Fabaceae—Pea family

Caragana arborescens Lam.

Siberian peashrub

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Synonym. *Caragana caragana* Karst.

Other common names. caragana, pea-tree.

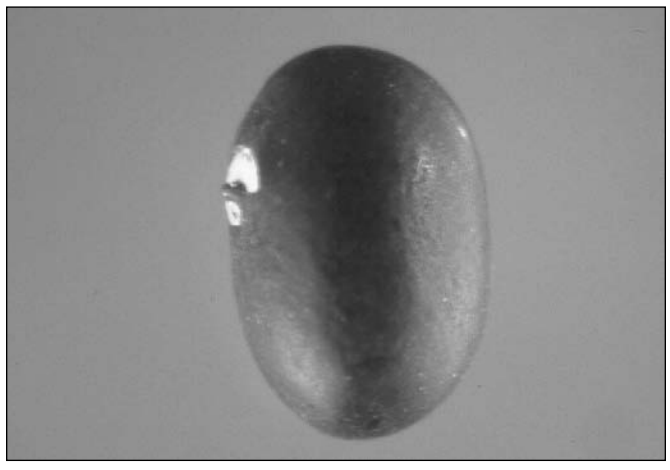
Growth habit, occurrence, and use. Siberian peashrub—*Caragana arborescens* Lam.—is one of the most hardy small deciduous trees or shrubs planted on the northern Great Plains (George 1953; Rehder 1940). Introduced into North America in 1752 (Rehder 1940), Siberian peashrub is native to Siberia and Manchuria and occurs from southern Russia to China *(Graham 1941)*. Varieties include the dwarf (*C. a. nana* Jaeg.) and Lorberg (*C. a. pendula* Carr.) peashrubs (Kelsey and Dayton 1942). The species readily adapts to sandy, alkaline soil and open, unshaded sites on the northern Great Plains, where it grows to heights of 7 m. It has been planted extensively for shrub buffer strips and windbreaks on farmlands and for hedges and outdoor screening in many towns and cities of the upper mid-West (Dietz and Slabaugh 1974; George 1953). It was also planted for wildlife and erosion control in the Great Lakes region (Graham 1941) and for deer-range revegetation programs in the Black Hills of South Dakota (Dietz and Slabaugh 1974). It is now considered invasive.

Flowering and fruiting. The yellow bisexual flowers appear from April to June. The fruit is a legume (pod) that measures 2.5 to 5 cm (figure 1) and contains about 6 reddish-brown, oblong to spherical seeds 2.5 to 4.0 mm in diameter (Lindquist and Cram 1967; Ross 1931) (figures 2 and 3). Fruits change in color to amber or brown as they ripen from June to July (Rehder 1940). Seed dispersal is usually completed by mid-August in most areas on the Great Plains. Shrubs take about 3 to 5 years to reach commercial seed-bearing age, and good crops occur nearly every year (Dietz and Slabaugh 1974).

Collection of fruits. The optimum seed collection period for Siberian peashrub is less than 2 weeks—usually in July or early August. Because the fruits begin to split open and disperse the seeds as soon as they are ripe, the legumes should be gathered from the shrubs by hand as soon as the first ones begin to open (Dietz and Slabaugh 1974).

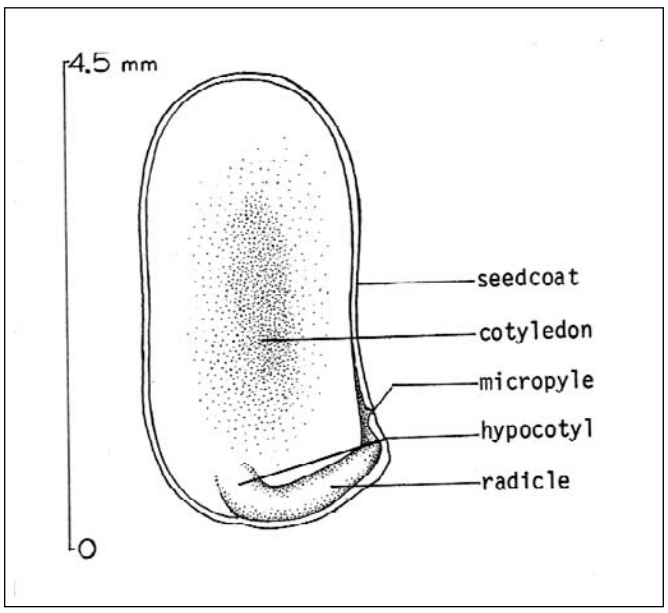
Figure 1—*Caragana arborsecens*, Siberian peashrub: legume.

