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Comparison study of the plant communities of El Khukha area of El Hudayda Governorate of the coastal plains of Red Sea and El Najed El Ahmar area of Ibb governorate, Yemen Republic

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Abstract

This study carried out on El Khukhaarea and El Najed El Ahmar, in Yemen Republic. El Khuka area is located in the province of El Hudayda, it is characterized by dry climate and low of rain fall, while El Najed El Ahmar area which is located in Ibb gowernorate characterized by moderate climate throughout the year and the amount of rainfall is very large and rich vegetation with diversity of plants. A total of49 species belonging to28 families collected from 17 sites in the study area. From The results Asteraceae was the most abundant family comprising species (5species) related by Asclipiadaceae, Fabaceae and Poaceae represented by 4 species. Acanthaceae included 3 species. The plant life form of the studied area show that the highest life form recorded was for Phanerophytes constituted species representing 21 species (42.6 %) of the total species followed by the chaemophytes 12 species (26.4 %),Cryptophytes representing 9 species (18 .4 %), Therophytes 5 species (10.3 %) and Hemicryptophytes only with one species (2.3%).Application of TWINSPAN led to classifying the seventeen sites of the study area into four vegetation groups (00, 010, 011and 100). El Khukha sites were contain Groups 00, 001 and 01. Group 00 was dominated by *Odyssia mucronata* in sites 1 to 5, while in site 6 was *Odyssia mucronata* community was recorded high cover value in El Khukh dominated by *Prosopis juliflora*. Group 010 were dominated by *Prosopis juliflora, Hyphaene thebaica* group 011 was dominated by Phoenix dactylifera and group 1 were dominated by *Guizotia scarab* (sites 16 & 17), Acacia etbaica (site 15), *Opuntiaficus-indica* (site 13), *Rumex nervosus* (site 14).DECORANA results have confirmed the classification of TWINSPAN where groups A , b and C that represents El Khukha of Tihama plains were positively correlated to axis 2 while group A D that represents El Najed El Ahmar of Ibb governorate positively correlated with axis 1. Ordination has shed light on the relations among plant communities and different soil parameters where communities El Khukha of Tihama plains (*Odyssia mucronata, Prosopis juliflora Hyphaene thebaica* and *Phoenix dactylifera*) were positively correlated with calcium and carbonate, while communities El Najed El Ahmar of Ibb governorate (*Guizotia scarab, Acacia etbaica, Opuntiaficus-indica* , *Rumex nervosus*) were positively correlated with the chlorides, pH, Magnesium, Organic carbon, moisture content and E C.ANOVA showed that the moisture content has recorded the highest level of significance in comparison to other soil parameters.

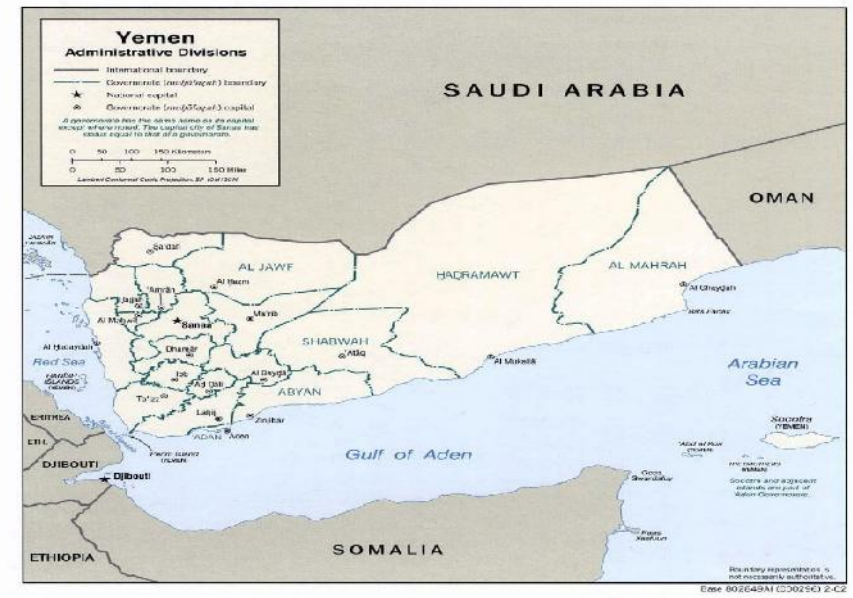
Keywords: Vegetation analysis, Soil Analysis, TWINSPAN, ANOVA, Yemen Republic

