

# *Lathyrus cassius* (L. sect. *Cicercula*, Leguminosae), a new species for the flora of Europe

Fatma Güneş<sup>1</sup> & Ali Hikmet Çırpıcı<sup>2</sup>

<sup>1</sup> Department of Pharmaceutical Botany, Faculty of Pharmacy, Trakya University, Edirne, Turkey, e-mail: drgunes@gmail.com (corresponding author)

<sup>2</sup> Maltepe University, Istanbul, Turkey, acirpici@gmail.com

Received: May 05, 2015 ▷ Accepted: June 15, 2015

**Abstract.** *Lathyrus cassius* is reported for the first time for the European flora. The species belongs to *L. sect. Cicercula*. It was collected in 1998 from Erikli village nearby Aegean Sea in the province of Edirne, European Turkey. Morphological description of the species, chromosome number,  $2n=14$ , and karyotype characteristics are provided. Photos of the species and closely related taxa are presented as well as illustrations of the morphological characters and karyotype.

**Key words:** Europe, European Turkey, *Fabaceae*, *Lathyrus*, new record

## Introduction

The genus *Lathyrus* L. is represented by 13 sections and 200 species worldwide (Kupicha 1983) and new species are still being described (Mozaffarian & al. 2008; Conti 2010; Genç & Şahin 2011; Güneş 2014). The eastern Mediterranean region is the main center of diversity for the genus, which is less diverse in North and South America (Bässler 1980; Kupicha 1983). In Turkey, *Lathyrus* is represented by 10 sections, 76 taxa, 26 of which are endemic (Davis 1970, 1988; Güneş & Özhatay 2000; Güneş 2012). *Lathyrus* sect. *Cicercula* (Medic.) Gren. & Godr. contains approximately 25 annual species throughout middle and southern Europe, southwest Asia and north Africa (Kupicha 1983). *Cicercula* is the largest (19 taxa) and most difficult section of the genus in Turkey. In this section the flower colour is very important for identification, but it often changes drastically on drying (brick-red flowers turn to bluish-purple). So, it is crucial to take field notes on flower colour. The group is very diverse and taxonomically intricate in Turkey (Davis 1970).

The aim of this study is to report *L. cassius* as a new species for the European flora and for the flora of European Turkey, and to provide details on its chromosome number and karyotype.

## Material and methods

Specimens were collected between 1998 and 2011. The samples were identified using publications relevant to the flora of Turkey (Davis 1970, 1988; Güneş & Özhatay 2000; Güneş 2012) and to the floras of neighbouring countries, e.g., Syria (Post 1932), Bulgaria (Kožuharov 1976), Cyprus (Meikle 1977), Iraq (Townsend & Guest 1977), Iran (Rechinger 1979), Palestine (Zohary 1987). *Flora Europaea* (Ball 1968) was consulted too. The collected material was compared with herbarium material in the herbaria EDTU, EGE, FUH, GAZI, HUB, ISTE, MUFE and E.

For chromosome counting and study of the karyotype seeds were obtained from the locality in the European Turkey. Root tips from germinating seeds were collected and pre-treated in a saturated solution

of  $\alpha$ -Bromonaphthalene for 24 hours at 4°C and then fixed in Carnoy's solution. The root tips were hydrolyzed in 1N HCl for 10–20 min at 60°C and stained with Feulgen solution. Semipermanent slides were examined by light microscopy. Mitotic chromosomes were photographed by 100 immersion objective of Nikon E600 trinocular photomicroscope. Chromosomal measurements were made using  $\times 4000$  magnified photographs of 7 well-spread metaphase plates. Short arm length (S) and long arm length (L) were measured, total length of the chromosomes (C), arm ratio ( $R=L/S$ ), centromeric index (I) and relative length (R) were calculated. Classification of chromosomes by centromeric indices follows Levan & al. (1964).

## Results and discussion

***Lathyrus cassius*** Boiss., Diagn. Pl. Orient., ser. 1(9) (1849) 128 – kelimirdik (Turkish name) (Figs. 1, 2)

Syn.: *L. annuus* L. var. *cassius* (Boiss.) Post, Fl. Syria (1896) 292; *L. annuus* L. subsp. *cassius* (Boiss.) Holmboe, Veg. Cyprus (1914) 115; *L. egirdiricus* Genç & Şahin in Bot. J. Linn. Society, 158 (2008) 301, nom. invalid.; *L. egirdiricus* Genç & Şahin ex L.A. Silva, J. Freitas, V.F. Dutra & Alves-Araújo in Phytotaxa, 184(5) (2014) 295.

