



A new species of *Lathyrus cirpicii* F.Güneş (Fabaceae) from Turkey

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Abstract

Lathyrus cirpicii was described as a new species from Turkey. This species is most morphologically similar to *L. annuus*, *L. hierosolymitanus* and *L. cassius* but it have some differs like broader stems, longer pedicels, larger flowers, more-flowered peduncles, bright-red corollas, linear-oblong pistils, widely keeled upper sutures of legumes and subprolate seeds. The pollen and seed structure of *L. cirpicii* and related species is described using scanning electron microscopy (SEM) and light microscopy (LM). A detailed description, information about the habitat, distribution, phytogeography and conservation and illustrations of the new species are also added.

Key words: New species, *Lathyrus cirpicii*, Turkey.

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Türkiye’den bir *Lathyrus cirpicii* F.Güneş (Fabaceae) türü

Özet

Lathyrus cirpicii Türkiye’den yeni bir tür olarak tanımlandı. Bu tür morfolojik olarak, *L. annuus*, *L. hierosolymitanus* and *L. cassius*’a çok benzemektedir ancak gövdenin genişliği, çiçek saplarının uzunluğu, çiçeklerin büyüklüğü, çiçek durumundaki çiçek sayısı, parlak kırmızı çiçek rengi, uzun ve geniş dişi organ, meyve üzerindeki kanatların daha geniş olması ve tohum şekli gibi farklılıkları vardır. Polen ve tohum yapısı electron mikroskobu (SEM) ve ışık mikroskobu (LM) ile incelenmiştir. Türün detaylı bir betimi, yaşama alanı, yayılışı hakkında bilgi, coğrafyası ve korunma durumu, çizimi ve bazı fotoğraflar çalışmaya eklenmiştir.

Anahtar kelimeler: İtrşahi, *Lathyrus cirpicii*, Türkiye

1. Introduction

Lathyrus L. is the largest genus in the Fabeae tribe of the family Fabaceae, with about 160 species worldwide [1]. The eastern Mediterranean region is the main centre of diversity for the genus, which is less diversified in North and South America [2]. In Turkey, 65 species and 75 taxa of *Lathyrus* have been identified [3; 4]. Morphological, anatomical, pollen and seed micromorphological studies have been conducted on some taxa of *Lathyrus* [5; 6; 7; 8; 9; 10; 11].

During field excursions to the southern part of Turkey, specimens of an unknown species of *Lathyrus* were collected. They were found to be similar to *L. annuus* L. [1753: 729], *L. hierosolymitanus* Boiss. [1872: 604] and *L. cassius* Boiss. [1872: 604] based on some morphological properties, such as habit, stem length, leaflet size and shape, petiole length and legumen length. However, after careful comparisons with descriptions of *Lathyrus* in relevant literature this species could not be matched with any previously known species. Therefore, it is described here as a species that is new to science with longer pedicels and flowers, more flowered peduncles, bright-red corollas, linear-oblong pistils, widely keeled upper sutures of legumes, and subprolate seeds, and is contrasted with the morphologically similar *L. annuus*, *L. hierosolymitanus* and *L. cassius*.

2. Materials and methods

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Specimens were collected between 2009 and 2011. Morphological studies were carried out on the specimens kept in the herbarium of Trakya University, Faculty of Pharmacy, Department of Pharmaceutical Botany, as well as in the herbaria EDTU, EGE, FUH, GAZI, HUB, ISTE, K, MUFE in Turkey and L in Holland.

The samples were identified by referring to the “Flora of Turkey” [2; 3; 4] and publications regarding the flora of neighbouring countries, namely in “Species Plantarum” [12], “Flora Orientalis” [13]. “Flora of Syria” [14], “Flora of the USSR” [15], “Flora Europaea” [16], “Flora Republicae Popularis Bulgaricae” [17], “Flora of Cyprus” [18], “Flora of Iraq” [19], “Flora Iranica” [20], and “Flora Palaestina” [21].

