khatonieh , Mayadeen , AboKamal , Mserip.		
419	*Tamarix rosea* Bge. *Tamarix syriaca* (Stev.) Boiss	Ss	Ch	IT	Ghab.		
69	***Cistaceae***						
420	*Helianthemum salicifolium* (L.) Mill. *Cistus salicifolium* L.	A P	Th H	Med Eu-Ir	, Wadi Al-Qaren, Maalola , Seydnaya Dmeir, Damascus , Jabal Qassion , Hama, TalKotchak , Sanamin, Shahba, SweidaJabal Al-Hass , Palmyra, Homs , Maskanih, Deir-ez Zour , Mayadeen , Ain Al-Beda , Palmyra.		
421	*Helianthemum nummularium* (L.) Mill. *Cistus nummularius* L. *Helianthemum vulgare* Gaertn. *Helianthemum chamaecistus* Auct. non Mill.	P	H	Med	Shatha, Messiaf, Slenfah, Wadi Qandil ,Kasab, Cassius.		
422	*Fumana scoparia* Pomel.	P	H	Med	Safita, Slenfah, Lattakia ,Harem ,Aleppo.		
423	*Fumana arabica* (L.) Spach. *Cistus arabicus* L.	P	H	Med	Ain Helakim, Ariha , Harem , Kasab, Lattakia.		
424	*Fumana thymifolia* (L.) Vert. *Cistus thymifolius* L. *Fumana glutinosa* (L.) Boiss.	P	Ch	Med	Al-Kabeir river, Harem, Jabal Samaan, Qadmous, Safita, Ghotah, Qara Douran, Qasatel, Akrad Mountain.		W
425	*Cistus creticus* L. *Cistus villosus* L.	P	Ch	Med	Bhamra, Qal'aat Al-Marqub, Kasab, Qasatel, Jiser Al-Shoghour, Hzerin, Messiaf , Qara Douran, Akrad Mountain, Ras Al-Bassit.	C.M.	C
426	*Cistus salviifolius* L.	P	Ch	Med	Lattakia, Bhamrah, Al-Kabeir river, Qasatel, Jiser Al-Shoghour, Hzerin, Qara Douran, Messiaf , Shatha, Ras Al-Bassit, Om Al-Toyour.	C.M.	C
70	***Celastraceae***						
427	*Evonymus latifolius* Gard. Dict.	S	Ch		Barshin.		R
71	***Rhamnaceae***						

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428	*Paliurus spina-christi* Mill. *Rhamnus paliurus* L. *Paliurus aculeatus* Lam.	S	N		Tartous, Lattakia, Wadi Qandil, Hama, Bloudan, Salamieh, Dara'a, Qara Douran, Akrad Mountain, Sweida, Ain Dewar.	C.M.	C
429	*Zizyphus spina-christi* (L.) Willd *Rhamnus spina-christi* L.	S	N		Banias , Hemmah , Damascus	C.M	C
430	*Zizyphus lotus* (L.) Lam. *Rhamnus lotus* L.	S	N		Tiger river, Hama, Salamieh, Banias ,Hemmah.		C
431	*Rhamnus alaternus* L.	S	N	Med	Banias , Bhamrah , Bdama.	Q.I	D
432	*Rhamnus punctata* Boiss.	Ss	Ch	E Med	Ras al-Bassit, Kasab, Wadi Qandil, Qara Douran, Om Al-Toyour.	Q.ca	C
433	*Rhamnus palaestina* Boiss. *Rhamnus lycioides* subsp.*graeca* (boiss. & Reuter) Tutin	Ss	N	Med	Wadi al-Qaren, Yabroud , Shahba, Palmyra, Jabal Al-Beshri, Qara Douran, Sweida, Akrad Mountain, Rakhleh, Qasatel, Wastani mountain Messiaf , Coastal mountain, Wadi Qandil ,	Q.ca	C
72	***Vitaceae***						
434	*Vitis sylvestris* Gmel.	C	Ch		Ghab ,Ain Al-Haramieh, Qara-Douran.	Q.I	
435	*Ampelopsis orientalis* (Lam.) Planchon. *Cistus orientalis* Lam. *Vitis orientalis* (Lam.) Boiss.	C	Ch	E Med	Jubet Barghal ,Nabi Yunus ,Qara-Douran.	Q.pub	R
73	***Lythraceae***						
436	*Lythrum hyssopifolia* L.	A	Th	Cos	Damascus, Bloudan, As-Sin River, Lattakia, Safita, Bhamrah, Homs, Kasab, Ras El-Ain, Qunaytra, Sweida.		C
74	***Myrtaceae***						
437	*Myrtus communis* L.	S	N	Med	Lattakia, Safita, Qastal Maaf, Bdama, Qara Douran, Jiser Al-Shoghour, Hzerin, Om Al-Toyour, Qadmous .	O.C.	C
75	***Onagraceae***						
438	*Circaea lutetiana* L.	Rh	G	Es	Frenloq, Barshin.	O.Q.p.	R
439	*Epilobium montanum* L.	Rh	G		Bloudan.		
440	*Epilobium hirsutum* L. *Epilobium tomentosum* Vent.	Rh	G	Eu-Med Ir	Zabadani, Bloudan, Damascus, Wadi Barada, Qunaytra, Al-Btar ,Akrad Mountain,		C
441	*Epilobium tetragonum* L. *Epilobium adnatum* Griseb.	Rh	G	Scos	Bloudan, Qara-Douran, Arneh, Tal Qulaib , Qanawat, Kafer.		
76	***Thymelaeaceae***						
442	*Lygia aucheri* (Meissn.) Boiss. *Thymlci aucheri* Meissn.	P	H	E Med	Bloudan, Harem, Banias, Qadmous, Hzerin .	G.P.	C
443	*Daphne oleifolia* Lam. *Daphne sericea* Vahl.	Ss	Ch	E Med	Hafeh, Slenfah, Jubet Barghal, Kasab, Ras al-Bassit, Kezil Dagh, Ain Al-Haramieh, Qara Douran, Hzerin, Deir Osman, Shatha	C.M.	C
77	***Elaeagnaceae***						
444	*Elaeagnus angustifolia* L.	S	N	IT	Dimas, Homs, Zabadani ,Arneh ,Maabatli.		C
78	***Araliaceae***						
445	*Hedera helix* L.	C	H	Es Med	Jubet Barghal, Kasab ,Qara-Douran, Hzerin, Messiaf, Nabi Ozair .	Q.pub.	C
79	***Apiaceae***						
446	*Eryngium campestre* L.	P	H		Zabadani , Ariha , HomsSalamieh, Raqqah, Khabour river , Hasakeh , Derbasseah , Jabal Abdullaziz, Sweida , Busra , Izra'a.		
447	*Eryngium falcatum* Laroche	P	H	E Med	Shokaran, Barshin, Qara Douran, Shatha, Akrad Mountain ,Om Al-Toyour, Qasatel.	Q.call.	C
448	*Eryngium maritimum* L.	P	H		Tartous, Lattakia , Banias, Wadi Qandil.		
449	*Anthriscus lamprocarpa* Boiss.	P	H	E Med	Slenfah, Frenloq, Ain Al-Haramieh, Qanawat, Sa'ad Ass'oud	OS.c-Q,ps	C

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450	*Pimpinella cretica* Poir.	A	Th	E Med	Tartous, Banias , Sarmada , Jabal Samaan , Qatana ج , Jabal Qassion , Shahba, Hemmah.		
451	*Danaa cornubiensis* Burn. *Physospermum aquilegifolium* Koch	P	H		Slenfah, Shokaran, Kasab .	O.Q.p.	C
452	*Lecoquia cretica* (Lam.) D.C. *Cachrys cretica* Lam .	P	H	E Med	Slenfah, Ain Al-Haramieh, Barshin, Qara Douran, Abo-Qubais.	Q.C.l.	C
454	*Seseli rubellum* Post.	P	H	E Med	Kezil Dagh.		
455	*Foeniculum vulgare* Mill. *Anethum foeniculum* L. *Foeniculum officinale* All. *Foeniculum capillaceum* Gilib.				Messiaf		
456	*Ammi majus* L.	A	Th		Damas , Adra , Dmeir, Ras El-Ain , Aleppo , Ghab.		C
457	*Ammi visnaga* (L.) Lam. *Daucus visnaga* L.	A	Th		Banias , Lattakia , Khabour river .Arneh , Damas.		C
458	*Bupleurum semicompositum* L. *Bupleurum glaucum* Rob. & Cost.	A	Th		Adra , Dmeir,Tiger river, Khatonieh , Palmyra, Ain Al-Beda , Abo shamat , Khnaseir.		C
459	*Ferula hermonis* Boiss.	P	H		Bloudan.		E
460	*Ferula armandii* Mout.	P	H		Qastal		
461	*Ferulago autumnalis* Thieb.	P	H	E Med	Slenfah, Ain Al-Haramieh, Kasab, Shokaran	Q.C.l.	C
462	*Ferulago cassia* Boiss.	P	H	E Med	Slenfah, Ain Al-Haramieh, Kasab, Qara-Douran.		
463	*Peucedanum mucronatum* Thiéb.	P	H	E Med	Al-Kabeir river,Kezil Dagh, Hzerin, Deir Osman , Salma.	Q.C.l.	W
464	*Johrenia porteri* Post	P	H	E Med	Frenloq, Hzerin	O.Q.p.	
465	*Johrenia dichotoma* D.C.	P	H	E Med	Jabal Matta, Sarmada, Cassius.	C.M.	C
80	***Cornaceae***						
466	*Cornus mas* L.	S	N	Es	Frenloq, Hzerin, Qara-Douran	Q.pub.	RW
467	*Cornus sanguinea subsp. australis* (C.A Meyer) Jav. *Cornus australis* C.A. Mey.	S	N		Jubet Barghal , Slenfah, Jabal Matta, Kasab, Qara-Douran	Q,C.l	R⁻
81	***Ericaceae***						
468	*Arbutus andrachne* L.	S	N	E Med	Banias, Qadmous, Shatha, Qara Douran,Kezil Dagh, Hzerin, Qasatel, Jesr Al-Shoghor, Om Al-Toyour .	Q.I.	C
469	*Erica manipuliflora* Salisb. *Erica verticillata* Forsk.	Ss	Ch	E Med	Tartous, Safita, Messiaf , Kasab, Balloran, Om Al-Toyour, Qadmous, Qasatel	C.M.	C
82	***Primulaceae***						
470	*Anagallis arvensis* L. *Anagallis phoenicea* Scop. *Anagallis caerulea* L.	A	Th	Cos	Ain Helakim, Bhamrah, Homs, Barshin, Maalola, Rabweh, Dara'a, Ain Al-Haramieh, Kasab .		C
471	*Lysimachia dubia* Solander.	A	Th	E Med	Dara'a, Ain Al-Haramieh, Kasab,Kezil Dagh .		W
472	*Cyclamen coum* Mill.	Co	G	Med	Wadi al-Qaren, Bloudan, Qunaytra, Slenfah, Frenloq, Kasab, Barshin.	Q.C.l.	CW
473	*Cyclamen persicum* Mill. *Cyclamen latifolium* Sm.	Co	G	E Med	Qara Douran, Qasatel, Bdama, Jiser Al-Shoghour , Balloran, Shatha, Qadmous.	Q.call.	C
474	*Primula acaulis* (L.)L. *Primula vulgaris* Huds. *Primula veris* var *acaulis* L.	P	H	Es	Safita, Nabi Yunus, Slenfah, Barshin, Ain Al-Haramieh, Qara Douran,Nabi Ozair, Qadmous .	Q.pub. (O.Q.p.)	C
83	***Plumbaginaceae***						
475	*Limonium sieberi* O.Kuntze. *Statice sieberi* Boiss.	P	H	Med	Lattakia , Ras Al-Bassit.		
84	***Styracaceae***						
476	*Styrax officinalis* L.	S	N	E Med	Banias, Al-Kabeir river, Bhamrah, Messiaf , Frenloq, Ain Al-Haramieh, Arneh, Hemmah, Barshin, Harem, Akrad Mountain, Om Al-Toyour, Hzerin, Qara Douran,Coastal mountain , Wastani mountain.	Q.pub.	C

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85	***Oleaceae***						
477	*Olea europaea* L.	T	Ph	Med	Banias , Jabal Matta, Harem, Sarmada , Qara-Douran.	Q.I	C
478	*Phillyrea latifolia* L. *Phillyrea media* L.	T	N	Med	Banias, Tartous, Bdama, Jabal Matta, Akrad Mountain, Ain Al-Haramieh, Kasab, Akrad Mountain, Ariha, Messiaf , Qadmous, Jabal Barakat, Coastal mountain, Messiaf , Akoum.	Q.call.	C
479	*Fontanesia phillyreoides* Labill.	S	N	E Med	As-Sin River, Lattakia ى Jiser Al-Shoghour, Wadi Qandil, Ras Al-Bassit, Cassius .	Q.I.	W
480	*Fraxinus ornus* L.	T	Ph	E Med	Slenfah, Jabal Matta, Ain Al-Haramieh, Kasab, Shokaran, Shatha, Qadmous, Qara Douran,Nabi Ozair, Hzerin.	Q.C.l.	CW
481	*Fraxinus excelsior* L.	T	Ph		Kotchok Darmik		R
482	*Fraxinus angustifolia* subsp. *syriaca* (Boiss.) yalte *Fraxinus syriaca* Boiss.	T	Ph		Damascus , Dummar , Aleppo , Al-Kabeir river , Bloudan, Maalola, Ghab.		R
483	*Jasminum fruticans* L.	Ss	Ch	Med	Safita, Slenfah, Jabal Matta, Salqein, Ariha, Jabal Samaan, Ain Al-Haramieh, Sarmada, Akrad Mountain .	Q.call.	
86	***Apocynaceae***						
484	*Vinca major*.	P	H	Med	Damascus		
485	*Vinca herbacea* Waldst.& Kit. *Vinca libanotica* Zucc.			Med	Zabadani, Bloudan , Seydnaya , Aleppo , KaferAleppo , Homs ,Jabal Al-Hass.		
486	*Nerium oleander* L.	Ss	Ch	Med	, Bhamrah, Qadmous, Kasab, TalKalakh, TalKotchak, Akrad Mountain, Jabal Samaan, Jabal Al-Arab,	O.C.	C
87	***Gentianaceae***						
487	*Blackstonia perfoliata* (L.) Huds. *Centaurium perfoliata* L. *Chlora perfoliata* (L.) L.	A	Th		Bhamrah, Hzerin, Sa'ad Ass'oud .		W
488	*Erythraea centaurium* auct. *Centaurium erythraea* Rafn .	A	Th	Es	Kasab, Ain Al-Haramieh, Frenloq, Safita, Messiaf , Lattakia, Om Al-Toyour, Qara Douran, Hzerin.	C.M.	C
88	***Asclepiadaceae***						
489	*Vincetoxicum canescens* (Willd.) Decne. *Asclepias canescens* Willd. *Cynanchun canescens* (Willd.) K.Schum.	P	H	Med	Jabal Samaan , Jabal Matta.		
490	*Periploca graeca* L.	C	H	E Med	Damascus, Rabweh, Dummar, Ghab .	O.Q.p.	RW
491	*Periploca angustifolia* Labill. *Periploca laevigata* Sensu.	C	H	Med	Qara Douran.		R
89	***Convolvulaceae***						
492	*Convolvulus dorycnium* L.	C/P	H	Med	Aleppo , Tartous, Kasab, Shahba.		
493	*Convolvulus contabrica* L.	C/P	H		Kasab, Lattakia, Ain Helakim , Safita, Hafeh, Jubet Barghal, Slenfah, Ain Al-Haramieh		W
494	*Convolvulus libanoticus* Boiss.	C/P	H		Zabadani, Bloudan.		E
495	*Convolvulus scammonia* L.	C/P	H		Tartous, Bhamrah , Slenfah, Messiaf , Jabal Samaan , Cassius , Banias.		
496	*Convolvulus pentapentaloides* L.	A	Th	Med	Tartous, Banias , Aleppo , Afreen, Jabal Samaan , Homs, Hama , Izra'a, Dara'a , TalHadeed , Homs, Kalakh.		
497	*Calystegia silvatica* (Kit.) Griseb. *Convolvulus silvaticus* Kit. *Convolvulus sylvestris* Willd.	C	H	Med	Zabadani, Qara Douran, Barshin		C
90	***Boraginaceae***						

