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Symphytum tanaicense (Boraginaceae) new for the Italian flora

Abstract

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Symphytum tanaicense is recorded for the first time for Italy (Lake of Massaciuccoli, NW Tuscany). Morphological, karyological and ecological characteristics of this plant, as compared with those of *S. officinale,* are presented and discussed.

Introduction

The Eurasian genus *Symphytum* L., according to Pawłowski (1972), is represented by 14 species in Europe. Five of them occur in peninsular Italy (Pignatti 1982): *S. officinale* L., *S. bulbosum* Schimp. and *S. tuberosum* L. are native, *S. asperum* Lepechin and *S. orientale* L. are naturalized aliens in N Italy and in Tuscany, respectively. A sixth, *S. gussonei* F. W. Schultz, is endemic to Sicily and considered as an insular vicariant of *S. tuberosum*. Pignatti (1982) noted several doubts surrounding the Italian species and the consequent need for a revision of their infraspecific variation, taxonomy, nomenclature and synonymy.

During our cytotaxonomic study of the Tuscan populations of the *Symphytum officinale* group, placed in the frame of a general biosystematic revision planned for the entire genus in Italy, plants with peculiar somatic, karyological and ecological features were recognised as a distinct taxon and identified as *S. tanaicense* Steven. This species had not previously been reported for the Italian flora. We found, however, specimens of it in the herbaria of Pisa (PI) and Firenze (FI), collected earlier in localities of the same general area, one coinciding with our own locality, the others presumably from populations that are now extinct.

In the present preliminary account, the morphology, chromosomes and distribution of the species are described and briefly discussed. Further information on the taxonomy, systematics and populational variation will be presented in a forthcoming contribution, dealing with the whole *Symphytum officinale* complex, to which *S. tanaicense* may be referred.

Material and methods

Macro- and micro-morphological data were obtained both from live plants collected in situ, then transplanted to the Pisa Botanic Gardens (H.B.P.), and from herbarium specimens preserved in PI and FI.

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For chromosome counting, metaphases of root tips, pretreated with a solution of 0.3 % of colchicine, fixed in Carnoy, hydrolysed and stained with fuchsine, were squashed in orceine acetic solution.

Live plants
Symphytum tanaicense (purplish violet-flowered): Lake of Massaciuccoli (Province of Lucca), loc. Piaggetta, along a canal close to Villa Ginori, 30.8.1999, *Peruzzi & Bottega* (H.B.P. access. no. 387-388/1999).
Symphytum officinale (white-flowered): Lucca, canals along the town walls, 22.6.1999, *Peruzzi & Bottega* (H.B.P. access. no. 406-455/1999);
Symphytum officinale (pinkish violet-flowered): Montescudaio (Province of Pisa), plants under cultivation in a private garden (original source: Berlin, Germany) (H.B.P. access. no. 423/1999).

Herbarium specimens of *Symphytum tanaicense*
ITALY: Pisa, lungo i fossi a Castagnolo, 1.6.1856, *Caruel* (FI); ibid., 8.1842, *Savi* (FI); Pisa, lungo la Sofina presso Castagnolo, 24.3.1918, *Savelli* (FI); Pisa, Castagnolo selva pisana, 1.6.1856, *Grilli* (FI); ibid., 1.5.1881, *Della Nave* (FI); ibid., 28.5.1891, *Fantozzi* (FI); Pisa, 9.6.1923, *Passerini* (FI); Pisa, padule di Castagnolo, 15.8.1861, 4.1862, *Beccari* (FI); Massaciuccoli (Lucca), torbiera della Piaggetta, 31.5.1879, *Bottini* (PI); Coltano (Pisa), paludosi lungo le rive ove vive con le radici immerse nell'acqua, s.d., *s. coll.* (PI); presso la cantina dell'Orto-Istituto agrario (Pisa), 31.5.1923, *Passerini* (PI); Massaciuccoli (Lucca), la Piaggetta, fiori viola, già sfiorito, 30.8.1999, *Peruzzi* (PI)

Morphological data

The specimens here examined and referred to as *Symphytum tanaicense* are quite different to and well distinguishable from *S. officinale*. The main diagnostic characters, deduced from the living and dried material analysed, are summarized in Table 1. See also Fig.1.