Introduction

Many authors were studied geographical regions of Yemen Republic and classified into different phytogeographical regions (Al-hubaishi and Mueller, 1984; Wood, 1997; and Obadi and Al-Khulaidi, 1997). According to Al-Khulaidi (2013) the topography of Yemen has been divided into eight main topographical units as follows Coastal plains, Tihama foothills , High altitude western, southern and south eastern mountains, Medium altitude western, southern and south eastern mountains, Highland plains including high altitude plains (above 1800m,Eastern and north eastern mountains, Eastern desert and Socotra. Coastal plain including Res Sea, Gulf of Aden and Arabian Sea, El Khukha area which lie south of Al Hudyda governorate of Tihama plains of Red Sea coastal land Some floristic study carried by many authors of coastal plains of Yemen, Al-Dubaie and Al-Khulaidi (1993). Al-Gifri (1991a &b), Al-Gifri *et al.* (1992) Al-Gifri and Al-Subai (1994), El Gifri and Hussein, (1993) in vegetation study of coastal plain of Yemen Al-Gifri and Gabali (1991) ElGifri and Gabali,. (2002) and Othman & El Naggar (2015), Al-khulaidi, (1992a). Ibb governorate is belong to High altitude western mountain (above 1800 m) and represented here by El Najed El Ahmar area wich lie south of Ibb city Some floristic study carried by many authors of (Forsskål, 1775). (Lavranos, 1971a, b, c). (Wood, 1997). (Miller and Cope, 1996). Al-Khulaidi& Pole (1989). And Al-Hubaishi and Mueller(1984). Aqlan (2008) surveyed the flora of Ibb governorate by visiting different localities representing various topographical features of the governorate and collected 416 species belong to 294 genera and 95 plant . Marei *et al*. (2016) studied plant communities of Badan mountain of Ibb governorate using modern programs for analysis and described the plant communities in Badan mountain Also . Marie, (2016) was study the plant communities of Al Ta'akr mountain and El Sohol area of Ibb governorate according to vegetation soil relationship with important role of elevation. The aims of the present work are comparison study of the plant communities of El Khukha of the coastal plains of Red Sea and El Najed El Ahmar area of Ibb govornorate.

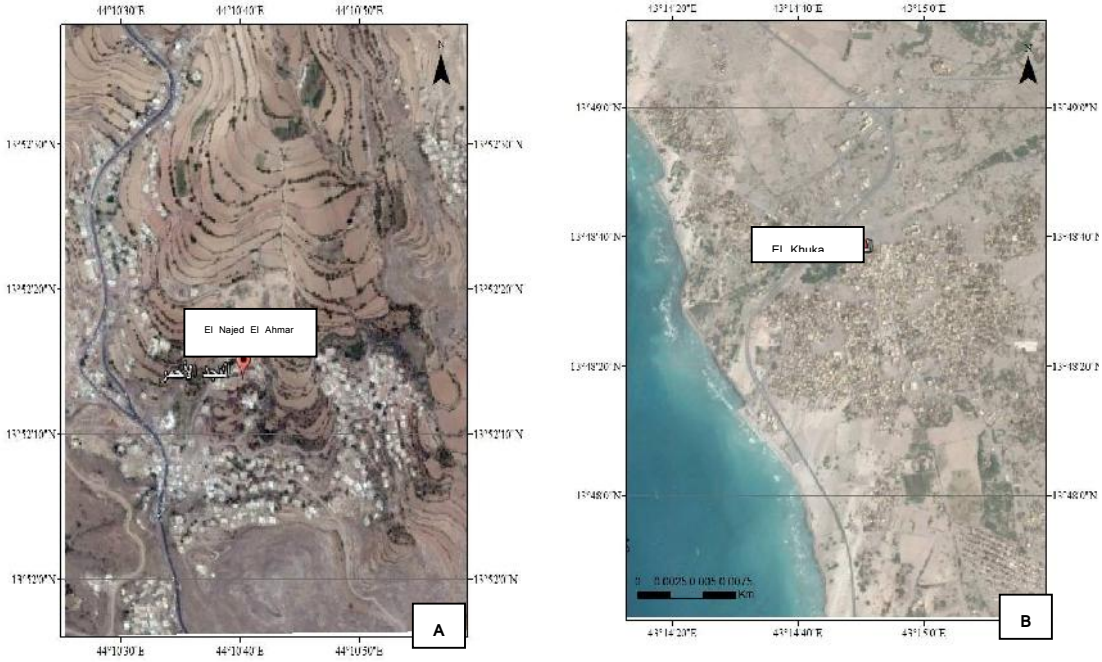
The study area

Ibb governorate is called the green province and it belongs to four topographical units of the Republic of Yemen. These units are western mountains, medium altitude of western mountains, high altitude mountains and highland plains (Map1).



