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A study of a poorly known Spanish endemic, *Tanacetum vahlii* (Asteraceae)

Abstract

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Tanacetum vahlii, endemic to East Central Spain, is a little known species that is somewhat isolated from the other W European species of *Tanacetum*. An illustration and a complete description are provided, highlighting its distinctive morphological characteristics. Also included are the results of karyological, palynological and carpological studies. The ecology and distribution of the species are outlined, and its taxonomic status and intraspecific variation, are discussed.

Introduction

Tanacetum vahlii DC. is an endemic of East Central Spain that is clearly isolated from the remaining species of *Tanacetum* L. growing in western Europe. Although it does not present major taxonomic difficulties, it is scarcely known and is poorly represented in herbaria.

Candolle (1838: 129), first published this name giving a precise description based on a specimen said to come "probably" from Spain, and anyhow from the botanical garden in Madrid, that had been given to L'Héritier by Vahl, perhaps a part of Pavón's collection referred to by Willkomm (1865: 101). Willkomm, in 1850, on the high barren plains of Guadalajara and Teruel, collected a somewhat different plant, which was considered as a separate species, *T. willkommii*, by Schultz Bipontinus, and as a mere variety, *T. vahlii* var. *brevepedunculatum*, by Willkomm (1965) himself.

The species was later forgotten and hardly ever collected again. During the last two decades, only Segura Zubizarreta (1975: 773, 1981: 54) and more recently Buades (1987a: 223, 1987b: 551, 1989: 260, 270) and Mateo (1990: 153) mentioned it.

Nevertheless, as some of the references and collections are old enough, the treatment by Heywood (1976: 171) is rather surprising. He placed it in *Tanacetum* sect. *Pyrethrum* (Zinn.) Reichenb. fil. and considered it as a species of questionable taxonomic status, mentioned in a note under *T. parthenium* (L.) Schultz Bip — in spite of the fact that its ligules are yellow, as Segura Zubizarreta (1981) has already briefly indicated.

Material and methods

Morphological studies have been made on material from the herbaria COI, G, MA,

MAF, MACB and SALA. In particular 25 sheets of each of the collections numbered SALA 34044 and 49044 were studied.

Chromosomes were counted on mitotic plates in radical meristems of wild plants that had been previously potted. Young roots were pretreated in water at 4°C for about 20 hours, fixed with ethyl alcohol-acetic acid (3 : 1), hydrolysed and stained in aceto-orcein and CIH-IN (9 : 1). Mounts were prepared using the squash technique.

The pollen samples studied were taken from the collections 34044 and 49044 (SALA). For light microscopy the pollen was acetolysed according to the method by Erdtman (1960), as modified by Hideux (1972), and was mounted in glyceric gelatine. For scanning electron microscopy (SEM), both acetolysed and non-acetolysed grains were dried and metal-coated. The fruits observed by SEM were obtained from the collection MAF 76070.

Results

Tanacetum vahlii DC., Prodr. 6: 129. 1838 = *Pyrethrum vahlii* (DC.) Boiss. & Reuter in Boiss., Diagn. Pl. Orient. ser. 2, 3: 29. 1856. — **Ind. loc.:** "Verisimiliter in Hispaniâ, saltem ex horto Madrit. cl. Vahlus ad L'Héritier specim. misit". — **Lectotypus:** "ex horto Madrit., Vahl (G-DC.; Fig. 1a). — **Ic.:** Fig. 2 (No previous illustrations are known).

