



Survey on medicinal plants in the flora of Al Riyadh Region, Saudi Arabia

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Abstract

The present study aims to assess medicinal plants in Al Riyadh region comparing with total medicinal plants in Saudi Arabia Kingdom. This may be useful in developing strategies for sustainable use of one of the threatened natural resources in Saudi Arabia. The result revealed that there are 108 species were recorded, belonging to 36 families and 94 genera. The most dominated families were Asteraceae, Poaceae, Fabaceae, Chenopodiaceae, Boraginaceae, Brassicaceae, Charyophyllaceae and Zygophyllaceae. About 97% of the total recorded species have at least one aspect of potential or actual economic uses i.e., 165 species are having medicinal value. This means that this region has a large number of medicinal plants, which needs to be discovered and surveyed. This study confirms on importance of medicinal plants protection because almost of them are rare or endangered species.

Keywords: flora, medicinal, grazing, life form, economic uses, vegetation

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INTRODUCTION

The flora of Saudi Arabia is one of the richest biodiversity areas in the Arabian Peninsula and comprises very important genetic resources of crop and medicinal plants. In addition to its large number of endemic species, the components of the flora are the admixture of the elements of Asia, Africa and Mediterranean region. A total of 2250 species (including pteridophytes and gymnosperms) in 142 families are represented in the flora of the Kingdom of Saudi Arabia. Of these, there are 242 endemic and 600 rare and endangered species in the wild; thus, an action plan should be taken for their conservation and sustainable development (Migahid, 1978; 1996).

Medicinal plants represent an important health and economic component of biodiversity. It is essential to make the complete inventory of the medicinal component of the flora of any country for conservation and sustainable use (Al-Sodany et al. 2013). According to Al-Yahya, (1984) the Arabian peninsula is the birth place of herbal drugs, and the use of folk medicine has existed there since time immemorial. However, traditional medicine, occupies a significant part of Saudi Arabia's heritage and it is widely practiced until now (Al-Essa et al., 1998). According to Mossa et al. 1987 [64], the Kingdom of Saudi Arabia is gifted with a wide range of flora, consisting of a large number of medicinal herbs, shrubs and trees.

The complete inventory of the medicinal plant resources of Saudi Arabia is in progress under the auspices of Medicinal, Aromatic and Poisonous Plant Research Center (MAPPRC) and the Department of Pharmacognosy, both of the College of Pharmacy, King Saud University, Riyadh. As an initial step, two volumes of Medicinal Plants of Saudi Arabia were published by (Mossa et al. 1987; 2000) with 300 species from the flora, representing 12% of the total species of the flora. These 300 species, belonging to 72 families, were reported from 2250 species of Saudi flora.

The aim of this study is to make a survey on all medicinal plants in the kingdom and determine the number, percentage and economic uses of species present in the flora of Al Riyadh Region.

MATERIALS AND METHODS

The present study was conducted as a part of the analysis of the medicinal plant diversity in the flora and to determine their status in the wild for giving conservation priorities. The important sites in Al Riyadh region (Wadi Hanifa, Wadi Al Aysan, Eastern and western of Al Riyadh region) were visited and surveyed between 2018-2020. In each site, the following data

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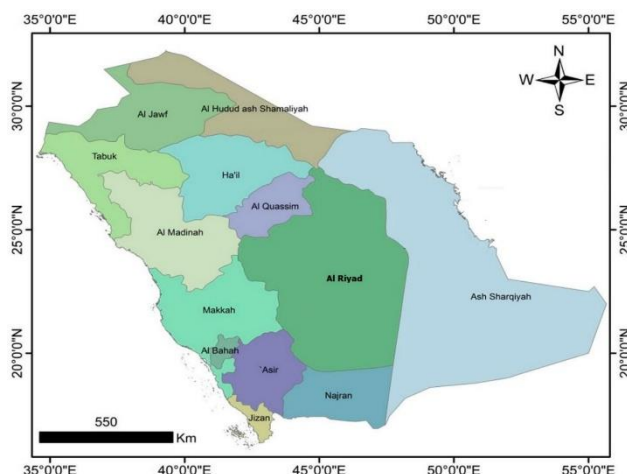


