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Short Communication

A new taxon of *Sideroxylon mascatense* in Oman

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Abstract: A new subspecies of *Sideroxylon mascatense* (A.DC.) T.D.Penn. in the Western Hajar Mountains, differing from the type subspecies in the colour of the mature fruit, is described. The two colour forms are genetically isolated, showing that these two are distinct taxa.

Keywords: *Sideroxylon mascatense*, Oman, Western Hajar Mountains

1. Introduction

Sideroxylon mascatense (A.DC.) T.D.Penn. is distributed from SW Pakistan to NE Africa. It is present in Afghanistan and Baluchistan (Pakistan), Oman, Saudi Arabia, and Yemen in the Arabian Peninsula, and in Djibouti, Ethiopia, and Somalia in NE Africa [1–7]. It is typically a shrub or large tree found from 550–2100 m (meters) in its native range of distribution. In Oman, populations occur above 1000 meters in the Hajar Mountains in northern Oman and in the Dhofar mountains in southern Oman [4,8].

Two fruit colour forms, black and yellowish-brown (at maturity), are found in the populations of *Sideroxylon mascatense*. In Pakistan and Afghanistan, the fruit is described as black in colour [5,6], while in Ethiopia and Somalia, the fruit is described as yellowish-brown [3,9]. Chaudhary [1] does not give the colour of fruit; he notes that the Saudi Arabian plants belong to subsp. arabica Chiov., but we have not been able to locate the publication where that subspecies may have been described. Both the black and the yellowish-brown forms coexist in Oman [4,10,11] and are well known by the local habitants of the Western Hajar mountains. The yellowish-brown form is known as "hegimt" and the black form as "būt" (Arabic), a name also used for the *Sideroxylon mascatense* plant in general. The distribution of *Sideroxylon mascatense* in the Western Hajar mountains is shown in Figure 1.

Research on population genetics of *Sideroxylon mascatense* showed a significant level of genetic differentiation between the two forms. Cluster analysis showed two main clades, one with mostly specimens of black coloured fruit, and the other with mostly specimens of yellowish-brown coloured fruit [12]. Morphologically, mature fruit colour is the only trait that visibly distinguishes the two forms.

2. Materials and Methods

A detailed study of the morphology of *Sideroxylon mascatense* was performed during a larger study on its population genetics and distribution, and its associated plant communities in Oman [8]. This included surveying 114 quadrats in the Western Hajar Mountains. Out of a total of 513 specimens of *Sideroxylon mascatense* studied, only 172 had mature fruit. Of these, 158 specimens had black fruit and 14 had yellowish-brown fruit. The population genetics of the samples was analysed by AFLP fingerprinting (see details in [12]. The yellowish-brown form was genetically distinct from the black form and is described here as a new taxon.

In the protologue of *Monotheca mascatensis* (basionym of *Sideroxylon mascatense* (A.DC.) T.D.Penn.) Candolle describes the fruit as immature and does not give any colour

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… "bacca immature 3 lin. longa, ovoidea-globosa." (A.DC., Prodr. [A. P. de Candolle] 8: 152 1844 – type from Mascate, *Aucher-Éloy* 4916 & 4917, G-BOISS !, K !). Our fieldwork showed that the black fruit form is the more common of the two; we are, therefore, maintaining the black fruit form as the type subspecies.

3. Description and Taxonomic Treatment

Sideroxylon mascatense (A.DC.) T.D.Penn. subsp. **hajarense** E.Hopkins, R.Al-Yahyai, & Ghaz., subsp. nov.

TYPE: Sultanate of Oman, Western Hajar Mountains, Saiq Plateau, 1914 m, N23° 4' 0.4188" E57° 37' 39", 30 June 2021, E. Hopkins 518 (ON, holo.; E, K, iso.). Figure 2.

Morphologically, subsp. *hajarense* differs from the type subsp. *mascatense*, primarily in the yellowish-brown colour of fruit at maturity as opposed to the mature black fruit of the type subspecies.

