

A NEW SPECIES OF SATUREJA (LAMIACEAE) FROM IRAN

Z. Jamzad

Received 03 03 2010. Accepted for publication 20 09 2010.

Jamzad, Z. 2010 12 31: A new species of *Satureja* (Lamiaceae) from Iran. -*Iran. J. Bot.* 16 (2): 213-217. Tehran.

Satureja kermanshahensis is described as a new species from Iran. It is characterized by a dense columnar spicate inflorescence, 3-10 cm long, verticillasters 2-flowered and densely glandular pubescent leaves. It grows in crevices of rocks in Kermanshah province in western Iran. It is compared with *S. coerulea* from Bulgaria, Romania and NW Turkey, *S. bachtiarica* and *S. edmondi* growing in western Iran.

Ziba Jamzad, Research Institute of Forests & Rangelands, P. O. Box 13185-116, Tehran, Iran <jamzad@rifrac.ir>.

Key words. Lamiaceae, *Satureja*, new species, Iran.

گونه جدیدی از جنس مرزه (*Satureja kermanshahensis* (Lamiaceae) از ایران

زیبا جمزاد، استاد پژوهش مؤسسه تحقیقات جنگلها و مراتع کشور.

مرزه کرمانشاهی *Satureja kermanshahensis* به عنوان یک گونه جدید از ایران شرح داده می شود. این گونه با داشتن گل آذین سنبله ای مترکم به طول ۳ تا ۱۰ سانتی متر و چرخه های گل با دو گل، برگهای با غده های ترشحي و کرک مترکم مشخص می گردد. این گونه در شکاف صخره ها در استان کرمانشاه، غرب ایران می روید و با گونه *S. coerulea* از بلغارستان و شمال غرب ترکیه و گونه های *S. bachtiarica* و *S. edmondi* از غرب ایران مقایسه می گردد.

Introduction

Satureja s. l. belongs to a large complex including ca. 235 species (Doroszenko, 1985). The genus has been a subject of much discussion among taxonomists and is variously treated. Bentham (1876) recognized four genera: *Calamintha*, *Gardoquia*, *Micromeria* and *Satureja* s. str. Briquet (1895-1897) recognized one: *Satureja*, but Doroszenko (1985) considered a narrow concept for the *Satureja* complex and recognized 17 genera. In Flora Europaea, Heywood & Richardson (1972) recognized 5 genera in the region including *Acinos*, *Calamintha*, *Clinopodium*, *Micromeria* and *Satureja* s. str. In the Flora of USSR (Shishkin, 1954), China (Lee & Hedge, 1994), Turkey (Davis, 1982) and Iranica (Rechinger, 1982) a similar classification was adopted considering to some specific genera which were included on the basis of geographical distribution. Most American authors used Briquet's broad circumscription of *Satureja* (Epling & Játiva, 1964-1966; Gleason & Cronquist, 1991; Munz, 1959) but a few (Clewell, 1985; Jones, 1976) followed Bentham (1876) in assigning American species to *Micromeria* and *Calamintha* rather than *Satureja* (Cantino & Wagstaff, 1998). Based on chloroplast DNA restriction site analysis and morphological characters Cantino and

Wagstaff (1998) divided the complex into five genera: *Cyclotrichium*, *Obtegomeria*, *Gardoquia*, *Xenopoma* (including *Hesperothymus*) and *Clinopodium* (including *Calamintha*, *Diodeilis* and *Montereya*). Later, more molecular phylogenetic studies elucidated the status of the genera within the *Satureja* complex and in tribe Mentheae (Braüchler et al. 2005, 2006 and 2008; Trusty et al. 2004).

Satureja in its narrow concept is a genus comprising 30 species, mainly distributed in Mediterranean Region but also extended to Irano-Turanian phytogeographical Region.

Satureja species are well known medicinal plants of *Lamiaceae* family. Due to presence of secondary metabolites such as flavonoids, steroids, terpenoids and tannins they are known for their healing properties for a long time and have been used as traditional folk remedies to treat various ailments such as cramps, muscle pains, nausea indigestion, diarrhoea and infectious diseases (Bezić, N, et al. 2009).