Fig. 1. Map showing the protected areas of Saudi Arabia including Al Riyadh region

Table 1. Monthly variation in air temperature (°C), relative humidity (%), weed speed (km/hr) and rainfall (mm month) as recorded in Al Riyadh meteorological station located in the study area. The data are long-term averages (Climatological Normals for KSA, 2010 - 2020). The F-value for each variable are calculated (ANOVA), ***: P=0.001.

Month	Temperature			RF (mm)	RH (%)	WV (Km/h)
	Max.	Mean	Min.			
Jan	20.2	14.4	9	11.9	47	17.1±2.9
Feb	23.4	17.3	11.2	6.4	36	19.3±8.3
Mar	27.7	21.4	15.2	21	32	16.1±0.7
Apr	33.4	26.9	20.4	23.8	28	17.1±2.9
May	39.4	32.9	25.9	4.9	17	19.1±1.1
Jun	42.5	35.7	28	0	11	21.8±4.1
Jul	43.5	36.8	29.3	0	10	21.8±4.1
Aug	43.6	36.7	29.2	0.4	12	21.0±2.1
Sep	40.4	33.5	25.9	0	14	20.2±0.2
Oct	35.3	28.4	21.2	0.8	20	23.7±5.1
Nov	27.8	21.5	15.5	8.7	36	22.3±8.6
Dec	22.2	16.3	10.6	14.6	47	17.7±4.5
Total mean	33.3±8.74	26.8±8.38	20.1±7.6	92.5±8.47	26±13.6	19.6±2.41
F value	20.2***	34.3***	47.5***	6.8***	13.1***	1.5***

were recorded: List of the annual and perennial species. Nomenclature was according to (Migahid, 1978). The herbarium sheets of the recorded species were kept in the Herbarium of Biology Department, Faculty of Science, Shaqra University. The potential and actual economic uses of the wild plants were assessed on three bases; field observations, information collected from local inhabitants and literature review (Allred, 1968; Farnam, et al, 2016).

Study area and Climate

Al Riyadh city is located approximately (600m) above sea level in eastern Najd (Highland) in the center of the Arabian Peninsula at (24°30'N - 46°45'E). The topography of Riyadh itself, however, is relatively flat. Soils in and around the city are made up of an alluvium of gravel, sand, silt, clay deposits, and a limestone subsoil (Fig. 1). Al Riyadh has a hot desert climate (Jeddah Regional Climate Centre, South West Asia), with long, extremely hot summers and short, very mild winters. The average high temperature in August is 43.6 °C. The city and coolness in the winter, with lows averaging in the low (10 °C), though there is a large difference between daytime and nighttime temperatures.

Because of the distance from major bodies of water and the general scarcity of precipitation in the city, especially in summer, but receives a fair amount of rain in March and April. It is also known to have dust storms during which the dust can be so thick that visibility is under 10m. Humidity in Riyadh remains low throughout the year, especially during the summer. When precipitation does occur, it is largely confined to the months between November and May (Table 1).

RESULTS

The survey of literature showed that the study area includes 108 plant species: 84 annuals (32.2%) and 174 perennials (66.7%). These species belong to 55 different plant families and 178 genera (Table 2). The most dominant families are: Asteraceae (17.6%; 19 plant species), Brassicaceae, Chenopodiaceae and Poaceae (7.41%; 8 plant species) respectively. Zygophyllaceae (6.48%; 7 plant species), Charyophyllaceae and Fabaceae (5.56%; 6 plant species). Nineteen families were represented only by one species; 5 families were represented by two species; 2 families were represented

