Geographical distribution and Life form of plants in Sassu Valley, Misurata area, Libya

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Abstract:
The present study aims to describe the floristic composition, biological spectrum and ecological features in Valley Sassu as one of the biggest Valleys in Misurata area. A total of 58 plant species, 31 perennials and 27 annuals, belonging to 51 genera from 23 different families were recorded. Therophytes are the predominant life form (36%) > chamaephytes (24%) > hemicryptophytes (22%) > phanerophytes (14%) and Geophytes, Parasite (2%). chorological analysis revealed that monoregional region representing 43% , biregional 34% and 3% of the recorded species are Pluri-regional taxa of wide geographical range.

Keywords:Vegetation, Floristic composition, Chorotypes, Life forms, Flora, Valley Sassu, Misurata.

I- Introduction.

The Mediterranean Basin is the only climate region that includes parts of three continents (Europe, Africa and Asia), giving it a very rich flora particularly where continents meet. It Located at the cross roads between them, the Mediterranean Basin has served as a melting pot and meeting ground for species of varyingorigins. Many elements in the course of history have colonized the basin (Blondel and Aronson, 1999).The Mediterranean climate is classified by Emberger (1955) as a non-tropical with regular annual rainfall with summer as the dry season. The flora of the Mediterranean basin is one of the richest in the Old World. It includes more than 25,000 species of flowering plants (Quezel, 1985), reaching about 30,000 species and subspecies (Greuter, 1991), as well as some 160 or more species of ferns.

Libya is almost entirely a Saharan country, and only along the coastal strip does a variation of the Mediterranean type of climate occur. Libya (total area =2,105,000 km2) is characterized by a remarkably smooth coastline. The landscape of the Southern Mediterranean coastal land of Libya is dissected by a

drainage system (Valley) originating from a southern limestone plateau lying parallel to the Mediterranean Sea. These Valley drain northwards into the Mediterranean Sea. An ecological account of one of these Valley (Valley Sassu) is given below. Valleys are usually dry but are river beds which come to life following a period of rain. In the extreme desert zones annual rainfall is so low that rare downpours of rain occur less than annually but when they do plant life develops. This plant life however has a short lifetime as after the rainfall event the water drains and evaporates quickly. The possibility is that some at least of the larger Valley developed during periods when rainfall was higher. During present day conditions the floral ecology of the Valley will be influenced by the frequency and general level of annual precipitation, so that in this regard the facility of the environment for vegetation is determined by the climatic regime in which the Valley is situated.

Though the natural flora of the coastal and inland deserts of Libya has been studied by several authors, Maire (1952–1977), Keith (1965), Boulos (1971, 1972, 1975,1977, 1979a, b), Greuter et al. (1984–1986, 1989), Ali and Jafri (1976-1986), Pratov and El-Gadi (1980), and Qiser and El-Gadi (1984); yet few published reports have dealt with its vegetation ecology: Edrawi and El-Naggar (1995), Ebrahim (1999), El-Kady (2000), Al-Sodany et al. (2003), El-Morsy (2008), Aljarroushi and Almedham (2013). The present investigation aims at studying the plant life and the floristic composition in Valley Sassu that is seemed to be vegetationally and floristically on of the richest Valleys in the Misurata area.

II- Matrial and Methods.

The study area is located in South of Misurata city; between longitude (32°08`&32°07`E) and latitude (14° 47`&15° 00`N), and extends for about 35km long (Fig. 1).

