

field pennycress

Thlaspi arvense L.

Synonyms: *Teruncius arvensis* (Linnaeus) Lunell, *Thlaspi collinum* M. Bieb.

Other common names: bastard cress, fanweed, Frenchweed, mithridate mustard, pennycress, stinkweed

Family: Brassicaceae

Invasiveness Rank: 42 The invasiveness rank is calculated based on a species' ecological impacts, biological attributes, distribution, and response to control measures. The ranks are scaled from 0 to 100, with 0 representing a plant that poses no threat to native ecosystems and 100 representing a plant that poses a major threat to native ecosystems.

Description

Field pennycress is an annual or winter annual that grows from 15 to 55 cm tall. The plant has a slender taproot and fibrous lateral roots. It is glabrous or nearly glabrous and sometimes glaucous. Stems can be simple or, less frequently, freely branched. Basal leaves wilt early and are petiolated, oblanceolate, smooth to shallow-toothed, 1 to 5 cm long, and 4 to 23 mm wide. Stem leaves lack stalks and are oblong, 1.5 to 4 cm long, and 5 to 15 mm wide with ear-like lobes at the base and large-toothed to wavy margins. Flower stalks are spreading or slightly upcurved, 9 to 13 mm long, and slender. Each flower has four white, spatulate, 3 to 4 mm long petals that are broad at the tips. Fruits are flattened, oval to heart-shaped, 1 to 2 cm long, and 7 to 20 mm wide. They have deep notches at the tips and are divided in half by membranous walls. The plant has an unpleasant odor (DiTomaso and Healy 2007, eFloras 2008, Al-Shehbaz 2010, Klinkenberg 2010, NatureGate 2010).



Thlaspi arvense L. Photo by M.E. Harte.

Similar species: The non-native shepherd's purse (*Capsella bursa-pastoris*) is sometimes confused with field pennycress. Shepherd's purse has triangular pods and no odor, whereas field pennycress has distinctive pods, clasping upper leaves, smooth to shallow-toothed leaf margins on the lower leaves, and an unpleasant odor (DiTomaso and Healy 2007, NatureGate 2010).

Ecological Impact

Impact on community composition, structure, and interactions: Infestations of field pennycress have been shown to reduce wheat yields in cultivated fields in Canada and may reduce populations of native plants and increase the density of vegetation in disturbed and waste areas. However, it poses no threat to native vegetation in undisturbed areas (Best and McIntyre 1975, Holm et al. 1997, Otfinowski et al. 2007). Field pennycress is an alternate host for the nematode *Heterodera schachtii* and the fungus *Plenodomus lingam*, which infect many other brassicaceae as well. The seeds of field pennycress contain oil glucosides that cause digestive distress when eaten. Cattle that ingest field pennycress produce tainted milk (Best and McIntyre 1975, DiTomaso and Healy 2007)

Impact on ecosystem processes: Evidence from agricultural fields in Canada shows that infestations of field pennycress decrease the water and nutrients available to surrounding vegetation (Best and McIntyre 1975). Field pennycress is not likely to have ecological impacts in undisturbed areas (NAPPO 2003).

Biology and Invasive Potential

Reproductive potential: Field pennycress reproduces by seed only and is self compatible. On average, each plant produces 7,000 seeds. A single plant, however, is capable of producing as many as 20,000 seeds (Best and McIntyre 1975, Royer and Dickinson 1999, NAPPO 2003). Most seeds germinate within 9 years of being buried in soil, but a small proportion of seeds can remain viable for as long as 20 years. In Canada, 1,300 seeds per square meter were found in the upper layers of soil (Holm et al. 1997, NAPPO 2003, DiTomaso and Healy 2007).

Role of disturbance in establishment: Field pennycress

requires sparsely vegetated soil in disturbed areas or cultivated lands to germinate (Holm et al. 1997, NAPPO 2003). Infestations recorded in Alaska are associated with disturbances (AKEPIC 2010).

