

## Taxonomic and distributive notes on *Serapias lingua* subsp. *tunetana* (Orchidaceae), a rare endemic to Tunisia

R. EL MOKNI<sup>1,2,3</sup> & G. DOMINA<sup>4</sup>

<sup>1</sup> University of Carthage, Laboratory of Botany and Plant Ecology (SNA-214), Department of Life Sciences, Faculty of Sciences of Bizerte, Jarzouna, TN-7021 Bizerte, Tunisia

<sup>2</sup> University of Jendouba, Laboratory of Silvo-pastoral Resources, Silvo-Pastoral Institute of Tabarka, BP. 345, TN-8110 Tabarka, Tunisia

<sup>3</sup> University of Monastir, Laboratory of Botany, Cryptogamy and Plant Biology, Faculty of Pharmacy of Monastir, Avenue Avicenna, TN-5000 Monastir, Tunisia

<sup>4</sup> University of Palermo, Department of Agriculture, Food and Forest Sciences, viale delle Scienze, bldg. 4, IT-90128 Palermo, Italy

**ORCID iD.** R. EL MOKNI: <https://orcid.org/0000-0003-3849-1039>, G. DOMINA: <https://orcid.org/0000-0003-4184-398X>

Author for correspondence: G. Domina ([gianniantonio.domina@unipa.it](mailto:gianniantonio.domina@unipa.it))

Editor: L. Sáez

Received 10 August 2018; accepted 2 October 2018; published on line 6 May 2019

### Abstract

TAXONOMIC AND DISTRIBUTIVE NOTES ON *SERAPIAS LINGUA* SUBSP. *TUNETANA* (ORCHIDACEAE), A RARE ENDEMIC TO TUNISIA.—*Serapias lingua* subsp. *tunetana*, a rare endemic orchid confined to Tunis, northern of Tunisia, has been rediscovered far away from its type locality nearly after 22 years. Since its first finding in 1996 and its description published in 2005, the subspecies has not been found again, and was presumed to be extinct, or the taxon was erroneously identified. A detailed description of the subspecies justifying an amendment to its description, a map of its current distribution and colour photographs are also provided. The affinities to the related taxa within the *S. lingua* group occurring in Tunisia are here presented. The global IUCN status for this taxon is evaluated.

Key words: chorology, conservation, endemism, Orchidaceae, *Serapias*.

### Resumen

NOTAS TAXONÓMICAS Y DISTRIBUTIVAS SOBRE *SERAPIAS LINGUA* SUBSP. *TUNETANA* (ORCHIDACEAE), UNA RARA ESPÈCIE ENDÈMICA DE TÚNEZ.—*Serapias lingua* subsp. *tunetana*, una rara orquídea endèmica con àrea de distribuci3n restringida en Túnez, al norte de Túnez, ha sido redescubierta lejos de su localidad tipo despu3s de 22 años. Desde su primer hallazgo en 1996 y su descripci3n publicada en 2005, la subespecie no se había encontrado nuevamente y se presume que se extinguió o fue identificada err3neamente. En este trabajo se proporciona una descripci3n detallada de la subespecie que justifica una enmienda a su descripci3n, y se aporta asimismo un mapa de distribuci3n y varias fotografías. Se listan las principales afinidades de la subsp. *tunetana* con los táxones más estrechamente relacionados dentro del grupo de *S. lingua* que se distribuyen en Túnez. Se evalúa su estado de conservaci3n atendiendo a los criterios y categorías de la UICN.

Palabras clave: conservaci3n, corología; endemismo, *Orchidaceae*, *Serapias*.

### C3mo citar este artículo / Citation

El Mokni, R. & Domina, G. 2019. Taxonomic and distributive notes on *Serapias lingua* subsp. *tunetana* (Orchidaceae), a rare endemic to Tunisia. *Collectanea Botanica* 38: e005. <https://doi.org/10.3989/collectbot.2019.v38.005>

### Copyright

© 2019 CSIC. This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International (CC BY 4.0) License.

