Altitudinal and rocky habitats of the flora eastern and western sides of the Al Jabal Al Akhdar in Libya

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Abstract: The study was conducted during 2010 and 2011 at two different areas Al-Mansora and Jarjr-oma in Al Jabal Al Akhdar. The ecological surveys are necessary for an adequate characterization of a plant community and change in different along altitudinal gradient species in importance value, dominance and plant density. In Rocky habitat increased number of species to 175 species in Al-Mansora when altitude 309.4 m asl and 153 species in Jarjr oma when altitude 1 m asl. However, altitude in Rocky habitat of Al Mansora gave the highest number of species than that of Jarjr oma percent 7 % although of increase altitude. In Al Mansora habitat the importance value of the different association type 1 to 8, the values of species *Thymus capitatus* high in all characteristics, following *Cistus parviflorus* give highest presence during autumn season its species unpalatable. Vegetation dendrogram of stands based on Dominance of the species TWINSPAN classification four groups of Rocky habitat Al Mansora area, dominant by *Cistus parviflorus*, *Rhamnus lycioides*, *Thymus capitatus* and *Sarcopoterium spinosum*. In general, Rocky Coastal of Jarjr oma area gave highest the IV species *Rhus tripartita*, *Sarcopoterium spinosum*, *Arisarum vulgare* and *Suaeda vera*, wherever, dominance the indicator species *Rhus tripartita*, *Sarcopoterium spinosum*, *Juncus acutus* and *Periploca angustifolia*. The effect of difference seasons on plant density of Rocky Coastal were annuals species such as *Mercurialis annua* and *Anagallis arvensis* gave the highest plant density 1.2 plant per m^2 in autumn its unpalatable species. However, species of *Arisarum vulgare* had the highest plant density than that of *Mercurialis annua* in winter. Palatable species such as *Hordeum marinum* and *Frankenia hirsuta* gave highest in spring, in summer season *Sarcopoterium spinosum*, *Rhus tripartita* and *Juncus acutus* had the highest plant density and its palatable species except *Sarcopoterium spinosum*. Al Mansora Rocky habitat was soil texture in community *Thymus capitatus* was silty lome while soil texture in community *Sarcopoterium spinosum* and *Cistus parviflorus* was silty clay, however, Rocky Coastal of Jarjr oma convergent community to clay perecentage of *Suaeda vera* and *Sarcopoterium spinosum* both 44%, while *Rhus tripartita* 42%, silty clay loam in *Sarcopoterium spinosum*. pH value a natural generally in all community. Electrical conductivity community *Suaeda vera* have highest mean value of 2.42 mmohs/cm.

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Keyword: Altitudinal, Rocky habitat, Flora, Dominance, Density and Important value

1. Introduction

Characterized land area Green Mountain generally high proportion of gravel and reveal the original material rock where he found that more than 45% of the soils Green Mountain severe rocky and nearly 50% of which has been characterized by shallow soil sector where less soil depth effective 50 cm due to high viability of soil erosion runoff water especially if they removed their natural vegetation cover (Al-Jabal Al-Akhdar south project, 2005). The most apparent pattern along altitudinal gradients is the decrease in species numbers with increasing altitude. As the number of alien species increases at higher altitudes, threats and impacts on native biodiversity, including endemic species might also increase (Khuroo *et al*., 2011). Inland rocky habitats of particular conservation value include natural rocks and cliffs, scree and limestone pavements. Rocky habitat is characterized by grasses, dwarf-shrubs and/or herbs growing in restricted crevices (APIS, 2011). Habitats are classified as scree or rock habitat types even if characteristic higher plant species are missing as long as characteristic moss and lichen species are present and the habitats are sufficiently natural (Schröder *et al*., 2006). The seasonal difference was mostly due to changing numbers of species between seasons. The numbers of species per sample-unit (i.e. species-density) always increased with distance from north to south in both seasons (Underwood *et al*., 2008). Most of the species grow mainly in spring season as annuals but most of them disappeared in summer season except perennials, whereas, the most of the annual species had the highest averages in spring season and reached the minimum in summer. However, perennials exhibited an opposite trend (Abou-Deya and Salem, 1990). Here, we analysed altitudinal distributions and

characteristics of the Rocky habitat flora of Al Mansora 309.4 m asl and Jarjr oma 1 m asl.

The study area: The study area is located in the Mediterranean Coast of Libya (Figure 1). The Rocky habitat Al-Mansora between latitude 32°, 50′, 44.8″ N and longitude 21°, 50′, 30.3″ E. Al-Mansora distance 11 Km east Al Baida city and Jarjr-oma between latitude 32°, 47′, 49.8″ N and longitude 21°, 26′, 40.6″ E, distance 28 km west Al Baida city, three transect were investigated from north to south. Distance Jarjr-oma 300 m of the sea with altitude 1 m and distance Al Mansora 6.5 km of the Mediterranean Sea with altitude at 309.4 m.

Geology, soils and topography

The rock type plays an important role in the morphology of the Al Jabal Al Akhdar. Geologically the area Al-Mansora is limestone. On weathering they give rise to fertile loamy clay, which collects only in sheltered places. The major part of the area Rocky's is composed of limestone, it contains Sand 22.3 %, Silt 44 % and clay 33.6 %. Indicate geologically area Jarjr-oma to exposure to sediments Quaternary consists soil from rocks Eocene, which consists of Nummulitic Limestone in Cretaceous and present sediment Quartet coastal area, Sand 18 %, 39 % Silt and Clay 43 %. Soil texture of Rocky habitat in both area Silty Clay Loam.

Soils are universally shallow and may overlie a great variety of geological formations from limestone, rocks. The soil derived from sandstone is poor and less fertile than soil from limestone. It supports nothing except the most xerophyllous vegetation (Hussain and Ilahi, 1991)

Data Collection: Vegetation study was undertaken during the autumn 2010 and winter, spring and summer 2011. A total of 24 stands in all season were sampled from Al Mansoura and Jarjr-oma from Al-Jabal Al-Akhdar (Figure 1). Stands and sites were selected as to represent the variation of vegetational, climatic and edaphic characteristics prevailing in the study area so that the location of stands was based on visual changes in habitats and plant communities along the transect. Examples of habitat classes include habitat types derived from Electric Conductivity (EC) classification schemes, habitat salinity EC from 6 – 9 ms/cm and habitat saltmarch from 11-36 ms/cm.

The floristic categories and chorology of species recorded in the study area were made with their characteristic distribution terms, the plant species were identified according to Jafri and El-Gadi (1977) and oulos (1999,2000, 2002 and 2005).

Three lines transect at Al Mansoura and Jerjr-oma were chosen for this study. The take 500 meters for each transect the number of three transects and all transect four stands with an area of 5*5 m^2. In these stands, the quadrate method was used and the size of each analytic quadrate area was 1 m^2. The stands were selected on the basis of visual difference and change in their vegetation coverage. The first step to calculating the index is to sample an area. Random sampling is a way to collect data in a manageable fashion rather than counting every plant. The species in each quadrate were listed. The number of individual of each species was counted. Number of species counted for each area and for each habitat were determined each 25 m^2 by community and habitat.

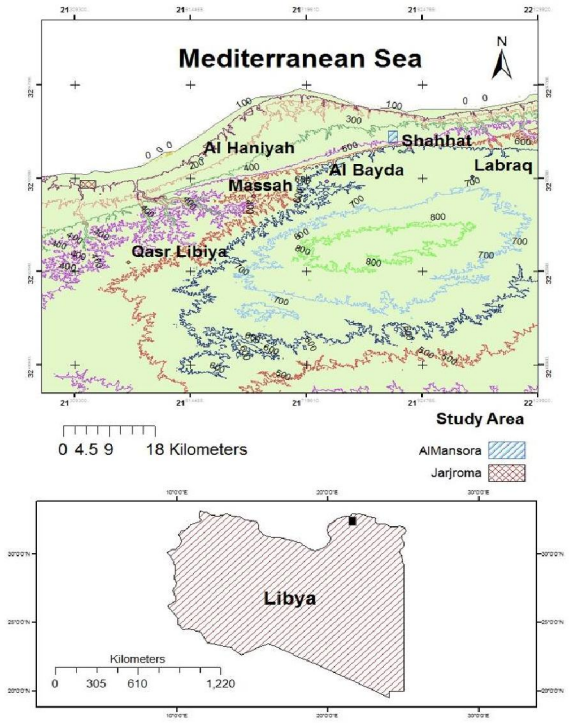


Fig. 1. Map of the Western Mediterranean Sea coast region of Libya indicating the location of Al Mansora and Jarjr oma in Al- Jabal Al- Akhdar.

Therefore, for each stand the absolute frequency, absolute density, and absolute cover were determined. The sum of relative density, relative frequency and relative cover gave the importance value (Ludwig and Reynolds, 1988) for the different species as following:

Density per m^2 = number of individuals ÷ area sampled

Relative density = (density for a species ÷ total density for all species) × 100

Frequency = number of sampled quadrates in which a species occurs ÷ total number of quadrates in the stand

Relative frequency = (frequency for a species ÷ total frequency for all species) × 100
Cover = the area occupied by the species ÷ the whole investigated area
Relative cover = (coverage of a species in the sample m^2 ÷ total cover of all species in the sample m^2) × 100
Coverage = Dominance species = average area of spatial coverage × Number of individuals species in every 1 m^2 (Al Hawas, 2004).
Importance value (IV) = Relative density + Relative cover + Relative frequency

Data Analysis: Classification and ordination of communities (stands) followed two trends of multivariate analysis. The applied classification technique here was the Two-Way Indicator Species Analysis (TWINSPAN), a CAP Program (Henderson and Seaby, 1999). The applied ordination techniques were the Detrended Correspondence Analysis (DCA) and PCA (principal components analysis) the application of the techniques based on the importance value, dominance and density of the species. The statistical treatments applied were according to Nie *et al.*, 1975.

3. Results

Rocky Habitat of Al – Mansora area

Importance value

Forty two species were recorded in the studied 12 stands. The application of TWINSPAN classification on the importance values of the recorded 42 species of autumn in 12 stands led to the recognition of 8 association and 175 species in all seasons (Figures 2 and 3). The importance value of the different association type 1 to 8 are presented in (Table 1). Each type comprises a set of stands with greater homogeneity of vegetation.

The values of species *Thymus capitatus* high in all characteristics, following *Cistus parviflorus* give highest presence during autumn season.

Based on the TWINSPAN outcome, Figures 2 and 3 was elaborated. The TWINSPAN analysis divided the stands into 8 vegetation clusters, each cluster representing a specific plant community according to the most importance value characteristic species that reached the highest IV.

Forty two species were recorded in the studied 12 stands in Al Mansora autumn. The application of TWINSPAN classification on the importance values of the recorded 42 species in 12 stands led to the recognition of 8 groups (Figure 2) The importance value of the different vegetation groups A to H are presented in (Table a). Each group comprises a set of stands with greater homogeneity of vegetation.

Group A. The dominant species at this group is *Thymus capitatus***,** this species is economic which attained the highest IV of 56.6. Vegetation dominated by *Drimia maritime*, *Asphodelus microcarpus* and *Phlomis floccose*, its species unpalatable.

Group B. The indicator species is *Sarcopoterium spinosum* indicated overgrazing. Vegetation dominated by *Colchium palaestinum*, *Arisarum vulgare* and *Rhamnus lycioides*.

Group C. The dominant species at this group is *Galium verrucosum*. The indicator species are *Leontedon tuberosus*, *Onopordum cyrenaicum*, *Umbilicus horizontalis*, *Rumelea cyrenaica*, *Ranunculus asiaticus*, *Narcissus elegans* and *Thapsia garganica* with IVs ranged from 1.5 to 6.

Group D. This vegetation group dominated by *Bellevalia sessiliflora*, association with *Fumana laevipes*, *Lotus cytisoides* and *Micromeria juliana*.

Group E. The dominant species at this group *Sedum sediforme*. The indicator species are *Scandix australis* and *Micromeria nervosa*.

Group F. Association by *Bellis sylvestris* dominant with *Viola scorpiuroides*.

Group G. The indicator species is *Erica multiflora* association by *Teucrium apollinis*, *Daphne jasmine*, *Phagnlon rupestre*, *Phuopsis stylosa* and *Pistacia lentiscus***.**

Group H. The indicator species is *Cistus parviflorus*, while the dominant species are *Juniperus phoenicea***,** *Prasium majus*, *Calicotome villosa***,** *Cyclamen rohlfsianum*, *Phillyrea latifolia*, *Globularia alypum*, *Senecio leucanthemifolius, Anagallis arvensis, Linum usitatissimum* and *Erodium malacoides.*

Detrended Correspondence Analysis (DCA) or DECORANA is applied for the 29 species recorded in the 12 stands. As shown in figure (3), the DCA ordination of stands and species demonstrates that the vegetation groups produced by TWINSPAN classification are markedly distinguished with a clear pattern of segregation on the ordination plane. Group A dominated based on importance value by *Thymus capitatus* that is dominated in rocky habitat Al-Mansora. Group B is co-dominated by *Sarcopoterium spinosum*. While group C that dominated by *Galium verrucosum*. Group D by *Bellevalia sessiliflora*. Group E by *Sedum sediforme*. Group F by *Bellis sylvestris*. Group G by *Erica multiflora*. Group H by *Cistus parviflorus* on based importance value.

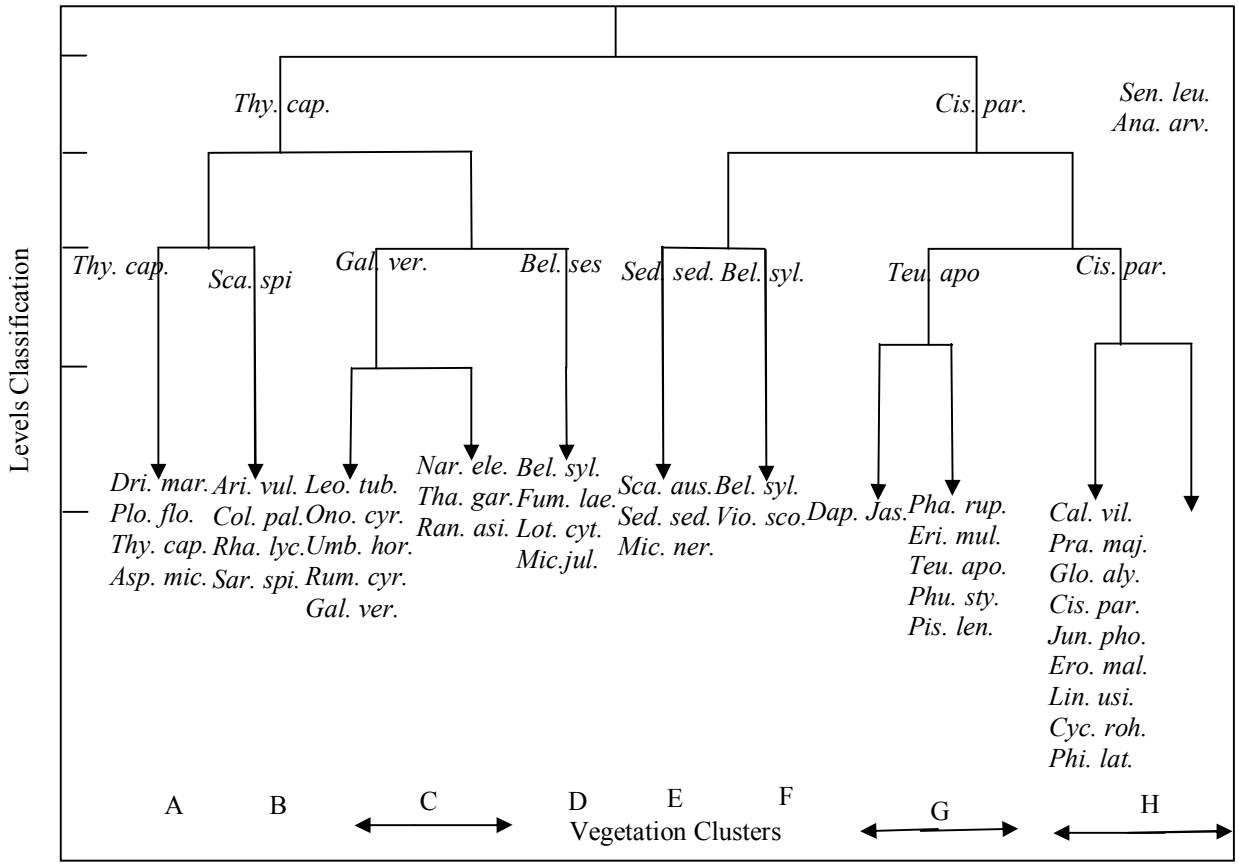


Fig. (2). Vegetation dendrogram of stands based on importance value of the species TWINSPAN classification groups of rocky habitat Al-Mansora area.

