

Rosaceae—Rose family

Physocarpus (Camb.) Raf.

ninebark

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Growth habit, occurrence, and use. The genus *Physocarpus* includes about 6 species of deciduous, spiraea-like shrubs with exfoliating bark, alternate and lobed leaves resembling *Ribes*, and small white to pinkish flowers in corymbs. The common name, ninebark, probably refers to the use of the plant in a number of medicinal cures (Stokes 1981) or the numerous layers of bark that peel off (Strausbaugh and Core 1978). Five species are native to North America, and one is introduced from Asia (table 1). Three subspecies of dwarf ninebark—*P. alternans* subspecies *alternans*, *P. alternans* subspecies *annulatus* J.T. Howell, and *P. alternans* subspecies *panamintensis* J.T. Howell—are recognized (USDA 2001). Although the genus is not wide-spread, certain species may be locally abundant because of root sprouting. Atlantic ninebark and common ninebark, 2 varieties of *P. opulifolius*—the specific epithet refers to *Viburnum opulus*, an introduced species from Europe (Stokes 1981)—are the most common species in the eastern United States and are found along streams, riverbanks, and moist hillsides. Atlantic ninebark grows to 1.5 m, whereas common ninebark may be twice that height. A dense, compact cultivar of Atlantic ninebark named 'Nugget' produces golden yellow foliage in the spring that matures to orange-bronze (Higginbotham 1990). Of the western species, dwarf ninebark is found mostly in rocky canyons and low-elevation forests of California and grows to 1 m in height; mountain ninebark is found from foothill forests to mountain tops of the central and southern Rocky Mountains and grows to 1 m in height; mallow ninebark is found in rocky

canyons and low-elevation open forests throughout the Rocky Mountains and grows to 2 m; and Pacific ninebark is found in moist to wet lowlands or foothills mostly west of the Cascade Range and grows to 3 m. A prostrate and rhizomatous cultivar of Pacific ninebark named 'Tilden Park' grows to a height of 1.5 m (Straley 1989).

Ninebark species and cultivars generally are hardy, do best in full sunlight or thin shade, and tolerate a wide variety of soil types (Krüssmann 1985). They are used primarily as ornamentals in landscaping or for watershed protection. Most of the species have been cultivated in the United States for nearly 100 years (table 1). In the wild, mallow ninebark sprouts prolifically from the root crown after spring and fall fires (Lea and Morgan 1993). Although the genus is reported to be remarkably free from insects and diseases (Everett 1981; Gill and Pogge 1974), at least 17 flower-eating, 63 leaf-and-stem-eating, and 4 seed-eating insects have been identified on common ninebark, including the flower-specialist mirids *Plagiognathus punctatipes* Knight and *Psallus physocarpi* Henry and seed-specialist torymids *Megastigmus gahani* Milliron and *M. physocarpi* Crosby (Wheller and Hoebeke 1985).

Flowering and fruiting. Flowers are complete, regular, and clustered together in terminal corymbs consisting of a few in mountain and mallow ninebarks, 3 to 6 in dwarf ninebark, and many in Pacific and common ninebarks. Flowers are from 0.5 to 1 cm in diameter, the corolla mostly white, sometimes pinkish to light pink in Pacific and mountain ninebarks. The five sepals are densely stellate pubescent to tomentose, except in Pacific ninebark, where they are sometimes glabrous (Krüssmann 1985). Flowers of Pacific ninebark appear in April through June, those of mountain ninebark appear in May through June, and those of mallow and common ninebarks in June.

The fruits are small, firm-walled, inflated follicles; the generic name *Physocarpus* is derived from the Greek *physis* (bladder or bellows) and *karpos* (fruit), referring to the bladder-shaped follicles (Stokes 1981). Follicles range in size from 5 mm in dwarf ninebark to 11 mm in Pacific ninebark. They are solitary in dwarf ninebark and sometimes mountain ninebark; paired in mallow ninebark and sometimes mountain ninebark; and number 3 to 5 in *P. amurensis*, Pacific, common, and Atlantic ninebarks. When mature, the follicles tend to be brown, reddish, or coppery in color, glabrous in common ninebark and sometimes Pacific ninebark, otherwise stellate-pubescent. Follicles burst open at both sutures when mature. They seldom fall of their own weight but are easily dislodged by wind or snow. Some fruits may persist until the end of

winter (Gill and Pogge 1974). Each follicle may contain several seeds, which are shiny and pyriform (figures 1 and 2). Seed ripening is indeterminate and does not always result in good fill (Link 1993).