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498	*Heliotropium bovei* Boiss.	A	Th	Med	Tartous, Lattakia Afreen, Hama Maaret Al-Noaman , Homs, Ariha , Idlib , Damascus , Khatonieh , Zabadani, Bloudan, Qatana , Qal'aat Al-Hosn , Busra.		
499	*Moltkia coerulea* (Willd.) Lehm. *Onosma coerulea* Willd.	P	H		Khatonieh , Raqqah, Palmyra, Tal Daba.		
501	*Onosma syriaca* Labill. *Onosma orientalis* (L.) L. *Cerinthe orientalis* L. *Podonosma syriaca* (Labill) Boiss.	P	H	Med	Darkoush , Harem , Sarmada , Dara'a.		
502	*Onosma frutescens* Lam.	P	H		Bhamrah , Banias , Arneh .		
503	*Onosma cassia* Boiss.	P	H	E Med	Shokaran,Kezil Dagh, Ain Al-Haramieh, Ras Al-Bassit.	Pto.Q.	
504	*Onosma montana* sm. *Onosma stellulata* var. *pallida* (Boiss.) Boiss. *Onosma aucherana* D.C. *Onosma pallida* Boiss.	P	H	E Med	Slenfah, Ras Al-Bassit,Kezil Dagh, Cassius, Qasatel		
505	*Echium glomeratum* Poiret	B/ P	H	Med	Lattakia, Kasab, Cassius, Aleppo, Jabal Samaan, Afreen, Qunaytra,Busra.		
506	*Anchusa hybrida* Ten.	B/ P	H	Med	Safita, Kalakh, Qal'aat Al-Hosn , Jubet Barghal , Anti Lebanon, Rakhleh.		
507	*Anchusa italica* Retz. *Anchusa azurea* Mill.	P	H		Lattakia , Arneh , Aleppo.		C
508	*Myosotis refracta* Boiss.	A	Th		Nabi Yunus, Cassius , Zabadani, Jdaidet Yabus , Wadi Al-Qaren, Bloudan, ج Maalola , Jabal Qassion , KaferSalkhad , Sweida , Shahba, TalShehan.		C
509	*Alkanna orientalis* (L.) Boiss. *Anchusa orientalis* L.	P	H	Med IT	, Haramoun , Maalola , Maarabah Dummar , Rabweh , Adra , Jabal Qassion , Jabal Abdullaziz, Kafer , Sweida , Shahba, Palmyra, Homs.		
510	*Symphytum anatolicum* Boiss.	P	H	E Med	.Hzerin ,Qara Douran ,Frenloq ,Kasab	O.Q.p.	ER
91	***Verbenaceae***						
511	*Verbena officinalis* L.	P	H	Cos	Damascus, Hemmah, Sweida, Qatana, Qara Douran , Ain Dewar, Akrad Mountain.		W
512	*Phyla nodiflora* (L.) Greene . *Verbena nodiflora* L. *Lippia nodiflora* (L.) Michaux.	P	H	Scos	Ghab , Jiser Al-Shoghour, Damascus.		C
513	*Vitex agnus-castus* L.	Ss	Ch	Med IT	Tartous, Kasab, Cassius, Izra'a, Shahba, TalKalakh, Ain Al-Tal, Derick, Jabal Al-Arab, Akrad Mountain, Tiger river		W
92	***Lamiaceae***						
514	*Ajuga orientalis* L.	P	H	Med IT	Safita, Slenfah,ا Shokaran , Ras Al-Bassit, Damascus , Ghotah , Kotchok Darmik , Sweida , Kafer , Harem.		W
515	*Ajuga chamaepitys* subsp. *leavigata* (Boiss.) Briq. *Ajuga laevigata* Boiss. *Teucrium laevigatum* Banks & Sol.	A	Th	E Med	Aleppo , Idlib , Bloudan.		
516	*Ajuga chamaepitys* subsp.*chia* (Schreber) Arcangeli *Ajuga chia* Schreb. *Teucrium chium* (Schreb.) J.F.Gmelim	P	H	E Med	Banias , Sarmada.		
517	*Teucrium creticum* L. *Teucrium rosmarinifolium* Lam.	P	H	E Med	Qadmous , Safita, Tartous, Messiaf , Wadi Qandil , Kasab.		R

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518	*Teucrium lamiifolium* subsp. *stachyophyllum* (P.H.Davis) Hedge & Ekim *Teucrium stachyophyllum* Davis	P	H	E Med	Tartous, Lattakia, Kasab, Cassius, Qara Douran.		
519	*Teucrium chamaedrys* L.	P	H	Es	Banias , Lattakia , Slenfah, Messiaf , Cassius , Kasab.	Q.pub	
520	*Teucrium divaricatum* Helder.	P	H	E Med	Messiaf , Safita.	C.M	
521	*Teucrium polium* L.	P	H	IT Med	Jabal Halimeh , Dmeir, Zabadani, Maalola, Sweida , Palmyra, Tartous, Kasab, Slenfah, Afreen, Jabal Samaan, Ras El-Ain, Ain Dewar, Raqqah, Jabal Qassion, Yabroud , Jabal Abdulaziz, Ariha, Om Al-Toyour.	C.M	C
522	*Prasium majus* L.	P	H	Med	Safita, Hemmah.	Q.I	
523	*Scutellaria heterophylla* Bentham.	P	H	E Med	Messiaf , Lattakia, Cassius, Ain Al-Haramieh	Pto.Q.	C
524	*Scutellaria brevibracteata* subsp. *subvelutina* (Rech.fil.) Greuter & Burdet *Scutellaria subvelutina* Rech. *Scutellaria sibthorpii* auct.	P	H	Med	Messiaf , Slenfah, Kasab, Jabal Samaan, Wadi al-Qaren, Arneh,Sweida,Hzerin.	C.M	C
525	*Lavandula stoechas* L.	P	Ch	Med	Ain Al-Haramieh, Qastal Maaf, Kasab, Ras Al-Bassit, Cassius, Qara Douran, Om Al-Toyour.	C.M	I
526	*Marrubium globosum* subsp. *libanoticum* (Boiss.) P.H.Daves *Marrubium libanoticum* (Boiss.)	P	Ch		Jabal Halimeh.	A.B	
527	*Marrubium vulgare* L.	P	Ch	Med IT	Aleppo , Homs, Ghotah Damascus , Dmeir, Sweida , Qanawat , Yabroud .		
528	*Nepeta italica* L. *Nepeta orientalis* Mill.	P	Ch	E Med	Slenfah, Cassius, TalEqerbrin, Jabal Samaan, Seydnaya, Wadi al-Qaren, Arneh, Qal'aat Al-Hosn .		C
529	*Nepeta cilicica* Boiss.	P	Ch	E Med	Arneh, Slenfah, Bloudan,Ain Al-Haramieh, Cassius, Hzerin.		R
530	*Sideritis libanotica* Labill.	P	Ch	E Med	Ain Al-Haramieh, Cassius, Shokaran, Ras Al-Bassit, Jabal Halimeh, Maalola .		C
531	*Sideritis syriaca* subsp.*nusairiensis* (Post) Huber-Morath *Sideritis nusairiensis* Post	P	Ch	E Med	Messiaf , Slenfah, Jabal Matta, Jubet Barghal.		
532	*Sideritis perfoliata* L. *Sideritis glandulifera* Post *Sideritis dictyoneura* Rech.	P	Ch	E Med	Jabal Matta, Harem, Qatma, Ras Al-Bassit, Ain Al-Haramieh, Kasab, Qara-Douran		C
533	*Prunella vulgaris* L.	P	H	Es	Frenloq, Kasab, Ras Al-Bassit.		W
534	*Prunella orientalis* Bornm. *Prunella grandiflora* Sensu.	P	H	E Med	Lattakia, Messiaf , Slenfah, Cassius, Ain Al-Haramieh, Frenloq, Shokaran, Deir Osman .	O.Q.p	C
535	*Phlomis brachyodon* subsp. *domascena* (Bornm.) Sam. *Phlomis orientalis* var. *damascena* Bornm. *Phlomis damascena* Rech.	P	Ch	Med	Anti Lebanon , Wadi Barada , Wadi Barada , Wadi Barada, Dummar , Doma , Jabal Qassion , Dimas, Kesoah, Hissah, Palmyra, ,Deir Attieh.	C.M	E
536	*Phlomis chrysophylla* Boiss.	P	Ch	E Med	Zabadani, Wadi Al-Qaren, Kasab, Qara-Douran.		I
537	*Phlomis viscosa* Poiret.	P	Ch	E Med	Masada, Lattakia , Qal'aat Al-Marqub , Slenfah, Cassius.		I
538	*Phlomis longifolia* Boiss. & B1anche *Phlomis bertrami* Post	P	Ch	E Med	Banias , Safita, Messiaf , Hafeh, Ain Helakim, Slenfah, Jabal Matta, Wadi Qandil.	Q.pub	
539	*Phlomis rigida* Labill.	P	Ch	E Med	, Anti Lebanon Damascus , Wadi Al-Qaren, Jdaidet Yabus , Arneh , Damascus, Qunaytra , Qunaytra , Shahba.		

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540	*Lamium striatum* Sibth.et Smith. *Lamium garganium* subsp. *striatum* (Sm.)Hayek	P	H	E Med	Wadi Al-Qaren, Wadi Barada , Yabroud , Maalola.		
541	*Lamium truncatum* Boiss.	P		E Med	, Bhamrah, Slenfah, Frenloq,Kasab, Ain Al-Haramieh, Qara Douran, Hzerin, Kaferon.	Q.pub	C
543	*Molucella spinosa* L.	P	Ch	Med	Tartous, Lattakia , Safita, Banias , Cassius.		
544	*Stachys cretica* subsp. *vacillans* Rech. Fil.	P	Ch	Med	Anti Lebanon, Wadi Al-Qaren, Maalola , Bloudan , Arneh , Qal'aat Al-Hosn , Safita, Slenfah, Bhamrah, Qadmous , Shahba, Qatma , Aleppo.		
545	*Stachys viticina* Boiss.	P	H/Ch	E Med	Wadi Qandil, Kasab, Ain Al-Haramieh		C
546	*Stachys hydrophila* Boiss.	P	H/Ch	Med			E
547	*Stachys distans* Bentham	P	H/Ch	Med	Banias		E
548	*Stachys nivea* Labill.	P	H/Ch	E Med	Ain Al-Haramieh, Al-Kabeir river		WE
549	*Salvia pinardii* Boiss.	P	H/Ch	IT	, Damascus , Wadi Al-Qaren , Masada , Bloudan, Qal'aat Jandal , Arneh , Damascus , Dimas, Dummar ,Jabal Abo-Ata, Sweida , Kafer, Tal Qulaib , Salkhad , Jabal Abiad , Jabal Bishri.		
550	*Salvia tomentosa* Mill. *Salvia grandiflora* Etli.	Ss	H/Ch	Med	,Bhamrah,Hafeh, Nabi Yunus, Slenfah,Kasab, Qara Douran, Qasatel,Hzerin	C.M	C
551	*Salvia aramiensis* Rech. fil.	P	H	E Med	Ain Al-Haramieh, Cassius,Kezil Dagh, Shokaran, Kasab, Om Al-Toyour.	Pto.Q.	C
552	*Salvia fruticosa* Miller. *Salvia triloba* L.fil. *Salvia libanotica* Boiss. & Gail.	P	H	Med	Qadmous.		
553	*Salvia viscosa* Jacq.	P	H	Med	Bhamrah , Ain Helakim , Messiaf , Slenfah.		
554	*Salvia judaica* Boiss.	P	H	E Med	Lattakia, Slenfah, Ras Al-Bassit, Kasab, Cassius .		C
555	*Salvia viridis* L.	A	Th	Med	Aleppo , Banias.		
556	*Melissa officinalis* L.	P	H	E Med	Ghotah , Qanawat, Hama, Cassius, Barshin, Harem, Hafeh, Qara Douran, Qasatel,Nabi Ozair, Ain Dewar, Drekish.	O.Q.p.	C
557	*Satureia myrtifolia* (Boiss & Holen.) Greuter & Burdet *Micromeria myrtifolia* (Boiss. & Hohen.)	P	H	E Med	Lattakia, Slenfah, Messiaf , Cassius Jabal Qassion, Shatha, Qasatel, Ghab, Balloran, Hafeh, Ain Helakim, Ras Al-Bassit, Bayer,Nabi Ozair, Jabal Barisha, .	C.M	I
558	*Satureia libanotica* (Boiss.) Briq. *Micromeria libanotica* Boiss.	P	H		Tal'at Mousa.		
559	*Satureia serpyllifoila* (MB.) Boiq. *Micromeria serpyllifolia* (Bieb.) Boiss. *Nepeta serpyllifolia* Bieb.	P	H		Qara Douran.		R
560	*Satureia calamantha* (L.)Secheele *Calamintha nepeta* Sensu. *Melissa calamintha* L. *Calamantha officinalis* Moench.	P	H	Med	Bayer, Al-Basset,Nabi Ozair.		C
561	*Satureia vulgaris* (L.) Fritsch *Calamintha clinopodium* Spenner *Calamantha vulgaris* (L.) Halacsy. *Clinopodium vulgare* L.	P	H	Es	Slenfah, Kasab, Cassius, Shokaran, Frenloq, Ain Al-Haramieh, Hzerin.	Q.pub.	C
562	*Ziziphora capitata* L.	A	Th	MEDIT	Qamishli , Tiger river, Hafeh, Slenfah, Ain Al-Haramieh, Lattakia , Wadi Qandil , Aleppo , Qatma , Homs , Yabroud , Jabal Qassion , Kafer , Sweida , Tal Qulaib , Sanamin.		
563	*Origanum syriacum* L. *Majorana syriaca* (L.) Rafin. *Origanum maru* L.	P	H	E Med	Slenfah, Rowaedif, Cassius, TalKalakh, Qara Douran, Dara'a, Shatha, Mashta Al-Holw, Hzerin, Barshin, Qadmous, Om Al-Toyour.	C.M	C