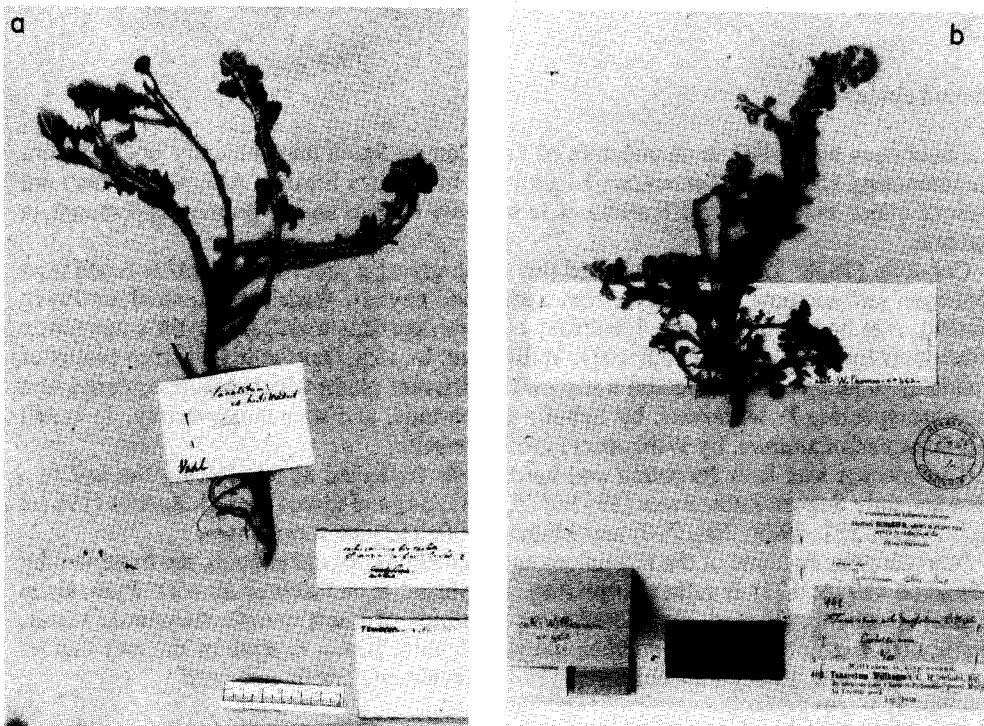


Fig. 1. Photographs of type specimens. — a: Lectotype of *Tanacetum vahlii* (G-DC); b: Lectotype of *Tanacetum vahlii* var. *subflosculosum* (Boiss.) Rico & al. (G).

Perennial, woody at the base. Stems (8-)10-30 cm high, procumbent and twisted at the base, branches erect, often sterile, with more or less appressed, abundant lanate tomentum, which is whitish on the basal internodes. Leaves 1.3-5 x 0.7-1.5 cm, alternate, oval in outline, bipinnatisect with short linear lobes, pubescent, white-tomentose when young; petiole expanded at the base, sheathing the sterile young shoots. Capitula (1-)2-6(-8), in a lax corymb; peduncles from very short (1-2 mm) to very long (70 mm), but mostly 1-4 times as long as capitula; involucre 4-6(-8) x 4-5(-6) mm. Bracts oblong, obtuse, the outer subtriangular, the inner lanate pubescent, with almost parallel, narrowly scarious margins and a membranous, lacinate apex. Ligules 6-10, short (1.3-3 mm), reflexed. Cypselae (Fig. 3) narrowly obconical, with a corona, projecting ridges (usually 8), and sometimes with sessile glands; body of the cypselae (1.5-)1.8-2 x 0.6-0.8 mm; corona denticulate, (0.7-)0.8-1(-1.1) x 0.6-0.8 mm. Flowering period: (V-)VI-VII(-VIII).

Palynology. — The pollen of *T. vahlii* (Fig. 4) belongs to the the *Anthemis arvensis* type (Diez, 1987: 333). It is tri-zonocolporate, isopolar, and with radial symmetry.

The polar axis (P) varies between 19.6 and 24 μm (21.56 ± 0.96), and the equatorial axis (E) between 20.5 and 24 μm (22.52 ± 0.92). In equatorial view it is circular or almost circular, with a P/E ratio oscillating between 0.84 and 1.12 (from semitransversal to suberect). Most of the grains are of the subtransversal type, the mean P/E value being 0.96 ± 0.06 . The ectoapertures are of the colpus-type and the endoapertures of the pore-type, the latter being situated on the equator.

