The genus Tamarix (Tamaricaceae) in Crete (Greece)

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The genus *Tamarix* (*Tamaricaceae*) in Crete (Greece)

Abstract

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A report on the genus *Tamarix* (*Tamaricaceae*) in Crete is provided. The previously recorded taxa are compared with new collections made on the island and with vouchers found at different herbaria. Three species were fully confirmed: *T. nilotica* and *T. parviflora*, collected in the field, and *T. smyrnensis*, found only in herbarium vouchers. The other previously reported taxa, *T. dalmatica*, *T. hampeana*, *T. pallasii* and *T. tetrandra* were not found; *T. dalmatica* was erroneously reported, the record of *T. hampeana* represents a fourth species but its identity requires further study, records of *T. pallasii* are probably misidentifications of *T. nilotica* and/or *T. smyrnensis*, and the record of *T. tetrandra* probably refers to *T. parviflora*. The presence of *T. nilotica* is documented, confirming that it has been historically overlooked and mistaken for *T. smyrnensis*. A morphological comparison between *T. nilotica* and *T. smyrnensis* is provided in order to avoid further confusion and misidentifications. A dichotomous key for the *Tamarix* species reported in Crete is provided.

Additional key words: distribution, Aegean Islands, taxonomy, Mediterranean flora

Introduction

The taxonomy of the genus *Tamarix* L. (*Tamaricaceae*) is notoriously complex (Bunge 1852; Zohary 1972; Baum 1978). It is thought to contain between 54 and 90 species (Zohary 1972; Baum 1978; Yang & Gaskin 2007), although about 200 taxa, including species, subspecies, varieties and forms, have been described since Linnaeus (1753) named the genus. According to Baum (1978: 178–179), *Tamarix* shows two main speciation centres, one in the Indo-Turanian region and the other in the Middle East. From there, the genus migrated south and west towards Africa and Europe, and also north and east to the cold deserts and the Pacific coast of Asia (Baum 1978).

The island of Crete is located in the Aegean Sea, 97 km from continental Greece, 179 km from continental Turkey and 287 km from the NE coast of Libya. *Tamarix* is widely distributed in Crete, particularly along the coastline, in ravines and in the lower courses of rivers. Seven species have been reported until now: *T. dalmatica* B. R. Baum, *T. hampeana* Boiss. & Heldr., *T. nilotica* (Ehrenb.) Bunge, *T. pallasii* Desv., *T. parviflora* DC., *T. smyrnensis* Bunge and *T. tetrandra* Pall. ex M. Bieb.

The first report of the genus *Tamarix* in Crete was *T. cretica* Bunge, which was described (Bunge 1852: 33) from plants collected by Sieber at "Armiro". However, *T. cretica* was soon synonymized to *T. parviflora* (Boissier 1867: 769), a synonymization that is now widely accepted (Baum 1968: 1978). *Tamarix pallasii* was reported by Boissier (1867: 773) and, based on material determined by Boissier, Raulin (1869: 419). In the first printed version of his monograph of the genus, Baum (1966: 122)

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only reported the presence of *T. parviflora* in Crete. However, two years later, in his Flora europaea account, Baum (1968: 293) added *T. dalmatica* and *T. smyrnensis*. Due to the lack of records, the occurrence of *T. dalmatica* was rejected by Greuter (1974: 139), who was followed by Dimopoulos & al. (2013: 143) and by most other publications. It should be noted that the correct identification of *T. dalmatica* has been regarded as troublesome in the W Mediterranean region (Villar & al. 2012: 254). There also exists a record of *T. hampeana* in the Chania region (Turland 2010, determined by B. R. Baum). Recently, Dimopoulos & al. (2013: 143) have cited *T. nilotica* and *T. tetrandra* as occurring in Crete. The *T. tetrandra* record probably follows Zielińsky's (1994: 34) treatment of *T. parviflora* as a synonym of *T. tetrandra*. Jahn & al. (2014: 295) questioned this record and called for further revision. In the present study, we have still considered both species as separate. Among all records, *T. parviflora* and *T. smyrnensis* were thought to be by far the most abundant species in Crete (cf. Fielding & Turland 2005: 414).