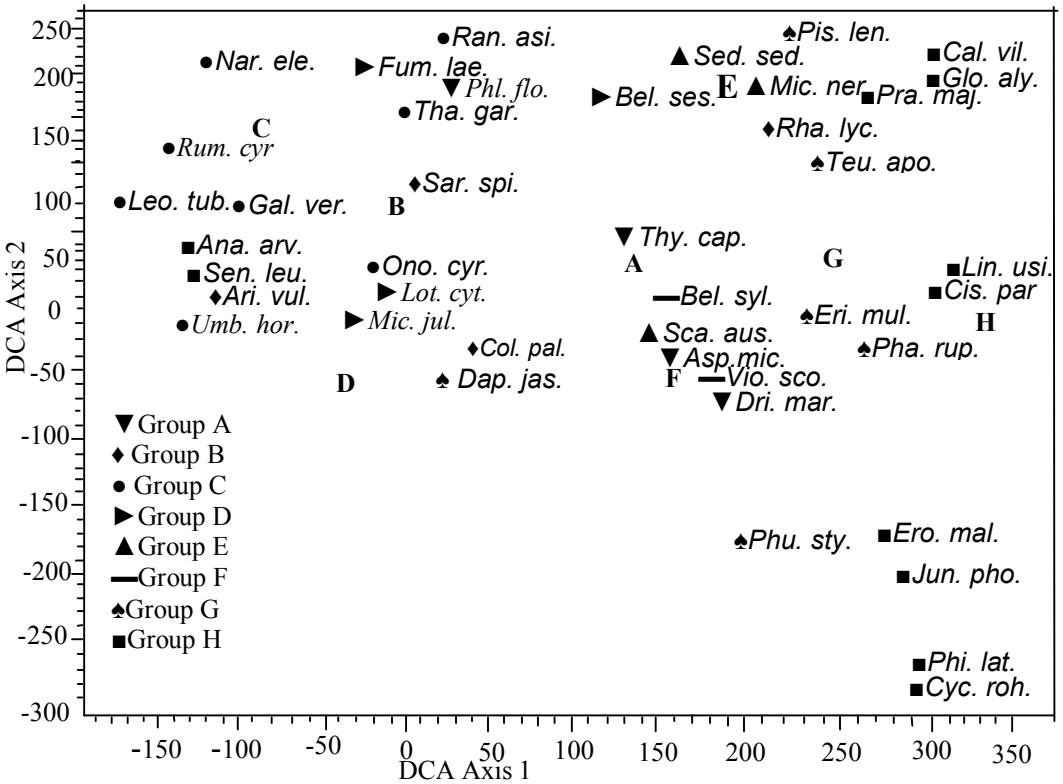


Fig. (3). DCA ordination diagram of stands with vegetation groups from TWINSPAN classification of the vegetation based on importance value in rocky habitat Al-Mansora.

Detrended Correspondence Analysis (DCA) is applied for the 42 species recorded in the 12 stands. As shown in figure (3), the DCA ordination of stands and species demonstrates that the vegetation groups produced by TWINSPAN classification are markedly distinguished with a clear pattern of segregation on the ordination plane. Group A, B, C, D, E, F, G and H dominated by *Thymus capitatus*, *Sarcopoterium spinosum*, *Galium verrucosum*, *Bellevalia sessiliflora*, *Sedum sediforme*, *Bellis sylvestris*, *Erica multiflora* and *Cistus parviflorus* in rocky habitat Al mansora. The ordination of the two axes of the DCA technique separated the vegetation into 8 groups on the ordination plane.

Show Figs. 4 and 5. Vegetation dendrogram of stands based on Dominance of the species TWINSPAN classification four groups of Rocky habitat Al Mansora area, dominant by *Cistus parviflorus*, *Rhamnus lycioides*, *Thymus capitatus* and *Sarcopoterium spinosum*.

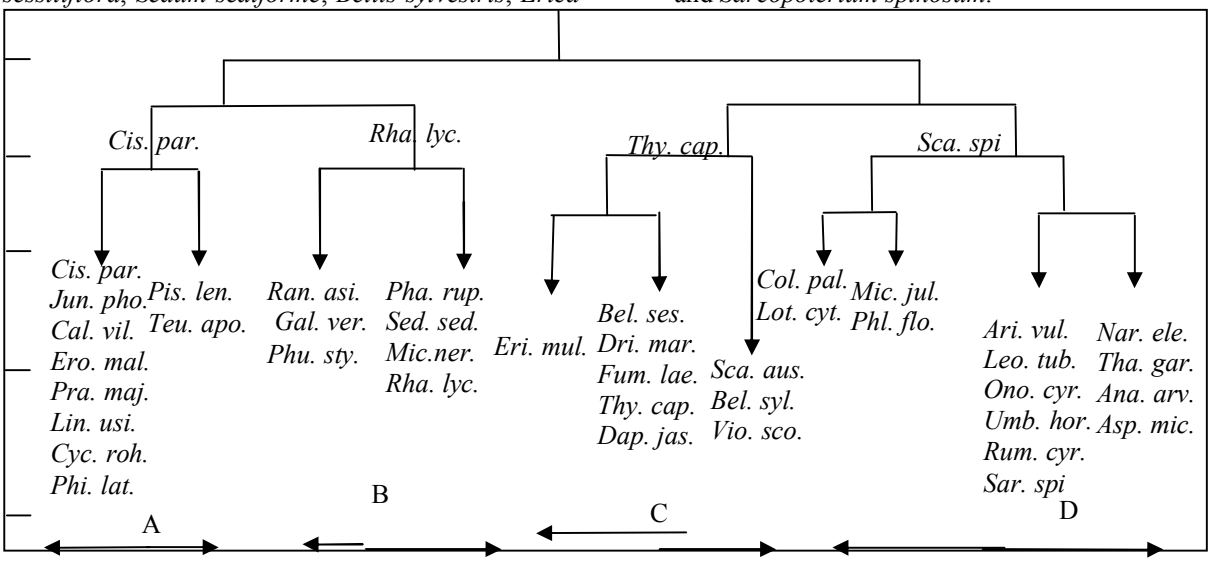


Fig. (4). Vegetation dendrogram of stands based on Dominance of the species TWINSPAN classification groups of Al Mansora area.

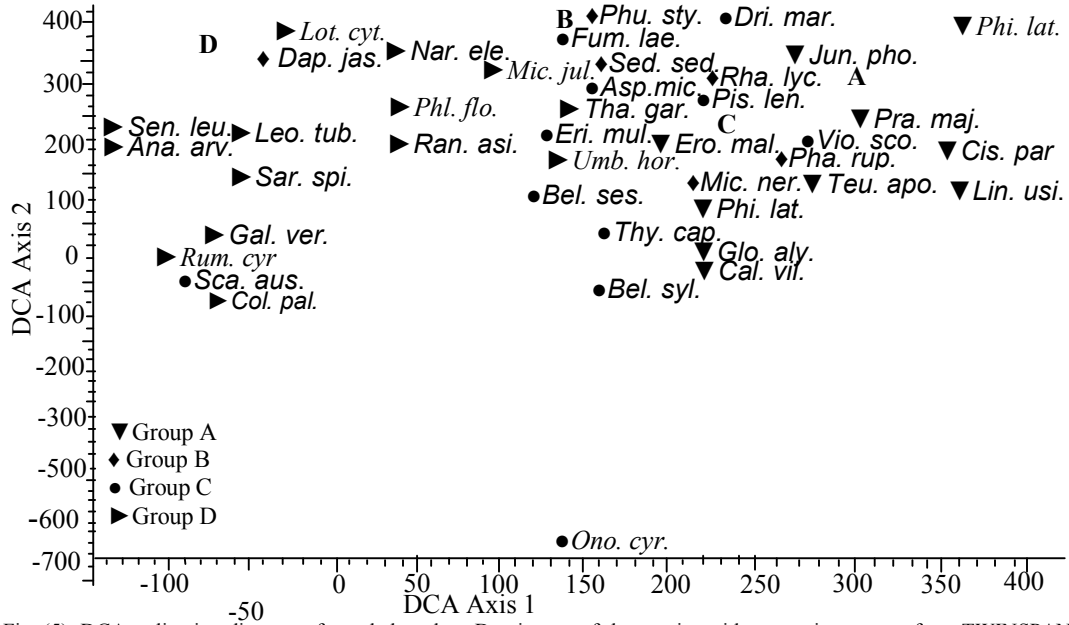


Fig. (5). DCA ordination diagram of stands based on Dominance of the species with vegetation groups from TWINSPAN classification of the vegetation in autumn season.

Plant Density

The density difference between seasons, distribution and numbers species shows in Figs. 6-9 DCA ordination diagram of stand s with vegetation groups Density from TWINSPAN classification of the vegetation in autumn, winter, spring and summer of Rocky habitat Al Mansora area.

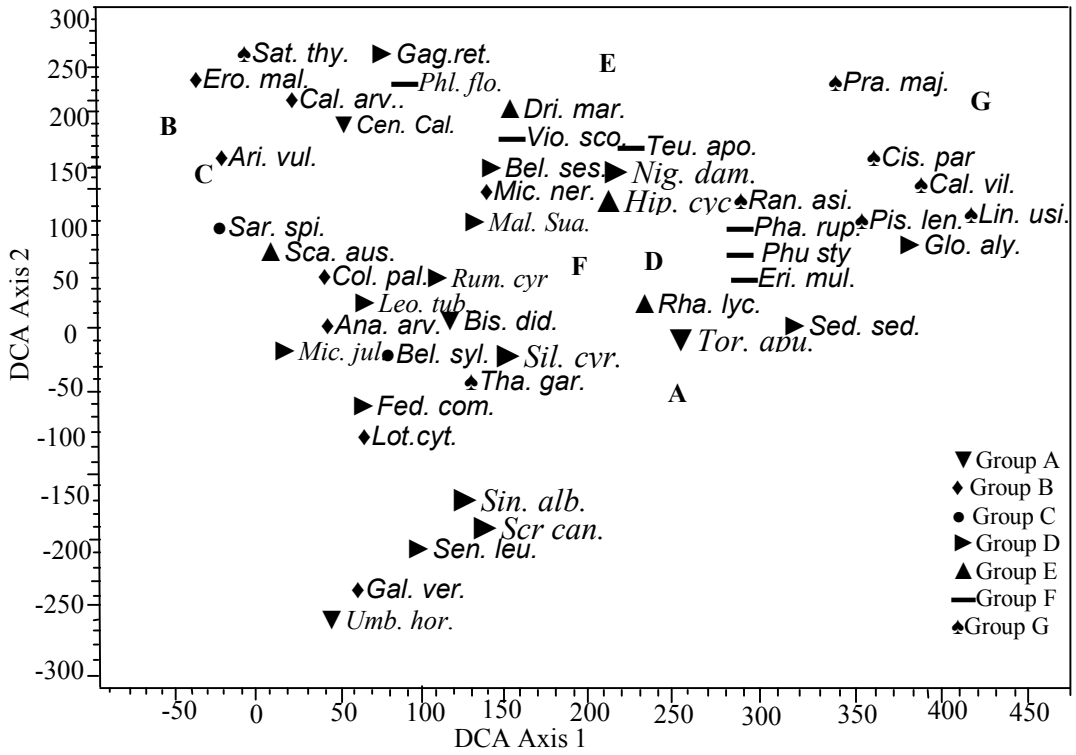


Fig. (6). DCA ordination diagram of stands with vegetation groups Density from TWINSPAN classification of the vegetation in autumn Al Mansora.

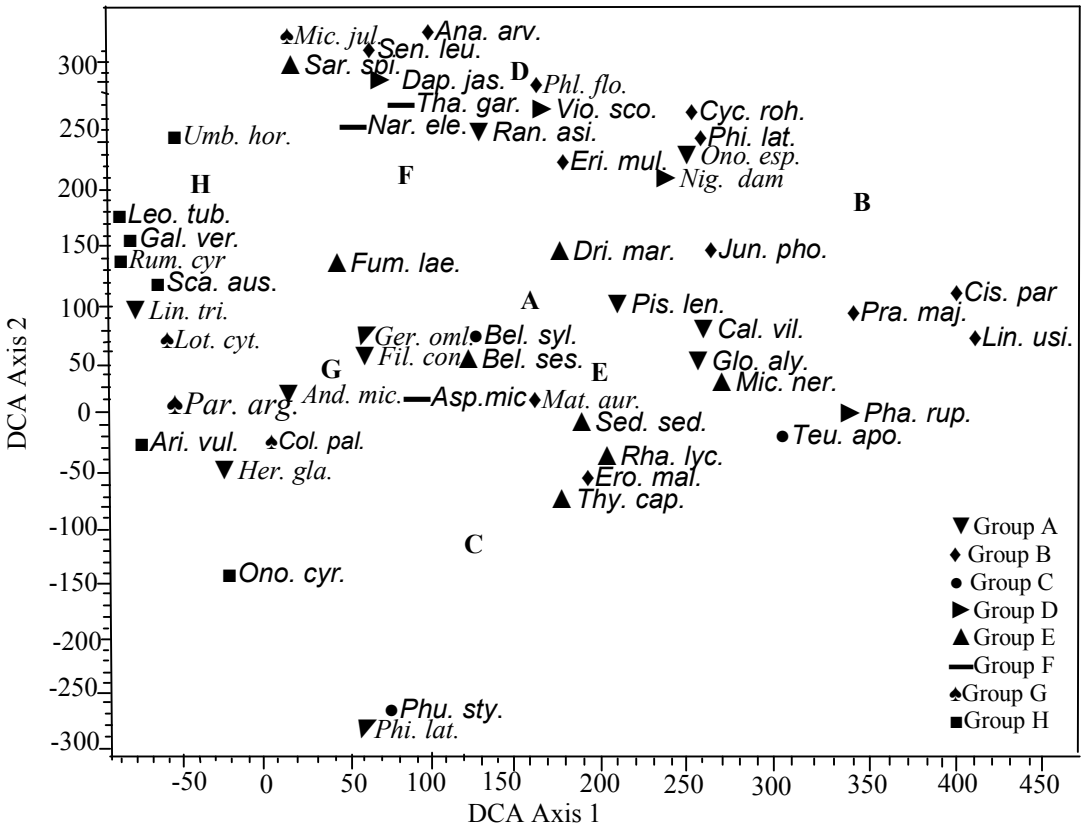


Fig. (7). DCA ordination diagram of stands with vegetation groups Density from TWINSPAN classification of the vegetation in winter Al Mansora.

