Vol 4 Issue 1 Oct 2014

ISSN No : 2249-894X

Monthly Multidisciplinary Research Journal

Review Of Research Journal

Welcome to Review Of Research

RNI MAHMUL/2011/38595 **ISSN No.2249-894X**

Review Of Research Journal is a multidisciplinary research journal, published monthly in English, Hindi & Marathi Language. All research papers submitted to the journal will be double - blind peer reviewed referred by members of the editorial Board readers will include investigator in universities, research institutes government and industry with research interest in the general subjects.

Advisory Board

Address:-Ashok Yakkaldevi 258/34, Raviwar Peth, Solapur - 413 005 Maharashtra, India
Cell : 9595 359 435, Ph No: 02172372010 Email: ayisrj@yahoo.in Website: www.ror.isrj.org

Review Of Research
ISSN:-2249-894X
Impact Factor : 2.1002 (UIF)
Vol. 4 | Issue. 1 | Oct. 2014
Available online at www.ror.isrj.org

FLORISTIC COMPOSITION AND LIFE FORMS FOR WILD PLANTS ASSOCIATED *COMMIPHORA GILEADENSIS* IN WADI STARA, Al-HARAZAT AND OSFAN AREAS IN JEDDAH PROVINCE, KSA

[1]Nadiah B. Al Sulami , [2]Abdul Moneam A. Al-Toukhyand and [1&3]Hanaa K. Galal

[1]Department of Biological Sciences, Girls Faculty of Science, King Abdulaziz University, Jeddah, Saudi Arabia.
[2]Department of Biological Sciences, Faculty of Science, King Abdulaziz University, Jeddah, Saudi Arabia.
[3]Botany Department, Faculty of Science, Assiut University, Egypt.

Abstract:-

Study space lies in western region of Kingdom of Saudi Arabia between the latitudes of 21º 35- North and longitudes of 39º 48- East. 3 locations, WadiStara, AlHarazat and Osfan in several highest on top of water level were chosen to review floristic composition and organic structure for wild plants associated Commiphoragileadensis with recognizing plant communities, life forms spectra, abundance and economic uses.Total variety of recorded species associated Commiphoragileadensis in study space was seventeen belongs to thirteen families. 9 species representing perennial and eight species were annual with ratios fifty two.9 and 47.1% severally. Poacea and Asteracea have the highest contributions (23.07%), followed by acanthus family, amaranth family,Burseraceae, pink family, Fabaceae, Liliaceae, Rhamnaceae, Solanaceae, Polygonaceae,Urtiaceae and bean-caper family with (7.69%) for every. The therophytes were the best ratios associated Commiphoragileadensis (47.5%),followed by chamaephytes and phanerophytes that ratios thirty five.29 attempt to seventeen.46, %respectively. The economic uses showed that grazing the best one (88.2%),medical. Fuel, different uses and human food with seventy.5, 47, 47 and 35.3% for every respectively

Keywords: Floristic composition, life forms, wild plants, *Commiphoragileadesis.*

INTRODUCTION

Saudi Arabia, a part of the Arabian Peninsula, covers more than 2 million sqkms and comprises several distinct physiographical regions, such as mountains, Valleys (Wadis), sandy and rocky deserts, salt pans (Sabkhahs) and lava areas (Harrats), etc. (AlSherif *et al*., 2013). Saudi Arabia's biodiversity is under threat from multiple stresses. Climate change is one of the several pressures. Although climate changes will have consequences all over Saudi Arabia, not all regions will be affected equally, nor all regions equally vulnerable to those impacts. Saudi Arabia, being located in the arid part of the world is expected to experience faster warming due to climate change than countries located in the tropical or temperate regions. However, significant variation can be anticipated due to the large size of the country, its diverse landscapes and also due to its Red Sea coast on the western side and the Arabian Gulf on the eastern side. The flora of Saudi Arabia has about 2281

species in 853 genera (Thomas, 2011).

