

Lotus angustissimus L.

Slender bird's-foot-trefoil

Lotus angustissimus is a hairy annual of the pea family (Fabaceae), typically occurring in south or south-west facing subaritime or paramaritime cliff-top grassland over thin, drought-prone soils. Key characters used for identification include the number of flowers per head, fruit length relative to calyx length, and the angle of bend along the lower limb of the flower keel. Outside the Channel Islands, its core areas of distribution in Britain lie along the southern coastlines of Cornwall and Devon. It becomes much rarer further east and north, with a small number of localities on the Isle of Wight, in South Hampshire and East Kent, and on the north coasts of Cornwall and Devon. It is absent from Wales, Ireland and Scotland. *L. angustissimus* has been assessed as 'Near Threatened' in England due to the small number of extant localities.



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IDENTIFICATION

Lotus angustissimus is a few-flowered (usually 1 - 2 per head) annual with a covering of patent hairs. The small pale 'egg-yolk' yellow flowers are held on short pedicels, and the keel of the flower, as seen in the picture above, has an almost right-angled bend to it about halfway along the lower edge of the limb (Stace, 2010), as well as a short, straight-tipped beak (Kramina, 2006).



South-facing cliff slopes at Start Point, S. Devon, looking out to Peartree Point. The grassland in the foreground contains both *L. angustissimus* and *L. subbiflorus* ©Pete Stroh

Fruits are long (up to 30 mm), straight and slender (less than 2 mm), and are more than three times the length of the calyx.

SIMILAR SPECIES

Lotus subbiflorus, with which *L. angustissimus* often grows, is much more densely hairy and can be picked out in the field by its rather hoary appearance and richer yellow ('free-range' rather than 'battery' egg-yolk) flowers. Plants of *L. subbiflorus* usually have more flowers per head (2 -4), but produce smaller, 'chubbier' fruits (≤ 12 mm) less than three times the length of the calyx. In addition, the keel has a more obtuse bend near the base of the lower edge of the limb (Stace, 2010).

The hybrid between *L. angustissimus* and *L. subbiflorus* is not known from this country, although there have been doubtful (rejected) records from S. Devon (Smith *et al.*, 2016). A comprehensive study of the *L. angustissimus* complex by Kramina (2006) did, however, reveal possible hybrid forms with intermediate morphological characters from sites in France, Italy and Greece, where they occur with typical representatives of both species.

HABITATS

Lotus angustissimus is typically present in south or south-west facing subaritime or paramaritime grassland over thin, drought-prone soils. It occurs in parched, open (often relatively sheltered) patches amongst cliff-top scrub, around rocky outcrops and on path-side verges and banks (Leach *et al.*, 1994; Leach, 1995, 1999, 2006; Stewart, 1999; Smith *et al.*, 2016; Kitchener, 2017). The relatively few inland populations

Lotus angustissimus L.

tend to occur on dry, steep and sheltered grassy slopes kept open by soil slippage and rabbit grazing (e.g. Leach & Porley, 1994), along field-borders and forestry tracks (Stewart, 1999), and on disused railway lines and at places associated in the past with quarrying activity (Bennallick *et al.*, 2009; Smith *et al.*, 2016). However, east of its core range in south-west England it is probable that some of these populations have originated via unintentional introduction with imported gravel (Rand & Mundell, 2011).

Extensive surveys undertaken across Devon and Cornwall in 1993-94 found that *L. angustissimus* occurs in both short, well-grazed grassland conforming to the *Hypochaeris radicata* sub-community of U1 *Festuca ovina-Agrostis capillaris-Rumex acetosella* grassland, or in transitional habitat between this and the *Rumex acetosella* sub-community of W23 *Ulex europaeus-Rubus fruticosus* agg. scrub community (Leach, 2006), with *Lotus subbiflorus* a frequent associate, along with occasional records of a number of other scarce annuals, e.g. *Trifolium glomeratum*, *Erodium moschatum*.

In southern and south-eastern Europe *L. angustissimus* is similarly associated with ephemeral therophytic grassland communities on infertile, drought-prone soils, such as those encompassed by the *Romulion* alliance, and open shrub vegetation such as the *Cistus incanus* sub-Mediterranean garrigue community, with associates including *Medicago*

minima, *Petrorhagia prolifera* and *Scilla autumnalis*.

BIOGEOGRAPHY

Lotus angustissimus is a European Southern-temperate species (Preston & Hill, 1997) found from the Mediterranean basin northwards to the Channel Islands and southern England, where it reaches the northern limit of its native range (Preston, 2007), and eastwards to the Ukraine. It is also present in northern Africa, Macronesia, and south-west Asia (Kramina, 2006). *L. angustissimus* was once widely used as a crop plant, and has become naturalised in many places outside of its native range, including China, South Africa, Australia and Russia (Siberia).