General appearance of *L. cirpici*, *L. annuus*, *L. hierosolymitanus* and *L. cassius* in the field is provided in Fig. 1A (a–d). The general characteristics of *Lathyrus cirpicii*, such as habitat, flower parts, pistil and fruit attributes are illustrated in Fig. 1B (a–i). The morphological properties are given in Table 1 and Fig. 1C–D (a–d) by comparison to the morphologically close species *L. annuus*, *L. hierosolymitanus* and *L. cassius*. 25 specimens belonging to the new species, 78 specimens in *L. annuus*, 54 specimens in *L. hierosolymitanus* and 63 specimens in *L. cassius* were investigated. The morphological properties of mature seeds were also examined using Olympus SZXH stereo-microscopy and SEM [Table 2, Fig. 2A (a–p)]. The pollen morphological properties of the four species were determined using the non-acetolysis method of Wodehouse [22] and SEM [Table 3, Fig. 2B (a–m)]. The pollen morphological descriptions follow the terminology of Moore *et al.* [23].

3. Results

3.1. Taxonomy

Lathyrus cirpicii F. Güneş *sp. nov.* (Figure.1–2) (İtirşahi)

Type:—Turkey. **C6** Hatay: Küçükaraçay, road and field sides, 50–110m, 19 April 2009, *F. Güneş 2016*. (holotype NGBB!, isotype MUFE!, HUB!, NGBB!).

Lathyrus cirpicii was found to be similar to *L. annuus*, *L. hierosolymitanus* and *L. cassius* but differs by having broader stems; 2–8 mm (not 1–6 mm), more-flowered peduncles; (3–)4–6 (not 1–3), longer pedicels 5–7 mm (not 3–5 mm) bright-red corollas (not soft-yellow or lilac), bigger flowers of 14–18 mm (not 9–13 mm), linear-oblong pistils (not linear), bigger and widely keeled upper suture of legumes (not narrower keeled), subprolate seeds (not spheroidal).

Scrambling annual, 50–160 cm, glabrous. Stems 2–8 mm wide, winged. Median and upper leaves with mostly 3–6-sect tendrils, 50–160 mm long; leaflets 1-paired, linear-lanceolate, 30–150 x 3–20 mm; petiole 20–35 mm long, winged; stipules subulate, semi-sagittate, 5–30 x 0.5–1 mm. Peduncles (3–)4–6 flowered, 75–120 mm long; pedicels 5–7 mm. Calyx 5–7 mm long; teeth triangular-lanceolate acuminate, with the lowest tooth slightly longer than the upper pair and longer than the tube; teeth 3–4 mm; tube 2–3 mm long. Corolla bright-red, 14–18 mm long; vevsillum 14–18 x 15–20 mm; wings 14–18 x 6–7 mm; keels 12–14 x 6–7 mm. Legumen linear-oblong, 55–90 x 10–13 mm; upper suture keeled and canaliculated; style 5–6 x 0.5–1 mm. Seeds 8–12, subprolate, coarsely tuberculate, 3.46–4.44 x 3.07–4.24 mm.

Paratypes:—TURKEY. **C1 Muğla:** Marmaris, Bozburun, 20 m, 24.04.2009, *F. Güneş 2089*. **C6 Hatay:** Küçükaraçay, above village, road sides, 50–110 m, 14 May 2011, *A. Ocak and F. Güneş 2717*. Amik Plain, Hüseyinli village, field sides, 53 m, 4 July 2011, *F. Güneş 2775*.

3.2. Key to the examined species of *Lathyrus*

1. Peduncles 1–6-flowered; corolla yellow or bright-red; legumes 50–90 mm 2
 2. Flowers bright red; peduncles 3–6-flowered; legumen 10–13 mm broad *L. cirpicii*
 2. Flowers yellow with reddish veins or orange; peduncles 1–3(–4) flowered; legume 6–11 mm broad 3
 3. Legume 9–11 mm broad; seeds coarsely tuberculate..... *L. annuus*
 3. Legume 6–7 mm broad; seeds ruminant-rugulose..... *L. hierosolymitanus*
1. Peduncles 1–2-flowered; standard purplish, pink or lilac, wings pale-mauve; legume 20–52 mm *L. cassius*

3.3. Distribution and habitat:—*L. cirpicii* is an endemic species found only in Hatay Amik Plain and Muğla-Bozburun province from Turkey. It has narrow distribution area. It is an element of the Mediterranean phytogeographic region and grows in cultivated fields, road sides and scrubs, at 20–70m.