The exine shows a thickness of 4 to 5 μm on the mesocolpium, with the sexine 4 times as thick as the nexine. The tectum is partial, with intratectal columellae. The surface is perforated, forming thorns from 3 to 4 μm high.

Karyology. — Material studied: Burgos, Santo Domingo de Silos, Hortezielos to Altos de Cervera, 30TVM 6141, 1120 m, *Casaseca & al.*, not flowering in the laboratory (same locality as the collections SALA 34044 and 49044). — $2n = 18$ (Fig. 5).

This is the first chromosome count reported for this species. The number obtained coincides with the somatic number most frequent in *Tanacetum*, including most European species of *T. sect. Tanacetum*. There are counts on Iberian material from the two annual species of this section, *T. microphyllum* DC. and *T. annuum* L., by Fernandez Casas (1976: 94) and Queiros (1973: 306), with identical results ($2n = 18$).

Distribution. — *Tanacetum vahlii* is endemic to the high barren plains of East Central Spain (Fig. 6). The localities mapped coincide with those of the map recently published by Buades (1989: 270), with the following exceptions: Willkomm's locality has been more precisely located; an additional locality (Blancas-Teruel) corresponds to the "prados del monte Blancas" of Almagro (MA 128888, 128889); and newly discovered localities cited by Mateo (1990: 154) are included. The specimens seen by us are listed here.

Burgos: Paramera de Silos, en el dominio de los bosques sabineros de Thurifera, 30TVM64, 3.7.1970, *Rivas Goday* (MA 245908, MAF 76070); Paramera de Silos, cerca de Espinosa de Cervera, 30TVM63, 3.7.1970, *Rivas Goday* (MA 245907, MAF 76069); sabinares de la carretera de Espinosa de Cervera a Santo Domingo de Silos, 30TVM63, *Molina & Izco* (MA 245909, 245910); ibidem, 27.7.1978, *Fuertes Lasala* (MA 245890); Santo Domingo de Silos, Hortezielos-Altos de Cervera, 30TVM6141, 1120 m, 3.7.1984, *Rico & Romero* (SALA 34044, 49044). — Guadalajara: in arenosis inter Chera et Pozondón, prope Molina in Castilla nova, 30T XL01 a XK29, 8.1850, *Willkomm 462* (COI-WILLK., G 7366). — Soria: entre Sagides (Soria) y Maranchón (Guadalajara), 30TWL64, 19.7.1958, *Segura Zubizarreta* (MA 357499); Espejón, juxta viam Espejón-

Huerta del Rey, 30TVM73, 1100 m, 17.6.1964, *Segura Zubizarreta* (MA 245892, 357420, MAF 108151); Casarejos, 30TVM9726, 14.7.1982, *Buades* (MACB 20975). — Teruel: prados del monte Blancas, 30TXL21, 6.1897, *Almagro* (MA 128888, 128889).

The species is now known from the provinces of Burgos, Guadalajara, Soria and Teruel. According to Rivas Martínez' (1973) terminology, it is virtually restricted to the Celtiberic-Alcarreño sector of the Castellano-Maestrazgo-Manchega province.



Fig. 2. *Tanacetum vahlii*. — a: Habit; b: Basis of the sterile shoots; c: Cypselae; d: Middle involucre bract.

Ecology. — *Tanacetum vahlii* is generally found on shallow limestone soils. It forms part of the low scrub covering the cold, high barren plains; it often grows at the border of groves of white sabbine (*Juniperus thurifera* L.), or in nitrate-rich habitats along paths or roads, preferably in humid or temporarily flooded places.

