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## Report on a visit to Jebel Akhdar (Cyrenaica, Libya)

### Abstract

Essokne, R. S. & Jury, S. L.: Report on a visit to Jebel Akhdar (Cyrenaica, Libya). — Fl. Medit. 25: 79-85. 2015. — ISSN: 1120-4052 printed, 2240-4538 online.

The results of a botanical exploration to Jbel Akhtar (Cyrenaica, Libya) by the authors are here presented. On the whole 280 collections were made. The data were entered in a database, Botanical Research And Herbarium Management System (BRAHMS) and are available for future floristic contributions.

*Key words:* floristics, endemism, N Africa.

### I. Preliminary assessments

#### **The Libyan Flora**

The Libyan flora is claimed to comprise 1825 native and naturalized species, with 137 endemic (compared to 3675 and 625 for Morocco and 2076 and 70 endemic for Egypt) (Groombridge & Jenkins 2002). However, over 90% of Libya's plant species occur along the Mediterranean coastal strip, including both Jbel Nefousa in Tripolitania and Jbel Akhdar in Cyrenaica. By far the highest number of species are found on Jbel Akhdar which also has greater numbers of endemics and affinities with the flora of the western Mediterranean, Crete, Cyprus as well as Egypt and the eastern Mediterranean. The areas of limestone and calcareous substrate, as well as the prevailing bioclimate, always favour species diversity, (El'Hamrouni 1990).

The Flora has recently been completed under the editorship of S.I. Ali, S.M.H. Jafri & A. El-Gadi (1977-1989) in 150 parts by family and published by Al Faateh University and weighing in at 16 kg. This rapidly published Flora is a good work with valuable illustrations, but has many inaccuracies and is now very much out-of-date, following the enormous amount of recent research on the Mediterranean flora. Of our 200-odd different species collected on this project, we have encountered some 21 endemics and 12 taxa where we are at variance with the names given in this Flora. This would seem extraordinary for such a superficial and short study of the area.

It should not come as a surprise as not only is the area under-explored botanically, but much of the previous botany has been done by foreigners who have taken the specimens out of Libya. Thus, the types and specimens relating to the early works of Durand & Barratte (1910) are in Montpellier and Paris; those on which the incredible work by

Pampanini (1931) are based, made by the Italian botanists during the period 1911—1943 are all in Florence, Italy. The recent collections of the late Peter Davis are in Edinburgh, London and Reading, United Kingdom. Although we exported our specimens with permission of the Environment General Agency, a complete, fully labelled set was sent back for use in Libya. After visiting the herbaria at Omar Mukhtar University (Al Bayda), Garyounis University (Benghazi), Tripoli University (Tripoli) and following discussions in person with a taxonomist from Zliten University, it was clear that the best place would be for them to remain *in situ* in the Green Mountain at Omar Mukhtar University.

### Areas Visited

In the very limited time available, visits were made by both of us to all the following sites where plants were surveyed, some photographed and others collected:

Wadi Ba Al Kashab, Marad Massoud, between Al Bayada and Qasr Libya \*\*\*\*

Shrine of Sidi Al Hamri and nearby proposed building site for new town \*

El Gaigab Fort

El Gaigab to Kholan

Kholan Fort \*\*\*\*\*

Ras Al Tin

Wadi at end of minor road, NNE of Umm Irrizam to Martuba road \*\*

Wadi Derna waterfall on outskirts of Derna

Roadside 3 km S of Gubba \*

Shahat ruins

Sea cliffs, 13 km E of Susa \*\*\*\*\*

Wadi Mahboul \*\*\*\*\*

Coast W of Susa

Limestone roadside Susa Chalets to Shahat

Edge of Susa

Coast W of Susa on road to Braklotha

Braklotha

By shrine of Sidi Amir on coastal track to Al Haniya from Braklotha \*\*

Roadside from Massa to Gnatta \*

Wadi el Kouf (on old road into wadi, by new bridge) \*\*

Wadi Sudan \*\*\*

Zawiat el Argoub (Al Bayda to Qasr Libya)

At new bridge over Wadi el Kouf \*

Cyrene necropolis on road to Al Bayda

16 km E of Wadi el Kouf bridge on road to Benghazi

S from Marj, junction of rd from Sidi Aboras and Alhmeda \*

1 km S of Alhmeda

Road to coast from Alhmeda, top of escarpment

Abou Garar on coast \*

Sidi Dahir

Tolmeta

\*= endemic species; number of asterisks = number of endemics found at site.

### Plants seen and collected

The data of the species were entered in a database, Botanical Research And Herbarium Management System (BRAHMS). This system allows searching and export of data and can link to GIS systems. It allows specimens to be easily cited in future work and any proposed floristic or monographic treatment, including easy production of maps. Labels detailing the 280 collections made by us (135 given Dr Matt Hall's collecting numbers, then Dr. Rafaa Essokne numbers 1 to 142) were generated from this database, A great many more collections could have been made to better document the flora, but the limited amount of time and resources precluded this.

