

TAXONOMIC REVIEW AND PHYLOGENETIC INVESTIGATIONS OF LAVANDULA FROM IRAN AND OMAN

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A review of the native Iranian species of *Lavandula* is presented, including the first recorded occurrence of *L. pubescens*, new distribution records for *L. coronopifolia*, and a detailed description and observations of the poorly known endemic *L. sublepidota*. The phylogenetic relationships of several taxa, including *Lavandula sublepidota* and *L. hasikensis* from Oman, are investigated for the first time using molecular data (*matK* and ITS regions), and changes to the sectional classification are proposed.

Keywords. Iran, *Lavandula hasikensis*, *Lavandula nooruddinii*, *Lavandula pubescens*, *Lavandula sublepidota*, Oman, phylogeny.

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Introduction

Lavandula L. (Lamiaceae, the lavenders) is a genus of more than 40 species most closely related to *Ocimum* Tourn. ex L. (the basil) in the tribe Ocimeae Dumort. and subtribe Lavanduleae Endl. (Harley *et al.*, 2004). An Old World genus, it is found from the North Atlantic Islands to India, with diversity hotspots in the Canary Islands, North Africa, the Arabian Peninsula and Northeast Africa. The most recent monograph recognised 39 species classified into three subgenera and eight sections (Upson & Andrews, 2004). Since then, new species have continued to be recognised from southern Italy (Passalacqua *et al.*, 2017) and Oman (Patzelt & Al Hinai, 2019), and some subspecies have been raised to species rank, for example *Lavandula luisieri* (Rozeira) Rivas Mart. from Portugal.

Sections *Pterostoechas* Ging., *Subnudae* Chaytor and *Hasikenses* Upson & S. Andrews are represented in the Iranian and Oman floras, with members of sect. *Subnudae* centred on the Arabian Peninsula, tropical Northeast Africa and Southwest Asia and collectively accounting for c.40% of the species. These sections are distinguished by their single-flowered cymes and dissected or lobed leaves, and many are woody-based shrubs associated with arid environments. Related to these are the Indian species classified in sect. *Chaetostachys* Benth.

Members of *Pterostoechas*, *Subnudae* and *Hasikenses* are distinct from most other lavenders, which are well known as garden plants and grown for their aromatic essential oils, used primarily in perfumery and aromatherapy and for culinary purposes (Upson, 2003; Upson & Andrews, 2004; Meftahizade *et al.*, 2011; Lesage-Meessen *et al.*, 2015). These oils

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also have antimicrobial, antifungal and antioxidant activity, and the taxa of interest in the present study have also been investigated for their oils and their potential uses (El-Garf *et al.*, 1999; Ansari *et al.*, 2014; Rashed *et al.*, 2016).

Two species, *Lavandula coronopifolia* Poir. (synonym *L. stricta* Delile) and *L. sublepidota* Rech.f., had previously been recorded in the *Flora of Iran* (Rechinger, 1982; Jamzad, 2012). Fieldwork in Bushehr Province, southern Iran, discovered two unrecorded populations of *Lavandula pubescens* Decne. Both *Lavandula coronopifolia* and *L. pubescens* belong to sect. *Pterostoechas* (Upson & Andrews, 2004), with the single-flowered cymes borne in a decussate arrangement.

Lavandula sublepidota was described from southern Iran, Fars Province (Rechinger, 1979) and later reported from Hormozgan (Jamzad, 2012). Fieldwork presented here has expanded knowledge of its ecology, conservation status and key morphological features. The sectional relationships of this species have been problematic, with it originally having been placed in sect. *Pterostoechas* (Rechinger, 1979, 1982) and later in a new section, *Hasikenses*, together with *Lavandula hasikensis* A.G.Mill. from southern Oman, on the basis of shared bract morphology and spirally arranged cymes (Upson & Andrews, 2004).

The most recent molecular phylogenetic study of *Lavandula* sampled 30 taxa but did not include sect. *Hasikenses* (Moja *et al.*, 2016). In the present study, we investigated the phylogenetic relationships of *Lavandula sublepidota*, *L. hasikensis* (sect. *Hasikenses*), the recently described *L. nooruddinii* A.Patzelt & A.Al Hinai from Oman (sect. *Subnuda*), and the regional taxa in sect. *Pterostoechas*.

Materials and methods

Fieldwork and plant materials

Materials of *Lavandula pubescens* were collected from Bushehr Province, south Iran, in October 2017 and April 2018 and deposited in the MIR herbarium. *Lavandula coronopifolia* was studied using herbarium specimens deposited in MIR. Specimens of *Lavandula sublepidota* were collected in vegetative, flowering and fruiting states during three field trips to Fars Province, south Iran, from April to June 2018.

The species of *Lavandula* from the flora of Oman, including *L. dhofarensis* A.G.Mill. and *L. macra* Baker, were collected during a short field expedition to Dhofar, southern Oman, in November 2018. The leaves of *Lavandula hasikensis*, *L. nooruddinii* and *L. subnuda* Benth. were sampled from the herbarium of OBG and those of *L. samhanensis* Upson & S.Andrews from ON. Herbarium acronyms follow Thiers ([continuously updated](#)).