## INTRODUCTION

The genus *Serapias* L. (Orchidaceae) comprises about 26–30 species (Nelson, 1968; Baumann & Künkele, 1989; Baumann *et al.*, 2006; Delforge, 2016) with mainly Mediterranean distribution, although some species reach the west of the Atlantic coast. Its range extends from the Azores and the Canaries in the west to the Caucasus, and in the east and north as far as Brittany (France) (Gözl & Reinhard, 1980; Pérez Chiscano *et al.*, 1991; Delforge, 1995, 2016). In Tunisia, according to APD (2018) this genus includes six species: *S. cordigera* L., *S. lingua* L., *S. nurrica* Corrias, *S. parviflora* Parl., *S. stenopetala* Maire & T. Stephenson, and *S. strictiflora* Veiga. Within *Serapias lingua* it is possible to distinguish *S. lingua* subsp. *lingua*, a Mediterranean-Atlantic taxon, and *S. lingua* subsp. *tunetana* B. Baumann & H. Baumann, a taxon endemic to Tunisia, little known among botanists, very rare and not seen since 2000. From taxonomic and nomenclatural point of view, some authors (e.g. Le Floc'h *et al.*, 2010; Véla *et al.*, 2012; Martin *et al.*, 2013, 2015) considered *S. lingua* subsp. *tunetana* as synonym of *S. strictiflora*.

The discovery of three localities where *S. lingua* subsp. *tunetana* grows allowed us to conduct taxonomic and distributive observations on this taxon. This contribution is part of the project of floristic investigation of Tunisia conducted by the authors in the last years (e.g. Domina *et al.*, 2015; El Mokni *et al.*, 2015a, b; Astuti *et al.*, 2017).

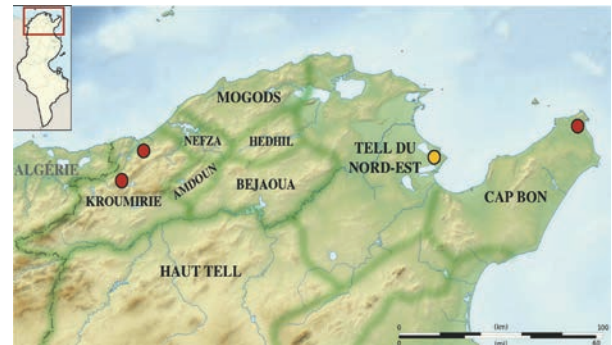
## MATERIALS AND METHODS

Systematic field excursions in the north of Tunisia were carried out in order to investigate taxonomy and distribution of taxa belonging to *Serapias lingua* gr. In Table 1 are presented the main morphological discriminant characters, and phenological and ecological traits between *Serapias lingua* subsp. *tunetana* and the taxonomic closest taxa occurring in Tunisia (*S. lingua* subsp. *lingua* and *S. strictiflora*). Characters of *S. lingua* subsp. *tunetana* were measured in the field; data of the other species result from literature (Lorenz, 2001; Baumann *et al.*, 2006; Venhuis *et al.*, 2007; Martin *et al.*, 2015; Delforge, 2016). In order to assess the IUCN status

(IUCN, 2012) of this taxon the Extent of occurrence (EOO) and the Area of occupancy (AOO) were calculated using the GeoCAT tool according to Bachman *et al.* (2011) calculated with a 2 × 2 km cell fixed grid.

## RESULTS AND DISCUSSION

The new findings were done on the course of botanical surveys in 2013 and 2014 in the north of Tunisia (Fig. 1). In 2013 the taxon was found in the Cap Bon peninsula, where some small, flowering individuals (Fig. 2) were recoded near the sea level, on Oligocene substrate within a loam-sandy depression of an acidic soil.



**Figure 1.** Distribution of *Serapias lingua* subsp. *tunetana* in Tunisia; the yellow dot indicates presumed locality discovered in 1996, whereas red dots indicate new discovered populations in the north of Tunisia, since April 2013.

In 2014 this taxon was discovered in the Kroumiria region where two populations were found in Tabarka on loam to clay-sandy depressions and in Ain Draham on clay-loamy depressions extending both on numidic substrate (Oligo-Eocene).

*Description:* Plants with 2–3 subglobose or ovoid tubercles. Stem straight and cylindrical, 100–200 mm high, green and often spotted red at the base; 3–5 basal leaves, linear-lanceolate, 40–110 mm long and 6–11 mm broad, and 1–2 bract-like cauline leaves; inflorescence lax, bearing 2–4 slender flowers; bracts ovate-lanceolate, grey to red with reddish veins, 38–52 mm long and 12–22 mm wide; sepals and petals form a pointed hood, which is normally (sub-) horizontally positioned; sepals ovate-lanceolate, 15–25 mm long, green to red colored with pinkish to purple veins; petals usually shorter than sepals, from a purple, orbicular



