

Amelanchier Medik.

serviceberry

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Growth habit, occurrence, and use. The serviceberries (the genus *Amelanchier*) include about 25 species of small deciduous trees and shrubs native to North America, Europe, and Asia. Distribution and chief uses of 6 species are listed in table 1. Most species provide browse and edible fruits for wildlife and many have attractive flowers. Saskatoon and common serviceberries have been used to a limited extent for shelterbelt and wildlife plantings and as a minor fruit crop, but other species also should be considered for these and other environmental uses. Native Americans have traditionally used most species of serviceberry for food and medicine (Meeker and others 1993; Moerman 1986). Common and Saskatoon serviceberries are tolerant of temperatures to -60°C (Junttila and others 1983; Kaurin and others 1984; Lindstrom and Dirr 1989). Common serviceberry regenerates vegetatively and by seed after clearcutting and burning (Scheiner and others 1988). Geographic races of *Amelanchier* have not been identified, but they could occur in widely distributed species such as the Saskatoon and common serviceberries. Several natural hybrids are known (Campbell and others 1991; Cruise 1964; Flessner and others 1992).

Flowering and fruiting. The perfect white flowers of serviceberries appear in terminal and lateral clusters early in spring, before the leaves in some species (table 2). Fruits are berrylike pomes (figure 1) that turn dark purple or black when they ripen (table 3). Each fruit contains from 4 to 10 small seeds weighing from 1.1 to 6.9 mg, although some of these are usually abortive (St. Pierre and Steeves 1990). Gorchoy (1985) reported that fruits containing more seeds develop quicker, suggesting asynchronous fruit development of the genus. Fertile seeds are dark brown with a leathery seedcoat (figure 2) and with the embryo filling the seed cavity (figure 3). Seeds are dispersed almost entirely by birds and animals; however, Turček (1961) reported that seeds of some species are distributed by insects. Fruits usually are eaten by birds or animals as soon as they ripen. Fruit loss of Saskatoon serviceberry can be significant (up to 81% of the potential). These losses occurred because of insects and disease (54%) and frost (27%), with the remaining losses (19%) undetermined (St. Pierre 1989). Fruit loss can exceed 95% in some years and some locations (St. Pierre personal communication).

Collection of fruits. To minimize losses to wildlife, fruits must be picked from the shrubs as soon as possible after ripening (table 2). Fruit color is the best way to judge maturity (table 3). Unless the seeds are to be extracted promptly, the fruits should be spread out in thin layers to dry. Loss of viability will result if the fruits are allowed to overheat.

Extraction and storage of seeds. Seeds are usually extracted by macerating the fruits in water and washing them over screens (Heit 1967; Munson 1986; Peterson 1953), which removes most of the pulp. After this remainder is dried and rubbed through the screens, the seeds and remaining debris are run through a fanning mill to remove small, aborted seeds and bits of fruit (Brinkman 1974). Seed yield and weight data are listed in table 4. Few storage tests have been made of serviceberry seeds, but dry storage in sealed containers at 5 °C is usually recommended (Brinkman 1974; Crocker and Barton 1931). However, excessive drying of seeds may induce a deeper dormancy with consequential decrease in germination rate (St. Pierre, personal observation).

Pregermination treatments. Embryos of all species show dormancy that can be at least partially overcome by cold stratification (Crocker and Barton 1931), however, control of fungi during this period is critical (McTavish 1986). The seedcoat of some species also may retard germination. Scarification of Allegheny serviceberry in concentrated H₂SO₄ followed by stratification improved germination (Hilton and others 1965). Addition of a mixture of benzyladenine and thiourea enhanced seed germination of Saskatoon serviceberry (Weber and others 1982). The necessary time period of cold stratification varies, but most species require 2 to 6 months (Heit 1968) (table 5). Robinson (1986) reports improved germination from seeds of fruits consumed by cedar waxwings.

Germination tests. Germination of Saskatoon serviceberry appears to be genetically controlled and, to a limited extent, can be influenced by environmental fluctuations (Acharya and others 1989). Germination of stratified seeds can be tested in sand or a sandBpeat mixture. Constant temperatures of 21 °C or alternating day/night temperatures of 30 and 20 °C have been equally successful. Light does not appear to be necessary during tests (table 5). Germination is epigeal (figure 4). Germination of Saskatoon serviceberry seeds often occurs during stratification (St. Pierre 1996). Previously stratified seeds of Saskatoon serviceberry showed 84 to 99% germination at 2 to 5 °C (McKeever 1938; McLean 1967). Under natural conditions, germination could begin in the early spring under snow or shortly after snowmelt.

Nursery practice. Serviceberry seeds may be either sown in the fall or stratified and sown in the spring (Bailey 1935). Many seeds do not germinate until the second spring. It is suggested that the seeds be sown as soon as possible after collection and that the beds be kept mulched until germination begins the following spring (Brinkman 1974). Seeds should be sown in drills at the rate of 80 sound seeds/m (25 seeds/ft) and covered with 6 mm (3 in) of soil. At least for Saskatoon serviceberry, half-shade during the first year apparently is beneficial.

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Figure 1 *Amelachier*: pomes, $\times 2$.

Figure 2 *Amelachier*: seeds, $\times 2$.

Figure 3 *Amelachier sanguinea*, roundleaf serviceberry: longitudinal section through a seed (left) and exterior view (right), $\times 12$.

Figure 4 *Amelachier* spp.: seedling development at 3, 5, and 7 days after germination.

