

Rare and Endangered Succulent Plants in Southwestern Saudi Arabia

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ABSTRACT. The status of endangered succulent plants was evaluated according to their range of distribution in the Southwestern region of Saudi Arabia. Forty seven rare succulent plants are threatened as a result of overgrazing, trampling, road construction, and lack of concern for their conservation. Immediate action is required for the protection of these plants.

Succulent plant species in Southwestern Saudi Arabia are endangered because of disturbances of their natural habitats as a result of overgrazing, road construction, and lack of concern for conservation among the public.

Unless stringent measures are taken, the remaining succulent populations are likely to disappear. In an effort to protect the wildlife the government of Saudi Arabia has recently established the "National Commission for Wildlife Conservation and Development"; we expect that it will play a major role in the conservation of succulent species.

During the last ten years the authors have travelled extensively throughout the region and have collected notes on the distribution and the status of the succulent plants. This paper records the distribution, natural habitats, and elevation of known sites of occurrence of 47 of the most threatened succulents in the southwestern region of Saudi Arabia, and offers proposals on how to preserve and protect such plants.

General Features

The Southwestern region which includes Asir, Jizan, and Najran provinces is the most diverse in terms of topography, climate, and vegetation in the country (Fig. 1). It ranges between sea level and up to 3000 m and is made up of sandy flats, sand dunes, sandy and rocky shores, rolling landscape, rocky hillsides, rocky outcrops, cliffs, escarpments, valleys, ravines, wadis, ponds and waterfalls.

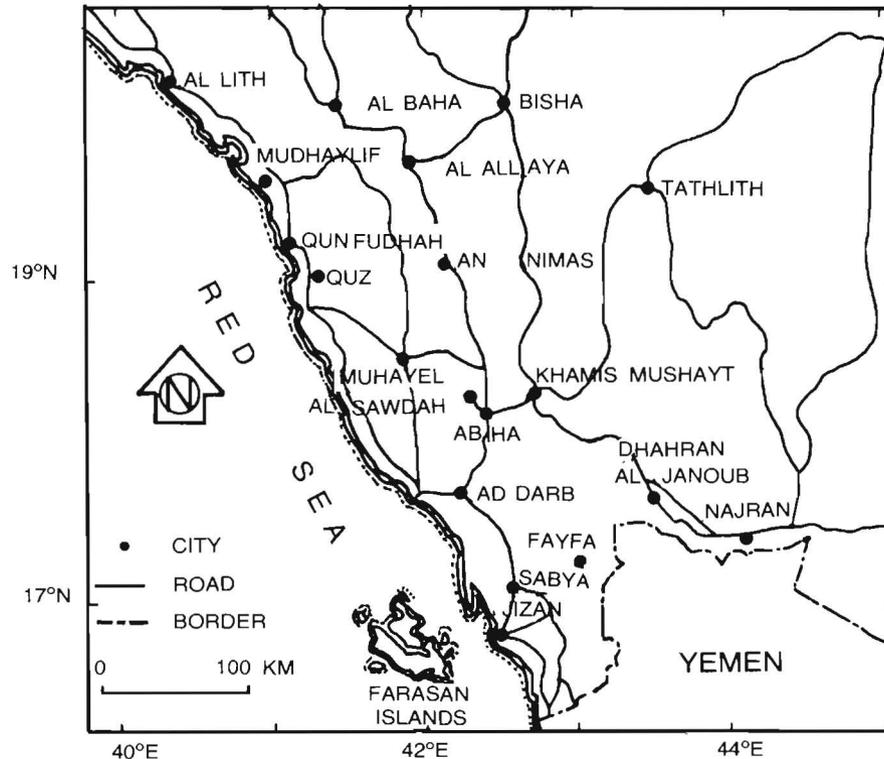


Fig. 1. A map showing the southwestern region of Saudi Arabia

The climate of the region is variable with two pronounced extremes. The first extreme which prevails in lowlands is characterized by a mild winter and hot summer with an average annual rainfall of approximately 310 mm (in Jizan, 130 m above sea level), where sand storms are common during the summer (Abulfatih 1985). The second extreme which is restricted to the highlands is characterized by cold winters with a few freezing nights, and mild summers with an average annual rainfall of approximately 458 mm (in Al Sawdah, 3000 m above sea level). The

rainfall in the whole region is of the monsoon type which falls in heavy short showers scattered throughout the year.

The region maintains the most diverse natural vegetation in the country (Abulfatih 1979, 1981 a,b) with relatively high species diversity and moderate vegetation cover (Vesey-Fitzgerald 1955, Mandaville 1965, Mighaid 1978, Brooks and Mandil 1983, and Abulfatih 1984 a,b, and 1987 a,b). Succulent plant species have been found to be quite prominent within the flora of the region.

