TECHNICAL NOTES

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PLANT MATERIALS No. 28

DESCRIPTION, USE AND ESTABLISHMENT OF PACIFIC SERVICEBERRY

***Amelanchier alnifolia* (Nutt.) Nutt. ex M. Roemer var. *semiintegrifolia* (Hook.) C. L. Hitchc.**

plant symbol = AMALS

Introduction

Pacific serviceberry has been referred to in the literature by several different scientific names, including *Amelanchier florida*, *Amelanchier alnifolia*, and currently, as a variety of *Amelanchier alnifolia*. The infomation contained in this document refers specifically to Pacific serviceberry (as a variety of *Amelanchier alnifolia*) only when so stated. Synonyms of Pacific serviceberry include *Amelanchier alnifolia* spp. *florida* and *Amelanchier florida* (USDA Natural Resources Conservation Service 1999).

Description

Pacific serviceberry occurs west of the Cascade and Sierra Nevada Mountain ranges, from British Columbia south to central California (USDA Forest Service 1974). It may be found in open woods, along canyons, or on hillsides, from near sea level to subalpine altitudes (Anonymous 1976). This cool season species is a thicket-forming shrub or small tree 3-12 meters tall with smooth brown bark, slender branches, and oblong leaves sharply and coarsely toothed along the upper margin (Elias 1980). For *Amelanchier alnifolia*, a typical ramet is comprised of long shoots and short shoots; only short shoots bear fruit. Floral buds are formed in the first season on branches at least one-year-old, and fruit develops the following season (St. Pierre and Steeves 1990). Clusters of perfect white flowers appear in spring before leaves, and dark purple to black berrylike pomes are produced in mid- or late summer (USDA Forest Service 1974). It is primarily self pollinated but may be cross-pollinated via insects or wind (Davidson and Mazza 1991; Olson 1984). Recent studies show basic chromosome number is n=17; there are diploid (2n=34) as well as tetraploid plants (4n=68) (Pruski and others 1991). The fruit contains 4-10 dark brown seeds with leathery seed coats (USDA Forest Service 1974). This species may not flower and reproduce before 10 years or longer, especially on harsh sites (Wasser and Shoemaker 1982).

Cultivars and Improved Materials (and area of origin)

Currently, no cultivars of Pacific serviceberry have been developed. The development of saskatoon serviceberry [(*Amelanchier alnifolia* (Nutt.) Nutt. ex M. Roemer] cultivars has been slow, occurring over many years (Davidson and Mazza 1991). The most important of these cultivars have been selected from wild populations, although some hybridization has resulted in commercially acceptable varieties (Davidson and Mazza 1991; Wilson 1993). Improved fruit quality and a better growth habit have been the result. Notable cultivars and improved materials include 'Altaglow' (Alberta), 'Smoky' (Alberta), 'Pembina' (Alberta), 'Forestberg' (Alberta), 'Northline' (Alberta), 'Thiessen' (Saskatchewan), 'Honeywood' (Saskatchewan), and 'Regent' (MN).

Uses

Cultural: *Amelanchier alnifolia* has a long history of use by native populations and early settlers of the Pacific Northwest. The berries were eaten raw or cooked or dried and stored. Dried berries were often mixed with dried vegetables or meat or cooked in soups or puddings. Cakes of dried berries were a common trading item (Gunther 1995; Turner and others 1990.) The wood is hard and was used for combs, digging sticks, firedrills, arrows, tool handles, hoops, and spreaders. Decoction of stems, twigs (bark), leaves, and berries were used as medicine (Turner and others 1990).

Ornamentals: Pacific serviceberry may be used effectively in naturalized plantings and as hedges, windbreaks, or screens in urban areas (Flessner and others 1992). As stated above, several cultivars of saskatoon serviceberry are available for ornamental plantings and commercial fruit production in North America. Many of these cultivars and ecotypes originated in western Canada and the northern region of the United States. The named varieties have larger, sweeter, and juicier fruits than their wild relatives and are used to make jams, jellies, syrups, baked goods, candies, fruit leather, and wine. Commercial producers in Alberta, Sasketchewan, and Manitoba have established many acres of saskatoons and have developed a fresh and processed fruit cottage industry (Wilson 1993).

Wildlife: Deer, moose, and other mammals browse serviceberry, and its fruit are relished by several species of song and game birds (Elias 1980; Marks and Marks 1988). These shrubs are often used as cover for small mammals and birds.