**Figure 2.** *Serapias lingua* subsp. *tunetana* from Cap Bon, northeastern Tunisia: (A), habitat and habit; (B), front view flower; (C), three-flowered inflorescence; (D), typical oval epichile (photographs: R. El Mokni, April 28, 2013).

base acuminate into a slender labellum by a constriction divided into hypochile and epichile; hypochile 8–13 mm long and 18–24(26) mm wide; lateral lobes inwardly replicated but still largely visible, purple with a red colored center; hypochile with a deeply grooved stigmatic surface; epichile

lanceolate, 14–19(20) mm long and 8–11 mm in width [for Baumann & Baumann (2005) epichile measures only 4–7 mm —mean 5.4— in width and 7–10 mm —mean 8.7— long, see Table 1], red to dark red with very short yellowish to reddish hairs; ovary cylindrical, 18–24 mm (see Table 1).



**Table 1.** Main morphological characters, phenological and ecological traits of *Serapias lingua* subsp. *tunetana* and the two most closely related taxa occurring in Tunisia.

Taxon	<i>S. lingua</i> subsp. <i>tunetana</i>	<i>S. lingua</i> subsp. <i>lingua</i>	<i>S. strictiflora</i>
<b>Number of flowers</b>	2–3	2–6	2–4
<b>Lip (epichile) color</b>	Red to dark-red	Red to wine red, but also bright to whitish	Dark-red to purple-black
<b>Epichile length (mm)</b>	14–19(20)	8–14(18)	14–18(22)
<b>Epichile width (mm)</b>	8–11	7–8(10)	4–6
<b>Epichile shape</b>	Ovate to ovate-lanceolate	Lanceolate	Narrowly lanceolate to narrowly triangular
<b>Epichile indumentum at the base</b>	Slightly hairy	Slightly hairy	Very hairy
<b>Flowering period</b>	March to May	May to June	May to June
<b>Plant habitat</b>	Clay-loamy depressions on rocky coastal area with sparse thermophilic vegetation	Mainly oak forest areas within clay-sandy depressions with ombrophilous vegetation or psammophilous coastal area with sparse thermophilous vegetation	Slow-drainage clay-loamy depressions with thermophilous or ombrophilous vegetation

*Flowering & fruiting period:* March–May.

*Habitat:* In Cap Bon, in slow-drainage clay-loamy depressions with thermophilous or ombrophilous vegetation, growing mainly with *Cicendia filiformis* (L.) Delarbre, *Filago lojaconoi* (Brullo) Greuter, *Hypochaeris achyrophorus* L., *Lotus hispidus* DC., *Paronychia echinulata* Chater, *Plantago bellardii* All., *Romulea ramiflora* Ten., *Rumex bucephalophorus* L. subsp. *bucephalophorus* and *Trachynia distachya* (L.) Link.

In Kroumiria, in slow-drainage clay-loamy depressions with hemi-ombrophilous vegetation, growing mainly with *Cyperus* sp. pl., *Stachys arvensis* (L.) L., *Geranium dissectum* L., *Silene laeta* (Aiton) Godr., *Trifolium subterraneum* L., *Lotus hispidus* DC., *L. palustris* Willd., or in sandy-clay dried depressions on prairial areas within ombrophilous vegetation, growing mainly with *Bellis annua* L., *Trifolium campestre* Schreb., *T. micranthum* Viv., *Lythrum hyssopifolia* L., *Trachynia distachya* (L.) Link.

*Distribution:* Endemic to North Tunisia: Cap Bon, West Nabeul, El Haouaria-Jbel Labiadh: 80–120 m a.s.l.; Kroumiria, East Tabarka, Ras-Rajel: 100–150 m a.s.l.; Ain Draham, Fej-Errih: 600–650 m a.s.l. (Fig. 1)

*Specimens examined (new records):* Tunisia: Nabeul: El Haouaria-Jbel Labiadh, 37° 02' 42" N, 11° 04' 12" E, 94 m, 28.IV.2013. *R. El Mokni & G. Domina s.n.* (PAL-Gr!). Jendouba: Tabarka-Ras

Rajel, 36° 56' 26" N, 08° 53' 06" E, 137 m, 18.IV.2014, *R. El Mokni. s.n.* (Herb. Univ. Bizerta!); Ain Draham-Fej Errih, 36° 45' 04" N, 08° 41' 26" E, 607 m, 15.V.2014, *R. El Mokni. s.n.* (Herb. Univ. Bizerta!).