Succulents require, in general, less moisture and accordingly they inhabit places which receive water for short periods during the year. They are present along an elevation gradient between sea level and up to 3000 m in many cases they are rare and patchy and difficult to find. Rocky habitats with little soil are favoured by most succulents. However, a few species have been found in hard sandy or hard loamy soils.

Discussion and Conclusion

In southwestern Saudi Arabia indiscriminate destruction of succulent plants is resulting from livestock trampling, opening of new roads, and other impacts of farming, and motor vehicles.

In many cases, succulent plants have been destroyed by people because of their belief that some species are poisonous and cause illness to their livestock.

Unrestricted grazing has resulted in extensive encroachment upon wildlife habitats in the region. In spite of the fact that the rangelands provide only limited forage resources, the number of livestock has substantially increased in recent years as a result of higher demand for meat. This situation is leading to overgrazing of palatable forage species, destruction of succulents, and eventually also to enhancement of the growth of scrub vegetation. Such process is usually accompanied by soil erosion.

Creation of new farms or expansion of the old ones is occurring at the expense of the natural areas. The process of constructing a network of roads in the southwestern region is causing destruction of vast natural areas.

Efforts are now required to protect succulent plant communities in their natural habitats. This can be accomplished by fencing and guarding a number of representative communities. Moreover, simulated habitats for succulents can be easily established in rocky gardens or greenhouses in research centres at appropriate sites. Rare and endangered succulents can then be transferred to such

sites for protection, study, and propagation. There are many excellent opportunities for such action to be taken by various governmental bodies such as research institutes, universities, the national commission for wildlife conservation and development, and ministry of agriculture and water.

Enumeration of the Study Plants

Forty seven species of rare and endangered succulent plants are now reported in this paper. The species are alphabetically arranged in their relevant families. A brief note on the distribution, habitat, and elevation is given. Some of the succulents which were not encountered by the authors in nature are quoted from Collenette (1985), and are indicated by asterisks.

AIZOACEAE

Delosperma harazianum (Defl.) Popp. & Ihl.

Jabal Al Sawdah, 28 km NW of Abha, 2743 m; Raida 50 km NW of Abha; in crevices on cliffs.

ASCLEPIADACEAE

Caralluma commutata Berger

Muhayel, 366 m, on rocky and loamy dry soil; Wadi Al Sudr, 44 km SSE of Abha, 1158 m, on loamy dry soil.

****Caralluma deflersiana*** Lavr.

Near Al Ardah, SE of Jizan, in the shade of bushes, 244 m.

****Caralluma edulis*** (Edgew.) Benth.

Jabal Mershid, 40 km east of Al Qunfudhah, in sandy wadi, 15 m.

****Caralluma eremastrum*** Swartz

Jabal Fayfa, 100 km NE of Jizan, among rocks on well vegetated hillside, 1524 m.

Caralluma penicillata (Defl.) N.E.Br.

Wadi Al Uss NW of Jabal Al Sawdah, among rocks, 1615 m; Raida village 50 km NW of Abha; Wadi Al Sudr, 44 km SSE of Abha, 1158 m.

Caralluma petraea Lavr.

Near Suq Al Ithnayn, 58 km SE of Abha, in rocky ground, 2286 m; near

Muhayel, in loamy soil of rocky habitat, 366 m; 40 km south of Dhahran Al Janoub, in rocky habitat, 1890 m.

Caralluma plicatiloba Lavr.

Around the College of Education, 14 km east of Abha, in rocky habitat, 1890 m; Wadi Al Uss, NW of Jabal Al Sawdah, in rocky habitat, 1615 m; Wadi Al Sudr, 44 km SSE of Abha, in rocky habitat, 1158 m.

Caralluma quadrangula (Forssk.) N.E.Br.

Wadi Al Uss, NW of Jabal Al Sawdah, in rocky habitat, 1615 m; around the College of Education, 14 km east of Abha, in rocky habitat, 1890 m; 22 km east of Abha, along Abha-Khamis Mushayt road, in rocky areas, 1890 m.

Caralluma russeliana (Courb. ex Brongn.) Cufod.

A number of patches were found between Ahad Rufaida and Dhahran Al Janoub, in rocky habitat, 1981 m.

Caralluma shadhbana Lavr.

Muhayel, Jeddah-Jizan road, in hard sand under scattered acacias, 366 m; Wadi Al Uss NW of Jabal Al Sawdah, in open sandy soil, 1524 m.