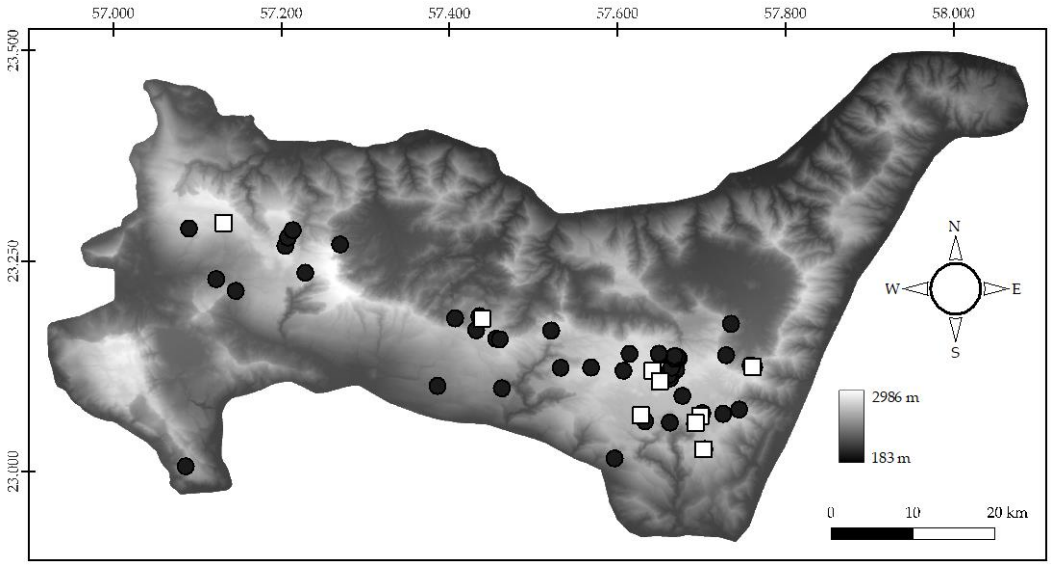

Figure 1. Distribution of *Sideroxylon mascatense* subsp. *mascatense,* represented by black dots, and *Sideroxylon mascatense* subsp. *hajarense,* represented by white dots, on the Western Hajar mountains of Oman.

3.1. Description

Large evergreen woody shrub up to 2 m tall, spreading up to 2.4 m in width. Bark grey, mealy, lateral branches ending in spines. Leaves alternate, 5.8–4.2 × 3.2–12 mm (millimeters), oblong-ovate to spatulate, base tapering into a short petiole 1–2.5 mm, margins entire; lamina grey-green above, grey-green-sericeous beneath or glabrous. Flowers pale yellow, in axillary clusters, sessile, 3.9–4.5 mm across. Sepals 5-lobed, sericeous. Petals 5-lobed. Stamens exserted. Fruit a fleshy berry, globose, 10–11.5 mm in diameter, with a short apical point, 1-seeded, yellow-brown when ripe, edible (Figs. 2, 3).

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Figure 2. *Sideroxylon mascatense* subsp. *hajarense* at 1914 m elevation on Jebel Akhdar in the Western Hajar Mountains of Oman.

