EPPO Datasheet: *Lespedeza cuneata*

Last updated: 2020-04-23

IDENTITY

Preferred name: *Lespedeza cuneata*
Authority: (Dumont de Courset) G. Don
Taxonomic position: Plantae: Magnoliophyta: Angiospermae: Fabids: Fabales: Fabaceae: Papilionoideae
Other scientific names: *Anthyllis cuneata* Dumont de Courset, *Aspalathus cuneata* (Dumont de Courset) G. Don, *Hedysarum sericeum* Thunberg, *Lespedeza argyraea* Siebold & Zuccarini, *Lespedeza juncea var. sericea* (Thunberg) Lace & Hauech, *Lespedeza sericea var. latifolia* Maximowcz, *Lespedeza sericea* (Thunberg) Miquel
Common names: Chinese bush clover, Chinese lespedeza, Siberian lespedeza (US), bush clover, perennial lespedeza (US), sericea lespedeza (US), silky bush clover
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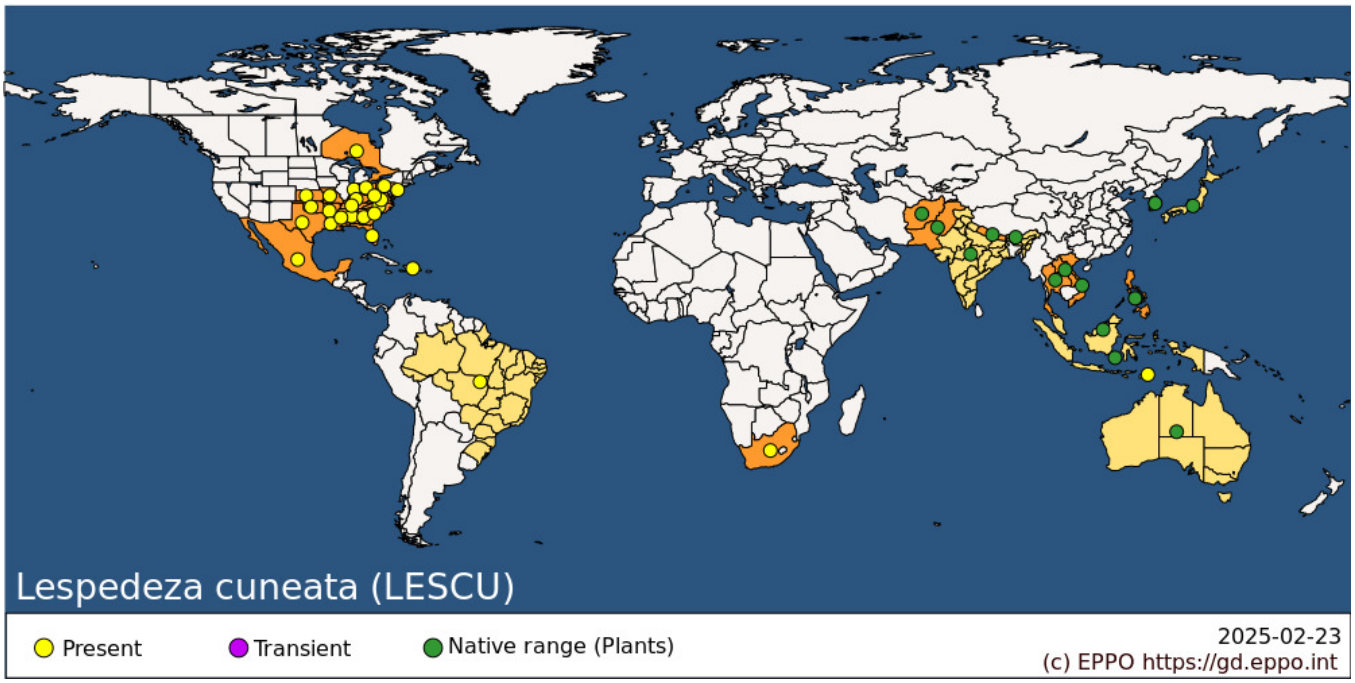
EPPO Categorization: A1 list
view more categorizations online...
EU Categorization: IAS of Union concern
EPPO Code: LESCU