Glabrous annual, glaucescent. Stems (15)30–130 cm long, 2–4 mm wide, with 0.5–1.5 mm wings. Median and upper leaves bearing mostly 3-sect tendrils; leaflets 1 pair, 10–95  $\times$  0.5–10 mm, linear-lanceolate, with

2–4 parallel veins; petiole 25–35 mm, winged; stipules 5–20  $\times$  0.5–1 mm, subulate, semi-sagittate. Peduncles 15–250 mm, 1–2-flowered, at least the pedicels bearing dark sessile glands; pedicel 1–4 mm. Calyx 4–6(7) mm, with sessile glands; tube 3–4 mm; teeth 2–3 mm, unequal, triangular-acuminate. Flowers (8)9–13(15) mm, purplish-pink or lilac; standard 12–13  $\times$  9–10 mm; wings 10–11  $\times$  3–4 mm, paler or whitish; keel 9–10  $\times$  3–4 mm, whitish. Style 4–5 mm, linear and twisted; stigma narrower than 1 mm. Legume 20–52  $\times$  5–7 mm, linear-oblong; upper suture shortly 3-keeled, when young valves dotted with sessile glands and distinctly veined. Seeds (2)4–8, 2.67–4.24  $\times$  2.52–3.88 mm, coarsely tuberculate; hilum 0.91–1.45  $\times$  0.48–0.80 mm. Pollen prolate ( $P/E=1.48$ ,  $P=44.77$ ,  $E=30.11 \mu\text{m}$ ).  $2n=14$ .

**Distribution and habitats:** The species is distributed in E, SE, S, SW & NW Turkey, W Syria, Cyprus, N Iraq (Fig. 3). It grows in *Pinus brutia* forest, scrub, volcanic out-crops, fallow fields, roadsides, up to 1650 m.

This is the first report of the species for Europe. In the European Turkey, *L. cassius* was recorded in only one locality in rocky outcrops in the Edirne province: A1(E) Edirne: Erikli – Yayla road, Erikli exite, scrub, 50 m, 31.05.1998, coll. F. Güneş 5744 (MUFE), *ibid.*, 13.06.1998, coll. A. Çırpıcı & F. Güneş 5749 (MUFE). The species is much localized in the European Turkey and its natural habitat is under threat due to reforestation activities and construction works.

*Lathyrus cassius* is morphologically similar to *L. annuus* and *L. hierosolymitanus*. Detailed morphologi-



**Fig. 1.** Habit and general view of *Lathyrus cassius* (a, F. Güneş 2135), *L. egirdiricus* (b, F. Güneş 2341), *L. annuus* (c, F. Güneş 2015) and *L. hierosolymitanus* (d, F. Güneş 2006).

