

# saskatoons juneberries serviceberries

Juneberries and serviceberries are members of the genus *Amelanchier*. On the east coast, they are also known as shadbush or shadblow. The term 'saskatoon' primarily refers to juneberries from the Canadian prairies. We will use "juneberry" as the common term in this chapter. All juneberries are shrubs and small trees, native to North America, that produce blue, edible fruit. There are about twenty species of juneberries belonging to the genus *Amelanchier*, found in every part of North America, six of which have been domesticated. All domesticated *Amelanchier* have edible fruit. The species most commonly grown in the U.S. is the ornamental Allegheny serviceberry (*Amelanchier laevis*). A second species commonly used in landscaping is the thicket serviceberry or shadblow, *A. canadensis*. The two species have been crossed to form *A. X grandifolia* or the apple serviceberry, which is also widely planted. Although these three species have edible fruit, the fruit has not been developed

for commercial production.

The only juneberries that have been selected for commercial fruit production are the saskatoons. Saskatoons are cultivars of *A. alnifolia* from the prairie provinces of Canada that have been selected for fruit quality. The Canadian plants had a few traits that made them more suitable for fruit production than Midwestern juneberries. Minnesota juneberries grow in forests as an understory shrub. Canadian saskatoons grow in large groves in full sun and produce larger fruit on shorter plants than Midwest juneberries. Some saskatoon varieties produce fruit the size of a quarter or larger, while native juneberries produce fruit similar in size to a large blueberry. Saskatoon varieties grow between 10 and 20 feet tall. Native juneberries are small trees that grow up to 25 feet. Saskatoons tend to sucker more easily than native juneberries.

Juneberries are pomelo related to apples, pears, and aronia. Like apples and pears, the sepals of the flower stay on the fruit at harvest, and look like blue petals at the tips of the fruit (Figure 35). Blueberries also have sepals at the tips of the berries, and these superficial similarities are one reason why some nurseries mislabel saskatoons as “saskatoon blueberries.” Saskatoons are unrelated to blueberries: they require different soils, are susceptible to different diseases, ripen differently, and taste very different. A more accurate term would be “saskatoon juneberries.”

Saskatoons produce 6 to 12 fruit per cluster. Some

cultivars have a waxy coating that gives the fruit a light blue appearance while others without the waxy blush are dark blue or purple. The flesh is a light green. The fruit have low acidity with prominent edible seeds. The leaves are small, elliptical, and slightly serrated, with a light, almost bluish green color. New leaves tend to have a silvery red color (Figure 37). The plants bloom in early spring before the leaves emerge with showy, white flowers.

Being that juneberries are newly domesticated, there are relatively few cultivars (Table 12). All *A. alnifolia* cultivars listed here are saskatoons from Canada.



**Figure 35, 36.** Ripe wild juneberry fruit (*A. alnifolia*).



**Figure 37.** Saskatoon leaves that are just starting to emerge, with distinctive reddish color and small hairs.

**Table 12. Juneberry and saskatoon varieties suitable for Minnesota.**

Name	Species	Fruit Size*	Fruit Quality	Plant Height	Other
Honeywood	<i>alnifolia</i>	Medium	Tangy	14 Feet	Large clusters, but uneven ripening
Martin	<i>alnifolia</i>	Large	Mild	10 Feet	Uniform Ripening
Nelson	<i>alnifolia</i>	Medium	Tangy	15 feet	Some disease resistance
Northline	<i>alnifolia</i>	Large	Sweet, mild	13 feet	Spreads by root suckers
Pembina	<i>alnifolia</i>	Med	Sweet	16 feet	Upright, few suckers
Smokey	<i>alnifolia</i>	Med	Sweet, mild	15 Feet	Many root suckers
Thiessen	<i>alnifolia</i>	Large	Sweet	16 Feet	Few root suckers, uneven ripening
Autumn Brilliance	<i>grandiflora</i>	Medium	Sweet		Disease resistant, red leaves in fall
Prince William	<i>canadensis</i>	Small	Sweet	10 feet	Heavy producer, good fall color
Princess Diana	<i>grandiflora</i>	Small		20 feet	Good fall color
Standing ovation	<i>alnifolia</i>	Small		15 feet	Columnar tree form

\*Large = fruit > ½ inch in diameter, Medium = fruit < ½ inch in diameter but > 3/8 inch. Small = < 3/8 inch.

