
Flora of Shaumari Wildlife Reserve, Jordan

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ABSTRACT

Shaumari Wildlife Reserve is the first reserve established by the Royal Society for the Conservation of Nature in Jordan, yet the total flora accounts has never been published or known to the nearest species number. In this study the flora of Shaumari Wildlife Reserve has been prepared and accumulated based on the latest survey and all previous studies since 1975.

This study has revealed that the flora is composed of a total number of 237 species belonging to 152 genera and 36 families. All taxa and abbreviations were checked in accordance to the latest Plant List of Plants (Royal Botanic Garden, Kew, UK) and according to the Tropicos database (Missouri Botanical Garden, USA).

Key Words: Flora, Shaumari Wildlife Reserve, Eastern Desert, Jordan.

INTRODUCTION

Shaumari Wildlife Reserve (SWR) is the oldest reserve established in 1975 as the first Jordanian wildlife reserve that acts as a breeding center for endangered or locally extinct faunal species and to provide an open station for scientific research programs in the arid and semi-arid habitats. The last ecological survey was conducted in 2002 by Royal Society for the Conservation of Nature (RSCN) staff, and thus the need for updating ecological database of the site is becoming urgently needed.

Unpublished work on the flora of SWR was undertaken by John Clarke in the 1975-1979. He started his investigation by collecting plant specimens as a herbarium collection, then made notes on the reserve and suggested some tracks for walking through, as well as the remarkable center point known as Clarks Point. Ecological and vegetation studies were conducted in SWR almost 30 years ago. Ecological analysis of the vegetation of SWR was studied based on line transect survey. Soils types vegetation covers were described, 46 plant species were recorded, in addition to parameters of vegetation analysis as dominance, density coverage, height and carrying capacity (Al-Eisawi & Hatough, 1987).

Another study was conducted for assessment of the vegetation present at that time in SWR in relation to the number of the introduce heard of Oryx and the total number of animals that can live after their release within the larger area of the reserve based on calculation of the carrying capacity (Hatough & Al-Eisawi, 1988). A further study was also published related to the rodents types namely gerbils occurring within Shaumari boundaries and what type of plants they feed upon, especially *Anabasis syriaca* (Hatough *et al.*, 1986). A study on the Arabian Oryx was made to evaluate the presence of Oryx in SWR and the need for natural feed.

The study recorded a list of palatable species within the reserve such as *Atriplex halimus* and *Artemisia herba-alba* in addition to about 20-30 palatable herbaceous plants occurred in the reserve, where the vegetation within the reserve proved to be very rich and dense (Hatough & Al-Eisawi, 1988).

RSCN (2002) undertook the ecological baseline survey for the reserve which was the latest floral study till now; they produced a list of unpublished work. Nowadays, many challenges are facing SWR as low annual rainfall and human encroachments that cause deterioration and habitat damage, and thus the need for updating ecological database of the site is appeared.

A study was made between February and April, 2014 and resulted in recording 81 species belonging to 63 genera and 22 families. Six species recorded as rare plants and two species were endemic recorded within the reserve. Twenty two species were palatable and eight of medicinal uses and four woody plants, in addition to three edible and two poisonous species (Al-Eisawi *et al.*, 2014). The results showed variation in number of recorded plant species in the reserve during the last 40 years. The difference of plant species number in the reserve in comparison with other studies is a result of sharp fluctuation of rainy season, including amount of annual rainfall and time of falling, and this is confirmed by Al-Eisawi (1996).

In recent years in Jordan a quite good work has been produced related to the flora and biodiversity of Jordan especially, those related to conservation of biodiversity and medicinal plants. Among these studies is the vascular plants of Shoubak (Oran, 1994); Biodiversity of Karak province (Oran *et al.*, 1994); a list of the flowering plants of Tafila Province (Oran, 2014a) and the status of medicinal plants of Jordan (Oran, 2014b).

The present study represents additional records for the flora of SWR.

MATERIALS AND METHODS

Continuous visits to the reserve since the initiations were made. The visits have various objectives either assessing general status of the reserve in terms of conservation validation, studying the flora, students training and observation and sometimes taking groups of interested peoples to observe the biological

diversity. In most visits herbarium species as well as vegetation studies plant samples have been collected. Most of the specimens are deposited at the herbarium, Department of Biological Sciences, University of Jordan, Amman. Some of the specimens are still deposited at the Shaumari Reserve and some are deposited at the RSCN.