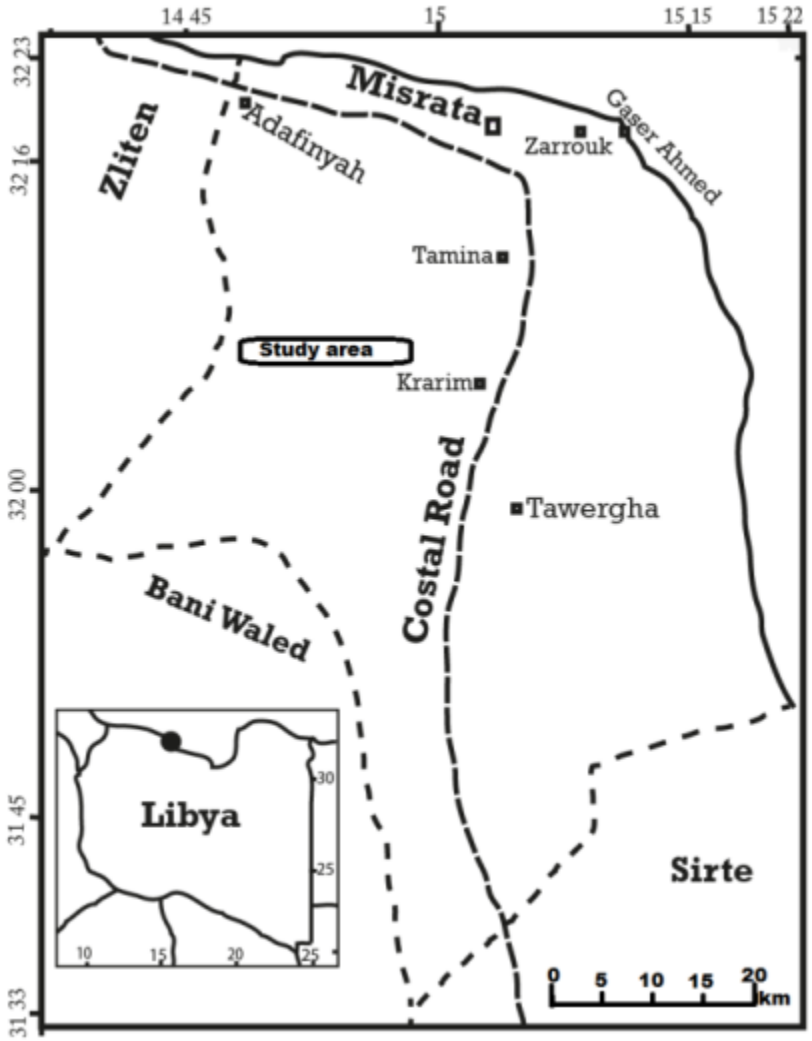

Fig.1: Map of study area 3

The nine stands was selected randomly were surveyed and vegetation sampling collected during the period 2014- 2015 (Fig. 2).

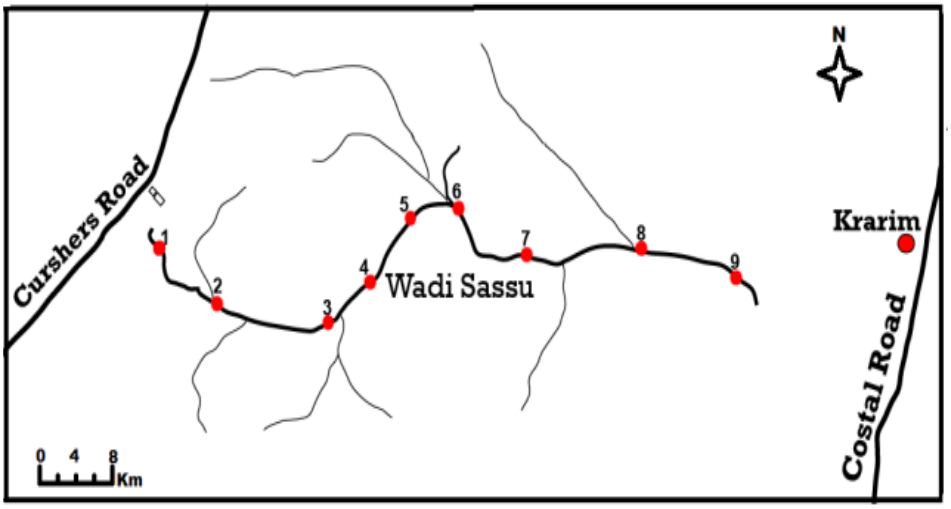

Fig.2: Location map of Wadi Sassu

The identification and species arrangement is according to Flora of Libya by El-Gadi(1972-1986). Plant specimens were deposited in the Misurata University Herbarium, Botany Department, Faculty of Science. Species life-forms were determined according to the location of regenerative buds and the parts shed during the unfavorable season (Raunkier, 1934). A chronological analysis of the floristic categories of species was made to assign the recorded species to world geographical groups, according to Zohary (1973), (Fig.3).