During two field trips to Crete, in July and October of 2009, a number of *Tamarix* specimens were collected throughout the island, but some did not match with any of the previously reported taxa. The aim of this study was to clarify the identity of those specimens, and to provide a tool to easily identify the species present on the island.

Material and methods

The 22 specimens collected during the fieldwork were prepared, databased and stored at the Herbarium of the University of Alicante (ABH), Spain. Moreover, several international herbaria were visited or consulted (B, G, K, MA, MO, MPU, P, PR, PRC, VAL and W; herbarium codes according to Thiers, 2008+). About 180 vouchers, belonging to the reported species in Crete, were studied in order to properly clarify the identity of the specimens collected. Different taxonomic studies and dichotomous keys were also consulted to obtain accurate identifications (Bunge 1852; Baum 1968; 1978; Zohary 1972; Villar & al. 2014). The main studied material of the species found in Crete is listed in the Appendix. Detailed images were obtained using a binocular motorized microscope (Olympus SZX16) with adapted digital camera.

Results

After a detailed morphological study of the 22 collected specimens, twelve were identified as *Tamarix nilotica*, seven as *T. parviflora*, and three remained unclear, although their scarce remaining floral features suggested some resemblance to *T. africana* Poir. At the different herbaria visited, the following species were recognized among those vouchers collected in Crete: *T. nilotica* (as *T. pallasii* and *T. smyrnensis*), *T. parviflora*, and *T. smyrnensis* (as *T. pallasii*). The first record of *T. parviflora* (as *T. cretica*) corresponds to Sieber's collection at "Armiro", which is the type material of *T. cretica*. The oldest, and the only, herbarium vouchers of *T. smyrnensis* we found from Crete belong to the collection *Raulin 618* from 1845 (G! and P!), first identified as *T. pallasii* (probably by Boissier) and as *T. smyrnensis* by Bunge, respectively. On the other hand, the oldest *T. nilotica* specimens we found from Crete are *Greuter* collections from 1966 (G! and W!), which were identified as *T. pallasii* and stored as *T. smyrnensis.*

Among all samples and records, the presence of *Tamarix nilotica* was only reported recently (Dimopoulos & al. 2013: 143), but no explicit reference to any voucher was made. According to Strid (pers. comm. 2014), the entry in Dimopoulos & al. (2013) is based on the following specimen: Greece, Kriti, Nomos of Lasithi, Eparchia of Mirabello: peninsula of Spinalonga, 35°16'N, 25°45'E, 1 Aug 1973, *Stamatiadou 17391* (ATH); conf. J. Zieliński. Actually, according to our observations, it is widely distributed in Crete. It is easily found growing wild on coastal salt marshes (e.g. Aposelemis, Kouremenos bay), as well as planted in most of the coastal villages and towns (eg. Paleochora, Tris Ekklisies). Among the species reported from Crete, the most similar to *T. nilotica* is clearly *T. smyrnensis.* These two species show similarities in their general morphology and they resemble each other in their general aspect. They both produce racemes of equivalent size, arranged on terminal compound panicles. In addition, they are both pentamerous-flowered species with white or whitish petals, and are both also pentandrous, with the staminal filaments inserted between the nectariferous disk lobes. However, there are some notable differential characters (Fig. 1), which are to be observed to avoid confusion. The leaves (Fig. 1D & E) of *T. nilotica* are broad at their base, ampexicaul or subamplexicaul in their lower half, with deep and numerous salt glands on their surface, whereas *T. smyrnensis* presents lanceolate leaves with a narrow and decurrent base, notably less glandular (Fig. 1A & B). These differences are maintained throughout the complete leaf development, from young to old stages. The sepals of *T. nilotica* show some morphological variation through the natural distribution area of the species. Nevertheless, the specimens growing in Crete seem to be quite stable in presenting ovate-orbicular, obtuse-tipped sepals, whereas *T. smyrnensis* shows ovate to lanceolate, acute-tipped sepals. *Tamarix nilotica* shows elliptic petals, deciduous at the fruiting stage, whereas *T. smyrnensis* has broadly elliptic to ovate petals, characteristically gibbous keeled, or at least with a rougher and coloured central part, persistent after anthesis. Finally, the phenology of both species differs notably: *T. nilotica* flowers essentially at late summer and autumn, whereas *T. smyrnensis* has its main flowering period in late winter and spring. Although *Tamarix* species are able to show secondary flowering periods, they tend to be weaker and