## HISTORY

People have been eating juneberries in North America for thousands of years. Although found across North America, juneberries were most popular in the northern plains, where little other fruit grew. Juneberries were a key ingredient in pemmican, a mixture of bison meat, bison fat, and dried berries. Pemmican was a winter staple for Native Americans in the center of the continent, and an important source of Vitamin C. The Cree word for juneberries is “misass-kutu-mina” which European settlers shortened to “saskatoon”. Settlers named the town that would become the provincial capital of Saskatchewan, “Saskatoon” after the abundant shrubs that grew along the Saskatchewan River.

In eastern U.S., European settlers domesticated the Allegheny and thicket serviceberries as well as the hybrid *A.x grandifolia* as ornamentals in the 19th century. The fruit of ornamental juneberries was only occasionally eaten so they weren’t planted for fruit production. Interest in growing juneberries for

Note from Thaddeus:

*In western Colorado where I lived as a child, “sarvisberries” (serviceberries) were not eaten. In that part of Colorado there were wild apricots, cherries and apples, but people still made chokecherry jelly and wine. Sarvisberries were left for the birds. I have eaten serviceberries and juneberries from many parts of the U.S. and have found little difference in flavor. Some of the eastern species have a little higher acidity, which makes them more acceptable for fresh eating.*

tron began in the middle of the 20th century when Canadian horticulturists started selecting wild *A. alnifolia* plants which were commercially promoted as saskatoons. All saskatoon varieties registered so far have been plants selected from the wild and propagated vegetatively. There has never been a breeding program for saskatoons in which scientists cross different plants with selected characteristics. Attempts to breed saskatoons with related species in order to improve disease resistance or develop fruit with smaller seeds have had few successes (Anthony Mintenko, personal communication.)

In the 1980s and 90s, saskatoons were planted in large orchards in the prairie provinces of Canada. At the time, food processors hoped to export berries to European Union. The export market never fully developed, primarily due to the untimely death of one of the exporters, so growers started building local markets. Over time local markets have been able to buy most of the saskatoon production in Canada. Currently there are over 2600 acres of

saskatoons in Alberta, Saskatchewan, and Manitoba that are grown for local markets, including pick-your-own and small scale food processing.

In the U.S., there have been several waves of interest in saskatoon production. The first wave occurred in the 1980s when improved saskatoon varieties were introduced into Minnesota. More than a half dozen berry growers planted test parcels of a tenth of an acre. A fungal disease defoliated the trees and birds ate all the fruit. The plants were largely neglected after the first few years, although many growers kept the plants around as a wind break or as a trap crop for birds.

The second wave of interest occurred in the early 2000s, when Canada was developing saskatoons for export to Europe. Once again, several Minnesota growers planted saskatoon parcels, and none of them became profitable due to the same problems in the 1980s; including birds, deer, and leaf diseases.

## USES AND HEALTH BENEFITS

All juneberries and saskatoons can be eaten fresh, and have a unique flavor that can't be compared to other fruits. Saskatoons have an unusual problem that keeps them from being popular as a fresh crop: the fruit is too low in acidity. Many saskatoons and juneberries are sweet but bland, lacking the sour flavors that give fruit a balanced taste. The second problem with saskatoons is large seeds that turn consumers off. The seeds are high in protein, which is partly why the berries are so attractive to birds.

Saskatoons are best when processed or used in cooking. They can be made into pies, pastries, syrups, and jams or canned. Due to the fruit's naturally low acidity, saskatoons taste the best when combined with rhubarb or a high acid fruit. Saskatoon-rhubarb jam is excellent, while saskatoon-currant jam has great potential. Cooking causes the seeds to release an intense almond flavor that infuses the whole dish.

The almond flavoring of processed juneberries is due to two compounds found in the seeds called amygdalin and prunasin, which are cyanogenic glycoside: sugars that can release cyanide (see the Elderberry chapter for more detail.) Some people believe that amygdalin provides health benefits, but both compounds are toxic when consumed at high levels. The highest level of amygdalin measured in saskatoons was 129 mg/kg fresh weight.<sup>46</sup> Amygdalin can be harmful if around 500 mg is consumed per day, on a daily basis, in a pure form. There are no verified cases of people being hurt by amygdalin from eating fresh or processed fruit. Not only are levels in fresh fruit too low to harm people, but amygdalin breaks down rapidly during processing.

