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Floristic Diversity And Vegetation Structure Of Nice Mountain, In Al Baha Region, Saudi Arabia.

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ABSTRACT

Nice Mountain is one of the areas with many diverse environments and important plant populations in the Al Baha region and is the forerunner of many endangered plants and many endemic, medicinal and scientific plants of high economic importance. The objective of this study is to determine the vegetative structure of Nice Mountain in Al Baha, Saudi Arabia, where 15 sites were distributed homogeneously for the study site, monitoring the existing plants and their quantity, and measuring the biodiversity indicators of plant populations. A total of 78 plant species belonging to 48 species and 34 species were identified. The main growth forms in the study area were 24% of shrub and then subshrub and Herb, 21% tree then 20% tree, then perennial grass 6% and Succulent plant 4%. These ratios are considered logical since the study area is a mountain region with a tropical climate. Acanthaceae was the largest number of species (11%), followed by Euphorbiaceae (7%) and 6 plant species. The number of species is about 113, which means that there is richness in the plant diversity of the species. This is because the studied area has climatic conditions suitable for the growth of many species of plants.

Keywords: Acanthaceae; perennial grass; Succulent plant; vegetation diversity

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INTRODUCTION

The climatic and topographic conditions were reflected on the quality of vegetation cover in the environments of Saudi Arabia Kingdom. The habitats are characterized by great density and vegetation diversity, such as the southern region. On the other hand there are habitats having low vegetation diversity, such as the deserts that cover large areas of the Kingdom. The weak vegetation cover has a reflection on the number of living organisms in the following levels of the food pyramid, so the degradation in vegetation has anegative repercussions on the remaining trophic levels, which will lead to a decrease in bioprocesses and energy transfer rates which have great importance in maintaining the ecological balance. Perennial trees, despite their fewness, play an important and necessary role in the balance of the fragile ecosystem in their places of existence, as they represent the sustainable structure of the vegetation in them, as they are the only woody plants that can be observed throughout the year thanks to their formal and functional qualities that enable them to survive and live under the harsh environmental conditions that prevail in these places most of the year, such as high temperature, sand movement, scarcity of water and food [1].

Despite this diversity, the density of vegetation cover remains relatively low, especially in the central, eastern and northern regions of the kingdom. On the contrary, the western regions, especially the southwestern regions, are characterized by more dense vegetation cover and more diverse flora, where approximately 70% of the plant diversity in the Kingdom grows [2].

Floristic Diversity provides major economic, environmental, social and cultural services and benefits, over the ages, it has contributed to providing the local population with food, energy, medicine, fiber and air, and has provided a suitable environment for the practice of various living and leisure activities. Plants in the Kingdom are currently facing major threats due to cutting, logging, overgrazing, urban expansion and fires. In addition to the observed change in the climate, which recorded some decrease in humidity levels, whether annual rates of rain or amounts of fog. In addition, the phenomenon of desertion and degradation of agricultural terraces widespread in mountainous areas has negatively affected the hydrological system, which increased the severity of the drought of trees and led to their weakening and rendering them vulnerable to insect and parasitic infestations [3].

From this point of view, it is evident the importance of vegetation cover and wild plants in the life of society, and since wild plants are currently facing major threats, this research was prepared as a contribution to enhance the efforts made to preserve wild plants and document their presence in their different environment, especially valleys and mountains, as environments that embrace many plant communities, whether perennial or annuals. The idea of the research is measuring the composition of the prevailing plant communities, vegetation and plant diversity of Nice Mountain, which is located in the Al Baha region, because of its high importance in preserving biodiversity.

MATERIALS AND METHODS

Study Area and Plant Collection: Field trips were made to the study area, Nice Mountain, in the Qilwah Governorate, Al Baha region. Fifteen sites were identified with an area of 10×10 meter for each site and their coordinates were recorded, as they covered adequately what the mountain contained in terms of habitats and plant species in order to collect the samples are as shown in Table (1) and Figure (1). The available plant samples and the botanical survey were collected at each site during the spring of 2019 and at each site a list of plant species was recorded at each site. The plant species were defined according to the herbarium in the College of Science, King Saud University, Saudi Arabia.