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564	*Thymus syriacus* Boiss.	P	H		Cassius , Drekish , Qal'aat Jandal , Anti Lebanon, Wadi Al-Qaren, Jdaidet Yabus , Qatma , Aleppo , Hama , Dimas, Hasakeh , Jabal Abdullaziz, Misalwn, Qunaytra , Ras El-Ain , TalAbiad , , Khatonieh , Palmyra.	C.M	CD
565	*Thymus cilicicus* Boiss. & Bal.	P	H	E Med	Lattakia, Slenfah, Ain Al-Haramieh,Kasab, Ras Al-Bassit.	Pto.Q.	E
566	*Lycopus europaeus*	P	H	Es	Rabweh, Damascus, Ghotah, Hemmah, Aleppo, Hama.		
567	*Mentha pulegium* L.	P	H	Med	Kasab, Lattakia, Homs, Hzerin		
568	*Mentha aquatica* L.	P		IT	Homs.		
570	*Mentha spicata* subsp. *condensata* (Briq.) Greuter & Burdet *Mentha microphylla* C.Koch. *Mentha sieberi* C.Koch.	P	H	Med	Slenfah, Jabal Matta , Kalakh, Damascus, Dimas, Damascus, Hama, Aleppo , Sweida , Haramoun, Arneh .		
93	***Solanaceae***						
571	*Physalis alkekengi* L.	P	H	Eux	Akrad Mountain		
572	*Lycium europaeum* L.	Ss	Ch		Damascus		
573	*Lycium barbarum* L.	Ss	Ch		Lattakia , Aleppo , Homs, Qal'aat Al-Hosn , Salhiyeh , Yabroud , Khatonieh , Sweida , Ain Al-Beda , Mayadeen , AboKamal		C
574	*Solanum nigrum* L.	A	Th	Cos	Damascus , Banias , Bhamrah , Qanawat.		
575	*Solanum dulcamara* L.	P	H		Ghotah, Damascus, Doma.		W
576	*Datura stramonium* L.	A	Th	Cos	Banias , Damascus		
577	*Hyoscyamus reticulatus* L.	A	Th		Dimas , Misalwn , Seydnaya , Maalola , Wadi Al-Qaren, Aleppo , Azaz , Jabal Samaan , Homs, Qamishli , TalKotchak , Sanamin, Qaryatin.		
578	*Hyoscyamus albus* L.				Jableh , Kasab, Aleppo , Jabal Samaan , Shahba, Sweida , Palmyra, Homs.		
579	*Hyoscyamus aureus* L.	P	H		Lattakia , Messiaf , Damas, Jabal Qassion , Banias , Jabal Abdullaziz , Jabal Abiad , Izra'a, Abo shamat , Palmyra		
94	***Scrophulariaceae***						
580	*Verbascum agrimoniifolium* Hub.-Mor. *Celsia heterophylla* Desf. *Celsia agrimoniaefolia* C.Koch.	P	H	IT	Rabweh ,Qunaytra, Hemmah , Izra'a, Sweida, Qanawat, Kafer, Derick.	Pto.Q.	C
581	*Verbascum pinetorum* (Boiss.) O.Kuntze *Celsia pinetorum* Boiss.	P	H	E Med	Ain Al-Haramieh,Frenloq,Qastal Maaf,Shokaran.		WE
582	*Verbascum infidelium* Boiss. & Hausskn.	P	H	E Med	Ain Al-Haramieh, Frenloq, Hzerin		WE
583	*Verbascum tripolitanum* Boiss.	P	H	E Med	Zabadani, Bloudan , Lattakia, Ain Al-Haramieh, Wadi Qandil, Kasab, Slenfah, Bdama, Ras El-Ain .		
584	*Verbascum caesareum* Boiss.	P	H	E Med	, Slenfah, Qara Douran, Kasab, , Qasatel.		
585	*Anarrhinum orientale* Benth. *Linaria damascena* Boiss & Gaill.	P	Ch	IT	Wadi al-Qaren, Maalola, Yabroud , Zabadani, Kasab, Cassius, Aleppo, Jabal Qassion, Qanawat, TalShehan, Tal Qulaib, Palmyra .		
586	*Scrophularia umbrosa* Dum. *Scrophularia macrophylla* Boiss. *Scrophularia pisidica* Boiss. & Heilder.	P	H	Es	Frenloq, Ain Al-Haramieh, Messiaf , Rabweh , Zabadani, Homs , Ain Dewar		R
587	*Veronica leiocarpa* Boiss. *Veronica stenobotrys* Boiss.	P	H		Jiser Al-Shoghour, Hafeh, Kasab, Kasab -Ras Al-Bassit , Cassius , Ain Al-Haramieh, Ras Al-Bassit, Kezil Dagh, Shokaran , Sweida.		

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588	*Veronica macrostachya* subsp. *macrostachya* *Veronica aleppica* Boiss.	P	H	Med	Slenfah, Bhamrah, Hafeh, Ain Helakim, Idlib, Akrad Mountain, Ariha, Aleppo,Ras Al-Bassit, Kasab, Cassius, Sweida.		C
589	*Bellardia trixago* L. All. *Bartsia trixago* L. *Rhinanthus trixago* L. *Trixago apula* Stev .	A	Th		Tartous, Qal'aat Al-Marqub , Banias , Lattakia , Safita, Hafeh, Bhamrah , Tiger river.		
590	*Veronica syriaca* Roem. & Sch. *Veronica pedunculata* Labill. non Vahl.	A	Th	Med	Hafeh , Kasab, Aleppo, Homs, Jabal Al-Arab, Izra'a , Wadi Al-Qaren .		C
591	*Siphonostegia syriaca* Boiss. *Lesquereuxia syriaca* Boiss. & Reut.	P	H	Med	Ain Al-Haramieh, Shokaran, Qara Douran, Qadmous, Hzerin .	G.P.	CW
592	*Parentucellia latifolia* (L.) Caruel. *Euphrasia latifolia* L. *Eufragia latifolia* (L.) Griesb. *Bartsia latifolia* (L.) Sibth. & Sm.	P	H		Ras Al-Bassit , Aleppo, Khan Sheikhon, Maaret Al-Noaman, Jabal Qassion, Bloudan, Wadi al-Qaren, Jabal Abdulaziz , Palmyra, Tiger river, Karatchok, Sweida, Qanawat.		CW
94	***Globulariaceae***						
593	*Globularia trichosantha* Fisch. & Mey.	P	H		Banias , Qadmous , Qadmous Messiaf .		
95	***Acanthaceae***						
595	*Acanthus syriacus* Boiss.	P	H	Med IT	Safita, Qara Douran, Hemmah, Arneh.		W
96	***Orobanchaceae***						
596	*Cistanche phelypaea* (L.) Coutinho. *Phelipaea lusitanica* Cosson *Cistanche tinctoria* Sensu	P	H		, Palmyra, Abo shamat , Ain Al-Beda , Qaryatin , Kaser Al-Heer.		
597	*Orobanche major* L. *Orobanche elatior* Sutton	E	E		Ras Al-Bassit, Ain Al-Haramieh,Kezil Dagh, Jubet Barghal, Slenfah.		C
97	***Plantaginaceae***						
598	*Plantago major* L.	P	H	Cos	Coastal mountain, Damascus, Homs, Qara Douran, Hzerin, Ain Dewar		C
	Plantago lanceolata L.	P	H	Med	Damascus , Hemmah , Ghotah , Aleppo , Qatma , Bloudan, Homs, Hama		
	Plantago ovata Forssk.	P/ A	Th		Jabal Qassion , Raqqah, Hasakeh , Deir-ez Zour , Maskanih, Palmyra , Salhiyeh , Jabal Abiad , Abo shamat , Qaryatin , Damascus , Dmeir, Khnaseir .		
599	*Plantago coronopus* L.	A/ P	T H	Es	Banias , Qastal Maaf.		
98	***Rubiaceae***						
600	*Putoria calabrica* (L.f.) Pers. *Asperula calabrica* L.f.	P	Ch	Med	Messiaf , Jubet Barghal, Al-Kabeir river, Kasab, Homs, Qal'aat Al-Hosn , Mashta Al-Holw, Hzerin, Qadmous .	G.P.	R
601	*Rubia aucheri* Boiss.	P	H	Med	Hafeh, Slenfah, Messiaf, Nabi Yunus , Shokaran , Cassius.	Q.C.l	C
602	*Rubia tinctorum* L.	P	H	Med IT	Bloudan, Zabadani, Damascus , Rabweh , Dummar , Hama, Homs, Banias.		
603	*Rubia tenuifolia* Var. *stenophylla* Bolss. Diagn. *Rubia olivieri* A.Rich.	C	H	Med	Zabadani, Bloudan, Wadi Al-Qaren, ج Maalola , Yabroud , Slenfah, Bhamrah , Ras Al-Bassit, Kasab, Kezil Dagh, Jabal Samaan , Jabal Al-Arab , Kafer , Ain Al-Khadra, Haramoun.	Q.ca	
604	*Crucianella macrostachya* Boiss.	A	Th	E Med	Bloudan, Zabadani, , Tartous, Lattakia , Ain Helakim , Aleppo , Sweida , Shahba.		
605	*Crucianella imbricata* Boiss.	A	Th	E Med	Ain Al-Haramieh, Qara Douran,Akrad Mountain,Nabi Ozair		
606	*Crucianella exasperata* Fisch. & Mey.	A	Th	IT	, Khatonieh , Hasakeh , Deir-ez Zour , Masada, Palmyra.		

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607	*Asperula stricta* Boiss.	P	H	E Med	Jiser Al-Shoghour, Qadmous, Messiaf , N-E-Lattakia, Jabal Matta, Kasab, Cassius, Ain Al-Haramieh, Bloudan , Hzerin .	C.M	C
608	*Asperula libanotica* Boiss.	P	H	Med	Ras Al-Bassit.		E
609	*Galium constrictum* Chaub. *Galium palustre* L.	P	H	Es	Lattakia , As-Sin River , Bhamrah , Homs.		
610	*Galium bassitense* Thiéb.	P	H	IT	Ras Al-Bassit, Ain Al-Haramieh, Qara Douran, Slenfah .		C
611	*Galium canum* Requien.	P	H	E Med	Zabadani, Anti Lebanon, Maalola , Yabroud , Rabweh , Ain Al-Khadra, , در Damascus ج , Jabal Qassion , Hama, Sarmada , Jabal Samaan , Qara-Douran, Ras Al-Bassit.		
612	*Galium tricornutum* Dandy. *Galium tricorne* Stokes in With.	A	Th	Med IT	Messiaf , Lattakia , Rajo, Midan Akbas, Hama , Homs, Salamieh, Aleppo , Wadi Al-Qaren, Bloudan, Yabroud , Damascus , Jabal Qassion , Misalwn, Sanamin , Sweida ,Abo shamat , Palmyra.		
613	*Galium aparine* L.	A/P	Th H	Eu-Med I	Wadi al-Qaren, Jdaidet Yabus,Sweida, Tal Qulaib,Homs, Nabi Yunus, Damascus, Hzerin		W
614	*Galium spurium* L.	A	Th	Es	Jdaidet Yabus ج , Maalola , Wadi Al-Qaren, Al-Rastan, Yabroud ,Jabal Abo-Ata, Aleppo , Karatchok Dagh, Tiger river , Dmeir, Jabal Abiad.		
615	*Galium verticillatum* Danth in Lam.	A	Th	Med	Zabadani, Wadi Al-Qaren, Bloudan, Maalola ,Deir Attieh, Cassius , Palmyra , Jabal Abiad , Shahba.		
616	*Cruciata coronata* Ehrendorfer. *Galium coronatum* Sibth.	P	H	IT Med	Wadi Barada, Arneh, Wadi al-Qaren, Cassius, Kasab, Jabal Qassion, Ain Helakim, Ghab.		W
99	***Caprifoliaceae***						
617	*Sambucus ebulus* L.	Ss	Ch	Es	Lattakia , Slenfah, Banias , Cassius.		I
618	*Lonicera etrusca* G.Santi.	C	Ch	Med	Zabadani, Tartous , Ain Helakim, Masada, Qunaytra.	Q.I	
619	*Lonicera nummulariifolia* Jaub. & Spach. *Lonicera persica* Jaub. & Spach.	C	Ch	Med	Tal Qulaib , Arneh .		
620	*Lonicera caucasica* subsp. *orientalis* (Lam.)Chamberlain & Long. *Lonicera orientalis* Lam.	C	Ch		Slenfah.	Q.C.l	
100	***Valerianaceae***						
621	*Valeriana dioscoridis* Sibth. et Sm. *Valeriana italica* Lam. *Valeriana sisymbrifolia* Desf.	P	H	IA E Med	Qadmous, Slenfah , Kasab, Cassius, Wadi al-Qaren,Abo-Qubais		W
622	*Centranthus longiflorus* Stev.	P	H		Zabadani, Bloudan, Wadi Al-Qaren , Arneh ,. Rakhleh , Wadi Barada.		R
101	***Dipsacaceae***						
623	*Cephalaria amana* Rech. Fil.	P	H	E Med	Jiser Al-Shoghour, Al-Kabeir river, Jabal Matta,Kezil Dagh, Shokaran .		E
624	*Scabiosa palaestina* (L.) Rafin.	A	Th	IT	Sweida , Qanawat , Ain Helakim, Wadi Al-Qaren, Aleppo.		
102	***Cucurbitaceae***						
625	*Ecballium elaterium* (L.) A.Richard.	P	Ch	Med	Damascus , Qunaytra , Homs, Hama, Sweida , Shahba, Dara'a .		CI
626	*Bryonia multiflora* Boiss. & Helder.	C	Ch	I	Lattakia , Tartous, Wadi Al-Qaren , Jabal Samaan , Hemmah.	Q.ca	
627	*Bryonia syriaca* Boiss .	C	Ch	Med	Hemmah.	Q.ca	