Affinities. — *Tanacetum vahlii* doubtless is a distinct species, whose most outstanding

morphological characteristics are probably the shoots, sheathed by the petiole bases and the abundant white tomentum that covers the internodes, giving the impression of an

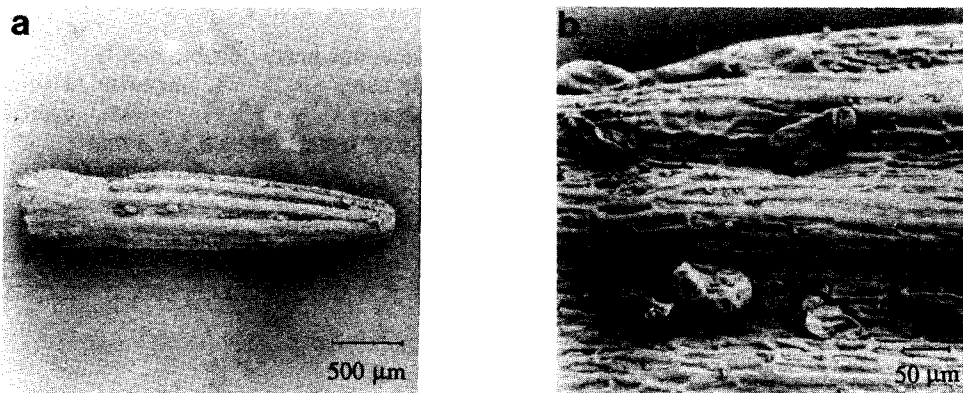


Fig. 3. Cypselae of *Tanacetum vahlii*. — a: Overall view (scale bar = 500 µm); b: Detail on which sessile glands can be seen (scale bar = 50 µm).

extended ochrea. Its nearest relationship is with other species of *T. sect. Tanacetum* from the steppes and dry zones of eastern Europe and Asia, such as *T. achilleifolium* (MB.) Schultz Bipontinus, *T. millefolium* (L.) Cvelev, and *T. santolina* Winkler. Schultz Bipontinus, when describing *T. willkomii*, already indicated its affinities with *T. achilleifolium*. Our material primarily differs from all European species of the same section recognized by Heywood (1976) by the greater size of the corona of the cypselae (0.7-1.1 mm). There are also other differences, as mentioned in the following key which is based on that by Heywood (1976), with such changes as are necessary to include *T. vahlii*.

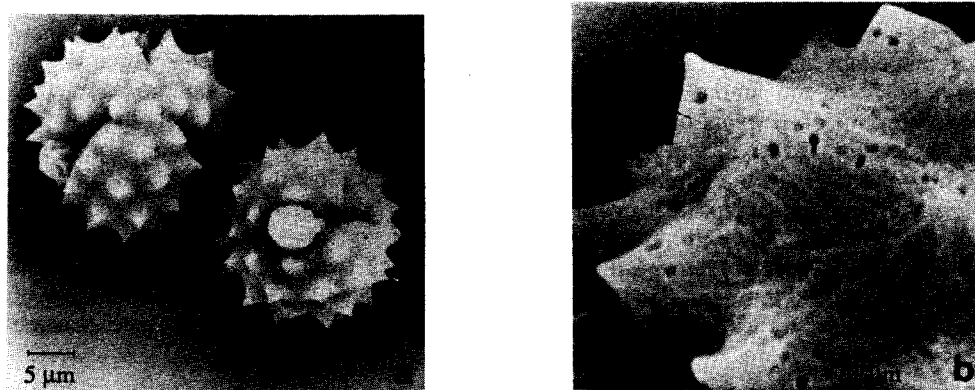


Fig. 4. Pollen grains of *Tanacetum vahlii*. — a: Two grains in polar (1) and equatorial view (2), scale bar = 5 µm; b: Detail of the ornamentation of the exine, scale bar 1 µm.

