
Harvesting Saskatoons

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The proper timing of harvest and appropriate handling of fruit during and after harvest are critical for the maintenance of fruit quality. Any damage to the fruit will increase the rate of deterioration and therefore shelf life.

Timing Of Harvest

The correct timing of fruit harvest is important to maximizing marketable yield and fruit quality. Normal harvest dates for saskatoons vary from early- to late-July. Harvesting of fruit can begin when fruit are at the reddish-purple stage, but it is preferable to wait until about two-thirds of the fruit are fully ripe. Fruit at an early stage of maturity are high in pectin and have greater acidity, and are suitable for processing. Fully mature fruit have higher sugar contents and are better for wine making. Depending on the degree of unevenness of ripening, up to three pickings may be required. The duration of the harvestable period ranges from about five days (under hot, dry conditions) to 15 days (under cool, humid conditions). Fruit quality quickly declines once the fruit are fully ripe. It is better to harvest too soon rather than too late. Green fruit are easier to cull than are fruit that are too ripe.

Saskatoon fruit often do not ripen evenly; this is partly dependent on cultivar

and weather, but may also be associated with a variable number of seeds per fruit. Dry weather may increase uneven ripening, but regular irrigation does not appear to completely solve this problem. Too much water may lead to insipid fruit flavour and fruit cracking. Research done at the University of Alberta has indicated that ethephon (at a concentration of 250 to 1,000 ppm), applied six days prior to harvest (when most fruit were still red), significantly enhanced uniform ripening. However, this effect was dependent on the cultivar tested. At present, ethephon is not registered for use on saskatoons.

Picking And Handling Fruit

Fruit should be harvested at their optimum stage of ripeness. Over-ripe fruit should not be picked as they are less firm, more susceptible to decay and have a shorter shelf life. Although saskatoon fruit continue to ripen after picking, harvesting the fruit before they are fully ripe will result in significant reductions in marketable yield. This is because the largest gains in fruit weight of saskatoons occur during the later stages of fruit ripening. Fruit must be handled minimally and gently to avoid injury or crushing. The depth of saskatoons in containers should not exceed 10-15 cm. Containers should have holes or slots on the sides and bottom to permit air movement

through the fruit to facilitate cooling.

If fruit are hand-picked, care should be taken to ensure that no twigs or other debris gets into the pail. Pressure from fingers and thumbs can bruise fruit and sharp fingernails can cause damage. Fruit also should not be dropped (a 30 cm fall can be quite damaging). Any poor quality or immature fruit should be culled in the field during the picking process. Clean picking will prevent or minimize the need to clean out debris and sort through fruit after harvest. If practical, hand-pick directly into the containers that the fruit will be marketed in, in order to minimize handling. Machine-harvested fruit will contain immature fruit, twigs and other debris, which must be removed with a blower.

Completing the harvest of fruit early in the morning, or late in the evening, when the air temperature is no greater than 18 to 20°C, substantially reduces problems resulting from field heat. At this time, outdoor and fruit temperatures are cooler, and less time and energy will be required for subsequent cooling of the fruit. After the fruit are harvested, they should be kept in the shade or covered with reflective tarpaulins to avoid warming in the sun. Fruit left in full sun can increase in temperature from 2 - 8°C per hour. Reflective tarpaulins have been found to keep fruit temperature lower, and also maintain a higher humidity around the fruit, reducing moisture loss. The fruit should also be protected from the sun and wind during transportation. Refrigerated transport, or some type of portable cooling unit are preferable for transporting fruit.

Fruit should not be harvested if there

has been a heavy dew, or immediately after a rain. The fruit should be dry when harvested, otherwise conditions conducive to the development of disease may substantially reduce potential shelf life.

Methods Of Harvest

During the first two to three years of production, yields may be low. It is not economical to use commercial harvesters under these circumstances and therefore U-Pick, or contract hand picking should be considered. Hand-harvesting requires only a low capital cost for equipment and results in less damage to the fruit. Some of the most successful growers hire pickers annually.

Reconditioned, hand-held vibrators (manufactured by BEI) are powered by batteries carried on a cart, cause little, if any damage to saskatoon plants, are sturdy and require little maintenance. Up to four vibrators can be run from the battery cart and a catching frame is used to collect the harvested fruit. A single, hand-held vibrator will enable a grower to harvest 200 to 400 kg of fruit per day, depending on how heavy the yields are.

Mechanical harvesters are often too expensive for growers to afford if their orchards are small. Some budget analyses indicate that an orchard must be greater than 8 ha in size in order for machine harvesting to be economically feasible. Harvesting machines are faster and require less labour, but are harder on the fruit, work better if the crop ripens uniformly and may be better suited to fruit destined for processing.

Mechanical harvesting can be accomplished using pull-type or self-propelled harvesters made by companies such as Joonas, Korvan, Littau or BEI (Figures 5.1 to 5.3). The cost of new machines is high (up to \$120,000 or more), but used, pull-type harvesters can be found for less than \$10,000. These machines usually need to be modified with the addition of a shrub splitter for more efficient harvest. The Joonas 1500 has been modified specifically for saskatoons. It has been made somewhat larger, more robust, and has greater power and storage capacity. This harvester comes with a removable V-splitter and an optional V-picking head. The V-picking head is preferable because 50% less fruit are lost, more being effectively transferred to the conveyor in the machine which collects the harvested fruit.