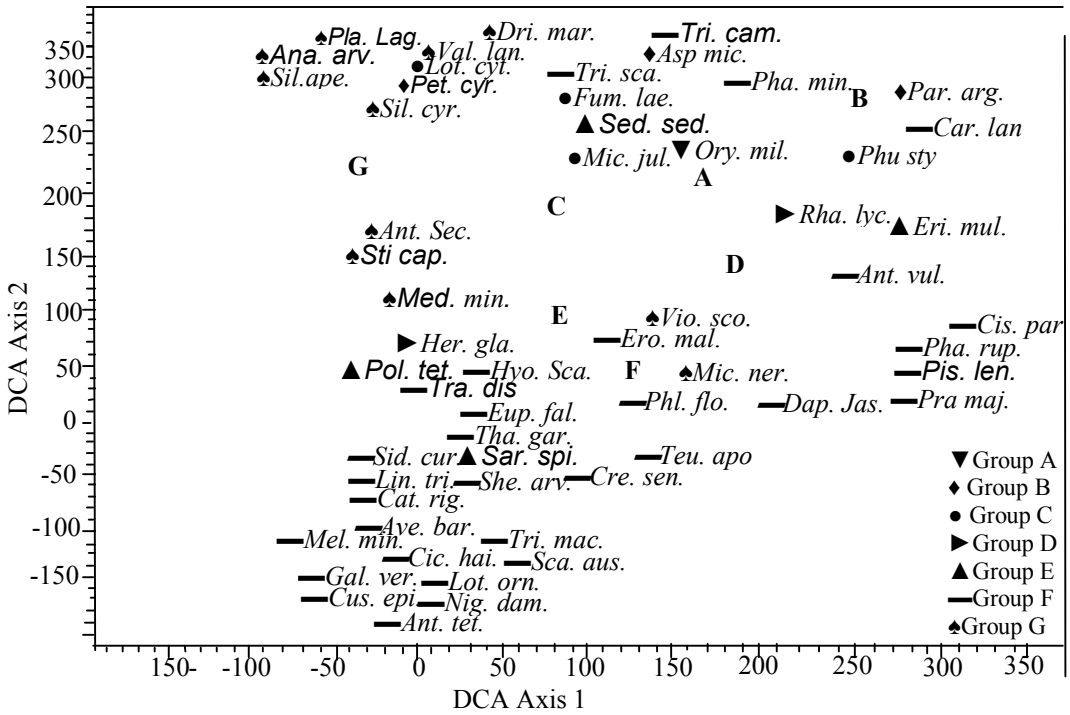


Fig. (8). DCA ordination diagram of stands with vegetation groups Density from TWINSPAN classification of the vegetation in Spring Al Mansora.

Table (1) Mean and standard deviation of the Density of the twenty four species in different vegetation groups resulting from TWINSPAN classification of the stands surveyed in rocky habitat of summer of Al Mansora.

No.	Scientific name	TWINSPAN groups		
		A	B	C
1	*Allium negrianum* Maire & Weiller	0.003±0.01	-	-
2	*Allium nigrum* L.	0.003±0.01	-	-
3	*Pistacia lentiscus* L.	-	-	0.01±0.03
4	*Torilis nodosa* (L.) Gaertn.	0.003±0.01	-	-
5	*Carthamus lanatus* L.	0.003±0.01	-	-
6	*Petrorhagia cyrenaica* (Durand & Barratte) Ball & Heywood	-	-	0.03±0.05
7	*Cistus parviflorus* Lam.	-	-	0.36±0.66
8	*Fumana laevipes* (L.)Spach	-	0.10±0.12	-
9	*Cuscuta epithymum* L.	-	-	0.02±0.04
10	*Juniperus phoenicea* L.	-	-	0.01±0.02
11	*Erica multiflora* L.	-	-	0.52±0.72
12	*Micromeria Juliana* (L.) Benth. Ex Reichenb.	-	0.40±0.41	-
13	*Phlomis floccosa* D. Don	-	-	0.02±0.04
14	*Satureja thymbra* L.	-	-	0.01±0.03
15	*Thymus capitatus* (L.) Hoffm .& Link	-	0.64±0.45	-
16	*Phillyrea latifolia* L.	-	-	0.003±0.01
17	*Papaver rhoeas var. rhoeas*	0.003±0.01	-	-
18	*Globularia alypum* L	-	-	0.04±0.13
19	*Bromus madritensis* L.	0.003±0.01	-	-
20	*Rhamnus lycioides* L. Jahandez	-	0.19±0.14	-
21	*Sarcopoterium spinosum* (L.)Spach	-	0.44±0.45	-
22	*Phuopsis stylosa* Trin.	-	-	0.13±0.24
23	*Scrophularia canina* L.	0.003±0.01	-	-
24	*Daphne jasminea* Sibth. Et Sm.	-	-	0.14±0.22

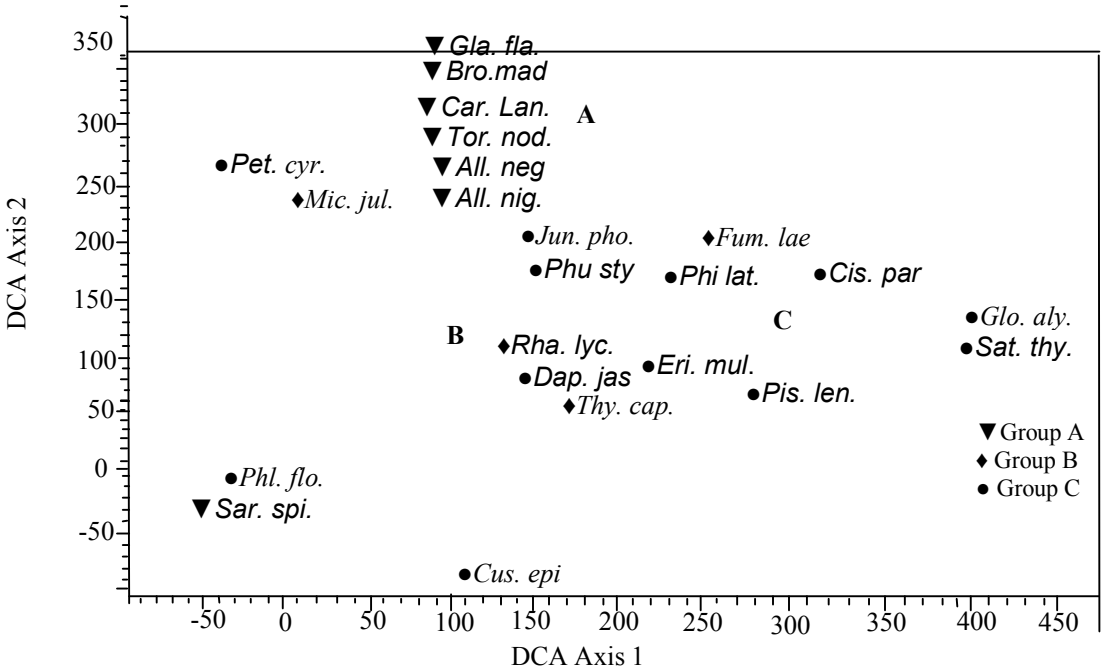


Fig. (9). DCA ordination diagram of stands with vegetation groups Density from TWINSPAN classification of the vegetation in Summer Al Mansora.

Rocky Coastal habitat of Jarjr-oma area

Importance value

Three transects extended from the north to south with 12 stands. Forty species of autumn and 153 species during four seasons in rocky. The importance value of the different association type A to D are presented in (Table 2) and (Figs. 10 and 11). Each type comprises a set of stands with greater homogeneity of vegetation.

Group A: Stands of this type the dominant species *Sarcopoterium spinosum* IV 31.3. Association only species *Centaurea alexandrina*. Group B: This vegetation type the IV 15 *Suaeda vera* association by *Calendula arvensis* and *Rumex bucephalophorus*. Group C: Vegetation of this community the dominant species *Rhus tripartita* associated by *Drimia maritima*, *Juniperus phoenicea* and *Umbilicus horizontalis*. Group D: The IV 25.7 species *Arisarum vulgare* associated by *Anagallis arvensis*, *Mercurialis annua* and *Juncus acutus*.

Table (2) Importance value of Rocky habitat of autumn season in Jarjr oma area.

No.	Scientific name	Twinspan groups			
		A	B	C	D
1	*Suaeda vera* Forak. ex Gmel.		15.0±39.6		
2	*Pistacia lentiscus* L.			1.5±4.0	
3	*Rhus tripartita* (Ucria) Grande			34.2±38.5	
4	*Torilis nodosa* (L.) Gaertn.				8.0±12.5
5	*Periploca angustifolia* Labill.				9.0±15.8
6	*Arisarum vulgare* Targ. Tozz				25.7±19.8
7	*Asparagus stipularis* Forsk.				1.6±4.1
8	*Bellevalia sessiliflora* (Viv.) Kunth				9.8±17.2
9	*Drimia maritima* (L.) Stearn			10.4±12.2	
10	*Scilla peruviana* L.				1.2±3.2
11	*Calendula arvensis* L.		9.8±14.2		
12	*Centaurea alexandrina* Delile	5.4±7.1			
13	*Cynara cornigera* Lindley			4.3±11.3	
14	*Leontedon tuberosus* L.			4.7±5.9	
15	*Onopordum cyrenaicum* Maire & Weiller		5.8±9.1		

16	*Phagnlon rupestre* (L.) Dc.			1.2±3.2	
17	*Polycarpon tetraphyllum* (L.) L.		2.3±6.0		
18	*Colchium palaestinum* Baker.				3.1±5.6
19	*Umbilicus horizontalis* (Guss.)Dc.			6.4±6.0	
20	*Bryonia cretica* L.				1.1±2.9
21	*Juniperus phoenicea* L.			10.3±19.3	
22	*Mercurialis annua* L.				16.2±29.3
23	*Lotus ornithopodioides* L.			4.3±5.4	
24	*Trigonella stellata* Forsk.			1.6±4.3	
25	*Erodium malacoides* (L.) L'Herit.			2.3±6.0	
26	*Geranium molle* L.				5.0±6.4
27	*Juncus acutus* L.				10±26.3
28	*Phlomis floccosa* D. Don				3.5±4.4
29	*Prasium majus* L.			0.9±2.5	
30	*Teucrium barbeyanum* Aschers				3.7±9.9
31	*Malva parviflora* L.		4.6±12.2		
32	*Anagallis arvensis* L.				18.3±21.3
33	*Cyclamen rohlfsianum* Aschers.			3.6±9.6	
34	*Limoniastrum monopetalum* (L.) Boiss.				6.1±11.2
35	*Limonium sibthorpianum* (Guss.) O. Ktze.				1.3±3.5
36	*Rumex bucephalophorus* L.		9.1±19.6		
37	*Sarcopoterium spinosum* (L.) Spach	31.3±20.2			
38	*Crucianella maritime* L.			0.26±0.68	
39	*Theligonum cynocrambe* L.			4.6±12.2	
40	*Asphodelus microcarpus* Salzm.& Viv.				2.6±4.7

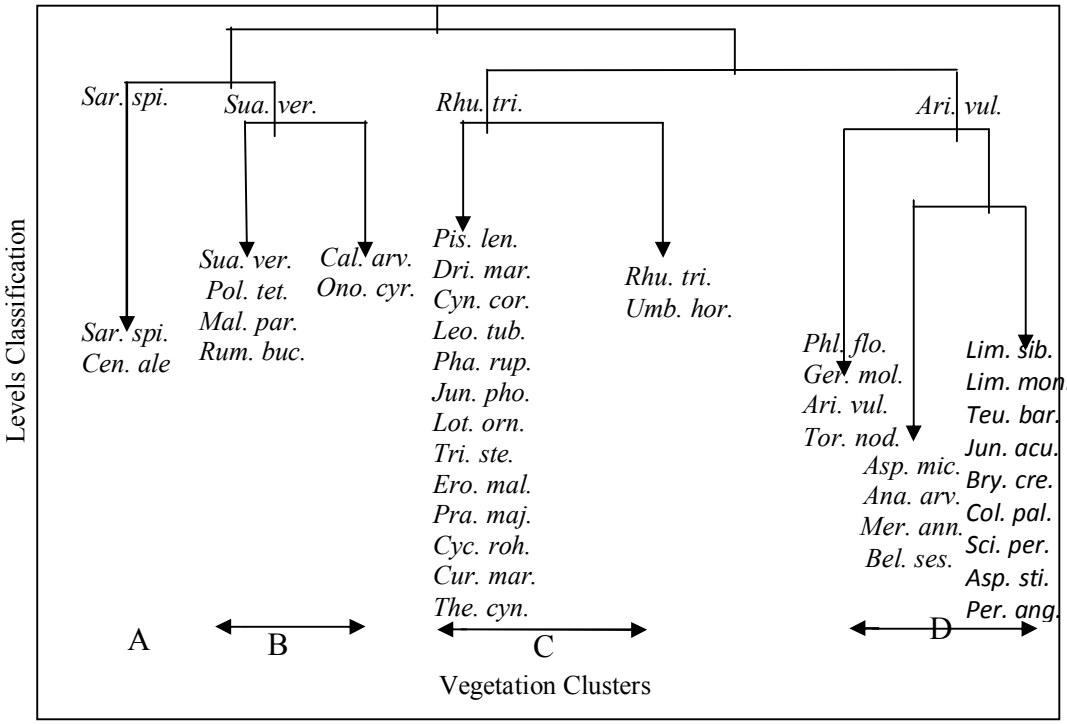


Fig. (10). Vegetation dendrogram of stands sbased on importance value of the species TWINSPAN classification 5 groups (A to D) of Rocky habitat Jarjar oma area.

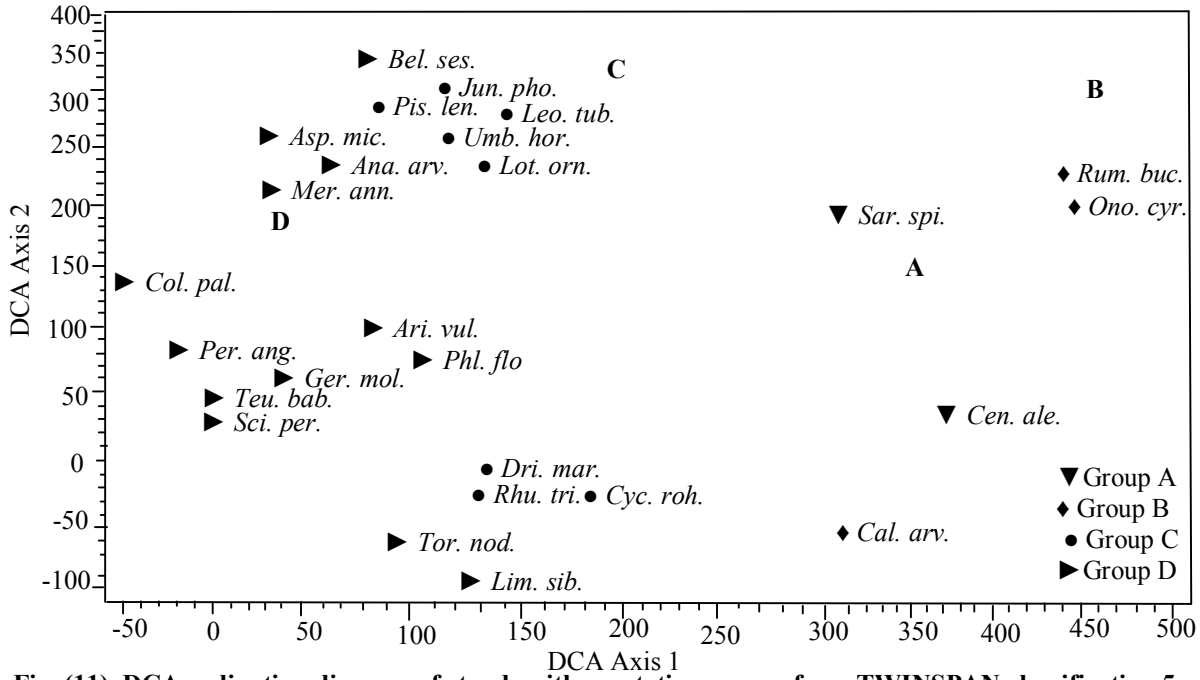


Fig. (11). DCA ordination diagram of stands with vegetation groups from TWINSPAN classification 5 groups (A to D) of the vegetation based on importance value of Rocky habitat Jarjr oma area.

Table (3) Dominance of Rocky habitat of autumn season in Jarjr oma area.