The specimens have been treated as routine treatment of collection, pressing, drying, poisoning and mounting on an international sheet size (12x18"). After that the specimens have been identified and then filed and deposited in the herbarium. Most of the important tools used are, note book for recording taxa and other notes, camera, GPS, plastic bags, shears, diggers and private tools. Field guides and identification references were used to verify the identification of collected specimens (Zohary *et al.*, 1966-1986; Al-Eisawi, 1998 & 2013).

Study area

SWR is located in the eastern desert of Jordan between coordinates 28° 7' 100" to 29° 25' 00" N and 35° 17' 500" to 35° 11' 200" E with a total area of 22 km² which is completely surrounded by a double fence and situated at a distance of about 120 km from the capital city Amman. Eastern Jordan in general including SWR is made more or less of flattened area, composed of loamy to clay-sandy soil, covered mostly by gravels and in some cases with black pebbles as result of lava and old volcanic eruptions in various parts. Thus such terrain is often known as Hammada land formation and Hammada soil (Zohary, 1962 & 1973). However, SWR is part of this natural land formation, others describe it as a Hammada land (Al-Eisawi & Hatough, 1987; Al-Eisawi, 1996).

Nevertheless, SWR consists of three main wadis Al-Shaumari, Al-Dabi and Al-Ghadaf. The clayey-sandy soil land that forms the site has two main component; limestone hammada plains (gravel hammada) in the southern and southwestern parts, intersected with wadis system (Fig. 1). Shaumari is characterized by hot summer and cold winter with lowest annual rainfall in the country ranges between 50-100 ml and specifically, about 70 ml in the Shaumari and Azraq Wetland Reserves. The reserve lies within the Saharo-Arabian region (Fig. 2) and dominated by Hammada vegetation type which covers the whole reserve and characterized by the presence of two subdivisions that are: Runoff Hammada and Gravel Hammada with different plant species.

Rain water as well as drainage water coming through the valley (*wadi*) systems in the reserve are moving towards north-east due to the inclination in soil level and altitude in the direction of the great *Qa'* (Azraq Oasis *Qa'*) since it is the lowest spot in the eastern desert in that region (Al-Eisawi, 1996). This water movement in the reserve often filling the *wadis* system and thus water stays for a little while in the *wadis* and accumulates for sometimes, often up to few months. Therefore, this formation of the soil barrier and thus forming a water pool named as *As-Sad* (Water Dam or *Hafira*).

At the end of the day excess water is absorbed deep in the soil and moves in the same direction (North-East) leaching the salts during the course of movement and thus forming salt accumulation at the end of the water passage. This ends by forming a clear saline water and thus saline plant community with unexpected and totally different plant community from the rest of the reserve.

