2014 Northern-Hardy Fruit Evaluation Project Update

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In 2014, the Northern Hardy Fruit Evaluation Project (Fruit Project) at Carrington Research Extension Center provided advice, tours and fruit-growing information to almost 1,600 people. Overall, 65% of our contacts were made by speaking engagements with the remainder consisting of tours, emails and phone calls. Approximately 120 phone calls were answered, including 13 calls from NDSU and NDSU Extension coworkers. There were five field tours. Since its inception in 2006, the Fruit Project has reached over 4,950 people. Contacts this year were primarily North Dakotans, but are also residents of South Dakota, Minnesota, Montana, Vermont and New York.

Cooperators: This year, three businesses utilized 1,150 pounds of fruit from the project for products that included wine and jelly. The cooperators were: Dakota Sun Gardens Winery, Grace City; Berry Dakota, Jamestown; and Tongue River Vineyard, Miles City, MT.

Approximately 400 pounds of 'Hazen' apples were distributed locally this fall.

Weather: The 2013-14 winter put a nice amount of snow on the orchard, much of it blown in. Snowfall was 44 inches and there were 17 nights at -20 or lower, with the lowest temperature recorded on January 2, 2014 as -29^{o}F. There were reports of -40^{o}F in Minnesota and Montana. This winter was characterized by what seemed like 5 to 7-day periods of very cold air masses repeatedly covering much of the country. A slow spring allowed for an unhurried pruning season. Temperatures in the mid-40s to mid-50s were common until mid-May. Damp conditions persisted once the snow melted with 33 of 102 days gathering 6.8 inches of rain through June. From July 1 until October 30, though, only another 6.1 inches of rain fell. Though it was cool with temperatures 4.3^{o}F below average, the growing season lasted until sometime in the first 10 days of October.

Field Day: We counted 125 people attending the July 15th CREC Field Day Tour. Our featured speaker was Dr. Bob Bors, project leader of the domestic fruit program and assistant professor in the Department of Plant Sciences, University of Saskatchewan-Saskatoon. Dr. Bors is considered to have jump-started the fruit industry in the Prairie Provinces with the release of the dwarf sour cherry cultivar 'Carmine Jewel' in 1999, followed by five others in 2004. In 2007, the haskap cultivars 'Borealis' and 'Tundra' were released. There are millions of both these fruits planted on the Canadian Prairies and he's become a bit of a 'rock star' in the northern fruit world, much to his surprise. In the afternoon, a smaller group discussed fruit growing in North Dakota and breeding efforts in Saskatchewan as well as Dr. Brian Smith's work at University of Wisconsin-River Falls.

New Currant Trial: In mid-May we installed a new black currant trial with dormant, rooted plants from McGinnis Berry Crops in British Columbia. There are 6 varieties and 14 plants each, planted 4 feet apart. A seventh variety was planted in one row with half the plants spaced at 2-feet and half at 3-feet apart. Plantings that are mechanically harvested are generally planted with 2-foot spacing.

New Irrigation: Our other new project involves irrigation. There is no power or well in the orchard so we bought a 1200 gallon tank on a trailer and use it for drip irrigation. We are irrigating half of the 2007 currant trial (112 foot row) and half the 2006 Juneberry trial (100 foot row). Both are planted with 4-foot plant spacing. We also used it to water the new 2014 currant trial. Using only gravity, we can apply approximately 400 gallons of water in 10 hours divided between 2 hi-flow drip tapes per row with 8-inch slit spacing. For currants, this is about 0.6 gallons of water per dripper or 7.2 gallons of water per plant and for Juneberry this is calculated to be 0.67 gallons of water per dripper or 8 gallons of water per plant. We did not get it set up until currant harvest, so we watered the Juneberries first and then waited to water the currants after all harvest was completed.

Apples: The work horse of our orchard is 'Hazen' apple. We rigorously thinned fruit this spring and still harvested at least 400 pounds of fruit from four trees September 12-15. 'Haralred' also produced a very large crop after thinning with bland, tough-fleshed fruit. 'Honeycrisp' produced little fruit this year; it tasted a bit 'caramelized' and had watercore during the ripening period. 'Zestar' production increased again on the most productive tree but it was still about two dozen fruits; a second tree had a few apples, too. 'Sweet Sixteen' ripened very late with very few fruits from one or two trees; the cherry flavor of the fruit was finally apparent this year.