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628	*Bryonia lasiocarpa* Mouterde.	P	Ch	End	Tal Qulaib.		E
103	*Campanulaceae*						
629	*Campanula strigosa* Banks & Solander	A	Th	Med IT	Qal'aat Al-Marqub , Lattakia , Tartous, Qadmous , Ain Helakim, Cassius , Wadi Qandil , Zabadani , Bhamrah , Wadi Al-Qaren, Seydnaya , Aleppo , Homs, , Jiser Al-Shoghour, Sweida , Dara'a , Hama, Midan Akbas, Arneh , Damas, Wadi Barada.		
630	*Campanula peregrina* L.	P	H	E Med	Slenfah, Frenloq, Kasab, Sa'ad Ass'oud, Hzerin, Mashta Al-Holw .	O.Q.p.	C
631	*Campanula rapunculus* L.	P	H	Es	Ain Helakim, Bhamrah, Hafeh, Slenfah, Kasab, Messiaf , Cassius, Ain Al-Haramieh, Wadi al-Qaren, Bloudan,Kafer, Qunaytra, Qanawat, Jabal Samaan, Barshin, Qara Douran, Hzerin .	Q.pub.	C
632	*Campanula phrygia* Jaub. & Spach.	A	Th		Wadi Al-Qaren, Tal Qulaib.		
633	*Campanula retrorsa* Labill.	A	Th	E Med	Tartous, Bhamrah , Ain Helakim, Safita, Messiaf , Wadi Qandil , Kasab, Qara-Douran, Jabal Samaan , Hama, Homs.		
634	*Michauxia campanuloides* L'Hérit. *Mindium campanuloides* L'Hérit.	P	H	E Med	Ain Helakim, Kasab,Kezil Dagh, Qal'aat Al-Hosn, Mashta Al-Holw .		C
635	*Legousia falcata* (Ten.) Fritsch. *Prismatocarpus falcatus* Ten . *Specularia falcata* (Ten.) DC.	A	Th		Tartous, Kasab, Bhamrah, Slenfah, Qadmous, Messiaf , Qanawat, Shahba, Qara Douran, Akrad Mountain,Nabi Ozair .		W
104	***Asteraceae***						
636	*Eupatorium cannabinum* L.	P	Ch	Es	Rabweh, Wadi Barada, Frenloq, Hzerin , Sa'ad Ass'oud.	O.Q.p.	W
637	*Bellis annua* L.	A	Th		Banias , Lattakia , Homs, Wadi Al-Qaren, Qunaytra.		C
638	*Bellis perennis* L.	A	H	EU-Med	Slenfah, Nabi Yunus, Wadi al-Qaren, Yabroud , Damascus ,Dummar, Homs, Qaryatin, Wadi Barada, Aleppo,Afreen,Kafer ,Hzerin,Qara Douran.		C
639	*Inula viscosa* (L.) Aiton. *Erigeron viscosum* L . *Dittrichia viscosa* (L.) Greuter.	P	Ch	Med	Damascus, Rabweh, Qanawat, Kasab , Akrad Mountain,Nabi Yunus,Qasatel		C
640	*Phagnalon rupestre* (L.)A.DC. *Conyza rupestris* L.	P	H		Qal'aat Al-Marqub Lattakia , Safita, Jabal Samaan, Aleppo , Jabal Qassion , Hama , Sweida , Qaryatin , Palmyra, Deir-ez Zour.		
641	*Helichrysum conglobatum* (Viv.) Steudel subsp. *conglobatum* *Gnaphalium stoechas* auct. non L. *Gnaphalium barrelieri* Ten. *Gnaphalium siculum* Sprengel *Helichrysum stoechas* subsp. *barrelier* (Ten.) Nyman *Helichrysum siculum* Boiss. *Helichrysum siculum* var. *brachyphyllum* Boiss.	P	H	Med	Lattakia , Messiaf , Safita, Tartous, Al-Kabeir river , Bhamrah , Wadi Qandil.		
642	*Helichrysum plicatum* subsp. *Plicatum* Author. *Helichrysum anatolicum* Boiss. *Helichrysum mouterdei* Arenes.	P	H		Banias , Coastal mountain.		
643	*Helichrysum sanguineum* (L.) Kostel. *Gnaphalium sanguineum* L.	P	H	E Med	Banias, Al-Kabeir river, Bhamrah, Ras Al-Bassit, Safita, Tartous , Qara Douran.	C.M.	
644	*Xanthium spinosum* L.	A	Th	Scos	Jableh , Damas, Damascus Qunaytra , Al-Rastan		
645	*Xanthium echinatum* Murray.	A	Th		Al-Kabeir river , Euphrates river , Deir-ez Zour , Hemmah.		
646	*Achillea fragrantissima* (Forssk.) Schultz Bip.	P	H	Ir-Tu Sh-Ar	, Deir Attieh, Damascus, Adra , Doma, , Dmeir, Palmyra, Kaser Al-Heer , Shahba, TalShehan , Dara'a.		

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647	*Achillea wilhelmsii* C.Koch. *Achillea santolina* L. *Achillea eriophora* D.C.	P	H		Deir-ez Zour , Palmyra, Qamishli , Maskanih, Ain Al-Tal Aleppo , AfreenHoms,Deir Attieh, Bloudan , Damas , Jabal Qassion , Dmeir, Adra , Sanamin, Shahba, Tal Qulaib.		
648	*Achillea biebersteinii* Afan. *Achillea micrantha* Willd.	P	H		Afreen, Homs , Damascus , Dummar , Doma , Kesoah , Misalwn, Hauran , Sweida , Kafer, Tal Qulaib, Wadi Al-Qaren.		
649	*Anthemis tinctoria* L.	P	H	Es	Messiaf , Ain Al-Haramieh, Qastal Maaf, Kasab, Shokaran .		W
650	*Anthemis wettsteiniana* Hand.-Mazz. *Anthemis deserti-syriaca* Eig. *Anthemis deltawensis* Eig. *Tripleurospermum grandiflorum* Bornm.	P	Th		Jabal Qassion , Qaryatin , Kaser Al-Heer , Palmyra.		
651	*Tripleurospermum oreades* Rech.fil. *Chamaemelum oreades* Boiss. *Tripleurospermum grandiflorum* Bornm. *Chamaemelum grandiflorum* Boiss. & Hausskn.	P	H	E Med	Yabroud , Maalola, Bloudan, Jdaidet Yabus, Wadi al-Qaren, Wadi Barada, Jabal Qassion, Slenfah, Nabi Yunus,Kezil Dagh, Homs, Aleppo, Sarmada, Sweida, Kafer , Mashta Al-Holw .		
652	*Matricaria chamomilla* L.	A	Th	Med	Lattakia, Safita, Qal'aat Al-Hosn, Ain Al-Haramieh, Barshin .		W
653	*Chrysanthemum coronarium* L.	A	Th	Med	Lattakia , Safita, Hama, Damascus , Hemmah.		
654	*Tanacetum cilicium* (Boiss.) Grierson *Pyrethrum cilicium* Boiss. *Chrysanthemum cilicium* (Boiss.) Bornm.	P	H	E Med	Ain Helakim, Jabal Matta, Cassius, Ain Al-Haramieh,Kezil Dagh, Frenloq, Shokaran, Barshin.	Q.C.l.	CI
655	*Artemisia herba-alba* Asso.	Ss	Ch	IT	Salamieh, Homs, Maalola , Dmeir, Wadi Barada , Maarabah ج , Jabal Qassion , Adra , Kesoah ,Damascus ,Salhiyeh , Palmyra, , Kaser Al-Heer , Ain Al-Beda , Qaryatin , Jabal Abiad , Jabal Abdullaziz, TalKotchak , Khatonieh		C
656	*Tussilago farfara* L.	P	H		Deir Osman, Jiser Al-Shoghour.		R
657	*Doronicum orientale* Hoffm. *Doronicum caucasicum* Bieb.	P	H	Med	Hafeh,Slenfah,Ras Al-Bassit,Frenloq,Barshin,Qara Douran.	Q.C.l.	C
658	*Senecio vernalis* Waldst. & Kit.	A	Th		Bhamrah, Qal'aat Al-Hosn, Bloudan, Wadi al-Qaren, Rabweh, Damascus, Homs, Aleppo, Izra'a , Sweida, Ain Al-Haramieh, Kasab .		
659	*Calendula officinalis* Asso.	A	Th	Cos	Homs, Damascus.		
660	*Gundelia tournefortii* L.	P	H	IT	Haramoun,Wadi al-Qaren,Sweida,Shahba,Deir-ez Zour, Hama, Jabal Al-Beshri, Jabal Abdullaziz ,Qara Douran ,		
661	*Echinops viscosus* D.C.	P	H	E Med	Slenfah, Darkoush, Qunaytra, Aleppo, Yabroud , Qara Douran .		
662	*Cirsium vulgare* (Savi.) Tenore. *Cardus vulgaris* Savi. *Cirsium lanceolatus* L. *Cirsium lanceolatum* (L.) Scop.	A			Frenloq, Damascus, Ghotah .		W
663	*Ptilostemon diacantha* subsp. *turcicus* Greuter.	Ss	Ch	E Med	Qara Douran	C.M.	W
664	*Serratula cerinthifolia* (Sm.) Boiss. *Centaurea cerinthifolia* Sm.in Sibth. et Sm *Serratula behen* (L.) Lam.	P	H	Med	Aleppo, Messiaf, Damascus	C.M.	C
665	*Serratula pusilla* (Lab.) Dittrich. *Cynara pusilla* Lab. *Rhaponticum pusillum* (Lab.) Boiss. *Centaurea pygmaea* (D.C.) Benth.	P	H	Med	Kezil ,Ras Al-Bassit ,Frenloq ,Qara Douran . Dagh		
666	*Centaurea dumulosa* Boiss.	P	H				

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667	*Centaurea cassia* Boiss. *Centaurea jacea* var. *cassia* (Boiss.) Briquet.	P	H	E Med	Qara Douran, Kezil Dagh, Cassius, Arneh, Qatana, Wadi al-Qaren, Jabal Qassion, Jabal Abdulaziz, Kafer, Hzerin , Qanawat,Shahba, Tel- Qulleb,Qunaytra,Jabal Al-Hass , , Qadmous.	Q.C.l.	C
668	*Centaurea cheirolopha* (Fenzl) Wagenitz. *Chartolepis cheirolopha* Fenzl. *Centaurea cheiracantha* Fenzl. ex. Boiss.	P	H	E Med	Bloudan, Wadi al-Qaren, Zabadani, Aleppo, Hama, Arneh, Safita, Sweida		
669	*Centaurea arifolia* Boiss.	P	H	E Med	Frenloq, Ain Haramiyeh.	Pto.Q.	E
670	*Siylbum marianum* (L.) Gaertner *Carduus marianus* L.	P	H	Med	Lattakia, Homs, Damascus		C
671	*Ptosimopappus bracteatus* Boiss. *Centaurea ptosimopappa* Hayek. *Petrodavisia bracteata* (Boiss.) Holub.	Ss	Ch	E Med	Yabroud , Maalola , Dimas ,Dummar ,Jabal Abiad , Palmyra.	Pto.Q.	E
672	*Centaurea iberica* Trev. ex Sprengel. *Centaurea damascena* Boiss.	P/ A	Th/H	IT	Ain Helakim, Jabal Matta, Cassius, Kasab, Shokaran, Kezil Dagh, Ain Al-Haramieh .		
673	*Cichorium intybus* L.	P	H		Qadmous, Messiaf , Banias , Slenfah, Cassius , Kasab, Shokaran.		
674	*Lapsana communis* subsp. *ramosissima* (Boiss.) Rech.f. *Lapsana ramosissima* *Lapsana peduncularis* Boiss.	P	Th	E Med	Frenloq, Jubet Barghal.	C.M.	C
675	*Tragopogon hybridum L.* *Geropogon glabrum* L. *Geropogon hirsutum* L. *Geropogon hybridus* (L.) Schultz Bip.	P	Th		Tartus, Bassit, Homs, Afrin, Sweida, Aleppo.		
676	*Tragopogon buphthalmoides* (D.C.) Boiss.	P	H	IT	Cassius ,Ras Al-Bassit,Ain Al-Haramieh Kasab.		
677	*Scorzonera mollis* M.Bieb. *Scorzonera syriaca* Boiss. & Bal.	P	Ch	Med IT	Lattakia ,Jabal Samaan ,Homs ,Damascus , Izra'a .		
678	*Taraxacum officinale* Webber. *Taraxacum kurdiciforme* Hagl. *Taraxacum laxum* Hagl.	P	H		Damascus, Yabroud, Dummar.		
679	*Scariola orientalis* (Boiss) Sojak *Phaenopus orientalis* Boiss. *Lactuca orientalis* (Boiss.) Boiss.	P	Ch		Wadi ,Ain Al-Haramieh ,Ras Al-Bassit ,Cassius ,Qastal Maaf ,Qandil,Ras al-Bassit,Shokaran . Om Al-Toyour		
680	*Crepis reuteriana* subsp. *reuteriana* Boiss.	P	H	E Med		Q.pub.	C
681	*Crepis pulchra* L.	A	Th			Q.pub	
682	*Crepis syriaca* (Bornm.) Babcock & Nav. *Crepis alpina* var. *syriaca* Bornm.	A	Th	E Med			
683	*Hieracium bauhinii* Besser. *Hieracium auriculoides* A.F.Lang.	P	H				CW

Appendix 2: Relevés data:

Species code	Relevés number	A02	A24	B03	C04	C09	C10	C11	L06	L05	C07	C08	L22	R08	R09	A04	A12	C13	C12	C18	A27	C24	C15	C20	Constancy
	Altitude m	380	520	240	170	460	420	240	420	350	420	700	180	240	365	370	490	370	300	460	820	650	300	480	
	Exposition	SE	NW	SE	NW	-	NW	W	SW	-	E	N	S	N	E	-	N	-	-	E	N	N	S	SW	
	Slope %	25	30	40	60	-	20	10	25	-	10	20	20	30	40	-	20	-	-	30	40	30	40	50	
	Total cover %	30	50	30	70	50	35	40	65	30	40	50	80	20	40	70	30	60	20	80	20	75	50	60	
	Trees cover %	-	40	-	10	-	10	25	-	-	-	5	70	-	-	-	60	85	-	80	15	10	10	20	
	Shrubs cover %	-	-	10	30	-	25	30	-	-	-	50	70	10	20	-	40	50	60	15	10	60	40	20	
	Ground cover %	-	-	-	40	-	30	45	-	-	-	20	30	-	-	-	40	70	-	5	5	20	10	50	
	Parent rock	Cal.	Cal.	Cal.	Cal.	Cal.	Cal.	Cal.	Cal.	Cal.	Cal.	Cal	Cal.	Cal.	Cal.	Cal	Cal.	Cal.	Cal.	Cal.	Cal	Cal	Cal	Cal	
	Surface m^2	200	200	400	200	400	200	100	400	400	400	400	200	400	400	400	200	400	100	400	400	200	400	400	
QUAE	*Quercus aegilops*	3.3	+	2.2	2.2	2.2	1.1	+	1.1	2.2	+	1.1	2.2	2.2	2.2	3.3	+	2.2	1.1	3.3	+	+			21
	Crataegeto-Quercetm aegilopsii (Ghazal 1994)																								
CRAZ	*Crataegus azarolus*	+		1.1	1.1	1.2	1.1	1.1	1.1	2.3		1.1	+		2.2		+	1.1	2.2	1.1	+	1.1			17
QUCA	*Quercus calliprinos*	1.1	2.2	3.3	2.2	+	1.2	2.2	4.4	1.2	2.2	2.2	2.3	1.1	1.1	2.2	2.2	2.2	3.3	1.1	1.2	2.2	2.2	2.2	23
PIPA	*Pistacia palaestina*		2.2		2.2		1.1	1.1	1.1	+	1.2	1.2	2.2			+	2.2	2.2	1.2		+	1.1	+	+	17
PHME	*Phillyrea media*		2.2		1.1		+	1.1	1.1				2.2	+		1.1	2.2	2.2	1.1	1.1	+	+	1.2	+	16
TACO	*Tamus communis*		2.2		+		1.1	1.1	+		1.1		+			1.1	2.2	2.2	+						11
BRMU	*Bryonia multiflora*		+				1.1	+	1.1		1.1								+		+				7
SMAS	*Smilax aspera*				1.1		1.1	1.1					1.1					1.1	1.1		+	+		+	9
ASAC	*Asparagus acutifolius*					+		1.1			1.2		+			1.1		1.1	1.1		+	+		+	10
LAPU	*Lavatera punctata*						+	1.1										1.1	2.2	+					5
	Querco-Pistacietum atlanticae (Ghazal 1994)																								
PIAT	*Pistacia atlantica*															1.1	+	+	1.2	1.1	+	+		+	5
JAFR	*Jasminum fruticans*		3.3			2.2	1.1	1.1	+		2.1		1.1			1.1	3.3	1.1	1.2		1.2	2.2	1.1	+	15
RHPA	*Rhamnus palaestina*		1.1	+	1.1		1.1	1.2					+			1.1		1.1	1.1		+		+	+	12
CLCI	*Clematis cirrhosa*				1.1		+	1.1	+							+	2.3	2.2	1.1		1.1	+	1.1		11
EPCA	*Ephedra campylopoda*		1.1					1.1									1.1	+			+	+	+		7
BRSY	*Bryonia syriaca*						1.1	+								+		1.1							4
HYCU	*Hypericum cuneatum*						1.1	1.1										+							3
PYSY	*Pyrus syriaca*	+			+						2.1														3
	Quercion calliprini																								