In Jeddah province, west of KSA, Al-Harazat, Osfan and WadiStara areas have a large importance diversity of the group of wild plants. Species among these wild plants sukuf or *Commiphoragileadensis* (*C. gileadensis*) which has a history dating back to Testament times. *C. gileadensis* is native to Eritrea, Ethiopia, Kenya Sudan, Egypt, and Arabia also Its size varies depending on environment, ranging in form from a small shrub to a small tree of several meters tall; it grows in various places in Saudi Arabia Mountains (Eslamieh, 2011 and Eitanet al., 2012).

The *Commiphoragileadensis* ecosystem has adapted and it is considered to be the "weather predictor" of the desert and while this phenomenon is shared by most *Commiphorait* is more so with this species. *C. gileadensisgoes* through a complete cycle of procreation within the short monsoon period: it leafs out, flowers, gets pollinated, sets seeds and disburses those ripened seeds all within the few months of the monsoon season. As the monsoon rolls out, the trees lose their leaves, remaining leafless for most of the year until the next monsoon season. Occasionally when there is a rise of heat, humidity and low barometric pressure, the plants will leaf out off season but it is unknown if they produce flowers (Eslamieh, 2011).

The aim of the present study is to investigate floristic composition for wild plants associated *C. gileadensis* in three locations (Al-Harazat, Osfan and WadiStara) in Jeddah province at KSA.

MATERIAL AND METHOD

Fifteen stands were selected from three locations: Al-Harazat, Osfan and WadiStara to represent the environmental variations that associated with distribution of *C. gileadensis* (Fig. 1). The stand size 20 × 20 m. In each stand, list of species, common species were recorded to Braun- Blanquet scale (Muller- Dombosis and Ellenberg, 1974); the abundance and life form were calculated according to Braun- Blanquet cover abundance scale as follows:

Scale 5, 4, 3, 2, 1,+ and r cover abundance >75%, 50-70%, 25-50%, 5-25%, 1-5%, few and solitary respectively, where life forms of the species were identified following the Raunkiar scheme as follows (Raunkiar 1937), Code Ph, Ch, G, Th and P means life form Phanerophytes, Chamaephytes, Geophytes-Helophytes, Therophytes, Therophytes and Parasites respectively. The potential and actual economic uses of wild plants were assessed on three bases; field observations, information collected from local inhabitants and literature review. (e.g. Allred, 1968; Truaxet al., 1972; Täckholm, 1974; FAO, 1979; Haslam, 1978; El-Kady, 1980; Zohary, 1987; Feinbrun-Dothan, 1978, 1986; Danin, 1983; Boulos, 1983, 1989; Sculthorpe, 1985; Mossaet al., 1987; Mandaville, 1990; Ayyad, 1992; Belal and Springuel, 1996 and Shaltout, 1997). The economic uses were classified into 5 major categories: grazing, fuel, medicinal uses, human food, and other uses (e.g. ornamental uses, sand binder, soap manufacture and oil and dye extraction…etc.). As almost all the plants are ecologically important (e.g. keeping stability and biodiversity of the ecosystems, sharing in soil stabilization and symbiosis, etc.), this criterion was not taken into consideration in the evaluation of the economic importance of the plants.

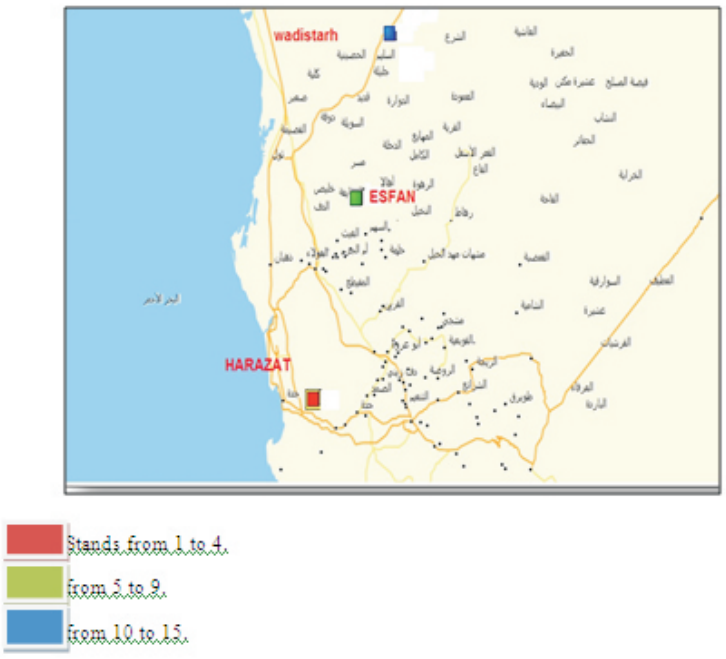

Fig. 1: Distribution of 15 stands along study area by using their coordinates (GPS).