3.4. Phenology:—Flowering ranges from April to May.

3.5. Conservation status:—*L. cirpicii* has a limited distribution area in spite of its narrow population. Although the distance between Hatay and Muğla is far it should be evaluated as the category “Endangered (EN)” (criterion B1ab(ii)+2ab(iii)) as it has never been detected outside of the regions described above [24].

3.6. Etymology:—The new species is named in honour of the Turkish botanist Prof. Dr. Ali Çirpıcı (Marmara University, Department of Biology), who is an expert on Turkish *Ranunculus*, *Silene* and *Lathyrus*.

Table 1. Comparison of *Lathyrus cirpicii* with two morphologically similar species

Characters	<i>L. cirpicii</i>	<i>L. annuus</i>	<i>L. hierosolymitanus</i>	<i>L. cassius</i>
Stem width (mm)	2–8	1–6	2–5	2–4
Leaflets length x width (mm)	30–150 x 3–20, linear-lanceolate	25–130(–140) x 1–10(–20) median leaves linear (1–5), lower leaves linear-lanceolate	20–130 x 1–12(–20), linear-lanceolate	10–95 x 0.5–10, linear-lanceolate,
Petiole length (mm)	20–35	20–35	8–35	25–35
Stipules length x width (mm)	5–30 x 0.5–1	10–30 x 0.5–1	5–30 x 0.5–1	5–20 x 0.5–1
Peduncles length (mm)	75–120	15–80	15–50(–70)	15–250
Flowers number of peduncles	3–6	1–3(–4)	1–2(–3)	1–2
Pedicels length (mm)	5–7	3–5	3–5	1–4, pedicel bearing dark sessile glands
Flowers colour	bright red	soft yellow	pale yellow	purplish, pink or lilac
Flowers length (mm)	(13–)14–18	9-13(–14)	10–12(–14)	(8–)9–13(–15)
Calyx length (mm)	5–7	4–5	(5–)6(–7)	4–6(–7) bearing dark sessile glands
Style length x width (mm)	5–6 x 0.5–1	4–5 x 0.5–1	3–4 x 0.5–1	4–5 x 0.5–1
Pistil shape	linear-oblong and twisted	linear and twisted	linear and twisted	linear and twisted
Legumen length x width (mm)	55–90 x 10–13, upper suture widely keeled	50–70 x (7–)9–11, upper suture narrowly keeled	55–70 x 6–7(–8), upper suture narrowly keeled	20–52 x 5–7, upper suture shortly 3-keeled
The number of examined specimens	25	78	54	63

Table 2. Seed morphology of *Lathyrus cirpicii*, *L. annuus*, *L. hierosolymitanus* and *L. cassius* (with stereomicroscope)

<i>L. cassius</i> (MUFE 5749, F.Güneş 1972, 2262, 2795)	(2.67–)3.78(–4.64) x (2.52–)3.60(–4.00)	1.09	spheroidal	brown tones, parti-colored	tuberculate	(0.91–)1.24(–1.62)	(0.48–)0.64(–0.88)	400	Güneş, 2013
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Table 3: (Non acetolysed) : Characteristics of pollen grains of *L. cirpicii*, *L. annuus*, *L. hierosolymitanus* and *L. cassius* . M; arithmetic means, σ; Standard deviation, var.; variations, P: polar diameter, E: equatorial diameter, P/E: Pollen shape, Ex/int: the ratio of exine to the intin, clg: colpus length, clt: colpus width, plg: porus length regarding the poles, plt: porus width regarding the equatorial diameter, plg/plt: porus shape, t: one edge of polar triangle, structure: exine, sculpture: ornamentation. Marks (except variations) are in micrometers (µm). Variation numbers are bar numbers in LM.