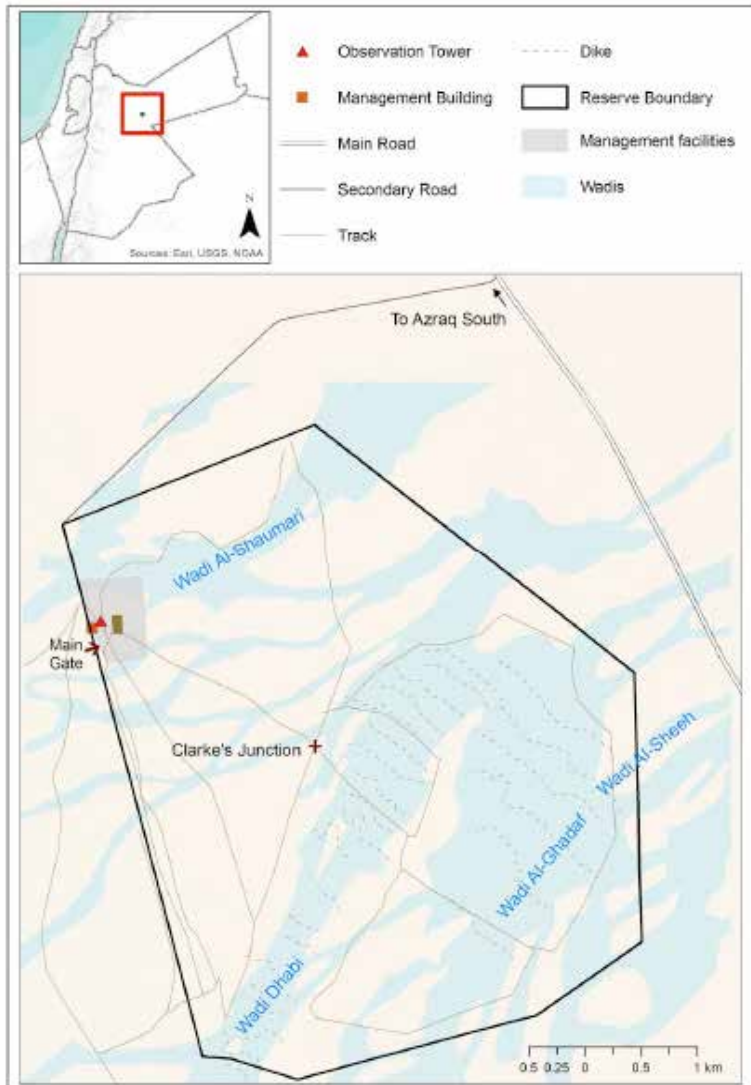


Figure 1: Location and boundaries of Shaumari Wildlife Reserve in Jordan.

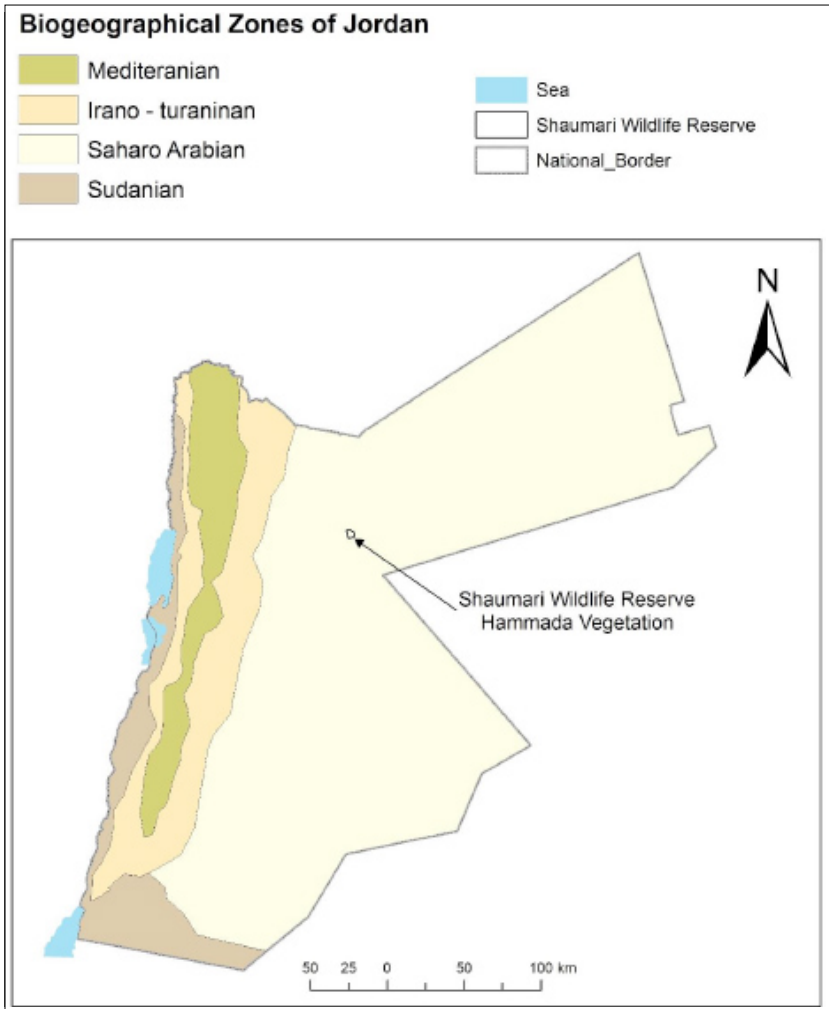


Figure 2: Showing Bio-geographical Zones of Jordan (By Al-Eisawi, 1996) and the location of Shaumari Wildlife Reserve within the Saharo-Arabian region.

RESULTS

Based on recent survey and previous surveys and visits since 1975 tell now, a total number of 237 species belonging to 152 genera and 36 families have been identified (Table 1). Some of the recorded names in the past have been altered according to new names treatment and according to new international databases such as The List of Plant Names produced by the Royal Botanic

Gardens, Kew, UK, as well as the database named Tropicos, produced by the Missouri Botanical Garden, Missouri, USA.