Table 1. Diagnostic features of *Symphytum tanaicense* and *S. officinale.* – Note: Morphological hair types appear to lack diagnostic value; further histochemical tests are planned.

Symphytum tanaicense (Fig.1)	*Symphytum officinale*
Stem scarcely winged, leaves (especially the lower ones) not or only shortly decurrent	Stem distinctly winged, leaves decurrent
Plant sparsely covered with short stiff hairs, easily lost in senescent or dried material	Plant covered with usually dense and long, soft hairs, also in dried specimens
Calyx not appressed to corolla, lobed to 4/5; lobes ovate-lanceolate, with short setae only along the margins and midrib	Calyx appressed to corolla, lobed to 1/2 or 2/3; lobes triangular-lanceolate, with hairs scattered over the whole surface
Corolla urceolate-campanulate, always purplish-violet	Corolla campanulate, white or pinkish-violet
Nutlets dark-brown, rather smooth at the base, with teeth reflexed	Nutlets black with denticulate base, with teeth merging

Karyology

All studied plants of the Massaciuccoli population of *Symphytum tanaicense* showed a chromosome number of 2n = 40. Plants of *S. officinale* from Lucca (two specimens) and Montescudaio (one specimen) in contrast showed 2n = 24 + 0-4 B and 2n = 48 chromosomes, respectively (Fig. 2).

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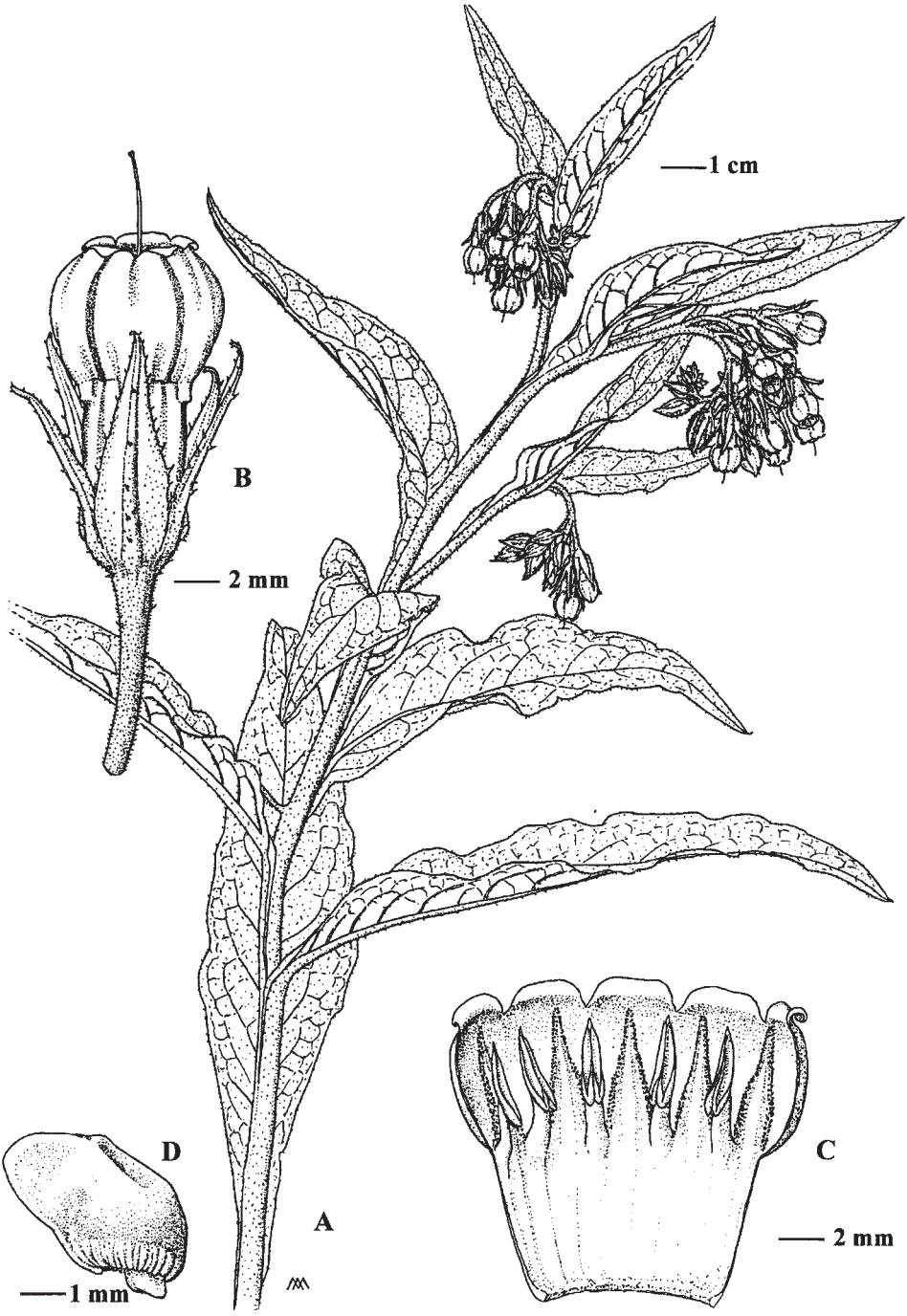