Caralluma shadhbana Lavr. var. ***barhana*** Lavr.

On the Abha-Najran road, 45 km south of Dhahran Al Janoub, in crevices of a limestone outcrop, 1890 m; Muhayel, in the shade of *Acacia nubica* Benth., in loamy soil, 366 m.

Caralluma subulata (Forssk.) Decne.

Muhayel, on the Jeddah-Jizan road, in gravelly sand under acacias, 366 m.

Caralluma wissmannii Schwartz

Jabal Sharda, a granite mountain west of Baljurashi, among rocks, 2134 m; Wadi Al Uss, NW of Jabal Al Sawdah, in rocky habitat, 1585 m.

****Duvalia sulcata*** N.E.Br.

Near the junction of Jeddah-Jizan road, on rocky hillsides, 762 m.

Duvalia sulcata N.E.Br. var. ***semi-nuda*** Lavr.

Muhayel, Jeddah-Jizan road, on stony ground at the base of an acacia tree, 366 m.

****Duvalia velutina*** Lavr.

Near Abu Arish, east of Jizan, in hard sand, under the shade of bushes, 152 m.

Huernia* sp. nov. aff. *boleana Gilb.

Near Wadi Wejj, 25 km SW of Taif, among rocks on a rather barren hillside, 1829 m; Tanuma, 120 km north of Abha, in rocky habitat.

****Huernia lodarensis*** Lavr.

Near Jabal Manfah, 50 km NNW of Najran, among rocks, 1890 m.

Huernia saudi-arabica D.V. Field

Al Mugadh, between Abha and Jabal Al Sawdah, on steep rocky hillside, near a waterfall, 2590 m; Dalaghan National Park, 33 km SE of Abha, in rocky habitat, 2150 m.

Rhytidocaulon sheilae D.V. Field

15 km SE of Khamis Mushayt, on a granite outcrop, 1829 m; Muhayel, in loamy soil, under bushes, 366 m.

COMPOSITAE

****Kleinia pendula*** (Forssk.) Sch. Bip.

Jabal Fayfa, 100 km NE of Jizan, on steep rocky hillside, in light shade, 1615 m.

CRASSULACEAE

Crassula alba Forssk.

Jabal Al Sawdah, 28 km NW of Abha, in crevices on the lip of the escarpment, 2804 m.

Kalanchoe alternans (Vahl.) Pers.

Between Khamis Mushayt and Suq Al Ithnayn, among pink granite rocks, 2286 m; around the College of Education, 14 km SE of Abha, in rocky habitat, 1890 m.

Kalanchoe citrina Schweinf.

Wadi Al Uss, on the western slope of Jabal Al Sawdah, NW of Abha, among shrubs, in rocky habitat, 1067 m.

**Kalanchoe crenata* (Andr.) Haw.

Jabal Fayfa, 100 km NE of Jizan, on steep rocky slope, among bushes, 1463 m.

**Kalanchoe* sp. aff. *glaucescens* Brit.

Aqabat Dhila, along the road to Jizan, halfway down the escarpment, on rocky hillside, among shrubs, 1219 m.

Kalanchoe sp. aff. *laciniata* DC.

Wadi Al Uss, on the western side of Jabal Al Sawdah, 28 km NW of Abha, among rocks and bushes, 975 m.

Kalanchoe lanceolata (Forssk.) Pers.

Wadi Al Uss, in rocky habitat among shrubs, 1069 m; Wadi Al Sudr, 44 km SSE of Abha, among bushes, 1158 m.

Sedum hispanicum L.

Jabal Al Sawdah, 28 km NW of Abha, in a rock crevice on the lip of the escarpment, 2743 m.

Umbilicus horizontalis Boiss. var. *intermedius* Boiss.

15 km NW of Abha on the road to Al Sawdah, in crevices, 2134-2743 m.

EUPHORBIACEAE

**Euphorbia ammak* Schweinf.

Jabal Fayfa, 100 km NE of Jizan, among rocks, 1524 m.

Euphorbia cactus Ehrenb.

Jabal Mershid, 40 km east of Al Qunfudhah, in hard sand, 15 m; Raidah (Wadi Ghaithan) 50 km NW of Abha, on rocky hillside.

Euphorbia fractiflexa S. Carter & J.R.I. Wood

Between Mudhaylif and Muhayel, Jeddah-Jizan road, on sandy plain, 366 m.

Euphorbia inarticulata Schweinf.

12 km SW of Jabal Abu Hassan, SE of Abha, on rocky hillside, 914 m; Muhayel, among shrubs of *Acacia nubica* Benth., in rocky and loamy soil, 366 m.