	Relevés number	A02	A24	B03	C04	C09	C10	C11	L06	L05	C07	C08	L22	R08	R09	A04	A12	C13	C12	C18	A27	C24	C15	C20	
RHCO	*Rhus coriaria*										.	1.1									1.1				2
ROTE	*Robia tenuifolia*																		+						1
LANO	*Laurus nobilis*				+																			+	2
	Quercetea (etalia) Ilicis																								
OLEU	*Olea europaea* var. *oleaster*		3.3						1.1	3.3		1.1					3.3				+	1.1	2.2		8
OSAL	*Osyris alba*		1.1			1.2								+			1.1	+	1.2			+		+	8
ERFA	*Eryngium falcatum*												+			1.1		1.1							3
PRMA	*Prasium majus*						1.2	1.2										+							3
QUAE	*Quercus aegilops*										+	1.1					+								3
SCMA	*Scilla maritima*							+	+																2
SCHE	*Scutellaria heterophylla*					1.1							1.1												2
LOET	*Lonicera etrusca*							+																	1
RUAC	*Ruscus aculeatus*																	+							1
PIBR	*Pinus brutia*																						+		1
ARAN	*Arbutus andrachne*																				+				1
CUSE	*Cupressus sempervirens*																						+		1
	Querco - cedretalia libani																								
UMIN	*Umbillicus intermedius*		1.1	+													1.1	+			+				5
QUIN	*Quercus infectoria*		+									1.1					+	2.2							4
PRUR	*Prunus ursina*							+								1.1		+			+				4
LOOR	*Lonicera orientalis*				+						1.1											1.1			3
ROGL	*Rosa glutinosa*											+									+				2
CYCO	*Cyclamen coum*																	2.2							1
DRLI	*Dryopteris libanotica*				+																				1
	Quercetea (etalia) pubescentis																								
STOF	*Styrax officinlais*				1.1	+	1.1	1.1				+	+			+		1.1	2.2	1.1	1.1				11
PHLO	*Phlomis longifolia*			+	1.1	2.2		1.1									1.2	2.2							6
CRMO	*Crataegus monogyna*		+			1.1										1.1									3
CLVI	*Clematis vitalba*		2.2										+												2
COEM	*Coronilla emeroides*										+														1
CESI	*Cercis siliquastrum*												1.1												1
RUTO	*Rubus tomentosus*												+												1
QUCA	*Quercus castaneafolia*																	+							1

	Relevés number	A02	A24	B03	C04	C09	C10	C11	L06	L05	C07	C08	L22	R08	R09	A04	A12	C13	C12	C18	A27	C24	C15	C20	
	Cisto-Micromerietea																								
ASMI	*Asphodelus microcarpus*	+		2.2		2.3	2.2	+	+	1.2	2.1			2.3	1.1	1.1		1.2	+	2.2	+	1.1	1.1	1.1	18
POSP	*Poterium spinosum*								+	1.1			+		+								+		5
MIMY	*Micromeria myrtifolia*				+		+	1.1										1.1						+	5
DAOL	*Daphne oleoides*				+			+										2.2			+				4
PASP	*Paliurus spina-christi*				+	1.1		+								1.1									4
CAVI	*Calycotome villosa*				+								+					1.1							3
ANFO	*Anagyris foetida*										3.3		+									2.2			3
HYHI	*Hyparrhenia hirta*												1.1						1.1				1.1		3
HESA	*Helichrysum sanguineum*				1.1													+							2
TEPO	*Teucrium polium*					+							+												2
ASLU	*Asphodeline lutea*											1.1													1
CISA	*Cistus salviifolius*				+																				1
ORSY	*Origanum syriacum*												+												1
ASST	*Asperula stricta*																		1.1						1
	Companion species																								
HOBU	*Hordeum bulbosum*										+						1.2								2
AEOV	*Aegilops ovata*											+					+								2
ALOF	*Althaea officinalis*																+						+		2
DIMU	*Dianthus multipunctatus*											+												+	2
MUPA	*Muscari parviflorum*																+						+		2
SEST	*Sedum steudelii*											+					1.2								2
ARSP	*Arum* spec.											+					+								2
FICA	*Ficus carica*											1.1									+				2
TRSP	*Trifolium* spec.																+							+	2
GASP	*Galium* spec.										1.1											+			2
SECE	*Serratula cerinthifolia*																				+				1
AMCO	*Amygdalus communis*																					+			1
AMOR	*Amygdalus orientalis*																					+			1
ARDI	*Arum dioscoridis*											+													1
BRMA	*Briza maxima*																+								1
CEAU	*Celtis australis*											+													1
CEOF	*Ceterach officinarum*																						+		1

	Relevés number	A02	A24	B03	C04	C09	C10	C11	L06	L05	C07	C08	L22	R08	R09	A04	A12	C13	C12	C18	A27	C24	C15	C20	
CHPT	*Cheilanthes pteridioides*																						1.1		1
FUOF	*Fumaria officinalis*											+													1
GAAP	*Galium aparine*																							+	1
GETU	*Geranium tuberosum*											+													1
HAOR	*Hayacinthus orientalis*											+													1
IRHI	*Iris histrio*											+													1
RUBU	*Rumex bucephalophorus*																+								1
TRBU	*Tragopogon buphtalmoides*										+														1
UMER	*Umbilicus erectus*																1.1								1
CAST	*Campanula strigosa*																+								1
TRST	*Trifolium stellatum*																1.1								1
IRSP	*Iris* spec.																2.2								1
MESP	*Medicago* spec.											+													1
ACSP	*Achilla* spec.											+													1
ALSP	*Allium* spec.																+								1
COSP	*Colchicum* spec.																				+				1
FASP	*Fabigia* spec.																					+			1
ORSP	*Orchis* spec.											+													1
		5	15	7	21	13	18	26	13	7	18	31	22	5	5	17	39	32	20	8	25	20	18	15	

Site description of the relevés (appendix 2):

Relevés Code	Name	Lat.	Long.	Site location and description	Reference
A02	Jolly Kaly	36.48.00	36.40.12	Jolly Kally, in Al-Akrad mountain.	Ghazal 1994
A04	Qara Baba	36.48.06	36.40.12	Near Midan-Akbas, in Al-Akrad mountain.	Ghazal 1994
A12	Rajo	36.42.10	36.40.12	Near Rajo in Al-Akrad mountain.	Ghazal 1994
A24	Rajo	36.43.12	36.39.36	Near Rajo in Al-Akrad mountain.	Ghazal 1994
A27	Amaro	36.34.12	36.42.00	Amaro village, in Al-Akrad mountain.	
B03	Kanfo	35.15.00	36.24.10	Near Kanfo village, in Al-Ghab plain.	Ghazal 1994
C04	Sheikh Issa	35.58.48	36.25.48	Sheikh Issa village, in Wastani mountain.	Ghazal 1994
C07	Daret azzeh	36.18.06	36.51.36	North Daret azzeh village, Jabal Sam'an.	Ghazal 1994
C08	Barakat	36.17.24	36.48.36	Near Daret azzeh village in Barakat mountain	
C09	Hafsargeh	36.03.08	36.33.02	North Hafsargeh, in Wastani mountain.	Ghazal 1994

C10	Darkosh Ain Al-Zarga	35.56.24	36.27.08	Maryameen- Darkosh road, in Wastani mountain.	Ghazal 1994
C11	Maryameen	35.57.05	36.26.24	Near Maryameen, in Wastani mountain.	Ghazal 1994
C12	Ain Al-Zarga	35.57.08	36.27.36	Near Ain Al-Zarga, in Wastani mountain.	Ghazal 1994
C13	Nabhan	35.57.36	36.27.04	Near Al-Nabhan village, in Wastani mountain.	Ghazal 1994
C15	Harem	36.10.48	36.31.48	East Harem, in Wastani mountain	
C18	Maryameen	35.57.00	36.27.08	Near Maryameen, in Wastani mountain.	Ghazal 1994
C20	Barakat	36.18.10	36.49.12	Near Daret-azzeh village in Barakat mountain	
C21	Qalb Lozeh	36.10.12	36.35.24	Qalb Lozeh village, in Wastani mountain.	
L05	Rab’ao	35.07.12	36.24.06	Rab’ao village, near Messiaf.	Ghazal 1994
L06	Ain borah	35.07.36	36.22.12	Near Ain borah village, in Al-Ghab plain.	Ghazal 1994
L08	Al-Bara	35.41.24	36.34.12	Al-Bara village, in Al-Zawiah mountain	Ghazal 1994
L22	Baiad	34.48.04	36.55.12	Baiad village, southern of the Coastal Mountains..	Ghazal 1994
R08	Kanfo	35.15.02	36.23.24	Near Kanfo village, in Al-Ghab plain.	Ghazal 1994
R09	Kanfo	35.13.48	36.24.00	Near Kanfo village, in Al-Ghab plain.	Ghazal 1994

Appendix 3: Relevés data:

Species code																									Constancy
	Relevés number	F22	F23	F24	F25	J32	L38	M05	M06	M07	R15	C17	H14	J10	N01	N03	N02	H15	G07	M03	M04	H18	M02	H05	
	Altitude m	120	5	5	50	180	720	670	560	90	400	320	480	480	925	1150	1070	450	105	510	710	620	610	600	
	Exposition	-	-	-	SW	S	NW	N	NW	NW	320	N	SW	-	NW	W	N	S	S	E	NE	NW	SW	N	
	Slope %	-	-	-	20	20	5	55	70	40	20	40	40	-	40	40	40	35	15	30	55	30	30	10	
	Total cover %	90	70	50	50	60	90	95	95	90	60	80	100	100	60	90	70	90	100	80	85	100	75	70	
	Trees cover %	60	20	-	-	10	20	80	40	80	40	70	70	80	20	60	60	50	60	40	55	65	45	60	
	Shrubs cover %	30	50	30	30	30	80	30	70	30	30	70	80	60	50	40	30	30	40	30	25	60	75	60	
	Ground cover %	50	30	20	30	40	40	50	35	10	20	50	45	30	20	30	20	40	30	70	75	50	65	30	
	Parent rock	M	M	M	S	M	M	S	S	S	Cal	Cal	Cal	Cal	Cal	Cal	Cal	M	B	S	S	S	S	S	
	Surface m^2	200	200	200	200	200	200	100	100	100	200	400	400	200	200	200	200	200	200	200	200	400	200	200	
	Gonocytiso-Pinion																								
PIBR	*Pinus brutia*	4.4	1.1		1.1	1.1		+	+	4.4	2.2	2.3	2.3	4.4	3.4	1.2	3.3	2.2	2.2	2.2	3.3	3.3	3.3	3.3	21
JUOX	*Juniperus oxycedrus*						1.1		+					.	1.1	.	2.2	1.1		+	1.1	1.1	.	1.1	9
GOPT	*Gonocytisus pterocladus*						+											1.1				+		+	4
CYDO	*Cytisopsis dorycniifolia*				+		+															+		+	4
DOHA	*Dorycnium haussknechtii*																					+		+	2
LYAU	*Lygia aucheri*						+																		1
	Junipero-Quercion																								
PIPA	*Pistacia palaestina*	1.1				1.1	+	+		1.1		+	1.1	+	1.2	.	2.2	1.1		+	1.1	.	+		14
ARAN	*Arbutus andrachne*						1.1		+	+					+			2.2		1.1		+	1.1	+	9
JAFR	*Jasminum fruticans*	2.2									1.1				+		1.1								4
RHAL	*Rhamnus alaternus*						+						+	+											3
JUEX	*Juniperus excelsa*														.	1.1	1.1								2
	Quercion calliprini																								
SMAS	*Smilax aspera*	1.1	1.1	+	+	+	+			1.1	1.1	+	+	1.1				+	+	+	1.1	+	2.2	+	18
PHME	*Phillyrea media*	+	1.1		+	1.1	1.1	+		+	2.2		2.2	1.1	2.2		1.1	1.1		+		+	+	+	17
QUCA	*Quercus calliprinos*	3.2	2.2			+	+			2.2	2.2	+	2.2	3.3	2.3	.	2.2	1.1	+			.	.		13
ASAC	*Asparagus acutifolius*	2.2	2.2								+	+	+	1.1					+	+			1.2		9
ERFA	*Eryngium falcatum*	1.1				+	+				1.1	+						1.1	2.2		+	+		+	10
PYSY	*Pyrus syriaca*													+	1.1	+						+	+		5
TACO	*Tamus communis*												+									+		+	3
CYPE	*Cyclamen persicum*	2.2	1.1		1.1						+		+	2.2	+										7
EPCA	*Ephedra campylopoda*											+													1

	Relevés number	F22	F23	F24	F25	J32	L38	M05	M06	M07	R15	C17	H14	J10	N01	N03	N02	H15	G07	M03	M04	H18	M02	H05	
RHCO	*Rhus coriaria*		+														+								2
EPCA	*Ephedra campylopoda*		+																						1
ARAL	*Aristolochia altissima*									+	+														2
CLCI	*Clematis cirrhosa*	+	+							+															3
RHPU	*Rhamnus punctata*							1.1													+				2
	Oleo-Ceratonion																								
MYCO	*Myrtus communis*		+		+	2.2	2.2			2.2			2.2	2.2						1.2					8
CESI1	*Ceratonia siliqua*		+		1.1																				2
NEOL	*Nerium oleander*			2.2																					1
ORMI	*Oriyzopsis miliacea*									+															1
PILE	*Pistacia lentiscus*	2.2	1.1		2.2																				3
	Ptosimopapo-Quercion																								
PTBR	*Ptosimopappus bracteatus*			1.1																2.3	1.1		1.1		4
EUCA	*Euphorbia cassia*																				1.2	+		+	3
GLFL	*Glycyrhiza flavescens*																			1.2			1.1		2
SCHE	*Scutellaria heterophylla*							+	+																
CEAR	*Centauria arifolia*																			+					1
	Quercetea ilicis																								
RHPA	*Rhamnus palaestina*	1.1	1.1				+			1.1	1.1	+	+	+			1.1	+					.		10
IRUN	*Iris unguicularis*									+				.				1.1			+	+	2.3	+	6
CUSE	*Cupressus sempervirens*											+													1
OLEU	*Olea europaea* var. *oleaster*	+									+	+													3
ONSU	*Onobrychis supina*																	+				+		+	3
OSAL	*Osyris alba*	3.2					+				1.1			+											4
QUIN2	*Quercus infectoria* ssp. *Microphylla*																					+		+	2
ACSY	*Acer syriacum*						+						+												2
CRAZ	*Crataegus azarolus*		+			+				+								+							4
BRSY	*Bryonia syriaca*			+																					1
FOPH	*Fontanesia phillyreoides*			+																		+			2
ASAD	*Asplenium adiantum-*							1.2	1.1																2