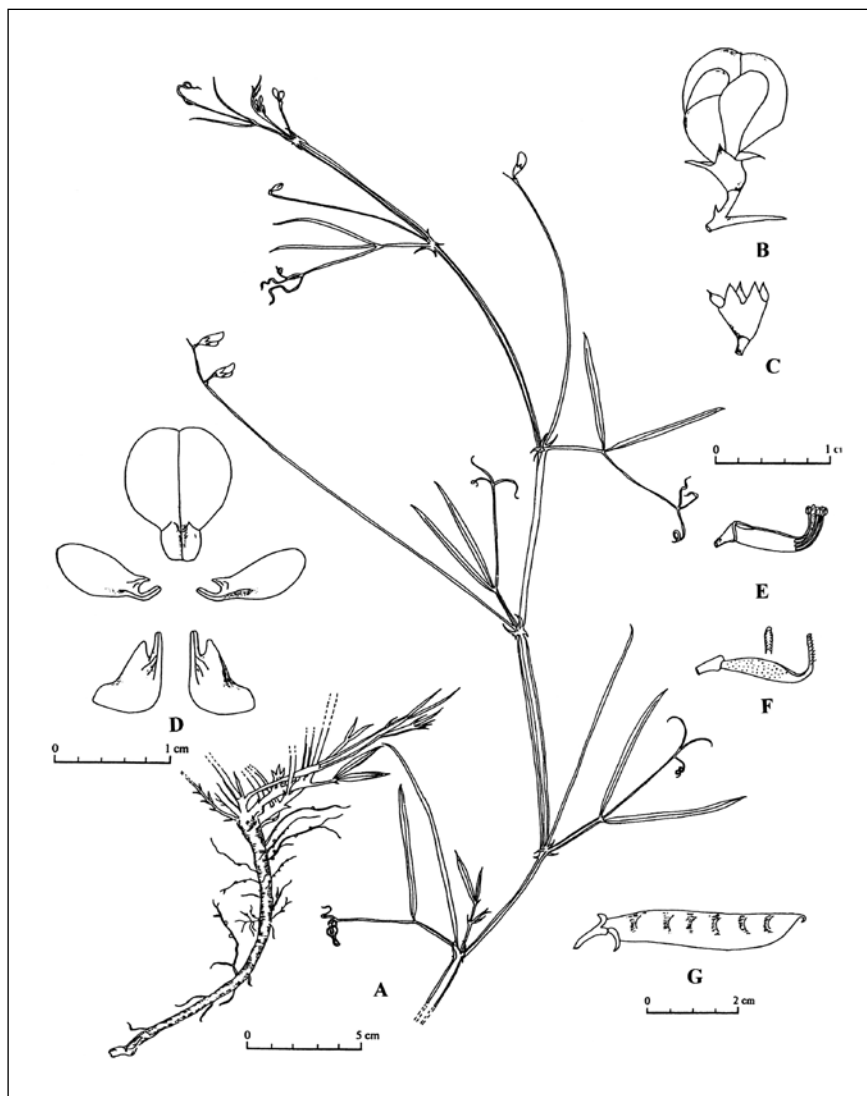


Fig. 2. *Lathyrus cassius* (MUFE 5749): A – habit and root, B – flower, C – calyx, D – stantard, wings and keel, E – androecium, F – gynoecium, G – legume (drawn by F. Güneş).



Fig. 3. Distribution map of *Lathyrus cassius*.

cal comparison of these species has already been provided (Güneş 2014). In the European Turkey, *L. annuus* is well known as it has been collected from 8–10 different locations in Thrace and there are numerous herbarium specimens. According to *Flora of Turkey and the East Aegean Islands* (Davis 1970) *L. cassius* and *L. hierosolymitanus* are distributed around the Hatay and Osmaniye provinces, which are very far from the Thrace region. In the field studies carried out since 2000, specimens of these taxa were collected from their natural habitats and compared with the material from Edirne province. Field studies showed the flowers of *L. hierosolymitanus* were yellow (not pink as stated in *Flora of Turkey and the East Aegean Islands*) and that it had far greater similarity to *L. annuus*. Furthermore, as a result of the examinations, it was found that the specimens collected from the Isparta – Eğirdir to Aksu region (Güneş 2341, Güneş 2752, Güneş 2795) and the isotypes of *L. egirdiricus* Genç & Şahin in FUH and GAZİ!, a new species, invalidly published by Genç & Şahin (2008), in fact belong to *L. cassius*.

Thus, the name *L. egirdiricus*, recently validated (Silva & al. 2014), should be regarded a synonym of *L. cassius* (Güneş 2012).

The location of the new record is geographically very far away from its previously known distribution. We believe that *L. cassius* is somewhat undercollected in the region between the two locations. *Lathyrus egirdiricus* (Genç & Şahin 2008), regarded as a synonym of *L. cassius*, was described from the region of Eğirdir, approximately halfway between the former distribution area of *L. cassius* and its new record in the European Turkey. We expect that there will be more findings of *L. cassius* between these localities.