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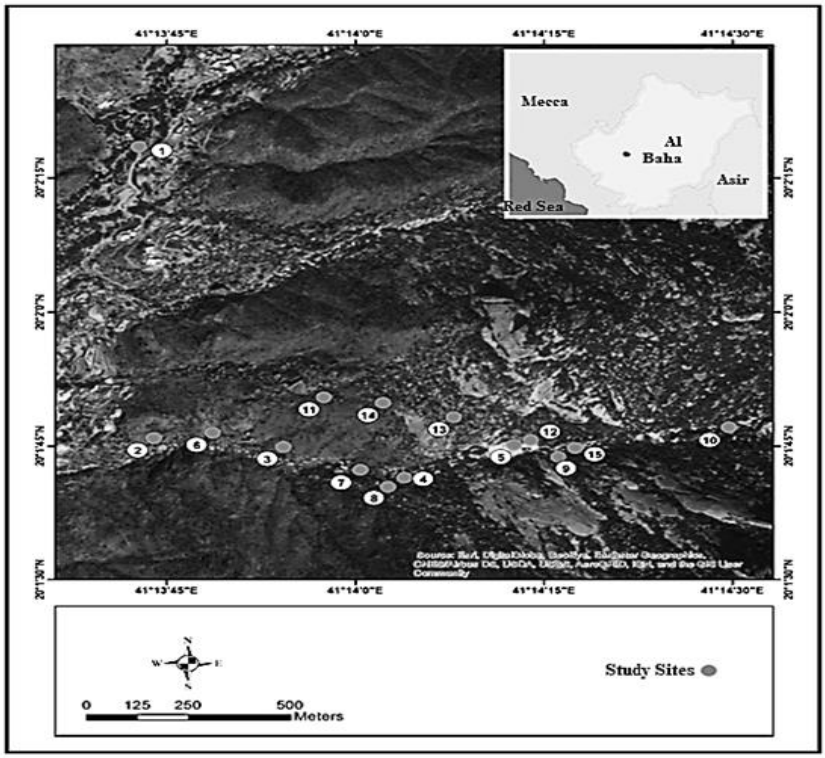

Figure 1: Plant Communities in Nice Mountain in Al Baha region in Saudi Arabia (google map 2019).

Table 1: Study sites nature, number, Longitude and Latitude

Site Number	Land Form	Longitude	Latitude
1	Mountain Terraces	41.228556	20.03848
2	Mountain out rockcorps	41.228881	20.029422
3	Mountain slope	41.231746	20.029149
4	Mountain slope	41.234425	20.028191
5	Mountain slope	41.236837	20.029212
6	Mountain slope	41.230184	20.029586
7	Mountain slope	41.233446	20.028438
8	Drainage line	41.234057	20.027911
9	Drainage line	41.237821	20.028836
10	Drainage line	41.241585	20.029761
11	Out rockcorps	41.232645	20.030688
12	Mountain slope	41.237211	20.029363
13	Mountain slope	41.235511	20.030074
14	Mountain slope	41.233948	20.030511
15	Mountain slope	41.238189	20.029116

RESULTS

Plant species and general

A floristic list of plant species was made in the study area. As Figure (2) shows, it is clear that the number of plant species that were counted in the study area is 78 plant species belonging to 48 genera, and it follows 34 species, and according to the generic index (78/48 = 1.625), the specific richness reached 1.625.

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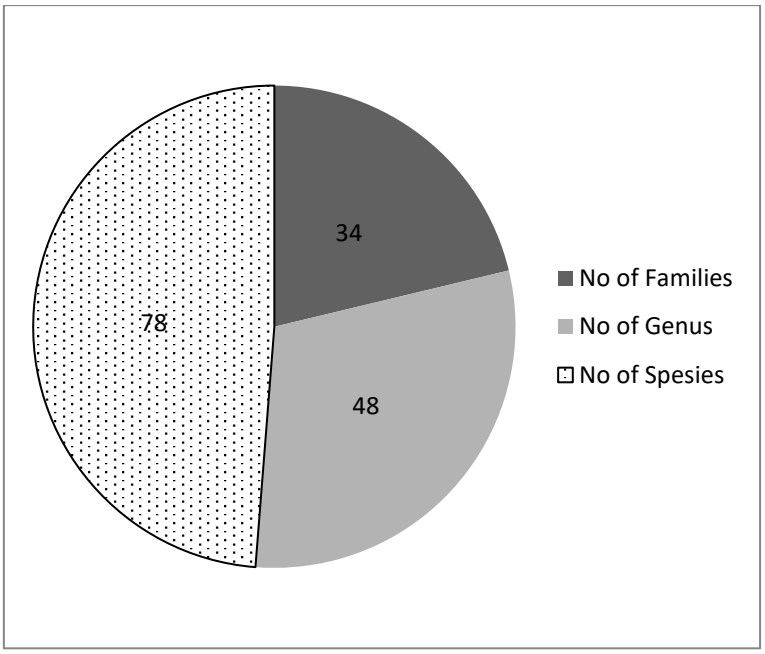

