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A new species of *Linum* (Linaceae) from west Anatolia, Turkey

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A new species, ***Linum vuralianum*** Yılmaz & Kaynak, is described and illustrated from west Anatolia, Turkey. It is closest to *L. flavum* L., but differs by its annual or biennial life form, the presence of rosette leaves at anthesis, and the absence of staminodes. The World Conservation Union (IUCN) threat category and observations on the population are noted. The geographical distribution of the new species and its related taxon is given. *Botanical Journal of the Linnean Society*, 2008, **156**, 459–462.

ADDITIONAL KEYWORDS: conservation – endemics – *Linum* section *Syllinum* – taxonomy.

INTRODUCTION

The genus *Linum* L. comprises about 180 species in temperate regions (Mabberley, 2002). The Mediterranean area is one of the main centres of diversity for this genus, especially localized to the Balkans and Anatolia (Davis, 1967a), where there are about 75 species (Greuter, Burdet & Long, 1989). *Linum* is represented in *Flora Europaea* by 36 species (Ockendon & Walters, 1968), in the *Flora of USSR* by 45 (Juzepchuk, 1974), in the *Flora of Cyprus* by eight (Meikle, 1977), in the *Flora of Iraq by* 13 (Agnew, 1980), in the *Flora of Iran* by 15 (Sharifnia & Assadi, 2001), and in *Flora Palaestina* by nine (Zohary, 1987).

Since *Linum* was revised by Davis (1967a) for the *Flora of Turkey and the East Aegean Islands*, one new subspecies has been described from Anatolia, *L. pamphylicum* Boiss. & Heldr. ex Planch. ssp. *olympicum* Kaynak & Yılmaz (Yılmaz, Kaynak & Vural, 2003), and *L. maritimum* L. has been added as a new record to the flora (Güner *et al*., 1996). The number of species in Turkey is now 40 with the description here of *L. vuralianum*. One-third of the species are endemic in Turkey.

MATERIAL AND METHODS

The specimens reported here were collected from two different localities during field studies in west Anatolia, Turkey. The specimens were checked using the literature given above and other relevant publications (Boissier, 1867; Davis, 1957, 1967b; Rechinger, 1974; Pignatti, 1982; Hartvig, 1986; Greuter *et al.*, 1989; Özhatay, 2000). Specimens of similar taxa from the herbaria AEF, ANK, EGE, GAZI, ISTF, and HUB were studied. The authors of plant names follow Brummitt & Powell (1992).

TAXONOMIC TREATMENT

LINUM VURALIANUM YILMAZ & KAYNAK, **SP. NOV.** (SECTION *SYLLINUM* GRISEB.) (FIG. 1).

Type: TURKEY: B2 Kütahya: Tavşanlı–Emet, 2 km from Emet, 39°20′N, 29°18′E, 1026 m, 17.vi.2004, *Ö. Yılmaz, E. Erdoğan* (Holotype: *BULU 19958*).

Paratype: A2 Bilecik: Yenişehir–Bilecik, around Pelitözü, 40°10′N, 29°55′E, 746 m, 26.vi.2004, *Ö. Yılmaz* (BULU 19943).

Diagnosis: Lino flavo L. affinis sed planta bienni vel annua, caule florifero basi dense rosulatim foliato, foliis caulinis anguste oblanceolato-spathulatis vel anguste oblanceolatis vel linearis, staminodiis carentibus differt.

Description: Plant annual or biennial. Flowering stems erect, 15–60 cm, with nonscabrid ridges and persistent basal rosettes. Rosette leaves dense, spathulate, petiolate, 15–30 × 6–10 mm; lower cauline leaves narrowly oblanceolate-spathulate, acute,