RESULTS

Floristic Composition:

The recorded species in the study area, their families, vernacular names, life forms, habits, abundance and their uses are listed in Table (1). The total number of recorded species associated with *Commiphoragileadensis* in the study area is 17 species belong to 13 families. Fig. 2 showed that more than 52% of the recoded species are perennials (9 species) and 47 % are annuals (8 species). The family PoaceaeandAsteraceaehave the highestcontributions (23.07%),followed by other families in equal ratios (7.69%) for each. Six species were recorded in more than 70% of the total stands (Blepharisciliaris, *Commiphoragileadensis, Acaciaseyal, Echinopssp., Hordeums-pontaneum* and *Forsskaoleatenacissima*).The rest of species (11 species) were recorded in less than 58.8% of the total stand.

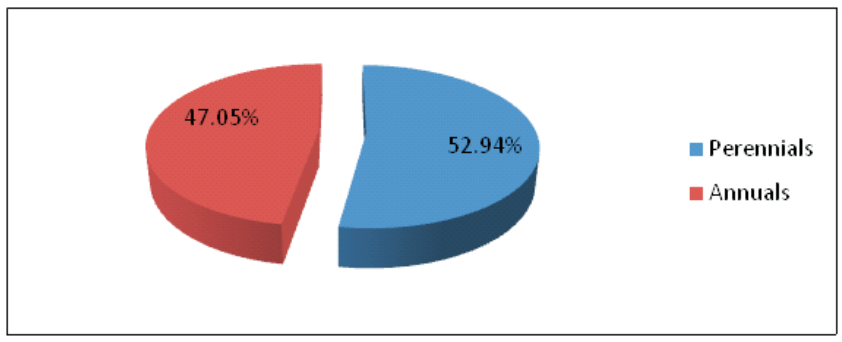

Fig. 2: Percentage of habits of the recorded species associated with *Commiphoragileadensisat* Al-Harazat, Osfan and WadiStara.

Table 1: Floristic composition of the recorded species associated with *Commiphoragileadensis* at Al-Hharazat, Osfan and WadiStara at Makkah Al-Mukarramah Region.

Species	Families	LF.	Habit	Abundance	Uses				
					M	G	E	F	O
Blepharisciliaris	*Acanthaceae*	Ch	Per	common	+	+	-	-	-
Aervajavanica	*Amaranthaceae*	Ch	Per	common	+	+	-	+	-
*Echinops*sp	*Asteraceae*	Ch	Per	common	-	+	-	+	-
Centaureasinaica		Th	Ann	common	+	+	-	-	+
Onopordonheteracanthum		Th	Ann	common	+	+	-	-	+
Commiphoragileadensis	*Burseraceae*	Ph	per	common	+	+	+	+	+
Gymnocarposdecandrum	*Caryophyllaceae*	Ch	Ann	common	-	+	-	+	-
Acacia seyal	*Fabaceae*	Ph	Per	common	+	+	+	+	-
Asphodelustenuifolius	*Liliaceae*	Th	Ann	common	+	-	+	+	-
Cenchrusbiflorus	*Poaceae*	Th	Ann	common	-	+	-	-	-
Hordeumspontaneum		Th	Ann	common	-	+	-	-	-
Stipagrostis plumose		Th	Ann	common	-	+	-	-	+
Rhamnusoleoides	*Rhamnaceae*	Ph	per	rare	+		-	+	+
Rumexvesicarius	*Polygonaceae*	Th	Ann	common	+	+	+	-	+
Withaniasomnifera	*Solanaceae*	Ch	Per	common	+	+	+	+	+
Forsskaoleatenacissima	*Urticaceae*	Ch	Per	common	+	-	-	-	-
Zygophyllum simplex	*Zygophyllaceae*	Th	Ann	common	+	+	+	-	+