Reviewing the studies on terpenoids in some genera belonging to the *Satureja* complex reveal that the *Satureja* s. str. and its closely allied genus: *Gontscharovia* are markedly different from the other genera in the complex by their essential oil constituents

which is characterized by carvacrol, thymol, P-cymene and γ -terpinene as the major constituents, due to different species (Sefidkon & Jamzad; 2000; 2004a & 2004b; 2005; 2006a, 2006b & 2006c; Sefidkon et al. 2007). The essential oil constituents show different ingredients in other genera i.e. *Acinos* with pulegone, menthone and germacrene D as the prominent constituents of their oils (Chalchat et al. 2004; Stojanović et al. 2009), *Calamintha* with piperitone oxide and Cis- piperitone oxide (Hanlidou et al. 1991 and Kitic et al. 2001); *Clinopodium* with cis-piperitone oxide, piperitone oxide, pulegone and isopulegone (Mohan Bikram Gewali, 2008; Castilho et al. 2006). In *Micromeria* α -pinene, β -pinene, linalool, β -caryophyllene and α -gurjunene, (Mastelic et al. 2005) are the major constituents of the oil. However terpenoids can be recognized as potential taxonomic markers at generic levels. More investigation on essential oil pattern in other genera within the *Satureja* complex will provide a better understanding of their phylogenetic relationships.

Satureja s. str. occurs in Iran in north, northwest, west and north east and central parts of the country. They usually appear in small populations in mountainous habitats. Rechinger (1982) reported 11 species from Iran. A few species were later described by the present author i.e. *S. kallarica* Jamzad (Jamzad, 1992); *S. khuzistanica* Jamzad (Jamzad, 1994); *S. rechingeri* Jamzad (Jamzad, 1996) and recently *S. macrosiphonia* Bornm. was recorded for the first time for the flora of Iran (Jamzad, 2009). Considering the total number of species recognized so far from Iran (16), the number of endemics is surprising. Fifty percent of the taxa (8 species) occurring in Iran are endemics. They are mainly distributed in Zagros Mountains in western Iran. Reviewing the phytogeographical distribution pattern of *Satureja* s. str. reveals that the Mediterranean and Irano-Turanian Regions are two centers of origin for the genus and for the latter region, Iran seems to be the centre of speciation.

In the course of identification of the plant materials collected from West Iran, for the Flora of Iran project a specimen collected from Kermanshah province was identified as new *Satureja* species. It is described here, its relationship with its allies discussed and an illustration is presented.

***Satureja kermanshahensis* Jamzad, sp. nov.**

Suffrutex caespitosus, humilis. Folia oblongo-linearita, longitudinaliter plicata vel \pm plana, utrinque dense glanduloso-punctata, breviter hirsuto-puberula. Verticillastri 2-flori, approximati, spicastrum

elongatum, tenuem formantes. Calyx campanulatus, retrorse hispido-pubescentibus et glandulis sessilibus rubris obsitus. Corolla calyce 2-plo longiore. Stamina bina superiora \pm exserta. Affinis *S. coerulea* sed folia et calyces longiora; folia breviter hirsuto-puberula, dense glanduloso-punctata; calycis dentibus hispidus.

Holotypus. Kermanshah: Between Eivan and Sumar, Chehlzari, 1100 m, Assadi & Nikchehre 76300 (TARI).

Caespitose perennial, woody at base. Stems many, 12 - 20 cm high, covered with white short retrorse hairs. Cauline leaves 3-6.5 mm long, 1-2 mm wide, oblong-linear, \pm flat to conduplicate with whorls of small leaves in the axis, covered with short stiff hairs and red sessile glands on both surfaces; floral leaves 2.5 x 1 mm, oblong, shorter or equal to the calyx, covered with short hispid hairs and sessile glands. Inflorescence spicate, 3-10 cm long, 0.5-0.6 cm wide; verticillasters two- flowered, all close to each other. Flowers sessile. Calyx 2.5-3 mm long, campanulate, purple, covered by white hispid retrorse hairs and red sessile glands; upper teeth 0.5 mm long, triangular-lanceolate; lower teeth 1 mm long. Corolla 5-6 mm long, pink-purple, suddenly expanded at the throat; upper lip rounded, shortly cleft in the middle; lower lip with three equal oblong-ovate lobes. The upper stamens \pm exerted from the corolla. Nutlets 1.1x 0.6 mm, oblong-triangular (Fig. 1.).

The new species grows in crevices of rocks in Kermanshah province in western Iran. It is a late flowering species (October) like the other Iranian *Satureja* species and is characterized by a dense columnar spicate inflorescence and 2-flowered verticillasters. It is easily recognized from the other native Iranian species by the above mentioned characters.

Satureja kermanshahensis seems to be most closely related to *S. coerulea* Janka described from Bulgaria and with its closest locality to Iran so far reported being N.W Turkey. It is recorded as a rare in Turkey (Davis, 1982) and differs from it in longer leaf and calyx and leaves glabrous except in the margin with scattered glands and calyx teeth glabrous in *S. coerulea*. The new species differs from *S. edmondi* Briq. which is an Iranian endemic growing in Kermanshah province, in leaf shape and size, the lower ones with flat surface; verticillasters 4-6 flowered, lowers distant and calyx glabrous in *S. edmondi*. The new species differs from *S. bachtiarica* Bunge which is also distributed in Kermanshah province in habit which is erect subshrub, inflorescence many flowered verticillasters, lowers distant and smaller calyx in *S. bachtiarica*.