Table 1C *Amelanchier*; serviceberry: nomenclature and occurrence

Scientific name & synonym(s)	Common name	Occurrence
<i>A. alnifolia</i> (Nutt.) Nutt. ex M. Roemer <i>Amelanchier carrii</i> Rydb. <i>Aronia alnifolia</i> Nutt.	Saskatoon serviceberry, juneberry, western shadbush	W Ontario to Yukon, S to Oregon & Utah, E to Utah, NW Iowa
<i>A. alnifolia</i> var. <i>semiintegrifolia</i> (Hook.) C.L. Hitchc. <i>A. florida</i> Lindl.	Pacific serviceberry, western serviceberry	Pacific Coast region from Alaska S through W British Columbia, Washington, & NW California
<i>A. arborea</i> (Michx. f.) Fern. <i>A. alabamensis</i> Britton <i>A. arborea</i> var. <i>alabamensis</i> (Britton) G. N. Jones	common serviceberry, downy serviceberry, shadblow, serviceberry	New Brunswick W to Ontario & Minnesota, S to Nebraska & Texas, E to Florida
<i>A. canadensis</i> (L.) Medik. <i>A. lucida</i> Fern. <i>A. canadensis</i> var. <i>subintegra</i> Fern.	Canadian serviceberry, thicket shadblow, shadbush, thicket serviceberry	Maine to Pennsylvania & Georgia
<i>A. laevis</i> Wieg. <i>A. arborea</i> var. <i>laevis</i> (Wieg.) Ahles	Allegheny serviceberry, juneberry, shadbush	Newfoundland & Quebec to Minnesota, S to Kansas, E to Ohio & Delaware, & in mtns. to Georgia & Alabama
<i>A. sanguinea</i> (Pursh) DC. shadbush, Huron serviceberry	roundleaf serviceberry, roundleaf juneberry, shore mtns. to North Carolina	Maine & S Quebec to Minnesota, S to Iowa & E to New Jersey,

Source: Brinkman (1974).

Table 2C *Amelanchier*, serviceberry: phenology of flowering and fruiting

Species	Location	Flowering dates	Fruit ripening dates
<i>A. alnifolia</i>	C	MayBJune	JulyBAug
<i>A. alnifolia</i> var. <i>semiintegrifolia</i>	Oregon: 520 m 1,310 m	Apr May May	Aug C Aug
<i>A. arborea</i>	C	MarBJune	JuneBAug
<i>A. canadensis</i>	Carolinas	MarBApril May	MayBJune June
<i>A. laevis</i>	C	MarBJune	JuneBAug
<i>A. sanguinea</i>	C	MayBJune	JulyBSept

Sources: Fernald (1950), Jones (1946), Mowat (1969), Plummer and others (1968), Radford and others (1964), Rehder (1940), St. Pierre and Steeves (1990), Van Dersal (1938).

Table 3C *Amelanchier*, serviceberry: height and fruit ripeness criteria

Species	Height at maturity (m)	Year first cultivated	Color of ripe fruit
<i>A. alnifolia</i>	5	1826	Blue purple
<i>A. alnifolia</i> var. <i>semiintegrifolia</i>	12	1826	Purplish black
<i>A. arborea</i>	18	1623	Reddish purple
<i>A. canadensis</i>	8	1641	Nearly black, sweet
<i>A. laevis</i>	9	1870	Dark purple
<i>A. sanguinea</i>	3	1824	Dark purple, sweet

Sources: Fernald (1950), Jones (1946), Petrides (1958), Rehder (1940), Small (1933), Strausbaugh and Core (1953).

Table 4C *Amelanchier*, serviceberry: seed yield data

Species	Place collected	Fruit wt/vol		Seed wt/fruit wt		Seed wt/fruit vol		Thousands of cleaned seeds/weight			
		kg/hl	lb/bu	kg/45 kg	lb/100 lb	kg/hl	lb/bu	Range		Average	
								/kg	/lb	/kg	/lb
<i>A. alnifolia</i>	C	C	C	0.9	2	C	C	80B251	36.3B113.8	181	82
<i>A. alnifolia</i> var. <i>semiintegrifolia</i>	Oregon	118	42	0.9	2	2.8	1	C	C	119	54
<i>A. arborea</i>	C	C	C	0.5	1	C	C	110B178.6	50B81	176	80
<i>A. sanguinea</i>	Minnesota	C	C	C	C	C	C	C	C	185	84

Sources: Brinkman (1974), McKeever (1938), Mowat (1969).

Table 5C *Amelanchier*, serviceberry: cold stratification period, germination test conditions, and results

Species	Cold stratification period* (days)	Germination test conditions					Amount (%)	Time (days)	Germination percentage Ave. (%)	Daily Samples	Germination rate Purity (%)
		light (hrs)	Medium	Temp. (°C)		Duration (days)					
				Day	Night						
<i>A. alnifolia</i>	180+	16	Sand	30	20	30	C	C	C	70	2
	120	0	Sand or blotters	21	21	70	50	8	C	62	10
<i>A. alnifolia</i> var.H	30B90	6	Kimpack	30	20	31	C	C	10	2	C
<i>semiintegrifolia</i>	76										
<i>A. arborea</i>	90B120	16	Sand or sand & peat	30	20	C	C	C	54	2	93
<i>A. canadensis</i>	120	C	C	C	C	C	C	C	C	C	C
<i>A. laevis</i>	60+	C	Filter paper	20	20	6B7	C	C	61B74	4	C

Sources: Babb (1959), Brinkman (1974), Hilton and others (1965), McKeever (1938), Mclean (1967).

* Stratification was done in a moist medium at temperatures between 1 and 6 °C.

H In an additional test on excised embryos, germination was 82% (Brinkman 1974).

I In an additional test on excised embryos, germination was 95% (Hilton and others 1965).