Morphological analysis

Material was identified by reference to the taxonomic literature (Rechinger, 1982; Collenette, 1985; Upson, 2003; Upson & Andrews, 2004; Jamzad, 2012; Ghazanfar, 2015). Additionally,

photographs were checked against images available in the online databases of G, K, P and W, including those of types (Thiers, [continuously updated](#)). For morphological studies, vegetative and the floral parts of herbarium specimens were examined. Measurements were taken from at least 10 specimens, using an Olympus SZ40 Stereo Microscope (Olympus, Tokyo, Japan).

Molecular and phylogenetic analysis

Genomic DNA of *Lavandula* was isolated from herbarium material by using a DNeasy Plant Mini Kit (Qiagen, Hilden, Germany). The *matK* region was amplified for *Lavandula sublepidota* and *L. hasikensis* in two parts by using the primer pair 3914F/1235R and following Johnson & Soltis (1995), and in the middle part by using nearly universal primers for angiosperms, namely 390F (5'-CGATCTATTCATTCAATATTTC-3') and 1326R (5'-TCTAGCACACGAAAGTCGAAGT-3'), which amplify 930 base pairs between positions 429 and 1313 of the *matK* sequence (Sun *et al.*, 2001). This region was amplified by polymerase chain reaction, using 30 cycles (each of 90 s of denaturation at 94°C, 2 min of annealing at 48°C and a 3-min extension at 72°C), followed by a 15-min final extension.

Amplification of the ITS region (ITS1, 5.8S gene and ITS2) was performed for *Lavandula coronopifolia*, *L. dhofarensis*, *L. hasikensis*, *L. macra*, *L. nooruddinii*, *L. pubescens*, *L. samhanensis*, *L. sublepidota* and *L. subnuda*, following the protocol in Blattner (1999) using primers ITS-A and ITS-B. For each data set, a master mix was created comprising 8 µL of deionised water, 10 µL of the 2× Taq DNA Polymerase Master Mix Red (Ampliqon, Odense, Denmark; catalogue no. 180301; Tris-HCl pH 8.5, (NH₄)₂SO₄, 3 mM MgCl₂, 0.2% Tween 20, 0.4 mM of each dNTP, 0.2 units/mL Ampliqon Taq DNA polymerase, inert red dye and stabiliser), 0.5 µL of each primer (50 pmol/µL) and 1 µL of template DNA, for a final volume of 20 µL. Additional sequences of *Lavandula* species for each data set (Moja *et al.*, 2016) were obtained from the National Center for Biotechnology Information (NCBI) nucleotide database and included in the analyses.

All the nucleotide sequences were aligned using the BioEdit sequence alignment editor version 7.2.5 (Hall, 1999). All *matK* and ITS sequences generated in this study were stored in the NCBI nucleotide database ([Appendix](#)). The best-fitting model of sequence evolution was estimated to be GTR+I for *matK* and GTR+G for ITS with the Akaike information criterion in jModelTest 2.0 (Darriba *et al.*, 2012). Bayesian analysis was performed with MrBayes 3.1 (Ronquist & Huelsenbeck, 2003) for each individual data set, running two analyses for 5 × 10⁶ and 2 × 10⁶ generations for the *matK* and ITS matrices, respectively, sampled every 1000 generations. The first 25% of the trees were discarded as burn-in, and posterior probabilities calculated on the basis of the remaining trees. Trees were drawn by using FigTree version 1.3.1 (Rambaut, 2006–2009).

Assessment of conservation status

The categories and criteria of the International Union for Conservation of Nature (IUCN, 2012) were used to evaluate threat levels for *Lavandula* species distributed in Iran. We used the occurrence data for our taxa in GeoCAT (GeoCAT, no date) to determine conservation priorities (Bachman *et al.*, 2011).

Results

The recent phylogenetic analysis of Moja *et al.* (2016), based on the *matK* gene, provided the base tree to which we added *Lavandula sublepidota* and *L. hasikensis* (Figure 1). Although we were unable to amplify the entire gene region (1313 out of 1653 bp were amplified), the general topology of our tree and the grouping of the sections were similar to those in the previous study's tree. However, the proposed relationship between *Lavandula sublepidota* and *L. hasikensis* was not supported, with both species being within the *Subnudae* clade. The Bayesian analysis did suggest a relationship between *Lavandula sublepidota* and the Indian species *L. bipinnata* Kuntze (sect. *Chaetostachys*); however, this was with low support (posterior probability, 0.66). The phylogenetic tree placed *Lavandula hasikensis* close to *L. samhanensis*, with strong support (see Figure 1), their *matK* sequences being identical.

Although fewer ITS sequences were available, we carried out a molecular phylogenetic analysis to further elucidate relationships. This indicated a closer relationship between *Lavandula hasikensis* and *L. dhofarensis* than between the former and *L. samhanensis*, and as with the *matK* analysis, no close relationship between *L. sublepidota* and *L. hasikensis* (*L. bipinnata* was not sampled) (Figure 2). The recently described *Lavandula noorudinii* (Patzelt & A.Al Hinai, 2019) was included in a molecular analysis for the first time, confirming its classification in sect. *Subnudae*.