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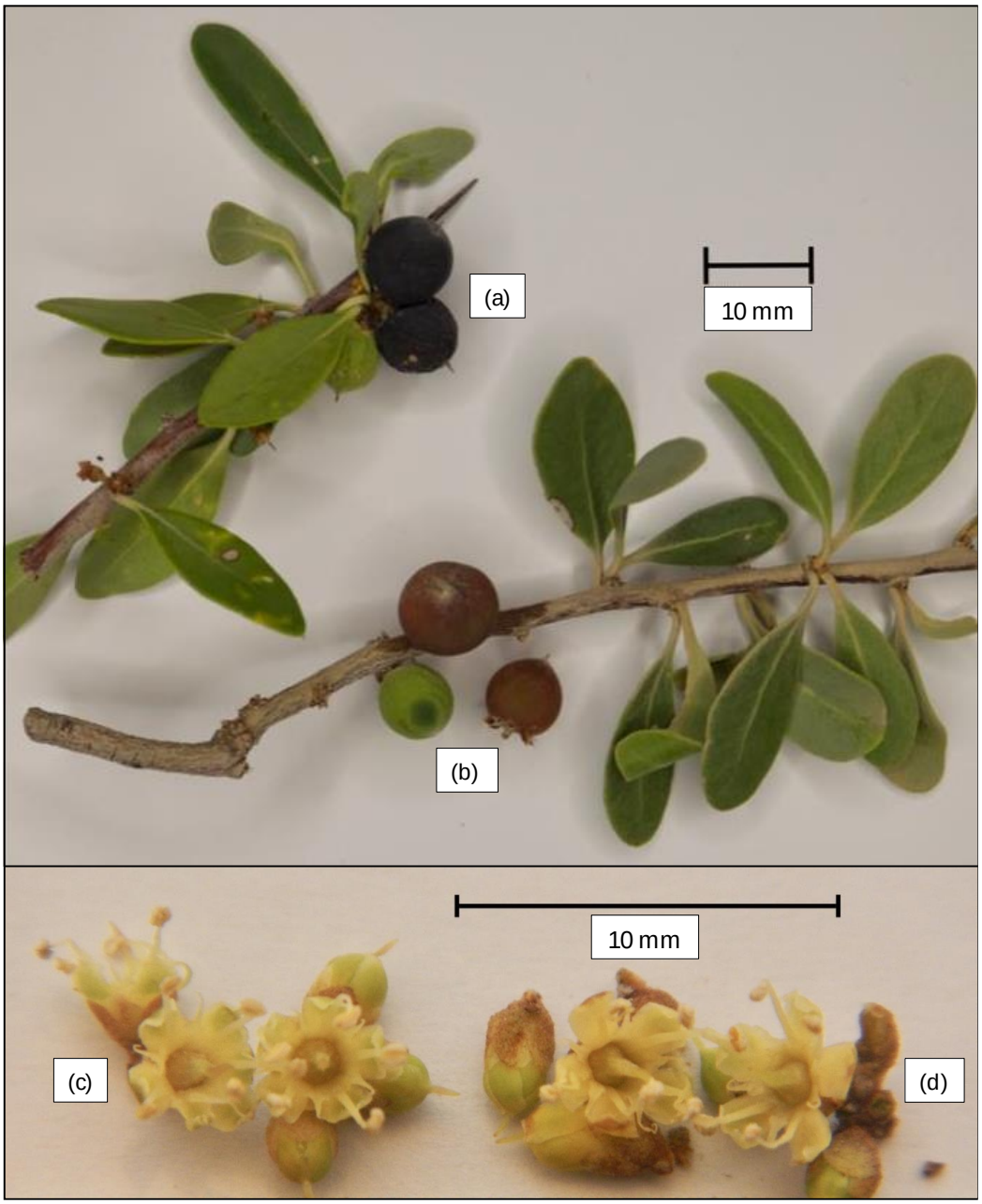

Figure 2: (a) Fruit of *Sideroxylon mascatense* subsp. *mascatense*. (b) fruit of *Sideroxylon mascatense* subsp. *hajarense*. (c) Flowers of *S. mascatense* subsp. *mascatense*. (d) flowers of *S. mascatense* subsp. *hajarense*.

3.2. Habitat

Rocky hillside with sparse vegetation of small to medium shrubs, woody and herbaceous perennials on rocky clay soil with boulders and exposed rock face. Growing alongside *Vachellia gerrardii* subsp. *negevensis* (Zohary) Ragup., Seigler, Ebinger & Maslin, *Ziziphus hajarensis* Duling, Ghaz. & Prend., and *Olea europaea* subsp. *cuspidata* (Wall. & G.Don) Cif.

3.3. Phenology

Flowering January through July; fruiting April through September. Observations based on many field trips throughout the Western Hajar Mountains.

3.4. Etymology

The new subspecies is named after the Hajar mountains, where it is found and which is also the type locality.