Fig.3: Location of studied stands inside Wadi Sassu

Climate:

Climatic changes associated with land degradation, vegetation overuse, desertification and global food crises are actually the major issues worldwide, the problem is even worse in arid and semi-arid regions (Anonymous, 1998a). Their natural vegetation is under great threat due to the high population increase and the systems of land use. The apparent effects of these threats include loss of biodiversity, rapid deterioration in land cover (vegetation) and depletion of water availability through destruction of catchments and aquifers. According to Meigs (1953) hot deserts, both coastal and inland are world dry regions that receive little precipitation and could be classified under three categories as follow:

1. Hyper-arid (extremely dry) lands having at least 12 consecutive months without rainfall. However, as there are virtually no places where rainfall is entirely unknown and according to Allan and Warren (1993), hyper-arid areas receiveless than 25 mm annual rainfall.

2. Arid (dry) lands having a mean annual rainfall less than 250 mm.

3. Semiarid lands having a mean annual rainfall between 250 and 500 mm and aregenerally referred to as grasslands or steppes rather than deserts. Meigs (1953) estimated that the total areas of the dry lands (deserts) to cover about one third of the Earth's land surface.

Climatically, the study area is classified as an arid region. The average of monthly meteorological records for Misurata city (Table 1) indicate that the monthly mean temperature varies between 13.2°C in January and 28.8°C in August.

Table 1: Meteorological data of Misurata area (2015)

Months	Temperature (C°)	Relative humidity (%)	Rainfall (mm)
Jan.	**13.2**	**66**	**19.7**
Feb.	**13.2**	**61**	**11.6**
Mar.	**15.1**	**70**	**19.7**
Apr.	**18.1**	**63**	**0**
May.	**22.2**	**60**	**0.2**
Jun.	**24**	**67**	**1.2**
Jul.	**27.3**	**68**	**0**
Aug.	**28.8**	**64**	**14.3**
Sap.	**26.9**	**63**	**18**

Oct.	**24.8**	**68**	**30.3**
Nov.	**18.7**	**71**	**28.9**
Dec.	**15**	**76**	**58.2**
Yearly			**202.1**

The relative humidity is higher in winter than in summer; it attains a minimum average of 60% in May, and a maximum average of 76% in December. Most of the rainfalls during the period between October and Mar., with an annual mean of 202.1 mm.

III- Result and discussion.

Floristic analysis.

The floristic composition of the species showed that 58 plant species were recorded in Valley Sassu. They include perennials 31 and 27 annuals, belonging to 51 genera from 23 different families (Tab. 2). The largest family was Asteraceae, which included 8 genera and 9 species. Four of them were perennials and the others were annuals (Tab. 2). The second family was Fabaceae with five genera and six species. Three of them were annuals and three were perennials. Brassicaceae, Boraginaceae and Chenopodiaceae had the same number of the recorded species (four for each). Family Brassicaceae, Boraginacea and Chenopodiaceae included two perennial and two annuals for each. Family Euphorbiaceae included one perennial and two annuals. Two genera and four species were recorded for family Fabaceae. Three of them were annuals and three was perennial.

Three species were recorded as members of the Solanaceae family. For each of the Aizoaceae, Geraniaceae, Lamiaceae, Papaveraceae, Polygonaceae, families two (for each) species were recorded. One genera belonged to families Aloaceae, Ascloepiadaceae, Malvaceae, Mimiosaceae, Nuradaceae, Orobanchaceae, Resedaceae, Rhamnaceae, Scrophulariaceae, Tamaricaceae and Urticeae were represented by one species, for each (Tab. 2).

Table 2: List of plant species recorded in the study area with their families, life forms and floristic category

Species	Dura.	Chor.	L.F
Aizoaceae			
Aizoon hispanicum L.	Ann	M+SA+IT	Th
Mesembryanthemum nodiflorum L.	Ann	M+ES+SA	Th
Aloaceae			
Aloe vera (L.) Burm.	Per	M	Ch
Asclepiadaceae			
Pergularia tomentosa L.	Per	SA	Ch
Asteraceae			
Anacyclus monanthos (L.) Thell.	Ann	M	Th
Anthemis glareosa Durand&Barratte.	Ann	SA+IT	H
Artemisia herba-alba Asso	Per	SA	Ch
Centaurea dimorpha Viv.	Per	M+IT	H
Chrysanthemum carinatum L.	Ann	M+SA	H
Echinops spinosus L.	Per	M	H
Launaea nudicaulis (L.) Hooker fil	Ann	SA	H
Pulicaria arabica (L.) Cass.	Ann	M+IT	Ph
P. undulata (L.) C. A. Mey.	Per	SA+SZ	Ch
Boraginaceae			
Echium angustifolium Miller	Ann	M	H
Heliotropium bacciferum Forsk	Per	SA	Ch
H. europaem L.	Per	SA	Ch
Trichodesma africanum (L.) R. Br.	Ann	SA+SZ	Ch
Brassicaceae			
Brassica tournefortii Gouan	Ann	M+SA+IT	Th
Diplotaxis harra (Forssk.) Boiss.	Per	SA	H
Diplotaxis muralis (L.) DC.	Ann		H