Taxonomic treatment and conservation assessments

Lavandula coronopifolia Poir., Encycl. Meth. Bot. 3: 308 (1813). – Type: Egypt, dans le Desert de Suez, Val de l'Egaremont, *Delile s.n.* (lectotype P; isolectotype K, P). Figure 3.

Description. See Rechinger (1982), Upson & Andrews (2004) and Jamzad (2012).

Phenology. Flowers February to April, fruits March to May.

Distribution. Occurring from the Cape Verde Islands, across northern Africa, western Asia and the western Arabian Peninsula to southern Iran (Upson & Andrews, 2004). This is the most widespread distribution of any *Lavandula* species. In Iran, *Lavandula coronopifolia* was previously known from Hormozgan and Bushehr Provinces, and this study extends this to Kerman Province further to the east (Figure 4).

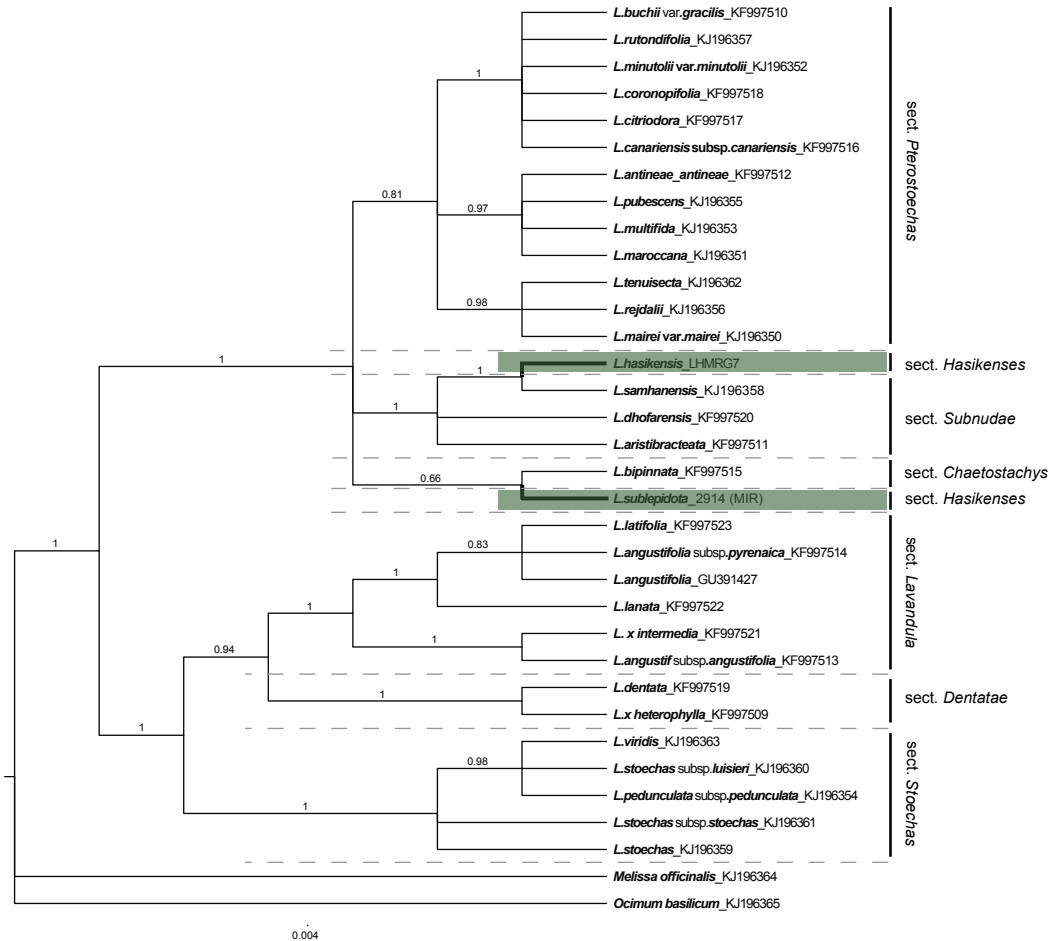


Figure 1. Bayesian consensus tree based on *matK*. *Lavandula hasikensis* and *L. sublepidota* (both sect. *Hasikenses*) are indicated in green. Data above the branches are posterior probability values from Bayesian inference.

Habitat and ecology. The distribution pattern of this species follows that of the Sahara-Arabian floristic region of Iran (Zohary, 1973). It typically grows on stony slopes, along river margins and at the edges of farms and cultivated areas (Jamzad, 2012).

Conservation status. *Lavandula coronopifolia* has an extent of occurrence (EOO) of 53,467 km² (an estimate based on previous records of this species; Jamzad, 2012) and an area of occupancy (AOO) of 3200 km² in Iran. It is treated as Near Threatened (NT) in Iran, and Least Concern (LC) globally.