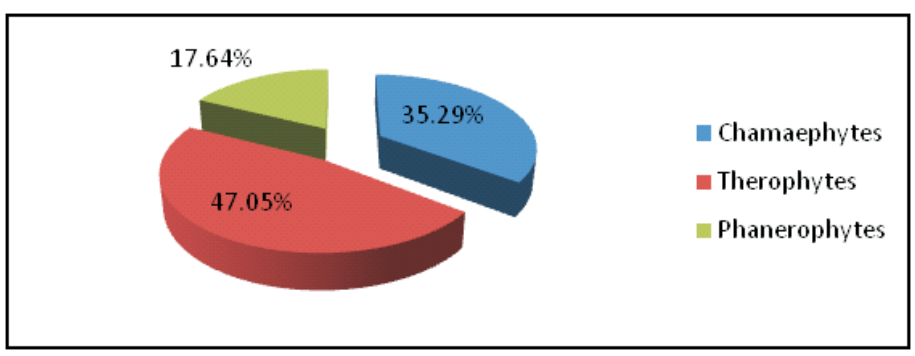

Fig. 3: Life form spectra of the recorded species associated with *Commiphoragileadensis* at Al-Harazat, Osfan and WadiStara.

ECONOMIC IMPORTANCE OF SPECIES:

Ten species have ≥ 3 (out of 5) economic aspects, of them two species have 5 economic aspects. These are:*Commiphoragileadensis, Withaniasomnifera*. Fifteen species (88.2% of total

recorded species) are grazing, 12 species (70.5% of total recorded species) are medicinal, 8 species (47% of total recorded species) are fuel, also 8 species (47% of total recorded species) used as other economic uses and 6 species (35.2% of total recorded species) are edible by man. The economic uses of the recorded species could be arranged descendingly as follows: grazing → medicinal → fuel = other uses → edible by man (Fig. 4).

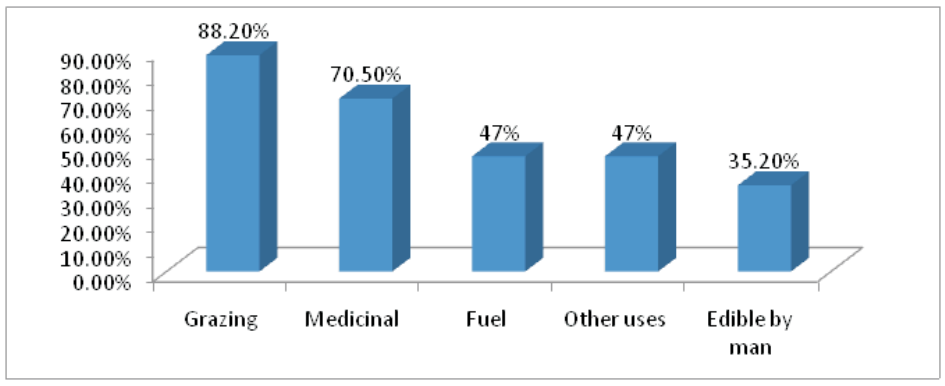

Fig. 4: Descending arrangement of the economic uses of the recorded species associated with *Commiphoragileadensis* at Al-Harazat, Osfan and WadiStara.

ABUNDANCE:

