Mechanical Harvesting of Haskap, Saskatoons, and Dwarf Sour Cherries using The Joanna Harvester in 2009

Figure 1. The Joanna Harvester

Background on the Harvester

The Joanna harvester was designed for harvesting black currents and is manufactured in Poland. In a 2006 tour of Saskatoon Growers in AB, SK and MB, I found that this was the most popular type of harvester being used by Saskatoon growers. Three of the leading Saskatoon farms on the prairies, Prairie berries (SK), The Saskatoon Farm, AB, and Ritz Farm, MB, were giving glowing recommendations for this machine. There are at least 3 other farms that have purchased these in SK recently.

The machine depicted above harvests half the row in one pass. Branches are forced down to a 45^{O} angle and finger-like bars penetrate the canopy while shaking off the fruit. The fruit drops to a conveyor belt which moves it past a fan where leaves, soil and other debris are blown off. The fruit is then dropped onto a second conveyer which carries the fruit to loading area at the back of the machine. In figure 1, the harvesting arm is shown in the 'travelling' position. When

harvesting, the arm sits on the ground and is dragged forward; this allows harvesting of branches as low as one foot off the ground.

The sideways harvesting style of this machine is more efficient than upright harvesters and causes less damage to the fruit. In an upright harvester, fruit drops from 1 to 6 feet down depending on where it is located on the bush. In the Joanna, fruit drops at most for about a 1 ½ feet. Because the branches are moved away from the bush, some fruit may be jarred loose and drop near the middle of the bush; an estimated loss of 5%. An upright harvester can easily lose 20% or more of the fruit if the bush has multiple trunks, but could be as efficient as 10% loss if the grower is vigilant about pruning and training. In my tour of Saskatoon farms I found few farmers that had pruned their bushes in a suitable way for an upright harvester.

The big disadvantage of Joanna style sideways harvesters is that it is harder on the branches. If a branch is too thick it can become jammed in the machine. If too brittle it could break. Varieties (like Theissen) with an upright growth habit can be pulled out of the ground if the bush is young or if it has a shallow root system.

Tests at the U of SK

In 2009, local grower Keith Jorgenson brought his Joanna Harvester to the U of SK plots and tried it on Haskap, Cherries and Saskatoons. The machine was able to harvest all 3 types of fruit. I was highly impressed by the lack of damage to the fruit, and the low reach of the machine (fig. 2). Reaching low was very important for the harvesting of Haskaps. The upright harvesters I have seen in person or in pictures have collection plates (also called fish plates) at 12 to 18 inches off the ground which means that branches lower than that cannot be harvested. Young Carmine Jewel bushes have been observed with productive branches close to the ground (fig 3).

It became obvious that the siderow style harvester did cause damage to upright and thick branched phenotypes of Saskatoons and Cherries. When encountering large branches, the machine snapped branches, became jammed, or pulled bushes out of the ground. Such damage could be prevented with regular pruning and maintenance of the bushes. However, without pruning, the damage inflicted by the harvester provides an indicator of branch strength and flexibility. This is valuable information for breeders, and could be used for selection purposes. The split row method of this machine offers another advantage that no other machine can provide: It allows the harvest of one side of a bush, or row of bushes, at a time. This allows two harvest dates, tree damage assessments, and harvest method comparisons.

Successful mechanical harvest techniques could help support the continued growth of the small fruit sector in Saskatchewan. High wages and low worker availability mean that, in many cases, mechanical harvesting is becoming more economical than handpicking. Economical advantages are multiplied with the Joanna, which is capable of harvesting multiple crops. The U of Sk Fruit Breeding Program is seeking funding for the purchase of a Joanna harvester. Owning a harvester would allow the Fruit Breeding Program to select species and cultivars which offer fruiting and

growth characteristics best suited for mechanical harvesting. We hope that this will ultimately result in reduced costs for growers, while maintaining the quality of fruit.

Figure 2. Joanna Harvester with collector lowered to the ground. It is designed to pick fruit just a few inches off the ground

Figure 3. Four year old 'Carmine Jewel' bushes showing productive branches close to the ground.

Since 2007 we have been planting new seedling rows of Haskap far enough apart for mechanized harvesting. Those plants were too young and small to be useful to demonstrate mechanical harvesting, so we removed several rows from our oldest seedling plots (fig. 4).

Figure 4. Haskap bushes also have branches close to the ground. This particular row was the one from which our new varieties 'Borealis' and 'Tundra' were selected.

Figure 5. Haskap bushes being fed into the Joanna harvester.

Figure 6. Haskap berries from different rows and different settings. The harvesting machine can have different settings which will blow off more leaves. But also some seedlings/varieties hold onto their leaves more strongly than others. This was done on seedling rows where each plant is different.