

rugosa rose *Rosa rugosa* Thunb.

Synonyms: *Rosa ferox* Lawrence, *R. pubescens* Baker., *R. rugosa* Thunb. forma *alba* Rehder, *R. rugosa* var. *albiflora* Koidz.

Other common names: Japanese rose, rugose rose, Sitka rose, Turkestan rose

Family: Rosaceae

Invasiveness Rank: 72 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

Rugosa rose is a many-stemmed, erect shrub with extensive, woody rhizomes that grows up to 2 m tall. Mature plants form dense thickets by vegetative reproduction. Stems and branches are armed with thick prickles. Larger prickles are hairy at the base. Leaves are alternate, 5 to 13 cm long (including the petioles), and compound with five, seven, or nine leaflets each. Leaflets are elliptic to obovate, toothed, 1.5 to 5 cm long, and 1 to 3 cm wide with many concave veins that impart a wrinkled (or rugose) appearance. The upper surface of leaflets is dark green, shiny, and glabrous while the lower surface is grey-green and hairy. Pedicels are hairy. Flowers are single or in small groups, axillary, 4 to 9 cm in diameter, with five to many petals and five sepals each. They are pink or sometimes white. Numerous, small, single-seeded fruits are enclosed by the hips (hypanthia). Hips are dark red, spherical, glabrous, smooth, 1.5 to 2 cm long, and 2 to 2.5 cm wide with persistent, erect sepals. Seeds are ovoid and 2 to 6 mm long (Bruun 2005, eFloras 2008, NatureGate 2010).



Flowers of *Rosa rugosa* Thunb. Double variety pictured.



Leaf of *Rosa rugosa* Thunb. with nine leaflets.

Similar species: Three native *Rosa* species grow in Alaska and could be confused with rugosa rose. Prickly rose (*Rosa acicularis*) can be found in Southcentral Alaska, the Interior-Boreal ecogeographic region, and parts of the Arctic-Alpine ecogeographic region; Nootka rose (*Rosa nutkana*) can be found in Southeast Alaska; Woods' rose (*Rosa woodsii*) can be found in the Interior-Boreal ecogeographic region. Similar to rugosa rose, these native species can also form thickets and spread from extensive rhizomes. Prickly rose can be distinguished from rugosa rose by its slightly smaller flowers (3.5 to 5 cm in diameter), sparsely hairy lower surfaces on the leaflets, and the presence of bristles and thin, needle-like prickles rather than thick prickles. Nootka rose can be distinguished from rugosa rose by the presence of few, short, flattened prickles on its stems and branches or by the lack of prickles on the upper parts. Unlike rugosa rose, Woods' rose has leaflets that are glabrous on both sides, pedicels that are glabrous, and pairs of prickles mostly at the bases of the leaves and at the internodes (Hultén 1968, eFloras 2008, Klinkenberg 2010).

Ecological Impact

Impact on community composition, structure, and

interactions: Rugosa rose can increase the density of coastal shrubs due to its dense growth habit. In Denmark, rugosa rose spread on coastal heath from a few infestations to cover a contiguous area of 35,000 square meters (Bruun 2005). It may decrease or eliminate the lower vegetation layers by reducing the amount of light available to native plant species (Weidema 2006, Isermann 2008). Nearly monospecific infestations of rugosa rose cause significant declines in species diversity in coastal dunes in Europe (Essl 2006, Isermann 2008). Rugosa rose threatens the rare species Spanish catchfly (*Silene otites*) and Carthusian pink (*Dianthus carthusianorum*) on the North Frisian island of Amrum (Bruun 2005). In Sweden, the native species sea holly (*Eryngium maritimum*) is also endangered by invasions of rugosa rose (Gren et al. 2007). Although rugosa rose does not appear to disperse well in Alaska, it has the potential to displace surrounding vegetation once established (Rapp pers. obs.). Rugosa rose is insect pollinated (Weidema 2006), and its presence may alter native plant-pollinator interactions. In Europe, insects that feed on native *Rosa* species also feed on rugosa rose, with rugosa rose becoming the preferred food source in some cases. Birds and small mammals eat the hips (Bruun 2005, Weidema 2006). Only juvenile plants are grazed and browsed by large mammals. Rugosa rose provides additional hosts to wasp species that cause galls on native *Rosa* species. A variety of parasites and diseases affect this species. The roots form mycorrhizal associations. In its native range, rugosa rose forms hybrids with prickly rose (*Rosa acicularis*) (Bruun 2005). It may hybridize with native *Rosa* species, including prickly rose, in Alaska.