	Relevés number	F22	F23	F24	F25	J32	L38	M05	M06	M07	R15	C17	H14	J10	N01	N03	N02	H15	G07	M03	M04	H18	M02	H05	
	nigrum																								
PIHA	*Pinus halepensis*						2.2																		1
LOET	*Lonicera etrusca*	+																							1
LANO	*Laurus nobilis*												+												1
QUAE	*Quercus aegilops*																		2.2						1
	Osteryo-Quercion pseudocerridis																								
EUMA	*Euphorbia macrostegia*							1.2	1.1																2
LALI	*Lathyrus libani*							1.1	2.2																2
QUCE	*Quercus cerris* subsp *pseudocerris*						+	3.3	2.2											2.2	2.2		2.3		6
OSCA	*Ostrya carpinifolia*						+	2.2	2.3																3
SIAM	*Silene amana*																				1.1				1
	Geranio-Cedrion																								
GELI	*Geranium libani*												+												1
RUAU	*Rubia aucheri*		1.1				1.1						+		+										4
	Querco-Cedretalia libani																								
QUIN1	*Quercus infectoria*	+				+	+	1.2		+	+		+	.	+		1.1	+	+	+	3.3		1.2		14
LECR	*Lecoquia cretica*														+	2.3	1.1								3
FECA	*Ferulago cassia*																					+		+	2
CELI	*Cedrus libani*															2.2	1.1								2
CONU	*Cotoneaster nummularia*															1.1	1.1					.	.		2
FROR	*Fraxinus ornus*						1.1	+												+					3
GELY	*Genista lydia*																				2.2	.			1
PRAC	*Primula acaulis*						+		1.1				+												3
LADE	*Lathyrus degitatus*																					+			1
ADCA	*Adiantum capillus-veneris*												+												1
JUDR	*Juniperus drupacea*										+														1
CICA	*Cistus cassius*							+	+																2
PYCI	*Pyrethrum cilicium*								+																1
TRCA	*Trifolium cassium*							2.2	+																2

	Relevés number	F22	F23	F24	F25	J32	L38	M05	M06	M07	R15	C17	H14	J10	N01	N03	N02	H15	G07	M03	M04	H18	M02	H05	
ALOR	*Alnus orientalis*			2.2																					1
COAU	*Cornus australis*						+																		1
SEST	*Sedum steudelii*							1.1																	1
DRLI	*Dryopteris libanotica*						+	1.1	+																3
CYCO	*Cyclamen coum*	+																							1
LATR	*Lamium truncatum*							+	+																2
VIAL	*Viola alba*						+	+	+														+		4
	Quercetea pubescentis																								
STOF	*Styrax officinlais*			+		+	+	1.1	2.2			+	+	+			1.1		+	1.1	1.1		2.2		13
RHCO1	*Rhus cotinus*					+	+				+		+					+		2.2	2.2	1.1	1.1	1.1	10
RUAC	*Ruscus aculeatus*						+	2.2	1.1		2.2		+	+						+	+		2.2		9
CESI2	*Cercis siliquastrum*								+				+				+		+	+		1.1		1.1	7
RUSA	*Rubus sanctus*			1.1		+	+						+	+						+			1.2		7
CLFL	*Clematis flammula*			1.1						+				+								+		+	5
POSU	*Polygala supina*						+													+		+		+	4
COEM	*Coronilla emeroides*	2.2					+															+		+	4
CRMO	*Crataegus monogyna*							+				1.1											+		3
PTAQ	*Pteridium aquilinum*						+						+							+					3
CACL	*Calamintha clinopodium*						+																		1
MATR	*Malus trilobata*																+								1
CRRE	*Crepis reuteriana*																				+				1
HEHE	*Hedera helix*						1.1	2.3	1.1				+												4
PHLO	*Phlomis longifolia*	1.1												1.1											2
CERU	*Cephalanthera rubra*						+																		1
CLVI	*Clematis vitalba*							+	+																2
LUFO	*Luzula foresteri*								+																1
MEOF	*Melissa officinalis*			1.1																					1
MEAN	*Melica uniflora*																						+		1
HYTH	*Hypericum thymifolium*												+												1
VISY	*Vitis orientaslis*												+												1
DOCA	*Doronicum caucasicum*												+												1
FEAU	*Ferulago autumnalis*																						1.1		1
	Cisto-Micromerietea			`																					

	Relevés number	F22	F23	F24	F25	J32	L38	M05	M06	M07	R15	C17	H14	J10	N01	N03	N02	H15	G07	M03	M04	H18	M02	H05	
CAVI	*Calycotome villosa*		1.1	2.2	+	1.1	+			+	1.1		+			1.2		1.2	1.1			+	+	+	14
CIVI	*Cistus villosus*					+	+			+	1.1			.	1.1	.	1.1	2.2		+	1.1	+	+	+	12
POSP	*Poterium spinosum*	+	3.3		1.1		+					+		+								+		+	8
SAGR	*Salvia grandiflora*							1.1			1.1		+	.	+					+	+	+	1.1	+	9
SPJU	*Spartium junceum*					+							+		.	2.3						+	+	+	6
CISA	*Cistus salviifolius*	1.1	1.1	+	2.2	3.3	1.1			1.1			+					1.1			1.1		+		11
TEPO	*Teucrium polium*	+					+				+	+					1.1					+		+	7
DAOL	*Daphne oleoides*																			+		1.1		1.1	3
DOHI	*Dorycnium hirsutum*	1.1	+			+							+									+		+	6
MIMY	*Micromeria myrtifolia*	+											+				1.1	+							4
ORSY	*Origanum syriacum*					+	+	1.1		+			+				1.1								6
ASST	*Asperula stricta*																				+	1.1		1.1	3
ASMI	*Asphodelus microcarpus*	+	1.1	1.1															2.2						4
ERVE	*Erica verticillata*						2.2						+												2
PASP	*Paliurus spina-christi*																						+		1
FUTH	*Fumana thymifolia*												+												1
GEAC	*Genista acanthoclada*				3.2		1.1																		2
LAST	*Lavandula stoechas*				2.1					1.1															2
SECE	*Serratula cerinthifolia*						+																		1
HESA	*Helichrysum sanguineum*									+															1
HYHI	*Hyparrhenia hirta*			1.1	1.1					1.1															3
THSY	*Thymus syriacus*										+														1
POMI	*Potentilla* micrantha							+	1.1																2
THBE	*Thesium bergeri*					+																			1
LAPU	*Lavatera punctata*																		1.1						1
	Companion species																								
CAHA	*Carex haleriana*																					+		+	2
DAGL	*Dactylis glomerata*							+													+		1.1		3
GLSE	*Gladiolus segetum*																					+		+	2
ONAU	*Onobrychis aurantica*													.								+	.	+	2
TRPU	*Trifolium purpurium*																					+		+	2
POSA	*Poa sativa*														1.2		+								2
BEPE	*Bellis perennis*																					1.1			1

	Relevés number	F22	F23	F24	F25	J32	L38	M05	M06	M07	R15	C17	H14	J10	N01	N03	N02	H15	G07	M03	M04	H18	M02	H05	
SAAL	*Salix alba*																			+					1
GABA	*Galium bassitense*																				+				1
HYPE	*Hypericum perforatum*						+														+				1
INVI	*Inula viscosa*																								1
PARH	*Papaver rhoeas*													.	.	+									1
PICA	*Pinus canareansis*													+											1
PIPI	*Pinus pinea*											1.2													1
PIRA	*Pinus radiata*													+											1
PRMI	*Prunus microcarpa*													.	+	.									1
PRPR	*Prunus prostrata*														.	4.5									1
TRIN	*Trifolium incarnatum*														1.2										1
VIAG	*Vitex agnus-castus*			2.2																					1
ASEX	*Asperula experata*																	+							1
BRTE	*Bromus tectorum*														.	1.1									1
CASP	*Capparis spinosa*											+													1
FICA	*Ficus carica*												+												1
SCMA	*Scilla maritima*	2.1	1.1		1.1														+						4
JURE	*Juglans regia*												+												1
HYLY	*Hypericum lydium*							+																	1
MISE	*Micromeria serpyllifolia*										1.1														1
VADI	*Valeriana discoridis*						+																		1
CASA	*Castania sativa*								+																1
ACCY	*Acacia cyanophylla*	2.2																							1
EQRA	*Equisetum ramosissimum*			1.1																					1
TAPE	*Tamarix pentendra*			1.1																					1
ASSP	*Astragalus* spec.																	+				+		+	3
GASP1	*Galium* spec.						+			+				+			+						+		5
IRSP	*Iridium* spec.														.	1.1	+								2
LISP	*Linum* spec.														+										1
PHSP	*Phlomis* spec.										+														1
ROSP	*Rosa* spec.						+																		1
ASSP1	*Asperula* spec.						+																		1

	Relevés number	F22	F23	F24	F25	J32	L38	M05	M06	M07	R15	C17	H14	J10	N01	N03	N02	H15	G07	M03	M04	H18	M02	H05	
IRSP	*Iris* spec.						+			+	+														3
MESP	*Melica* spec.							+		+															2
ONSP	*Onosma* spec.						+																		1
TESP	*Teucrium* spec.						+																		1
TRSP	*Trifolium* spec.									+															1
CYSP	*Cyperus* spec.			3.3						+															1
		28	21	18	15	19	51	29	25	27	24	16	40	21	18	12	23	21	13	25	24	38	28	34	

Site description of the relevés (appendix 3):

Relevés Code	**Name**	**Lat.**	**Long.**	**Site location and description**
F22	Wadi Qandil	35.52.12	35.37.48	North of Lattakia in the Coastal Plains
F23	Wadi Qandil	35.52.48	35.46.12	North of Lattakia in the Coastal Plains
F24	Wadi Qandil	35.54.00	35.46.12	North of Lattakia in the Coastal Plains
F25	Um-Tuyour	35.52.12	35.46.48	North of Lattakia in the Coastal Plains
J32	Qasatel	36.06.36	35.43.48	In Aleppo-Lattakia road
L38	East Safita	36.09.36	34.50.24	East Safita in the Coastal Mountains
M05	Frenloq	36.00.00	35.51.36	In the center of the Frenloq reserve area in Baer-Bassit Mountain
M06	Frenloq	36.00.00	35.52.12	In the center of the Frenloq reserve area in Baer-Bassit Mountain
M07	Balloran	35.55.12	35.48.36	Near Balloran Dam in Baer-Bassit Mountain
R15	Shatha	36.14.24	35.30.36	In the eastern slopes of the Coastal Mountains
C17	Harem	36.10.12	36.32.24	East Harem in Wastani Mountain
M02	Ain Al-Haramieh	35.58.48	36.01.12	Near the center of the Froluqe reserve area in Baer-Bassit Mountian
G07	Al-Mastorah	34.42.00	36.52.12	In the south of the coastal plains
H05	Al-Zoof	35.56.24	36.13.12	North Jesr-Shogour.
H14	Merige	35.45.08	36.03.10	In the northern slopes of the Coastal Mountains
H15	Sa'ad-Ass'oud	35.55.48	36.18.10	North Jesr-Shogour.
H18	Al-Zoof	35.55.48	36.12.36	North Jesr-Shogour.
J10	Shardob	35.37.12	36.07.48	West of Hefah in the Coastal Mountians
M03	Frenloq	35.51.06	35.59.24	Near the center of the Froluqe reserve area in Baer-Bassit Mountian
M04	Al-Atlal	35.52.48	36.02.02	Near Qastal Maaf in Baer-Bassit Mountian

N01	Akoum	34.34.48	36.22.48	In the west Lebanon Mountain
N02	Akoum	34.33.36	36.21.00	In the west Lebanon Mountain
N03	Akoum	34.31.48	36.22.12	In the west Lebanon Mountain

Appendix 4: Relevés data:

Species code	Relevés number	G01	J11	J27	L11	L29	L03	L32	R01	R10	R04	R05	L08	J12	J26	L27	L09	R11	Constancy
	Altitude m	110	340	930	920	870	880	370	900	1010	680	850	650	440	780	665	830	530	
	Exposition	-	N	NE	NE	SSE	N	NE	-	W	W	SSW	E	-		NNW	SW	SE	
	Slope %	-	20	10	50	30	30	20	-	30	30	35	5	-		50	25	30	
	Total cover %	100	70	70	80	75	60	80	70	70	90	60	60	60	80	80	60	70	
	Trees cover %	10	30	50	20	10	30	60	40	60	80	20	10	20	70	70	40	20	
	Shrubs cover %	40	60	30	20	60	50	30	60	20	40	50	50	40	40	40	50	40	
	Ground cover %	20	40	70	20	20	30	10	30	30	10	20	20	20	5	20	30	70	
	Parent rock	M	M	Cal	Cal	M	Cal	Cal	Cal	Cal	B	M	Cal	Cal	Cal	B	B	Cal	
	Surface m^2	200	200	400	200	200	200	400	200	200	200	400	400	200	200	200	200	200	
QUCA	*Quercus calliprinos*	1.1	1.1	3.3	2.3	2.2	2.2	3.3	+	1.1	+	2.1	2.3	2.3	2.2	3.3	2.3	2.2	17
	Pistacio (palaestina)-Quercetum calliprini																		
PIPA	*Pistacia palaestina*	1.1	+	+	2.2	1.1	+	1.1	2.2	+			1.1		1.1	1.1		2.2	13
QUIN	*Quercus infectoria*	+		1.1	2.2	4.4	2.2		3.3		1.1	2.2				1.1	1.1	+	11
CRAZ	*Crataegus azarolus*	.					+		+				+		+	2.2	1.2	1.1	7
LANO	*Laurus nobilis*	+	1.1		1.1		1.1	+	1.1		+								7
RUAC	*Ruscus aculeatus*	+	1.1		1.1		+		2.3	1.1	+		.		+				8
PRUR	*Prunus ursina*			+		+	+				+		1.1			1.1			6
PYSY	*Pyrus syriaca*				+		+		2.2								+		4
ARAN	*Arbutus andrachne*		+		+								+					+	4
RHAL	*Rhamnus alaternus*		+														+		2
CESI1	*Cercis siliquastrum*		+		1.1														2
CLFL	*Clematis flammula*		+											+					2
SPJU	*Spartium junceum*				+		+												2
ACSY	*Acer syriacum*		+					+											2
	Querco (calliprinos)-Phillyreetum mediae																		
PHME	*Phillyrea media*	+	+	+	1.1	2.2	+	1.1	1.2			+	1.1			2.2		2.2	12
RHPA	*Rhamnus palaestina*	+				+				+		+							4
LATR	*Lamium truncatum*										+				+				2
	Quercion calliprini																		
SMAS	*Smilax aspera*	1.1	+		+	+	+			+	+	+	+	1.2					10
TACO	*Tamus communis*					+	1.1	+			+			+		1.1	+	+	8
ERFA	*Eryngium falcatum*	+		+		+	+			1.1	+			1.1				+	8
ASAC	*Asparagus acutifolius*	+	+		+			+	.		+				+	+			7
ARAL	*Aristolochia altissima*	.	+		1.1	+			1.1	+	+	+							7
JAFR	*Jasminum fruticans*				+				1.2				1.2						3
BRSY	*Bryonia syriaca*																+		1
	Oleo-Ceratonion																		
MYCO	*Myrtus communis*		+									+		+					3
CESI	*Ceratonia siliqua*	+																	1
NEOL	*Nerium oleander*		1.1																1
	Gonocytiso-Pinion																		
GOPT	*Gonocytisus pterocladus*	+	+						.										2
PIBR	*Pinus brutia*	.													4.4				1
	Quercetea ilicis																		
BRMU	*Bryonia multiflora*	.					.		.							+	+		2
CUSE	*Cupressus sempervirens*	.							.			1.1							1
OLEU	*Olea europaea* var. *oleaster*							+											1
SCMA	*Scilla maritima*										+								1