Figure 2: The number of plant families, genera and species in the study area

Plant Families

The most representative families of vegetation in the study area is the Acanthaceae family, with a rate of 11%, where it is represented with 9 plant species, followed by the Euphorbiaceae family and the Leguminosae family with a rate of 7%, where 6 plant species were represented for each of them, then followed by the Gramineae family, including 6% of them, followed Capparaceae and Malvaceae, where each family represented 4 species of plants for each family, at a rate of 5% for each family (Table (2)).

Table 2: Representation percentages of plant species for all species and their total number in all study sites

No	Family name	Total No of Species.	%
1	Acanthaceae	9	11.7
2	Aloeaceae	2	2.6
3	Amaranthaceae	1	1.3
4	Apocynaceae	3	3.9
5	Aristolochiabracteolata	1	1.3
6	Asparagaceae	2	2.6
7	Aspleniaceae	1	1.3
8	Boraginaceae	2	2.6
9	Burseraceae	1	1.3
10	Cactaceae	1	1.3
11	Capparaceae	4	5.2
12	Commelinaceae	2	2.6
13	Convolvulaceae	3	3.9
14	Euphorbiaceae	6	7.8
15	Gramineae	5	6.5
16	Leguminosae	6	7.8
17	Malvaceae	4	5.2
18	Molluginaceae	2	2.6
19	Moraceae	3	3.9

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20	Nyctaginaceae	1	1.3
21	Ochnaceae	1	1.3
22	Ppaceae	1	1.3
23	Portulacaeae	2	2.6
24	Pteridaceae	1	1.3
25	Rhamnaceae	1	1.3
26	Rubiaceae	1	1.3
27	Salvadoraceae	1	1.3
28	Sapotaceae	1	1.3
29	Talinaceae	1	1.3
30	Tiliaceae	5	6.5
31	Verbenaceae	1	1.3
32	Vitaceae	1	1.3
33	Zygophyllaceae	1	1.3

Life forms of plant species at the study site

As can be seen from Figure (3) and Table (3), the main growth forms in the study area were distributed to 24% of the shrubs, then the subshrub plants, as well as the perennial herb, where both of them represented 21%, then the trees by 20%, then the perennial grass by 6%, then the succulent plant by 4%.

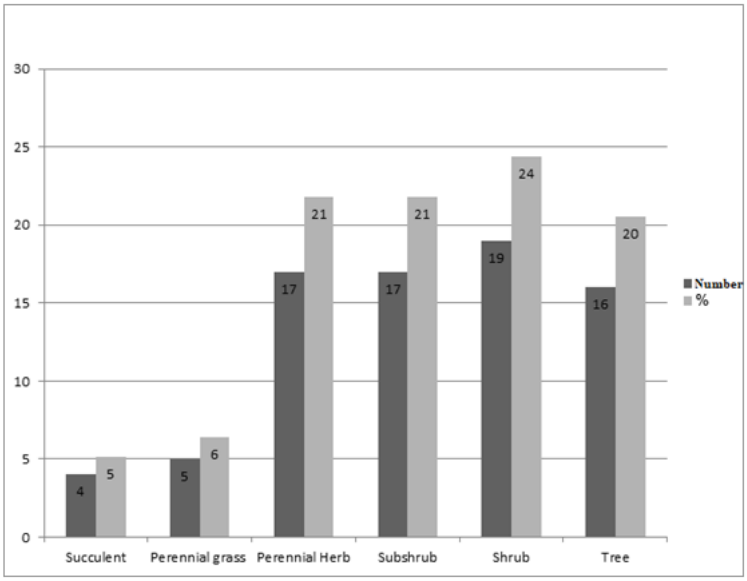

Figure 3: Main Life forms in Nice Mountain

Table 3: Plant species, their families and their life forms in Nice Mountain, Al-Baha region

