

Hazelnut Trial in BC Beginning to Yield

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Introduction

European hazelnuts have been cultivated in British Columbia for their tasty, nutritious and versatile nuts for over a century. Unfortunately, eastern filbert blight (EFB), a disease spread by wind-borne spores and introduced only in about 2005 has decimated our orchards. Six EFB-resistant cultivars (from a long-term breeding program at Oregon State University) were established as a trial of new varieties in 2011 to 2013. This paper gives a brief overview and summarizes the most recent results in the trial.

Background

The first hazelnut orchard in BC began in the early 1900's on Okanagan Lake and remains today as Gellatly Regional Park and Heritage Farm. By the 1940's there was a commercial industry in the Fraser Valley which greatly expanded in the '80's and '90's, largely due to the efforts of Henry Wigand. It continued to grow until about 2005 at which time there were about 1200 acres planted to hazelnut.

The arrival of Eastern Filbert Blight (EFB) is bringing the industry down. The fungus, spread by wind-borne spores, typically infects young twigs in the spring. It grows undetected for several years before making characteristic black elliptical cankers (stromata) on the stems of diseased trees. Endemic on native hazelnut species in eastern North America which remain symptomless, EFB is a serious disease of the cultivated European hazelnut. It has spread like wildfire since 2005 and because the old varieties are highly susceptible, virtually every commercial orchard in BC is now diseased and many have been removed. Harvests have declined from over 1,000,000 pounds in 2010 to less than 30,000 lbs. in 2015.

Currently there is a quarantine prohibiting importation of hazelnut trees to British Columbia from areas known to have EFB except in tissue culture. Some say: "the disease is here, open the border", but there are reasons to be cautious. While many diverse strains of EFB exist in its native range, evidence points to a single introduction to western North America. Since breeding for resistance has focused on the local EFB strains, it is prudent to maintain the restrictions currently slowing the spread of more diverse strains of the disease (Capik & Molnar 2012).

Trial of new varieties

The long term fix for EFB is selective breeding for trees resistant to the disease; such has been undertaken for over four decades at Oregon State University with encouraging results. Varieties with good resistance and improved yields are now available and, largely because of this project, are obtainable in BC.

Six of these new cultivars are being evaluated at five sites in the Fraser Valley and Hornby Island. Timing of pollen shed and female flowering, nut quality (percent kernel, defects and spoilage) and yield are being measured at each site. The main cultivars 'Jefferson', 'Sacajawea' and 'Yamhill' and pollinizers 'Eta', 'Gamma' and 'Theta' are planted double density with each grower managing by their usual methods. Note that main crop cultivars also supply pollen and pollinizers also produce nuts.

Timeline of the Project

The project began in 2010, at which time participating orchardists were identified and planning commenced. In several cases those participating had to clear existing orchards to make way for the new varieties.

In 2011 the first of cultivars ‘Jefferson’, ‘Eta’ and ‘Theta’ were planted; the remaining cultivars took longer to obtain. In 2013 more trees were planted including cultivars ‘Gamma’, ‘Sacajawea’ and ‘Yamhill’ and we began measuring flowering for ‘Jefferson’, ‘Eta’ and ‘Theta’. By 2014 we were seeing flowering of all varieties and harvested some ‘Jefferson’ nuts for quality measures. Last fall, 2015, saw the first harvest of ‘Jefferson’ nuts for yield measurements, as well as nut quality samples for ‘Sacajawea’ and ‘Yamhill’.



Figure 1. Clearing and planting at one farm for this project. Year planted shown in white text.

- A. Google Earth (2005): Orchard established before 1950.
- B. Google Earth (2011): First planting.
- C. Google Earth (2013): Completed planting for this trial.
- D. Google Earth (2015): Additional (2014) planting not for the trial.

Results and Discussion

EFB

Most of the trial orchards adjoin heavily diseased older orchards of ‘Barcelona’, ‘Duchilly’ or ‘Ennis’. Symptoms of EFB have been observed at all of the orchards in the Fraser Valley, but not the one on Hornby Island (where there is no diseased orchard and the owner has been treating with fungicide). So far, a few trees of ‘Jefferson’ have had a few cankers while almost half of the ‘Sacajawea’ have more extensive areas with cankers; these are less pronounced than in more susceptible cultivars (‘Barcelona’ etc.) and are showing signs of healing over (**Figure 2**).



Figure 2. EFB-infected stem of Sacajawea planted 2013, photo taken February 2016.

Current recommendations from Oregon are to use fungicides for the first few years, even on the most resistant varieties in areas with high disease pressure.