Ethnobotany. No uses are recorded in Iran or elsewhere.

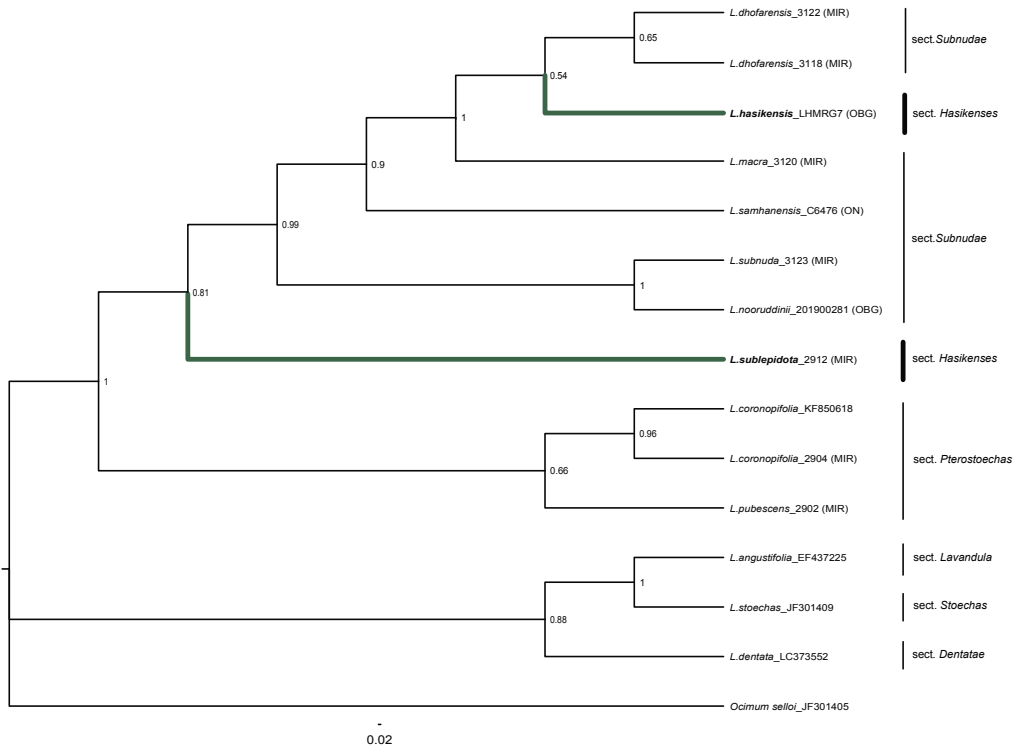


Figure 2. Bayesian consensus tree based on ITS data. Posterior probability values are shown beside the nodes. *Lavandula hasikensis* and *L. sublepidota* (both sect. *Hasikenses*) are indicated in green.

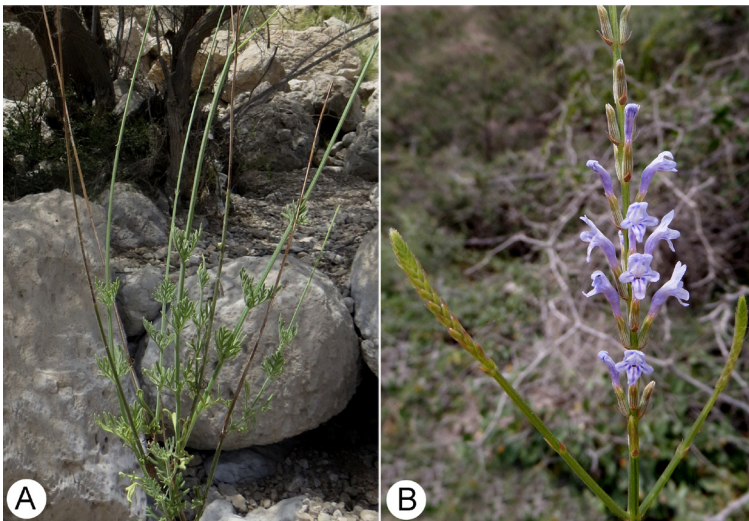


Figure 3. *Lavandula coronopifolia*. A, Habit and base; B, inflorescence. Photographs: A, M. Mirtadzadini; B, M. Doostmohammadi.



Figure 4. Distribution of *Lavandula* in Iran: *L. coronopifolia* (circles), *L. pubescens* (diamond) and *L. sublepidota* (triangle).

Specimens examined. IRAN. South, Hormozgan Province: Gavbandi, 18 iii 1998, Jaafari & Qasemi 2906 (MIR); NW of Bandar-e Abbas, Mt Genu, 27.368608°N [27°22'06.99"N], 56.162597°E [56°09'45.35"E], 1 v 2015, Mirtadzadini 2904 (MIR); Kerman Prov., Mijan, 3 v 2000, Mirtadzadini 2905 (MIR).

Recorded as *Lavandula stricta* in *Flora Iranica* (Rechinger, 1982) and *Flora of Iran* (Jamzad, 2012), the accepted name by priority is *L. coronopifolia* (Upson & Jury, 2002). The highly branched peduncles and long, often-interrupted, almost wispy flower spikes make this species readily recognisable (see Figure 3A,B). Its short bracts and calyx lobes of equal size are characteristic.