Fig. 1. A–C: *Tamarix smyrnensis* – A: older leaves; B: recent leaves; C: petals. – D–F: *Tamarix nilotica* – D: older leaves; E: recent leaves; F: petals. – Scale bars = 1 mm. – A & B: *Yaprak 2007-011* (ANK); C: *J. Kashefi* (MO); D & F: *Villar & Vicente* (ABH54325); E: *Villar & Vicente* (ABH54323).

less coordinated with the surrounding individuals than the main flowering periods.

Discussion

The previously reported geographic distributions of both taxa could have played a key role in the identification of *T. nilotica* specimens as *T. smyrnensis*. According to Baum (1966; 1978), *T. nilotica* is native to Lebanon, Israel, Egypt, Sudan, Somalia and Kenya. *Tamarix smyrnensis* is supposed to be distributed in Romania, Bulgaria, Greece, Turkey, Cyprus, Syria, Lebanon, Israel, Russia, Georgia, Turkmenistan, Iraq, Iran and Afghanistan (Baum 1966, 1978). However, the most eastern localities of *T. smyrnensis* may correspond to *T. hohenackeri* Bunge, which we do not recognize as a synonym of *T. smyrnensis* (Villar & al. 2014). Therefore, we consider that the main distribution area for *T. smyrnensis* is found in the Turkish and Greek continental

coasts, making its presence in Crete easily predictable.

Below we briefly discuss the presence of each of the previously reported taxa.

Tamarix dalmatica B. R. Baum, Monogr. Rev. Gen. Tamarix: 100, 180. 1966.

No specimen of *Tamarix dalmatica* was found in the field or in the herbaria visited. Baum (1968) made no mention of a precise location or a concrete voucher and no other occurrence has been reported since then. In addition, Greuter (1974: 139) and Dimopoulos & al. (2013: 298) considered this species as erroneously reported from Crete. Accordingly, the presence of *T. dalmatica* has to be discarded.

Tamarix hampeana Boiss. & Heldr. in Boiss., Diagn. Pl. Orient., ser. 1, 10: 8. 1849.

We examined the sample on which the record of *Tamarix hampeana* (Turland 2010) was based (*Turland 1778 & Bareka*), and it corresponds with our three samples collected at the same location (see Appendix), which we found difficult to identify, although they showed some resemblance to *T. africana*. However the morphology of these specimens shows certain peculiarities, and detailed studies are being undertaken in order to better clarify their taxonomic identity.

Tamarix nilotica (Ehrenb.) Bunge, Tent. Gen. Tamar.: 54. 1852 ≡ *T. gallica* var. *nilotica* Ehrenb. in Linnaea 2: 269. 1827.
? *Tamarix pallasii* auct. non Desv.

The previous data suggest that *Tamarix nilotica* has been overlooked and confused with *T. smyrnensis.* The existence of the collection *Raulin 618* confirms the presence in Crete of *T. smyrnensis*, and suggests that both species coexist there. The reported presence of *T. smyrnensis* is likely to have led to the misidentification of *T. nilotica*, due to the general resemblance of these species to each other.

It remains doubtful whether *Tamarix nilotica* can be considered native or introduced to Crete, although some trees show big, wide trunks suggesting that their presence in the island goes further back than Greuter's 1966 collection. As can be seen in the Appendix, *T. nilotica* is also present in the East Aegean islands (Samos, Patmos, Rhodes), and it is also reported for two other regions of Greece, the Ionian Islands and the West Aegean Islands (Dimopoulos & al. 2013: 143). Therefore, further research would be needed to date its previously known distribution, or to clarify if its natural populations extend more than expected towards S Anatolia and the Aegean coasts.