In fact, major groups, taxa and families have been displaced, families have merged or other families have been split into different families. One of the major steps of this kind is the emerging of the family Chenopodiaceae into the family Amaranthaceae and merging the family Asclepiadaceae and Apocynaceae together. In contracts the family Liliaceae has been split into different families and the genus *Allium* was placed in the family Alliaceae then it has been placed in Amaryllidaceae.

Nevertheless, all valid names as well as abbreviations of authors are all recorded exactly in accordance to The List of Plant Names and Tropicos as major internationally accepted databases.

Very few of the recorded species are still suspicious since they have been recorded without the presence of herbarium specimens or the herbarium specimens are missing and the species are

Girgensohnia oppositiflora (Pall.) Fenzl and *Halotis pilifera* Botsch. = *Syn.: Halimocnemis pilifera* Moq.; *Halotis pilosa* Iljin. Both species are belonging to the family Amaranthaceae which were originally under the family Chenopodiaceae.

Table 1. Showing the total list of plant species recorded in Shaumari Wildlife Reserve.

Family	Species
Acanthaceae	<i>Blepharis ciliaris</i> (L.) B.L.Burt <i>Blepharis attenuata</i> Napper
Aizoaceae	<i>Aizoanthemum hispanicum</i> (L.) H.E.K.Hartmann = <i>Syn.: Aizoon hispanicum</i> L. <i>Aizoon canariense</i> L.
Amaranthaceae	<i>Atriplex halimus</i> L. <i>Agathophora alopecuroides</i> (Delile) Fenzl ex Bunge = <i>Syn.: Agathophora alopecuroides</i> = <i>Syn.: Halogeton alopecuroides</i> <i>Anabasis articulata</i> (Forssk.) Moq. <i>Anabasis setifera</i> Moq. <i>Anabasis syriaca</i> Iljin <i>Arthrocnemum macrostachyum</i> (Moric.) K.Koch <i>Atriplex leucoclada</i> Boiss.
	<i>Atriplex semibaccata</i> R.Br. <i>Atriplex stylosa</i> Viv. <i>Bassia eriophora</i> (Schrad.) Asch. = <i>Syn.: Bassia latifolia</i> (Fresen.) Asch. & Schweinf <i>Bassia indica</i> (Wight) A.J.Scott = <i>Syn.: Kochia indica</i> Wight <i>Bassia muricata</i> (L.) Asch.

	<p> <i>Chenopodium murale</i> L. <i>Girgensohnia oppositiflora</i> (Pall.) Fenzl <i>Halocnemum strobilaceum</i> (Pall.) M.Bieb. <i>Halothamnus acutifolius</i> (Moq.) Botsch.= Syn.: <i>Aellenia autranii</i> (Post) Zohary <i>Halothamnus hierochunticus</i> (Bornm.) Botsch. <i>Halotis pilifera</i> Botsch. = Syn.: <i>Halimocnemis pilifera</i> Moq.; <i>Halotis pilosa</i> Iljin <i>Haloxylon salicornicum</i> (Moq.) Bunge ex Boiss. = Syn.: <i>Hammada salicornica</i> (Moq.) Iljin <i>Hammada eigii</i> Iljin <i>Hammada scoparia</i> (Pomel) Iljin = Syn.: <i>Hammada scoparia</i> (Pomel) Iljin <i>Mesembryanthemum nodiflorum</i> L. <i>Salsola imbricata</i> Forssk. = Syn.: <i>Salsola baryosma</i> (Schult.) Dandy <i>Salsola jordanicola</i> Eig <i>Salsola longifolia</i> Forssk. <i>Salsola schweinfurthii</i> Solms <i>Salsola tetrandra</i> Forssk. <i>Salsola vermiculata</i> L. <i>Salsola volkensis</i> Schweinf. & Asch. <i>Seidlitzia rosmarinus</i> Bunge ex Boiss. <i>Suaeda aegyptiaca</i> (Hasselq.) Zohary <i>Suaeda vermiculata</i> Forssk. ex J.F.Gmel. <i>Suaeda vermiculata</i> Forssk. ex J.F.Gmel.= Syn.: <i>Suaeda fruticosa</i> Forssk. ex J.F.Gmel. <i>Traganum nudatum</i> Delile </p>
Apiaceae	<p> <i>Deverra triradiata</i> Hochst. ex Boiss. = <i>Pituranthos triradiatus</i> (Hochst. ex Boiss.) Asch. & Schweinf. <i>Eryngium glomeratum</i> Lam. <i>Ferula communis</i> L. <i>Peucedanum spreitzenhoferi</i> Dingler <i>Pimpinella eriocarpa</i> Banks & Sol. </p>
Asteraceae	<p> <i>Anthemis pseudocotula</i> Boiss. <i>Aaronsomia factorovskyi</i> Warb. & Eig <i>Achillea falcata</i> L. <i>Achillea fragrantissima</i> (Forssk.) Sch.Bip. </p>
	<p> <i>Artemisia herba-alba</i> Asso, Not, <i>Artemisia sieberi</i> Besser = <i>Artemisia inculta</i> var. <i>laxiflora</i> (Boiss.) Täckh. <i>Asteriscus graveolens</i> (Forssk.) Less. <i>Asteriscus pygmaeus</i> (DC.) Coss. & Durieu <i>Atractylis cancellata</i> L. <i>Atractylis mutica</i> C.C.Towns. <i>Calendula arvensis</i> (Vaill.) L. = Syn.: <i>Calendula micrantha</i> Boiss. & Noë <i>Calendula arvensis</i> M.Bieb. <i>Calendula tripterocarpa</i> Rupr. </p>