Map 1. Administrative map of Yemen showing different governorates of Yemen Republic.

The study area of the present work including El Najd El Ahmar area which lie at south from Ibb city (Map 2). Climatic data of Ibb governorate were obtained as (Statistical year book, 2001-2004). Temperature of Ibb averages between 27.9 ºC in January and 33 ºC in June which represents a limited variability and a moderate temperature along the year.. The maximum precipitation rate was recorded in June with 287.5 mm. Records of wind speed showed the highest speed in December with 5.2 knot/s and the lowest in January with 3.4 knot/s. The highest relative humidity records were in August with 69.75%, while the lowest was in March with 47.25%.Al Hudayda governorate is lie in Tihama coastal plains of Red Sea with an altitude area it belong to El Khukha area range from 0 to 300 meters above sea level, the mean annual temperature isabout 30℃ and seasonal changes are not very distinct; the minimum and maximum range from 20℃ (in winter) and 40℃ (in summer) and rainfall probably ranges between 50-100 mm per year (Map 2 B).



Map 2. Showing (A): El Najed El Ahmar (South of Ibb city) and (B): El Khukha area (South of El Hudayda governorate).

Materials and Methods

Seventeen sites were selected to represent the vegetation of El Khukhaarea and Najed El Najed El Ahmer, sites from 1 to 12 represented El Khukha area. Sites from 13 to 17 represented El Najed El Ahmar area For each site, three soil samples were collected at a depth of 5-30 cm. soil chemicals analysis .were carried out according to Piper (1950), Jackson (1967) and Richards (1954).Vegetation of ten quadrates (10×10 m) in each stand was investigated. Floristic composition of the 17 sites were recorded. All plant species existing in each stand were listed after complete identification according to Täckholm (1974), Wood (1997) and Boulos (1999-2009). Voucher herbarium specimens were prepared and kept in the herbarium of the Department of Biology, Faculty of Science, Ibb University. According to Shukla and Chandel (1989) Density (D), percentage of frequency (F), abundance (A), cover (C), relative density (RD), relative frequency (RF), relative abundance (RA), relative cover (RC) and importance value (IV) were calculated for each species in each stand. Data management was performed using PC-ORD ver. 5 (McCune and Mefford, 1999) to run TWINSPAN and DECORANA. (terBraak, 1988). Analysis of variance (ANOVA) using SPSS ver. 22 (Santoso, 2014) was used to test the most significant soil factors affecting the classification of samples.

Results

A total of 49 species belonging to 28 families ofwere recorded in 17 sites of the studied area Family Asteraceae was themost abundant family comprising species (5 species). Asclipiadaceae, Fabaceae and Poaceae represented by4 species as well as Acanthaceae includes 3 species. The plant life form of the studied area show that the highest life form recorded was for Phanerophytes constituted species representing 21 species (42.6 %) of the total species followed by the chaemophytes 12 species (26.4 %),Cryptophytes representing (species (18 .4 %),Therophytes 5 species (10.3 %) and Hemicryptophytes recorded by only with one species (Table 1).

Table 1: Species recorded in El Kukha(ElHudayda governorate) and El Najed El Ahmar (Ibb governorate).

Family	Species	Life form	El Najed El Ahamer	El Khukha	Abbreviation in TWINSPAN
Acanthaceae	*Barleriatri spinosa*(Forssk.) Vahl.	Phanerophyte.	p		*Bartri*
	Hypoestes forskalii (Vahl.) R. Br.	Chamaephyte.	p		*Hypfor*
	*Ruellia patula*Jacq.	Hemicryptophyte	P		*Ruepat*
Actinopteridaceae	*Adiantumcapillus-veneris*L.	Cryptophyte	P		*Adicap*
Agavaceae	*Agave sisalana* Perr.	Phanerophyte.	p		*Agasis*
Apiaceae	*Ferula communis*L.	Chamaephyte.	P		*Fer com*
Asclepiadaceae	*Caralluma cicatricosa(Deflers) N. E. Br*	Chamaephyte	P	P	*Kanlan*
	.Leptadenia pyrotechnica (Froosk .) Dence	Phanerophyte	P	P	Leppyr
	Gomphocarpus sinaicus Boiss Burm. f.)	Chamaephyte	P		Gom sin
		Thearophyte	P		Odo rad
	Odontanthera radians (Frossk .) D. Fie	Cryptophyte			Asp aet
Aspleniaceae	*Asplenium aethiopicum (Burm f Becherer*	Cryptophyte			Asp tri
	Asplenium trichomanesL.				
Asteraceace	*Echinops spinosissimus* Turra	Chamaephyte.	P		
	Tagetes minuta L.	Therophyte		P	*Tagmin*
	Centaurothamnus maximus (Forssk.) Wagenitz&Dittrich	Phanerophyte	P		*Cenmax*
	Guizotia scarab(Vis .) Chiov.	Chamaephyte	P		Guisca
	Pulicaria undulata (L.) C. A. Mey.	Chamaephyte	P		Pul und
Cactaceae	*Opuntiaficus-indica*(L.) Miller	Phanerophyte.	p		*Opufic*
Cease;pinaceae	*Senna italica* Miller	Chamaephyte.		P	*Senita*