TAXA		P	E	P/E	Ex/int	clg	clt	plg	plt	plg/plt	t	structure	sculpture	References
<i>L. cirpicii</i> (Güneş 2016)	M	33.00	28.70	1.14 spheroidal- subprolate	≈2/1	29.76	3.32	11.88	13.80	0.86	non measurable	Tectate infrastructurae	Mesocolpium distinct reticulate, reticules big and granulate, apocolpium slightly reticulate. Polar view triangular to circular	-----
	σ	±1.58	±1.19			±2.07	±0.75	±1.13	±1.01					
	var.	11– 14	10– 12			19– 24	1–3	7–10	8–11					
<i>L. annuus</i> (MUFE 5392)	M	36.68	33.09	1.10 spheroidal	≈1/1	20.30	1.86	7.02	9.05	0.78	non measurable	Tectate infrastructurae	Mesocolpium distinct reticulate, reticules big and granulate, apocolpium slightly reticulate. Polar view triangular to circular	Güneş and Çırpıcı 2010
	σ	±1.62	±1.46			±1.48	±0.57	±0.50	±0.70					
	var.	11– 13	10– 13			16– 21	1–1	5–7	7–9					
<i>L. hierosolymitanus</i> (Güneş 2006)	M	31.20	29.07	1.07 spheroidal	≈1/2	30.27	4.87	12.32	13.22	0.93	non measurable	Tectate infrastructurae	Mesocolpium distinct reticulate, reticules big and granulate, apocolpium slightly reticulate. Polar view triangular to circular.	Güneş 2012-b
	σ	±1.47	±1.16			±1.53	±0.70	±1.01	±1.016					
	var.	11– 13	10– 12			20– 24	3–4	7–10	8–11					
<i>L. cassius</i> (MUFE 5744)	M	39.89	26.00	1.53 prolate	≈2/1	38.40	3.58	7.39	11.65	0.63	non measurable	Tectate infrastructurae	Mesocolpium reticulate, reticules big, pocolpium perforate to psilate	Güneş 2012-b
	σ	1.23	0.74			1.48	0.69	0.89	1.14					
	var.	15– 16	9–11			27– 32	2–3	4–6	7–10					