Data in Table (2) showed that *Commiphoragileadensis* was found at all stands (15 stands) which represented 1-5 % and few in most stands, also solitary in stand 10 where in stands 7, 8, and 9 in Osfan location the percentage 5 – 75 %. *Acacia seyal* found in all locations (15 stands) as common species where it was found in one stand, abundance ranged between less than 1 % and 50 % and solitary in two stands (10 and 11). Also, the *Blepharisciliaris* was found as common species where it was found in 14 stands. The number of individuals of this species represent 25–75 % present in the stands of Al-Harazat and Osfan and between 1–5 % in WadiStara location, followed by *HordiumSpontaneum* presence found in 12 stands, the abundance was from 5–50 % and Echinopssp. (presence in 12 stands) and the abundance was from 5–50 % in Al-Harazat and from 1–5 % in WadiStara location. *Asphodelustenuifolius* (presence in 6 stands) and *Stipagrostisphumosa* (presence in 5 stands) showed abundance between 5–50 % which was found in stands from 10–15 (WadiStara). Zygophyllum simplex was found only in stand 12, the abundance was 25–50 %. Abundance in *Centaureasinaica* (presence in 4 stands), *Cenchrusbiflorus* (presence in 6 stands) and *Farsskaoleatenacissima* (presence in 12 stands)ranged between 1–25 %. Also, we found that abundance of *Aervajavanica* (presence in 5 stands), *Gymnocarposdecandrum* (Presence in 6 stands), *Onopordonheteracanthum* (presence in 5 stands), *Rhamnusoleoides*(presence in 6 stands) and *Rumexvesicarius* (presence in 3 stands) ranged between less than 1-5 % and few in these species, sometimes were solitary. Abundance was from 1-25 % in *Withaniasomnifera* (presence in 10 stands). All studied species were common only *Rhamnusoleoides* was rare.

Table 2: Determination of the abundance of species according to Braun- Blanquet cover-abundance scale.

Family	Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Presence
Acanthaceae	*Blepharisciliaris*	3	3	3	3	3	3	0	4	4	1	1	1	1	1	1	14
Amaranthaceae	*Aervajavanica*	0	0	0	0	0	0	0	0	0	1	1	0	1	1	1	5
Asteraceae	*Echinops*sp.	2	2	2	2	3	3	0	0	0	1	1	1	1	1	1	12
	Centaureasinaica	0	0	0	0	0	0	0	0	0	0	0	1	1	1	2	4
	Onopordonheteracanthum	0	0	0	0	0	0	0	0	0	1	+	0	+	+	r	5
Burseraceae	*Commiphoragileadensis*	1	+	1	1	1	+	4	3	2	r	+	+	+	1	1	15
Caryophyllaceae	*Gymnocarposdecandrum*	0	0	0	0	0	0	0	0	0	+	+	+	1	1	1	6
Fabaceae	*Acacia seyal*	1	1	2	1	1	1	3	1	2	r	r	1	1	1	1	15
Liliaceae	*Asphodelustenuifolius*	0	0	0	0	0	0	0	0	0	2	2	2	3	3	3	6
Poaceae	*Cenchrusbiflorus*	0	0	0	0	0	0	0	0	0	2	1	1	2	2	2	6
	HordiumSpontaneum	2	3	2	2	2	2	0	0	0	2	2	2	2	2	2	12
	Stipagrostisplumosa	0	0	0	0	0	0	0	0	0	3	3	0	2	2	2	5
Rhamnaceae	*Rhamnusoleoides*	0	0	0	0	0	0	0	0	0	+	r	+	+	+	+	6
Polygonaceae	*Rumexvesicarius*	0	0	0	0	0	0	0	0	0	1	+	r	0	0	0	3
Solanaceae	*Withaniasomnifera*	1	1	2	1	1	0	0	0	0	1	1	0	1	1	1	10
Urticeceae	*Farsskaoleatenacissima*	2	2	2	2	1	1	0	0	0	1	1	2	2	2	2	12
Zygophyllaceae	*Zygophyllum simplex*	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	1

DISCUSSION

The recorded species in the present study (17 species) represent about 0.78% of the whole flora of Saudi Arabia and their families represent 8.72 %. From the biodiversity viewpoint. The present study can conclude that this area seems to be the lowest area of the Kingdom. One of the main characteristics of the vegetation cover of Saudi Arabia is its low floristic diversity. The number of plant species that recorded in the country is 2172 species, many of which are in the wetter areas of its south–western part. Which include Sarrawat Mountains these species belong to 840 genera and 149 families (Al-Nafie, 2004). The number of species increased to 2250 by adding subspecies, extinct and species that have not been identified yet (Collenette, 1999). Numbers of families, genera, and species are very low compared to Saudi Arabia's vast land area, which is probably, the result of the harsh environmental conditions that prevail in the Sahara-Arabian region which covers vast area of the country. The greatest plant diversity, approximately 74% of the total plant species of Saudi Arabia, is found in the mountainous western area which includes the study area due mainly to a greater rainfall (Al- Nafie, 2008).