Zilla spinosa (L.) Prantl	Per	SA	Ch
Chenopodiaceae			
Atriplex halimus L.	Per	M+SA	Ph
Chenopodium murale L.	Ann	Cosm	Th
Salsola kali+C2 L.	Ann	pluriregiona	Th
Suaeda pruinosa Lange.	Per	SA	Ch
Cucurbitaceae			
Citrullus colocynthis (L.) Schrad.	Per	M+SA+IT	H
Euphorbiaceae			
Euphorbia retuse Forsk.	Ann	SA	Th
Euphorbia helioscopia L.	Ann	M+ES	Th
Euphorbia terracina L.	Per	M	Ch
Fabaceae			
Astragalus corrugatus Bert.	Ann	SA	Th
A. sinaicus Boiss.	Per	SA+IT	Ch
Medicago marina L.	Per	M	Ch
Retama raetam (Forssk.) Webb & Berthel.	Per	SA+IT	Ph
Trigonella stellata Forsk.	Ann	IT+SS	Th
Vicia monatha Retz.	Ann	IT	Th
Geraniaceae			
Erodium hirtum(Forsk) Willd.	Per	SA+IT	H
E. glaucophyllum (L.) L'Herit	Per	SA+IT	Th
Lamiaceae			
Marrubium vulgare L.	Per	M+IT	H
Teucrium polium L.	Per	SA	Ch
Malvaceae			
Malva parviflora L.	Ann	M+ES+IT	Th
Mimosaceae			
Acacia tortilis (Forssk.) Hayne	Per	SA+SZ	Ph
Nuradaceae			

Neurada procumbens L.	Ann	M+SA+IT	Th
Orobanchaceae			
Orobanche cernua Loefl.	Per	M+SA+IT	P
Papaveraceae			
Papaverr hybridum L.	Ann	SA	Th
Papaver rhoeas L.	Ann	SA	Th
Poaceae			
Bromus catharticus Vahl	Ann	M+ES+IT	Th
Panicum turgidum Forssk.	Per	M+SA	Ge
Stipagrostis plumosa (L.) Munro ex T. Anderson	Per	M+SA+IT	H
Polygonaceae			
Emex spinosa (L.) Campd.C55	Ann	pluriregiona	Th
Rumex vesicarius L.	Ann	M+SA+IT	Th
Resedaceae			
Reseda pruinosa Delile	Ann	SA	Th
Rhamnaceae			
Ziziphus lotus (L.) Lam.	Per	M+SA	Ph
Scrophulariaceae			
Kickxia aegyptica (L.) Dum. Cours.	Per	SA+SZ	Ch
Solanaceae			
Hyoscyamus albus L.	Per	SA	H
Lycium europaeum L.	Per	SA	Ph
Nicotiana glauca R.C.Graham	Per	M	Ph
Tamaricaceae			
Tamarx aphlla (L.) Krast.	Per	SU	Ph
Urticaceae			
Urtca urens L.	Ann	M+ ES	Th

The life forms are Ch: Chamaephytes, Ge: Geophytes, H: Hemicryptophytes, P: Parasite, Ph: Phanerophytes and. Th: Therophytes and the floristic category are: ,Cosmopolitan, Monoregiona and Pluriregional.

Life form:

Fig.4 shows the life forms of the recorded plant species according to Raunkiaer (1937). The total number of species in the study area was 58, which belong to Six different life forms. Therophytes (36%) constitute the largest number of species (21species). Chamaephytes had 24% including 14 species. Phanerophytes have 8 species represent about 14% of the flora. Hemicryptophytes represent about 22 % of the flora including 13 species. Geophytes (2%) are represented by one species; Panicum turgidum and Parasites (2%) by Orobanche cernua. The vegetation structure is relatively simple, in which the species have to withstand the harsh environmental conditions. This is not only reflected by the preponderance of annuals, but also by the presence of several highly adapted, drought-resistant species (Abdel-Razik et al., 1984). The most critical gradients in abiotic factors may be related to water availability, including annual precipitation, soil properties, and topography (Parker, 1991).