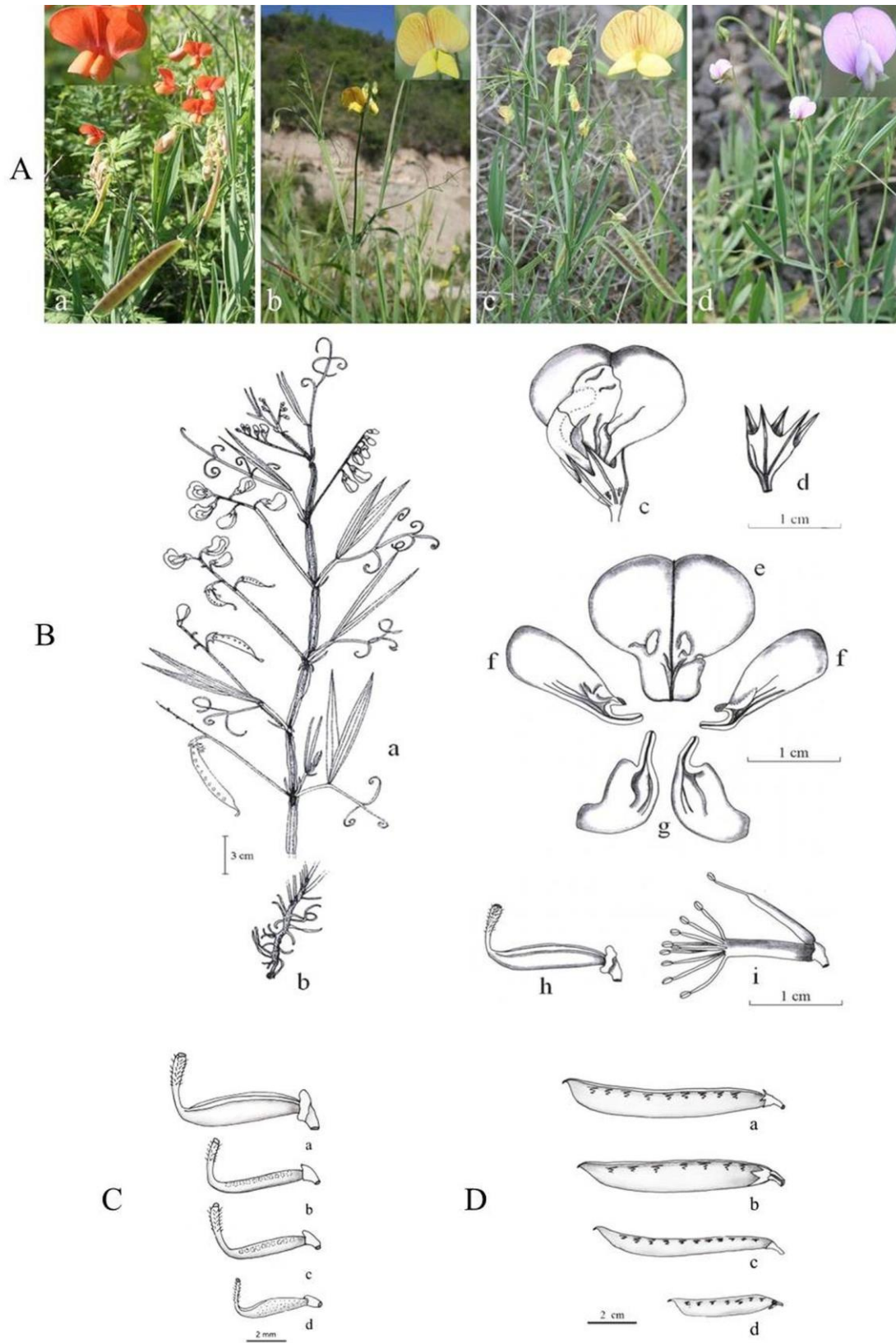


Figure 1. **A:** Habit and general view of (a) *L. cirpicii* (Güneş 2016), (b) *L. annuus* (Güneş 2015), (c) *L. hierosolymitanus* (Güneş 2006) and (d) *L. cassius* (Güneş 1972). **B:** *L. cirpicii* Güneş, sp. nov. (Güneş 2016). (a) habit, (b) root, (c) flower, (d) calyx, (e) standard, (f) wing, (g) keel, (h) androecium, (i) gynoecium. From the holotype, drawn by F. Güneş. **C:** Pistil. (a) *L. cirpicii* (2016) (b) *L. annuus* (Güneş 2015), (c) *L. hierosolymitanus* (Güneş 2006), (d) *L. cassius* (MUFE 5744). **D:** Legumen. (a) *L. cirpicii* (Güneş 2016), (b) *L. annuus* (Güneş 2016), (c) *L. hierosolymitanus* (Güneş 2006), (d) *L. cassius* (MUFE 5744) drawn by F. Güneş.