It is evident that the composites (family *Asteraceae*) have the highest contribution, followed by graminoides (family *Poaceae*). These results similar to the whole flora of Saudi Arabia where the highest families in the Whole flora are Poaceae (262 species =12.1%), Asteraceae (233 species = 10.7%), and Fabaceaee (210 species = 9.7%) which represented by 705 species or 32.5% of the total plant species in the Kingdom (Mosallam, 2007). Also, similar trend to the flora of other similar studied region in the Kingdom such as Al-Sherifet al., 2013 whom found that the major plant families present in the area in question were Poaceae (42 species) followed by papilonaceae (20 species), Euphorbiacea and Asteraceae (18 and 15 species, respectively), while 18 families were represented by only one species.

Many investigators, Al–Turki and Al- Olayan (2003), Al–Turki (2004), Abdel Fattah and Ali (2005), Mosallam (2007), Al–Zahrani (2003) and Al Nafie (2004 and 2008) were studied the vegetation–environment relations, vegetation ecosystem and flora of some regions in K.S.A, they found that the most plant species of Saudi Arabia belong to a limited number of plant families, for

example, 1586 species belong to 23 families or 15.4% of the total families, and these plant species represent 73% of the total species in the Kingdom. Also 46 families or 30% of the families in the country such as *Aloaceae, Celastraceae, Commelinaceae* and *Burseraceaeare* found only in Sarrawat Mountains.

The life form spectrum indicated that therophytes were the most represented followed by chamaephytes and phanerophytes. These results agree with the studies in the same region (Mosallam, 2007) which indicated that therophytes had the highest contribution. This may be due to the sampling in the present study was during season in which many annuals are dead. Moreover, he indicated that the loss of chamaephytes was due to overgrazing in that area. On the other hand, the results of the present study disagree with that of Heneidy and Bidak (2001) on Bisha, Asir region in southwestern of Saudi Arabia and (El-Demerdash*et al*., 1994) in the southern region. They concluded that the dominance of chamaephytes and therophytes over other life forms in that region would seem to be the hot dry climate, topography variations and biotic influence. Also, Chamaephyte life form is able to withstand water logging, high salinity levels and a wide range of temperature variability (Beeftink, 1977 andZahran, 1982).

The present study indicated that *Commiphoragileadensis* did not grow at low altitudes, they only grow at altitude above 111 m above sea level. This may due to animal browsing, human interference, poor seed–setting, change in land use patterns and prevalence of unfavorable climatic conditions (Negash, 2002). It is necessary to consider all possible causes of vegetation change at high altitudes. This is of particular significance in the case of endemic plants confined to high summits. At the species level, the changes observed must have not only affected *C. gileadensis*, but also modified the distribution of associated taxa that are less easily detectable in aerial images (Sanz-Elorza*et al*., 2003). It was interesting to define the high associated species with *C. gileadensis*. These species are: *Blepharisciliaris, Aervajavanica, Echinopssp, Gymnocarposdecandrum, Centaurea-sinaica, Onopordonheteracanthum, Acacia seyal, Asphodelustenuifolius, Cenchrusbiflorus, Hordeumspontaneum, Stipagrostisphumosa, Rhamnusoleoides, Rumexvesicariu, Withaniasomnifera, Forsskaoleatenacissima* and *Zygophyllum simples.*

Commiphoragileadensis has 5 economic uses: grazing, medicinal, fuel, other use and edible by man. Also, it was found that fifteen species associated (88.2% of total recorded species) are grazing, 12 species (70.5% of total recorded species) are medicinal, these results agreement with resource of the Ministry of Agriculture (2000) which stated that overgrazing is a major impediment to the regeneration of juniper woodlands. Also, according to the Joint Study Project (JICA and NCWCD, 2002), which found that juniper woodlands are being destroyed from trampling stemming from overgrazing. For medicinal uses Al-Harthy (1997) stated that we can extract “Miswak” from its flexible branches. Eitan*et al*.(2012) showed that *C. gileadensisstems* contain an apoptosis inducer; also balsam was also used as a diuretic drug, as a cure for respiratory diseases and coughing, and as an anti-toxin acting as a snake bite antidote (Gunther, 1959 andLargus, 1887).