Tamarix pallasii Desv. in Ann. Sci. Nat. (Paris) 4: 349. 1825.

Boissier's *Tamarix pallasii* could correspond to *T. smyrnensis*, as could many of the varieties of *T. pallasii* described by Bunge (1852; Baum 1978: 44). Indeed, the oldest Cretan specimens of *T. smyrnensis* – and *T. nilotica* – were initially identified as *T. pallasii.* This indicates that the presence of *T. pallasii* in Crete is doubtful, and that the name has probably been applied to specimens of *T. nilotica* and/or *T. smyrnensis.*

Tamarix parviflora DC., Prodr. 3: 97. 1828.
= *Tamarix cretica* Bunge, Tent. Gen. Tamar.: 33. 1852.
? *Tamarix tetrandra* auct. non Pall. ex M. Bieb.

Beyond any doubt, *Tamarix parviflora* is abundantly present in Crete, *T. cretica* being accepted as a synonym.

Tamarix smyrnensis Bunge, Tent. Gen. Tamar.: 53. 1852.
? *Tamarix pallasii* auct. non Desv.

The presence of *Tamarix smyrnensis* in Crete is confirmed. However, it seems clear that its abundance has been overestimated, as *T. nilotica* specimens were commonly identified as *T. smyrnensis*. Nonetheless, having conducted the fieldwork in July and October, we cannot be sure of the real abundance of *T. smyrnensis.* Spring surveys would be needed in order to clarify if it is widely distributed or just sporadic, as the only specimens found are those belonging to the collection *Raulin 618*.

Tamarix tetrandra Pall. ex M. Bieb, Fl. Taur.-Caucas. 1: 247. 1808.

The recent record of *Tamarix tetrandra* (Dimopoulos & al., 2013: 143) probably arises from Zielińsky's (1994: 34) treatment of *T. parviflora* as a synonym of *T. tetrandra.* However, this synonymization still needs further research to be fully clarified, and for the time being we consider the two species as separate.

Identification key for Cretan *Tamarix*

The key below includes all four species of *Tamarix* that we recognize as present in Crete. The identity of the population recorded as *T. hampeana* still needs clarification.

1. Racemes broader than 6 mm . . . . . ***T.* sp.** (*T. "hampeana"*)
– Racemes usually narrower than 5 mm **2**
2. Flowers with 4 sepals, 4 petals and 4 stamens . . . . . ***T. parviflora***
– Flowers with 5 sepals, 5 petals and 5 stamens **3**
3. Leaves with a narrow and decurrent base; petals gibbous keeled, whitish with a yellowish brown central part . . . . . ***T. smyrnensis***
– Leaves with a broad base, sub-amplexicaul to amplexicaul; petals elliptic and flat, white . . . . . ***T. nilotica***

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References

Baum B. 1966: Monographic revision of the genus *Tamarix*. Final research report for the USDA. – Jerusalem: Department of Botany, Hebrew University.

Baum B. 1968: *Tamarix* L. – Pp. 292–294 in: Tutin T. G., Heywood V. H., Burges N. A., Moore D. M., Valentine D. H., Walters S. M. & Webb D. A. (ed.), Flora europaea **2.** – Cambridge: University Press.

Baum B. 1978: The genus *Tamarix*. – Jerusalem: Israel Academy of Sciences and Humanities.

Boissier E. 1867: Flora orientalis **1.** – Basileae, Genevae: H. Georg.

Bunge A. 1852: Tentamen generis Tamaricum species accuratius definiendi. – Dorpati: J. C. Schuenmanni et C. Mattieseni.

Candolle A. P. de 1828: Prodromus systematis naturalis regni vegetabilis **3.** – Parisiis: Treuttel et Würtz.

Dimopoulos P., Raus Th., Bergmeier E., Constantinidis Th., Iatrou G., Kokkini S., Strid A. & Tzanoudakis D. 2013: Vascular plants of Greece: an annotated checklist. – Berlin: Botanic Garden and Botanical Museum Berlin-Dahlem; Athens: Hellenic Botanical Society. [Englera **31**].