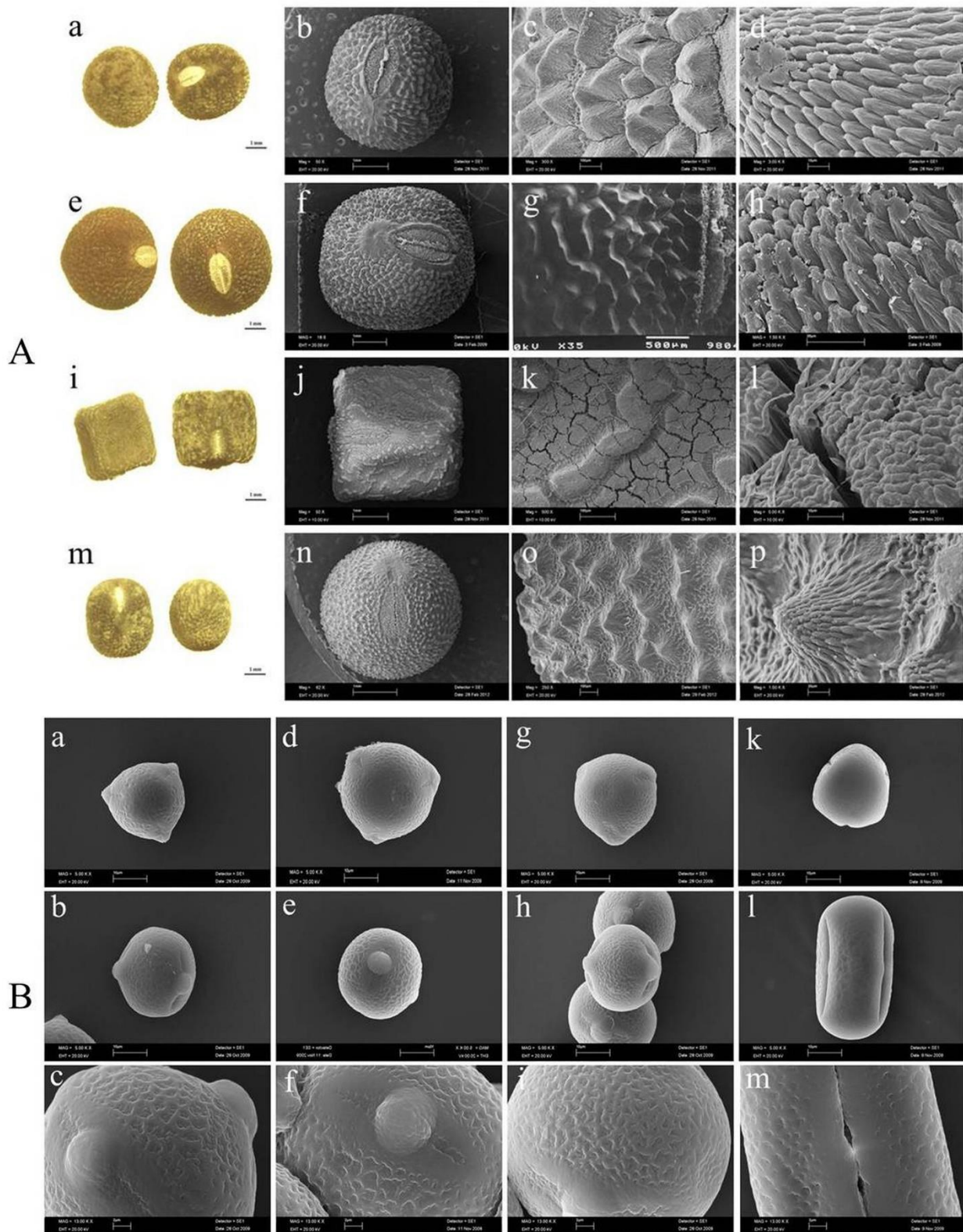


Figure 2. A: LM and SEM microscopy micrographs of seeds. (a–d) *L. cirpicii*, from Güneş 2775, (e–h) *L. annuus*, from MUFE 5568, (i–l) *L. hierosolymitanus*, from Güneş 2773, (m–p) *L. cassius* from Güneş 2262. a,e,i,m; general view in LM, b,f,j,n; general view in SEM, c,g,k,o; general surface shape in SEM, d,h,l,p; testa sculpture in SEM. B: SEM micrographs of pollen grains. (a–c) *L. cirpicii* from Güneş 2016, (d–f) *L. annuus* from Güneş 2076, (g–i) *L. hierosolymitanus* from Güneş 2006, (k–m) *L. cassius* from Güneş 2795, a,d,g,k; polar view, b,e,h,l; equatorial view, c,f,i,m; ornamentation.