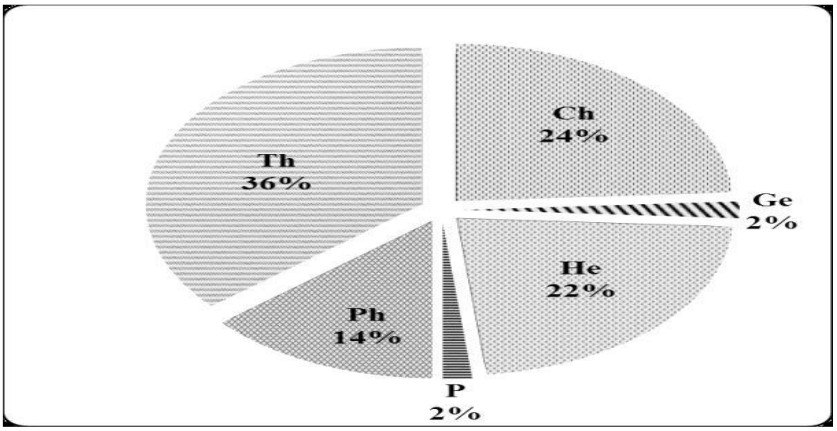

Fig.4: Life form relative spectrum of Wadi Sassu vegetation. Ch= Chamaephytes; Cr=Crptophytes; G=Geophytes;He=Hemicrptophytes; P=Parasites;Ph=Phanerophytes; Th= Therophytes.

Chorological affinities.

Results of the total chorological analysis of the surveyed flora presented in Fig.5 revealed that 24 species belonging to monoregional region representing 43% of the total recorded species. There were 16 species recorded as Saharo-Arabian species (29%). A total of 19 species are biregional elements representing 34% of the recorded species. It comprises the following six regions as follows: 4 species belonging to the Saharo-Arabian, Sudano-Zambezian regions representing 7% of the recorded species. Mediterranian, Irano-Turanian

regions, represented by 3 species, formed 5 % of the recorded species. 5 species belonging to the Saharo-Arabian, Irano-Turanian regions represented 9% of the recorded species. 4 species belonging to the Saharo-Arabian, Mediterranian region consist 7% of the recorded species. A total of 2 species (3% of the recorded species) are Pluri-regional taxa of wide geographical range. They were as follows: Emex spinosa, Salsola kali. Chenopodium murale is the only species representing.

The importance of the study area from a phytogeo-graphical point of view may be due to its position, which is located in the intersection of the four phytogeographical regions Mediterranean, Irano-Turanian, Sudano-Zambezian and the Saharo-Arabian region. This may reflect the relatively rich floristic diversity of Misurata area. The presence of the monoregional Saharo-Arabian chorotype in a higher percentage than the inter-regional chorotypes (bi- and pluriregionals) is not in accordance with Zahran (2010).

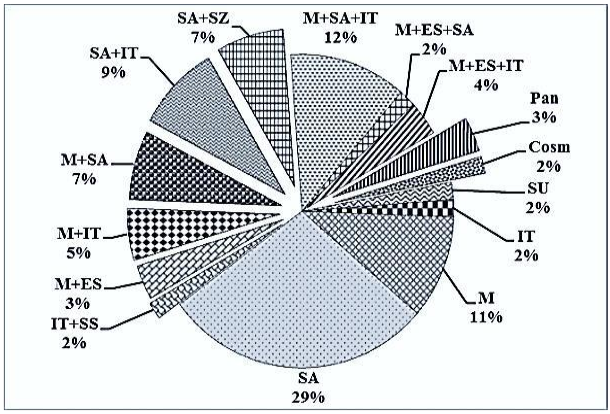

Fig.5: Chorological analysis of the recoded species in Wadi Sassu vegetation. SA, Saharo-Arabian; SZ, Sudano-Zambezian; IT, Irano-Turanian; ES, Euro-Siberian; M, Mediterranean; Cosm, Cosmopolitan; Pan, Pantropic

The Saharo-Arabian chorotype decreased northward and replaced by Mediterranean and Irano-Turanian chorotype (Hegazy and Amer, 2001; Salama *et al* 2005). This may be attributed to the fact that plants of the Saharo-Arabian species are good indicators for desert environmental conditions, while Mediterranean species stand for more mesic environment.

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