Fielding J. & Turland N. [Mathew B. (ed.)] 2005: Flowers of Crete. – Kew: Royal Botanic Gardens.

Greuter W. 1974: Floristic report on the Cretan area. – Mem. Soc. Brot. **24:** 131–171.

Jahn R., Raus Th. & Strid A. 2014: *Tamarix tetrandra.* – In: Raab-Straube E. von & Raus Th. (ed.), Euro+Med-Checklist Notulae 3. – Willdenowia **44:** 287–299.

Linnaeus C. 1753: Species plantarum **1.** – Holmiae: Laurentii Salvii.

Raulin V. 1869: Livre IV. Botanique. – Pp. 693–974 in: Description physique de l'île de Crète **2.** – Paris: Arthus Bertrand.

Thiers B. 2008+ [continuously updated]: Index herbariorum: a global directory of public herbaria and associated staff. – New York Botanical Garden: published at http://sweetgum.nybg.org/ih/ [accessed 29 Jul 2014].

Turland N. 2010: *Tamarix hampeana* Boiss. & Heldr. – Pp. 198–199 in: Greuter W. & Raus Th. (ed.), Med-Checklist Notulae 29. – Willdenowia **40:** 189–204.

Villar J. L., Alonso M. A., Juan A. & Crespo M. B. 2012: Does *Tamarix dalmatica* (*Tamaricaceae*) occur in Spain? – Anales Jard. Bot. Madrid **69:** 253–258.

Villar J. L., Juan A. & Alonso M. A. 2014: *Tamarix hohenackeri* Bunge, a new record for the flora of Mexico. – Acta Bot. Mex. **106:** 117–128.

Yang Q. E. & Gaskin J. 2007: *Tamarix* Linnaeus. – Pp. 59–65 in: Wu Z. Y., Raven P. H. & Hong D. Y. (ed.), Flora of China **13.** – Beijing: Science Press; St. Louis: Missouri Botanical Garden Press.

Zieliński J. 1994: *Tamarix* L. – Pp. 30–34 in: Browicz K. (ed.), Chorology of trees and shrubs in south-west Asia and adjacent regions **10.** – Ponzań: Bogucki Wydawnictwo Naukowe.

Zohary M. 1972: *Tamarix*. – Pp. 351–364 in: Zohary M. (ed.), Flora palaestina **2.** – Jerusalem: Israel Academy of Sciences and Humanities.

Appendix: Herbarium specimens examined

***Tamarix* sp.** (*T. "hampeana"*)

Greece: Crete, Hania, Georgioupoli, river mouth, 35S KV 508171 [35°22'00"N, 24°15'28"E], 12 Jul 2009, *Alonso, Vicente & Villar T2CR* (ABH54194); Crete, Hania, Georgioupoli, river mouth, 35S KV 512172 [35°22'04"N, 24°15'42"E], 12 Jul 2009, *Alonso, Vicente & Villar T3CR* (ABH54196); Crete, Hania, Georgioupoli, 35S KV 516163 [35°21'34"N, 24°15'59"E], 12 Jul 2009, *Alonso, Vicente & Villar T4CR* (ABH54195); Crete, Nomos Chanion, Eparchia Apokorounou, Georgioupoli beach, by river mouth at E edge of village, 35°21'34.3"N, 24°15'59.6"E, 28 Mar 2009, *Turland 1778 & Bareka* (MO6207620).

Tamarix nilotica

Egypt: in Aegypto, 1829, *Savi* (W1889-65784 as *T. senegalensis*); Aegypt. sup., *Kotschy 1002* (W); Prov. Fayum et in insul. Nili, 1820–1826, *Ehrenberg* (K000242697); Ismailia, Qantra road, 28 Sep 1928, *A. Abdel Aty & M. Mokhtar* (MO5814872); Sinai, Straße von St. Katharina Richtung Dahab & Nuweibaa, c. 2 km N Gebel Barari, 1230 m, 24 Feb 2003, *Eberl & Kaiser* (W2007-25493, W2007-25494).

