A Trial to Evaluate New Hazelnut Cultivars in British Columbia

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Background

Hazelnuts, the fruit of the hazelnut tree, are sought worldwide as a delicious and healthful source of protein and oil with diverse end uses as candy, nut butter, protein powder and face cream. Despite a robust industry in Oregon, the U.S. imports over one-half of its hazelnuts and Canada is among the top ten importers in the world. While there are many species of hazelnuts, we focus on the cultivated European hazelnut (*Corylus avellana*).

Hazelnut trees prefer well-drained, fertile soils but can tolerate a wide range of conditions. More important is climate; nut production requires mild winters for pollination, but with adequate chilling for dormancy requirements. This limits commercial production to areas near large water bodies, such as the Black Sea and Pacific Ocean. Also required for pollination are at least two different varieties. These must be genetically compatible and must have overlapping pollen shed and female flowering. Current recommendations are to plant "three pollinizer varieties (early, mid, and late) in an orchard so pollen is available throughout the extended period of time during which female flowers appear"[1]. Many orchards are planted with pollinizers every third tree in every third row (11% of trees), but higher proportions may increase nut production.

Hazelnuts were introduced to B.C. in the early 1900's and commercial orchards were established by the 1930's. By 2000 there were at least 800 acres in commercial production in the Fraser Valley, mostly around Chilliwack and Agassiz, where processors are located. In 2003 Eastern Filbert Blight (EFB) was found in B.C. having made its way northward from Oregon and Washington. This, despite a quarantine on importation of trees (other than in tissue culture). Even though it failed to stop the introduction of the disease, this quarantine continues to be a useful tool to slow its spread[2].

Other management strategies for coping with EFB include programs of spraying and pruning. In the long run, resistant varieties are key to coping with the disease. These are produced from a breeding program now in its 5th decade at Oregon State University. Classic selective breeding using superior parents has led to many new cultivar releases with excellent yields, nut qualities and high levels of EFB resistance[3]. A trial to evaluate the suitability of some of these new varieties to British Columbia began in 2010 with support from the BC Hazelnut Grower's Association, the Investment Agriculture Foundation of BC and Nature Tech Nursery, Ltd. of Langley, BC.

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1 Olsen, J. 2013. Growing Hazelnuts in the Pacific Northwest: Pollination and Nut Development. EM-9074-E. Oregon State University Extension Bulletin. Accessed on line 2-6-2014. http://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/43809/em9074.pdf

2 Molnar, T.J., et al. 2010. First Report of Eastern Filbert Blight on *Corylus avellana* 'Gasaway' and 'VR20-11' Caused by *Anisogramma anomala* in New Jersey. Plant Disease, Vol. 94, p. 1265.

3 Jeff Olsen, J. Mehlenbacher, S., McCluskey, R. and D. Smith. 2013. Growing Hazelnuts in the Pacific Northwest: Hazelnut Varieties. EM-9073-E. Oregon State University Extension Bulletin. Accessed on line 2-8-2014. http://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/43808/em9073.pdf

Cultivar Trial

The goals of the trial are:

- To demonstrate the suitability of EFB resistant hazelnut cultivars to Fraser Valley.
- To compare performance of three EFB resistant hazelnut production cultivars and three pollinizer varieties at six sites in SW BC.
- To share information on cultivar performance with growers.

About 500 trees per site were planted at six sites in the lower mainland and Hornby Island in 2011 and 2013 (see map). Plantings are at double density (9x18' to 10x20') and were initially with containerized plants in 3.5" pots. Due to delays in obtaining propagative material from Oregon, and a decision to switch to larger (#1 pot) plants to reduce losses, the remaining trees were planted in 2013. All sites received the six varieties 'Eta', 'Gamma', 'Jefferson', 'Sacajawea', 'Theta', 'Yamhill' with pollinizer varieties ('Eta', 'Gamma', 'Theta') at 20 percent of the mix. We describe these varieties more fully in Argen & O'Dell (this volume) and additional details are available in Oregon State University extension publications[4].

The sites and their upkeep for the trial are voluntarily hosted by the owners in exchange for the trees (and knowledge). Five of six sites are existing hazelnut orchards, of which two required significant clearing of productive hazelnut trees by the owner to make way for this trial. Each planting is managed according to owner preference for exact spacing, pruning, fertilization, etc., but all have irrigation. We expect that the variation in site characteristics and management will result in a range of results representing the potential for these varieties in SW BC.

Over the next few years at each site we will monitor growth and health of the trees, time of flowering of catkins (or tassels) and pistillate (nut-producing female) flowers, time of nut harvest, nut yield and nut quality (% blank, spoiled or defective, % kernel weight).

Current Status and Results so Far

Participants finished site preparation in 2013. Trees planted in 2011 are up to 2" diameter and a few nuts were produced from 2011 planting.

We observed **no** symptoms of EFB on any of the new varieties (in nursery or trial plantings) even though most of the trial plantings adjoin infected orchards. One trial site had three 'Barcelona' planted in a row of 'Jefferson'; only the 'Barcelona' have cankers characteristic of EFB.

A few 'Jefferson', 'Eta' and 'Theta' flowered in winter/spring, 2013; more varieties are flowering this year (2014).

The first full monitoring of flowering (weekly visits to each site) is underway this winter. Nut harvest data collection is scheduled for fall 2014 through fall 2016. So far, it seems that flowering starts later in the season here than reported for Oregon.

Nature Tech Nursery has supplied trees to a wider cliental than just the trial participants. We will share what we learn from them as well.

[4] Ibid.

How (Hazelnut) Trees Can Save the Earth

Human population growth continues apace, and to feed the billions more food will be grown. However, humans are changing the environment in ways that challenge our food production systems with climate change and other stresses. Furthermore, food production and transportation contributes about 1/3 of greenhouse gas emissions. Therefore, we need to grow more food closer to home with fewer inputs, while sequestering carbon. Tree crops are perfect for these goals because, as long-lived perennials, they sequester carbon while producing a crop with relatively low inputs. Hazelnuts are an excellent source of high food-value protein and oil. Basic food security should point us toward diversifying local agriculture with nut crops. This trial will demonstrate the value of new hazelnut varieties in British Columbia food production.

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