Capparaceae Commelinaceae	*Capparis decidua (Froosk .)Edgw .* *Commelina forskalaeiVahl..Therophyte.*	Phanerophyte. Thaerophyte		P	*Cad far*
Euphorbiaceae	*Euphorbia parciramulosaSchweinf.*	Phanerophyte	P		*Eupamm*
Fabaceae	*Cadia purpurea* (Picc.) Ait. *Indigofera oblongifolia* Frossk *Indigofera argentea*Burm. f . *Tephrosia purpurea*(L.) Pres .	Phanerophyte Chamaephyte Thearophyte Chamaephyte	P P P P		*Cadpur* Indobl Indarg Teppur
Lamiaceae	*MenthaPiperia*L.	Chamaephyte.	P		Men pip
Malvaceae Mimosaceae	*Abutilon fruticosum*Guill. &Perr.	Phanerophyte.		P	*Abu fru*
	*Hibiscus deflersii*Schweinf. exCufod.	Phanerophyte		P	*Hibdef*
	*Acacia etbaica*Schweinf.	Phanerophyte	p	P	*Acaetb*
	Acacia mellifera(Vahl.) Benth	Phanerophyte	p	P	*Acamel*
	Prosopis juliflora (Sw.) DC	Phanerophyte	p		
Orobanchaceae Oleaceae	*Cistanche phelypaea* (L.) Cout. *Jasminum grandiflorum* L	 Cryptophyte. Phanerophyte	P P		*Cisphe* Jas gra
Poaceae	*Cynodon dactylon*(L.) Pers	Cryptophyte	P	P	*Cyndac*
	Pennisetum setaceum R. Br. ex Fresen *Pennisetum villosum* . Br. ex Fresen *Odyssea mucronata* (Frossk .) Stapf	Cryptophyte Cryptophyte Cryptophyte	P	P	*Penset* Pen vil Odymuc
Polygonaceae Palmae	*Rumex nervosus*Vahl. *Phoenix dactylifera*L. *Hyphaene thebaica*(L .) Mart .	Phanerophyte Phanerophyte Phanerophyte	P	 P P	*Rum ner* Pho dac Hyp the
Rhamnaceae	*Ziziphusspina-christi*(L.) Willd.	Phanerophyte		P	*Zizspi*
Rosaceae	*Rosa abyssinica*Lindley	Phanerophyte	P		*Rosaby*
Sapindaceae	*Dodonaea viscosa*(L.) Jacq.	Phanerophyte		P	*Dodvis*
Scrophulariaceae	*Kickxia elatine* (L.) Dum.	Therophyte.	P		*Kicela*
Selaginellaceae	*Selaginella yemensis*(Swartz) Spring	Cryptophyte	P		*Selyem*
Solanaceae	*Withania somnifera* (L.) Dunal *Solanum incanum*L	Chamaephyte. Phanerophye		P P	*Wit som* Sol inc
Zygophyllaceae	*Zygophyllum album*	Chamaephyte.		P	*Zygalb*

Classification of sites

Sites of El Kukha and El Najed E l Ahmar were classified using TWINSPAN. The classification resulted in four vegetation groups in the third level of classification (00, 001 , 01 and 1) each group with its distinct indicator species and soil factors which play important role in the distribution of these groups (Table 2 and Fig.1)