Impact on ecosystem processes: Rugosa rose may increase the concentrations of some nutrients in the top soil layer in coastal habitats. It has deep roots that reach lower soil layers to take up nutrients. Nutrients are then redistributed to the surface in the dense organic litter created by this species (Vanderhoeven et al. 2005, Dassonville et al. 2008). Rugosa rose stabilizes its substrate and prevents erosion (Weidema 2006). The establishment of rugosa rose creates conditions favorable to the establishment of other non-native species (Weidema 2006).

Biology and Invasive Potential

Reproductive potential: Rugosa rose can reproduce vegetatively from rhizomes to form large, dense stands (Bruun 2005, Weidema 2006, USDA 2010). Seed production of dense stands in the Russian Far East has been measured from 600 to 1,300 seeds per square meter (Bruun 2005). Seed banks are transient (Kollmann et al. 2009). Quantitative data on the amount of time for which seeds remain viable is not available.

Role of disturbance in establishment: In northeastern Asia, rugosa rose grows on stabilized dunes, rocky shores, and coastal meadows. It grows well in similar

habitats where it is naturalized, and it establishes in naturally disturbed or sparsely vegetated areas where bare sand is present (Bruun 2005, Weidema 2006). Disturbances increase the emergence and survival of seedlings, but the establishment of rugosa rose is not limited to disturbed areas (Kollmann et al. 2007). Most recorded infestations in Alaska are associated with fill importation along roads (AKEPIC 2010), but rugosa rose has been observed moving into natural areas in the Gustavus forelands (Rapp pers. obs.). In Anchorage, Alaska, rugosa rose has been found along coastal trails (Cortés-Burns and Flagstad 2009).

Potential for long-distance dispersal: Rugosa rose has been found on isolated Scandinavian islands where direct human dispersal is improbable. Both the seeds and the hips are buoyant and thus can be dispersed by water. Hips can float for 40 weeks, and seeds can float for several weeks. Seeds can germinate even after floating in salt water for weeks. Seeds can be dispersed long distances by birds after being ingested. They are also occasionally dispersed short distances by small mammals after being ingested. Rhizomes can float to new locations and establish new populations (Bruun 2005, Weidema 2006).

Potential to be spread by human activity: Rugosa rose is a commonly planted ornamental that frequently escapes cultivation (Bruun 2005, Weidema 2006, Klinkenberg 2010). It has been cultivated in Southeast Alaska since the early 20th Century (Gardner 1968), and it has naturalized near many homes in Gustavus, AK (Rapp 2006). In Denmark, infestations are significantly more common near roads, tracks, and houses (Jørgensen and Kollmann 2009).

Germination requirements: In each hip, 84% to 94% of the seeds are viable. Seeds have both physical and physiological dormancy. The pericarp, a fruit wall surrounding the seed, restricts the amount of water that reaches the seed and acts as a physical inhibitor of germination. Five weeks to several months of cold stratification breaks physiological dormancy. Scarification increases the germination of seeds that have not been subjected to cold stratification. The hips contain germination inhibiting substances; seeds that dry in the hips have stronger dormancy than fresh seeds or seeds that dry outside the hips (Bruun 2005).