The morphological features of the above mentioned species are compared in table 1.



Fig. 1. *Satureja kermanshahensis* ($\times 0.83$); details ($\times 8.3$).

Table 1. A comparison of morphological characters of *Satureja kermanshahensis* with the other close species.

Species	Habit	Leaf size & shape	Leaf indumentum	Verticillasters	Calyx
<i>S. kermanshahensis</i>	ascending	3-6.5 x 1-2 mm oblong-linear, ± flat conduplicate	short white hairs and dense glands on both sides	2-flowered	2.5-3 mm, teeth triangular-lanceolate, hairy
<i>S. coerulea</i>	procumbent or ascending	7-22 x 1.5-2 mm oblong-linear, recurved-conduplicate	glabrous except for the ciliate margin, sparsely gland dotted	2-flowered	4-5 mm, teeth lanceolate, glabrous
<i>S. edmondi</i>	arcuate-erect	10-15 x 3-6 mm oblong-lanceolate, lower flat, upper conduplicate	simple hairs and dense sessile glands on both sides	4-6 flowered	4-6 mm, teeth triangular, glabrous
<i>S. bachtiarica</i>	erect	5-10 x 1.5-3.5 mm, oblong-spathulate, oblong-linear, recurved conduplicate	dense sessile glands on both sides and short white stiff hairs	many-flowered	1.5 mm teeth triangular-lanceolate, hairy with sessile glands

Acknowledgements

I wish to thank Mr. Ian Hedge, Edinburgh, for his valuable comments on the new species. Thanks are due to Mrs Nobakhat for drawing the illustration.

References

- Bentham, G. 1876: Labiatae in G. Bentham and J. D. Hooker, editors. *Genera Plantarum*. vol. 2. 1160-1223. -Reeve & Co., London.
- Bezić, Nada, Ivica Šamanić, Valerija Bunkić, Višnja Besendorfer & Jasna Puizina, 2009: Essential oil composition and internal transcribed spacer (ITS) sequence variability of four south-Croatian *Satureja* species (Lamiaceae). -*Molecules* 14: 925-938.
- Braüchler, C., Meimberg, H., Abele, T. & Heubl, G. 2005: Polyphyly of the genus *Micromeria* (Lamiaceae)-evidence from cp DNA sequences data. -*Taxon* 54 (3): 639-650.
- Braüchler, C., Meimberg, H. & Heubl, G. 2006: New names in Old World *Clinopodium*- the transfer of the species *Micromeria* sect. *Pseudomelissa* to *Clinopodium*. -*Taxon* 55 (4): 977-981 (5).
- Braüchler, C., Ryding, O. & Heubl, G. 2008: The genus *Micromeria* a synoptical update. -*Willdenowia* 38: 363-4
- Briquet, J. 1895-1897: Labiatae. Pages 183-375. In: A. Engler & K. Prantl, editors. *Die natürlichen Pflanzenfamilien*. Teil 4. Abt. 3a. W. Engelmann, Leipzig.
- Cantino, P. D. & Wagstaff, S. 1998: A re-examination of North American *Satureja* s. l. (Lamiaceae) in light of molecular evidence. -*Brittonia*, 50 (1) 63-70.
- Castilho, P., Gouveia, S., Liu, K., Rodrigues, A., Feio, S., Tomi, F. & Casanova, J. 2006: *Clinopodium ascendens* from Madeira. Chemical composition and Bioactivity in C. Cervelli, B. Ruffoni, C. Dalla Guda (eds.), *ISHS Acta Horticulturae*, 723. International Symposium "The Labiatae: Advances in Production, Biotechnology and Utilization". Italy.
- Chalchat, Jean-Claude, Maksimovic, Zoran A, Petrovic, Silvana D, Gorunovic & Momcilo S. 2004: Essential Oil of *Acinos hungaricus* (Simonkai) Silic, Lamiaceae. -*Journal of Essential Oil Research* 16: 38-39.
- Clewell, A. F. 1985: Guide to the vascular plants of the Florida panhandle. -Florida State University Press, Tallahassee.
- Doroszenko, A, 1985: Taxonomic studies on *Satureja* complex (Labiatae). PhD. dissertation. Edinburgh University. (library copies in U. S. at Missouri Botanical Garden and Ohio University).
- Epling, C. & C. Játiva. 1964: Revision del género *Satureja* en America del Sur. -*Brittonia* 16: 393-416.
- Gewali, Mohan Bikram, 2008: Aspects of Traditional Medicinal Plants of Nepal, 175 pp. -Institute of Natural Medicine, University of Toyama, Japan.