	<p> <i>Carduus australis</i> Jord. <i>Carduus getulus</i> Pomel <i>Carduus pycnocephalus</i> L. <i>Carthamus tenuis</i> (Boiss. & Blanche) Bornm. <i>Centaurea ammocyanus</i> Boiss. <i>Centaurea pallescens</i> Delile <i>Crepis aspera</i> L. <i>Echinops glaberrimus</i> DC. <i>Echinops polyceras</i> Boiss. <i>Erigeron bonariensis</i> L. = <i>Conyza bonariensis</i> (L.) Cronquist <i>Fagonia olivieri</i> DC. <i>Filago desertorum</i> Pomel <i>Ifloga spicata</i> (Forssk.) Sch.Bip. <i>Lactuca undulata</i> Ledeb. <i>Lasiopogon muscoides</i> (Desf.) DC. <i>Launaea fragilis</i> (Asso) Pau <i>Launaea nudicaulis</i> (L.) Hook.f. <i>Leontodon laciniatus</i> (Bertol.) Widder <i>Notobasis syriaca</i> (L.) Cass. <i>Onopordum heteracanthum</i> C.A.Mey. <i>Picris longirostris</i> Sch.Bip. <i>Picris longirostris</i> Sch.Bip. <i>Scorzonera mollis</i> M.Bieb. <i>Scorzoneroides hispidula</i> (Delile) Greuter & Talavera = Syn.: <i>Leontodon hispidulus</i> (Delile) Boiss. <i>Senecio coronopifolius</i> Burm.f. <i>Senecio glaucus</i> L. <i>Sonchus oleraceus</i> (L.) L. <i>Takhtajianantha pusilla</i> (Pall.) Nazarova = Syn.: <i>Scorzonera pusilla</i> Pall. <i>Tripleurospermum auriculatum</i> (Boiss.) Rech.f. <i>Zoegea purpurea</i> Fresen. </p>
Boraginaceae	<p> <i>Anchusa aegyptiaca</i> (L.) A.DC. <i>Arnebia decumbens</i> (Vent.) Coss. & Kralik <i>Gastrocotyle hispida</i> (Forssk.) Bunge <i>Heliotropium europaeum</i> L. </p>
Brassicaceae	<p> <i>Brassica nigra</i> (L.) K.Koch <i>Brassica tournefortii</i> Gouan <i>Carrichtera annua</i> (L.) DC. <i>Diplotaxis acris</i> (Forssk.) Boiss. <i>Diplotaxis eruroides</i> (L.) DC. <i>Diplotaxis harra</i> (Forssk.) Boiss. <i>Eruca vesicaria</i> (L.) Cav. = Syn.: <i>Eruca sativa</i> Mill.; <i>Brassica eruca</i> L. <i>Erucaria hispanica</i> (L.) Druce </p>