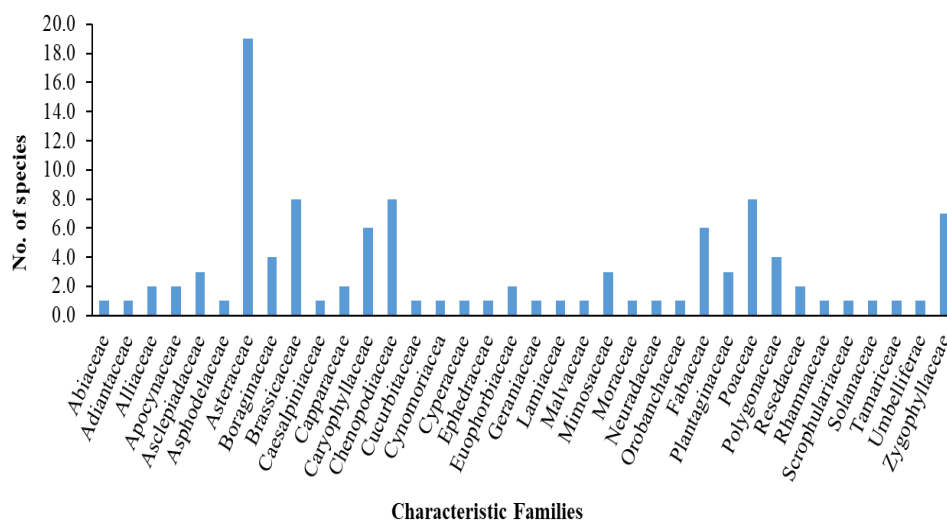


Fig. 2. Characteristic families of the recorded species in Al Riyadh region

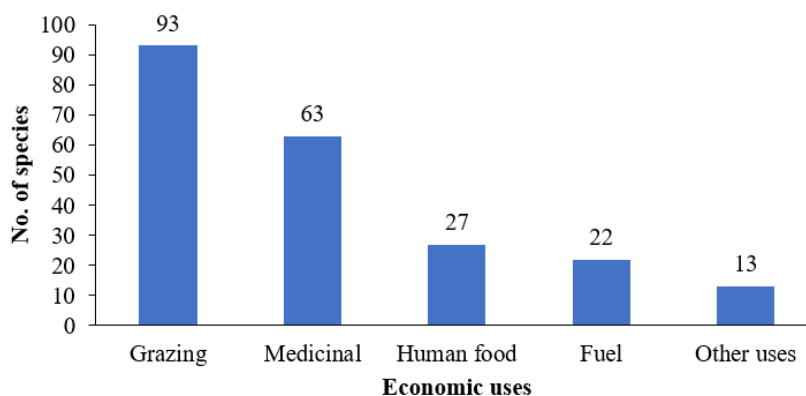


Fig. 3. Descending arrangement of the economic uses of the recorded species in Al Riyadh region

by three species and 2 families were represented by three species (Fig. 2).

Regarding to life forms, the perennial herbs had the highest contribution of the recorded species (60 species = 56.1%) and annuals (47 species. = 43.9%) (Table 2). The recorded plants in this area have at least one aspect of potential or actual economic uses (Table 2). On the

other hand, 93 species (42.7%) are grazing, 63 species (28.9%) are medicinal, 27 species (12.4%) are edible to man, 22 species (10.1% used as fuel and 13 species (5.96%) used for other economic purposes (Fig. 3). The economic uses of the recorded species could be arranged in descending order as follows: grazing, medicinal, human food, fuel and other uses.