Fig. 1. *Symphytum tanaicense* – A: habit; B: flower; C: opened corolla showing stamens and scales; D: nutlet rather smooth at the base, with teeth reflexed. – Drawn from H.B.P. 388/1999.

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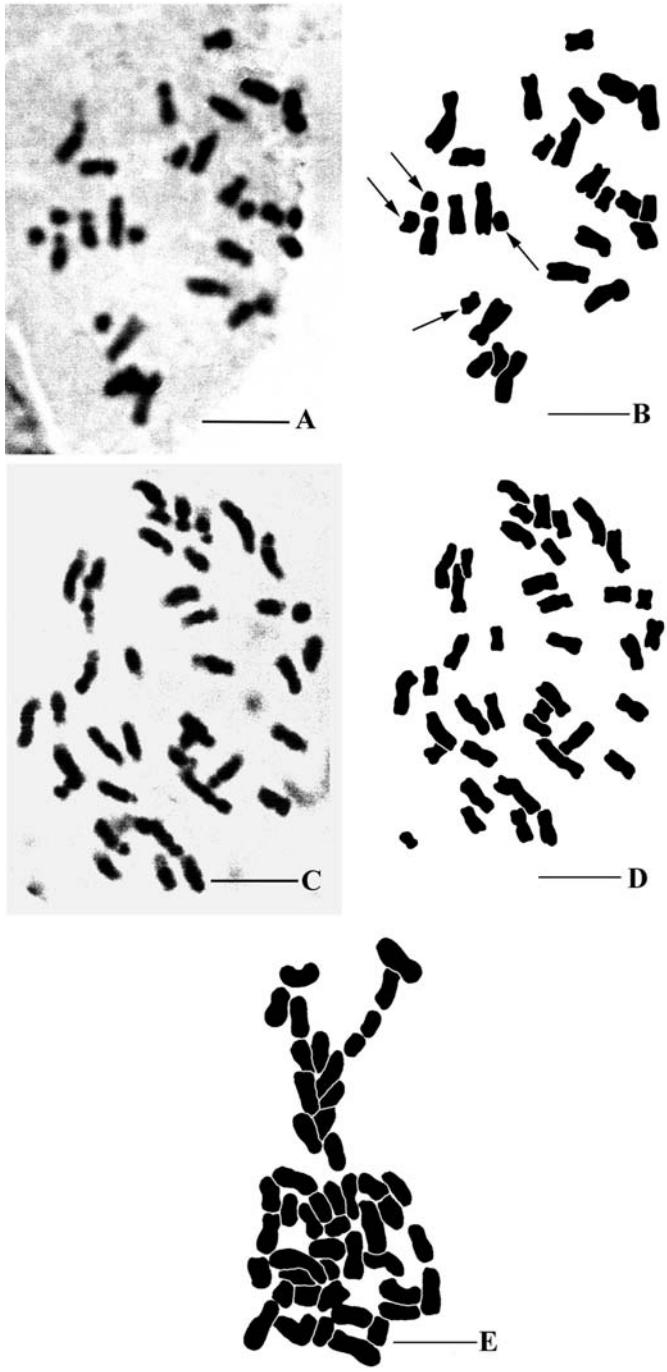