Flowering

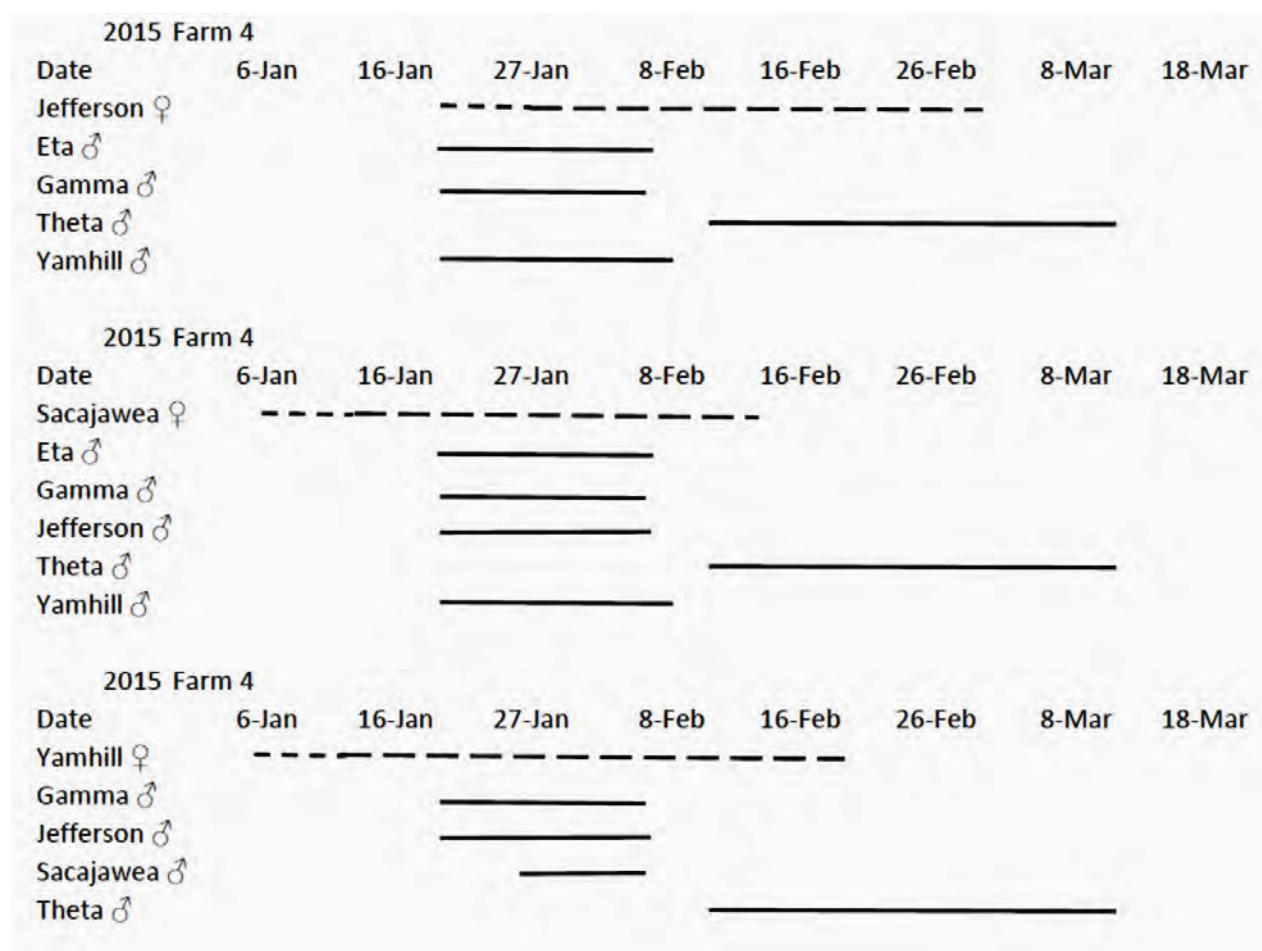


Figure 3. Timing of female flowering (dashed lines) of main crop cultivars, and pollen shed (solid lines) of genetically compatible cultivars in 2015.

There is quite a bit of year-to-year variation in the start and end of flowering and pollen shed. For example, pollen shed by ‘Theta’ did not begin until March 12 in 2014, but began a full month earlier in 2015 (data not shown). The varieties flower in the same chronological order as reported in Oregon, but with perhaps more overlap between the later and earlier varieties in B.C. In 2015, all compatible varieties shed pollen during the flowering of each main crop variety (**Figure 3**). The last pollen shedding is ‘Theta’, which overlapped only one week with female flowering of ‘Sacajawea’ and about two weeks with ‘Yamhill’ in 2015.