	<p><i>Erucaria pinnata</i> (Viv.) Täckh. & Boulos <i>Erucaria rostrata</i> (Boiss.) A.W.Hill ex Greuter & Burdet <i>Erucaria rostrata</i> (Boiss.) A.W.Hill ex Greuter & Burdet = Syn.: <i>Erucaria boveana</i> Coss. <i>Farsetia aegyptia</i> Turra</p>
Brassicaceae	<p><i>Glastaria glastifolia</i> (DC.) Kuntze = Syn.: <i>Texiera glastifolia</i> (DC.) Jaub. & Spach <i>Isatis lusitanica</i> L. <i>Lappula spinocarpos</i> (Forssk.) Asch. ex Kuntze <i>Lepidium aucheri</i> Boiss. <i>Lepidium draba</i> L. = Syn.: <i>Cardaria draba</i> (L.) Desv. <i>Malcolmia africana</i> (L.) R.Br. <i>Matthiola longipetala</i> (Vent.) DC. <i>Neoturularia torulosa</i> (Desf.) Hedge & J.Léonard = Syn.: <i>Sisymbrium torulosum</i> Desf. = Syn.: <i>Torularia torulosa</i> (Desf.) O.E.Schulz <i>Notoceras bicornis</i> (Aiton) Amo <i>Pseuderucaria clavata</i> (Boiss. & Reut.) O.E.Schulz <i>Sinapis arvensis</i> L. <i>Sisymbrium erysimoides</i> Desf. <i>Sisymbrium trio</i> L. <i>Sisymbrium septulatum</i> DC. = Syn.: <i>Sisymbrium bilobum</i> Grossh. <i>Thlaspi perfoliatum</i> L. <i>Zilla spinosa</i> (L.) Prantl</p>
Capparceae	<p><i>Capparis leucophylla</i> DC.</p>
Caryophyllaceae	<p><i>Paronychia argentea</i> Lam. <i>Dianthus strictus</i> Banks ex Sol. <i>Gypsophila arabica</i> Barkoudak <i>Herniaria hemistemon</i> J.Gay <i>Pteranthus dichotomus</i> Forssk. <i>Silene</i> sp. <i>Spergularia diandra</i> (Guss.) Heldr.</p>
Cistaceae	<p><i>Helianthemum ledifolium</i> (L.) Mill. <i>Helianthemum lippii</i> (L.) Dum.Cours. <i>Helianthemum salicifolium</i> (L.) Mill.</p>
Convolvulaceae	<p><i>Convolvulus pilosellifolius</i> Desr. <i>Cressa cretica</i> L. <i>Cuscuta</i> sp.</p>
Cucurbitaceae	<p><i>Citrullus colocynthis</i> (L.) Schrad.</p>
Dipsacaceae	<p><i>Lomelosia palaestina</i> (L.) Raf. = Syn.: <i>Scabiosa palaestina</i> L. <i>Pterocephalus brevis</i> Coult. <i>Pterocephalus pulverulentus</i> Boiss. & Balansa <i>Scabiosa polymorpha</i> Weigel</p>
Ephedraceae	<p><i>Ephedra alata</i> Decne. <i>Ephedra transitoria</i> Riedl</p>

Euphorbiaceae	<i>Euphorbia exigua</i> L. = Syn.: <i>Euphorbia retusa</i> (L.) Cav.
Fabaceae	<p><i>Alhagi maurorum</i> Medik. <i>Andrachne telephioides</i> L. <i>Astragalus boeticus</i> L. <i>Astragalus dactylocarpus</i> subsp. <i>acinaciferus</i> (Boiss.) Eug.Ott = Syn.: <i>Astragalus acinaciferus</i> Boiss. <i>Astragalus hamosus</i> L. = Syn.: <i>Astragalus brachyceras</i> Ledeb. <i>Astragalus sieberi</i> DC. <i>Astragalus spinosus</i> (Forssk.) Muschl. <i>Astragalus tribuloides</i> Delile <i>Lotus lanuginosus</i> Vent. <i>Medicago polymorpha</i> L. = Syn.: <i>Medicago hispida</i> Gaertn. <i>Medicago sativa</i> L. <i>Onobrychis ptolemaica</i> (Delile) DC. <i>Prosopis farcta</i> (Banks & Sol.) J.F.Macbr. <i>Retama raetam</i> (Forssk.) Webb <i>Trigonella caelesyriaca</i> Boiss. <i>Trigonella stellata</i> Forssk. <i>Vicia palaestina</i> Boiss. <i>Vicia peregrina</i> L.</p>
Geraniaceae	<p><i>Erodium oxyrhinchum</i> subsp. <i>bryoniifolium</i> (Boiss.) Schönb.-Tem. = Syn.: <i>Erodium bryoniifolium</i> Boiss. <i>Erodium cicutarium</i> (L.) L'Hér. <i>Erodium crassifolium</i> L'Hér. ex Aiton = Syn.: <i>Erodium hirtum</i> Willd. <i>Erodium glaucophyllum</i> (L.) L'Hér. <i>Erodium laciniatum</i> (Cav.) Willd. <i>Erodium touchyanum</i> Delile ex Godr. = Syn.: <i>Erodium deserti</i> (Eig) Eig <i>Monsonia nivea</i> (Decne.) Webb</p>
Iridaceae	<p><i>Moraea sisyrinchium</i> (L.) Ker Gawl. = <i>Gynandriris sisyrinchium</i> (L.) Parl. = Syn.: <i>Iris sisyrinchium</i> L.</p>
Lamiaceae	<p><i>Phlomis brachyodon</i> (Boiss.) Zohary ex Rech.f. <i>Salvia lanigera</i> Poir. <i>Salvia spinosa</i> L. <i>Teucrium polium</i> L. <i>Thymus bovei</i> Benth.</p>
Liliaceae	<p><i>Bellevalia desertorum</i> Eig & Feinbrun <i>Bellevalia eigii</i> Feinbrun <i>Bellevalia mosheovii</i> Feinbrun <i>Gagea reticulata</i> (Pall.) Schult. & Schult.f.</p>
Malvaceae	<p><i>Althaea ludwigii</i> L. <i>Malva parviflora</i> L. <i>Malva aegyptiaca</i> Steud.</p>
Orobanchaceae	<i>Cistanche salsa</i> (C.A.Mey.) Beck