GEOGRAPHICAL DISTRIBUTION

History of introduction and spread

Lespedeza cuneata has a native distribution to temperate and tropical Asia and Australasia (Harden, 2001). *L. cuneata* has been introduced into South Africa but little information is available on its occurrence. *L. cuneat*a is not native to North America. It was initially planted in the USA in 1896 at the North Carolina Agricultural Experiment Station. In the 1920s and 1930s, *L. cuneata* was grown and planted for erosion control and mine reclamation but was not widely utilized as a pasture species until the 1940s. As of 2009, *L. cuneata* was known outside of cultivation as far north as New Jersey and Michigan, as far south as Florida and Texas, and as far west as Nebraska and Oklahoma. *L. cuneata* populations are also reported in Hawaii. According to the Colorado Weed Management Association, *L. cuneata* is either absent or very limited in that state. The Southeastern Exotic Pest Plant Council reports that *L. cuneata* is especially common in the Piedmont and Coastal Plain regions.

Distribution



Africa: South Africa
Asia: Afghanistan, Bhutan, East Timor, India, Indonesia, Japan, Korea, Republic, Laos, Malaysia, Nepal, Pakistan, Philippines, Thailand, Vietnam
North America: Canada (Ontario), Mexico, United States of America (Alabama, Arkansas, Florida, Georgia, Indiana, Kansas, Kentucky, Louisiana, Mississippi, Missouri, New Jersey, North Carolina, Ohio, Oklahoma, Pennsylvania, South Carolina, Tennessee, Texas, Virginia, West Virginia)
Central America and Caribbean: Dominican Republic
South America: Brazil
Oceania: Australia

MORPHOLOGY

Plant type

Erect or sub-erect perennial herbaceous legume.

Description

L. cuneata is a long-lived perennial or subshrub, growing to a height of 0.5–1 m. The plant produces trifoliate leaves along the entire stem, which are more crowded than those of *Lespedeza juncea* s.s. (Pramanik & Thothathri, 1983); stems can be coarse or fine, depending on the cultivar (Hoveland & Donnelly, 1985). Leaflets are long, narrow and indented at the end; one of the key features that has been used to distinguish *L. cuneata* from *L. juncea* s.s. is the length to width ratio of the leaflets (Pramanik & Thothathri, 1983; Flora of China 2010), with the narrower-leafletted *L. cuneata* showing ratios between 4:1 and 6:1, but *L. juncea* s.s. being between 3:1 and 4:1.

BIOLOGY AND ECOLOGY

General

L. cuneata is a prolific seed producer, with individual stems able to produce in excess of 1000 seeds, with between 130 and 390 kg of seed produced per acre; 1 kg of seed equals around 770 000 actual seeds (Ohlenbusch *et al.*, 2001). Seed yields are highest if no biomass is removed from the plant (e.g. from grazing, cutting, or burning) during the year of seed harvest (Adamson & Donnelly, 1973). Seeds can be produced in the first year of growth:

experiments in Oklahoma demonstrated that plants could set seed as early as 15 weeks (Farris, 2006). Seed are expected to survive for more than 20 years in the soil, although Ohlenbusch *et al.* (2001) noted that no direct data was available to confirm this expectation. Inferences have been made about seed banks from field studies; however, Carter & Ungar (2002) found *L. cuneata* seed in 80–90% of soil samples on restored forest on coal mine spoil, although plants were only present in two of four plots. Likewise, Honu *et al.* (2009) found over 160 seeds per square metre from a forest plot in Illinois where the plant was not found.

Habitats

Pramanik & Thothathri (1983) state that *L. cuneata* (as *L. juncea* var. *sericea*) is 'the only representative of the group occurring in both temperate and tropical climates', although their circumscription of *L. juncea* var. *sericea* includes some taxa that are accepted as distinct species by some other authorities. In the USA it grows from 'Florida to Texas, north to Nebraska, and east to the Atlantic coast, through the states of Michigan and New York' (Ohlenbusch *et al.*, 2001). Mosjidis (1990), using growth chamber experiments, found that seedling height, shoot dry weight, leaf dry weight and stem dry weight of all genotypes tested were very sensitive to both day length and temperature. Increases in temperature and day length above the lowest temperature combination (18°C/14°C) and the shortest day length (11 h) brought about large increases in all measurements. Mosjidis (1990) suggests that 26°C/22°C or 30°C/ 26°C (day/night) and a day length of 13 h or 15 h are optimal conditions for screening seedling growth.