Effective machine-harvesting of saskatoons requires that row width at ground level be no more than 50 cm and shrub height no more than two to three m.

Regardless of the method of harvest, a certain percentage of the fruit will be lost. When machine-harvesting, approximately 15% of the fruit will be lost; hand-harvesting results in about a 5% loss of fruit. Additional losses of fruit may occur from culling during cleaning.

The BEI Model H Harvester - An Inexpensive Harvester For Small Or Young Orchards

The BEI Model H harvester, manufactured by BEI Inc. South Haven,

Michigan, is a portable, battery-powered, small fruit harvester originally designed for the highbush blueberry industry. The harvesting system (Figures 1 and 2) includes a cart which contains two automotive batteries and a battery charger, two handheld



Figure 1. BEI Model H harvester.

shakers and two catch frames. Production of these harvesters began during the mid 1960's and ended in the mid 1970's. All harvesters currently sold are reconditioned. The cost for the entire harvesting system is approximately US\$1600.00.

Overview Of Harvester Design

The BEI Model H harvester is powered by two 12 volt automotive batteries. The batteries, two 28 foot cables, a 5 amp battery charger and shakers can be moved throughout the orchard on the cart. Recharging times require 6 to 12 hours using a 110 volt (AC) outlet, depending on the initial charge and condition of the batteries.

The handheld shakers each weigh approximately 0.75 kg and are pistol-shaped. At the end of each shaker are four aluminum fingers. A button switch activates the fingers

which vibrate at a frequency of 5100 hertz. The shakers can be raked over or simply pressed against fruit-bearing branches. Fruit are harvested into 115 x 165 cm catch frames. Each frame is covered with plastic fabric with a hole and flap at the back of the frame, used to drain fruit into other containers. The front of each frame is contoured to allow better access underneath the bushes. Hard rubber wheels mounted on the front corners of the catch frame permit the frame to be manoeuvred underneath the bushes and throughout the orchard.



Figure 2. Operating the BEI Model H harvester.

Observations On Use

The BEI Model H harvester effectively removed fruit from Saskatoon bushes, but harvesting rate was found to be dependent on the density of fruit on the bush. Trials done at the University of

Saskatchewan in 1997 indicated that kilograms of fruit harvested per hour per operator varied from 37.9 for the cultivar Honeywood, to 68.9 for Smoky, to 72.7 for Pembina. These rates included the time required to move the catch frames along the row. Saskatoon yields in 1997 were above average and rates of fruit removal may have been exceptional. Results will likely vary with yield, cultivar, growth habit, pruning practices, and plant size. Sparse yields will significantly reduce harvesting speed. Plants of the cultivars Smoky and Pembina tested were an ideal height, ranging from 1.5 to 2.5 m. The cultivar Smoky was particularly easy to harvest since its fruit-laden branches hung over the catch frames. Honeywood bushes were too tall (approximately 3.6 meters) to easily harvest the fruit from the higher branches.

The BEI Model H harvester was also used to harvest fruit from the Native Fruit Development Program's Saskatoon cultivar trials during the 1997 and 1998 seasons. All the cultivars could be harvested by this method but not with equal ease. Large-fruited cultivars such as Thiessen were easiest to harvest. Cultivars with smaller fruit and less rigid branches such as Regent were more difficult to harvest but not impossible.

The BEI Model H harvester is a logical choice for small or young orchards. Harvesting was much faster than hand-picking and fruit were of superior quality. Very few over-ripe or unripe fruit were harvested and a single carefully-timed harvest could be used to remove most of the fruit. During hand-picking, fruit that are difficult to remove are often squashed,

which increases the amount of moisture around the fruit and the risk of fruit spoilage. The natural appearance of the saskatoon fruit was preserved when harvested using the BEI Model H harvester since the delicate bloom was not removed. Since the fruit are picked more quickly, time in the field prior to cooling can be reduced, thus accelerating the removal of field heat and improving storage life.

Some operators found the shakers too heavy and/or the vibration in their hands and wrists unbearable. Switching operators between bushes and limiting total harvesting time to about 3 hours helped avoid operator fatigue. An increased amount of debris such as twigs, leaves and insects, was harvested along with the fruit as compared with hand-picked fruit. This debris was easily removed using a commercial fruit cleaning machine.

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Plate 5. Harvest & Post-Harvest Handling



Figure 5.1: Korvan self-propelled harvester (Photo by M. Bantle).



Figure 5.2: BEI pull-type harvester (Photo by M. Bantle).



Figure 5.3: Joonas harvester (Photo by M. Bantle).



Figure 5.4: Sorting saskatoon fruit (Photo by J. Davidson).



Figure 5.5: Freezing saskatoon fruit (Photo by J. Davidson).



Figure 5.6: Fresh saskatoons packaged for shipping (Photo by J. Davidson).