4. Discussion

The new subspecies is representative of the larger community of *Sideroxylon mascatense* in the Western Hajar Mountains of Oman. The overall size and canopy architecture of specimens vary depending on water availability and grazing pressures. Specimens are known to grow to heights exceeding 4 m and grow gregariously, sometimes growing in clusters exceeding 4 m in width. Leaves vary in morphology due to water availability and grazing pressures. The more heavily-grazed lower branches have much smaller leaves and are heavily armed with spines, while the growth on the tops of the trees out of the reach of grazing animals has larger leaves and fewer spines. The fruit of *Sideroxylon mascatense* can vary from 6–19 mm in diameter, depending on water availability. Specimens of *Sideroxylon mascatense* subsp. *mascatense* dominate the communities with *S. mascatense* subsp. *hajarense* occurring less frequently.

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Conflicts of Interest: The authors declare no conflict of interest.

References

1. Chaudhary, S.A. Sapotaceae. In *Flora of the Kingdom of Saudi Arabia Vol. 1*; Ministry of Agriculture and Water: Riyadh, 1998; Vol. 1, p. 546.
2. Anderberg, A.A.; Swenson, U. Evolutionary Lineages in Sapotaceae (Ericales): A Cladistic Analysis Based on *Ndh*F Sequence Data. *Int. J. Plant Sci.* **2003**, *164*, 763–773, doi:10.1086/376818.
3. Friis, I. Sapotaceae. In *Flora of Ethiopia and Eritrea Vol. 4 (1)*; Hedberg, I., Edwards, S., Sileshi, N., Eds.; Uppsala University: Uppsala, Sweden, 2003; Vol. 4 (1), pp. 54–63 ISBN 9789197128551.
4. Ghazanfar, S.A. *Flora of Oman Vol. 1*; National Botanic Garden of Belgium: Meise, 2003; ISBN 90-72619-55-2.
5. Breckle, S.-W.; Rafiqpoor, M.D. *Field Guide Afghanistan: Flora and Vegetation.*; Scientia Bonnensis : New York, NY, USA, 2010; ISBN 3940766305.
6. Khan, N.; Ahmed, M.; Wahab, M.; Ajaib, M.; Hussain, S.S. Studies Along an Altitudinal Gradient in *Monotheca Buxifolia* (Falc.) A.D, Forest, District Lower Dir, Pakistan. *Pak J Bot* **2010**, *42*, 3029–3038.
7. Van-Breugel, P.; Friis, I.; Demissew, S. The Transitional Semi-Evergreen Bushland in Ethiopia: Characterization and Mapping of Its Distribution Using Predictive Modelling. *APPL VEG SCI* **2016**, *19*, 355–367, doi:10.1111/avsc.12220.
8. Hopkins, E. Population Genetics, Distribution, and Associated Plant Communities of *Sideroxylon Mascatense* in Oman. Unpublished Doctoral Dissertation,Sultan Qaboos University, Muscat, Oman, 2021.
9. Thulin, M. *Flora of Somalia: Vol. 3*; Royal Botanic Gardens, Kew: Edinburgh, 2006; ISBN 1842460994.
10. Al-Yahyai, R.A.; Al-Nabhani, H.S. Botanical Description and Phenological Cycles of *Monotheca Buxifolia*. *Acta Hortic.* **2008**, *769*, 247–254.
11. Hopkins, E.; Al-Yahyai, R. *Sideroxylon Mascatense*: A New Crop for High Elevation Arid Climates. *JAMS* **2020**, *25*, 02–08, doi:10.24200/jams.vol25iss1pp02-08.

12. Hopkins, E.; Al-Yahyai, R.; Al-Sadi, A.M.; Al-Subhi, A. Population Structure of Two Morphotypes of *Sideroxylon Mascatense* (A.DC.) T.D.Penn. in Oman. *Genet. Resour. Crop Evol.* **2021**, *68*, 1299–1308, doi:10.1007/s10722-020-01105-0.