Aronia: The plants bloomed the first week of June and were harvested the second week of September. The crop was light this year, with about 20-30 pounds of fruit per variety. Pear slug sawflies and lacebugs fed on the leaves again and were controlled with one application of spinosad.

Canadian Dwarf Sour Cherry: 'Carmine Jewel' production was much lower than the 30-pound-per-plant bumper crop produced last year. The estimated crop in July was seven pounds per plant. However a very strong wind event and bird depredation caused almost the entire crop to be lost. 'Crimson Passion' flowered well again but produced almost no fruit for a second year in a row. We sprayed for spotted winged drosophila and saw little damage and little evidence of the pest this year. Two shrubs had branches with gummosis during spring pruning. The entire branch was cut out; however, more resin was seen in fall. The infection was probably introduced by the large hail in 2011.

Evans/Bali Cherry: There were blossoms but no fruit this year.

Black Currants: 'Hilltop Baldwin' was badly affected by the 2012 spring freeze and had little fruit in 2013. Winter was quite cold this year and again it had a very small crop. There was still evidence of winter-damaged branches. This variety is a good candidate for removal due to its poor hardiness and evidence of plant variability, ie: there appears to be two types of plants as judged by growth habit and there are fruit ripening differences. 'Titania' and 'Minaj Smyriou' had good production again and are recommended for North Dakota. There was no powdery mildew across the crop and, for the first time, no white pine blister rust. The new varieties 'Blackcomb' and 'Whistler' had a bigger crop and did not show the 'sunburning' of the berries that was seen in 2013. They are said to be sweeter than Titania, but we did not find that.

Red and White Currants: 'Rovada' and 'Rosetta' had nice crops (35-38 lbs per four plants). 'Rovada' has more evenly-colored fruit but was quite tart this year. 'Jhonkeer van Tets' produced 30 pounds of fruit

per 4 plants and has nice long strigs of very dark red fruit. Our selection of 'Red Lake' is probably not the variety it was sold as. Its fruit is in very short, dense clusters of strigs that make it almost impossible to hand pick. We gave it away this year so that we did not have to pick it ourselves.

We learned to harvest currants efficiently this year. Unfortunately, it was on the last day of harvest. The method involves laying a sheet below the plants, restraining the outer end of the branch with your hand and then striking the branch with sharp blows. We used stiff yet flexible plastic tubing as our tool. This causes both the branch and fruit to oscillate with the result being that the fruit detached from its stem with no damage. The fruit is in better shape than when picked by hand. We will try this method with haskaps.

Gooseberries: There was a crop on most plants but a volunteer harvested them all a bit green – before we tasted them. Two applications of fungicide were applied in the spring. Leaf disease was improved this year and most had leaves into the fall.

Grapes: There was some cold damage to the grapes this year, but not at the levels of damage described in Minnesota this year (90% above ground kill on 'Marquette' in some vineyards). These plants had the most damage and least fruit production at CREC: 'Somerset Seedless', 'St Pepin', 'Petite Amie', Brianna. ES 8-2-43, and Prairie Star. Last year I commented on the hardiness and delightfulness of 'Somerset Seedless' and ES 8-2-43 (Osceola Muscat), but this past winter damaged them. They are recovering by training new shoots.

'Valiant' is the hardiest variety we grow and yet 2 of 16 plants had damage to the entire cambium this year and the plants collapsed after starting to leaf out. New shoots are being trained to replace these plants. The other 14 plants grew and produced fruit normally. The birds have been quite aggressive the past two years, taking this fruit very early, perhaps due to dry conditions. 'Valiant' started turning color August 12 and by the 27th, it was almost completely eaten.

Nine of our 19 varieties of grapes had fruit crops on every plant. These hardiest varieties include: 'Blue Bell', 'Clinton', 'Frontenac', 'Frontenac Gris', 'King of the North', 'Marquette', 'MN 1200', 'Sabrevois', and 'St. Croix'. 'Valiant' also had a full crop on the 14 plants that were not winter killed. Though each of these varieties had fruit on every plant, it may not have been a full crop. Further, we strictly limited the crop knowing that the growing season would be quite short.