Greece: Crete, Hania, Paleochora, 34S GE438 016 [35°13'40"N, 23°40'43"E], 14 Oct 2009, *Villar & Vicente* (ABH54319, ABH54320); Crete, [Chania], Chora Sfakion, ad viam prope portum, ut videtur culta, 9 Oct 1966, *Greuter 7695* (W1967-18626); Crete, Heraklion, Tris Ekklisies, 35S LU298 694 [34°57'10"N, 25°08'09"E], 12 Oct 2009, *Villar & Vicente* (ABH54318); Crete, [Iraklio], Pedias, ad litus maris prope Chani Kokini, ab Iraklio 10 km, in depressis salsuginosis hyeme inundatis, solo argilloso, 1 Nov 1966, *Greuter 7854* (G as *T. smyrnensis*); Crete, Heraklion, Aposelemis, 35S LV481 113 [35°20'00"N,

25°19'43"E], 9 Oct 2009, *Villar & Vicente* (ABH54314); Crete, Heraklion, prox. Dermatos, 35S LU477 724 [34°58'57"N, 25°19'53"E], 11 Oct 2009, *Villar & Vicente* (ABH54323); Crete, Heraklion, prox. Dermatos, 35S LU485 729 [34°59'14"N, 25°20'24"E], 11 Oct 2009, *Villar & Vicente* (ABH54326); Crete, Heraklion, prox. Arvi, 35S LU587 732 [34°59'29"N, 25°27'06"E], 11 Oct 2009, *Villar & Vicente* (ABH54325); Crete, Heraklion, prox. Arvi, 35S LU664 729 [34°59'23"N, 25°32'10"E], 11 Oct 2009, *Villar & Vicente* (ABH54322); Crete, Lasithi, Kalo Nero, 35S MU134 756 [35°01'09"N, 26°03'02"E], 10 Oct 2009, *Villar & Vicente* (ABH54317); Crete, Lasithi, Perivolakia, 35S MU140 785 [35°02'43"N, 26°03'25"E], 314 m, 10 Oct 2009, *Villar & Vicente* (ABH54327); Crete, Lasithi, Kouremenos Bay, 35S MU334 962 [35°12'23"N, 26°16'05"E], 10 Oct 2009, *Villar & Vicente* (ABH54315); Crete, Lasithi, Xerokambos, 35S MU308 793 [35°03'14"N, 26°14'28"E], 10 Oct 2009, *Villar & Vicente* (ABH54316); Samos, 18 Sep 1978, *K. H. Rechinger* (W2001-05521); Dodecanesa, Patmos, Strand östlich von Skala, 10–30 m, 10 Oct 1999, *H. Förther* (W2006-23819, W2002-13392); Rhodes, Lalisou, 36°25'15"N, 28°11'16"E, 20 Oct 2011, *Izquierdo* (ABH70539).

Israel: env. of Dead Sea, near Her Sedom, moist saline soil, 18 Dec 1938, *M. Zohary & T. Rayss* (W1960-1876).

Lebanon: prope Saïda, Oct, *Gaillardot 543b* (W); Jarezia and de Saïda, 10 Oct, *Gaillardot* (W); Antour de Saïda, haies des jardins, 14 Oct 1842, *I. Blanche 64* (W1889-96596).

Palestine: Kalia, wadi on the plain, 5 Dec 1942, *P. H. Davis* (W1961-10509).