Fig. 2. Mitotic metaphase plates (micrographs and drawings) of *Symphytum* – A-B: *S. officinale* (H.B.P. 455/1999) 2n = 24+4B (arrows indicate B-chromosomes); C-D: *S. tanaicense* (H.B.P. 388/1999) 2n = 40; E: *S. officinale* (H.B.P. 423/1999) 2n = 48. – Scale bar = 5 μm.

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Distributional data of *Symphytum tanaicense*

Originally collected in July 1817 by Steven (1851) "ad Tanain inferiorem", that is in the southern part of the Don river valley (SE Russia), *Symphytum tanaicense,* according to the published records (Steven 1851, Bucknall 1913, Dobrochaeva 1967, Gadella & al. 1983), extends the distribution area from Hungary and Romania through Ukraine to the western fringes of the Transvolga area in SE Russia. Sandbrink & al. (1990) added easternmost Slovakia and southeasternmost Poland to its distribution. For the time being, the only reliably known locality in Italy is the Lake of Massaciuccoli, Tuscany (Fig. 3). Here the plant grows along the high water beds and banks of the canals, on peaty soils rich in water. In Coltano and Castagnolo, the historical sites SW of Pisa where the plant lived in past times (cf. herbarium specimens), land reclamation and urbanisation carried out for the last forty years, led to the extinction of the populations. The presence of *S. tanaicense* in other regions of Italy has not been ascertained yet, but it is an obvious possibility.

Discussion

In his revision of *Symphytum,* Bucknall (1913) recognised two species in *Symphytum* "sect. *Officinalia*" (i.e. *S.* sect. *Symphytum*): the widespread *S. officinale* L. and *S. uliginosum* A. Kern., known from Hungary and S Russia. The whitish-flowered plants of the former were assigned to *S. officinale* "subvar. *ochroleucum*", the purple-flowered ones to subvar. *purpureum* (Pers.) Buckn. (i.e., subvar. *officinale,* according to A. Kurtto, pers. comm., February 2001; cf. Gadella (1984) for further information), of which *S. patens* Sibth. was considered a synonym. A taxon showing intermediate features between *S. officinale* and *S. uliginosum* was named *S. officinale* var. *lanceolatum* Weinm., with *S. tanaicense* as a tentative synonym.

Gadella & Kliphuis (1967) identified three main cytotypes in the *Symphytum officinale* group: 2n = 24, 40, and 48. The tetraploid (2n = 48) is the most widespread in Europe and may have white or purplish flowers. The white-flowered diploid (2n = 24) may show, in the southern parts of its distributional area, the presence of B chromosomes or not (2n = 24 + 0-4 B); it is sporadic and uncommon and, in the above quoted author's opinion, virtually indistinguishable from the tetraploid biotype on a morphological basis. However, according to Basler (1972), there are some significant differences in pollen morphology, length of stomata and cells size. Both diploid and tetraploid cytotypes occur in moist places, forelands of canals, by wood margins, on clayey and sandy soils, but never in peaty habitats.