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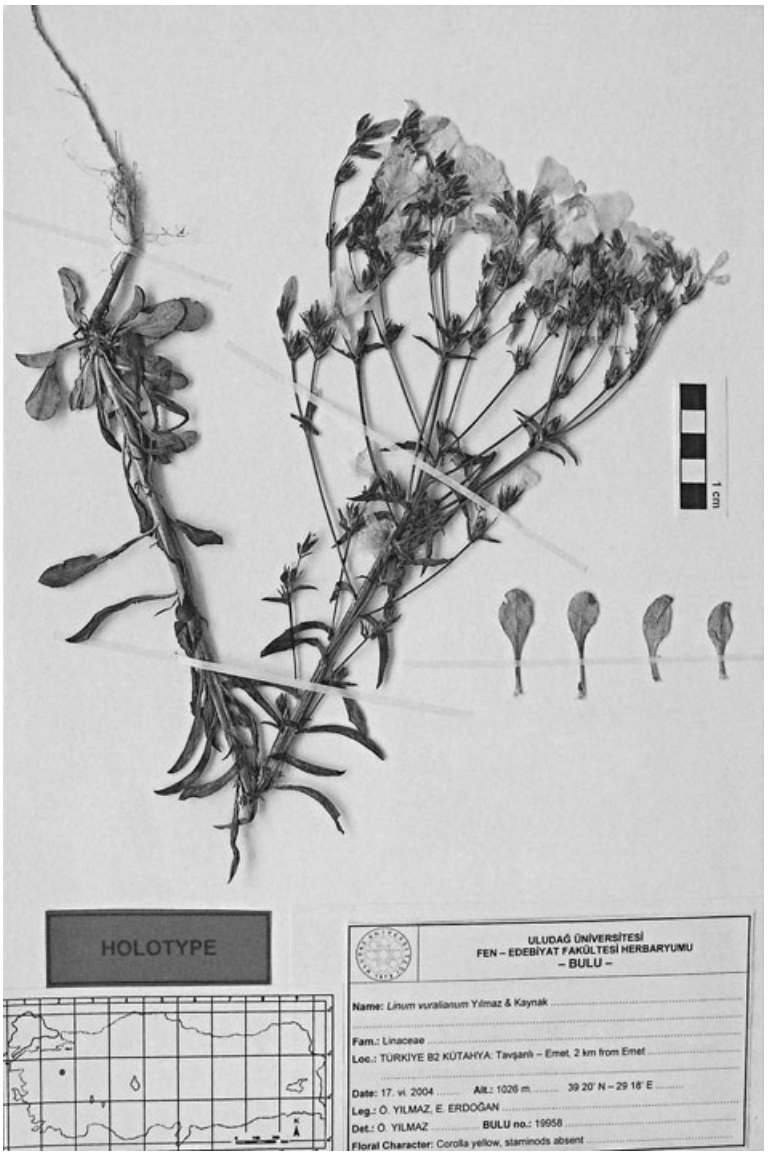

Figure 1. Holotype of ***Linum vuralianum*** Yılmaz & Kaynak.

20–45 × 3–6 mm, uppermost cauline leaves narrowly oblanceolate or linear, acute, 15–35 × 2–6 mm, one- (to three-) nerved, with stipular glands at base. Inflorescence many flowered. Flowers heterostylous. Sepals lanceolate or narrowly ovate, acuminate, 7–10 mm, keeled, with narrow membranous glandular-ciliate margins. Petals yellow, 18–22 mm. Filaments equal, 5–11 mm, united at base into a short tube, *c*. 1 mm; staminode absent, anthers oblong, *c*. 1.5 mm. Styles in short-styled flowers *c*. 4 mm and in long-styled flowers *c*. 7 mm and united in the middle, stigma linear. Capsule spherical, 3–5 mm. Seeds oblong, 2.5–3 × 1–1.5 mm, brown.

Etymology: We named this taxon in honour of the eminent Turkish botanist and expert on the flora of Turkey, Professor Mecit Vural of the Biology Department, Gazi University.

Phenology and habitat: Flowering in May and June; fruiting in July and August. It grows under trees, and in open places, in forests of *Pinus nigra* J. F. Arnold ssp. *nigra* var. *caramanica* (Loudon) Rehder at an altitude of 700–1050 m.

Distribution and conservation status: Endemic to north-west Anatolia. Mediterranean element. The species is known from two different populations and from an area of 5000 km^2. The population is not in good condition and numbers approximately 300 individuals. Therefore, it is suggested that this new species is