Table 2. Botanical survey of the plant species recorded in Al Riyadh region

Family	Species	Arabic name	Life form	Grazing	Medicinal	Human food	Fuel	Other uses
Abiaceae	<i>Anisosciadium lanatum</i>	بمبباس	Annual	+	+	+		
Adiantaceae	<i>Adiantum capillus-veneris</i>	كزبرة البئر	Perennial		+			
Alliaceae	<i>Allium sindjarensis</i>	الطيبط	Perennial	+	+	+		
Alliaceae	<i>Allium sphaerocephalum</i>	الكرات	Annual	+	+	+		
Apocynaceae	<i>Rhazya stricta</i>	الحرملة	Perennial		+			
Asclepiadaceae	<i>Calotropis procera</i>	العشر	Perennial		+		+	
Asclepiadaceae	<i>Laptadenia pyrotechniac</i>	المرخ	Perennial	+	+		+	
Asclepiadaceae	<i>Pergularia daemia</i>	العلاقة	Perennial	+	+			
Asphodelaceae	<i>Asphodelus tenuifolius</i>	البروق	Annual		+			
Asteraceae	<i>Anthemis deserti</i>	أقحوان	Annual	+	+	+		
Asteraceae	<i>Anthemis deserti</i>	النقد	Perennial	+	+			+
Asteraceae	<i>Artemisia monosperma</i>	العاذر	Perennial	+				+
Asteraceae	<i>Centaurea pseudosinaica</i>	المرار	Annual	+	+	+		
Asteraceae	<i>Launaea capitata</i>	الحواء	Annual	+	+	+		
Asteraceae	<i>Launaea cassiniana</i>	البقراء	Annual	+	+	+		

Table 2. Botanical survey of the plant species recorded in Al Riyadh region (continued)