Table 2. TWINSPAN classification of 17 sites showing different groups of the study area
Sites from 1 to 12 represented El Khukha area and sites from 13 to 17 represented ElNajed Al Ahmar area

```
                 11 111111
            12345678129034567

6  phodae   ----------87-----  00
7  Indobl   ----------4------  00
8  teppur   ----------3------  00
9  Indarg   ----------1------  00
10  capdec  -----------2-----  00
11  sen eta -----------2-----  00
12  abufru  -----------1-----  00
13  leppyr  -----------1-----  00
14  zizspn  -----------1-----  00
1  odymuc   9999874--2-------  01
2  prossp   3253787785-2-----  01
3  odo rad   ---1------------  01
4  hyp the   ------775--2-----  01
5  zygalb   -------432-------  01
15  opufic  ------------5----  1
16  cadpur  ------------3----  1
17  Cyndac  ------------21---  1
18  rumner  ------------24-22  1
19  aga sis ------------4----  1
20  guisca  ------------13267  1
21  Gym sin ------------1-11-  1
22  hyp for ------------1----  1
23  witsom  ------------1----  1
24  rue pat ------------1----  1
25  carcic  ------------1----  1
26  Men pip ------------1---1  1
27  fer com ------------1----  1
28  jasgra  ------------1----  1
29  cen max ------------1----  1
30  Penvil  ------------1----  1
31  acaetb  -------------35-2  1
32  echspi  -------------212-  1
33  Bar tri  -------------2---  1
34  acamel  -------------111-  1
35  cist an  -------------1---  1
36  comped  -------------1--2  1
37  pul und  -------------1---  1
38  tag min  -------------11--  1
39  pen set  --------------5-5  1
40  dodvis  --------------42-  1
41  solinc  --------------1--  1
42  hibdef  --------------1--  1
```

43 rosaby ----------2- 1
44 Kicela ----------2- 1
45 adi cap ----------2- 1
46 selyem ----------1- 1
47 Aspaet ----------1- 1
48 Asp tri ----------1- 1
49 Eup par ----------2 1

00000000000011111
000000000011
0000001111 ********** TWINSPAN completed **********

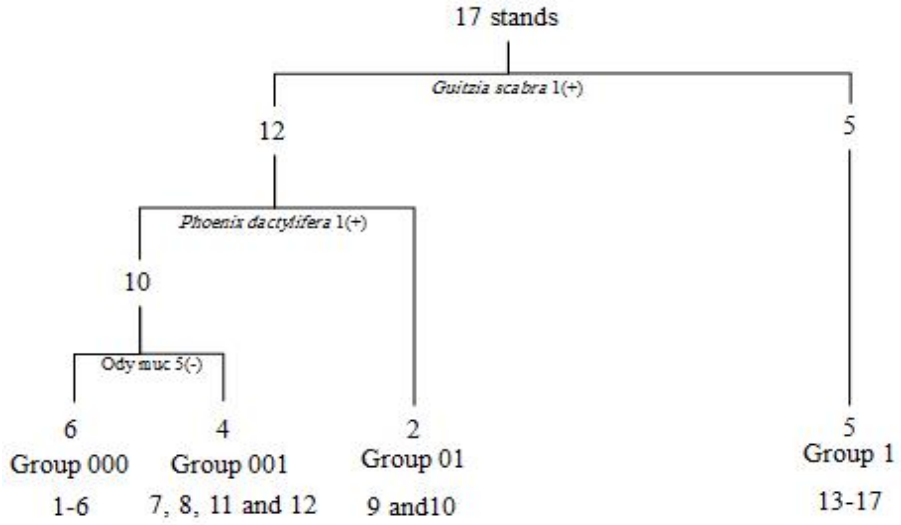


Fig. 1:Denderogram groups of the study area obtain of output of TWINSPAN

Group (00) was formed at the third level of classification. It includes six sites (1 to 6) which represent open sand dunes of El Kukha. The indicator species of this group *Odyssea* were with high important value and *Prosopis juliflora* sites from 1 to 5 showing *Odyssea mucronata* communities with important value are 328.5, 255.9, 294, 312and 247 respectively and *Prosopis juliflora* is co dominant species with important value are71.5 , 43.9 , 105 .6 , 72.2 and 152.2 respectively , while site 6 dominated by *Prosopis juliflora* (with important value is 207.5) and *Odyssia mucronata* is represented here a co dominant species (with important value is 192.2), these dominant species making a pure communities types in sand dunes habitats. Soil factors which characterize this group are Calcium and Carbonate positive correlation with axis 1 and others soil factors with negative correlation in this group. Group (001) was formed at the third level of classification. It includes four sites (7, 8, 11 and 12) and its indicator species *Prosopis juliflora, Hyphaene thebaica* and *Odyssea mucronata*. It is clear that,*Prosopis* is an indicator species in this group with important values are 169 , 157 , 250 .9 and 111.2 respectively, *Hyphaene thebaica* with important values are 151, 157, 118 respectively and this species is not recorded at site 12, *Odyssea mucronata* with important values are 78 (1n site 7) and 25 (in site 12) where the species is dominant in this site, *Zygophyllum album* represent associated species in this group which found in three sites 8 , 11 and 12 with important values are 87, 50 and 31 respectively .Group (01) was formed at the second level of classification. It includes two sites of El Kukha(9 and 10) and its indicator species here is *Phoenix dactylifera* , this community type in sea found in shore of El Kukha area with important values are (222 and 163 in both sites). Associated species *Odyssea mucronata* and *Prosopis* with present here only in site 10 with low important value 36 for each, co dominant species are in site 9 *Indigofera oblongifolia* with important value 50 and *Capparis decidua* in site 10 with important value is 40 and other recorded species with low values *Sennaitalica, Indigofera argentea ,Tephrosia purpurea*.