Collection, extraction, and storage. Ripe fruits can be picked from the shrubs or shaken onto dropcloths, dried either naturally or with artificial heat, and then threshed with a hammermill, and cleaned. Seeds of common and Atlantic ninebark are extracted by dry maceration followed by hand-screening to remove debris and follicle fragments (Yoder 1995). Yields are about 1,650 clean seeds/g (46,800/oz) for mallow ninebark (Link 1993), 1,550 clean seeds/g (43,750/oz) for Pacific ninebark (USDA 2001), and 1,000 to 3,650 clean seeds/g (28,350 to 103,500/oz) for common ninebark (Gill and Pogge 1974). Viability is usually less than 50%. The seeds are orthodox and may be stored for at least 5 years when cool and dry (Link 1993).

Nursery practices. Mallow ninebark seeds may be planted in the fall or planted in the spring after 30 days of prechilling (Link 1993). Seeds of common ninebark and Atlantic ninebarks are sown in raised beds either in the fall or in the spring after 60 days of prechilling (Yoder 1995). Seeds are mixed one part seeds to three parts (by volume) dry, sifted sawdust to provide bulk and facilitate even distribution; sown at a depth of about 3 mm; and mulched with a layer of sawdust about 6 mm (¼ in) thick (Yoder 1995). The ninebarks are easily propagated by softwood cuttings planted under mist, or hardwood cuttings planted in the field (Everett 1981; Dirr and Heuser 1987).

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Figure 1—*Physocarpus opulifolius*, common ninebark: follicles (above), H2; seeds (below), H 20.

Figure 2—*Physocarpus malvaceus*, mallow ninebark: longitudinal section through a seed, H 25.

Table 1—*Physocarpus*, ninebark: nomenclature, occurrence, and first cultivation

Scientific name & synonyms	Common name	Occurrence	First cultivated
<i>P. alternans</i> (M.E. Jones) J.T. Howell <i>Neillia monogyna</i> var. <i>alternans</i> Jones <i>Opulaster alternans</i> Heller	dwarf ninebark	California to Nevada	—
<i>P. amurensis</i> (Maxim.) Maxim. <i>Spiraea amurensis</i> Maxim.	—	Manchuria & Korea	1856
<i>P. capitatus</i> (Pursh) Kuntze <i>Spiraea capitatus</i> Pursh	Pacific ninebark	Alaska, British Columbia, Montana, south to California	1827
<i>P. malvaceus</i> (Greene) Kuntze <i>Neillia malvacea</i> Greene <i>Opulaster malvaceus</i> (Greene) Kuntze ex Rydb. <i>Opulaster pauciflorus</i> (Torr. & A. Gray) Heller <i>Opulaster pubescens</i> Rydb. <i>P. pubescens</i> (Torr. & A. Gray) Piper <i>P. pubescens</i> (Rydb.) A. Nels. <i>P. pauciflorus</i> Piper <i>Spiraea opulifolia</i> L.	mallow ninebark	British Columbia to Montana, south to Oregon, Utah, & Wyoming	1897
<i>P. monogynus</i> (Torr.) Coult. <i>Opulaster hapmanii</i> Rydb. <i>Opulaster monogynus</i> Kuntze <i>P. torreyi</i> (S. Wats.) Maxim.	mountain ninebark	South Dakota to Texas, Arizona, Nevada	1889
<i>P. opulifolius</i> (L.) Maxim. <i>Opulaster alabamensis</i> Rydb. <i>P. missouriensis</i> Daniels <i>P. ramaleyi</i> A. Nelson <i>O. australis</i> Rydb. <i>O. opulifolius</i> (L.) Kuntze <i>O. stellatus</i> Rydb. <i>Spiraea opulifolia</i> L.	common ninebark	Maine to Minnesota, S to Tennessee & Florida	1687
<i>P. opulifolius</i> (L.) Maxim. var. <i>intermedius</i> (Rydb.) Robins. <i>Opulaster intermedius</i> Rydb. <i>P. intermedius</i> (Rydb.) Schneid.	Atlantic ninebark	Quebec to North Dakota, S to Colorado, Arkansas, & Missouri	1908