Nut Quality

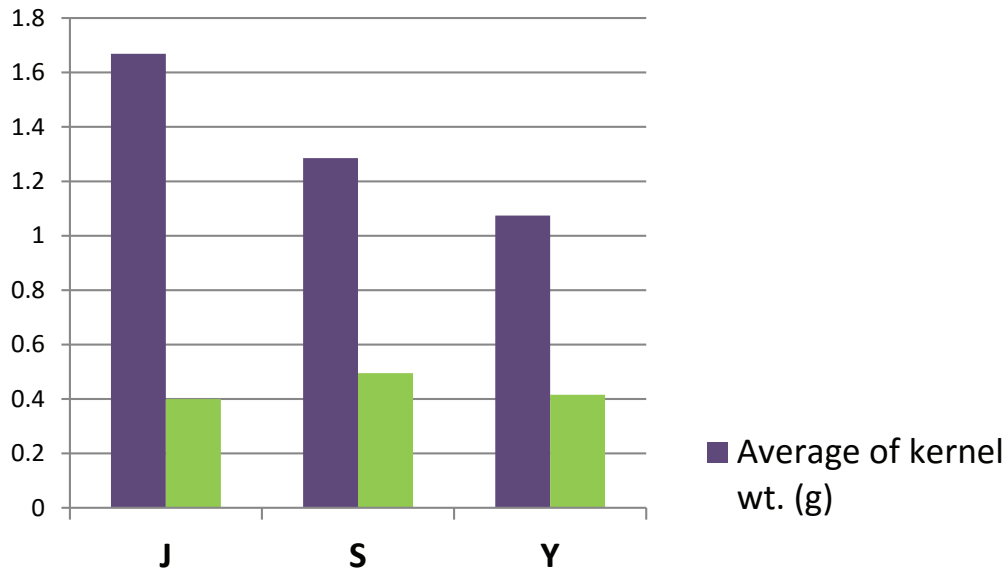


Figure 4. Average kernel weight and percent kernel.

50 nuts per variety from 4 farms were dried to ~ 10% moisture content in a dehumidifying cabinet. Nuts were weighed, shelled and the kernel weighed again. Crack out (percent kernel) equals kernel weight divided by unshelled nut weight. Average kernel weight was 1.7g for ‘Jefferson’, 1.3g for ‘Sacajawea’ and 1.1g for ‘Yamhill’. Crack out was 40% for ‘Jefferson’ and ‘Yamhill’ and 50% for ‘Sacajawea’.

Yield

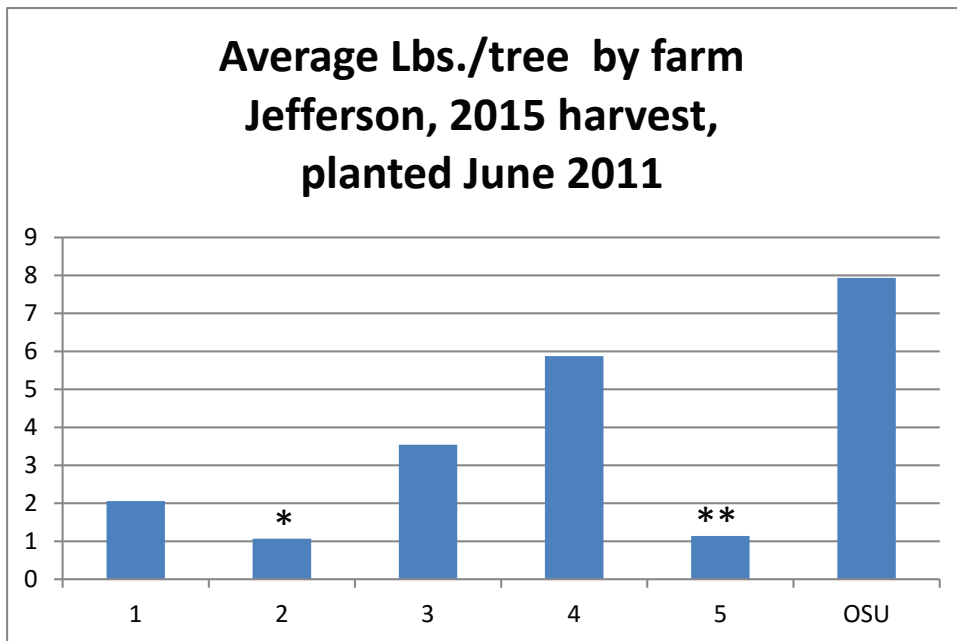


Figure 5. Average yield per tree in September 2015.

* = trees transplanted in 2015 ** = initial planting in September (not June) 2011.

Four trees of 'Jefferson' at each farm were selected earlier in the season for measuring nut yield. These were harvested after nut fall (~10 September) from the ground by hand and dried as above. Yield was quite variable between farms, averaging one to about 6 lbs per tree by farm (**Figure 5**). Differences in site characteristics (e.g., soil drainage) and management (e.g., fertilizing and pruning) may explain much of the difference. The best per farm average yield was still only about three fourths of that reported for 'fourth leaf' trees in Oregon. This could be due to better climate and soils, or to the fact that our trees were planted in June (September in one case) 2011 and put on little top growth the first year.

References

Capik, J.M. Molnar, T.J. 2012. Assessment of Host (*Corylus* sp.) Resistance to Eastern Filbert Blight in New Jersey. *J. AMER. SOC. HORT. SCI.* 137(3):157–172. 2012.

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