This community was recorded number of species more than other group for near sea shore .Soil factors which characterize these groups are Organic carbon, pH, E C, Moisture content, Chloride and Magnesium with positive correlation with axes 2 and Calcium and Carbonate negative with these groups. Group (1) was formed in the third level of classification of El Najed Al Ahmar area . It includes five sites (13 to 17) and its indicator species are *Guizotia scarab, Acacia etbaica, Opuntiaficus-indica, Rumex nervosus*. In site 13 showed that community of *Opuntiaficus-indica* in slope with important value is 117, here Agave is represented a co dominant species with important value is 89 also *Cadia purpurea* was associated species in this site with important value is 40 as well as *Cynodon dactylon* with important value is 40. In site 14, *Rumex* represented as dominant species in high slope with important value is 94 *Guizotia scarab*is a dominant species with important value is 65 also *Acacia* sharing as associated species in this site with important value is 52. In site 15,*Acacia* community in high slope with important value is 104, *Pennisetum setaceum* is a codominant species here with important value is 100 also *Dodonaea viscosa* is a co dominant species for recorded important value is 96. In sites 16 and 17, Guizotia *scarab* community was found in plateau, the species with high important values in both sites (133 and 160,respectively), co dominant species in site 16 are sharing between *Rumex nervosus* and *Rosa abyssinica* which recorded the same important values 40. *Pennisetum setaceum*is represented as codominant in site 17 with important value of 108.This group is characterized by the presence of microhabitats which is favorable for the growth of plant species, There is a lot of ferns plants growing in this site because of low of moist places. Also El Najed El-Ahmar area contains a quantity of moisture and high water that allows the growth of a lot of ferns, these plants are *Adiantumcapillus-veneris, Asplenium aethiopicum, Aspleniumt richomanes* and *Selaginella yemensis* Soil factors which characterize this group are Calcium and Carbonate positive correlation with axis 1 and others soil factors with negative correlation in this group.DECORANA (DCA) was used to clarify the relations between the distribution of plants and soil factors along two axes to form a graph ordination which represents all factors (plants and soil variables) according to their significance as calculated according to Pearson (r) and Kendall (tau) Correlations with Ordination Axis1 and 2. The ordination results of DCA analysis showed that sites of El Khukha area were positive correlated with axes 2. On the other hand, El Najed Al Ahmar group was positive correlated with axis 1(Fig 2).

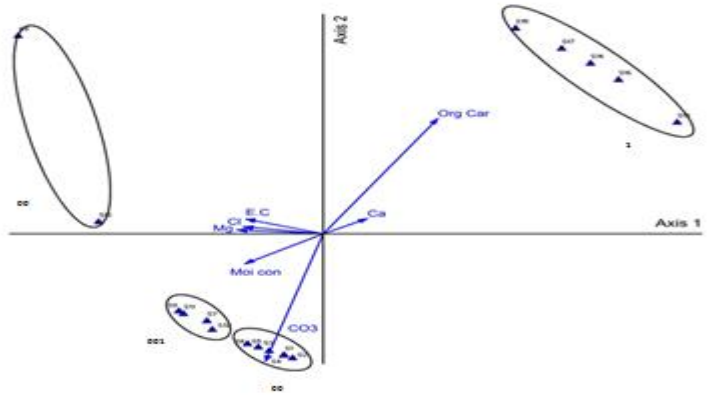


Fig. 2. DCA ordination diagram for the vegetation groups of the 17 sites of EL Khukha area and El Najed El Ahmararea .