Euphorbia schimperi Presl.

North of Talha on the Abha-Najran road, on barren rocky hillside, 2134 m; Wadi Al Uss NW of Al Sawdah mountain, on a steep hillside, 1069 m; Wadi Al Sudr, 44 km SSE of Abha, in a rocky habitat, 1158 m.

Euphorbia triaculeata Forssk.

Wadi Maraba, Abha-Jizan road, in a rocky ravine, 610 m.

LILIACEAE

****Aloe castellorum*** J.R.I. Wood

Jabal Fayfa, 100 km NE of Jizan, among rocks, 1615 m.

Aloe fleurentinorum Lavr.

Jabal Abu Hassan, on sandstone between Abha and Najran, 1676 m; Raida, 50 km NW of Abha, on sandy soil and rocky hillside.

Aloe* sp. aff. *neibuhriana Lavr.

Wadi Al Uss, on the western slope of Jabal Al Sawdah NW of Abha, among boulders, 762 m; Rijal Alma, Riz escarpment and Wadi Ksan, NW of Al Sawdah, in a rocky habitat 1067-1524 m.

Aloe rubroviolacea Schweinf.

Jabal Al Sawdah, 28 km NW of Abha, on sandstone cliffs, 2804 m; Riada, 50 km NW of Abha, on rocky cliffs and escarpments, 2743 m.

Aloe sabaea Schweinf.

5 km SW of Muhayel on the road to Ad Darb, among volcanic boulders, 366 m; Wadi Al Sudr, 44 km SSE of Abha, in rocky habitat, 1158 m; Raida, 50 km NW of Abha, on rocky cliffs and escarpments, 2438-2743 m.

****Aloe sheilae*** Lavr.

83 km ESE of Al Bahah and 72 km west of Bishah, in rocky habitat, 1615 m.

Aloe* sp. aff. *tomentosa Defl.

Near Suq Al Ithnayn, 58 km SE of Abha, on a sandstone plateau, 2408 m; around the College of Education, 14 km east of Abha, rocky habitat, 1860 m; Wadi Al Uss NW of Al Sawdah Mountain, in rocky habitat, 1050 m; Yadhah escarpment, 40 km SSE of Abha, in rocky habitat.

***Aloe vacillans* Forssk.**

14 km east of Abha, on a rocky hillside, 1890 m; Yadla escarpment, 40 km SSE of Abha, in a rocky habitat.

***Aloe vera* (L.) Burm.f. var. *officinalis* Forssk.**

Jeddah-Muhayel-Jizan road, on sandy plain, 366 m.

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النباتات العصارية النادرة والمهددة بالانقراض في الجنوب الغربي للمملكة العربية السعودية

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قسم علوم الحياة - كلية التربية - جامعة الملك سعود - فرع أبها - ص. ب. ٩٣٢ - أبها
المملكة العربية السعودية

خلال دراسة امتدت لعشرة سنوات، أمكن التعرف على ٤٧ نوعاً من النباتات العصارية في الجنوب الغربي للمملكة العربية السعودية. ولوحظ خلال فترة الدراسة تناقص أعداد هذه النباتات واختفائها من بيئات عديدة، ويعزى ذلك إلى عوامل مختلفة، أهمها فتح شبكات واسعة للطرق، وتحويل مساحات من الأرض الطبيعية إلى مزارع، وإزالة العديد منها من قبل الأهالي لاعتقادهم بأنها تسمم حيواناتهم الأليفة، أو لإتلاف المواشي والأغنام لها أثناء رعيها بصورة مكثفة في البيئات الطبيعية.

تنتمي هذه الأنواع العصارية إلى ست فصائل نباتية هي الآتي مرتبة حسب أهميتها من حيث عدد الأنواع: الفصيلة الاسكليبادية (٢٠)، والفصيلة الكرسولوية (١٠)، والفصيلة الليلية (٩)، والفصيلة اليوفورية (٦)، والفصيلة الأيزوية (١)، والفصيلة المركبة (١). يوجد الكثير من هذه النباتات على سفوح الجبال وعلى المنحدرات الصخرية في منطقة تهامة، تحت ظروف مناخية دافئة أو معتدلة، وفي بيئات تصلها مياة الأمطار أو السيول لفترات قصيرة خلال أيام السنة.

يوصي الباحثان بضرورة اتخاذ إجراءات عاجلة لحماية هذه النباتات وذلك بإنشاء محميات في البيئات الطبيعية، ومحاولة تكثيرها بالطرق العلمية في البيوت المحمية وفي المختبرات حفاظاً عليها من الانقراض.