- Gleason, H. A. & Cronquist, A. 1991: Manual of vascular plants of northeastern United States and adjacent Canada. Ed. 2. -New York Botanical Garden, Bronx.
- Hanlidou, E., Kokkini, S., Bosabalidis A. M. & Bessi re, J. -M. 1991: Glandular trichomes and essential oil constituents of *Calamintha menthifolia* (Lamiaceae). -Plant. Syst. and Evol. 177: 17-26.
- Heywood, V. H. & Richardson, I. B. K. 1972: Labiatae, pp. 126-192. In: T. G. Tutin et al. (eds.), *Flora Europaea*, vol. 3. -Cambridge University Press, Cambridge.
- Jamzad, Z. 1992: Two new species from Labiatae in Iran. -Iran. Journ. Bot. 5 (2): 69-74.
- Jamzad, Z. 1994: A new species of the genus *Satureja* (Labiatae) from Iran.- Iran. Journ. Bot. 6 (2): 215-218.
- Jamzad, Z. 1996: *Satureja rechingeri* (Labiatae), a new species from Iran. -Annalen Des Naturhistorischen Museum In Wien 98B suppl. (1996) 75-77.
- Jamzad, Z. 2009: New species and new records of Lamiaceae from Iran. -Iran. Journ. Bot. 15 (1): 51-56.
- Jones, S. B. Jr. 1976: Mississippi Flora V. The mint family. -Castanea 41: 41-58.
- Kitic, D., Palic, R., Ristic, M., Stojanovi , G. & Jovanovic, T. 2001: The volatile constituents of *Calamintha sylvatica* Bromf. subsp. *sylvatica*. - Flavour and Fragrance Journal 16 (4): 257-258.
- Li, H. W. & Hedge, I. C. 1994: Lamiaceae, pp. 50-299. In: Z. Y. Wu and P. H. Raven co-chairs of editorial committee. *Flora of China*, vol. 17. -Science Press. Beijing and Missouri Botanic Garden, St. Louis.
- Munz, P. A. 1959: *A California Flora*. -University of California Press, Berkeley.
- Rechinger, K. H. 1982: Labiatae in K. H. Rechinger, *Flora Iranica*, no. 150: 532-551. -Academische Druck-u. Verlagsanstalt, Graz.
- Sefidkon, F. & Jamzad, Z. 2000: Essential oil of *Satureja bachtiarica* Bunge. -J. Essent. Oil Res. 12: 545-546.
- Sefidkon, F. & Jamzad, Z., 2004a: Essential oil composition of *Satureja spicigera* (C. Koch) Boiss. from Iran. -Flavour and Fragrance Journal 19: 571-573.
- Sefidkon, F., Jamzad, Z. & Mirza, M. 2004b: Chemical variation in the oil of *Satureja sahendica* from Iran. -Food Chemistry 88: 325-328.
- Sefidkon, F. & Jamzad, Z. 2005: Chemical composition of the essential oil of three Iranian *Satureja* species (*S. mutica*, *S. macrantha* and *S. intermedia*). -Food Chemistry 91: 1-4.
- Sefidkon, F. & Jamzad Z. 2006a: Essential oil analysis of Iranian *Satureja edmondi* and *Satureja isophylla*. -Flavour and Fragrance Journal 21: 230-233.
- Sefidkon, F. & Jamzad, Z. 2006b: Essential oil composition of *Satureja boissieri*. -Journal of Essential Oil Bearing Plants 9 (3): 287-291.
- Sefidkon, F. & Jamzad, Z. 2006c: Chemical composition of the essential oil of *Gontscharovia popovii* from Iran.- Flavour & Fragrans Journal 21: 619-621.
- Sefidkon, F., Khajeh Abbasi, Jamzad, Z. & Ahmadi, S. 2007: The effect of distillation methods, stage of plant growth on the essential oil composition of *Satureja rechingeri* Jamzad. -Food Chemistry 100: 1054-1058.
- Shishkin, B. K. (editor) 1954: Labiatae. *Flora of the USSR*, vol. 21. -Botanical Institute of the Academy of Science of the USSR.
- Stojanovi , G., Globuvi , T., Kiti , D. & Pali , R. 2009: *Acinos* species: Chemical composition, antimicrobial and antioxidative activity. -Journal of Medicinal Plants Research 3 (13):1240-1247.
- Trusty, J., Olmstead, R. G., Bogler, D. J. Santos-Guerra, A. & Francisco-Ortega, J. 2004: Using molecular data to test a biogeographic connection of the Macaronesian genus *Bystropogon* (Lamiaceae) to the New World: A case of conflicting phylogenies. -Systematic Botany 29 (3): 702-713.