	Relevés number	G01	J11	J27	L11	L29	L03	L32	R01	R10	R04	R05	L08	J12	J26	L27	L09	R11	
IRUN	*Iris unguicularis*				.									+			.		1
	Querco-Cedretalia libani																		
DRLI	*Dryopteris libanotica*				+		1.1		1.1		+					1.2	+		6
RUAU	*Rubia ausheri*		+		+	2.2				+		+							5
QUCE	*Quercus cerris* subsp *pseudocerris*	.		1.1					1.1	3.3	4.4								4
MIMO	*Milium montanum*				.									1.1			+		2
FIFI	*Ficaria ficarioides*	.					1.1		.		+								2
CYCO	*Cyclamen coum*	.					+				+								2
LONU	*Lonicera nummularifolia*													1.1		+			2
LOOR	*Lonicera orientalis*	.				+			.				.			+			2
PLOR	*Platanus orientalis*	.	2.2					3.3	.										2
LECR	*Lecoquia cretica*	.						1.1	.		1.1								2
UMIN	*Umbilicus intermedius*	.							.		+		.				1.1		2
FROR	*Fraxinus ornus*		+							+									2
CELI	*Cedrus libani*	.					2.1		.										1
DOCA	*Doronicum caucasicum*	.					2.1		.										1
GELI	*Geranium libani*	.					1.1		.										1
ARDI	*Arum dioscoridis*													+					1
PACO	*Paeonia corallina*															+			1
	Quercetea pubescentis																		
STOF	*Styrax officinlais*	1.1	+	1.1	+	1.2	1.1		2.2	2.2	2.2			2.2		1.1	3.3	+	13
JUOX	*Juniperus oxycedrus*	.	+	1.1	1.1	2.2		+	1.1	+		1.1	.		+				9
HEHE	*Hedera helix*	.	3.3		+		+		.		+								4
CRMO	*Crataegus monogyna*	.					1.1		+		+		.			2.2			4
RUSA	*Rubus sanctus*	.							3.3	+							1.1		3
RHCO	*Rhus cotinus*	.	1.1	+					.										2
SIIT	*Silene italica*				+							+			+		.		3
PHLO	*Phlomis longifolia*	.							.		+		.					1.1	2
ACMO	*Acer monspessulanum*	.							1.2										1
CACL	*Calamintha clinopodium*					+													1
CELO	*Cephalanthera longifolia*										+								1
CERU	*Cephalanthera rubra*				.						1.1						.		1
COEM	*Coronilla emeroides*	.							.				1.1						1
POSU	*Polygala supina*											+							1
CLVI	*Clematis vitalba*	.							.					+					1
COMA	*Cornus mas*					+													1
HYTH	*Hypericum thymifolium*				+												.		1
LAIN	*Lathyrus inermis*										1.1								1
MEOF	*Melissa officinalis*		2.1																1
PHAQ	*Physospermum aquilegifolium*										+								1
	Cisto-Micromerietea																		
CAVI	*Calycotome villosa*	2.2			+		+		.			+	1.1			1.1	1.1		7
POSP	*Poterium spinosum*	1.1				2.3						+	1.1			1.1			5
CIVI	*Cistus villosus*	1.1			.			3.2	.				3.3					1.1	4
CISA	*Cistus salviifolius*	.		+	+				.			1.1					+		4
SAGR	*Salvia grandiflora*	.		+	+	1.2			.	+									4

	Relevés number	G01	J11	J27	L11	L29	L03	L32	R01	R10	R04	R05	L08	J12	J26	L27	L09	R11	
DAOL	*Daphne oleoides*	.		+						1.1			.						2
GEAC	*Genista acanthoclada*	2.1							.							1.1			2
ORSY	*Origanum syriacum*							+		+									2
PASP	*Paliurus spina-christi*	1.1				+													2
THSY	*Thymus syriacus*	.							.							+			1
	Astragalo-Brometea																		
ROGL	*Rosa glutinosa*	.							.							1.1			1
	Companion species																		
CEAU	*Celtis australis*	.							.						+	1.1	2.2		3
PTAQ	*Pteridium aquilinum*	.					+		.						+				2
OSCA	*Ostrya carpinifolia*	.	+	+					.										2
MELO	*Mentha longifolia*		1.1																1
BEPE	*Bellis perennis*										1.1								1
CYEC	*Cynosurus echinatus*				.									+			.		1
SAAL	*Salix alba*	.	+						.										1
ABCI	*Abies cilicica*	.					1.1		.										1
AJCH	*Ajuga chia*	.							.									+	1
ASAD	*Asplenium adiantum-nigrum*		+																1
CEOF	*Ceterach officinarum*	.					.		.								+		1
EQMA	*Equisetum maximum*		+																1
LUHI	*Lupinus hirsutus*	.							.							+			1
POBU	*Poa bulbosa*												1.1						1
RUMO	*Rumex molle*													+					1
SCSI	*Scilla sibirica*	.					+		.										1
TRHY	*Tragopogon hybridum*													+					1
ULCA	*Ulmus campestris*										+								1
GASP	*Galium* spec.	1.1			+			1.1	.				1.1						4
PHSP	*Phlomis* spec.				+	2.2						1.1					.		3
ROSP	*Rosa* spec.									+	+								2
AJSP	*Ajuga* spec.												+						1
ARSP	*Arum* spec.										+								1
ASSP	*Astragalus* spec.	.					2.1		.										1
CASP	*Campanulla* spec.		+																1
POSP	*Potentilla* spec.										+								1
RASP	*Ranunculus* spec.										+								1
VESP	*Verbascum* spec.														+				1
VISP	*Viola* spec.		+																1
		20	31	14	26	20	27	14	17	20	32	16	15	15	12	22	17	12	

Site description of the relevés (appendix 3):

Relevés Code	Name	Lat.	Long.	Site location and description
G01	Wadi Qandil	35.45.36	35.52.12	North of Lattakia in the Coastal Plains
R01	Al-Bared Road	35.13.48	36.17.24	In the road of Al-Bared Jableh west of Al-Dalieh
R05	Al-Bared Road	35.14.24	36.14.24	In the road of Al-Bared Jableh west of Al-Dalieh
R11	East Jableh	35.15.02	36.01.48	In the road of Al-Bared Jableh north Messiaf
J11	Hzerin Valley	35.42.36	36.07.48	Near Salma in the Coastal Mountains
J12	Beshraeel	35.03.36	36.06.36	North of Sheikh-Bader in the Coastal Mountains
J26	Rowaibel	35.34.12	36.00.36	West of Ain Al-Tineh in the Coastal Mountains
J27	Al-Hagar	35.34.12	36.06.10	West of Al-Hagar in the Coastal Mountains
L03	Al-Sheeha	34.49.48	36.20.24	West of Misiaf in the Coastal Mountains
L08	Near Messiaf	35.01.12	36.16.12	Near of Misiaf in the Coastal Mountains
L09	Wadi Nadara	34.49.48	36.20.24	East of Al-Naserah in the Coastal Mountains
L11	West Messiaf	35.05.24	36.19.12	West of Sheen in the Coastal Mountains
R04	Ozaer	34.59.24	36.24.06	Near of Misiaf in the Coastal Mountains

L27	Ba’reen	34.48.06	36.23.24	East of Sheikh-Bader in the Coastal Mountains.
L29	Wadi Al-Oyoun	35.03.08	36.18.08	West of Wadi-Oyoun in the Coastal Mountains
R10	Al-Bared Road	35.13.12	36.07.12	In the road of Al-Bared Jableh west of Al-Dalieh
L32	Abo Qbais	35.07.48	36.16.48	Abo Qbais in the Coastal Mountains

Appendix 5: Relevés data:

	Relevés number	O12	O07	O08	O11	O10	O09	L34	J30	J31	C30	C31	L35	F20	F19	L36	L37	G15	J33	F21	
	Altitude m	610	1100	1290	1180	1130	926	450	340	370	340	270	880	440	90	780	480	80	620	470	
	Exposition	-	-	-	S	N	-	EN	-	N	-	-	W	NW		W	E	W	W	NNW	
	Slope %	-	-	-	25	15		20	-	60	-	-	20	40		40	W	20	10	20	
	Total cover %	15	30	40	60	50	25	70	60	80	30	80	100	60	60	95	60	70	80	70	
	Trees cover %	-	-	-	-	-	-	40	20	60	-	20	90	20	40	30	10	20	40	20	
	Shrubs cover %	10	20	30	50	40	20	30	40	20	10	50	10	20	20	80	40	30	30	60	
	Ground cover %	5	10	10	15	20	10	20	10	10	30	40	50	10	10	50	20	30	20	40	
	Parent rock	Cal	Cal	Con	Cal	Cal	Cal	Cal	M	S	M	M	B	Cal	M	B	B	B	M	M	
	Surface m^2	400	400	400	400	400	400	400	200	200	400	400	200	400	400	200	200	200	200	200	
	Quercion calliprini																				0
PIPA	*Pistacia palaestina*							2.2	+		+			2.2	+		+	1.1	1.1	+	9
RHPA	*Rhamnus palaestina*			1.1	1.1	+	1.1				+	+						+			7
ASAC	*Asparagus acutifolius*							+	+			+						+	+		5
CRAZ	*Crataegus azarolus*		+	1.1							+	+		+							5
PHME	*Phillyrea media*							1.1	+	+					1.1			+			5
PYSY	*Pyrus syriaca*			+	+	1.1		1.1				+									5
SMAS	*Smilax aspera*								+					1.1				+	+	1.2	5
TACO	*Tamus communis*							+				+				1.1			+	+	5
LANO	*Laurus nobilis*								1.1					1.1					+	2.3	4
QUCA	*Quercus calliprinos*							+	1.1					2.2				+			4
ARAL	*Aristolochia altissima*								+									+		+	3
JAFR	*Jasminum fruticans*							1.1			1.1	+									3
BRSY	*Bryonia syriaca*											+								+	2
CYPE	*Cyclamen persicum*														1.1			+			2
RHCO1	*Rhus coriaria*															+	+				2
CLCI	*Clematis cirrhosa*																	+			1
LAPU	*Lavatera punctata*																	+			1
RHPU	*Rhamnus punctata*														2.2						1
	Oleo-Ceratonion																				0
MYCO	*Myrtus communis*									2.3					2.2			1.1		+	4
NEOL	*Nerium oleander*								1.1	2.2								2.2	+		4
CESI	*Ceratonia siliqua*																	+			1
	Gonocytiso-Pinion																				0
RHAL	*Rhamnus alaternus*								+			+		+				1.1	+	+	6
VIOR	*Vitis orientalis*									1.1				+				+	+	+	5
ACSY	*Acer syriacum*								1.1						+			1.1	+		4
ARAN	*Arbutus andrachne*								+										+		2
BRMU	*Bryonia multiflora*										+	+									2
GOPT	*Gonocytisus pterocladus*								+												1
IRUN	*Iris unguicularis*												+								1
SCMA	*Scilla maritima*														1.1						1
	Ptosimopapo-Quercion																				
SCHE	*Scutellaria heterophylla*																			+	1
	Quercetea ilicis																				0
AMOR	*Amygdalus orientalis*		+	+	2.3	2.2	1.1				+										6
OSAL	*Osyris alba*											+							+	+	3
FOPH	*Fontanesia phillyreoides*													+							1
	Osteryo-Quercion pseudocerridis																				
EUCN	*Eupatorium cannabinum*																+				1

EUMA	*Euphorbia macrostegia*													+								1
	Querco-Cedretalia libani																					0
QUIN	*Quercus infectoria*							2.1				+	+			+		+	+	+		7
LOOR	*Lonicera orientalis*							+			+		1.1	+		1.1		+		+		7
PLOR	*Platanus orientalis*								2.2	2.2							+	2.2	2.3			5
PRUR	*Prunus ursina*											+	1.1	+						1.1		4
LATR	*Lamium truncatum*							+					1.1			1.1	+					4
DRLI	*Dryopteris libanotica*							+						+					+			3
RUAU	*Rubia ausheri*							1.1	+					+								3
FROR	*Fraxinus ornus*							1.1	+					+								3
QUCE	*Quercus cerris* subsp *pseudocerris*												4.4			3.3						2
COAU	*Cornus australis*													+					+			2
UMER	*Umbilicus erectus*															+		+				2
CYCO	*Cyclamen coum*												+									1
LECR	*Lecoquia cretica*												2.2									1
UMIN	*Umbilicus intermedius*																				+	1
DOCA	*Doronicum caucasicum*												1.1									1
GELI	*Geranium libani*															+						1
ARDI	*Arum dioscoridis*																	+				1
PACO	*Paeonia corallina*													+								1
SOTO	*Sorbus torminalis*							1.1														1
NENI	*Neottia nidus - avis*												+									1
CONU	*Cotoneaster nummularia*			+																		1
	Quercetea pubescentis																					0
STOF	*Styrax officinlais*								+	+			2.2	+		1.1		+	+	1.1		8
HEHE	*Hedera helix*								3.3				+	+		3.3	2.2	1.1	2.2	+		8
MEOF	*Melissa officinalis*								1.1	+		+						+	+	+		6
CRMO	*Crataegus monogyna*							1.1					1.1			+		+		1.1		5
CLFL	*Clematis flammula*								+			+		+				+		+		5
CLVI	*Clematis vitalba*									+							1.1	+	+	+		5
RUAC	*Ruscus aculeatus*							+	1.1				1.1			1.1						4
CACL	*Calamintha clinopodium*							+						+		+				+		4
RHCO	*Rhus cotinus*								1.1					+	+							3
SIIT	*Silene italica*												+	+		+						3
COEM	*Coronilla emeroides*													+	+				+			3
LAIN	*Lathyrus inermis*												2.2			1.1				+		3
PRAC	*Primula acaulis*													+		+			+			3
JUOX	*Juniperus oxycedrus*							1.1	+													2
CESI1	*Cercis siliquastrum*								+			+										2
GEUR	*Geum urbanum*															+				+		2
RUTO	*Rubus tomentosus*																4.4	+				2
PHLO	*Phlomis longifolia*										+				1.1							2
HYTH	*Hypericum thymifolium*																	+		+		2
CARA	*Campanula rapunculus*																			+		1
MEUN	*Melica uniflora*																			+		1
PRMA	*Prunus mahaleb*											+										1
CRPU	*Crepis pulchra*																	+				1
LUFO	*Luzula foresteri*												1.1									1
CELO	*Cephalanthera*															+						1