Acid levels stayed high this year. For our eight wine grapes, 'Frontenac', 'Frontenac Gris', 'Prairie Star', 'Sabrevois', 'St. Croix', 'LaCrescent', 'Marquette', and 'St. Pepin', average results were: pH 2.82, ^{o}Brix 21.4 and TA 1.88. These parameters are below those suggested by University of Minnesota for winemaking, found here by variety: http://viticulture.hort.iastate.edu/cultivars/cultivars.html

CREC Harvest parameters and cold injury results can be found on the Fruit Index>Grape page.

Haskaps and Honeyberries: Production was good this year with plenty of flowers on most plants. However, a 36-hour wind storm from June 29-30 pulled the net loose and allowed it to rub across the oldest Canadian and Japanese plants, ruining much of the crop. This was a disappointment. 'Tundra'

was ready to be harvested and since its fruit shakes loose more easily, much of it was lost. 'Borealis' clings more tightly and was approximately one week from harvest; it came through with less loss. 'Indigo Gem' did not lose much crop and its five plants yielded 12.3 pounds of fruit – or 2.46 pounds per plant. This still seems like a small crop.

We collected fruit from the Haskap Planting Depth Trial this year. There are eight plants of each 'Borealis' and 'Tundra'. Four plants were planted 1-inch deeper than in the original pot and four were planted 3-inches deeper than in the original pot. For each set of four plants, two had all branches pruned to several buds the spring following planting and two were not pruned at all.

Standard pruning was also applied to these plants in spring 2014. I debated whether to prune at all but decided that I would normally prune a plant sooner than wait for mistakes to accumulate. Therefore, as for any other plant, low and crossing branches were removed.

The production vs. treatment results for 'Borealis' and 'Tundra' were opposite of each other:

- 'Borealis' had less fruit if it was pruned and less fruit when planted 1-inch deep.
- 'Tundra' had less fruit if it was not pruned and less fruit when planted 3-inches deep.

Haskap Planting Trial 2011					Amount of Fruit	
2014			No. Plants	ave gram	Pruning	Depth
	Borealis - 1" deeper	Pruned	2	147.2	less	less
	Borealis - 1" deeper	not	2	193.7	+ 46.5g	
	Borealis - 3" deeper	Pruned	2	270.3	less	+ 275.5g
	Borealis - 3" deeper	not	2	346.1	+ 75.8g	
	Tundra - 1" deeper	Pruned	2	742.7	+ 202.4g	+183.3g
	Tundra - 1" deeper	not	2	540.3	less	
	Tundra - 3" deeper	Pruned	3	697.1	+ 294.5g	less
	Tundra - 3" deeper	not	1	402.6	less	

There are not enough plants to be statistically relevant, but the results are interesting. 'Borealis' grows with much more branching while 'Tundra' is rangier and thin. Pruning seems to make 'Tundra' more fruitful since there is a 2-300 gram increase in fruit after first spring pruning, but the raw data does not show an increase in branching due to pruning.

We will continue to collect harvest data for the next two years.

Juneberries: The plants were treated with propiconazole in early May to prevent entomosporium leaf and berry spot. The plants looked great and then in mid-June, there was suddenly an outbreak of the same disease after a rainy period. A second treatment was applied. Azadirachtin controlled flower thrip feeding and there was little damage this year.

We pruned for the first time this spring with the help of three master gardeners and their extension agent who came for some experience. Older branches were removed from most plants and some tall branches were tipped; some literature indicates that tipping does not encourage new fruiting buds.

Harvest was decreased by 56% this year but we don't know if it was strictly related to pruning or whether the colder winter conditions influenced bud viability.

We irrigated the first two rows of Juneberry August 7 and 8. In 2015, we will be able to start irrigating as soon as it is needed.

Plums: Flowering was excellent again yet fruit production was poor. There was plum curculio damage again. 'Toka' had almost no crop for a second year. We are starting to see borer holes and gum exuding from the trunks of the plum trees.

Elderberries: Of the two remaining plants, there were one or two clusters of fruit that ripened to black color this year but most of the fruit (est. 90%) did not.