No	Species	Family	life form
1	*Abutilon pannosum*	Malvaceae	Shrub
2	*Abutilon sp*	Malvaceae	Shrub
3	*Acacia asak*	Leguminosae	Tree
4	*Acacia etbaica*	Leguminosae	Tree
5	*Acacia johnwoodii*	Leguminosae	Tree

No	Species	Family	life form
6	*Acacia tortilis*	Leguminosae	Tree
7	*Acalyphafruticosa*	Euphorbiaceae	Shrub
8	*Acalyphaindica*	Euphorbiaceae	Shrub
9	*Actiniopteris radiata*	Pteridaceae	Herb
10	*Adenium obesum*	Apocynaceae	Shrub
11	*Aervajavanica*	Amarnathaceae	Subshrub
12	*Aloe sabaea*	Aloeaceae	Subshrub
13	*Aloe vulcanica*	Aloeaceae	Subshrub
14	*Anisotestrisulcus*	Acanthaceae	Shrub
15	*Aristolochiabracteolata*	Aristolochiaceae	Herb
16	*Asplenium trichomanes*	Aspleniaceae	Herb
17	*Barleriabispinosa*	Acanthaceae	Subshrub
18	*Barleriaprionitis*	Acanthaceae	Subshrub
19	*Barleriatrispinosa*	Acanthaceae	Subshrub
20	*Blepharis edulis*	Acanthaceae	Herb
21	*Boerhaviadiffusa*	Nyctaginaceae	Subshrub
22	*Brachiarialata*	Gramineae	Annual grass
23	*Brachiarialeersioides*	Gramineae	Annual grass
24	*Cadabafarinosa*	Capparaceae	Shrub
25	*Capparis tomentosa*	Capparaceae	Shrub
26	*Carallumaretrospiciens*	Apocynaceae	Succulent
27	*Cenchrusciliaris*	Gramineae	Perennial grass
28	*Cenchrussetigerus*	Gramineae	Perennial grass
29	*Cissusrotundifolia*	Vitaceae	Subshrub
30	*Cleome droserifolia*	Capparaceae	Herb
31	*Combretum molle*	Capparaceae	Tree
32	*Commelinaalbescens*	Commelinaceae	Herb
33	*Commelinaforskaolii*	Commelinaceae	Herb
34	*Commiphoramyrrha*	Burseraceae	Tree
35	*Corbichoniadecumbens*	Molluginaceae	Herbes
36	*Corchorus trilocularis*	Tiliaceae	Shrub
37	*Crossandrawissmannii*	Acanthaceae	Subshrub
38	*Dobera glabra*	Salvadoraceae	Tree
39	*Duvaliavelutina*	Apocynaceae	succulent
40	*Ecboliumviride*	Acanthaceae	Tree
41	*Ehretiaobtusifolia*	Boraginaceae	Shrub
42	*Enteropogonmacrostachyus*	Gramineae	Grass
43	*Euphorbia serpens*	Euphorbiaceae	shrub
44	*Evolvulusalsinoides*	Convolvulaceae	Herb
45	*Ficuscordata*	Moraceae	Tree
46	*Ficussycomorus*	Moraceae	Tree
47	*Ficusvasta*	Moraceae	Tree

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No	Species	Family	life form
48	*Grewiatenax*	Tiliaceae	Shrub
49	*Grewiatrichocarpa*	Tiliaceae	Shrub
50	*Grewiavelutina*	Tiliaceae	Shrub
51	*Grewiavillosa*	Tiliaceae	Shrub
52	*Heliotropiumlongiflorum*	Boraginaceae	Subshrub
53	*Hibiscus deflersii*	Malvaceae	Tree
54	*Hibiscus micranthus*	Malvaceae	Tree
55	*Indigoferahochstetteri*	Leguminosae	Shrub
56	*Indigofera spinosa*	Leguminosae	Shrub
57	*Jatropha glauca*	Euphorbiaceae	Subshrub
58	*Jatropha pelargoniifolia*	Euphorbiaceae	Subshrub
59	*Justicia flava*	Acanthaceae	Subshrub
60	*Mimusopslaurifolia*	Sapotaceae	Tree
61	*Mollugonudicaulis*	Molluginaceae	Herb
62	*Ochnainermis*	Ochnaceae	Tree
63	*Opuntia ficusindica*	Cactaceae	Subshrub
64	*Pennisetumsetaceum*	Gramineae	Perennial grass
65	*phyllanthusrotundifolius*	Euphorbiaceae	Subshrub
66	*Portulaca grandiflora*	Portulacaceae	Herb
67	*Portulaca oleracea*	Portulacaceae	Herb
68	*Premnaresinosa*	Verbenaceae	Tree
69	*Psydraxschimperiana*	Rubiaceae	Shrub
70	*Pupalialappacea*	Amaranthaceae	Herb
71	*Ruelliapatula*	Acanthaceae	Herb
72	*Sansevieriaehrenbergii*	Asparagaceae	succulent
73	*Sansevieriaforskaliana*	Asparagaceae	succulent
74	*Sedderalatifolia*	Convolvulaceae	Subshrub
75	*Sedderavirgata*	Convolvulaceae	Subshrub
76	*Talinum portulacifolium*	Talinaceae	Herb
77	*Tribulus terrestris*	Zygophyllaceae	Herb
78	*Ziziphus spina-christi*	Rhamnaceae	Shrub