Family	Species	Arabic name	Life form	Grazing	Medicinal	Human food	Fuel	Other uses
Asteraceae	<i>Launaea mucronata</i>	العصيد	Annual	+	+	+		
Asteraceae	<i>Picris babylonica</i>	الحوذان	Annual	+	+	+		
Asteraceae	<i>Pulicaria undulata</i>	الجذجات	Perennial	+				+
Asteraceae	<i>Richardia tingitana</i>	مكتان	Annual	+				
Asteraceae	<i>Tripleurospermum auriculatum</i>	قرقاص	Annual	+	+	+		
Asteraceae	<i>Rhanterium eppaposum</i>	العرفج	Perennial	+	+			
Asteraceae	<i>Ifloga spicata</i>	التربة	Annual	+	+			
Asteraceae	<i>Artemisia sieberi</i>	الشيح	Perennial	+	+			
Asteraceae	<i>Pulicaria undulata</i>	الإشموم	Annual	+	+			
Asteraceae	<i>Matricaria aurea</i>	الحنذوق	Annual	+	+			
Asteraceae	<i>Carthamus nitidus</i>	العصفور	Perennial	+	+			
Asteraceae	<i>Artemisia judaica</i>	البيتران	Perennial	+	+			
Asteraceae	<i>Pulicaria glutinosa</i>	الشيح	Perennial	+	+			
Boraginaceae	<i>Echium arabicum</i>	كحيل	Annual	+	+			+
Boraginaceae	<i>Arnebia hispidissima</i>	أرينيه	Annual	+	+			+
Boraginaceae	<i>Moltkiopsis ciliata</i>	الحلم	Annual	+		+		
Boraginaceae	<i>Heliotropium bacciferum</i>	الزمرام	Perennial	+	+			
Brassicaceae	<i>Lepidium aucheri</i>	حب الرشاد	Annual	+	+	+		
Brassicaceae	<i>Diplotaxis harra</i>	الحازه	Perennial	+				+
Brassicaceae	<i>Eremobium aegyptiacum</i>	الغريرا	Annual	+				
Brassicaceae	<i>Horwoodia dicksoniae</i>	الخرامى	Annual	+	+			+
Brassicaceae	<i>Matthiola longipetala</i>	الشقارى	Annual	+				
Brassicaceae	<i>Schimpera Arabica</i>	الصفار	Annual	+				
Brassicaceae	<i>Zilla spinosa</i>	التبريم	Perennial	+	+			
Brassicaceae	<i>Farstia aegyptia</i>	الحما	Perennial	+				
Caesalpiniaceae	<i>Senna italica</i>	العشرق	Perennial		+			
Capparaceae	<i>Cleome amblyocarpa</i>	الخنيز	Perennial					
Capparaceae	<i>Capparis spinosa</i>	الشفطج	Perennial	+	+	+		
Caryophyllaceae	<i>Gypsophila cappillaris</i>	السليج	Annual	+				
Caryophyllaceae	<i>Silene villosa</i>	التربة	Annual	+	+			
Caryophyllaceae	<i>Gymnocarpus decandrum</i>	القراد	Perennial	+			+	
Caryophyllaceae	<i>Sclerocephalus arabicus</i>	الهراس	Annual	+				
Caryophyllaceae	<i>Paronychia arabica</i>	شدق الجمل	Annual	+				
Caryophyllaceae	<i>Polycarpaea repens</i>	المكر	Annual	+	+			
Chenopodiaceae	<i>Bassia muricata</i>	البيتم	Annual	+				
Chenopodiaceae	<i>Halothamnus bottae</i>	حمض	Perennial	+				
Chenopodiaceae	<i>Haloxylon salicornicum</i>	الرمث	Perennial	+	+		+	+
Chenopodiaceae	<i>Haloxylon salicornicum</i>	الغضى	Perennial	+			+	
Chenopodiaceae	<i>Suaeda fruticosa</i>	السواد	Perennial					
Chenopodiaceae	<i>Seidlitzia rosmarinus</i>	الأشنان	Perennial					
Chenopodiaceae	<i>Anabasis lachnauatha</i>	العجرم	Perennial	+			+	
Chenopodiaceae	<i>Salsola cyclophylla</i>	العراد	Perennial	+			+	
Cucurbitaceae	<i>Citrullus colocynthis</i>	الحنظل	Perennial		+			
Cynomoriaceae	<i>Cynomorium coccineum</i>	الطرتوث	Annual		+			
Cyperaceae	<i>Cyperus conglomeratus</i>	الثداء	Perennial	+				+
Ephedraceae	<i>Ephedra alta</i>	العلندى	Perennial	+	+		+	
Euophorbiaceae	<i>Andrachne telephioides</i>	العهيل	Perennial		+			
Euophorbiaceae	<i>Eurphobia retusa</i>	الزيرجان	Annual		+			
Geraniaceae	<i>Erodium laciniatum</i>	القرنوه	Annual	+				
Labiatae	<i>Teucrium polium</i>	الجعدة	Perennial	+	+	+		+
Malvaceae	<i>Malva parviflora</i>	الخيزارى	Annual	+	+	+		
Mimosaceae	<i>Acacia ehrenbergiana</i>	السلم	Perennial	+			+	
Mimosaceae	<i>Acacia gerrardii</i>	الطلح	Perennial	+			+	
Mimosaceae	<i>Acacia raddiana</i>	السمر	Perennial	+			+	
Moraceae	<i>Ficus salicifoli</i>	الأثب	Perennial	+	+	+		
Neuradaceae	<i>Neurada procumbens</i>	السعدان	Annual	+	+	+		
Orobanchaceae	<i>Cistanche phelypae</i>	الذنون	Perennial		+			
Papilionaceae	<i>Astragalus tribuloides</i>	الفقعاء	Annual	+	+			
Papilionaceae	<i>Medicago laciniata</i>	النفل	Annual	+	+			+
Papilionaceae	<i>Astragalus spinosa</i>	الكداد	Perennial				+	
Papilionaceae	<i>Ononis serrata</i>	التربة الخضراء	Annual	+				
Papilionaceae	<i>Trigonella anguina</i>	الشعطري	Annual	+	+			
Papilionaceae	<i>Alhagi graecorum</i>	عاقول	Perennial	+	+			
Plantaginaceae	<i>Plantago albicans</i>	الربلة	Annual	+	+	+		
Plantaginaceae	<i>Plantago coronopus</i>	قريطة	Annual	+	+	+		
Plantaginaceae	<i>Plantago amplexicaulis</i>	أبو لحية	Annual	+	+			
Poaceae	<i>Schismus barbatus</i>	الصميماء	Annual	+		+		
Poaceae	<i>Stipa capensis</i>	الصمصاء	Annual	+		+		