This widespread species reaches its most easterly point of its distribution in Iran.

Lavandula pubescens Decne., Ann. Sci. Nat., Bot., Sér. 2, 2: 246 (1834). – Type: Egypt, at the foot of Mt Sinai, vi 1832, *N. Bové* 55 (lectotype and isolectotype P [photos!]). [Figure 5](#).

Description. See Upson & Andrews (2004).

Phenology. In Iran, flowers from February to October, curtailed by winter cold rather than drought stress. Inflorescences up to 10 cm long are common, bearing both flowers and fruit (see [Figure 5D](#)).

Distribution. Southwest Asia (Jordan and Palestine), Northeast Africa (Egypt, Eritrea), the Arabian Peninsula (Saudi Arabia and Republic of Yemen) and Iran (Bushehr Province).

Habitat and ecology. This species is found in the moist valleys on the northern slopes of Mount Khormoj and is known from two populations 5 km apart (see [Figure 4](#)). Here it is restricted to mesic environments in moist valleys on the northern slopes, which are recognised as part of the Saharo-Arabian floristic region (Zohary, 1973).

One population grows on stony margins of date palm gardens and the other on rocky slopes and stony habitats accompanied by *Mentha mozaffarianii* Jamzad, a narrow endemic species previously recorded only from Hormozgan Province (Jamzad, 1987; see [Figure 5A](#)). It is clearly restricted to favourable microclimates away from the intense aridity typical of the area.

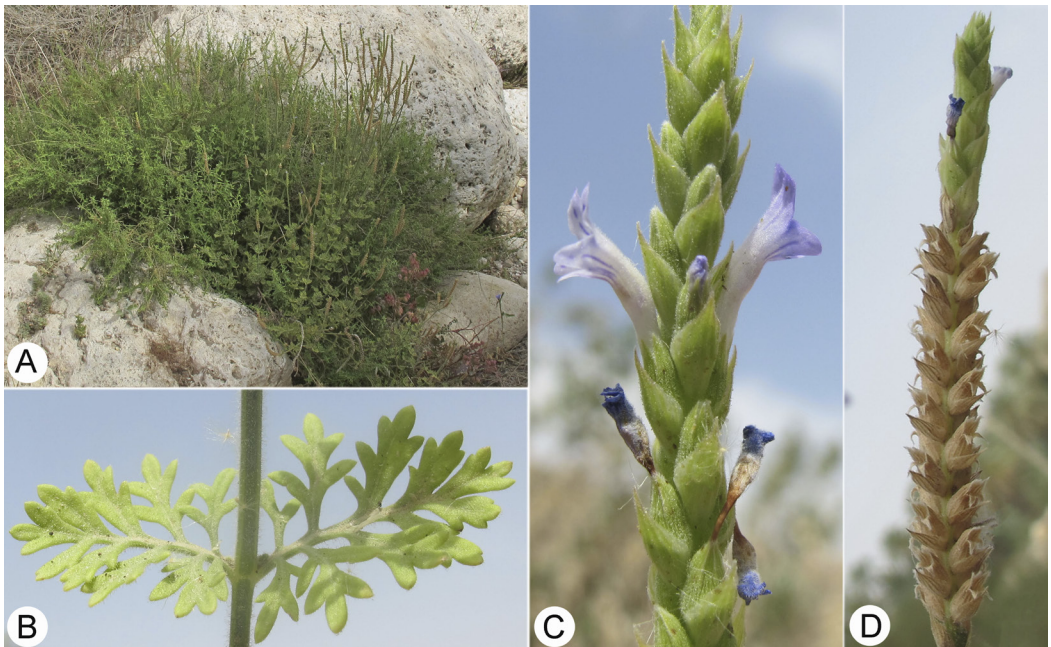


Figure 5. *Lavandula pubescens*. A, Habit; B, leaves; C and D, close-up views of inflorescence. Photographs by F. Bordbar.

Conservation status. During field observations, about 30 individuals were counted in two populations with an AOO of about 12 km² and an EOO of 0.05 km². *Lavandula pubescens* is assessed as Critically Endangered (CR) in Iran [B1ac(ii+iii_iv)+B2ac(ii+iii+iv) + D] (IUCN, 2012). Its occurrence with the other restricted species strongly suggests that these habitats need protection. Globally, it is of Least Concern (LC) (Upson & Andrews, 2004).

Ethnobotany. This species' essential oil is composed largely of carvacrol, caryophyllene oxide, β -bisabolene, *p*-cymen-8-ol, β -caryophyllene, carvacrol methyl ether and terpinolene, and has shown notable antibacterial and antifungal activity (Chhetri et al., 2015; Ibrahim et al., 2017; Al-Badani et al., 2017). It has been the subject of many studies for its application in the production of palm oil (Rashed et al., 2016) and honey (Nuru et al., 2015). In Yemen it is used in folk medicine as a carminative, insect repellent and antiseptic (Chhetri et al., 2015). No uses are recorded in Iran, and based on fieldwork it is little known to local people.