Streambank and Riparian Restoration: Pacific serviceberry is an excellent candidate for streambank and riparian restoration in terms of erosion control and improved wildlife habitat as the species suckers readily and tolerates many types of soils (Dirr 1983; L. H. Bailey Hortorium 1976; Plummer and others 1968).

Plant Communities and Adaptation

Pacific serviceberry is reported as a component of *Quercus garryana*, prairie, mixed conifer, and *Pseudotsuga menziesii/Pinus contora/Berberis nervosa/Spirea betulifolia* plant communities (Franklin and Dryness 1973). The species is tolerant of most soil textures and occurs from near sea level to subalpine altitudes (Wasser and Shoemaker 1982). It is found on open, dry rocky slopes to partially shaded sites with moist, deep soils but prefers moist, well-drained, acid soil and full sun or partial shade (Dirr 1983; Wasser and Shoemaker 1982; Wilson 1993). *Amelanchier alnifolia* was reported to increase in frequency following fire, although canopy cover decreased, in one study (Anderson and Bailey 1980). Plants of *Amelanchier alnifolia* can even be grown in granitic mine spoil and produce reasonable growth, but not on pyritic spoil (Voeller and others 1998). This species is generally not tolerant of saline soils and high water tables (Wasser and Shoemaker 1982).

Propagation and Establishment

Amelanchier alnifolia reproduces naturally by stolons and seed. In nursery practice, cultivars may be propagated successfully by cold-moist stratification of dried seed, division, layering, root cuttings, grafting or budding, and tissue culture (Anonymous 1976b; Dirr 1983; Dirr and Heuser 1987; McDonald 1986; Nelson and Bishop 1980; USDA Forest Service 1974).

Seeding: Seed propagation can result in variability in select traits of 20-30% (Pruski and others 1991). Many growers use open-pollinated seedlings from named cultivars of saskatoon serviceberry for commercial orchard establishment as this species is difficult to vegetatively propagate by conventional means (Davidson and Mazza 1991). This method of establishment should be monitored and evaluated for variability, depending on targeted use of fruit.

It is important to note that usually a large percentage of seed collected from wild populations is infertile and insect-infested. Seed can be extracted from berries using a dull-bladed or rubber-bladed blender (Kabaluk and St. Pierre 1992). Once seed is separated from pulp and skin, they may be placed in a mixture of 1:1:1 peat-perlite-vermiculite and stratified (moist-chilled) at 4°C for 3-6 months (Kabaluk and St. Pierre 1992; USDA Forest Service 1974). Acid scarification (abrasion of seed coat) may reduce stratification length, although the acid concentration and duration of scarification must first be tested or evaluated for effectiveness. Prior to stratification, selecting medium-weight seeds may further reduce seed dormancy (Weber and others 1982). Some propagators have encountered severe fungal growth during cold stratification; using sterile conditions and adding fungicide to the media can reduce the fungal growth (McTavish 1986). Average germination percentages of cold-moist stratified seed range from 50 to 70%.

Once fresh seed is separated from the pulp and air-dried, the dry seed may be further cleaned using hand screens, a fanning mill, or air-screen machine (USDA Forest Service 1974; Wasser and Shoemaker 1982). Although seed quality for *Amelanchier alnifolia* has not been standardized, a minimum of 95% purity and 60% germination is desired (Wasser and Shoemaker 1982), and seeds per pound can range from 36,000 to 113,000 or a mean of 61,000 (Vories 1980). Air-dried seed of serviceberry may be stored in sealed containers with little decline in viability for 5 years (USDA Forest Service 1974). Many seeds do not germinate until the second spring.

In the nursery, the saskatoon serviceberry is seeded at the rate of 25 pure live seeds per foot of row (Wasser and Shoemaker 1982). This seeding rate may be reduced to obtain desired or original composition on sites being restored or improved. Unstratified seed is planted in late fall, and moist, pre-chilled seed is planted in spring, at a depth of approximately 0.6 centimeters (USDA Forest Service 1974; Wasser and Shoemaker 1982).

Cuttings: Reports of rooting success using softwood cuttings of *Amelanchier alnifolia* are variable (Bishop and Nelson 1980; Dirr 1983; Harris 1976; Pruski and others 1991). Timing of cutting and stage of growth of the mother shrub are important factors in rooting success (Bishop and Nelson 1980). Best results (95% rooting) were obtained using softwood cuttings taken from etiolated, field-grown, rejuvenated stock plants under intermittent mist without hormonal treatment (Nelson 1987). Summer rooted cuttings cease growth following rooting and exhibit poor winter survival (Harris 1976). Hormonal treatments in combination with other factors have been used to prevent this dormancy (Pruski and others 1991). Another study reported 80% rooting using 4-5 inch softwood cuttings from terminal stems with a basal dusting in talc of 0.8% IBA and placed in 100% perlite in a mist bench (Chong and others 1992). Bottom heat (70°F or 21°C) has been reported to improve rooting success in some cases (Bishop and Nelson 1980; Harris 1976).