Weber (2017) and Gucker (2010) report that typical invaded habitats include grassland, woodland, forests, edges of wetlands, pastures and disturbed sites.

Environmental requirements

L. cuneata can grow where the annual precipitation exceeds 760 mm. However, the species is also considered to be drought tolerant and is well adapted to clay or loam soils (Hoveland & Donnelly, 1985). A deep taproot system, with numerous lateral branches and finer fibrous roots, may penetrate 1.2 m or more into the soil (Guernsey, 1977; Ohlenbusch *et al*., 2001) and contributes to the species' drought resistance. Note that the breeding of cultivars adapted to particular soil types is likely to have extended the fundamental niche of the species; for example, Hoveland & Donnelly (1985) report that the cultivar 'Serala 76' is better adapted to light-textured soils than the originally imported accessions.

L. cuneata can tolerate shallow soils of low productivity with a low pH (< 5), withstanding the high aluminium contents typical of such substrates (Cope, 1966; Plass & Vogel, 1973; Hoveland & Donnelly, 1985; Ohlenbusch *et al.* , 2001). However, *L. cuneata* reportedly grows best between a pH of 6.0 and 6.5 on deep, well-drained clay or loamy soils (Ohlenbusch *et al*., 2001). Ohlenbusch *et al.* (2001) also note that the species tolerates shade reasonably well and is able to establish in dense shade where sunlight does not reach during the day; however, the best establishment is typically obtained where the competing vegetation is very short and light is able to reach both the seed and seedlings (Ohlenbusch *et al.*, 2001). It has been shown in the USA that the species performs better in soil in which it has been previously grown, although the precise mechanism for this self-facilitation is not known (Coykendall & Houseman, 2014). Crawford & Knight (2017) provided evidence that effects on the soil biota were responsible, but also found that the self-facilitation advantage was not found in competition with communities of native prairie species.

Natural enemies

There are no known natural enemies in the EPPO region.

Uses and benefits

Historically, the socio-economic benefits of this species were considered to be high: *L. cuneata* was originally introduced for the purposes of fodder and soil conservation, with subsequent development of improved varieties for hay and pasturage (Hoveland & Donnelly, 1985). Hoveland & Donnelly (1985) estimated that total hay production was usually 6-11 tonnes ha^{-1} ; the plant is still promoted for this purpose in some territories. The quality of the forage can be high due to its high levels of crude protein, although the quality is reduced if tannin levels are also high

(hence the development of low-tannin varieties). Field drying also decreases tannin concentrations, and livestock will 'readily consume' hay containing *L. cuneata* (Ohlenbusch *et al.,* 2001). Gucker (2010) provides an overview of a number of variables affecting forage quality. The plant is also considered by some authors (e.g. Stubbendiek & Conard, 1989) to be good for honey production.

Positive effects of the species on animal health and the commercial quality of milk (a reduction in the number of somatic cells in milk) have also been reported (Min e*t al*., 2005). Forage containing condensed tannins, such as *L. cuneata*, has shown anthelmintic activity against gastrointestinal nematodes of sheep and goats (Terrill *et al*., 2009). It may play a role in a rotation grazing system and may be included in an integrated control plan.

The use of *L. cuneata* to provide rapid greening of disturbed sites includes its use for the revegetation of surface coal mine sites in the eastern USA (e.g. Carter & Ungar, 2002).

It has often been stated that *L. cuneata* is valuable for wildlife (see Gucker, 2010), although some of this information appears to be anecdotal. Schneider *et al*. (2006) found the species to be an important year-round food source for reintroduced elk (*Cervus elaphus*) foraging on restored mine spoil in South-Eastern Kentucky. *L. cuneata* has been recommended as a food source for the northern bobwhite quail (*Colinus virginianus*), although one study found that birds fed *L. cuneata* experienced 'critical' weight losses, and that it would be unlikely to sustain birds during severe winter conditions (Newlon *et al*., 1964). Unger *et al.* (2015) used radio-tracking to determine habitat use by northern bobwhite on a reclaimed coal mining site and found that *L. cuneata* stands were frequently used; however, these authors still recommended that *L. cuneata* control could be beneficial, partly due the suppressive effect of the species on native plants that are of higher nutritional value to the birds. Many authors agree that, in general, the wildlife value of *L. cuneata* is low (Vogel, 1981; Ohlenbusch *et al*., 2001).