Because saskatoons historically are a minor crop grown almost exclusively in remote parts of Canada, and because other types of juneberries have been

<sup>46</sup> Mazza, G., and T. Cotrell. 2008. Carotenoids and cyanogenic glucosides in saskatoon berries (*Amelanchier alnifolia* Nutt.) *Journal of Food Composition and Analysis*: 21:249-254.



grown as ornamental shrubs, their health benefits have received little scientific research. Like most fruit with blue color, juneberries are high in anthocyanins. Scientists in Manitoba have measured both the total anthocyanin content and identified the different types of anthocyanins in saskatoons. The total anthocyanin content in saskatoons is about the same as aronia, but saskatoons have a greater

diversity of anthocyanins. Saskatoons boast about 15 different anthocyanins compared to four different anthocyanins in aronia. There are no human trials that look at the health benefits of saskatoons, but preliminary studies suggest that they will prove to be as good as aronia and other fruits that are promoted as “super foods.”<sup>47</sup>

## PROPAGATION

Home gardeners can easily propagate saskatoons by digging out suckers that sprout near the original plant. The best time to dig suckers is in late winter or early spring after the ground thaws but before the plants start sprouting. Saskatoons sprout early in the spring, so the window for transplanting suckers is small. Always make sure there are enough roots for the plant to survive and be aware that digging suckers is labor intensive. Details on propagation can be found in the guidebook, “Saskatoon Production Manual,” which is available at several different Canadian provincial agricultural websites.<sup>48</sup>

Juneberries grown from seed nearly always produce good fruit on productive plants, which means that juneberries are one of the few perennial fruit plants that can be propagated by seeds. Juneberry flowers do not need cross pollination with other varieties, and about 70-80% of seedlings are similar to the parent stock of most cultivars. Even juneberry

seedlings that are not identical to the parent plant nearly always produce edible fruit. The saskatoon cultivar ‘Northline’ almost always comes true from seed. Juneberry seed must be stratified: the fruit is macerated, and the seeds left in the fruit. The macerated fruit is stored at temperatures near 40°F for 4 to 5 months, and is planted in late winter or early spring. Seedlings grow rapidly, and are typically planted in the field after spending a year or more in a seedling bed. Seedlings go through a juvenile period, which delays fruit production a year or two later than those propagated vegetatively. For large scale nurseries propagating juneberries for revegetation projects, seed propagation is more cost effective than vegetative propagation, and these nurseries often have juneberry seedlings of two or three species. Those who want edible landscaping, and do not need trees that ripen at the same time, can easily buy seedlings for a fraction of the cost of registered varieties.

## PLANTING AND CARE

Those interested in growing saskatoons for fruit production should look at the crop as an intensively managed crop, like apples and blueberries, rather than a plant that can be thrown into the ground and neglected. Those planting saskatoons for commercial production should develop a plan for bird, deer, and disease control before the first shrub is in the ground.

Like apples and other tree fruit, saskatoons need to grow two to three feet the first year after planting to be commercially viable. Unfortunately, saskatoon plants tend to stop growing very early in the season if the soil dries out, if there is weed competition, or if there are leaf diseases. Be prepared to water the plants during the first two years if there is a dry spell in the months of June or July.

<sup>47</sup> Bakowska-Barczak, A.M., M. Marianchuk and P. Kolodziejczk, 2007. Survey of bioactive components in Western Canadian berries. *Can. J. Physiol Pharmacology*. 85:1139-52

<sup>48</sup> Spencer, Robert, et al. *Saskatoon Production Manual*. Edmonton: Alberta Agriculture and Rural Development, 2013. Web. [http://www1.agric.gov.ab.ca/\\$Department/deptdocs.nsf/all/agdex14362](http://www1.agric.gov.ab.ca/$Department/deptdocs.nsf/all/agdex14362)

Saskatoons should always be planted in soil that is free of weeds, and the weeds controlled as much as possible the first three years after planting. Soil preparation should be started the summer before planting. Quackgrass is best controlled with a spray of the herbicide glyphosate the fall before planting. Organic growers can attempt to control quackgrass by using a field cultivator to bring quackgrass roots to the soil surface, allowing them to dry out. The summer after planting, weeds can be controlled mechanically or with woodchip mulch. After the plants are established and approaching full size, weeds can be controlled by mowing next to the plant.