No.	Scientific name	Twinspan groups			
		A	B	C	D
1	*Suaeda vera* Forak. ex Gmel.		0.24±0.64		
2	*Pistacia lentiscus* L.				0.0003±0.0008
3	*Rhus tripartita* (Ucria) Grande	1.38±1.76			
4	*Torilis nodosa* (L.) Gaertn.				0.005±0.009
5	*Periploca angustifolia* Labill.				0.27±0.51
6	*Arisarum vulgare* Targ. Tozz				0.1±0.1
7	*Asparagus stipularis* Forsk.				0.01±0.03
8	*Bellevalia sessiliflora* (Viv.) Kunth				0.005±0.012
9	*Drimia maritima* (L.) Stearn			0.13±0.22	
10	*Scilla peruviana* L.				0.002±0.006
11	*Calendula arvensis* L.		0.01±0.01		
12	*Centaurea alexandrina* Delile		0.02±0.04		
13	*Cynara cornigera* Lindley				0.14±0.36
14	*Leontedon tuberosus* L.			0.01±0.02	
15	*Onopordum cyrenaicum* Maire & Weiller		0.005±0.01		
16	*Phagnlon ropestre* (L.) Dc.				0.002±0.005
17	*Polycarpon tetraphyllum* (L.) L.		0.0005±0.001		
18	*Colchium palaestinum* Baker				0.0003±0.0006
19	*Umbilicus horizontalis* (Guss.)Dc.			0.01±0.02	
20	*Bryonia cretica* L.				0.001±0.004
21	*Juniperus phoenicea* L.				0.18±0.35
22	*Mercurialis annua* L.				0.024±0.044
23	*Lotus ornithopodioides* L.			0.0003±0.0004	
24	*Trigonella stellata* Forsk.		0.0007±0.002		
25	*Erodium malacoides* (L.) L'Herit.				0.001±0.004
26	*Geranium molle* L.				0.001±0.002
27	*Juncus acutus* L.				0.32±0.85
28	*Phlomis floccosa* D. Don				0.004±0.009
29	*Prasium majus* L.				0.0003±0.0008
30	*Teucrium barbeyanum* Aschers				0.11±0.29

31	*Malva parviflora* L.		0.003±0.009		
32	*Anagallis arvensis* L.				0.02±0.03
33	*Cyclamen rohlfsianum* Aschers.		0.009±0.02		
34	*Limoniastrum monopetalum* (L.) Boiss.				0.14±0.26
35	*Limonium sibthorpianum* (Guss.) O. Ktze.				0.002±0.005
36	*Rumex bucephalophorus* L.		0.006±0.01		
37	*Sarcopoterium spinosum* (L.) Spach				0.64±0.54
38	*Crucianella maritima* L.				0.006±0.02
39	*Theligonum cynocrambe* L.				0.009±0.024
40	*Asphodelus microcarpus* Salzm.& Viv.				0.008±0.019

Dominance

The indicator species gave four groups of A to D Stands of this type shown in Tab. 3 and Figs. 12 and 13. Group A: The dominant species of this type is only species *Rhus tripartita* which attained the highest dominance of 1.38. Group B: *Suaeda vera* associated *Centaurea alexandrina* and *Calendula arvensis*. Group C: Vegetation of this community the dominant species *Drimia maritima* association *Umbilicus horizontalis* and *Leontedon tuberosus*. Group D: The Dominance 0.64 *Sarcopoterium spinosum* association by *Juncus acutus* and *Periploca angustifolia*.

Tab. 4 -7 shows the effect of difference seasons on plant density of Rocky habitat in Jarjr oma area in 2010 and 2011. Figs. 14 - 15 DCA ordination diagram of stand s with vegetation groups Density from TWINSPAN classification of the vegetation. Annuals species such as *Mercurialis annua* and *Anagallis arvensis* gave the highest plant density 1.2 plant per m^2 in autumn of 2010 in group C its unpalatable species. However, species of *Arisarum vulgare* gave the highest plant density than that of *Mercurialis annua* in group C of winter 2011. Palatable species such as *Hordeum marinum* and *Frankenia hirsuta* gave highest in spring 2011. In summer season *Sarcopoterium spinosum*, *Rhus tripartita* and *Juncus acutus* had the highest plant density and its palatable species except *Sarcopoterium spinosum*.

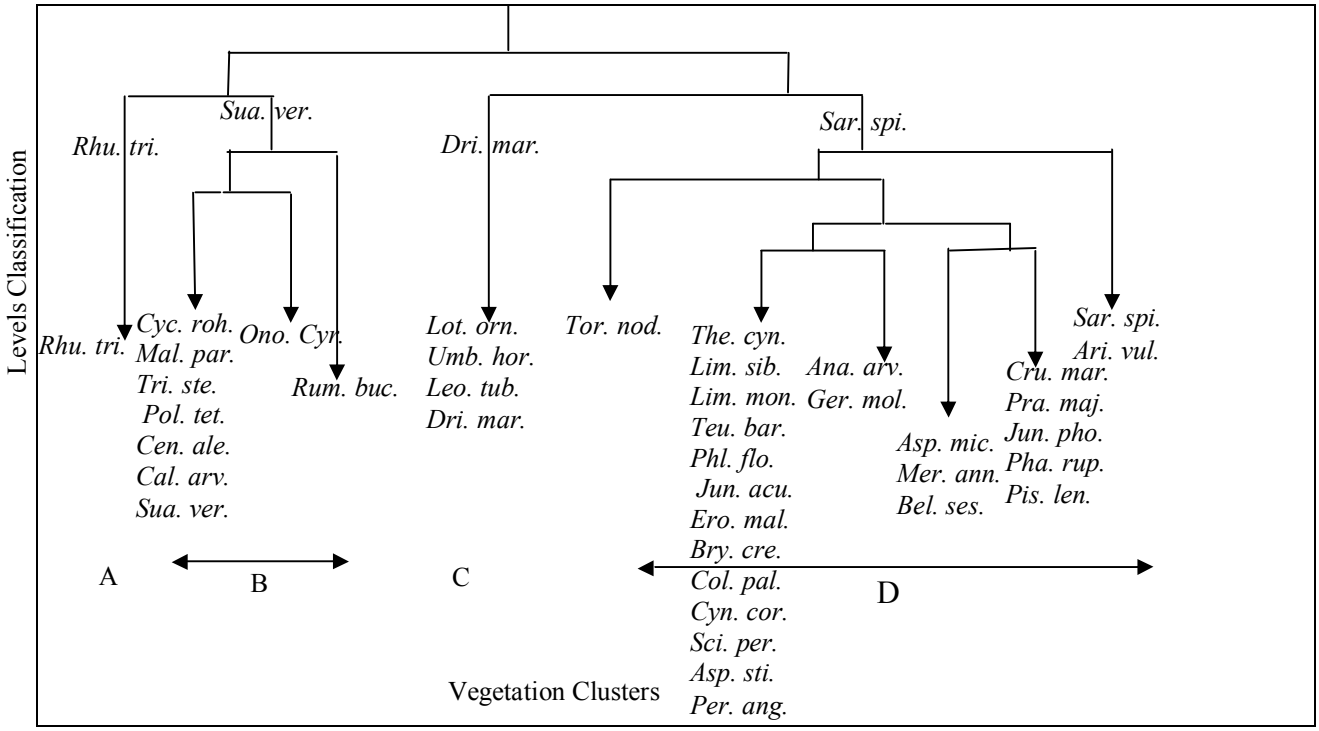
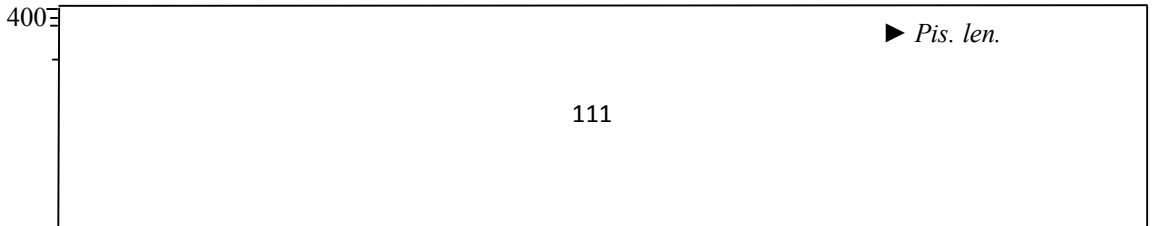


Fig. (12). Vegetation dendrogram of stands based on Dominance of the species TWINSPAN classification groups of autumn season in Jarjr oma area.



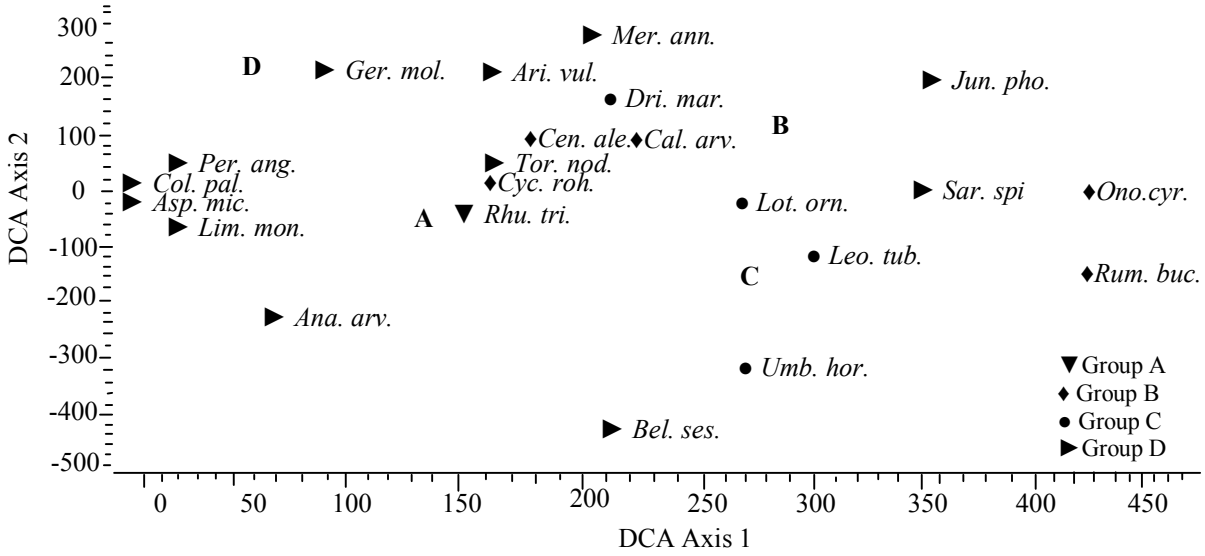


Fig. (13). DCA ordination diagram of stands with vegetation groups on Dominance from TWINSPAN classification of the vegetation of autumn season in Jarjr oma area.

Plant Density

Table (4) Density of Rocky habitat of autumn season in Jarjr oma area.

N0	Scientific name	Twinspan groups			
		A	B	C	D
1	*Suaeda vera* Forak. Ex Gmel.	0.07±0.2			
2	*Pistacia lentiscus* L.				0.01±0.02
3	*Rhus tripartita* (Ucria) Grande			0.1±0.1	
4	*Torilis nodosa* (L.) Gaertn.			0.23±0.41	
5	*Periploca angustifolia* Labill.			0.03±0.06	
6	*Arisarum vulgare* Targ. Tozz			1.1±1.3	
7	*Asparagus stipularis* Forsk.			0.01±0.02	
8	*Bellevalia sessiliflora* (Viv.) Kunth			0.7±1.6	
9	*Drimia maritima* (L.) Stearn				0.14±0.22
10	*Scilla peruviana* L.			0.01±0.03	
11	*Calendula arvensis* L.		0.23±0.45		
12	*Centaurea alexandrina* Delile	0.04±0.07			
13	*Cynara cornigera* Lindley				0.03±0.09
14	*Leontedon tuberosus* L.				0.07±0.12
15	*Onopordum cyrenaicum* Maire & Weiller		0.06±0.1		
16	*Phagnlon ropestre* (L.) Dc.				0.03±0.08
17	*Polycarpon tetraphyllum* (L.) L.	0.01±0.03			
18	*Colchium palaestinum* Baker.			0.03±0.07	
19	*Umbilicus horizontalis* (Guss.)Dc.			0.1±0.13	
20	*Bryonia cretica* L.			0.01±0.02	
21	*Juniperus phoenicea* L.				0.03±0.05
22	*Mercurialis annua* L.			1.2±2.2	
23	*Lotus ornithopodioides* L.				0.02±0.04
24	*Trigonella stellata* Forsk.				0.02±0.05
25	*Erodium malacoides* (L.) L'Herit.				0.05±0.12
26	*Geranium molle* L.			0.05±0.08	
27	*Juncus acutus* L.			0.02±0.06	
28	*Phlomis floccosa* D. Don			0.03±0.04	
29	*Prasium majus* L.				0.01±0.02
30	*Teucrium barbeyanum* Aschers			0.02±0.06	
31	*Malva parviflora* L.	0.07±0.18			
32	*Anagallis arvensis* L.			1.2±2.1	
33	*Cyclamen rohlfsianum* Aschers.				0.1±0.26
34	*Limoniastrum monopetalum* (L.) Boiss.			0.02±0.05	

35	*Limonium sibthorpianum* (Guss.) O. Ktze.			0.01±0.02	
36	*Rumex bucephalophorus* L.	0.21±0.39			
37	*Sarcopoterium spinosum* (L.) Spach	0.16±0.10			
38	*Crucianella maritima* L.				0.006±0.02
39	*Theligonum cynocrambe* L.				0.14±0.38
40	*Asphodelus microcarpus* Salzm.& Viv.			0.02±0.4	

Table (5) Density of Rocky habitat of winter season in Jarjr oma area.