*Conservation status:* *Serapias lingua* subsp. *tunetana* is so far known only from one locality in Cap Bon and two in Kroumiria. All the populations were found on small areas of about 20 m<sup>2</sup> and represented by no more than a dozen of individuals each. According to Bachman *et al.* (2011) methodology there are: EOO = 1950 km<sup>2</sup> and AOO = 12 km<sup>2</sup>. There is no detailed information available on population dynamics; however, due to its habitat, the population trend and the number of mature individuals can be considered stable.

The population in Cap Bon is located in an area near the sea, but future urban developments (i.e. construction of roads, buildings) could represent a potential threat to the population. The Red List category (IUCN, 2016) here proposed for this taxon is: EN (Endangered) using the Criteria (Global Assessment): B1ab(iii)+D.

The most important conservation measure that we suggest is the habitat conservation. The areas where the found populations grow could be protected at local level according to the system of plant micro-reserves adopted in East Spain (Laguna *et al.*, 2004).

*Taxonomic notes:* This taxon was described as *Serapias lingua* subsp. *tunetana* by Baumann & Baumann (2005) from Cap Bon Region. Two years later it was considered as a form, *S. lingua* f. *tunetana* by Delforge (2007). Then, it was included in the synonymy of *S. strictiflora*, or of *S. lingua* subsp. *duriaei* (Rchb.) Maire by Le Floc'h *et al.* (2010) and Martin *et al.* (2013, 2015).

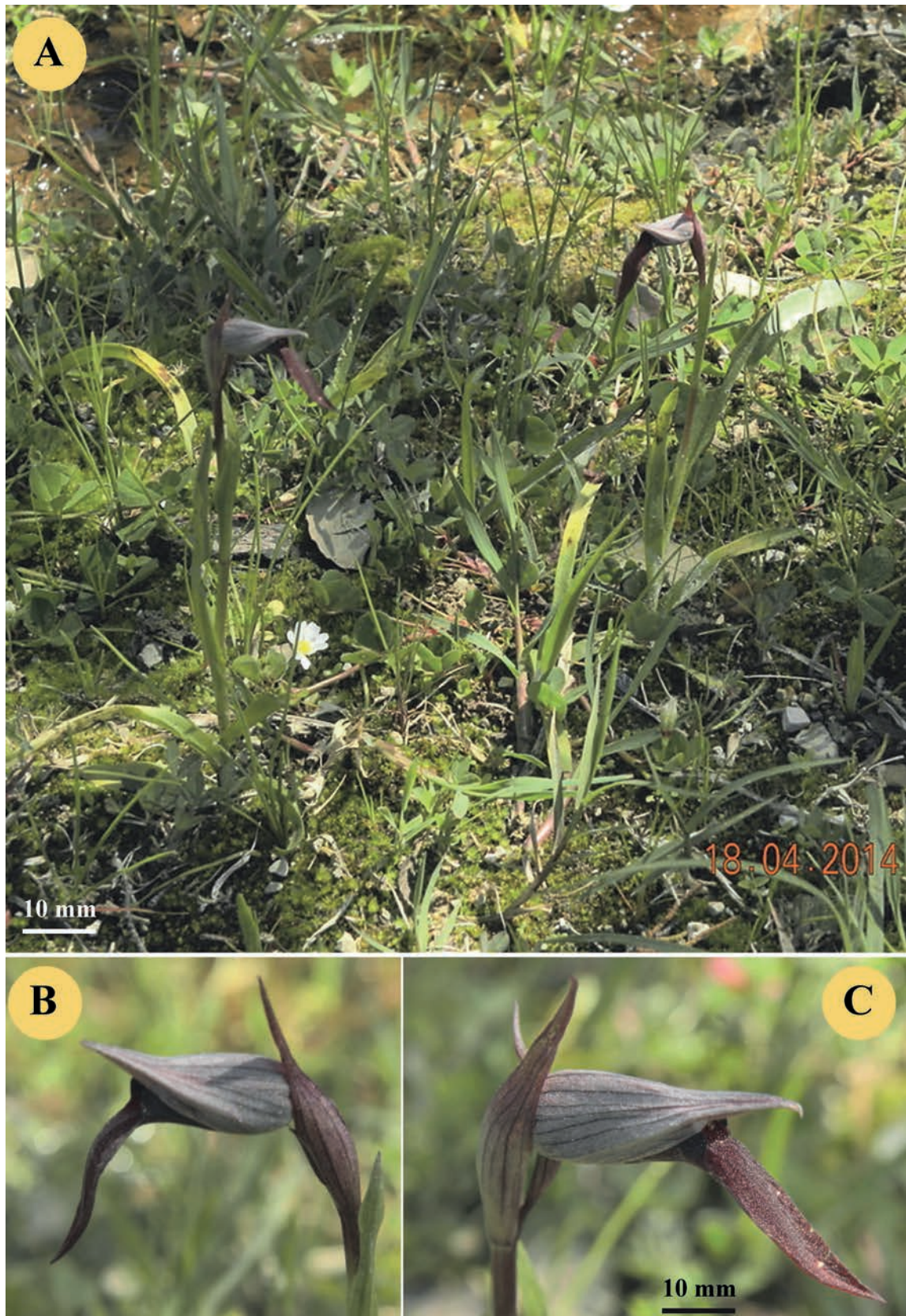
*Serapias lingua* subsp. *tunetana*, in our opinion, differs from *S. lingua* subsp. *lingua* and *S. strictiflora*