Ordination results were in accordance with TWINSPAN classification which is quite common in vegetation studies. Axis 1 group (D) were dominated *by Guizotia scarab, Acacia etbaica, Opuntiaficus-indica* and *Rumex nervosus* , this group with high values of Organic carbon 2.02 and calcium 8.4. On the other hand, groups correlated to axis 2 (A , B and C) were dominated groups. In case of group A were dominated by *Odyssea mucronata* and *Prosopis*, this group with low value of pH than others groups, group B were dominated by *Prosopis, Hyphaene thebaica* and *Odyssea mucronata*, this group with high value of pH than other groups and group C were dominated by *Phoenix dactylifera* , this group is characteristic bb ,high values of Moisture content (9.9) , Cl (0,9) Mg (130) and E C (8.58).

ANOVA was used to detect such factors. Moisture content was the most significant factor in determining different ecological groups with *P* value = 000, followed by carbonates with P value = 0.006, organic carbon with *P* value = 0.01, And E C with *P* value = 0.054(Table 3).

Table 3. Standard deviation (S. D.), Mean values and ANOVA *P* values of the soil variables in the studied sites.

Soil parameters	Group 000	Group 001	Group 01	Group 1	*P* value
Moisture content	7.25 ± 8.17	3.77 ± 12.5	9.96 ± 2.12	2.47 ± 1.54	0*
pH	6.94 ± 0.25	7.52 ± 0.79	7.40 ± 1.15	7.35 ± 0.50	0.464
Organic Carbon %	0.43 ± 0.29	0.48 ± 0.46	0.93 ± 0.89	2.02 ± 1.04	0.01*
CO_3	4.39 ± 0.27	4.87 ± 0.39	3.06 ± 1.35	2.90 ± 1.10	0.006*
Cl	0.15 ± 0.27	0.31 ± 0.40	0.90 ± 1.17	0.05 ± 0.03	0.142
Ca	4.58 ± 4.42	6.93 ± 3.24	3.74 ± 2.48	8.44 ± 4.06	0.354
Mg	31.2 ± 41.6	39.5 ± 29.2	130. ± 180.	4.38 ± 1.77	0.128
E .C	1.08 ± 1.04	1.39 ± 0.65	8.58 ± 11.5	0.24 ± 0.08	0.054

Discussion

The area of El Khukha is located in the province of El Hudayda, which is characterized by dry climate, the amount of rain fall per year is very few, so the vegetation is very poor in this region. It extends along the coastal area of Red Sea, Gulf of Aden and Arabian Sea and extends more than 2000 Km long. It includes the easterncoastal plain (Tihama coastal plain) and southern plain, with an altitude range from 0 to 300 meters above sea level, the mean annual temperature is about 30^{o}C and seasonal changes are not very distinct; the minimum and maximum range from 20^{o}C (in winter) and 40^{o}C (in summer) and rainfall probably ranges between 50-100 mm per year .while ElNajed El Ahmar area which is located in Ibb governorate characterized by moderate climate throughout the year and the amount of rainfall is very large and rich vegetation with diversity of plants. This study is compared between two different variables in climate and soil as well as in plant coverings. Floristic composition of the work showed that Asreraceae, Asclepiadaceae, Fabaceae and Poaceae are the dominant families. Plant life forms of the study areas showed that Phanerophyte represent the dominant life form throughout the study area with 21 species followed by Chaemophyte with 13 species. Cryptophyte took its place in the third level with 9 species followed by therophytes with 5Marie, *et al.* (2016) reported that Asteraceae was the most abundant family comprising 12 species andThe plant life form of the studied area shows that phanerophytes are the most dominant species representing 37 % followed by chaemophytes with28 species representing25 %. Therophytes with 26 species representing 23 %, cryptophytes with 13 species representing 11 % and hemicryptophytes with only 2 species representing1.8 % of total species of Badan mountain. These result supported by Aqlan, (2008).Application of TWINSPAN led to classifying the seventeen sites of the study area into four vegetation groups (00, 010, 011and 100). El Khukha sites were containing Groups 00, 001 and 01. Group 00 was dominated by *Odyssia mucronata* in sites 1 to 5, while in site 6 was *Odyssia mucronata* community was recorded high cover value in El Khukha, ElGifri and Hussein, (1993) reported that O mucronatain adento Abyan road with recorded cover vegetation of 80 %, Kurschneri *et al*.(1998) reported that *O mucronata* was distributing coastal belt of Yemen from coastal sites to the dune sites of and Arabian Gulf, Red Sea. Al Khulidi, (2013) reported that,*O.mucronata* community was recorded in Sandy plain covered by shrubland or bushland in Tihama plains dominated by *Prosopis juliflora*. Group 010 were dominated b y*Prosopis juliflora*, *Hyphaene thebaica* group 011 was dominated by Phoenix dactylifera and group 1 were dominated by Guizotia scarab (sites 16 & 17), *Acacia etbaica* (site 15), *Opuntiaficus-indica* (site 13), *Rumex nervosus* (site 14) Guizotia scarab This species was dominated at plateau of El Najed Al Ahmar . Marie, *et al* (2016) reported that *G scabra* represented a dominant species of plateau of Badanmountan. Likewise, Al Khulidi, (2013) reported that *Acacia etbaica* Is a woodland found on moderate steep slope mountains and hills south Taiz (between 1400-1600m).