Growth requirements: Rugosa rose often grows on sand and gravel but can also grow on other well-drained soils with pH between 4.7 and 7.7. Rugosa rose is tolerant of saline conditions, heat, frost, and drought and is well adapted to growing in coastal habitats. Plants resprout from the extensive rhizomes after burning the aboveground growth (Bruun 2005).

Congeneric weeds: Multiflora rose (*Rosa multiflora*) is considered a noxious species in AL, CT, IA, IN, KS, KY, MA, MD, MO, NH, OH, PA, SD, WV, and WI (Invaders 2010, USDA 2010).

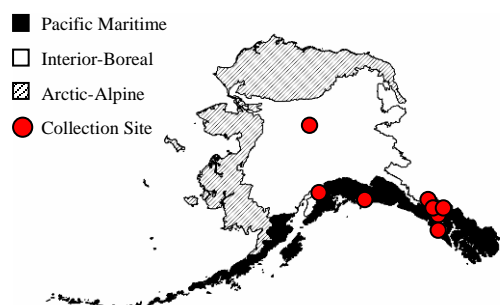
Legal Listings

- Has not been declared noxious
- Listed noxious in Alaska
- Listed noxious by other states (considered potentially invasive, but not banned, in Connecticut)
- Federal noxious weed
- Listed noxious in Canada or other countries (considered invasive in much of Northern Europe and Scandinavia)

Distribution and Abundance

Rugosa rose is a commonly cultivated garden ornamental (Klinkenberg 2010). In the Brandenburger region of Germany, rugosa rose was cultivated for more than 100 years before becoming invasive, and this species has exhibited a similar, although shorter, lag phase in other areas of Northern Europe as well (Weidema 2006). It has been cultivated in Southeast Alaska since the early 20th Century (Gardner 1968). Rugosa rose grows on coastal dunes, rocky shores, coastal meadows, disturbed areas, and roadsides in its native and non-native ranges (Bruun 2005, Klinkenberg 2010, NatureGate 2010).

Native and current distribution: Rugosa rose is native to northeastern Asia. It has been introduced to Europe and North America. This species has been documented from Tromsø in arctic Norway. It is considered most problematic in northern latitude coastal communities in northern Germany, Denmark, Sweden, Norway, and Finland; it is not considered highly invasive in Ireland (Bruun 2005, Weidema 2006). Rugosa rose grows in Eastern Canada and 21 states of the U.S. (USDA 2010). It has been documented from the Pacific Maritime and Interior-Boreal ecogeographic regions of Alaska (AKEPIC 2010, UAM 2010).



Distribution of rugosa rose in Alaska

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Management

Controlling infestations of rugosa rose can be difficult, labor-intensive, time-consuming, and expensive. The cost of controlling problematic infestations in Sweden was predicted to be the U.S. equivalent of \$177,600 to \$2,150,000 (based on the average exchange rate for 2007) per year (Gren et al. 2007). Coastal infestations can be reduced by not planting this species near coastal areas (Weidema 2006). Small plants can be pulled out (Kaufman and Kaufman 2007). Mowing or cutting several times per growing season can reduce the vitality of infestations for a short period of time. Digging is the most effective control method, although it is labor-intensive for large populations. Manual control measures must be repeated where plants regenerate from rhizome pieces. In Finland, an infestation was successfully controlled by removing all soil with an excavator to the depth of rooting and then revisiting the site to dig up plants regenerating from rhizome fragments later in the season (Bruun 2005). Uprooting the plants followed by burying the controlled area has proven moderately successful. While burial decreases the number of resprouting plants, it does not preclude the need to revisit controlled sites to dig up resprouts (Kollmann et al. 2009). Digging combined with herbicide applications has also proven effective. Glyphosate herbicides applied in late summer may damage rhizomes and roots (Bruun 2005, Weidema 2006). Several insect and fungi species have been suggested as potential biological control agents, although it has been noted that the impact of potential biological control agents on native *Rosa* species is unknown (Bruun 2006).

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