The third, aneuploid cytotype (2n = 40) was identified by Gadella & Kliphuis (1967) in Holland on plants with a purplish violet corolla growing on peaty soils usually being more wet than the aforementioned ones. They tentatively equated it with *Symphytum uliginosum*. Jaarsma & al. (1989) suggested a very close affinity of this cytotype and *S. tanaicense*. Later, Gadella & Kliphuis (1971), based on several cytogenetic studies and experimental hybridisation, found that the hybrids with 2n = 44 obtained from the crosses of 2n = 40 with 2n = 48 biotypes are able to backcross with the parents and, by introgressive hybridisation, give rise to a full range of aneuploids with 2n = 41, 42, 43, 45, 46, and 47. The hybrids and their progeny may be compared with *S. officinale* var. *lanceolatum*. In view of their interfertility, and also perhaps in order not to lose the epithet *uliginosum* for priority reasons (the synonymy between *S. uliginosum* and *S. tanaicense* had meanwhile been established by Degen 1930), Gadella & Kliphuis (1971) and Jaarsma & al. (1989) chose to treat *S. officinale* and *S. uliginosum* at subspecies level. Eventually, Gadella & Kliphuis (1973) included all Dutch cytotypes in *S. officinale* sensu lato.

Our analyses on the Tuscan populations evidenced (a) specimens with whitish flowers, a rather hairy calyx with erect-appressed teeth, and a diploid genomic level with or without accessory chromosomes (2n = 24 + 0-4 B); and (b) specimens with purplish flowers, a subglabrous calyx with widely spreading teeth, and definitely with 2n = 40 chromosomes, a number suggesting a stabilised aneuploid condition. The latter plants bloom about a month ahead of the former ones.

The examination of the type specimen of *Symphytum tanaicense* (Fig. 3) leaves no doubt on the taxonomic identity of the Massaciuccoli population with the plant from the River Don

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Fig. 3. Present stand of *Symphytum tanaicense* (black star), of *S. officinale* 2n=24 (black circle) and past stand of *S. tanaicense* (white star) in Tuscany, Italy.

(named Tanais in classical times) first collected and subsequently named *S. tanaicense* by Steven. We have no reasons to doubt Degen's (1930) conclusion that Kerner's *S. uliginosum* is synonymous with the latter as assumed in the following conclusions, but this question will be further dealt with after a careful analysis of Kerner's type specimen.

Conclusions

On the basis of Steven's and Kerner's original descriptions and after study of the exsiccata in FI and PI, the identity of the *Symphytum* from the Massaciuccoli Lake can be established as follows:

Symphytum tanaicense Steven in Bull. Soc. Imp. Naturalistes Moscou 24: 577. 1851 ≡ *Symphytum officinale* subsp. *tanaicense* (Steven) Soó in Bot. Közlem. 28: 127. 1931.
= *Symphytum uliginosum* A. Kern. in Oesterr. Bot. Z. 13: 227. 1851 ≡ *Symphytum officinale* subsp. *uliginosum* Nym., Consp. Fl. Eur.: 509. 1881.

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Fig. 4. *Symphytum tanaicense* – type specimen at the Botanical Museum, University of Helsinki (H).

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The Italian specimens here referred to *Symphytum tanaicense* are quite distinct from those of *S. officinale* in their morphology. The main diagnostic characters are summarized in Table 1 (see also Fig. 1). The karyological as well as ecological data (the latter briefly reported here) underpin this distinctness. In summary, the Tuscan populations of *Symphytum* studied so far consist either of white-flowered plants with 2n = 24 + 0-4 B *(S. officinale)* or purplish-flowered plants with 2n = 40 *(S. tanaicense)*.