4. Conclusions and discussion

Firstly *Lathyrus cirpicii* was recorded to Amik Plain from Hatay province in 2009, where it shares the same habitat with *L. annuus* and *L. hierosolymitanus*. Secondly it was recorded to Bozburun in Muğla province. It is more attractive, taller and stronger than the others. Furthermore, it morphologically differs by having longer pedicels, larger flowers, more-flowered peduncles, bright-red corollas, linear-oblong pistils, widely keeled upper sutures of legumes and subprolate seeds (Table 1-3, Fig. 1–2). As well, a young *L. cirpicii* plant has broadly winged and oblong-shaped pistils, while the other young species have narrowly-winged and linear pistils (Fig. 1C). This species is used for animal feed by local people.

The seeds of *L. cirpicii* are subprolate, but those of *L. annuus*, *L. hierosolymitanus* and *L. cassius* are spheroidal. The surface of seeds are coarsely-tuberculate in *L. cirpicii* and *L. annuus*, ruminant-rugulose in *L. hierosolymitanus* and tuberculate or papillose in *L. cassius*. *L. cirpicii* is differentiated from *L. annuus* in seed and hilum size. The details of a comparative study on the seed morphological characteristics are given in Table 2 and Fig. 2A (a-p).

The pollen characteristics of the examined species are provided in Table 3 and Fig. 2B (a–m). *L. cassius* differs from the other species by having prolate pollen grains. *L. cirpicii* pollen has spheroidal-subprolate pollen grains whereas *L. annuus* and *L. hierosolymitanus* spheroidal pollen grains. Moreover, *L. cirpicii* clearly differs from *L. annuus* pollen by having longer pollen and wider colpus and porus.

4.1. Additional specimens examined:—*L. annuus*. **Cyprus.** Girne-Karaoğlan, road side, 22.04.2017, F. Güneş, sea level, F. Güneş 5452. **France.** Hercult long weg van Montpelleri vaar Miontfonier Le hoogle van Plan-de-4-Seigneus, 30 April 1959, A. Town and J.H. Kroes 101280 (L!).

Turkey. A1(A) Çanakkale: Bozcaada, roadside, s.l., 13 April 1977, Ö. Seçmen and E. Leblebici 20547 (EGE!). **A1(E) Tekirdağ:** Değirmenaltı around, 27 May 1990, A. Kara 5121 (GAZI!). Malkara-Şahin road, İbrice bridge, riverside, 150 m, 8 June 1997, F. Güneş 5464 (MUFE!). **Kırklareli:** Lüleburgaz, Hamitabat village, fieldside, 100 m, 22 May 1997, F. Güneş 5223 (MUFE!). **Edirne:** Tayakadın village, fieldside and roadside, 122 m, 9 June 1987, G. Dalgıç and F. Dane 1016 (EDTU!). Babaeski: Mutlu village, in graveyard, 90m, 26 May 1997, F. Güneş and E. Akalın 5406 (MUFE!). **Çanakkale:** Gelibolu-Evreşe road, riverside, 30 m, 30 May 1998, F. Güneş 5476 (MUFE!). **A2(E) İstanbul:** Bahçeköy-Kilyos road, 10. km, 50 m, 25 June 1996, F. Güneş 5063 (MUFE!). **A7 Trabzon:** Karadeniz Technical University, Campus area, 53 m, 29 May 2009, F. Güneş 2208. **B1 İzmir:** Çeşme, Işıklar graveyard, 20 m, 11 May 1933, O. Schwarz 23007 (EGE!). Çamaltı Tuzlası, 15 m, 07 May 1995, N. Geyikçi 37499 (EGE!). **C1 Aydın:** Söke-Davutlar road, near Dilek Peninsula National Park, field side and road side, 45 m, 25 April 2009, F. Güneş 2099. **Muğla:** Datça, Palamut village, roadside, 5 m, 05 April 1995, D. Pearman 68888 (ISTE!). **C2 Muğla:** Dalyan, Eski village, fieldside, 13 m, 24 April 2009, F. Güneş 2076. **C3 Antalya:** Hacı Mehmetli village, fieldside, 150 m, 03 May 1987, H. Duman 3753 (GAZI!). **C5 Adana:** Ceyhan, Yakapınar village, fieldside, 48 m, 28 April 2008, F. Güneş 1576. **C5 Mersin:** Erdemli, 20 m, 19 May 1981, F. Coşkun 12771 (HUB!). **B7 Elazığ:** Martar Mountain, Şahsuvar village, 1100 m, 08 May 1984, H. Ruşen 1707 (FUH!). Mersin-Silifke road, 29. km, scrubs, 25 m, 20 April 2009, F. Güneş 2036. **C6 Hatay:** Amik Plain, border of fields, 45 m, 25 April 2005, F. Güneş et al. 48 (Güneş); Küçük Karaçay, roadside and slopes, 22 m, 19 April 2009, F. Güneş 2015; ibid. 14 May 2011, A. Ocak and F. Güneş 2716. **C7 Urfa:** Siverek-Urfa road, Karakoyun village, roadside and fieldside, 210 m, 12 May 2009, F. Güneş 2181. **C9 Siirt:** Baykan-Siirt road, 14. km, riverside and fieldside, 489 m, 09 May 2009, F. Güneş 2114.