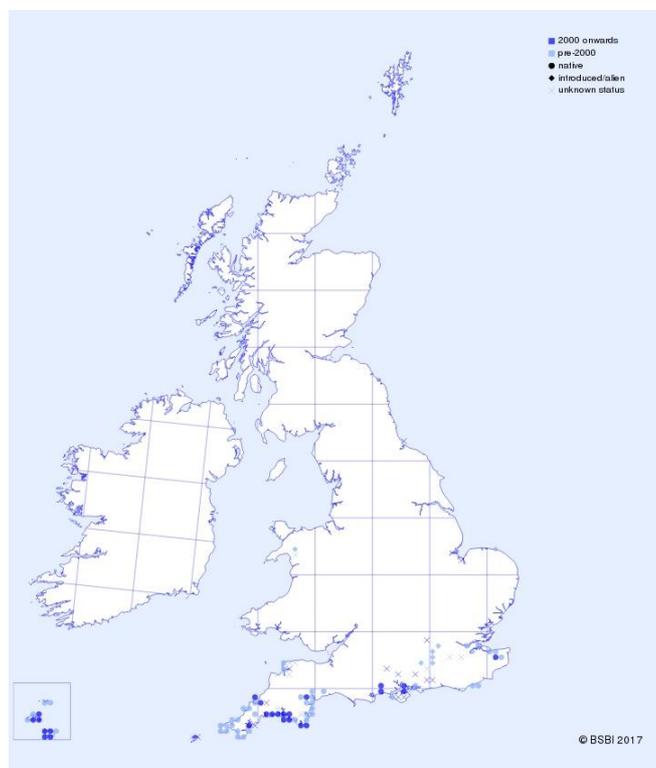
Preston *et al.* (2013) allocated *L. angustissimus* to the *Romulea columnae* 'biogeographic cluster' containing species with a similar (southern) distribution and showing a distinct preference for open, dry and nutrient-poor microhabitats in areas having high summer and winter temperatures. In Britain, outside the Channel Islands it is confined as a native to East and West Cornwall (although it is now very rare in the latter), North and South Devon, the Isle of Wight, South Hampshire and East Kent. In Kent it was feared extinct, until its discovery along a ride at Trenleypark Wood in 2016 (Kitchener, 2017). *L. angustissimus* has also recently appeared in a sandy field margin in East Sussex. Curiously, the first record for *L. angustissimus* in Britain was from East Sussex, "among rocks near Hastings" (Knapp & Abraham, 2008) and, although its status is uncertain, it is possible that the recent discovery involves a previously overlooked native population.

ECOLOGY

Lotus angustissimus is a self-fertile annual therophyte, flowering between June and October, although its appearance at a site depends largely on climate and the availability of short turf with patches of bare soil for germination, and in some years when conditions are unsuitable no plants may be present.

Each fruits contain numerous (12 -28) spheroid seeds (0.9 – 1.2 × 0.9 – 1.1 × 0.7– 0.9 mm). Seeds are smooth, dull or slightly glossy, and may be coloured yellow, sometimes with a rose or purple tinge, brown, yellowish-brown or reddish-brown (Kramina, 2006). Germination may take place in the autumn or spring, although spring-germinating plants, in particular, may be susceptible to summer drought. In exceptionally wet summers, seed produced in June can germinate almost immediately and produce plants that then flower and set seed in early winter (Leach, 1999).

Although there are no experimental studies in the literature concerning soil seed bank longevity, the colonisation of *L. angustissimus* in open ground following a gorse fire at a site in South Devon after a probable absence of many years (Leach, 1983) suggests that seeds are long-lived in the soil. Leach (1999) reported that *L. angustissimus* is erratic in appearance from year to year, with a potential for large numbers of plants two summers after a drought-year.



Distribution of *Lotus angustissimus* in Great Britain and Ireland.

Lotus angustissimus L.

In Australia, *L. angustissimus*, an introduced species, is one of the main hosts for another alien species, the parasitic *Parentucellia viscosa* (Pate & Bell, 2000).

THREATS

Lotus angustissimus is vulnerable to a lack of management, resulting in a rank, closed sward and the encroachment of scrub. It is also susceptible to severe summer drought. Re-routing or closure of cliff-top footpaths could also have a damaging impact on some populations, as could too much (or too little) grazing.

MANAGEMENT

Lotus angustissimus requires open areas and short turf. These conditions may be achieved by way of extensive sheep grazing and, when necessary, scrub clearance. Periodic cutting and/or burning, once common management on coastal grasslands in the south-west, can also be beneficial for this and other species, particularly on sites which have become bracken- or scrub-dominated after a period of neglect (e.g. Mitchley & Malloch, 1991). However, the consequences of fire for other threatened vascular plants, vertebrates and invertebrates will first need to be considered. Drought will also contribute to the maintenance of suitably open conditions in some years although, as stated above, severe drought may lead to its temporary absence due to substantial seedling mortality.

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