REFERENCES

1.Abdel-Fattah, R.T. and Ali, A.A. 2005. Vegetation- Environment relation in Taif, Saudi Arabia, Int. J. Botany, 4: 1-6.
2.Al-Harthy, A.M. 1997. Wild plant of Saudi Arabia, Riyadh: Jeraisy Institution for Distribution and Advertising.
3.Allred, B.W. 1968. Range Management Training Handbook for Saudi Arabia. FAO. Rome.
4.Al-Nafie, A. 2004. Plant Geography of Saudi Arabia, (In Arabic). 659p. King Fahd National Library. Riyadh. Saudia Arabia.
5.Al-Nafie, A. 2008. Phytogeography of Saudi Arabia. Saud. J. Biol. Scien., 15(1): 159-176.
6.Al-Sherif, E. A.; Ayesh, A. M. and Rawi, S. M. 2013. Floristic composition, life form and chorology of plant life at Khulais region, western Saudi Arabia. Pak. J. Bot., 45(1): 29-38.
7.Al-Turki, T.A. 2004. A prelude to the study of the flora of JabalFayfa in Saudi Arabia. Kuwait J. Sci. Eng., 31(2): 71-145.
8.Al-Turki, T.A. and Al-Olayan, H.A. 2003. Contribution to the flora of Saudi Arabia; Hail region. Saudi J. Biol. Sci., 10(2): 190-222.