PATHWAYS FOR MOVEMENT

The species is named in horticultural floras (e.g. Cullen, 1995) for the EPPO region and may be grown on a small scale and be available from horticultural suppliers. The species is also utilized as a forage species outside of the EPPO region and could be imported into the region for this purpose in the search for new protein plants in the future.

Although there is no published evidence of *L. cuneata* being transported as part of hay material from the USA, there is evidence that hay is imported into the EU (EPPO, 2018) and potentially seed of *L. cuneata* may be included.

IMPACTS

Effects on plants

All impacts described are from the USA. *L. cuneata* can thrive under a variety of conditions, crowding out native species in natural areas. The species forms dense stands in areas where it invades, reducing light availability and potentially increasing competition for soil water (Eddy & Moore, 1998; Allred *et al*., 2010). Eddy & Moore (1998) showed that invasions of *L. cuneata* into oak savannahs in South-Eastern Kansas reduced native species richness. For example, the number of native grass species decreased from 12 to 4 and native forb species declined from 27 to 8. There were also significant impacts on the numbers of invertebrate species found, and on the total biomass of native plant species. Peters *et al.* (2015) highlight that the bobwhite quail has low summer survival in areas dominated by *L. cuneata*.

Impacts on native plant diversity have also been identified in old fields; Brandon *et al.* (2004) found the species to suppress native plants, possibly through shading effects. Brandon *et al.* (2004) concluded that the species 'can subsequently take over grassland communities'. *L. cuneata* may also have impacts on native plant communities through allelopathic effects. Allelopathic chemicals have been found to reduce the performance of native grass species by up to 60% (Dudley & Fick, 2003). Positive and negative effects on small mammal diversity and abundances in response to different levels of *L. cuneata* cover have also been reported (Howard, 2003). Nitrogen-fixing bacteria have been shown to benefit *L. cuneata*, enabling its growth in nutrient-poor conditions (Brandon *et al* ., 2004; Houseman *et al.*, 2014); thus, an additional impact on ecosystem processes is the potential for the species to increase soil nitrogen levels in invaded habitats.

Environmental and social impact

L. cuneata can replace more palatable forage species in some systems. High tannin levels in old plants can have a negative impact on cattle and horses. *L. cuneata* has the potential to disrupt pollination networks as the species has been shown to attract more pollinators than co-occurring native species (Woods *et al.*, 2012). *L. cuneata* can alter nutrient cycling and soil microbial communities.

CONTROL

Ohlenbusch *et al.* (2001) provide an overview of control measures for *L. cuneat*a, emphasizing that, as with most invasive alien plants, 'early detection, isolation of infested areas, and control of individual plants with approved herbicides' offer the best approach. Integrated approaches to control are recommended for established stands, with the primary goal of reducing year-on-year seed production; these would typically include mixed combinations of grazing, burning and herbicide applications (see Ohlenbusch *et al.*, 2001, for an example schedule). Ohlenbusch *et al.* (2001) note that conventional management practices of grazing and prescribed burning have not been effective in preventing the spread of *L. cuneata*; however, burning can improve the effectiveness of herbicides if applied to the regrowth the same year.

REGULATORY STATUS

In 2016, *L. cuneata* was identified as a priority for risk assessment within the requirements of Regulation 1143/ 2014 (Branquart *et al*., 2016; Tanner *et al*., 2017). A subsequent pest risk analysis concluded that *L. cuneata* had a moderate phytosanitary risk to the endangered area (OEPP/ EPPO, 2018) and was added to the EPPO A1 List of pests recommended for regulation. In 2019, *L. cuneata* was included on the (EU) list of Union concern (EU Regulation 1143/2014).

In the USA, the plant has been declared a noxious weed in Kansas (Ohlenbusch *et al*., 2001) and, more recently, Nebraska (see http://www.nda.nebraska.gov/plant/noxious_ weeds/index.html). In Colorado, the species is also listed as a noxious weed (https://plants.usda.gov/). In addition, the species is listed as a noxious weed in New York State (http://www.dec.ny.gov/docs/lands_forests_pdf/islist.pdf).

In Spain, *L. cuneata* was considered for inclusion in the 'black' list of the Real Decreto (Royal Decree) 630/2013. This is a list of potentially invasive species. Inclusion on this list means, among other things, that the introduction of the species listed is prohibited, and that necessary measures should be taken for management, control and eradication. However, the species was not included in the final legislation.

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