**Phenology:** Flowering and fruiting specimens were collected from April to July.

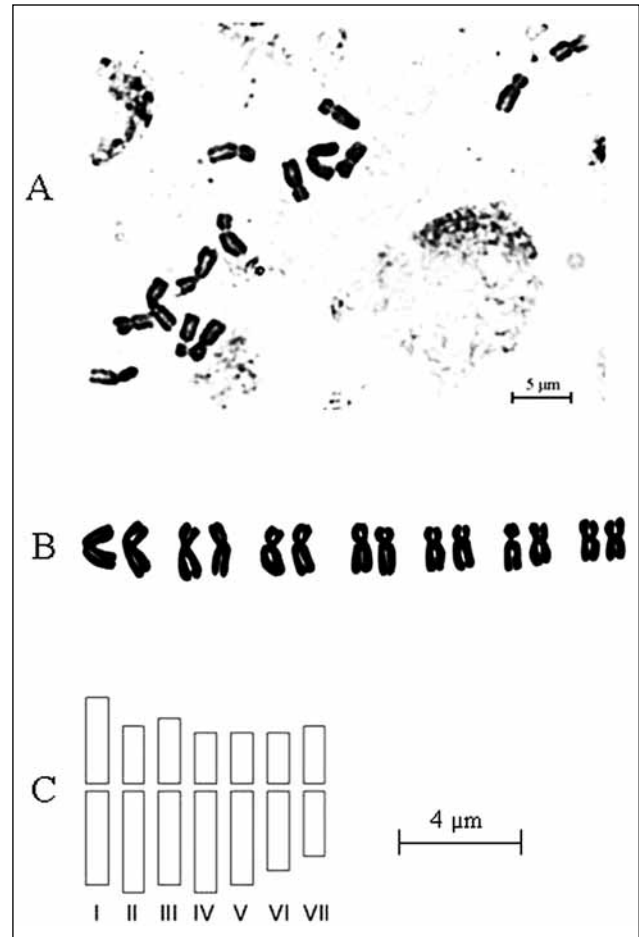


**Chromosome number and karyotype:** *Lathyrus cassius* is a diploid species,  $2n = 14$  (Fig. 4). Characteristics of the chromosomes are provided in Table 1. Our data are congruent with those of Şahin (1993) who first determined the chromosomal features of the species. The only differences between his and our data are in the length and type of third and fifth chromosomes. In this study the third chromosome is metacentric and  $3.63 \mu\text{m}$  in length, and the fifth chromosome is submetacentric and  $3.28 \mu\text{m}$  in length. In Şahin (1993) the third chromosome is submetacentric and  $3.82 \mu\text{m}$  in length, and the fifth chromosome is metacentric and  $3.49 \mu\text{m}$  in length. These differences are taxonomically insignificant and they may have arisen from the methodology used. Satellites have not been observed by both us and Şahin (1993).

**Table 1.** Chromosome types, chromosome length and ratio of *Lathyrus cassius*.

Chromosome pairs	Total length (C, $\mu\text{m}$ )	Long arm (L, $\mu\text{m}$ )	Short arm (S, $\mu\text{m}$ )	Arm ratio R=L/S	Centromeric index (I)	Relative length (R)	Chrom. type
I	4.3438	2.2813	2.0625	1.1061	47.4817	8.8423	m
II	3.8438	2.5625	1.2813	1.9999	33.3342	7.8245	sm
III	3.6249	2.2187	1.4063	1.5777	38.7955	7.3789	m
IV	3.5000	2.4375	1.0625	2.2941	30.3571	7.1247	sm
V	3.2815	2.2815	1.0000	2.2815	30.4739	6.6766	sm
VI	3.0625	2.0000	1.0625	1.8823	34.6938	6.2340	sm
VII	2.9062	1.5937	1.3125	1.2142	45.1620	5.9159	m
<b>Average</b>	MC=5.8928			MR=1.5145			

**Additional specimens of *L. cassius* examined:** **Lebanon**, in *Rapestribus regionis inferioris ad Brummana*, 6–700 m, 07.06.1897, coll. J. Bornmüller (E00370985); **Turkey:** **B7** Elazığ: Elazığ – Bingöl road, 70 km, the edges of water channel, 860 m, 11.07.2008, coll. F. Güneş 1972; **B8** Diyarbakır: Ovabağ Zelyağdı village, road side, 735 m, 11.05.2009, coll. F. Güneş 2135, Diyarbakır – Ergani road, 20 km, roadside, 754 m, 07.06.2009, coll. F. Güneş 2262; **B9** Muş: Malazgirt – Bulanık road, Malazgirt output, field side, 1511 m, 15.06.2008, coll. F. Güneş 1853; **C5** Mersin: Silifke – Taşucu road, 4 km, İmamuşağı village, 5 m, 21.04.2009, coll. F. Güneş 2038; **C6** Hatay: Dört Yol-Çökek plateau, the edge of forest and road side, 550 m, 28.05.2006, coll. F. Güneş 143; **C7** Urfa: Karakoyunlu village, field side, 701 m, 07.06.2009, coll. F. Güneş 2270.