DISCUSSION

In this analytical study to know the floristic diversity and vegetation structure of Nice Mountain in Al Baha region, Kingdom of Saudi Arabia. Fifteen sites in Nice Mountain were selected to fully represent the mountain environment. Plants were collected from the fifteen sites, identified and preserved in the herbarium of the College of Science at King Saud University, Jeddah, Saudi Arabia. It was found that the number of species that were counted in the study area in Jabal Nice in Al-Baha reached about 78 plant species belonging to 48 genera, 33 species were traced, and the ratio of the number of species to the number of genera (genera index) was 1.13, which means that there is a richness in plant diversity. This is because the studied area is characterized by climatic conditions suitable for the growth of many types of plants, where the first scientists showed the relationship between the soil layer, the climate and the natural plants, and they found that there is a strong relationship between the nature of the climate, the quality of the soil and the plant diversity on the surface of the earth [4,5]

The climatic factors are considered one of the most important environmental factors in the composition, pattern and distribution of vegetation cover, where temperatures control the formation of plant communities by their effect on the types that make up these societies [6]. Plant societies also depend entirely on the amount and distribution of rainfall, and the wind has an important role in the pattern. The distribution of vegetation cover by its impact on the transfer of seeds and pollen grains as well as the site factors (topography) affect the pattern and distribution of vegetation cover, that the topography affects the temperature and humidity factors that affect plant communities [7].

The study showed the existence of three communities, which are both *Acacia asak-Anisotestrisulcus-Adenium obesum*, which are distinguished by Nice Mountain. These societies are accompanied by the growth of many trees, shrubs, perennial herbs and annual herbs. Nice Mountain vegetation cover is characterized by diversity and density, where the study recorded 78 plant species belonging to 48 genera and to 34 families. Acanthaceae is the largest of the plant families in terms of the abundance of plant species where 9 plant species were recorded in it, followed by the Euphorbiaceae, Gramineae and Leguminosae families, in which 6 plant species were recorded. This is in agreement with what was stated by Howladar [2] who studied the botanical survey of the Al Baha region, especially the flood water catchment areas in 20 sites where Poaceae and Brassicaceae were the largest families, and therophytes and chamaephytes were the most common and widespread.

The plant species in the study area were classified into five main growth forms, which are shrubs, trees, and sub-shrub plants, herbaceous plants, weeds, and succulent plants. Its percentage is 21%, then the tree by 20%, then the perennial grass by 6%, then the succulent plant by 4%, and this is somewhat close to what was stated Al-Robai et al. [8] whose study was about vegetation cover in Zahran Soil Valley, Al Baha region, Saudi Arabia, where most of the species were herbs (87%). The most prominent groups were Therophytes (32.7%) and Chamaephytes (30.45%). Asteraceae was the largest family (15.4%), followed by Poaceae (9.4%). These ratios are considered logical as the study area is a mountainous region with a tropical climate.

CONCLUSION

The study highlighted the high importance of the Nice Mountain in preserving biodiversity. The study area showed high floristic biodiversity. The study ares have total of 78 plant species belonging to 48 species and 34 species were identified. The main growth forms in the study area were 24% of shrub and then subshrub and Herb, 21% tree then 20% tree, then perennial grass 6% and Succulent plant 4%. These ratios are considered logical since the study area is a mountain region with a tropical climate. Acanthaceae was the largest number of species (11%), followed by Euphorbiaceae (7%) and 6 plant species. The number of species is about 113, which means that there is richness in the plant diversity of the species. This is because the studied area has climatic conditions suitable for the growth of many species of plants.

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