No.	Scientific name	Twinspan groups			
		A	B	C	D
1	*Beta vulgaris* L.	0.01±0.02			
2	*Chenopodium murale* L.	0.01±0.02			
3	*Suaeda vera* Forak. Ex Gmel.				0.11±0.27
4	*Allium roseum* L.	0.01±0.02			
5	*Pancratium maritimum* L.	0.01±0.02			
6	*Pistacia lentiscus* L.				0.01±0.02
7	*Rhus tripartita* (Ucria) Grande				0.11±0.15
8	*Bupleurum lancifolium* Hornem.	0.01±0.02			
9	*Scandix australis* L.				0.08±0.21
10	*Torilis nodosa* (L.) Gaertn.				0.37±0.95
11	*Periploca angustifolia* Labill.				0.02±0.06
12	*Arisarum vulgare* Targ. Tozz			0.76±0.76	
13	*Bellevalia sessiliflora* (Viv.) Kunth			0.14±0.23	
14	*Drimia maritima* (L.) Stearn				0.13±0.30
15	*Ornithogalum tenuifolium* Guss.				0.01±0.02
16	*Scilla peruviana* L.				0.01±0.02
17	*Anthemis secundiramea* Biv.				0.01±0.02
18	*Calendula arvensis* L.				0.33±0.54
19	*Centaurea aegialophila* Boiss & Heldr.	0.01±0.02			
20	*Centaurea alexandrina* Delile				0.01±0.02
21	*Crepis senecioides ssp.senecioides* Delile				0.52±0.74
22	*Cynara cornigera* Lindley			0.11±0.14	
23	*Hyoseries scabra* L.				0.01±0.02
24	*Leontedon tuberosus* L.			0.48±0.76	
25	*Matricaria aurea*(Loefl.) Sch. Bip.	0.01±0.02			
26	*Onopordum cyrenaicum* Maire & Weiller				0.01±0.02
27	*Phagnlon ropestre* (L.) Dc.	0.02±0.05			
28	*Senecio gallicus* Chiax	0.01±0.02			
29	*Biscutella didyma* L.	0.05±0.12			
30	*Coronopus squamatus* (Forsk.) Ascherson	0.01±0.02			
31	*Enarthrocarpus pterocarpus* (Pers.) Dc.				0.01±0.03
32	*Sinapis alba* L.	0.01±0.02			
33	*Paronychia arabica* (Linn.) Dc.				0.19±0.28
34	*Polycarpon tetraphyllum* (L.) L.				0.01±0.02
35	*spergularia diandra* (Guss.) Heldr. & Sart.		0.01±0.02		
36	*Colchium palaestinum* Baker.				0.02±0.05
37	*Convolvulus supinus* Coss. Et Kral.				0.01±0.02
38	*Sedum sediforme* (Jacq.) Pau				0.03±0.09
39	*Umbilicus horizontalis* (Guss.) Dc.	0.01±0.02			
40	*Juniperus phoenicea* L.		0.02±0.04		
41	*Carex divisa* Huds.	0.01±0.02			
42	*Scabiosa arenaria* Forskal				0.01±0.02
43	*Euphorbia peplus* L.				0.03±0.09
44	*Mercurialis annua* L.			0.59±0.88	
45	*Anthyllis tetraphylla* L.	0.01±0.02			
46	*Lotus ornithopodioides* L.			0.09±0.09	
47	*Lotus tetragonolobus* L.				0.01±0.02
48	*Lupinus* L.				0.01±0.02
49	*Medicago polymorpha* L.				0.01±0.03
50	*Medicago tornata* (L.) Mill.	0.01±0.02			
51	*Melilotus sulcatus* Desf.				0.01±0.02
52	*Ononis hispida* Desf.				0.01±0.02
53	*Retama raetem* (Forsk.) Webb	0.01±0.02			
54	*Trigonella stellata* Forsk.				0.02±0.06
55	*Vicia sativa* L.	0.02±0.05			
56	*Vicia tetrasperma* (L.) Schreb.				0.02±0.03

57	*Erodium malacoides* (L.) L'Herit.				0.39±0.44
58	*Erodium moschatum* (L.) L'Herit.	0.01±0.02			
59	*Erodium touchyanum* Delile	0.01±0.02			
60	*Geranium molle* L.			0.19±0.32	
61	*Moraea sisyrinchium* (L.)Ker Gaweler (Europe)	0.01±0.02			
62	*Juncus acutus* L.				0.01±0.03
63	*Micromeria nervosa* (Desf.) Benth.	0.01±0.02			
64	*Phlomis floccosa* D. Don			0.03±0.04	
65	*Prasium majus* L.		0.01±0.02		
66	*Teucrium barbeyanum* Aschers				0.01±0.02
67	*Linum bienne* Mill.				0.07±0.16
68	*Linum nodiflorum* L.				0.01±0.02
69	*Malva aegyptia* L.				0.19±0.50
70	*Malva parviflora* L.				0.03±0.09
71	*Anagallis arvensis* L.				0.27±0.24
72	*Asterolinon linum stellatum* (L.) Duby				0.01±0.02
73	*Cyclamen rohlfsianum* Aschers.				0.14±0.38
74	*Orobanche coelistis* (Reut.) Boiss. & Reut.	0.01±0.02			
75	*Papaver hybridum* L.	0.01±0.02			
76	*Plantago coronopus* L.	0.01±0.02			
77	*Plantago cyrenaica* Durand & Barratte	0.01±0.02			
78	*Plantago ovata* Forskal	0.01±0.02			
79	*Limoniastrum monopetalum* (L.) Boiss.				0.01±0.03
80	*Limonium sibthorpianum* (Guss.) O. Ktze.				0.01±0.03
81	*Avena barbata* Pott ex Link				0.01±0.02
82	*Bromus rigidus* Roth				0.01±0.03
83	*Elymus farctus* (Viv.) Runem. Ex Melderis	0.01±0.02			
84	*Hordeum marinum* Huds.	0.01±0.02			
85	*Hordeum murinum ssp leporinum* (Link) Arcang.				0.01±0.03
86	*Emex spinosus* (L.) Camped	0.01±0.02			
87	*Polygonum equisetiforme* sm.	0.01±0.02			
88	*Rumex bucephalophorus* L.				0.05±0.12
89	*Adonis microcarpa* DC.		0.02±0.06		
90	*Ranunculus asiaticus* L.				0.01±0.02
91	*Ziziphus lotus* (L.) Lam.	0.01±0.02			
92	*Sarcopoterium spinosum* (L.) Spach				0.15±0.10
93	*Crucianella maritima* L.	0.01±0.02			
94	*Galium verrucosum* Huds.				0.01±0.02
95	*Sherardia arvensis* L.			0.39±0.46	
96	*Theligonum cynocrambe* L.		0.23±0.44		
97	*Lycium europaeum* L.				0.01±0.02
98	*Urtica urens* L.	0.01±0.02			
99	*Valerianella petrovichii* Ascherson				0.22±0.29
100	*Fedia cornucopiae* (L.) Gaetner				0.04±0.11
101	*Asphodelus microcarpus* Salzm.& Viv.				0.03±0.09
102	*Zygophyllum album* L.	0.01±0.02			

Table (6) Density of Rocky habitat of spring season in Jarjr oma area.

No.	Scientific name	Twinspan groups			
		A	B	C	D
1	*Chenopodium murale* L.				0.01±0.02
2	*Suaeda vera* Forak. ex Gmel.	0.09±0.23			
3	*Pancratium maritimum* L.				0.01±0.02
4	*Pistacia lentiscus* L.				0.01±0.02
5	*Rhus tripartita* (Ucria) Grande			0.09±0.13	
6	*Ammi visnaga* (L.) Lam			0.01±0.03	
7	*Torilis leptophylla* (L.) Reichb.			0.01±0.02	
8	*Torilis nodosa* (L.) Gaertn.			0.15±0.41	
9	*Caralluma europaea* (Guss.) N.E.Br.				0.01±0.02
10	*Periploca angustifolia* Labill.			0.02±0.04	
11	*Arisarum vulgare* Targ. Tozz	0.01±0.02			
12	*Asparagus aphyllus* L.				0.01±0.02
13	*Dipcadi serotinum* (L.) Medic.			0.01±0.02	
14	*Drimia maritime* (L.) Stearn			0.01±0.02	
15	*Scilla peruviana* L.			0.01±0.02	
16	*Anthemis secundiramea* Biv.	0.01±0.02			

17	*Calendula arvensis* L.			0.04±0.11	
18	*Carlina lanata* L.				0.03±0.07
19	*Carthamus lanatus* L.	0.01±0.02			
20	*Centaurea alexandrina* Delile	0.01±0.03			
21	*Chlamydophora tridentata* Ehrenb. Ex Less.			0.01±0.02	
22	*Cichorium endivia* L.			0.01±0.02	
23	*Cichorium spinosum* L.			0.01±0.02	
24	*Crepis senecioides ssp.senecioides* Delile		0.18±0.27		
25	*Crepis vesicaria ssp. vesicaria* L.				0.01±0.02
26	*Cynara cornigera* Lindley				0.06±0.10
27	*Hedypnois cretica* (L.) Dum. - Courset				0.01±0.02
28	*Hyoseries scabra* L.			0.01±0.02	
29	*Hypochaeris achyrophorus* L.				0.01±0.02
30	*Leontedon hispidulus* (Delile) Boiss.				0.01±0.02
31	*Leontedon tuberosus* L.				0.06±0.17
32	*Pallenis spinosa* (L.) Cass.			0.01±0.02	
33	*Phagnlon ropestre* (L.) Dc.				0.02±0.06
34	*Picris asplenoides* L.			0.08±0.21	
35	*Silybum marianum* (L.) Gaertner	0.01±0.02			
36	*Urospermum dalechampii* (L.) Scop. ex F.W. Schmidt		0.01±0.02		
37	*Biscutella didyma* L.	0.02±0.03			
38	*Rapistrum rugosum* (L.) All.				0.01±0.02
39	*Herniaria cinerea* Dc.				0.01±0.02
40	*Herniaria glabra* Linn.				0.01±0.02
41	*Paronychia arabica* (Linn.) Dc.	0.13±0.22			
42	*Polycarpon tetraphyllum* (L.) L.		0.11±0.29		
43	*Fumana thymifolia* (L.) Spach			0.01±0.02	
44	*Convolvulus althaeoides* L.				0.01±0.02
45	*Convolvulus supinus* Coss. Et Kral.			0.01±0.02	
46	*Sedum sediforme* (Jacq.) Pau				0.02±0.03
47	*Juniperus phoenicea* L.	0.02±0.04			
48	*Carex divisa* Huds.			0.01±0.02	
49	*Scabiosa arenaria* Forskal			0.01±0.02	
50	*Euphorbia falcata* L.			0.01±0.02	
51	*Mercurialis annua* L.		0.37±0.51		
52	*Anthyllis tetraphylla* L.				0.01±0.02
53	*Ceratonia siliqua* L.				0.01±0.02
54	*Lotus edulis* L.				0.01±0.02
55	*Lotus ornithopodioides* L.		0.01±0.02		
56	*Retama raetem* (Forsk.) Webb				0.01±0.02
57	*Trifolium tomentosum* L.	0.01±0.02			
58	*Trigonella maritima* Del. ex Poir.			0.01±0.03	
59	*Frankenia hirsute* L.			0.43±1.13	
60	*Centaurium pulchellum* (Swartz) Druce				0.02±0.03
61	*Erodium touchyanum* Delile	0.01±0.02			
62	*Geranium molle* L.	0.02±0.05			
63	*Juncus acutus* L.			0.02±0.05	
64	*Juncus subulatus* Forsk.			0.01±0.02	
65	*Micromeria juliana* (L.) Benth. Ex Reichenb.	0.02±0.05			
66	*Micromeria nervosa* (Desf.) Benth.				0.01±0.02
67	*Phlomis floccosa* D. Don			0.03±0.04	
68	*Prasium majus* L.				0.01±0.02
69	*Teucrium barbeyanum* Aschers			0.02±0.05	
70	*Linum bienne* Mill.			0.01±0.02	
71	*Linum strictum var.spicatum* Pers.				0.01±0.02
72	*Malva aegyptia* L.		0.02±0.05		
73	*Cyclamen rohlfsianum* Aschers.				0.01±0.02
74	*Orobanche coelistis* (Reut.) Boiss. & Reut.				0.01±0.02
75	*Glaucium flavum* Crantz				0.01±0.02
76	*Plantago lagopus* L.			0.01±0.02	
77	*Limoniastrum monopetalum* (L.) Boiss.				0.03±0.05
78	*Limonium sibthorpianum* (Guss.) O. Ktze.			0.01±0.02	
79	*Avena barbata* Pott ex Link			0.03±0.07	
80	*Brachypodium retusum* (Pers.) p. Beauv.	0.06±0.15			
81	*Bromus madritensis* L.		0.03±0.06		
82	*Bromus rigidus* Roth			0.02±0.05	

83	*Dactylis glomerata* L.			0.01±0.02	
84	*Hordeum marinum* Huds.	0.69±1.81			
85	*Lamarckia aurea* (L.) Moench			0.09±0.23	
86	*Phalaris minor* Retz.	0.06±0.15			
87	*Phragmites australis* (Cav.) Trin. ex Steud.			0.01±0.02	
88	*Polypogon monspeliensis* (L.) Desf.			0.06±0.15	
89	*Stipa capensis* Thunb.			0.30±0.43	
90	*Trachynia distachya* (L.) Link.			0.02±0.06	
91	*Trisetaria macrochaeta* (Boiss.) Maire			0.38±0.41	
92	*Polygonum equisetiforme* sm.	0.01±0.02			
93	*Rumex crispus* L.				0.01±0.02
94	*Nigella arvensis* L.			0.01±0.02	
95	*Sarcopoterium spinosum* (L.) Spach		0.17±0.11		
96	*Sherardia arvensis* L.			0.04±0.11	
97	*Theligonum cynocrambe* L.			0.05±0.12	
98	*Smilax aspera* L.				0.01±0.02
99	*Lycium europaeum* L.	0.01±0.02			
100	*Asphodelus microcarpus* Salzm.& Viv.			0.03±0.08	

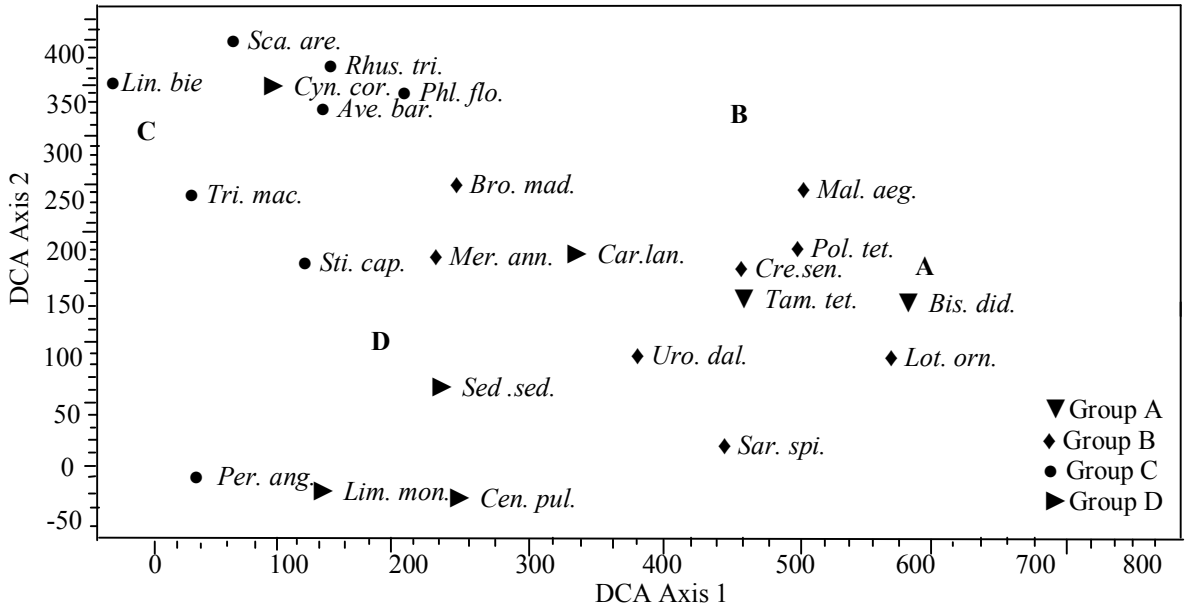


Fig. (14). DCA ordination diagram of stands with vegetation groups on Density from TWINSPAN classification of the vegetation of Rocky coastal habitat of spring season in Jarjr oma area.

Table (7) Density of Rocky habitat of Summer season in Jarjr oma area.

No.	Scientific name	Twinspan groups		
		A	B	C
1	*Suaeda vera* Forak. ex Gmel.			0.10±0.27
2	*Pistacia lentiscus* L.		0.01±0.02	
3	*Rhus tripartita* (Ucria) Grande			0.06±0.09
4	*Ammi visnaga* (L.) Lam	0.03±0.08		
5	*Periploca angustifolia* Labill.			0.01±0.02
6	*Asparagus aphyllus* L.	0.02±0.06		
7	*Juniperus phoenicea* L.		0.02±0.04	
8	*Juncus acutus* L.			0.06±0.12
9	*Phlomis floccosa* D. Don			0.02±0.04
10	*Prasium majus* L.	0.01±0.02		
11	*Limoniastrum monopetalum* (L.) Boiss.	0.03±0.06		
12	*Limonium sibthorpianum* (Guss.) O. Ktze.			0.01±0.02
13	*Sarcopoterium spinosum* (L.) Spach		0.15±0.11	
14	*Crucianella maritima* L.	0.02±0.05		
15	*Lycium europaeum* L.		0.01±0.02	
16	*Asphodelus microcarpus* Salzm.& Viv.	0.02±0.05		

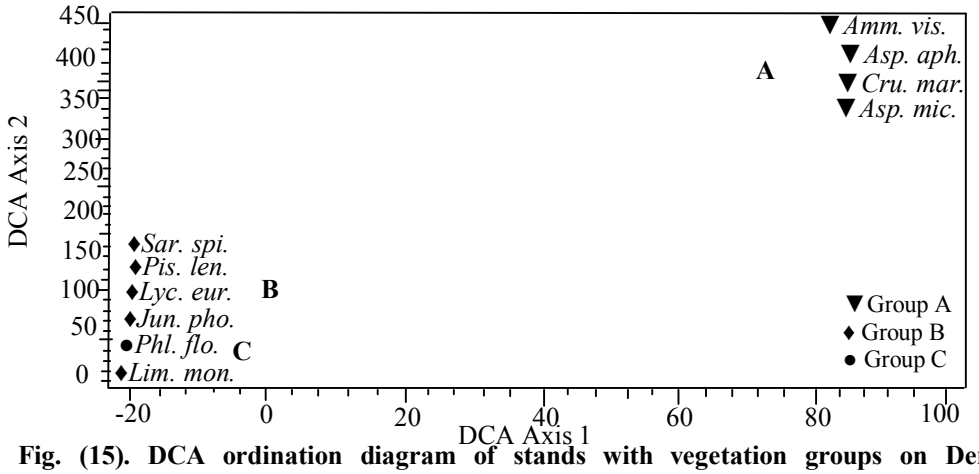


Fig. (15). DCA ordination diagram of stands with vegetation groups on Density from TWINSPAN classification of the vegetation of Rocky habitat of summer season in Jarjr oma area.