**Fig. 4.** Karyotype of *Lathyrus cassius*. A – mitotic metaphase chromosomes, B – karyotype, C – idiogram.

## References

- Ball, P.W. 1968. *Lathyrus* L. – In: Tutin, T.G. & al. (eds), Flora Europaea. Vol. 2, pp. 136-143. Cambridge Univ. Press, Cambridge.
- Bässler, M. 1980. Revision von *Lathyrus* L. sect. *Lathyrostylis* (Griseb.) Bässler (*Fabaceae*). – Feddes Repert., **90**: 210-241.
- Conti, F. 2010. A new species of *Lathyrus* L. (*Fabaceae*) from Central Apennine (Italy). – Pl. Biosyst., **144**(4): 814-818.
- Davis, P.H. 1970. *Lathyrus* L. – In: Davis, P.H. (ed.), Flora of Turkey and the East Aegean Islands. Vol. 3, pp. 328-369. Edinburgh Univ. Press, Edinburgh.
- Davis, P.H. 1988. Flora of Turkey and East Aegean Islands. Vol. 10, pp. 125-126. Edinburgh Univ. Press, Edinburgh.
- Genç, H. & Şahin, A. 2008. A new species of *Lathyrus* L. (section *Cicercula*; *Fabaceae*) from Turkey. – Bot. J. Linn. Soc., **158**: 301-305.
- Genç, H. & Şahin, A. 2011. A new species of *Lathyrus* L. (*Fabaceae*) from Turkey. – J. Syst. Evol., **49**(5): 505-508.
- Güneş, F. 2012. *Lathyrus* L. – In: Güner, A. & al. (eds), The List of Turkish Plants (Vascular Plants). Nezahat Gökyiğit Botanical Garden and Flora Research Society, Istanbul.

- Güneş, F.** 2014. A new species of *Lathyrus* (*Fabaceae*) from Turkey. – *Pensee Journal*, **76**(3): 339-350.
- Güneş, F. & Özhatay, N.** 2000. *Lathyrus* L. – In: **Güner, A. & al.** (eds), *Flora of Turkey and the East Aegean Islands*. Vol. **11**, pp. 92-94. Edinburgh Univ. Press, Edinburgh.
- Kožuharov, S.** 1976. *Lathyrus* L. – In: **Jordanov, D.** (ed.), *Fl. Reipubl. Popularis Bulgaricae*. Vol. **6**, pp. 503-547. In *Aedibus Acad. Sci. Bulgaricae, Serdicae* (in Bulgarian).
- Kupicha, F.K.** 1983. The infrageneric structure of *Lathyrus*. – *Notes Roy. Bot. Gard. Edinburgh*, **41**: 209-244.
- Levan, A., Fredga, K. & Sandberg, A.A.** 1964. Nomenclature for centromeric position on chromosomes. – *Hereditas*, **52**: 201-220.
- Meikle, R.D.** 1977. *Lathyrus* L. – In: *Flora of Cyprus*. Pp. 556-578. The Bentham-Moxon Trust, Royal Botanic Gardens, Kew.
- Mozaffarian, V., Ahavazi, M. & Charkhchian, M.M.** 2008. A new species of the genus *Lathyrus* L. (*Papilionaceae*) from Iran. – *Iran. J. Bot.*, **14**(1): 7-9.
- Post, G.** 1932. *Flora of Syria, Palestine and Sinai*. Vol. **1**, pp. 427-234. American Press, Beirut.
- Rechinger, K.H.** 1979. *Lathyrus* L. – In: **Chrtkova-Zertova, A & al.** (eds), *Flora Iranica. Papilionaceae*. Vol. **140**(1, *Vicieae*), pp. 61-82. Akad. Druck-u. Verlagsanstalt, Graz.
- Silva, L.A., Freitas, J., Dutra, V.F. & Alvesaraújo, A.** 2014. Validation of *Lathyrus egirdiricus* and three new combinations in *Leobordea* and *Senegalia* (*Leguminosae*). – *Phytotaxa*, **184**(5): 295-297.
- Şahin, A.** 1993. Karyotype analysis of some species of *Lathyrus* L. in Turkey [Türkiye'nin Bazı *Lathyrus* L. Türleri [*L. rotundifolius* Willd. subsp. *miniatus* (Bieb. ex Stev.) Davis, *L. cassius* Boiss., *L. cicera* L., *L. aphaca* L. var. *modestus* P.H. Davis]'nin Karyotip Analizleri, I]. – *Doğa Türk Bot. Derg.*, **17**: 65-69 (in Turkish).
- Townsend, C.C. & Guest, E.** 1977. *Flora of Iraq*. Pp. 549-573. Ministry of Agriculture and Agrarian Reform of the Republic of Iraq, Baghdad.
- Zohary, M.** 1987. *Flora Palaestina*. The Israel Academy of Sciences and Humanities, Jerusalem.
-