—*L. hierosolymitanus* **TURKEY. C4 Antalya:** Anamur-Gazipaşa road, Tenzile village, open forest and roadside, 30 m, 21 April 2009, F. Güneş 2053. **C5 Mersin:** Erdemli-Güzeloluk road, Çiriş village, roadside and scrubs, 37 m, 20 April 2009, F. Güneş 2032. Aydıncık-Gülнар road, 5. km, slopes and uncultivated fields, 67 m, 21 April 2009, F. Güneş 2047. **C6 Hatay:** İskenderun, 4-5. km south of Uluçınar, 20 m, 29 May 1996, A.J. Byfield and D. Pearman 73365 (ISTE!). **Hatay:** Samandağ-Yayladağ road, 8. km, slopes, 33 m, 19 April 2009, F. Güneş 2018. Kışlak, 29 m, 05 May 2011, A. Ocak and F. Güneş 2776. **Adana:** Ceyhan, Yakapınar village, fieldside, 43 m, 28 April 2008, F. Güneş 1575. **Osmaniye:** Korkut Ata University Campus, roadside and uncultivated fields, 25 m, 18 April 2009, F. Güneş 2005. Toprakkale, slopes and cultivated fields, 23 m, 18 April 2009, F. Güneş 2006. Ibid. 14 May 2011, F. Güneş 2722; ibid. 4 June 2011, F. Güneş 2773.

—*L. cassius*. **TURKEY. Type:** [Turkey C5 Hatay/Syria] in dumosis inter Cassab (Kasab) et Suadieh (Samandağı), June 1846, Boissier (K!, foto!). **A1(E) Edirne:** Erikli-Yayla road, Erikli exite, scrub, s.l.-50 m, 31 May 1998, F. Güneş 5744 (MUFE!); ibid., 13 June 1998, A. Çirpıcı and F. Güneş 5749 (MUFE!). **B7 Elazığ:** Elazığ-Bingöl road, 70 km, 860 m, 11 July 2008, F. Güneş 1972. **B8 Diyarbakır:** Ovabağ Zelyağdı village, roadside, 735 m, 11 May 2009, F. Güneş 2135. Diyarbakır-Ergani road, 20 km, roadside, 754 m, 07 June 2009, F. Güneş 2262. **B9 Muş:** Malazgirt-Bulanık road, Malazgirt output, field side, 1511 m, 15 June 2008, F. Güneş 1853. **C3 Isparta:** Eğirdir-Aksu road, 14. km, roadside and open *Pinus brutia* forest, 1118 m, 12 June 2009, F. Güneş 2341; ibid., 18 June 2011, F. Güneş 2752; ibid., 23 July 2011, F. Güneş 2795. **C5 Mersin:** Silifke-Taşucu road, 4. km, İmamuşağı village, 5 m, 21 April 2009, F. Güneş 2038. **C6 Hatay:** Dörtöl-Çökek plateau, the edge of forest and roadside, 550 m, 28 May 2006, F. Güneş 143. **C7 Urfa:** Karakoyunlu village, fieldside, 701 m, 07 June 2009, F. Güneş 2270.

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