EL-Sheikh, (2013) reported that *Acacia etbaica*, had a wide range of occurrence positively skewed towards small individuals in the wadi-bed rather than the hill-slope. This plant has a higher water demand than other Acacia spp. Hegazy *et al*. (1998) has stated that *R. nervosus* exists on the dry slopes at elevations between 2000-2500 m in south west Saudi Arabia highlands. AlGhamdy (2013) reported *R. nervosus* in the southwest of Saudi Arabia. Marei, *et al*. (2016) were recorded *R nervosua* as a dominant species on slope of Badan Mountain.DECORANA results have confirmed the classification of TWINSPAN where groups A, b and C that represents El Khukha of Tihama plains were positively correlated to axis 2 while group A D that represents El Najed El Ahmar of Ibb governorate positively correlated with axis 1. Ordination has shed light on the relations among plant communities and different soil parameters where communities El Khukha of Tihama plains (*Odyssia mucronata, Prosopis juliflora, Hyphaenet hebaica* and*Phoenix dactylifera*) were positively correlated with calcium and carbonate, while communities El Najed El Ahmar of Ibb governorate (*Guizotia scarba, Acacia etbaica,Opuntiaficus-indica, Rumex nervosus*) were positively correlated with the chlorides, pH, Magnesium, Organic carbon , moisture content and E C. ANOVA showed that the moisture content has recorded the highest level of significance in comparison to other soil parameters (Table 3). These results are in accordance with what was proved in previous studies by (Marie, 2006, El-Gazzar *et al*., 2007, Marie *et al*., 2016 and El Khuly& Ramadan, (2017). In this work, a comparison was made between the area of El Najd El Ahmar in the governorate of Ibb and the area of in this work; a comparison was made between the area of the Red Najd in the governorate of Ibb and the area of Al-Khoukha in the Tihama Plains in the Republic of Yemen. *Odyssia mucronata* and (Guizotia scarab are the most common species in El Najed El Ahmar and El Khukha areas respectively Fig 3A&B.

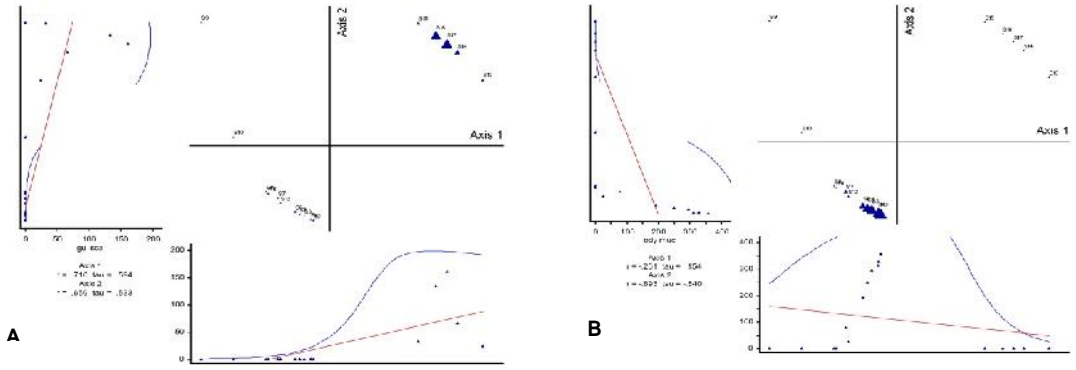


Fig. 3 DCA ordination diagram A:*Guizotiascarba* of El Najed El Ahmar area related to axes 1 and B :*Odyssia mucronata* of EL Khukha area related to axes 2 .

The area of of El-Khukha is a dry climatic zone and recorded by a few plant species while the area of El Najd El Ahmar is a temperate climate. So, the area of the plant species is more than the Al-Khukhaarea in the Tihama Plain in the Republic of Yemen. The two areas need more modern study by using remote senates and using vegetation mapping (GISprogram)in the future.

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