Orobanchaceae	<i>Cistanche tubulosa</i> (Schenk) Wight <i>Orobanche cernua</i> Loefl.
Papaveraceae	<i>Hypecoum pendulum</i> L. <i>Roemeria hybrida</i> (L.) DC.
Plantaginaceae	<i>Plantago afra</i> L. <i>Plantago amplexicaulis</i> Cav. <i>Plantago ciliata</i> Desf. <i>Plantago coronopus</i> L. <i>Plantago lanceolata</i> L. <i>Plantago ovata</i> Forssk.
Plumbaginaceae	<i>Limonium pruinosum</i> Kuntze
Poaceae	<i>Aeluropus lagopoides</i> (L.) Thwaites <i>Aeluropus littoralis</i> (Gouan) Parl. <i>Avena barbata</i> Pott ex Link <i>Avena fatua</i> L. <i>Avena sterilis</i> L. <i>Bromus danthoniae</i> Trin. <i>Bromus rubens</i> L. <i>Bromus tectorum</i> L. <i>Cynodon dactylon</i> (L.) Pers. <i>Echinochloa colona</i> (L.) Link = Syn.: <i>Milium colonum</i> (L.) Moench = Syn.: <i>Panicum colonum</i> L. <i>Eremopyrum distans</i> (K.Koch) Nevski <i>Hordeum bulbosum</i> L. <i>Hordeum marinum</i> Huds. <i>Hordeum murinum</i> subsp. <i>glaucum</i> (Steud.) Tzvelev = Syn.: <i>Hordeum glaucum</i> Steud <i>Hordeum spontaneum</i> K.Koch <i>Leptochloa fusca</i> (L.) Kunth = Syn.: <i>Diplachne fusca</i> (L.) Stapf <i>Lolium rigidum</i> Gaudin <i>Phalaris minor</i> Retz. <i>Poa bulbosa</i> L. <i>Rostraria berythea</i> (Boiss. & Blanche) Holub = Syn.: <i>Lophochloa berythea</i> (Boiss. & Blancke) Bor <i>Schismus arabicus</i> Nees <i>Stipa capensis</i> Thunb. <i>Stipa hohenackeriana</i> Trin. & Rupr.
Polygonaceae	<i>Emex spinosa</i> (L.) Campd. <i>Polygonum equisetiforme</i> Sm. <i>Polypogon monspeliensis</i> (L.) Desf. <i>Rheum palaestinum</i> Feinbrun <i>Rumex cypricus</i> Murb.
Ranunculaceae	<i>Anemone coronaria</i> L.