	longifolia																				
CERU	*Cephalanthera rubra*															+					1
DIMU	*Dianthus multipunctatus*						+														1
	Cisto-Micromerietea																				0
THSY	*Thymus syriacus*				1.1	+	+	+			+										5
TEPO	*Teucrium polium*	+			+	+	1.1				+										5
MISE	*Micromeria serpyllifolia*			+	+		+				+									+	5
CAVI	*Calycotome villosa*													+	1.1			+		+	4
POSP	*Poterium spinosum*	+					+				+	+									4
ORSY	*Origanum syriacum*									+				1.1				+	+		4
ASMI	*Asphodelus microcarpus*	+		+	+										+						4
SAGR	*Salvia grandiflora*												1.1	+						+	3
SPJU	*Spartium junceum*															+			+	+	3
HESA	*Helichrysum sanguineum*					+	+											+			3
CISA	*Cistus salviifolius*														3.3						1
CIVI	*Cistus villosus*														3.3						1
DAOL	*Daphne oleoides*																			+	1
ERCE	*Erythraea centaurium*																	+			1
MIMY	*Micromeria myrtifolia*	+																			1
FUTH	*Fumana thymifolia*																	+			1
INVI	*Inula viscusa*											+									1
PHOR	*Phlomis orientalis*				+																1
PHVI	*Phlomis viscosa*																			+	1
	Companion species																				0
NOMU	*Noaea mucronata*	+	+	1.1	+	+	1.1														6
ASAD	*Asplenium adiantum-nigrum*								+				+				1.1	+	+	1.1	6
PYCI	*Pyrethrum cilicium*								+				1.1	+						+	4
ARHE	*Artemisia herba-alba*	+		1.1		+	1.1														4
AVBA	*Avena barbata*	+			+	+	+														4
CASP	*Campanulla* spec.							1.1	+								+		+		4
DAGL	*Dactylis glomerata*	+			+	+	+														4
EUSP	spec. *Euphorbia*	+		+	+		+														4
LAOR	*Lactuca orientalis*	+			+	+	+														4
POBU	*Poa bulbosa*	+			+	+	+														4
RUSP	*Rubus* spec.				+	1.1				2.2						+					4
VESP	*Verbascum* spec.	+		+		+	1.1														4
AGLI	*Agropyron libanoticum*				+	+	+														3
PRTO	*Prunus tortuosa*			1.1	1.1	1.1															3
BRMA	*Bromus madriensis*				+	+	+														3
FACL	*Fibigia clypeata*				+	+	+														3
SAVE	*Salsola vermiculata*					+	1.1											+			3
STBA	*Stipa barbata*			1.1		+	+														3
STLA	*Stipa lagascae*				+	+	+														3
CYEC	*Cynosurus echinatus*															+		+		+	3
CASP	*Capparis spinosa*											+						+			2
FICA	*Ficus carica*																+	+			2
PIAT	*Pistacia atlantica*				1.1	1.1															2
VIAG	*Vitex agnus-castus*														+			+			2
ASKA	*Astragalus kahiricus*		+	1.1																	2
CEDU	*Centauria dumulosa*				+	+															2
GASP	*Galium* spec.										+	+									2
MAOX	*Mathiola oxycera*	+					+														2

ROSP	*Rosa* spec.											+				+				2
ZISP	spec. *Ziziphora*		+	+																2
EQMA	*Equisetum maximum*								+									2.2		2
MELO	*Mentha longifolia*								1.1									+		2
OSCA	*Ostrya carpinifolia*								+										2.2	2
PTAQ	*Pteridium aquilinum*												2.2			1.1				2
SAAL	*Salix alba*								+								+			2
AMSP	*Amygdalus spartioides*		1.1																	1
ARMA	*Aristolochia maurorum*		+																	1
CASI	*Calystegia silvatica*															+				1
CICA	*Cistus cassius*												+							1
CISY	*Citisus syriacus*															+				1
GAAP	*Galium aparine*							+												1
JURE	*Juglans regia*																+			1
ORMI	*Oriyzopsis miliacea*																+			1
PAOF	*Parietaria officinalis*																+			1
PLLA	*Plantago lanceolata*																	+		1
POOF	*Polypodium officinalis*																	+		1
PRMI	*Prunus microcarpa*	+																		1
TYLA	*Typha latifolia*											+								1
ACSP	*Acantholimon* spec.			+																1
ANOR	*Annarhinum orientalis*						+													1
ASGL	*Asphodeline globifera*					+														1
ASMU	*Asphodeline mumularia*			+																1
BASP	spec. *Ballota*			+																1
CESP	*Centaurea* spec.							2.2												1
CEFA	*Ceratocephalus falcatus*			+																1
CYSP	*Cyperus* spec.																	+		1
FISP	*Fabigia* spec.																		+	1
HYRE	*Hyoscyamus reticulatus*		+																	1
LIMU	*Linum mucronatum*		+																	1
MASP	spec. *Marrubium*			+																1
MALO	*Mathiolla longipetala*		+																	1
PHSP	*Phlomis* spec.	+																		1
POSP	*Potentilla* spec.								+											1
SAEB	*Sambucus ebulus*															+				1
SESP	spec. *Sedum*			+																1
STPA	*Stipa parviflora*						+													1
TESP	*Teucrium* spec.														1.1					1
TUSP	spec. *Tulipa*				+															1
VIMA	*Vinca major*		1.1																	1
VISP	*Viola* spec.								+											1
CEAU	*Celtis australis*																+			1
ULCA	*Ulmus campestris*																	+		1
		15	11	21	23	24	25	22	32	10	13	23	22	28	16	27	16	43	29	39	

Site description of the relevés (appendix 5):

Relevés Code	**Name**	**Long.**	**Lat.**	**Site location and description**
C30	Ma'aret Mosreen	36.43.12	36.02.12	In the Olive grove near Ma'aret Mosreen
C31	Harem-Salqeen	36.29.24	36.11.27	In the road Harem-Salqeen

F19	North Lattakia	35.52.43	35.43.42	North Lattakia 10km
F20	Qara-Douran	35.55.47	35.55.12	West of Kasab
F21	Qara-Douran	35.55.49	35.55.45	West of Kasab
G15	Al-Abrash	36.00.36	34.47.24	South Tartous 20 Km
J30	Sheikhaniah	36.07.42	35.42.36	North Salma in the Coastal Mountains
J31	Al-Khadrah	36.00.39	35.49.14	West Rabiah in Baer-Bassit
J33	Hzerin	36.78.45	35.42.36	West of Salma in the Coastal Mountains
L34	Abo-Qbais	36.19.43	35.15.01	North Mesiaf in the road to Dalieh in the Coastal Mountains
L35	Btaisah	36.21.60	34.51.36	North Sheen in the Coastal Mountains
L36	Ain Al-Jouz	36.22.42	34.52.12	North Sheen in the Coastal Mountains
L37	Mashta Al-Holw	36.16.48	34.52.49	Near Wadi Al-Oyoun in the Coastal Mountains
O07	Al-Tauani	36.31.13	33.55.47	West Ma’alula Anti-Lebanon
O08	Isal Al-Ward	36.26.24	33.52.48	West Ma’alula Anti-Lebanon
O09	Hasia	36.45.36	34.20.24	South Homs near Hasia in Anti-Lebanon.
O10	Hasia	36.43.47	34.20.25	South Homs near Hasia in Anti-Lebanon.
O11	Hasia	36.42.36	34.20.34	South Homs near Hasia in Anti-Lebanon.
O12	Jandar	36.44.23	34.30.01	South Homs in Anti-Lebanon.

Appendix 6: Photos.

Photo 1: Coniferous plantation area near Daret-Izah

Photo 2: The vegetation has disappeared in Jabal Samaan area

Photo 3: The vegetation remove from the site and the soil erosion leaving a bare parent rock and a site in an irreversible situation (Jabal Samaan).

Photo 4: Big site for plantation works in the north Coastal Mountains.

Photo 5: The vegetation degradation in the north of the Coastal Mountains and the expansion of fruit orchards

Photo 6: The low valley among Wastani hills collected the eroded soil from the slopes which lost their vegetation.

Photo 7: *Pinus brutia* forest was changed into fruit orchards in Jiser Al-Shoghour area.

Photo 8: The maquis still has energy to come back if it is protected (the Wastani Mountain).

Photo 9: The vegetation in the distance of the watershed of Asi River before entering Darkoush.

Photo 10: The understory vegetation in relevé H04

Photo 11: High trees of *Quercus calliprinos* in the Wastani Mountain.

Photo 12: Irafeet area where Pino (brutiae)-Iridetum unguicularis is recorded.

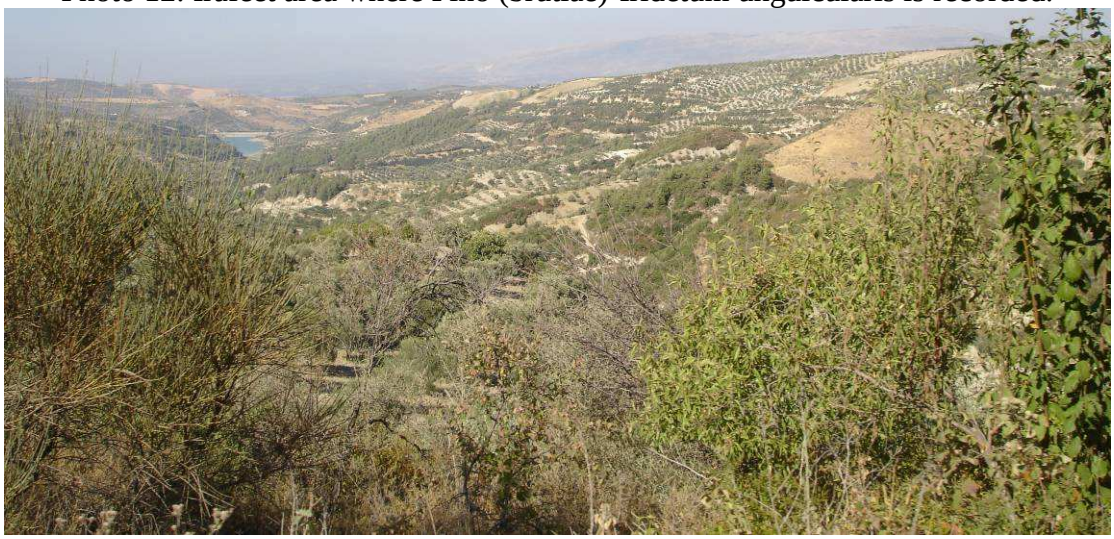

Photo 13: The vegetation of the watershed in Der-Osman Dam.

Photo 14: Location of relevé H22

Photo 15: *Pinus brutia* forest changes to fruit orchards in Jiser Al-Shoghour area.

Photo 16: The relevé J18 looking as a landmark in the maquis of the area

Photo 17: *Pinus brutia* forest in Jiser Al-Shoghour area where the Pino (brutiae)-Iridetum unguicularis is recorded.

Photo 18: The fire is the first step in removing the forest cover and changing it into a degraded form. (Fire 2005 near Joreen).

Photo 19: The vegetation near Salma area.

Photo 20: The understory has disappeared from the site by heavy walking (Al-Doha village) in the Coastal Mountains.

Photo 21: Wood has been cut from the forest for burning and cooking purposes.

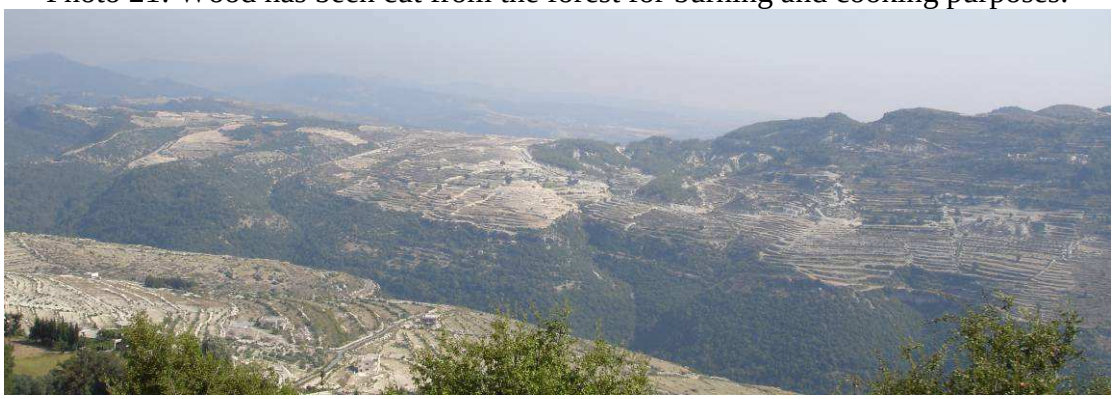

Photo 22: The vegetation on the western slopes of the Coastal Mountain south Haffeh.

Photo 23: The climax forest was changed into a restaurant that destroyed the ground vegetation under the trees in the Querco (infectoria)-Quercetum calliprini in the site of relevé J18.

Photo 24: The *Quercus calliprinos* was cut down from the site of relevé J19 after the tree has died due to insect infestation.

Photo 25: When the site was protected from human activities the vegetation grow up and become more dense as in the site of relevé J14

Photo 26: The under story is growing very well (relevé J22).

Photo 27: Maquis of *Quercus calliprinos* on the western slopes of the Coastal Mountains.

Photo 28: The maquis covers the eastern slopes along the Joureen-Slenfah road. The Ghab plain is in the back of the picture.

Photo 29: The vegetation type around Qal'aat Salahdeen.

Photo 30: The maquis is disappearing by changing the land into Olive grove in the eastern slopes of the Coastal Mountain.

Photo 31: The ground vegetation under high trees of the Querco (infectoria)-Quercetum calliprini (relevé J24)

Photo 32: The plantations help the natural vegetation to come back again (Al-Hagar J27).

Photo 33: Huge tree of *Qurecus infectoria* share the *Quercus calliprinos* in the Querco (infectoria)-Quercetum calliprini near Al-Basta village.

Photo 34: The natural vegetation was protected just near the holy places

Photo 35: Goats grazing also the remaining vegetation in the high land of the Coastal Mountains

Photo 36: Terraces protect the soil from erosion on steep slopes (near Salma).

Photo 37: The fire has destroyed the vegetation by giving the landscape a mosaic view.

Photo 38: New regeneration of *Pinus brutia* is coming back after fire in the Baer-Bassit Mountain

Photo 39: Big fire destroyed the forest in the Baer-Bassit Mountain.

Photo 40: *Pinus brutia* forests occupying the Thermo-Mediterranean area where *Ceratoina siliqua* and its vegetation grew (Um-Toyour).

Photo 41: On this cliff in Um-Toyour, *Cupressus sempervirens* appears among the vegetation.

Photo 42: The vegetation of Baer-Bassit Mountain.

Photo 43: The government cut some trees of *Pinus brutia* under a project aimed at managing the forest.

Photo 44: Huge quantities of *Pinus brutia* trunks cut from the forest by a management project from the government.

Photo 45: Landscape of Al-Akrad Mountain was changed into olive groves.

Photo 46: The vegetation in Al-Akrad Mountain shrunk dramatically.

Photo 47: Small forest patches of *Pinus brutia* appeared between the olive groves in Al-Akrad Mountain.

Photo 48: View for the relevé A17 in Al-Akrad Mountain Pino (brutiae)-Cistetum villosii.

Photo 49: High trees of *Pinus brutia* with low density appeared in Al-Akrad Mountain.

Photo 50: Remaining patches of different sizes of *Pinus brutia* vegetation that are decreasing while the olive groves are on the increasing in Al-Akrad Mountain.

Photo 51: The infrastructure projects destroyed wide areas from the forest as the case of Paradon Dam project on Al-Shamali River

Photo 52: The forest patches with different sizes on the hills of Al-Akrad Mountain due to the dramatical increase of the agriculture land among them.

Photo 53: The vegetation was removed, the soil eroded, and the site is in an irreversible condition.

Photo 54: Al-Ruge plain has changed to a big farm.

Photo 55: One of the important sites of the Querco infectorea -Quercetum calliprini (Surna)

Photo 56: Soil profile for relevé H01 in Irafeet area.