Tamarix parviflora

Greece: Crete, Armiro [Almyro], *Sieber* (type collection for *T. cretica*: G-BOIS unnumbered, MO3728838, P05171492, PR616956, PRC452710, PRC452711, PRC452712, PRC452713, W0031736, W0031737, W0031738); Crete, Hania, Platanias estuary, 34S GE 562 360 [35°32'04"N, 23°49'32"E], 12 Jul 2009, *Villar, Vicente & Alonso* (ABH54202); Crete, Distr. Apokorono, ad flumen Kilaris prope Kalyves, Mar 1904, *Dörfler 5264* (W1911-5630); Crete, Rethimnon, prox. Sises, 35S KV 863 213 [35°24'43"N, 24°38'47"E], 14 Jul 2009, *Villar*, *Vicente & Alonso* (ABH54201); Crete, Heraklion, Geropotamou estuary, 35S KU 944 836 [35°04'27"N, 24°44'42"E], 13 Jul 2009, *Villar*, *Vicente & Alonso* (ABH54200); Crete, Heraklion, Geropotamou estuary, 35S KU 957 800 [35°02'31"N, 24°45'36"E], 13 Jul 2009, *Villar*, *Vicente & Alonso* (ABH54198); Crete, Heraklion, Aposelemis, 35S LV 481 114 [35°20'03"N, 25°19'43"E], 10 Jul 2009, *Villar & Vicente* (ABH54199); Crete, Heraklion, prox. Aposelemis, 35S LV 487 103 [35°19'28"N, 25°20'07"E], 11 m, 14 Jul 2009, *Villar, Vicente & Alonso* (ABH54197); Crete, Heraklion, prox. Dermatos, 35S LU 476 726 [34°59'04"N, 25°19'49"E], 11 Oct 2009, *Villar & Vicente* (ABH54321).

Turkey: Constantinople, 1822, *Castagne* (holotype of *T. parviflora*: G-DC 3-97-14).

Tamarix smyrnensis

Cyprus: Cap Arnauti, près Polis, *M. Haradjian* (MO1621122); ad alveos prope litora maris in viciniis Kuklia, Amathus et aliis locis, May 1862, *Kotschy 572* (W1889-342770, W1889-342771, G-BOIS); in humid. pr. Kythraea, 2 Jun 1880, *Sintenis & Rigo* (PR as *T. pallasii*).

Greece: Larissa in Thessalia, Aug 1889, *Formanek* (PR); ad ripas Penes pr. Larissam, 2 Aug 1882, *Heldreich* (G); Etolias-Akaranias, Mesolongi, coast by the salt works, c. 5 km NW of Mesolongi, clayey marsh, 9 Jun 1997, *Nielsen 12171* (G as *T. parviflora*); Elis in paludosis maritimis Lintri, 3 Jun 1899, *Heldreich* (G); S Greece, NE Peloponnisos, Nafplion, 37°35'19"N, 22°47'44"E, 23 May 2003, *J. Kashefi* (MO); Crete, maritimus prope Khania, Jun 1845, *Raulin 618* (G-BOIS, P-L04034468 pro parte); Rhodes, bords des torrents près Salakos, 31 May 1870, *Bourgeau* (G-BOIS, PR as *T. gallica*, W1889-150434).

Macedonia: im Radovisna-Tal, 3–4 km N von Radovis, Bachlandschaft, 400–500 m, 11 Jul 1977, *F. Krendl* (W1994-01524).

Turkey: Smyrne, *Monbret* (W1889-223513); Smyrnae, in arenosis humidis, Apr–May 1827, *Fleischer* (P-L04034468 pro parte, PR376105, PRC452718, PRC452719, PRC452720, W1889-320298); marais d'eau saumâtre situés entre la Papeterie et la mer, près de Smyrne, 12 Apr 1854, *B. Balansa* (MO5475118, W1889-81992, W1889-80859); Lydia, in humidis ad ruinas Ephesi, 1 Jun 1906, *Bornmüller 9202* (W1908-678); A2 Bursa, 4 km S Uluabat, Damm, 27 Jun 1977, *F. Sorger* (W1990-06989); C2 Denizli, Pamukkale E, 400 m, 28 Jun 1967, *F. Sorger* (W1990-06983); Antalya, from Antalya to Akseki, beside the river, under the Karpuzçay bridge, 15 m, 17 May 2007, *Yaprak 2007-011* (ANK); C4 İçel, 12 km S Mut, 200 m, 6 Jun 1966, *F. Sorger* (W1990-07003); Cilicia, Mersina, bords du Guzel-Déré, à l'ouest de Mersina, 2 Apr 1855, *B. Balansa* (W1889-76155); B6 Sivas, Divriği, 2 km SO Sincan, 1600 m, 30 Jun 1970, *F. Sorger* (W1990-06991); N Muş, rechtes Murat Ufer, 1300 m, 20 Jun 1984, *F. Sorger* (W1990-06990).