Symphytum tanaicense was not mentioned so far for the Italian flora. Outside its main, Pannonian distributional area, it (or plants resembling it) had been reported from Austria, the Rhine valley (France and Germany), W Switzerland and the Netherlands, but there regarded as naturalised rather than indigenous (see Gadella & Kliphuis 1967: 391). In Tuscany however, in our opinion, its presence is likely linked to Quaternary glacial events. The marshes of the Tuscan lowlands favoured the survival of several microthermic species of boreal and alpine origin, today considered as relics (Tomei & al. 1986, 1995). The fact that the first dated collection of *S. tanaicense* in its single presently known Tuscan locality dates from 1879 lends support to our hypothesis.

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References

Basler, A. von 1972: Cytotaxonomische Untersuchungen an der Boraginaceen-Gattung *Symphytum* L. – Bot. Jahrb. Syst. **92:** 508-553.

Bucknall, C. 1913: A revision of the genus *Symphytum*. – J. Linn. Soc., Bot. **41:** 491-556.

Degen, A. von 1930: Bemerkungen über einige orientalische Pflanzenarten LXXXIX. Über *Symphytum uliginosum* Kern. – Magyar Bot. Lapok **29:** 144-148.

Dobrochaeva, D. N. 1967: On taxonomy of the genus *Symphytum* 1. *Symphytum* section. – Ukrayins'k. Bot. Žurn. **24(5):** 33-39.

Gadella, T. W. J. 1984: Notes on *Symphytum (Boraginaceae)* in North America. – Ann. Missouri Bot. Gard. **71:** 1061-1067.

— & Kliphuis, E. 1967: Cytotaxonomic studies in the genus *Symphytum* I. *Symphytum officinale* L. in the Netherlands. – Proc. Kon. Ned. Akad. Wetensch., C, **70:** 378-391.

— & — 1971: Cytotaxonomic studies in the genus *Symphytum* III. Some *Symphytum* hybrids in Belgium and the Netherlands. – Biol. Jaarb. **39:** 97-107.

— & — 1973: Cytotaxonomic studies in the genus *Symphytum* V. Some notes on W. European plants with the chromosome number 2n = 40. – Bot. Jahrb. Syst. **93:** 530-538.

— , — & Huinzing, H. J. 1983: Cyto- & chemotaxonomical studies on the sections *Officinalia* and *Coerulea* of the genus *Symphytum*. – Bot. Helv. **93:** 169-192

Kerner, A. 1863: Descriptiones plantarum novarum florae hungaricae et transsilvanicae. – Oesterr. Bot. Z. **13:** 227-228.

Pawłowski, B. 1972: *Symphytum* L. – Pp. 103-105 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 **3.** – Cambridge, etc.

Pignatti, S. 1982: Flora d'Italia **2.** – Bologna.

Sandbrink, J. M. Van Brederode, J. & Gadella, T. W. J. 1990: Phylogenetic relationships in the genus *Symphytum* L. *(Boraginaceae)*. – Proc. Kon. Ned. Akad. Wetensch. **93:** 295-334.

Steven, C. 1851: Observationes in asperifolias taurico-caucasicas. – Bull. Soc. Imp. Naturalistes Moscou **24:** 558-609.

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Tomei, P. E., Amadei, L. & Garbari, F. 1986: Données distributives de quelques angiospermes rares de la region méditerranéenne d'Italie. – Atti Soc. Tosc. Sci. Nat. Pisa, Mem., ser. B, **92:** 207-240.

— , Guazzi, E. & Barsanti, A. 1995: Contributo alla conoscenza floristica delle paludi e del Lago di Massaciuccoli. – Pp. 43-78 in: Tomei, P. E. & Guazzi, E. (ed.), Il bacino del Massaciuccoli. Collana di indagini tecniche e scientifiche per una migliore conoscenza del Lago di Massaciuccoli e del suo territorio **4.** – Pisa.

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