Transplants or containerized stock should be planted in early spring (for harsh, cold sites) or fall (Wasser and Shoemaker 1982). Planting material should be between 15 cm to 60 cm in height with extensive fibrous root systems for best results (Wilson 1993). Moist soil, mulch, and partial shade enhance survival and growth (Wasser and Shoemaker 1982). Bare-root stock may be planted in early spring. Two-year-old seedlings may be lifted in fall and stored at 33° F (1°C) untill planting (Howe 1976). For fruit production, seedlings may be planted in rows; between row and within row spacing should be a minimum of 3.6 meters and 1.8 meters, respectively (Flessner and others 1992).

Management

Fruit Production: For commercial orchards and ornamental specimens, branches that are more than four years old may be pruned out in spring for better fruit production and longer life span (Wallace 1978). Pruning of established stands may also include 1) removal of low spreading branches to encourage air circulation and more upright form, 2) removal of diseased shoots, and 3) heading back shoots to six feet

for more efficient harvest. Saskatoons usually begin to bear fruit when 3-5 years old, with full production at 8 years (Wilson 1993). Average crop yields of orchards range from 3000 to 4000 pounds per acre, with some orchards producing as much as 6000 pounds per acre (Wilson 1993). Well-maintained orchards can produce fruit for 20 years (Harris 1976).

Soil tests are necessary to determine fertilization requirements. Application of a balanced fertilizer during establishment will maximize survival and growth (Wilson 1993). Yearly fertilization with 100 pounds per acre of ammonium nitrate will improve color, size, and quality of fruit in older stands (Harris 1976). Weed control (chemical and mechanical) and irrigation also enhance fruit production (Harris 1976). The water requirements of saskatoon orchards are about 45 centimeters per year. Maintaining soil moisture at 50% of its water holding capacity is optimum for growth (Wilson 1993).

Revegetation: For streambank or riparian restoration, Pacific serviceberry (two-year-old stock) should be planted on the upper bank. Weed control and irrigation during the first growing season will enhance survival and growth. Moderate browsing of *Amelanchier alnifolia* can increase twig production (Wasser and Shoemaker 1982). Spring burns on high elevation rangeland can cause mortality but also significantly increase twig production in *Amelanchier alnifolia* (Cook and others 1994). Saskatoon serviceberry occurs in forests with fire regimes varying from frequent, low-severity fire to infrequent, severe fire (Howard 1997; Hickerson 1986).

Pests and Potential Problems

This species is susceptible to several pathogens including those that cause rust, witches broom, fire blight, powdery mildew, leaf blights or spots, fruit rot, dieback, canker, root rot, and wound rot. It is also host to several insects including leaf miners, borers, mites, sawflies, scale, root aphids, tent caterpillars, tarnished plant bug, and apple curculio (*Tachypterrellus quadrigibbus*) (Anonymous 1976; Dirr 1983; Furniss and Carolin 1977; Furniss and Krebill 1972; Pruski and others 1991; Steeves and others 1979; USDA Forest Service1971). Of these pests, rust, fire blight, and leaf blights cause the greatest losses; the apple curculio greatly reduces fruit yields (Furniss and Krebill 1972; Steeves and others 1979; USDA Forest Service 1971). Preventive measures including pruning out diseased wood and maintaining an open canopy aid in disease control. Biological measures (B.T.) and pesticides may be used to control pests.

Amelanchier alnifolia is capable of producing toxic levels of hydrogen cyanide (prussic acid) (Majak and others 1980a; Majak and others 1978). This is toxic to ruminants such as deer and cattle, although prunasin concentration in new growth (leaves) varies with subspecies or variety (Brooke and others 1988; Majak and others 1980b; Quinton and others 1985). Higher levels of this toxin are present in leaves and twigs during bloom stage and rapidly decline thereafter (Majak and others 1981). Reports of mycorrhizae on *Amelanchier* species are lacking.

Pacific serviceberry is not considered to be weedy or invasive, but individuals with concerns for a particular environment should make their decisions concerning plant selection and use on a case-by-case basis. It is recommended that local or on-site sources of Pacific serviceberry are used for restoration or revegetation projects.

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