Resedaceae	<i>Caylusea hexagyna</i> (Forssk.) M.L.Green <i>Oligomeris linifolia</i> (Vahl ex Hornem.) J.F.Macbr. <i>Reseda decursiva</i> Forssk. = Syn.: <i>Reseda alba subsp. decursiva</i> (Forssk.) Maire <i>Galium aparine</i> L.
Rubiaceae	<i>Galium incanum</i> Sm. <i>Haplophyllum blanchei</i> Boiss.
Rutaceae	<i>Ruta buxbaumii</i> Poir. = Syn.: <i>Haplophyllum buxbaumii</i> (Poir.) G.Don. <i>Hyoscyamus desertorum</i> (Asch. & Boiss.) Täckh.
Solanaceae	<i>Hyoscyamus muticus</i> L. <i>Frankenia adpressa</i> Summerh.
Tamaricaceae	<i>Frankenia pulverulenta</i> L. <i>Reaumuria alternifolia</i> (Labill.) Britten <i>Reaumuria hirtella</i> Jaub. & Spach <i>Tamarix passerinoides</i> Delile
Tamaricaceae	<i>Tamarix tetragyna</i> Ehrenb.= Syn.: <i>Tamarix tetragyna var meyeri</i> <i>Nitraria retusa</i> (Forssk.) Asch.
Zygophyllaceae	<i>Peganum harmala</i> L. <i>Tribulus pentandrous</i> Forssk. = Syn.: <i>T. longipetalus</i> Viv.

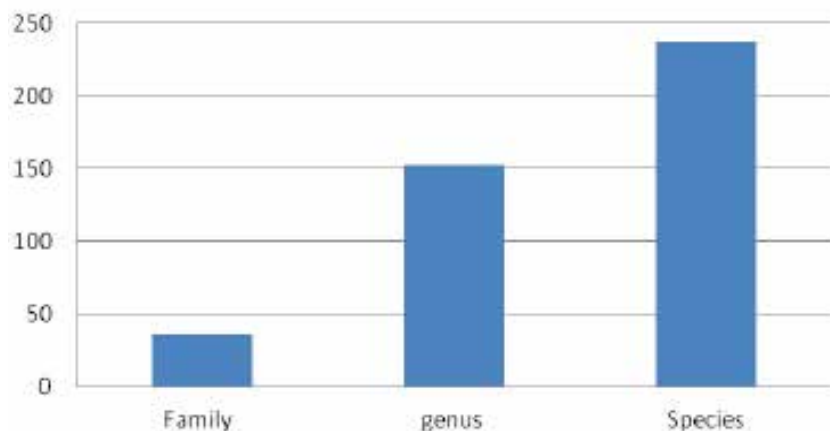


Figure 3: Showing number of families, genera and species of flora taxa in Shaumari Wildlife Reserve.

CONCLUSION AND DISCUSSION

The total number of 237 species recorded in the reserve is a very impressive number of plant species occurring in Jordan. If we consider the number of species in relation to the total area then Shaumari Wildlife Reserve total area is 22Km² and the total area of Jordan is 90.000 km².

In simple calculation we say Jordan area 90, 000 km² contains 2550 species = 100% present of the total Flora of Jordan.

Thus Shaumari Wildlife Reserve has $22/90000 \times 100 = 0.024\%$ of the total area of Jordan.

Jordan area is 90,000km² contains 2550 species while Shaumari Wildlife Reserve is 22Km² contain 237 species.

Thus $237/2550 \times 100 = 9.3\%$ of the total flora of Jordan.

If 0.24 area of Shaumari Wildlife Reserve contains 237 plant species in relation 100% of the total area and the total number of plant species, then this little area has about ten folds of the area production in terms of land area/ number of plant species.

Therefore, this desert reserve with its small total area situated in a very dry ecosystem according to the world classification holds and supports such a huge number of plant species 237/2550 of the total area. This number is really an impressive number in all means and calculations of biodiversity importance. This in reality projects and highlights the importance and diversity of the dry ecosystem in Jordan, Arab World and at all levels.

This fact becomes much more impotent if we know that lots of the recorded species are really medicinal, edible for humans and highly palatable of animals grazing and natural feed. Accordingly, this result projects the conservation impact and importance for any ecosystem whatever size it is and thus supports the very much appreciated and the noble roll of the Royal Society for the Conservation of Nature in managing and protecting such very important and limited areas in Jordan. This for sure emphasizes the roll of In-Situ conservation as one of the most important tools for the conservation of biodiversity and for the protecting future generation.

These findings agree very much with recent studies on particular parts of Jordan that show richness of the flora, biodiversity and medicinal plants and other resources especially in protected areas (Al-Eisawi, 2104a, 2014b, Oran & Al-Eisawi, 2014).

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