- 6 Ligulate florets few, the ligules 0.5-1(-1.5) mm; corona of the cypselae up to 0.5 mm long
- 7 Capitula hemispherical; leaves white-tomentose **8. santolina**
- 7 Capitula elongate-subglose; leaves glabrous to subglabrous **5. paczoskii**
- 6 Ligulate florets numerous, the ligules 1-3 mm
- 8 Involucre 4-7 (-8) mm in diameter, outer bracts ovate-lanceolate or subtriangular
- 8* Corona 0.3-0.5 mm, bracts glabrous or sparsely hairy **4. achilleifolium**
- 8* Corona (0.7-) 0.8-1.1 mm, bracts lanate pubescent **4*. vahlii**
- 8 Involucre 7-10 mm in diameter; outer bracts broadly ovate; corona 0.3-0.8 mm **6. millefolium**

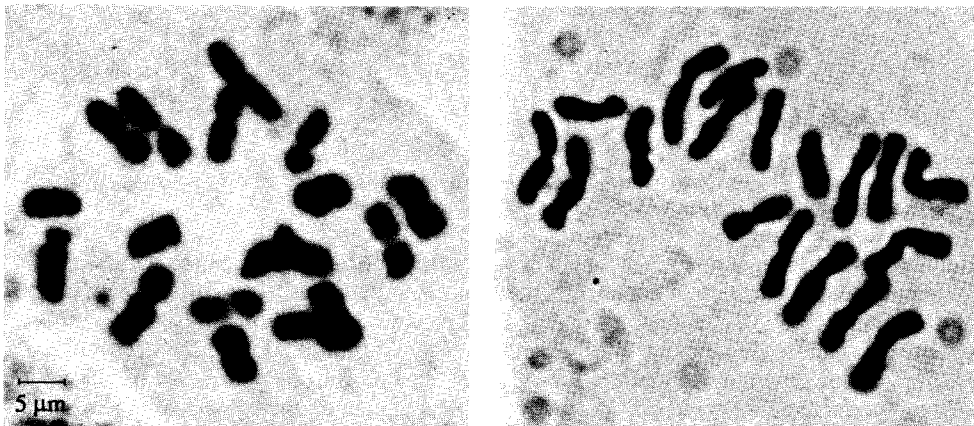


Fig. 5. Somatic metaphase plates of *Tanacetum vahlii* ($2n=18$). — Scale bar = 5 μ m.

Intraspecific variation. — *Tanacetum willkommii* Schultz Bipontinus was described on the base of the specimen Willkomm 462 (COI, G.) These plants are slightly different from the other ones of *T. vahlii* because of their size, somewhat smaller than average, their more abundant hair cover, and the capitula which are sessile in a dense corymb. The fruits, however, are similar. The first two characters do not tell much and are correlated, the lower parts of the plant being more densely white-tomentose. With respect to peduncle length, we found that in the same population (SALA 34044, 49044) it may vary from slightly shorter than the capitula to up to seven times its length. We consider that the differences may be due to the later flowering period: Willkomm's plants were collected in August, whereas *T. vahlii* usually flowers in June or July. Heywood (1976: 171) mentions both *Tanacetum vahlii* and *T. willkommii* as two separate though doubtful species, but Willkomm himself (1865) had already considered *T. willkommii* as a variety of *T. vahlii*, as Boissier had previously done. When maintained at that rank, its correct name is as follows.

Tanacetum vahlii var. *subflosculosum* (Boiss.) E. Rico, T. Romero & J. Sánchez, **comb. nov.** = *T. willkommii* Schultz Bipontinus, Flora 34: 748. (1851).
= *Pyrethrum vahlii* var. *subflosculosum* Boiss., Diagn. Pl. Orient. ser. 2, 3: 29.