Potential for long-distance dispersal: Wind occasionally disperses seeds over long distances. The entire plant can be uprooted and blown by wind, to new locations. Seeds can be transported by sticking to fur or feathers and remain viable after being ingested by animals (Ridley 1930, Best and McIntyre 1975, Holm et al. 1997, NAPPO 2003).

Potential to be spread by human activity: Field pennycress has been identified as a contaminant in some wheat and flax commercial seed and some commercial animal feed. Seeds can also stick to muddy vehicles, machinery, livestock, and people. Livestock can spread viable seeds after ingestion. The spread of field pennycress is commonly associated with agricultural operations. The wide distribution of field pennycress appears to result more from it being a contaminant in crop seed than from dispersal by wind (Ridley 1930, Holm et al. 1997, NAPPO 2003, DiTomaso and Healy 2007).

Germination requirements: Seeds are most often non-dormant but can become dormant under environmental conditions unfavorable to germination. In general, seeds germinate best in temperatures alternating between 50°F and 77°F. Light and scarification of the seed coats improve germination. Some seeds, however, can germinate in darkness. Most seeds germinate from mid-April to mid-May although a sizable portion germinates in the fall (Best and McIntyre 1975, NAPPO 2003).

Growth requirements: Field pennycress grows well on most soil types in dry or wet habitats. It is shade intolerant. Field pennycress grows well at sea level and has been documented growing as high as 2,739 m in Colorado. As a winter annual, field pennycress overwinters as a basal rosette and is insulated from cold temperatures by snow (Best and McIntyre 1975).

Congeneric weeds: Roadside pennycress (*Thlaspi alliaceum*) grows as a non-native weed in Delaware, Indiana, Kentucky, Louisiana, Maryland, North Carolina, Ohio, Pennsylvania, and Tennessee. It is native to Eurasia but is not listed as a noxious weed in any state (USDA 2010).

Legal Listings

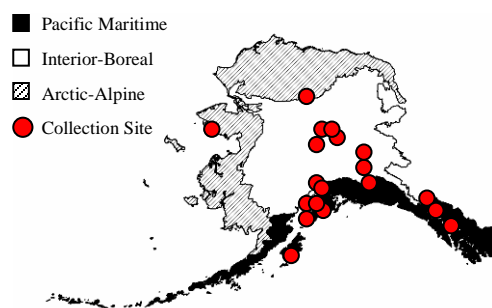
- Has not been declared noxious
- Listed noxious in Alaska
- Listed noxious by other states (listed as restricted noxious weed seed in Michigan)

- Federal noxious weed
- Listed noxious in Canada or other countries (MB, QC, SK)

Distribution and Abundance

Field pennycress is a primary colonizer of disturbed areas. Infestations occur in disturbed areas and agricultural fields over a range of different soil types and environmental conditions (NAPPO 2003). It is a common annual weed in agricultural fields (Best and McIntyre 1975, NatureGate 2010).

Native and current distribution: Field pennycress is native to Eurasia. It was common around Detroit in 1818 and found throughout the U.S. by 1937. It was once cultivated as an oil crop and now occurs as a major weed in 30 different crops. It is problematic as an agricultural weed in both the U.S. and Canada and is cosmopolitan in its current range (Best and McIntyre 1975, Holm et al. 1997, DiTomaso and Healy 2007, Al-Shehbaz 2010). Field pennycress has been documented from all three ecogeographic regions of Alaska (Hultén 1968, AKEPIC 2010, UAM 2010).



Distribution of field pennycress in Alaska

Management

Field pennycress is an annual plant and can be controlled by hand pulling before seed production, however this treatment must continue until the seed bank is exhausted (DiTomaso and Healy 2007). Herbicide applications have had mixed results in controlling field pennycress infestations in agricultural fields in Canada. Multiple herbicide applications per growing season may be necessary for chemical control methods to be effective (Holm et al. 1997). In some areas, control may not be necessary as field pennycress will naturally be replaced by native species in the absence of further disturbance (Best and McIntyre 1975).

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