Saskatoons are relatively tolerant of heavy soils, alkaline soils, and conditions where other fruit struggles. Low sites should be avoided, both to reduce the chance of frost injury and to minimize the risk of flooding. While tolerant of heavy soils, saskatoons will grow best in a well-drained soil with a pH between 7.0 and 7.5. *A. laevis*, *A. canadensis*, and *A. stolonifera* can grow in slightly acidic soils. Frost pockets – areas that often see frost in spring and fall when surrounding areas do not - should be avoided because juneberries bloom very early in the season.

Saskatoons can be planted as close as three feet apart within a row to form a hedge, or more than six feet apart if grown as individual shrubs. Saskatoons grown as a hedge will have a higher yield and will be easier to cover with bird netting, but shrubs that are separated will have lower disease pressure.

Some varieties sucker extensively and will form a solid row similar to raspberries.

Provided the soil is naturally fertile, juneberries require only a small amount of nitrogen and phosphorous, but require high amounts of potassium. Mature plantings should receive a maintenance program of 30 to 50 pounds of nitrogen per acre per year, preferably applied in spring, similar to the process for apples. Phosphorus should only be applied after planting if a soil test shows a deficiency. Organic producers can apply potassium with greensand, a natural product from Canada. For conventional producers, the best source of potassium is potassium sulfate, or sulfur of potash. 100 pounds of sulfur of potash per acre applied once every four years is sufficient to maintain potassium levels on a productive planting. Potassium sulfate is also allowed in organic production.

Pruning saskatoons is critical to reduce disease pressure, maintain shrub size, and optimize fruit quality. Pruning should begin three to five years after planting when the shrubs have started to fill in their space. Pruning should be done in late winter or early spring before bud break. The most productive branches are on one and two-year-old wood. Older, unproductive branches should be removed to make room for newer branches. Diseased branches should be removed, and branches should be pruned to keep the shrubs at the ideal height of about eight feet tall.

Note from Thaddeus:

*Help for Protecting Crops from Wildlife...*

*The Minnesota DNR offers guidance and solutions for wildlife exclusion on their website including fence design, materials, sources, safety, and maintenance:*

*[http://www.dnr.state.mn.us/livingwith\\_wildlife/fences/index.html](http://www.dnr.state.mn.us/livingwith_wildlife/fences/index.html)*

# PRODUCTION ISSUES AND PROBLEMS

Saskatoons are susceptible to a wide variety of large pests, small pests, and diseases. Deer will browse on saskatoons at any time of the year. Saskatoons may be the most susceptible to bird damage of any commercially grown fruit, and they are one of the only fruits that birds eat before they ripen. The extreme susceptibility of saskatoons to birds may be due to the high protein content of the seeds. Birds start eating saskatoons as soon as the berries turn red, which is usually more than a week before they are ripe. Bird netting should be installed while the fruit is still green.

Many insects also like saskatoons. The moths of eastern tent caterpillars lay their eggs on saskatoon canes in late summer. The eggs hatch in early spring, and the caterpillars form distinct silk tents on the branches about two weeks after hatching and leave the tents to feed on leaves. Tent caterpillars will defoliate entire shrubs in May if not controlled. The best way to control eastern tent caterpillars is to remove the tents, or quickly scorch the tents with a hand-held propane torch. Spraying tents directly with insecticide may work, but the silk protects the caterpillars and reduces effectiveness of insecticides. Round headed apple tree borers burrow into canes, where they feed on the wood and bark. Borers can kill entire canes, but since there are multiple canes, they rarely kill the entire plant. In Canada, the apple curculio has occasionally destroyed crops by laying eggs in developing fruit, which deforms the fruit or causes the fruit to fall off. Apple curculios are common throughout Minnesota. Integrated pest management (IPM) techniques developed for Minnesota apple growers may be helpful in saskatoon production.<sup>49</sup>