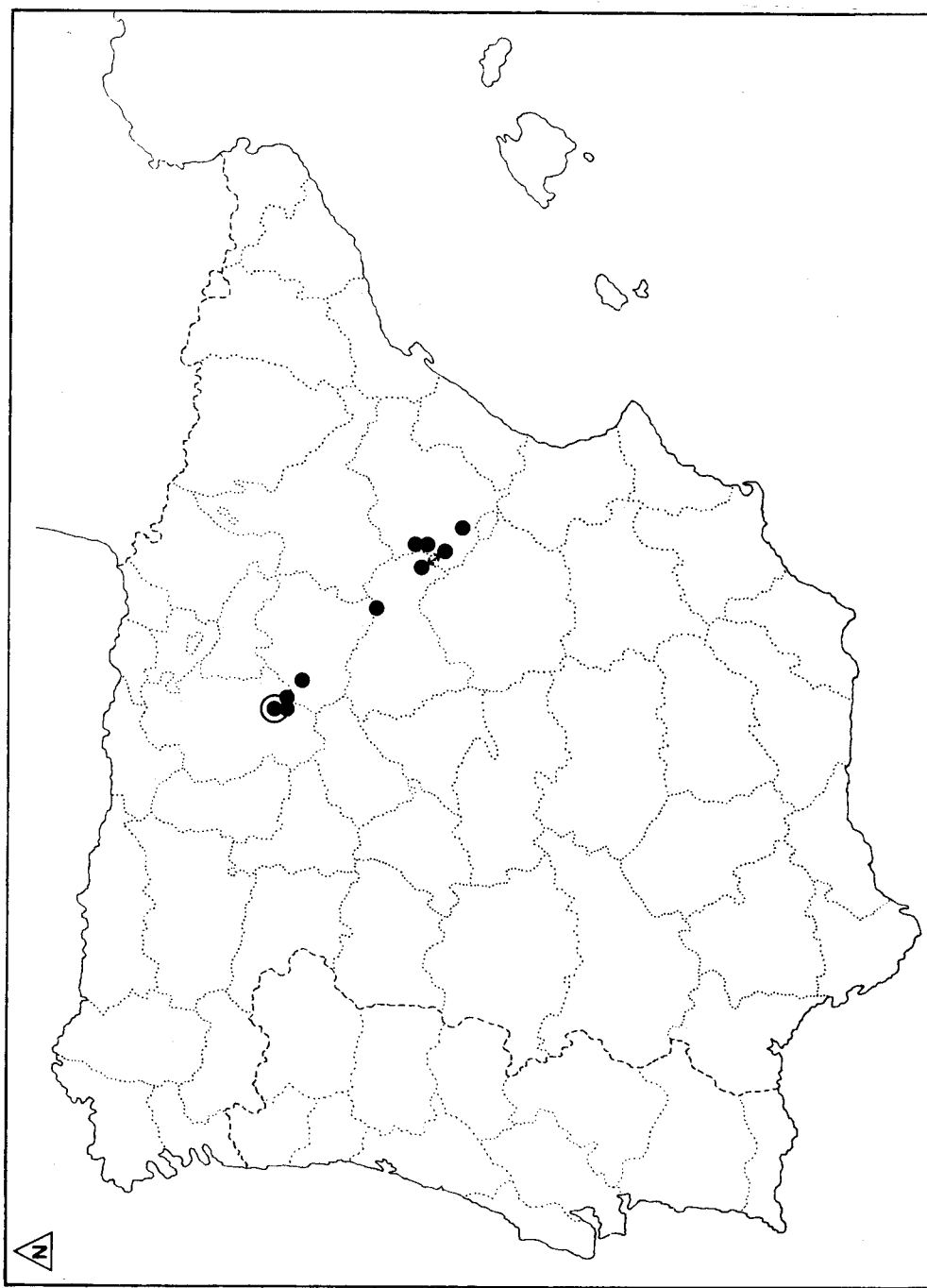


Fig. 6. Map of the geographical distribution of *Tanacetum vahlui*. The circled dot refers to the population that has been karyologically studied.

1856. = *T. vahlii* var. *brevepedunculatum* Willk. in Willk & Lange, Prodr. Fl. Hispan. 2: 101. 1865, nom. illeg. — Ind. loc.: "Hab. in Castella nova". — Lectotypus (designated by Burdet & al. 1983: 794: "In arenosis inter Chesra et Pozondón, prope Molina in Castella nova. Aug. 1850. Willkomm, it. hisp. secund. 462" (G; isotypus: COI).

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