Soil-vegetation relationship

Al Mansora Rocky habitat was soil texture in community *Thymus capitatus* was silty lome while soil texture in community *Sarcopoterium spinosum* and *Cistus parviflorus* was silty clay, increased electrical conductivity, cations and anions in the community *Thymus capitatus* compared *Sarcopoterium spinosum* and *Cistus parviflorus* except magnesium in *Cistus parviflorus* arrived to 1.84 m.eq./L.and was pH in the Rocky habitat of Mansoura close to neutral. Arrived electrical conductivity in *Thymus capitatus* to 1.7 mmohs/cm evidence of *Thymus capitatus* grow in soil salinity (Table 8).

Table 8. Physical and chemical analysis of soil samples for Al Mansora area. Community *Thymus capitatus*, *Sarcopoterium spinosum* and *Cistus parviflorus* are vegetation groups resulting from TWINSPAN.

Soil variable		**Classification community**		
Community		*Thymus capitatus*	*Sarcopoterium spinosum*	*Cistus parviflorus*
Soil fraction	Sand	0.37	0.13	0.17
	Silt	0.50	0.38	0.44
	Clay	0.13	0.49	0.39
Soil texture		Silty loam	Silty clay	Silty clay loam
pH		6.83	7.33	6.14
EC (mmohs/cm)		1.7	0.61	0.52
N %		0.16	0.14	0.12
MC %		4.43	4.88	4.43
$NaCl^-$ %		1.8	0.2	0.4
Anions (mg/L)	Cl^-	360	280	288
	$Co3^-$	0	0	0
	$So4^-$	12.5	22.63	20.63
Cations (m.eq./l)	Na^+	3.91	0.26	3.04
	K^+	0.77	0.15	0.10
	Ca^{++}	7.40	2.72	3.08
	Mg^{++}	1.80	0.88	1.84

The different soil characteristics in the community representing the different vegetation in different habitats are recorded in Table 9. The mechanical analysis of the soil samples for the vegetation community showed habitat site variations in Rocky coastal in site Jarjr oma. Rocky coastal: Clay: Convergent community to clay perecentage of *Suaeda vera* and *Sarcopoterium spinosum* both 44%, while *Rhus tripartita* 42%.. Silt: Community *Suaeda vera* has the highest silt value to 41% while *Sarcopoterium spinosum* and *Rhus tripartita* 39% and 37% respectively. Soil texture: Silty clay in *Suaeda vera* community, clay loam in *Rhus tripartita* community, while, silty clay loam in *Sarcopoterium spinosum*. pH value a natural generally in all community. Electrical conductivity community *Suaeda vera* have highest mean value of 2.42 mmohs/cm. The value of nitrogen content in the soil extract ranged between 0.13 to 0.15%. Moisture contact the proportion of moisture contact in soil reached to 3.05% in *Rhus tripartita* community and 3.31% in *Suaeda vera* community, while the highest were ratio *Sarcopoterium spinosum* 4.39%.

Table 9. Physical and chemical analysis of soil samples of Rocky Coastal habitat in Jarjr-oma area. Community based on vegetation groups resulting from TWINSPAN.

Soil variable		**Classification community**		
Community		*Sar. spi.*	*Sua. ver.*	*Rhu. tri.*
Soil fraction	Sand	0.17	0.15	0.21
	Silt	0.39	0.41	0.37
	Clay	0.44	0.44	0.42
Soil texture		Silty clay loam	Silty clay	Clay loam
pH		7.69	7.37	7.3
EC (mmohs/cm)		0.66	2.42	1.36
N %		0.13	0.15	0.14
MC %		4.39	3.31	3.05
$NaCl^-$ %		0.4	1.8	1.4
Anions (mg/L.)	Cl^-	315	310	300
	$Co3^{--}$	0	0	0
	$So4^{--}$	15.09	15.77	11.6
Cations (m.eq./L.)	Na^+	3.5	18.3	7.0
	K^+	0.5	1.2	0.2
	Ca^{++}	3.60	4.58	4.28
	Mg^{++}	0.80	1.06	0.32

4. Discussion

Results show that total areal extent does not yield as clear a correlation as does latitudinal extent, possibly because the area of the geographical range does not reflect the climatic challenges a species must face as well as does latitudinal extent. Two points separated only by longitudinal differences do not as consistently show climatic differences as two points separated by degrees of latitude. To see this, consider how climatic variables change with latitude. The altitudinal gradient showed three main zones low, intermediate and high altitude (Hegazy and Amer, 2002). Vegetation in the intermediate altitude attains the highest species diversity. Temperature extremes show a simple relation with latiude : the range in temperature readings over the course of many years is a positive function of latitude. rainfall as a function of latitude is more complicated (Stevens, 1989).

In general, in Al Mansora Rocky habitat the importance value of the different association type 1 to 8, the values of species *Thymus capitatus* high in all characteristics, following *Cistus parviflorus* give highest presence during autumn season its species unpalatable. Agree with Kamal, 1982 the analysis of vegetation of rocky ridges and similar areas of shallow soils by the ecological profile technique indicate a general group of species: *Plantago albicans, Asphodelus microcarpus, Thymelaea hirsuta, Reaumuria mucronata, Thymus capitatus, Globularia arabica, Dactylis glomerata, Noaea mucronata, Atractylis carduus, Limonium pruinosum* and *Limonium tubiflorum*. From the ecological-structural point of view, the association of *Limonium cyrenaicum* corresponds to the belt of *Limonium sp.* Pl. and *Crithmum maritimum* which characterizes the Mediterranean rocky coasts (Brullo and Furnari, 1981). Rocky Coastal habitat of Jarjr oma area was the IV 31.3 of species *Sarcopoterium spinosum*, *Suaeda vera* IV 15, *Rhus tripartita* IV 34.2 and species *Arisarum vulgare* the IV 25.7. Dwarf-shrub formations linked to soils with rocky emergences and characterized especially near Benghazi (Brullo and Furnari, 1981). Remark that *Crithmum maritimum*, which is very common on the rocky coasts of the Mediterranean, is very rare in Cyrenaica. According to Pampanini (1931), this species has been considered as uncertain for Cyrenaica. In fact, we have observed some specimens on very shady cliffs, only near Ras El-Hilal. This area coincides with the coastal part characterized by a greater rainfall (350 mm mean per annum) (Brullo and Furnari, 1981). Annuals species such as *Mercurialis annua* and *Anagallis arvensis* gave the highest plant density 1.2 plant per m^2 in autumn of 2010 in group C its unpalatable species. However, species of *Arisarum vulgare* gave the highest plant density than that of *Mercurialis annua* in group C of winter 2011. Palatable species such as *Hordeum marinum* and *Frankenia hirsuta* gave highest in spring 2011. In summer season *Sarcopoterium spinosum*, *Rhus tripartita* and *Juncus acutus* had the highest plant density and its palatable species except *Sarcopoterium spinosum*. Therefore, Limited nutrient and water availability, together with disturbance caused by rock fall and grazing, restricts the establishment of vigorous species and promotes early successional species rich plant communities similar to semi-natural grasslands (Davis, 1982 and Gilbert, 1989). The vegetation in the disturbed areas

does not reflect a naturally evolved species composition, but rather a mixture of small remnant native plants patches dominated by patches of largely invasive weedy alien plants. The rangelands in arid and semi-arid areas of the world provide primary products grasses, legumes, and shrubs, which are converted into animal protein (IFAD, 2000). Over grazing changed the botanical composition by increasing unpalatable species such as *Sarcopoterium spinosum* and *Asphodelus aestivus* in grazed plots at the three sites, whereas palatable species such as *Medicago spp*, *Bromus spp*, *Hordeum spp*, *Aegilops spp*, *Poa bulbosa* and *Avena sterilis* are the dominant species at the ungrazed plots. On the other hand, excluded grazing increased plant species density and allowed new species to appear (Al-Joaba, 2006).

Al Mansora Rocky habitat was soil texture in community *Thymus capitatus* was silty lome while soil texture in community *Sarcopoterium spinosum* and *Cistus parviflorus* was silty clay, however, Rocky Coastal of Jarjr oma convergent community to clay perecentage of *Suaeda vera* and *Sarcopoterium spinosum* both 44%, while *Rhus tripartita* 42%, community *Suaeda vera* has the highest silt value to 41% while *Sarcopoterium spinosum* and *Rhus tripartita* 39% and 37% respectively. Soil texture silty clay in *Suaeda vera* community, clay loam in *Rhus tripartita* community, while, silty clay loam in *Sarcopoterium spinosum*. pH value a natural generally in all community. Electrical conductivity community *Suaeda vera* have highest mean value of 2.42 mmohs/cm.

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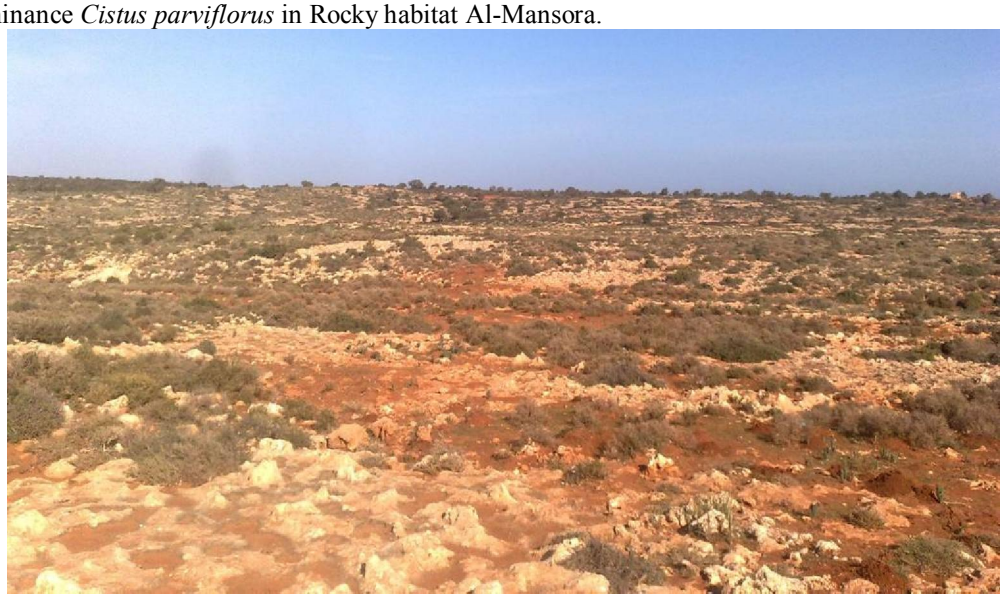
Degradation the rangeland of Autumn 2010 the Rocky habitat Al-Mansora

Dominance *Cistus parviflorus* in Rocky habitat Al-Mansora.



Dominance *Sarcopoterium spinosum* in Rocky habitat Al Mansora Autumn 2010.

Jarjar-oma Spring

Al Mansora Spring

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Appendix

Table (a) Mean and standard deviation of the importance value (IV) of the forty two species in different vegetation groups resulting from TWINSPAN classification of the stands surveyed in rocky habitat of autumn of Al Mansora.

No.	Scientific name	TWINSPAN groups							
		A	B	C	D	E	F	G	H
1	*Narcissus elegans* (Haw). Spach.	-	-	1.5±3.6	-	-	-	-	-
2	*Pistacia lentiscus* L.	-	-	-	-	-	-	3.3±6.5	-
3	*Scandix australis* L.	-	-	-	-	2.1±3.9	-	-	-
4	*Thapsia garganica* Lag.	-	-	1.6±3.8	-	-	-	-	-
5	*Arisarum vulgare* Targ. Tozz	-	11±17.7	-	-	-	-	-	-
6	*Bellevalia sessiliflora* (Viv.) Kunth	-	-	-	19.8±15.5	-	-	-	-
7	*Drimia maritime* (L.) Stearn	18.1±13.6	-	-	-	-	-	-	-
8	*Bellis sylvestris* var.cyrenaica Beguinot	-	-	-	-	-	10.2±13.5	-	-
9	*Leontedon tuberosus* L.	-	1.8±4.3	-	-	-	-	-	-
10	*Onopordum cyrenaicum* Maire & Weiller	-	1.3±3.2	-	-	-	-	-	-
11	*Phagnlon rupestre* (L.) Dc.	-	-	-	-	-	-	3.1±5.0	-
12	*Senecio leucanthemifolius* Poiret	-	-	-	-	-	-	-	0.9±3.1
13	*Cistus parviflorus* Lam.	-	-	-	-	-	-	-	16.0±25.1
14	*Fumana laevipes* (L.) Spach	-	-	-	3.2±4.9	-	-	-	-
15	*Colchium palaestinum* Baker.	-	17.4±15.1	-	-	-	-	-	-
16	*Sedum sediforme* (Jacq.) Pau	-	-	-	-	1.6±3.9	-	-	-
17	*Umbilicus horizontalis* (Guss.)Dc.	-	2.0±4.8	-	-	-	-	-	-
18	*Juniperus phoenicea* L.	-	-	-	-	-	-	-	3.6±8.7
19	*Erica multiflora* L.	-	-	-	-	-	-	18.8±19.4	-
20	*Calicotome villosa* (Poir.) Link	-	-	-	-	-	-	-	0.6±2.2
21	*Lotus cytisoides* L.	-	-	-	6.2±7.4	-	-	-	-
22	*Erodium malacoides* (L.) L'Herit.	-	-	-	-	-	-	-	0.5±1.8
23	*Rumelea cyrenaica* Beguinot	-	1.2±4.2	-	-	-	-	-	-
24	*Micromeria juliana* (L.) Benth. Ex Reichenb.	-	-	-	12.7±12.6	-	-	-	-
25	*Micromeria nervosa* (Desf.) Benth.	-	-	-	-	1.8±4.6	-	-	-
26	*Phlomis floccosa* D. Don	3.4±5.5	-	-	-	-	-	-	-
27	*Prasium majus* L.	-	-	-	-	-	-	-	1.2±2.8
28	*Teucrium apollinis* Maire et Weiller	-	-	-	-	-	-	4.5±6.3	-
29	*Thymus capitatus* (L.) Hoffm .& Link	41.0±22.5	-	-	-	-	-	-	-
30	*Linum usitatissimum* L.	-	-	-	-	-	-	-	0.6±2.2
31	*Anagallis arvensis* L.	-	-	-	-	-	-	-	3.0±10.2
32	*Cyclamen rohlfsianum* Aschers.	-	-	-	-	-	-	-	0.8±2.9
33	*Phillyrea latifolia* L.	-	-	-	-	-	-	-	0.8±2.8
34	*Globularia alypum* L.	-	-	-	-	-	-	-	0.8±2.8
35	*Ranunculus asiaticus* L.	-	-	0.9±3.0	-	-	-	-	-
36	*Rhamnus lycioides* L. Jahandez	-	24.6±14.4	-	-	-	-	-	-
37	*Sarcopoterium spinosum* (L.) Spach	-	33.6±23.7	-	-	-	-	-	-
38	*Galium verrucosum* Huds.	-	2.0±4.9	-	-	-	-	-	-
39	*Phuopsis stylosa* Trin.	-	-	-	-	-	-	3.8±8.0	-
40	*Daphne jasminea* Sibth. et Sm.	-	-	-	-	-	2.7±5.2	-	-
41	*Viola scorpiuroides* Coss.	-	-	-	-	-	3.8±4.8	-	-
42	*Asphodelus microcarpus* Salzm.& Viv.	12.3±10.8	-	-	-	-	-	-	-

Table (b) Mean and standard deviation of Dominance of the species of the forty two species in different vegetation groups resulting from TWINSPAN classification of the stands surveyed in rocky habitat of autumn of Al Mansora.