[= *S. lingua* subsp. *duriaei* (Batt.) Soó] mainly by the shape and size of the lip (see Table 1 and Figs. 2, 3 and 4). The difference in the size of the epichile included in the original description by Baumann & Baumann (2005; i.e. 7–10 × 4–7 mm) and that measured by us (14–19 × 8–11 mm) may due to the small number of observations made by the describing authors that accentuated the values measured on some individuals with smaller flowers, due to particularly dry years.



**Figure 3.** *Serapias lingua* subsp. *tunetana* from Kroumiria, northwestern Tunisia: (A), front view flower; (B), open flower with typical lanceolate epichile (photographs: R. El Mokni, May 15, 2014).





**Figure 4.** *Serapias lingua* subsp. *tunetana* from Kroumiria, northwestern Tunisia: (A), habitat and habit; (B), a profile view flower; (C), typical narrowly triangular epichile (photographs: R. El Mokni, April 18, 2014).



## ACKNOWLEDGMENTS

Our best thanks are addressed to Dr. R. Lorenz for his collaboration, for his revision of the first version of this manuscript and for all his amending comments.

## REFERENCES

- APD [African Plant Database] 2018. Conservatoire et Jardin botaniques de la Ville de Genève and South African National Biodiversity Institute, Pretoria. Version 3.4.0. Retrieved August 8, 2018, from <http://www.ville-ge.ch/musinfo/bd/cjb/africa>
- Astuti, G., Brullo, S., Domina, G., El Mokni, R., Giordani, T. & Peruzzi, L. 2017. Phylogenetic relationships among tetraploid species of *Bellevalia* (Asparagaceae) endemic to south-central Mediterranean. *Plant Biosystems* 151: 1120–1128. <https://doi.org/10.1080/11263504.2017.1320308>
- Bachman, S., Moat, J., Hill, A. W., Torre, J. de la & Scott, B. 2011. Supporting Red List threat assessments with GeoCAT: geospatial conservation assessment tool. In: Smith, V. & Penev, L. (Eds.), e-Infrastructures for data publishing in biodiversity science. *ZooKeys* 150: 117–126. <https://doi.org/10.3897/zookeys.150.2109>
- Baumann, H. & Künkele, S. 1989. Die Gattung *Serapias* L. eine taxonomische Übersicht [The genus *Serapias* L. A taxonomic overview]. *Mitteilungsblatt, Arbeitskreis Heimische Orchideen Baden-Württemberg* 21: 701–946 [in German].
- Baumann, B. & Baumann, H. 2005. Contributions to the knowledge of the orchid flora of Northwest-Africa. *Journal Europäischer Orchideen* 37: 915–938.
- Baumann, H., Künkele, S. & Lorenz, R. 2006. *Orchideen Europas (Naturführer)* [*Orchids of Europe (nature guide)*]. Eugen Ulmer, Stuttgart [in German].
- Delforge, P. 1995. *Orchids of Britain & Europe*. Harper Collins Publishers, New York.
- Delforge, P. 2007. *Serapias lingua* f. *tunetana* (B. Baumann & H. Baumann) P. Delforge. *Naturalistes Belges* 88: 248.
- Delforge, P. 2016. *Guide des orchidées d'Europe, d'Afrique du Nord et du Proche-Orient* (4th ed.). [*Guide of orchids of Europe, North Africa and Middle East*]. Delachaux et Niestlé, Lonay [in French].
- Domina, G., El Mokni, R., Greuter, W. & Raimondo F. M. (Eds.) 2015. Results of the 12th “Iter Mediterraneum” in Tunisia, 24 March–4 April, 2014. *Bocconea* 27: 1–76.