Table 2. Botanical survey of the plant species recorded in Al Riyadh region (continued)

Family	Species	Arabic name	Life form	Grazing	Medicinal	Human food	Fuel	Other uses
Poaceae	<i>Stipagrostis drarii</i>	السيط	Perennial	+		+		
Poaceae	<i>Stipagrostis plumosa</i>	النصي	Perennial	+				
Poaceae	<i>Tragus recemosus</i>	الغريزا	Annual	+				
Poaceae	<i>Panicum turegidum</i>	التمام	Perennial	+				+
Poaceae	<i>Pennisetum divisum</i>	الثيوم	Perennial	+				
Poaceae	<i>Cymbopogon commutatus</i>	السخير	Perennial	+	+			
Polygonaceae	<i>Emex spinosa</i>	حمباز	Annual	+		+		
Polygonaceae	<i>Rumex vesicarius</i>	الحميض	Annual	+	+	+		
Polygonaceae	<i>Calligonum comosum</i>	الأرطى	Perennial	+	+		+	+
Polygonaceae	<i>Calligonum crinitum</i>	العبل	Perennial	+	+		+	
Resedaceae	<i>Reseda Arabica</i>	ذيل الخروف	Annual	+				
Resedaceae	<i>Ochradenus baccatus</i>	القرضى	Perennial	+			+	
Rhamnaceae	<i>Ziziphus nummularia</i>	السدر	Perennial	+	+	+	+	
Scrophulariaceae	<i>Scrophularia hypericifolia</i>	العلقى	Perennial	+				
Solanaceae	<i>Lycium shawii</i>	العوسج	Perennial	+	+	+	+	
Tamariceae	<i>Tamarix aphylla</i>	الأثل	Perennial	+			+	
Umbelliferae	<i>Ducrosia anethifolia</i>	الحزا	Perennial	+	+	+		
Zygophyllaceae	<i>Tribulus terrestris</i>	الحسك	Annual	+	+			
Zygophyllaceae	<i>Fagonia indica</i>	الدرماء	Perennial	+			+	
Zygophyllaceae	<i>Fagonia glutinosa</i>	الشكعا	Perennial	+	+			
Zygophyllaceae	<i>Seetzenia lanata</i>	الحبيان	Perennial	+	+			
Zygophyllaceae	<i>Zygophyllum qatarense</i>	الهرم	Perennial	+			+	
Zygophyllaceae	<i>Zygophyllum migahidii</i>	الهرم	Perennial	+			+	
Zygophyllaceae	<i>Zygophyllum coccineum</i>	الهرم	Perennial	+			+	

DISCUSSION

One of the main characteristics of the vegetation cover of Saudi Arabia is its low floristic diversity. The number of plant species that were recorded in the country was 2172 species, many of which are in the wetter is evident that the Asteraceae family has the highest contribution, followed by the Poaceae and Fabaceae. These results are 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 Fabaceae (210 species= 9.7%) which represent 705 species or 32.5% of the total plant species in the Kingdom. As in most tropical and subtropical deserts, 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. These plant species represent 73% of the total species in the Kingdom (Al-Nafie, 2008). However, there is a shortage of information about the

multipurpose uses of natural species. Many substances that we use in our daily lives are plant products, although there are many uses of plant species still unknown. Numerous medicines, many industrial products are derived from plant products. Most are edible plant products that form the food base of human culture (Heneidy and Bidak, 2005). Evaluation of the effects of the environmental factors threatening the wild life should be taken in consideration. On the other hand, the increase of fodder grazed plants in this area indicated the good selection of this area as a protected area for breeding the endangered mammals in the Saudi Arabia.

The life form spectrum indicated that the perennial herbs had the highest contribution of the recorded species, followed by annuals, shrubs, shrublets and trees, while the biennials and parasites had the lowest contribution. These results agree with that of (Mosallam, 2007) in Taif region (Heneidy and Bidak, 2005) in Asir region in southwestern of Saudi Arabia and (El-Demerdash et al. 1994) in the southern region.

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