9.Al-Zahrani, H.S. 2003. Study on the vegetation and ecosystem of BaniSaad Mountains, South of Al-Taif City, Umm Al- Qura. Univ. J. Sci. Med. Eng., 15: 1-13.
10.Ayyad, M.A. (ed.). 1992.Rangland study of El-Qasr Rural development project. Final Report. (GTZ) GMBH., pp. 130.
11.Beeftink, W.G. 1977. The coastal salt marshes of western and northern Europe. In: Chapman V.J. (ed.), Ecosystems of the World 1. Elsevier, Amsterdam, pp. 109–155.
12.Belal, A.E. and Springuel, I. 1996. Economic value of plant diversity in arid environment. Nature & Environment 32: 33-39.
13.Boulos, L. 1983. Medicinal Plants of North Africa. References publication, Inc. Algonac, Michigan. p. 286.
14.Boulos, L. 1989. Geothermal Development of HammamFaraum Hot Spring Sinai-Egypt, International conference on applications of solar and renewable energy. 12p.
15.Collenette, S. 1999. Wild Flowers of Saudi Arabia. NCWCD (National commission for Wildlife Conservation and Development, Publication), Saudi Arabia. 799 pp.
16.Danin, A. 1983. Desert Vegetation of Israel and Sinai (Jerusalem: Cana Publishing House). deFelice, , VenenosSagrados, P.1936 -1975.
17.Eitan, A.; Rivka, O.; Nativ, D.; Elaine, S.; Tatiana, R. and Shimon, R. 2012. β-Caryophyllene, a Compound Isolated from the Biblical Balm of Gilead (Commiphoragileadensis), Is a Selective Apoptosis Inducer for Tumor Cell Lines. Evidence-Based Complementary and Alternative Medicine Volume 2012, Article ID 872394, 8 pages.
18.El-Demerdash, M. A.; Hegazy, A. K. and Zialy, A. M. 1994. Distribution of the plant communities in Tihamah coastal plains of Gazan region, Saudi Arabia. Vegetatio, 112: 141-151.
19.El-Kady, H. F. 1980. Effect of Grazing Pressures and Certain Ecological Parameters on Some Fodder Plants of the Mediterranean Coast of Egypt. M.Sc. Thesis, Faculty of Science, Tanta University, Tanta, 97p.
20.Eslamieh, J. 2011. Commiphoragileadensis, Cactus and Succulent Journal, 83(5): 206-210.
21.FAO 1979. China: Azolla propagation and small-scale biogas technology. FAO Soils Bull., Report No. 41. pp. 81.
22.Feinbrun - Dothan, N.A. 1978. Flora Palaestina (Part III). Jerusalem. Isr. Acad. Sci. Human.
23.Feinbrun - Dothan, N.A. 1986. Flora Palaestina (part IV). Jerusalem. Isr. Acad. Sci. Human. 463 pp.
24.Gunther, R.T. 1959.The Greek Herbal ofDioscorides. Hafner Publishing, New York (Translator).
25.Haslam, S.M. 1978. River Plants: The Macrophytic Vegetation of Watercoures. Cambirdge University Press: London, UK.
26.Heneidy, S.Z. and Bidak, L.M. 2001. Multipurpose Plant species in Bisha, Asir region, Southwestern Saudi Arabia. J. King Soud. Univ., 13:11-26.
27.JICA and NCWCD. 2002. The Joint Study Project on the Conservation of Juniper Woodlands in Saudi Arabia. Draft Final Report to NCWCD, Riyadh.
28.Largus, S. 1887. Conpositiones (Helmreich G, ed). Teubner, Leipzig.
29.Mandaville, J.P. 1990. Flora of Eastern Saudi Arabia. Kegan Paul International, London, 482 p.
30.Ministry of Agriculture 2000. Department of economic and statistics- Agricultural statistical year book. 10. Riyadh Saudia Arabia.
31.Mosallm, H.A. 2007. Comparative study on the vegetation of protected and non-protected areas, Sudera, Taif, Saudi Arabia. Intenational Journal of Agriculture and Biology, 2: 202−214.
32.Mossa, J.S.; Al-Yahya, M.A. and Al-Meshal, I.A. 1987. Medicinal Plants of Saudi Arabia (Vol. 1). Riyadh, King Saud University liberaries. 340 Pp.
33.Mueller-Dombois, D. and Ellenberg, H. 1974. Aims and Methods & Vegetation Ecology, Wiley and Sons. New York. 547p.
34.Negash, L. 2002. Successful vegetation propagation techniques for the threatended African pencil cedar (Juniperusprocera Hoechst. Ex Endl). Forest Ecology ana Management. 161: 53-64.
35.Raunkiaer, C. 1937. Plant Life Forms. Clarendon, Oxford.
36.Sanz-Elorza, M.; Dana, E. D.; Gonzalez, A. and Sobrino, E. 2003. Changes in the high-mountain vegetation of the central Iberian Peninsula and a probable sign of global warming. Ann. Bot., 92:

273−280.
37.Sculthorpe, C. D. 1985. The Biology of Aquatic Vascular Plants. Edward Arnold, London.
38.Shaltout, K.H. 1997. Current situation of flora and vegetation of south- west Egypt. In: Integrated Land Development of Southern Egypt: Available Resources and Alternative Options. Abdel-Ghaffar, A.S., Marei, S.M. and Gaber, H.M. (eds.). ICDR, CDRI, Canada, 199- 241.
39.Täckholm, V. 1974. Student's Flora of Egypt. Cairo University Press.Cairo, Egypt, 888 pp.
40.Thomas, A. prelude to the plant diversity of Saudia Arabia 2011. http://plantdiversityofsaudiarabia.info/Biodiversity-Saudi- Arabia/Vegetation/Vegetation.htm.
41.Truax, R.E.; Culley, D.D.; Griffith, M.; Johnson, W.A. and Wood, J.P. 1972. Duckweed for chick feed. Louisiana Agri., 16(1): 8-9.
42.Zahran, M.A. 1982. Ecology of the halophytic vegetation of Egypt. In: Sen D.N. and Rajpurohit K.S. (eds), Tasks for Vegetation Science. Dr. W. Junk Publisher, The Hague, pp. 3−20.
43.Zohary, M. 1987. Flora Palaestina (Part II). Jerusalem. Isr. Acad. Sci. Human.