- El Mokni, R., Domina, G., Sebei, H. & El Aouni, M. H. 2015a. Taxonomic notes and distribution of taxa of *Orobancha* gr. *minor* (Orobanchaceae) from Tunisia. *Acta Botanica Gallica: Botany Letters* 162: 5–10. <https://doi.org/10.1080/12538078.2014.993424>
- El Mokni, R., Domina, G., Sebei, H. & El Aouni, M. H. 2015b. On the distribution and subspecific variation of the Tunisian–Algerian endemic *Delphinium sylvaticum* (Ranunculaceae). *Nordic Journal of Botany* 33: 548–554. <https://doi.org/10.1111/njb.00900>
- Gölz, P. & Reinhard, H. R. 1980. *Serapias* (Orchidaceae). Ergebnisse statistischer und chorologischer Untersuchungen [*Serapias* (Orchidaceae). Results of statistical and chorological examinations]. *Mitteilungsblatt, Arbeitskreis Heimische Orchideen Baden-Württemberg* 12: 123–189 [in German].
- IUCN [International Union for Conservation of Nature] 2012. *IUCN Red List categories and criteria*. Version 3.2 (2nd ed.). IUCN Species Survival Commission. IUCN, Gland. Retrieved August 8, 2018, from [http://jr.iucnredlist.org/documents/redlist\\_cats\\_crit\\_en.pdf](http://jr.iucnredlist.org/documents/redlist_cats_crit_en.pdf)
- IUCN [International Union for Conservation of Nature] 2016. *The IUCN Red List of threatened species*. Version 2015-4. Retrieved August 8, 2018, from <http://www.iucnredlist.org>
- Laguna, E., Deltoro, V. I., Pérez-Botella, J., Pérez-Rovira, P., Serra, L., Olivares, A. & Fabregat, C. 2004. The role of small reserves in plant conservation in a region of high diversity in eastern Spain. *Biological Conservation* 119: 421–426. <https://doi.org/10.1016/j.biocon.2004.01.001>
- Le Floch, E., Boulos, L. & Vêla, E. 2010. *Catalogue synonymique commenté de la flore de Tunisie* [*Commented synonymic catalogue of the flora of Tunisia*]. Banque Nationale de Gènes, Tunis [in French].
- Lorenz, R. 2001. Die Gattung *Serapias* in Italien: Arten und Verbreitung [The genus *Serapias* in Italy: species and distribution]. *Journal Europäischer Orchideen* 33: 235–368.
- Martin, R., Ouni, R., Vêla, E. & Léger, J.-F. 2013. À la découverte des orchidées du Cap Bon en Tunisie: Une expérience de cartographie des orchidées sauvages [*Discovering the orchids of Cap Bon in Tunisia: an experience of cartography of wild orchids*]. Société Méditerranéenne d'Orchidologie, La Motte d'Aigues [in French].
- Martin, R., Vêla, E. & Ouni, R. 2015. Orchidées de Tunisie [Orchids of Tunisia]. *Bulletin de la Société Botanique du Centre-Ouest* 44: 1–160 [in French].
- Nelson, E. 1968. *Monographie und Ikonographie der Orchideen-Gattungen Serapias, Aceras, Loriglossum, Barlia* [*Monograph and iconography of the orchid genera Serapias, Aceras, Loriglossum, Barlia*]. G. & A. Claraz-Schenkung, Zürich [in German].
- Pérez Chiscano, J. L., Gil Llano, J. R. & Durán Oliva, F. 1991. *Orquídeas de Extremadura*. Fonda Natural, Madrid.
- Vêla, E., Ouni, R. & Martin, R. 2012. *Serapias nurrica* Corrias (Orchidaceae), nouveau pour la flore de Tunisie [*Serapias nurrica* Corrias (Orchidaceae), new for the flora of Tunisia]. *Journal Europäischer Orchideen* 44: 381–392 [in French].
- Venhuis, C., Venhuis, P., Oostermeijer, J. G. B. & Tienderen, H. van 2007. Morphological systematics of *Serapias* L. (Orchidaceae) in Southwest Europe. *Plant Systematics and Evolution* 265: 165–177. <https://doi.org/10.1007/s00606-007-0519-0>