No.	**Scientific name**	A	B	C	D
1	*Narcissus elegans* (Haw). Spach.	-	-	-	0.01±0.002
2	*Pistacia lentiscus* L.	0.31±1.86	-	-	-

3	*Scandix australis* L.	-	-	0.06±0.37	-
4	*Thapsia garganica* Lag.	-	-	-	0.01±0.004
5	*Arisarum vulgare* Targ. Tozz	-	-	-	1.27±3.33
6	*Bellevalia sessiliflora* (Viv.) Kunth	-	-	13.1±31.6	-
7	*Drimia maritima* (L.) Stearn	-	-	3.89±8.9	-
8	*Bellis sylvestris var.cyrenaica* Beguinot	-	-	1.16±2.65	-
9	*Leontedon tuberosus* L.	-	-	-	0.04±0.004
10	*Onopordum cyrenaicum* Maire & Weiller	-	-	-	0.01±0.002
11	*Phagnlon rupestre* (L.) Dc.	-	0.03±0.115	-	-
12	*Senecio leucanthemifolius* Poiret	-	-	-	0.01±0.002
13	*Cistus parviflorus* Lam.	19.1±66.03	-	-	-
14	*Fumana laevipes* (L.) Spach	-	-	0.01±0.014	-
15	*Colchium palaestinum* Baker	-	-	-	9.18±31.39
16	*Sedum sediforme* (Jacq.) Pau	-	0.02±0.07	-	-
17	*Umbilicus horizontalis* (Guss.)Dc.	-	-	-	0.01±0.006
18	*Juniperus phoenicea* L.	0.08±0.14	-	-	-
19	*Erica multiflora* L.	-	-	8.78±16.64	-
20	*Calicotome villosa* (Poir.) Link	0.02±0.001	-	-	-
21	*Lotus cytisoides* L.	-	-	-	0.03±0.041
22	*Erodium malacoides* (L.) L'Herit.	0.01±0.002	-	-	-
23	*Rumelea cyrenaica* Beguinot	-	-	-	0.04±0.01
24	*Micromeria juliana* (L.) Benth. Ex Reichenb.	-	-	-	1.31±1.65
25	*Micromeria nervosa* (Desf.) Benth.	-	0.10±0.82	-	-
26	*Phlomis floccosa* D. Don	-	-	-	0.24±1.30
27	*Prasium majus* L.	0.01±0.014	-	-	-
28	*Teucrium apollinis* Maire et Weiller	0.32±1.18	-	-	-
29	*Thymus capitatus* (L.) Hoffm .& Link	-	-	36.1±50.83	-
30	*Linum usitatissimum* L.	0.01±0.002	-	-	-
31	*Anagallis arvensis* L.	-	-	-	0.02±0.01
32	*Cyclamen rohlfsianum* Aschers.	-	-	-	0.0005±0.002
33	*Phillyrea latifolia* L.	0.01±0.002	-	-	-
34	*Globularia alypum* L.	0.08±0.01	-	-	-
35	*Ranunculus asiaticus* L.	-	-	-	0.01±0.002
36	*Rhamnus lycioides* L. Jahandez	-	8.85±14.16	-	-
37	*Sarcopoterium spinosum* (L.) Spach	-	-	-	27.19±50.0
38	*Galium verrucosum* Huds.	-	-	-	0.06±0.38
39	*Phuopsis stylosa* Trin.	-	0.37±2.43	-	-
40	*Daphne jasminea* Sibth. et Sm.	-	0.05±0.29	-	-
41	*Viola scorpiuroides* Coss.	-	-	0.02±0.067	-
42	*Asphodelus microcarpus* Salzm.& Viv.	-	-	1.25±2.64	-

Table (c) Mean and standard deviation of the Density of the forty two species in different vegetation groups resulting from TWINSPAN classification of the stands surveyed in rocky habitat of autumn of Al Mansora.

No.	Scientific name	TWINSPAN groups							
		A	B	C	D	E	F	G	H
1	*Narcissus elegans* (Haw). Spach.	-	-	-	-	-	0.01±0.02	-	-
2	*Pistacia lentiscus* L.	0.02±0.04	-	-	-	-	-	-	-
3	*Scandix australis* L.	-	-	-	-	-	-	-	0.10±0.23
4	*Thapsia garganica* Lag.	-	-	-	-	-	0.01±0.04	-	-
5	*Arisarum vulgare* Targ. Tozz	-	-	-	-	-	-	-	0.68±1.18
6	*Bellevalia sessiliflora* (Viv.) Kunth	-	-	-	-	1.08±1.31	-	-	-
7	*Drimia maritime* (L.) Stearn	-	-	-	-	0.64±0.67	-	-	-
8	*Bellis sylvestris* var.cyrenaica Beguinot	-	-	0.42±0.63	-	-	-	-	-
9	*Leontedon tuberosus* L.	-	-	-	-	-	-	-	0.02±0.05
10	*Onopordum cyrenaicum* Maire & Weiller	-	-	-	-	-	-	-	0.01±0.02
11	*Phagnlon rupestre* (L.) Dc.	-	-	-	0.08±0.18	-	-	-	-
12	*Senecio leucanthemifolius* Poiret	-	0.01±0.03	-	-	-	-	-	-
13	*Cistus parviflorus* Lam.	-	0.44±0.90	-	-	-	-	-	-
14	*Fumana laevipes* (L.) Spach	-	-	-	-	0.06±0.11	-	-	-
15	*Colchium palaestinum*	-	-	-	-	-	-	0.94±1.28	-
16	*Sedum sediforme* (Jacq.) Pau	-	-	-	-	0.08±0.20	-	-	-
17	*Umbilicus horizontalis* (Guss.)Dc.	-	-	-	-	-	-	-	0.03±0.07
18	*Juniperus phoenicea* L.	-	0.01±0.02	-	-	-	-	-	-
19	*Erica multiflora* L.	-	0.52±0.54	-	-	-	-	-	-
20	*Calicotome villosa* (Poir.) Link	0.01±0.02	-	-	-	-	-	-	-
21	*Lotus cytisoides* L.	-	-	-	-	-	-	0.20±0.40	-

22	*Erodium malacoides* (L.) L'Herit.	-	0.003±0.01	-	-	-	-	-	-
23	*Rumelea cyrenaica* Beguinot	-	-	-	-	-	-	-	0.13±0.46
24	*Micromeria juliana* (L.) Benth. Ex Reichenb.	-	-	-	-	-	-	0.27±0.30	-
25	*Micromeria nervosa* (Desf.) Benth.	-	-	-	-	0.11±0.35	-	-	-
26	*Phlomis floccosa* D. Don	-	0.02±0.04	-	-	-	-	-	-
27	*Prasium majus* L.	-	0.01±0.02	-	-	-	-	-	-
28	*Teucrium apollinis* Maire et Weiller	-	-	0.17±0.29	-	-	-	-	-
29	*Thymus capitatus* (L.) Hoffm .& Link	-	-	-	-	0.71±0.45	-	-	-
30	*Linum usitatissimum* L.	-	0.01±0.02	-	-	-	-	-	-
31	*Anagallis arvensis* L.	-	0.12±0.40	-	-	-	-	-	-
32	*Cyclamen rohlfsianum* Aschers.	-	0.01±0.03	-	-	-	-	-	-
33	*Phillyrea latifolia* L.	-	0.003±0.01	-	-	-	-	-	-
34	*Globularia alypum* L.	0.03±0.09	-	-	-	-	-	-	-
35	*Ranunculus asiaticus* L.	0.01±0.02	-	-	-	-	-	-	-
36	*Rhamnus lycioides* L. Jahandez	-	-	-	-	0.22±0.19	-	-	-
37	*Sarcopoterium spinosum* (L.) Spach	-	-	-	-	0.40±0.41	-	-	-
38	*Galium verrucosum* Huds.	-	-	-	-	-	-	-	0.17±0.47
39	*Phuopsis stylosa* Trin.	-	-	0.15±0.37	-	-	-	-	-
40	*Daphne jasminea* Sibth. et Sm.	-	-	-	0.03±0.07	-	-	-	-
41	*Viola scorpiuroides* Coss.	-	-	-	0.07±0.09	-	-	-	-
42	*Asphodelus microcarpus* Salzm.& Viv.	-	-	-	-	-	0.24±0.28	-	-

Table (d) Mean and standard deviation of the Density of the eighty two species in different vegetation groups resulting from TWINSPAN classification of the stands surveyed in rocky habitat of winter of Al Mansora.

No.	**Scientific name**	**TWINSPAN groups**						
		A	B	C	D	E	F	G
1	*Allium negrianum* Maire & Weiller	-	-	-	-	-	-	0.02±0.07
2	*Pistacia lentiscus* L.							0.01±0.02
3	*Malabaila suaveolens* (Dcl.) Coss	-	-	-	0.01±0.02	-	-	-
4	*Scandix australis* L.		-	-	-	0.35±0.68	-	-
5	*Thapsia garganica* Lag.	-	-	-	-	-	-	0.01±0.04
6	*Tordylium apulum* L.	0.003±0.01	-	-	-	-	-	-
7	*Arisarum vulgare* Targ. Tozz	-	0.4±0.61	-	-	-	-	-
8	*Bellevalia sessiliflora* (Viv.) Kunth	-	-	-	1.22±0.94	-	-	-
9	*Drimia maritima* (L.) Stearn	-	-	-	-	0.36±0.21	-	-
10	*Bellis sylvestris var. cyrenaica* Beguinot	-	-	0.75±0.94	-	-	-	-
11	*Calendula arvensis* L.	-	0.13±0.33	-	-	-	-	-
12	*Filago contracta* Boiss.	0.003±0.01	-	-	-	-	-	-
13	*Hyoseries scabra* L.	-	-	-	-	-	-	0.003±0.01
14	*Leontedon tuberosus* L.	-	-	-	0.17±0.22	-	-	-
15	*Matricaria aurea* (Loefl.) Sch. Bip.		0.08±0.01					
16	*Onopordum cyrenaicum* Maire & Weiller	-	-	-	-	-	-	0.003±0.01
17	*Onopordum espinae Cosson ex Bonnet*	0.003±0.01	-	-	-	-	-	-
18	*Phagnlon rupestre* (L.) Dc.	-	-	-	-	-	0.08±0.14	-
19	*Senecio leucanthemifolius* Poiret	-	-	-	0.16±0.45	-	-	-
20	*Borago officinalis* L.	-	-	-	-	-	-	0.003±0.01
21	*Cynoglossum cheirifolium* L.	0.003±0.01	-	-	-	-	-	-
22	*Alyssum minus* (L.) Rothm.	-	-	-	0.01±0.02	-	-	-
23	*Biscutella didyma* L.	0.01±0.02	-	-	-	-	-	-
24	*Enarthrocarpus pterocarpus* (pers.) Dc.	0.003±0.01	-	-	-	-	-	-
25	*Sinapis alba* L.	-	-	-	0.01±0.02	-	-	-
26	*Herniaria glabra* Linn.	0.01±0.02	-	-	-	-	-	-
27	*Paronychia argentea* Lamk.	-	-	-	-	-	-	0.003±0.01
28	*Petrorhagia cyrenaica* (Durand & Barratte)	0.02±0.06	-	-	-	-	-	-
29	*Silene apetala* Willd.	0.01±0.02	-	-	-	-	-	-
30	*Silene cyrenaica* Maire & Weiller	-	-	-	0.01±0.02	-	-	-
31	*Cistus parviflorus* Lam.	-	-	-	-	-	-	0.47±0.93
32	*Fumana laevipes* (L.) Spach	-	-	-	-	-	0.03±0.06	-
33	*Colchium palaestinum* Baker..	-	0.39±0.42	-	-	-	-	-
34	*Sedum sediforme* (Jacq.) Pau	-	-	-	0.08±0.2	-	-	-
35	*Umbilicus horizontalis* (Guss.)Dc.	0.04±0.08	-	-	-	-	-	-
36	*Juniperus phoenicea* L.	-	-	-	-	-	-	0.003±0.01
37	*Erica multiflora* L.	-	-	-	-	-	0.45±0.58	-
38	*Mercurialis annua* L.	-	-	-	-	-	-	0.06±0.21
39	*Anthyllis vulneraria* L.	-	-	-	-	-	-	0.03±0.1
40	*Calicotome villosa* (Poir.) Link	-	-	-	-	-	-	0.02±0.05
41	*Hippocrepis cyclocarpa* Murb.	-	-	-	-	0.01±0.02	-	-
42	*Lotus cytisoides* L.	-	0.12±0.17	-	-	-	-	-

43	*Medicago polymorpha* L.	-	-	-	-	-	-	0.01±0.03
44	*Trifolium uniflorum* L.	0.003±0.01	-	-	-	-	-	-
45	*Erodium malacoides* (L.) L'Herit.	-	0.06±0.12	-	-	-	-	-
46	*Erodium moschatum* (L.) L'Herit.	-	-	-	-	-	-	0.003±0.01
47	*Erodium touchyanum* Delile	0.003±0.01	-	-	-	-	-	-
48	*Geranium molle* L.	0.01±0.02	-	-	-	-	-	-
49	*Rumelea cyrenaica* Beguinot	-	-	-	0.23±0.30	-	-	-
50	*Micromeria Juliana* (L.) Benth. Ex Reichenb.	-	-	-	0.06±0.1	-	-	-
51	*Micromeria nervosa* (Desf.) Benth.	-	0.1±0.16	-	-	-	-	-
52	*Phlomis floccosa* D. Don	-	-	-	-	-	0.03±0.04	-
53	*Prasium majus* L.	-	-	-	-	-	-	0.03±0.06
54	*Satureja thymbra* L.	-	-	-	-	-	-	0.01±0.02
55	*Teucrium apollinis* Maire et Weiller	-	-	-	-	-	0.15±0.17	-
56	*Thymus capitatus* (L.) Hoffm .& Link	-	-	0.64±0.38	-	-	-	-
57	*Gagea reticulata* (Pall.) Schult.	-	-	-	0.01±0.02	-	-	-
58	*Linum usitatissimum* L.	-	-	-	-	-	-	0.003±0.01
59	*Anagallis arvensis* L.	-	0.05±0.12	-	-	-	-	-
60	*Cyclamen rohlfsianum* Aschers.	-	-	-	-	-	-	0.04±0.14
61	*Phillyrea latifolia* L.	0.003±0.01	-	-	-	-	-	-
62	*Anacamptis collina* (Banks & Sol. Ex Russell).	-	-	-	-	-	-	0.003±0.01
63	*Globularia alypum* L	-	-	-	0.04±0.11	-	-	-
64	*Linaria triphylla* (L.) Mill.	0.003±0.01	-	-	-	-	-	-
65	*Linaria virgata* (poir) Desf.	-	-	-	-	-	-	0.003±0.01
66	*Plantago coronopus* L.	-	-	-	-	-	-	0.003±0.01
67	*Poa bulbosa* L.	-	-	-	0.01±0.02	-	-	-
68	*Adonis microcarpa* DC.	0.01±0.02	-	-	-	-	-	-
69	*Nigella damascena* L.	-	-	-	0.01±0.02	-	-	-
70	*Ranunculus asiaticus* L.	-	-	-	-	-	-	0.1±0.14
71	*Ranunculus bullatus* L.	-	-	-	-	-	0.04±0.06	-
72	*Rhamnus lycioides* L. Jahandez	-	-	-	-	0.18±0.16	-	-
73	*Sarcopoterium spinosum* (L.) Spach	-	-	0.37±0.39	-	-	-	-
74	*Galium verrucosum* Huds.	-	0.14±0.27	-	-	-	-	-
75	*Phuopsis stylosa*Trin.	-	-	-	-	-	0.14±0.19	-
76	*Theligonum cynocrambe* L.	-	-	-	-	-	-	0.09±0.32
77	*Scrophularia canina* L.	-	-	-	0.01±0.02	-	-	-
78	*Daphne jasminea* Sibth. Et Sm.	-	-	-	-	-	-	0.03±0.09
79	*Centranthus calcitrapae* (L.) Dufresne	0.003±0.01	-	-	-	-	-	-
80	*Fedia cornucopiae* (L.) Gaetner	-	-	-	0.04±0.14	-	-	-
81	*Viola scorpiuroides* Coss.	-	-	-	-	-	0.12±0.15	-
82	*Asphodelus microcarpus* Salzm.& Viv.	-	-	0.23±0.14	-	-	-	-

Table (e) Mean and standard deviation of the Density of the one hundred forty seven species in different vegetation groups resulting from TWINSPAN classification of the stands surveyed in rocky habitat of spring of Al Mansora.