Figure 2—*Caragana arborsecens*, Siberian peashrub: seed.



Extraction and storage of seeds. The legumes should be spread out to dry in a protected area until they pop open. The seeds can then be extracted easily by light maceration or beating. Legume fragments and other trash can be removed with aspirators, air-screen cleaners, or fanning mills. The average number of cleaned seeds per weight ranges from 28,700 to 48,500/kg (13,000 to 22,000/lb), with a purity of 97 to 100% (Dietz and Slabaugh 1974). A yield

Figure 3—*Caragana arborsecens*, Siberian peashrub: longitudinal section through a seed.



of 13 to 20 kg of seeds/100 kg (13 to 220 lb/100 lb) of fresh legumes has also been reported.

Seeds of Siberian peashrub, like those of other legumes, are orthodox in storage behavior. Studies in Canada have shown that the seeds remain viable for at least 5 years when stored dry at room temperatures. Germination of seedlots stored this way was 94% after 1 and 2 years and 93% after 5 years (Cram 1956). For the best long-term storage, seeds should be stored dry in polyethylene bags (or other sealed containers) at –18 to 4 °C, with a moisture content between 9.6 and 13.5% (Lindquist and Cram 1967).

Pregermination treatments and germination testing. For a leguminous species, Siberian peashrub does not have a very impermeable seedcoat. Untreated seeds will germinate in 15 days after sowing, but the best germination (87 to 100% in 5 days) can be obtained by soaking seeds for 24 hours in cold or hot (85 °C) water (Dirr and Heuser 1987). Successful germination has also been reported after acid scarification, cold stratification for 2 weeks, or fall planting (Dietz and Slabaugh 1974; Dirr and Heuser 1987; Hamm and Lindquist 1968; Lindquist 1960). Certain pesticides, such as captan and thiram, can apparently increase germination, possibly by inhibiting seed-borne disease (Cram 1969). The official testing prescription for Siberian peashrub seeds calls for clipping or filing through the seedcoat on the cotyledon end, soaking these seeds in water for 3 hours, then germinating them for 21 days at alternating temperatures of 20/30 °C (ISTA 1993). Germination tests have also been carried out in flats of sand or perlite and in Jacobsen germinators for 14 to 60 days at the same alternating temperatures (Dietz and Slabaugh 1974; Hamm and Lindquist 1968). Germination after 25 to 41 days averaged 45 to 72%, and 55 to 100% after 60 days (Dietz and Slabaugh 1974).

Nursery practice. Seeds of Siberian peashrub may be drilled or broadcast in late summer or spring. In a North Dakota nursery, Siberian peashrub is seeded during the last week in July or the first week in August. A cover crop of oats is seeded between the tree rows early enough to give winter protection. The shrubs are large enough to dig the following fall (Dietz and Slabaugh 1974). Many nurseries recommend drilling 80 to 160 seeds/m (25 to 50/ft) at 6, 9, or 12 mm ($^1/_4$ to $^1/_2$ in) depth; percentages of seeds growing into seedlings have varied from 35 to 50 (Dietz and Slabaugh 1974; Lindquist and Cram 1964).

Grading seeds for size has greatly increased the percentage of plantable seedlings. To be plantable, seedlings should be 30 cm (12 in) or more in height at the time of lifting. Only 87% of the seedlings grown from seeds measuring 2.5 mm in diameter were plantable, whereas 77% of seeds measuring 4.0 mm in diameter were plantable (Lindquist and Cram 1967). Inoculation of seeds with *Rhizobium* ssp. before sowing has been recommended (Wright 1947), but other workers report no significant effect on 1+0 seedlings (Cram and others 1964). Commercial nurseries have recommended anywhere from 1+0 to 3+0 stock for outplanting (Dietz and Slabaugh 1974).

Spraying to control insects in the nursery may be necessary. Grasshoppers are especially destructive to Siberian peashrub, sometimes completely defoliating the plants (Kennedy 1968). Plants have also been extensively damaged by deer browsing.

Vegetative propagation of Siberian peashrub is also possible. Untreated cuttings taken in late July rooted 80% in sand, whereas cuttings taken earlier (May to June) responded well to indole-butyric acid (IBA) in talc (Dirr and Heuser 1987).

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