Specimens examined. IRAN. South, Bushehr Province: SE Ahram, Mokhdun village, 28°44'59.81"N, 51°30'03.48"E, 360 m, 3 x 2017, Bordbar 2902 (MIR); SE Ahram, Ashi, 28°43'13.66"N, 51°31'09.51"E, 573 m, 3 x 2017, Bordbar 2903 (MIR); ibid., 5 iv 2018, Bordbar 3121 (MIR).

Lavandula pubescens is a well-known species notable for its acrid and unpleasant smell; it has a diagnostic indumentum with short- and long-stalked glandular hairs and long simple hairs. The pinnatisect leaves, which are highly dissected two or three times, are characteristic (see Figure 5B). It is a species of arid areas, as reflected in its woody rootstock and stem base from which annual stems are produced (Collenette, 1985; Upson & Andrews, 2004).

Its previously known distribution followed the Syro-African Rift Valley, with the species occurring on mountains and hills along the Red Sea coast and reaching the Dead Sea depression in the north. Its occurrence in Iran is significant due to the large disjunction across the Arabian Peninsula.

Lavandula sublepidota Rech.f., Pl. Syst. Evol. 133: 105 (1979). – Type: Iran, south, Prov.

Fars: Gardaneh-e Bezan, 15 km NW Furk village, 1000–1400 m, 28 v 1973, (holotype PR [photo!], isotype PR). Figure 6.

Woody-based perennial, aromatic, up to 80 cm tall, the whole plant covered with a fine, dense and adpressed indumentum of star-like hairs. Stems erect, branched, particularly at the base with long internodes 10–15(–20) cm, often leafless for part of the year. Leaves rhomboid-lanceolate in outline, 10–30 × 15–20 mm, pinnatifid with rounded lobes, margin revolute, cuneate at base, petiole 4–7 mm long. Spike 10–15 cm long, the axis extending in fruiting time to 20–25 mm, cymes spirally arranged. Bract about half the length of calyx, 3.5–4 × 2–2.5 mm, ovate and scarious with long acuminate apex, 1–1.5 mm. Calyx 5–5.5 mm, lobes triangular, 1–1.5 mm, subequal. Corolla about twice the length of calyx, pale violet, lobes short, rounded. Nutlets brown, elliptic-oblong, slightly mucilaginous, 1.5–1.8 × 0.8–1 mm, scar one-third the length.

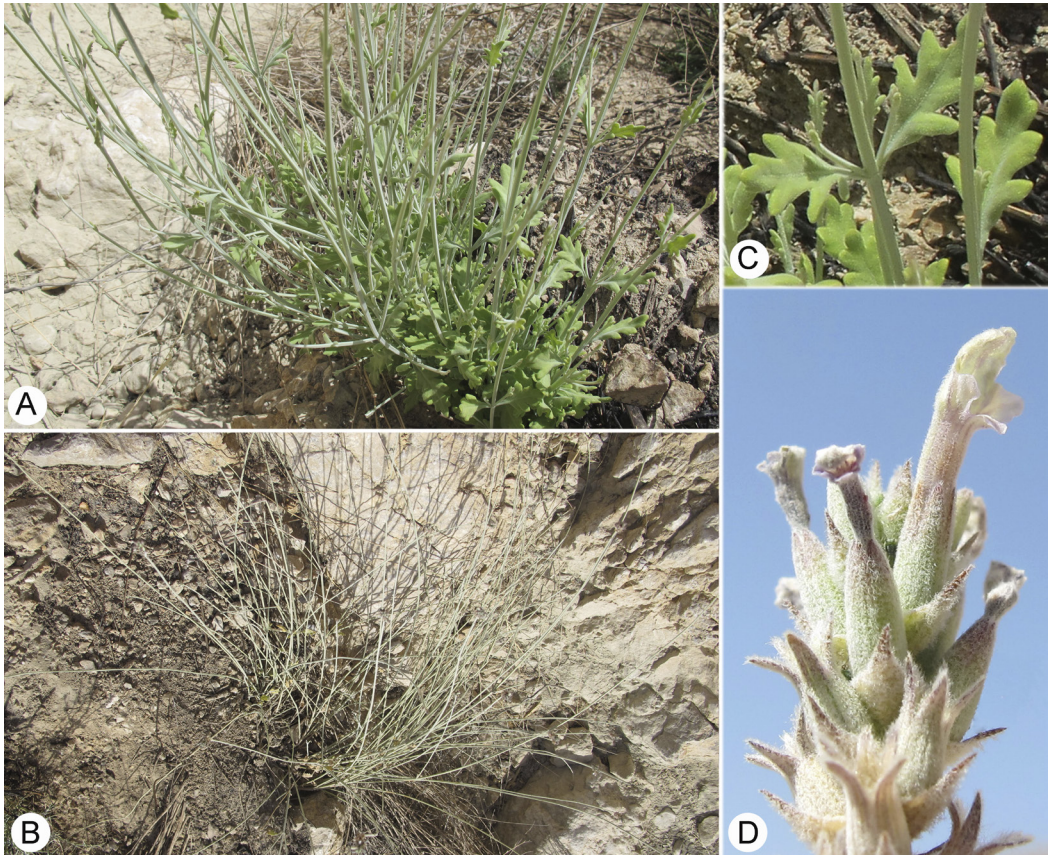


Figure 6. *Lavandula sublepidota*. A, Vegetative habit; B, fruiting; C, leaves; D, flowering inflorescence. Photographs by F. Bordbar.