The 21 endemics seen were:

- Allium longanum* Pamp. (Amaryllidaceae)
- Arbutus pavarii* Pamp. (Ericaceae)
- Asperula cyrenaica* (E. A. Durand & Barratte) Pamp. (Rubiaceae)
- Athamantha della-cellae* Asch. & Barbey (Apiaceae)
- Ballota andreuzziana* Pamp. (Lamiaceae)
- Cyclamen rolfisianum* Asch. (Primulaceae)
- Echinops cyrenaicus* E. A. Durand & Barratte (Asteraceae)
- Erica sicula* subsp. *cyrenaica* Brullo & Furnari (Ericaceae)
- Herniaria cyrenaica* F. Herm. (Caryophyllaceae)
- Lactuca haimanniana* E. A. Durand & Barratte (Asteraceae)
- Limonium cyrenaicum* (Rouy) Brullo (Plumbaginaceae)
- Limonium zanonii* (Pamp.) Domina (Plumbaginaceae)
- Micromeria conferta* (Coss. & Daveau) Stefani (Lamiaceae)
- Nepeta cyrenaica* Quézel & Zaffran (Lamiaceae)
- Onosma cyrenaica* E. A. Durand & Barratte (Boraginaceae)
- Pachyctenium mirabile* Maire & Pamp. (Apiaceae)
- Salsola cyrenaica* (Maire & Weiller) Brullo (Chenopodiaceae)
- Sedum cyrenaicum* Brullo & Furnari (Crassulaceae)
- Stachys rosea* (Desf.) Boiss. (Lamiaceae)
- Teucrium apollinis* Maire & Weiller (Lamiaceae)
- Teucrium barbeyanum* E. J. Durand & Barratte (Lamiaceae)
- Thapsia garganica* var. *silphium* (Viv.) Dc. (Apiaceae)

Some of these have been seen on a number of occasions, especially *Arbutus pavarii*, Fig. 1, a species reported in the 1997 IUCN Red List of Threatened Plants as Vulnerable. From the number of locations seen and the amount encountered on our site visits, we seriously doubt that this is the case. We were also pleased to see that we encountered the endemic *Cyclamen*, *C. rolfisianum*, Fig. 2 on a number of occasions, even though its leaves were dying back. We may have encountered fruits of *Arum cyrenaicum*, but as these were well past flowering, we were not able to identify them in the field and did not collect them.

At the enclosed site of Cyrene, a note was made of just over 200 different plant species, though only one was endemic, *Echinops cyrenaicus* (Fig. 3).



Fig. 1. *Arbutus pavarii*.



Fig. 2. *Cyclamen rohlfsianum*.





Fig. 3. *Echinops cyrenaicus*.



Fig. 4. *Juniperus phoenicea*.

### **Endemic hotspots noted**

It is clear that a number of sites stand out, from the number of asterisks by the sites listed above: Wadi Ba Al Kashab, Wadi el Kouf, Wadi Mahboul, coast near Susa and the limestone slopes surrounding the old Turkish Kholan Fort. Further detailed investigation would reveal many more species of note, especially earlier in the year and in the autumn when many bulbous species flower (e.g. the endemic *Crocus boulosii* described by Greuter in 1968 flowers in January). Cyrenaica is noted as one of ten Mediterranean Basin hotspots by Medail & Quezel (1997).

## **II. Recommendations and future plans**

### **Future notes planned on collections**

During the identification of the 200-odd species collected, 12 names were at variance with those in the *Flora*. A paper highlighting these nomenclatural and taxonomic issues will be prepared by us in collaboration with Dr Faraj Shaieb of Omar Muktar University, Al Bayda. This reinforces the state of knowledge of the flora and the need for further research and collaboration.

### **New Flora**

At the Environment General Agency, the Head of Environmental Protection, Mr. Essam Bourass indicated to us that he was actively considering how to institute a new project to initiate a new edition of the *Flora of Libya*. This was good news and with three students trained in systematics at the University of Reading in 2007, with a further PhD graduate in 2016, new blood is likely to be forthcoming to carry out the work. It is also pleasing to report that ideas are already forthcoming to undertake the work in the electronic era for use over the Internet, rather than another 16 kg of printed matter.

With the high number of species on Jbel Akhdar, this bodes well for the future of research on the area with its proposed development.

### **Natural Park and its Boundaries**

Consideration was given to the area of the natural park. Surprisingly, no endemics were found at Ras El Tin and the area to the east of Derna. However, examination of the coastal salty vegetation north of Benghazi did reveal the endemic *Salsola cyrenaica* in some good vegetation, even though what appeared to be a lorry disgorging sewerage was observed. The journey made south from Marj (through good barley cultivation with scattered *Juniperus phoenicea*) Fig. 4, and then west to the coast with its spectacular views over the scarp slope to this vegetation would be worth conserving.

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