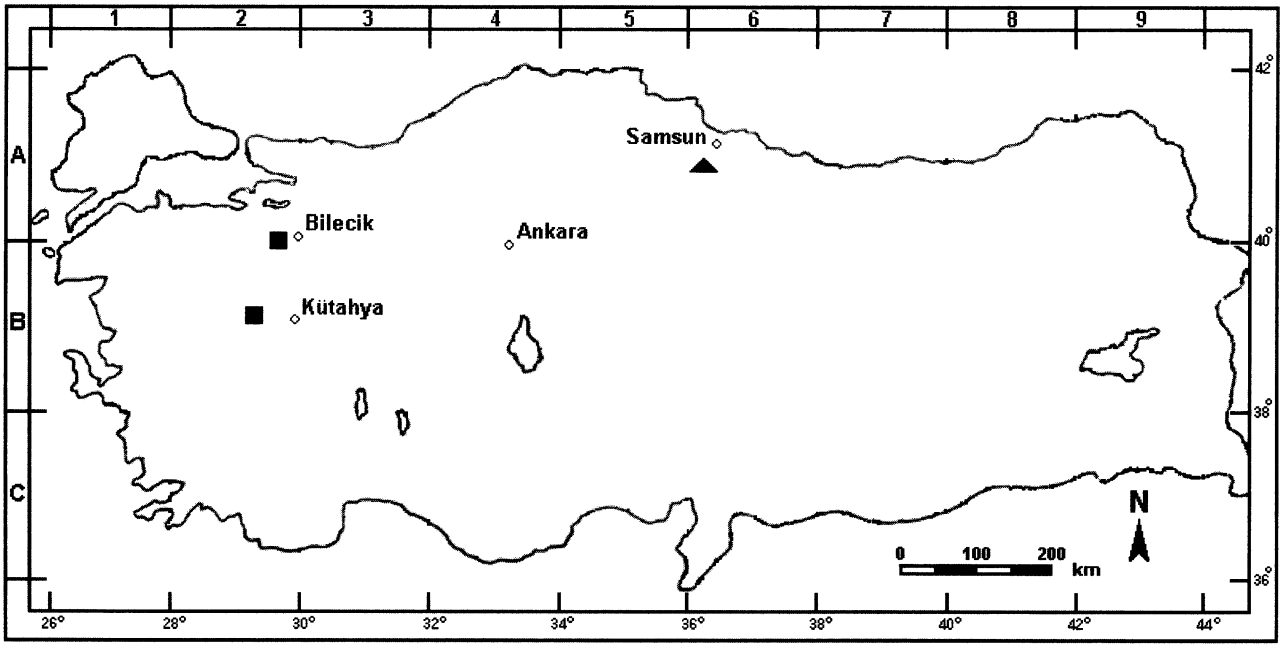

Figure 2. Distribution map of ***Linum vuralianum*** (■) and *L. flavum* (▲) in Turkey.

endangered (criterion B1a) under the World Conservation Union (IUCN) threat categories (IUCN, 2001).

DISCUSSION

The species of section *Syllinum* Griseb. are distributed chiefly in the Mediterranean area (Diedrichsen & Richards, 2000), are usually perennials (often suffruticose) and rarely annuals, and show the presence or not of stipular glands at the base of the cauline leaves. They have only glabrous sepals with glandular membranous margins and large (15–30 mm) yellow or white flowers.

Davis (1957, 1967a) indicated that the rosette leaves at anthesis are useful for specific diagnoses between the species. Nevertheless, he emphasized that the presence or absence of rosette leaves at anthesis is not certain, and this feature shows environmental variation. However, this character has been used for diagnosis in *Syllinum*.

Linum arboreum L., *L. pamphylicum* Boiss. & Heldr. ex Planch., *L. boissieri* Aschers. & Sint. ex Boiss., *L. tauricum* Willd. ssp. *bosphori* P.H. Davis, and *L. cariense* Boiss. have a basal rosette of leaves, whereas *L. ciliatum* Hayek, *L. flavum* L., and *L. mucronatum* Bertol. lack a basal rosette of leaves at anthesis (Davis, 1967a). Our observations on these species have indicated that the presence or absence of rosette leaves is constant in all populations examined. However, some individuals of species with basal leaves do not show this feature. It seems that the basal leaves wither at the end of flowering or at fruiting. Presumably, different environments have no effect on this character. Hence, it can be used for diagnosis.

The newly described species *L. vuralianum* is closest to *L. flavum*, which is known only from north Anatolia, Samsun Province, Turkey (Fig. 2), and is a Euro-Siberian element growing in clay at *c.* 170 m altitude (Davis, 1967a). *Linum vuralianum* is morphologically distinct from *L. flavum* by its annual or biennial life form, the presence of rosette leaves at anthesis, the cauline leaves narrowly oblanceolate-spathulate or narrowly oblanceolate or linear, and the flowers without staminodes (Table 1).

The genus *Linum* has five fertile stamens alternating with five small staminodes (Winkler, 1931). Rogers (1969) proposed that the absence of staminodes is an evolved feature and an important taxonomic character within the genus. The absence of staminodes has not been observed until now within other members of section *Syllinum* distributed in Turkey, except here in *L. vuralianum*.

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Table 1. Comparison of some morphological characters of ***Linum vuralianum*** and *L. flavum*

	L. vuralianum	*L. flavum*
Duration	Annual or biennial	Perennial
Plant height	15–60 cm	20–35 cm
Basal leaves	Present	Absent
	Spathulate	
	15–30 × 6–10 mm	
Lower cauline leaves	Narrowly oblanceolate-spathulate	Obovate
	20–45 × 3–6 mm	5–25 × 4–12 mm
Uppermost cauline leaves	Narrowly oblanceolate or linear	Oblong–oblanceolate
	15–35 × 2–6 mm	25–45 × 5–14 mm
	1- (to 3-) nerved	3–7-nerved
Sepals	Lanceolate or narrowly ovate	Lanceolate
	7–10 mm	8–15 mm
Petals	18–22 mm	20–25 mm
Filaments	5–11 mm	6–14 mm
Staminode	Absent	Present
		Subulate, *c.* 1 mm
Capsule	3–5 mm	4–5 mm

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