Phenology. Flowers and fruits from May to June.

Distribution. Iran (Provinces of Fars and Hormozgan). A narrow endemic known only from the Zagros Mountains, first found around Darab, Rostaq and Bezan passes (Rechinger, 1979) and later in Hormozgan Province, Haji Abad, Shamil-e Bala, Bukhun, by Mozaffarian (Jamzad, 2012).

Habitat and ecology. This species occurs on rocky limestone slopes with shallow soil on arid mountains (see Figure 6A,B). The areas of distribution in Darab (Fars) and Bukhun (Hormozgan) are the transitional area between the Irano-Turanian and Saharo-Arabian floristic regions (Zohary, 1973). It typically bears leaves around its base in spring (see Figure 6A), these subsequently dropping due to drought. Therefore it can appear leafless for parts of the year (see Figure 6B).

Conservation status. According the AOO of 48 km² and EOO of 267 km², *Lavandula sublepidota* is categorised as Endangered (EN) [B1ac(ii+iii+iv) + B2ac(ii+iii+iv) + D] (IUCN, 2012). During recent exploration of the area, only a single individual was recorded at the type locality (see Figure 4).

Ethnobotany. No uses recorded.

Specimens examined. IRAN. South, Fars Province: Darab, Rostaq, Bezan pass, 28°22'30.35"N, 55°10'00.44"E, 1238 m, 4 iv 2018, Bordbar 2912 (MIR); *ibid.*, 1 v 2018, Mirtadzadini 2913 (MIR); *ibid.*, 8 vi 2018, Bordbar 2914 (MIR).

This previously poorly known species was described by Rechinger (1979) during work on *Flora Iranica* and based on specimens collected in the Zagros Mountains in the Province of Fars, south Iran. The scale-like adpressed stem hairs, reflected in the epithet, are unique and give the species its characteristic whitish appearance.

Rechinger (1979) originally placed the species in sect. *Pterostoechas* and noted affinities to *Lavandula coronopifolia* (treated as *L. stricta*). Although it bears single-flowered cymes, these are spirally arranged in *Lavandula sublepidota* rather than decussate, as is diagnostic for sect. *Pterostoechas*. Its sectional affinities therefore lie elsewhere and are discussed further below.

Biogeography and the flora of Iran

Both *Lavandula pubescens* and *L. coronopifolia* reach their most easterly distributions in Iran. Of particular note is the strong disjunction of *Lavandula pubescens* between its main distribution centre along the Syro-African Rift Valley and Iran. Such disjunct distribution patterns are known in other *Lavandula* species, including *L. multifida* L., a western Mediterranean species with disjunct populations in Sicily and Egypt, and *L. dentata* L., also western Mediterranean but with a disjunction to the mountains of Yemen and Saudi Arabia. Rather than being a result of recent dispersal events, these distributions most likely reflect a previously much wider occurrence and subsequent range contraction due to post-glacial climate change and the increasing desiccation of the Sahara and adjacent regions over the past 5000 years (Upson & Andrews, 2004). The current occurrence of *Lavandula pubescens* in mesic environments in Iran supports such a relictual distribution. Although *Lavandula coronopifolia* has a widespread distribution, its actual occurrence across its range is associated with mid-altitude mountain ranges and desert wadis, which is reflected in its scattered distribution in Iran.

Section *Subnudae* is characterised by many narrow endemic species usually associated with mountain ranges. This pattern is reflected in the distribution of *Lavandula sublepidota*.

Sectional relationships

In the most recent taxonomic monograph by Upson & Andrews (2004), it was noted that *Lavandula sublepidota*, with single-flowered, spirally arranged cymes, could be assigned to sections *Subnudae*, *Chaetostachys* or *Hasikenses* rather than to sect. *Pterostoechas* (Rechinger, 1979). The general morphology, major differences in the nutlet and restriction of distribution to India is not consistent with its placement in sect. *Chaetostachys*, although a relationship with low support is suggested here.

Lavandula hasikensis, a narrow endemic from the Dhofar mountains in Oman, was described by Miller (1985), who noted the spirally arranged cymes, subequal calyx lobes and geography suggesting affinities with sect. *Subnudae*. Key differences were the distinctive double-lobed bracts, flower stalks extending in fruit and the habit of a woody subshrub (rather than a woody perennial), but it was not assigned to a section. Upson & Andrews (2004) created sect. *Hasikenses*, recognising the differences observed by Miller (1985), and included *Lavandula sublepidota* based on the photograph and description in *Flora Iranica* (Rechinger, 1982). This specimen showed bracts with the distinct wing-like membranous lobes, short central apex and capitate spikes extending in fruit.