Saskatoons are susceptible to a wide array of leaf and fruit diseases including cedar-apple rust, quince rust, and other diseases that are poorly understood. Some leaf diseases that regularly defoliate

saskatoons are rust fungi that use conifers as alternate hosts. Therefore, planting saskatoons near pines or red cedars should be avoided. In areas with high disease pressure the leaves start falling off in early July, and some cultivars have been completely defoliated by early September. Plants that lose their leaves early are often stunted or unable to set fruit. The extreme susceptibility of saskatoons to diseases may be a result of using genetic material selected in the Canadian prairies, where disease pressure is lower than Minnesota. Defoliation can be prevented with one or two applications of synthetic fungicides in June. *A. x grandifolia* varieties like 'Autumn Brilliance' appear to be more resistant to leaf diseases than any *A. alnifolia* selections, even when plants of the two species grow side by side. The Saskatoon Production Manual is a source of information about pest and disease control<sup>50</sup>.



**Figure 38.** An unidentified leaf disease in 'Northline' saskatoon. The plants were completely defoliated by September.

<sup>49</sup> McCamant, Thaddeus. 2007. *Integrated Pest Management Manual for Minnesota Apple Orchards*. Minnesota Department of Agriculture. <https://www.mda.state.mn.us/news/publications/pestsplants/pestmanagement/ipm/ipmapplemanual.pdf>

<sup>50</sup> Spencer, Robert, et al. *Saskatoon Production Manual*. Edmonton: Alberta Agriculture and Rural Development, 2013. Web. [http://www1.agric.gov.ab.ca/\\$Department/deptdocs.nsf/all/agdex14362](http://www1.agric.gov.ab.ca/$Department/deptdocs.nsf/all/agdex14362)

# EDIBLE LANDSCAPING

Those who are interested in using juneberries in landscaping should consider varieties of the eastern species *A. laevis* or native juneberries instead of saskatoons. Juneberry blossoms are very attractive to a wide variety of native pollinators. Saskatoons have a poor potential for edible landscaping due to the leaf diseases that defoliate plants by early September.

A number of eastern juneberries have been selected

for landscaping with large blossoms, excellent tree form, little suckering, good fall color, and are naturally resistant to fungal diseases common to the eastern U.S. Many of these ornamentals have very good fruit and are labeled as hardy to Zones 3 and 4. *A. x grandifolia* cultivars with good fruit include 'Autumn Brilliance', 'Forest Prince', and 'Princess Diana'. Two recent selections out of Wisconsin, suitable at least to Zone 4, include 'Prince Charles' and 'Prince William'.

## COMMERCIAL POTENTIAL IN MINNESOTA

Saskatoons are often promoted in areas where the conditions are unsuitable for blueberry cultivation. Saskatoons are more suitable where soils are either too alkaline or too heavy, or in areas too cold for blueberry production. Saskatoons are harder to market in areas where blueberries are abundant. In 1860, Henry David Thoreau foresaw this problem, noting that local juneberries or shad bushes were underutilized, but summed up their taste by saying, "Though an agreeable berry for a change, they are hardly so grateful to my pallet as huckleberries and blueberries."

Currently, there are three farms attempting to achieve commercial success growing saskatoons in Minnesota. Saskatoon growers report high demand for their product at farmers' markets, but they have been unable to see a profit due to the numerous production problems. Several producers have gone years with no crop. Saskatoons can probably be grown profitably in Minnesota, but growers need to avoid the pitfalls of those who have been unsuccessful.

People who want to grow saskatoons or juneberries commercially in Minnesota have two possibilities for dealing with defoliating diseases. The first would be to plant common saskatoon varieties, but be prepared to spray fungicides each summer. Organic production of saskatoon varieties out of Canada is highly unlikely in Minnesota.

The second possibility is to experiment with eastern juneberry species such as *A. laevis* and *A. grandifolia*. The fruit on those species is not as large as the common saskatoon cultivars, but is still the size of large blueberries, and many plants are quite productive. The flavor of eastern species tend to be as good or better than common saskatoon cultivars, and the plants keep their leaves all summer, so may be better suited for organic production.

Note from Thaddeus:

*In one test site, I was able to control a leaf disease completely with one fungicide application in late June. I have not seen any leaf diseases on *A. x grandifolia* varieties like 'Autumn Brilliance'.*