No.	**Scientific name**	**TWINSPAN groups**						
		A	B	C	D	E	F	G
1	*Allium negrianum* Maire & Weiller	-	-	-	-	-	-	0.04±0.14
2	*Pistacia lentiscus* L.	-	-	-	-	-	0.01±0.02	-
3	*Ammi majus* L.	0.003±0.01	-	-	-	-	-	-
4	*Ammi visnaga* (L.) Lam	-	-	-	-	-	0.003±0.01	-
5	*Malabaila suaveolens* (Dcl.) Coss	-	-	-	-	-	0.003±0.01	-
6	*Scandix australis* L.	-	-	-	-	-	0.03±0.08	-
7	*Thapsia garganica* Lag.	-	-	-	-	-	0.01±0.02	-
8	*Torilis arvensis* (Huds.) Link.	-	-	-	-	-	0.003±0.01	-
9	*Torilis leptophylla* (L.) Reichb.	0.01±0.02	-	-	-	-	-	-
10	*Torilis nodosa* (L.)Gaertn.	-	-	-	-	-	0.003±0.01	-
11	*Dipcadi serotinum* (L.) Medic.	-	-	-	-	-	0.003±0.01	-
12	*Drimia maritime* (L.) Stearn	-	-	-	-	-	-	0.07±0.14
13	*Anthemis secundiramea* Biv.	-	-	-	-	-	-	0.01±0.02
14	*Carlina lanata* L.	-	-	-	-	-	-	0.003±0.01
15	*Carthamus lanatus* L.	-	-	-	-	-	0.003±0.01	-
16	*Centaurea alexandrina* Delile	0.003±0.01	-	-	-	-	-	-
17	*Chrysanthemum segetum* L.	0.01±0.02	-	-	-	-	-	-
18	*Cicerbita haimanniana* (Ascherson) Beauverd	-	-	-	-	-	0.01±0.02	-
19	*Cichorium endivia* L.	-	-	-	-	-	-	0.003±0.01
20	*Cichorium spinosum* L.	0.003±0.01	-	-	-	-	-	-
21	*Crepis senecioides* ssp.*senecioides* Delile	-	-	-	-	-	0.09±0.22	-
22	*Dittrichia viscosa* (L.) W. Greuter	0.003±0.01	-	-	-	-	-	-
23	*Hedypnois cretica* (L.) Dum. - Courset	-	-	-	-	-	0.02±0.08	-
24	*Helichrysum stoechas* (L.) Moench	-	-	-	-	-	0.003±0.01	-
25	*Hyoseris scabra* L.	-	-	-	-	-	0.06±0.18	-

26	*Jasonia rupestris* Pomel	-	-	-	-	-	0.003±0.01	-
27	*Leontedon tuberosus* L.	-	-	-	-	-	0.01±0.02	-
28	*Onopordum cyrenaicum* Maire & Weiller	-	-	-	-	-	0.003±0.01	-
29	*Pallenis spinosa* (L.) Cass.	-	-	-	-	-	0.003±0.01	-
30	*Phagnlon rupestre* (L.) Dc.	-	-	-	-	-	0.09±0.14	-
31	*Rhagadiolus stellatus* (L.) Gaertner	-	-	-	-	-	0.003±0.01	-
32	*Scolymus hispanicus* L.	0.003±0.01	-	-	-	-	-	-
33	*Tragopogon* L.	-	-	-	-	-	0.01±0.02	-
34	*Borago officinalis* L.	0.003±0.01	-	-	-	-	-	-
35	*Cynoglossum cheirifolium* L.	-	-	-	-	-	-	0.003±0.01
36	*Echium angustifolium* Mill.	0.003±0.01	-	-	-	-	-	-
37	*Echium sabulicola* Pomel	-	-	-	-	-	-	0.003±0.01
38	*Alyssum minus* (L.) Rothm.	-	-	-	-	-	-	0.003±0.01
39	*Biscutella didyma* L.	-	-	-	-	-	0.01±0.02	-
40	*Rapistrum rugosum* (L.) All.	0.003±0.01	-	-	-	-	-	-
41	*Sinapis alba* L.	-	-	-	-	-	0.003±0.01	-
42	*Sinapis pubescens* L.	-	-	-	-	-	0.003±0.01	-
43	*Herniaria glabra* Linn.	-	-	-	0.02±0.04	-	-	-
44	*Paronychia argentea* Lamk.	-	0.03±0.09	-	-	-	-	-
45	*Petrorhagia cyrenaica* (Durand & Barratte) Ball & Heywood	-	0.04±0.09	-	-	-	-	-
46	*Petrorhagia velutina* (Guss.) Ball & Heywood	0.003±0.01	-	-	-	-	-	-
47	*Polycarpon tetraphyllum* (L.) L.	-	-	-	-	0.35±0.58	-	-
48	*Silene apetala* Willd.	-	-	-	-	-	-	0.04±0.09
49	*Silene colorata* Poiret	-	-	-	-	-	0.003±0.01	-
50	*Silene cyrenaica* Maire & Weiller	-	-	-	-	-	-	0.03±0.07
51	*Cistus parviflorus* Lam.	-	-	-	-	-	0.36±0.72	-
52	*Fumana laevipes* (L.)Spach	-	-	0.14±0.22	-	-	-	-
53	*Fumana thymifolia* (L.)Spach	-	-	-	-	-	0.003±0.01	-
54	*Convolvulus althaeoides* L.	0.003±0.01	-	-	-	-	-	-
55	*Cuscuta epithymum* L.	-	-	-	-	-	0.02±0.06	-
56	*Sedum sediforme* (Jacq.)Pau	-	-	-	-	0.52±0.58	-	-
57	*Umbilicus horizontalis* (Guss.)Dc	-	-	-	-	-	-	0.02±0.06
58	*Juniperus phoenicea* L.	-	-	-	-	-	0.01±0.02	-
59	*Scabiosa arenaria* Forskal	-	-	-	-	-	0.01±0.02	-
60	*Erica multiflora* L.	-	-	-	-	0.44±0.56	-	-
61	*Euphorbia falcata* L.	-	-	-	-	-	0.02±0.06	-
62	*Euphorbia parvula* Del.	-	-	-	-	-	0.003±0.01	-
63	*Mercurialis annua* L.	-	-	-	-	-	0.02±0.06	-
64	*Anthyllis tetraphylla* L.	-	-	-	-	-	0.01±0.02	-
65	*Anthyllis vulneraria* L.	-	-	-	-	-	0.03±0.09	-
66	*Bituminaria bituminosa*	-	-	-	-	-	-	0.003±0.01
67	*Ceratonia siliqua* L.	-	-	-	-	-	-	0.003±0.01
68	*Hippocrepis cyclocarpa* Murb.	-	-	-	-	-	0.003±0.01	-
69	*Lotus cytisoides* L.	-	-	0.17±0.26	-	-	-	-
70	*Lotus ornithopodioides* L.	-	-	-	-	-	0.02±0.05	-
71	*Lotus tetragonolobus* L.	0.003±0.01	-	-	-	-	-	-
72	*Medicago coronata* (L.) Bart	-	-	-	-	-	0.003±0.01	-
73	*Medicago minima* (L.)Bart.	-	-	-	-	-	-	0.04±0.07
74	*Medicago orbicularis* (L.) Bart.	0.003±0.01	-	-	-	-	-	-
75	*Medicago polymorpha* L.	-	-	-	-	-	0.003±0.01	-
76	*Medicago truncatula* Gaertn.	-	-	-	-	-	-	0.003±0.01
77	*Melilotus indicus* (L.) All.	0.003±0.01	-	-	-	-	-	-
78	*Ononis reclinata* L.	-	-	-	-	-	0.003±0.01	-
79	*Ononis vaginalis* Vahl.	-	-	-	-	-	-	0.003±0.01
80	*Scorpiurus muricatus* L.	-	-	-	-	-	0.003±0.01	-
81	*Trifolium campestre* Schreb.	-	-	-	-	-	0.02±0.05	-
82	*Trifolium scabrum* L.	-	-	-	-	-	0.03±0.08	-
83	*Centaurium pulchellum* (Swartz) Druce	-	-	-	-	-	0.003±0.01	-
84	*Erodium malacoides* (L.)L'Herit.	-	-	-	-	-	0.01±0.02	-
85	*Hypericum triquetrifolium* Turra	-	-	-	-	-	-	0.003±0.01
86	*Moraea sisyrinchium* (L.)Ker Gaweler (Europe)	0.003±0.01	-	-	-	-	-	-
87	*Ballota pseudo-dictamnus* (L.) Benth.	0.003±0.01	-	-	-	-	-	-
88	*Marrubium vulgare* L.	-	-	-	-	-	0.003±0.01	-
89	*Micromeria Juliana* (L.) Benth. Ex Reichenb.	-	-	0.35±0.37	-	-	-	-
90	*Micromeria nervosa* (Desf.) Benth.	-	-	-	-	-	-	0.36±0.47
91	*Origanum cyrenaicum* Beg. et Vaccari	0.003±0.01	-	-	-	-	-	-
92	*Phlomis floccosa* D. Don	-	-	-	-	-	0.02±0.04	-
93	*Prasium majus* L.	-	-	-	-	-	0.01±0.04	-
94	*Satureja thymbra* L.	-	-	-	-	-	0.01±0.03	-
95	*Siderites curvidens* Stapf.	-	-	-	-	-	0.08± 0.19	-

96	*Teucrium apollinis* Maire et Weiller	-	-	-	-	-	0.14±0.13	-
97	*Teucrium brevifolium* Schreber	-	-	-	-	-	0.003±0.01	-
98	*Thymus capitatus* (L.) Hoffm .& Link	-	-	-	0.50±0.33	-	-	-
99	*Malva parviflora* L.	-	-	-	-	-	0.003±0.01	-
100	*Anagallis arvensis* L.	-	-	-	-	-	-	0.01±0.04
101	*Olea europaea var. oleaster* (Hoffmg.&Link) Dc.	0.003±0.01	-	-	-	-	-	-
102	*Phillyrea latifolia* L.	-	-	-	-	-	0.003±0.01	-
103	*Glaucium flavum* Crantz	0.003±0.01	-	-	-	-	-	-
104	*Globularia alypum* L.	-	-	-	-	-	0.02±0.08	-
105	*Linaria triphylla* (L.) Mill.	-	-	-	-	-	0.01±0.02	-
106	*Misopates orontium* (L.) Rafin.	-	-	-	-	-	0.003±0.01	-
107	*Plantago coronopus* L.	0.003±0.01	-	-	-	-	-	-
108	*Plantago lagopus* L.	-	-	-	-	-	-	0.01±0.04
109	*Avena barbata* Pott ex Link	-	-	-	-	-	0.19±0.32	-
110	*Briza maxima* L.	-	-	-	-	-	0.003±0.01	-
111	*Bromus alopecuros* Poir.	-	-	-	-	-	0.003±0.01	-
112	*Bromus rigidus* Roth	-	-	-	-	-	-	0.003±0.01
113	*Catapodium rigidum* (L.) C.E. Hubbard	-	-	-	-	-	0.09±0.15	-
114	*Crithopsis delileana* (Schultes) Rozhev.	-	-	-	-	-	-	0.003±0.01
115	*Cynosurus elegans* Desf.	-	-	-	-	-	0.003±0.01	-
116	*Dactylis glomerata* L.	-	-	-	-	-	0.01±0.02	-
117	*Gastridium ventricosum* (Gouan) schinz et Thel	-	-	-	-	-	0.003±0.01	-
118	*Hyparrhenia hirta* (L.)Stapf	-	-	-	-	-	-	0.003±0.01
119	*Lolium loliaceum* (Bory et Chaub.) Hand.-Mazz.	-	-	-	-	-	0.003±0.01	-
120	*Lolium rigidum* Guad.	-	-	-	-	-	0.003±0.01	-
121	*Melica minuta* L.	-	-	-	-	-	0.003±0.01	-
122	*Oryzopsis miliacea* (L.) Asch. & Schweinf.	0.003±0.01	-	-	-	-	-	-
123	*Parapholis incurva* (L.) C.E. Hubbard	-	-	-	-	-	0.003±0.01	-
124	*Paspalidium geminatum* (Forsk.) Stapf	-	-	-	-	-	-	0.003±0.01
125	*Phalaris minor* Retz.	-	-	-	-	-	0.01±0.04	-
126	*Poa bulbosa* L.	0.003±0.01	-	-	-	-	-	-
127	*Stipa capensis* Thunb.	-	-	-	-	-	-	0.56±0.76
128	*Trachynia distachya* (L.) Link.	-	-	-	-	-	0.06±0.10	-
129	*Trisetaria macrochaeta* (Boiss.) Maire	-	-	-	-	-	0.24±0.36	-
130	*Polygonum equisetiforme* sm.	0.003±0.01	-	-	-	-	-	-
131	*Adonis microcarpa* DC.	-	-	-	-	-	0.003±0.01	-
132	*Nigella damascena* L.	-	-	-	-	-	0.02±0.08	-
133	*Rhamnus lycioides* L. Jahandez	-	-	-	0.20±0.17	-	-	-
134	*Sarcopoterium spinosum* (L.) Spach	-	-	-	-	0.35±0.38	-	-
135	*Galium verrucosum* Huds.	-	-	-	-	-	0.04±0.08	-
136	*Phuopsis stylosa* Trin.	-	-	0.25±0.35	-	-	-	-
137	*Sherardia arvensis* L.	-	-	-	-	-	0.01±0.02	-
138	*Theligonum cynocrambe* L.	-	-	-	-	-	0.02±0.06	-
139	*Valantia lanata* Del. Ex Coss.	-	-	-	-	-	-	0.05±0.13
140	*Scrophularia canina* L.	0.003±0.01	-	-	-	-	-	-
141	*Datura innoxia* Mill.	0.003±0.01	-	-	-	-	-	-
142	*Nicotiana glauca* R.C.Graham	-	-	-	-	-	0.003±0.01	-
143	*Daphne jasminea* Sibth. et Sm.	-	-	-	-	-	0.07±0.14	-
144	*Centranthus calcitrapae* (L.) Dufresne	-	-	-	-	-	-	0.003±0.01
145	*Fedia cornucopiae* (L.) Gaetner	-	-	-	-	-	0.01±0.02	-
146	*Viola scorpiuroides* Coss.	-	-	-	-	-	-	0.09±0.10
147	*Asphodelus microcarpus* Salzm.& Viv.	-	0.09±0.15	-	-	-	-	-

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