The availability of new herbarium collections of *Lavandula sublepidota* has since resulted in the interpretation of these characters being questioned. The bracts are consistently scarious with a long-acuminate apex, and although the bases are broad, they are not lobed. The availability of a high-quality scan of the type also shows the bracts to be less distinctly lobed than they appear in the photograph in *Flora Iranica*. It is possible to interpret the fruiting axis as extended.

The molecular data and phylogenetic analysis presented here has provided independent evidence of its affinities. Both sequence regions show *Lavandula sublepidota* embedded in the clade corresponding to sect. *Subnudae*. With reinterpretation of morphological characters based on new material, we hereby transfer *Lavandula sublepidota* to sect. *Subnudae*.

Our molecular data and increased sampling provide some intriguing new insights. The trees show *Lavandula hasikensis* embedded in sect. *Subnudae*, close to *L. samhanensis*, based on the *matK* region, and *L. dhofarensis* in the ITS tree. All three species are native to the escarpment mountains of Dhofar. It could be argued that *Lavandula hasikensis* should also be included in sect. *Subnudae*. However, the key morphological characters, such as bract morphology, noted by Miller (1985) would be inconsistent with other members of the section. We also note that sections *Subnudae*, *Chaetostachys* or *Hasikenses* share the spirally arranged cymes, a unique character in the genus. One possible treatment would be to merge all three into sect. *Chaetostachys* Benth., because this is the oldest name. However, this treatment would ignore some major morphological differences, and differences in chromosome number and nutlet morphology. The transfer of *Lavandula sublepidota* renders all three sections consistent and communicates useful information on geography and morphology, hence we retain these three sections.

Summary

This current study records *Lavandula pubescens* from Iran for the first time, and extends the known distribution of *L. coronopifolia*. It provides new and key information on a third species, *Lavandula sublepidota*, an Iranian endemic of the Zagros Mountains. Based on reassessment of morphological characters and molecular data, we transfer *Lavandula sublepidota* to sect. *Subnuda*. Sections *Subnuda*, *Chaetostachys* or *Hasikenses* are reviewed, noting the relationships between them.

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Appendix

Specimens examined in molecular studies

GenBank accession numbers are indicated in brackets. Order of GenBank accession numbers for *Lavandula hasikensis* and *L. sublepidota* refers to sequences of genomic regions in the following order: ITS (ITS1, 5.8S rDNA, ITS2), *matK*.

Lavandula coronopifolia Poir.

IRAN. **South, Hormozgan Province:** NW of Bandar-e Abbas, Mt Genu, 27.368608°N [27°22'06.99"N], 56.162597°E [56°09'45.35"E], 1 v 2015, *Mirtadzadini* 2904 (MIR) [MN907383].

Lavandula dhofarensis A.G.Mill.

OMAN. **South, Dhofar:** east of Salalah, Merbat, 17°04'29.37"N, 54°26'23.81"E, 210 m, 12 xi 2018, *Bordbar* 3118 (MIR) [MN907390]; west of Salalah, Al-Mugh sail, 16°52'41.68"N, 53°45'11"E, 155 m, 11 xi 2018, *Bordbar* 3122 (MIR) [MN907391].

Lavandula hasikensis A.G.Mill.

OMAN. **South, Dhofar:** Hadbeen, Jabal Noos, 17°14'13.32"N, 55°12'49.7"E, 381 m, 29 viii 2013, *Lupton et al.* LHMRG7 (OBG) [MN907385, MW291112].

Lavandula macra Baker

OMAN. **South, Dhofar:** east of Salalah, 17°32'25.09"N, 55°13'15.58"E, 238 m, 13 xi 2018, *Bordbar* 3120 (MIR) [MN907389].

Lavandula nooruddinii A.Patzelt & A.Al Hinai

OMAN. **North, Western Hajar Mountains:** Sharafat Al Alameyn, 23°09'58.8"N, 57°25'23.2"E, 1948 m, 30 i 2019, *Omar Al Amri* 201900281 (OBG) [MN907388].

Lavandula pubescens Decne.

IRAN. **South, Bushehr Province:** Ahram, Mokhdun village, 28°44'59.81"N, 51°30'03.48"E, 360 m, 3 x 2017, *Bordbar* 2902 (MIR) [MN907384].

Lavandula samhanensis Upson & S.Andrews

OMAN. **South, Dhofar:** Jebel Samhan, opposite Mirbat, 18 ii 1989, *McLeish* C6476 (ON) [MN901238].

Lavandula sublepidota Rech.f.

IRAN. **South, Fars Province:** Darab, Rostaq, Bezan pass, 28°22'30.35"N, 55°10'00.44"E, 1238 m, 4 iv 2018, *Bordbar* 2912 (MIR) (vegetation time) [MN907387, MW291111].

Lavandula subnuda Benth.

OMAN. **Muscat:** Oman Botanic Garden (cultivated), 15 xi 2018, *Bordbar* 3123 (MIR) [MN907392].