Hazelnuts in BC

the industry
and EFB

Peter G. Andres, BCHGA
Definition – Key Concepts

Integrated Approach of using Interactive Benefits from combining Trees with Crops and/or Livestock

Combines Agriculture and Forestry Technologies for creation of Diverse, Productive, Profitable, Healthy, Sustainable Land-Use

Land-Use in which Harvestable Trees are grown around crops or pastureland....

as means of preserving & enhancing land productivity
World Production of Nuts (kernels)
(All nuts are from Harvestable Trees)

Almonds 1,131,000 tons
Cashews 541,000 tons
Walnuts 516,981 tons
Hazelnuts 488,131 tons
Pecans 117,289 tons

Oregon produces only 3% of world production of hazelnuts
The North American and Canadian production

• 3% of the world's Hazelnuts are produced in North America of which Oregon produces about 95% of the North American hazelnut production on about 30,000 acres most of it planted to Barcelona (80%) and Ennis (11%)

• BC produces the remaining 5%, production amounts to one thousand tones harvested off about 700 acres

• The orchards are centred around Agassiz and Chilliwack

• The dominating varieties are ‘Barcelona’, ‘Ennis’ and ‘Duchilly’ and for pollination ‘Butler’ and ‘Daviana’
Size of the BC Hazelnut Industry

<table>
<thead>
<tr>
<th></th>
<th>Acreage</th>
<th>Number of growers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional</td>
<td>476</td>
<td>27</td>
</tr>
<tr>
<td>Organic</td>
<td>202</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>678</td>
<td>39</td>
</tr>
</tbody>
</table>
## Hazelnut Production in Fraser Valley in lbs

<table>
<thead>
<tr>
<th>Year</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional</td>
<td>835,318</td>
<td>721,182</td>
<td>530,400</td>
<td>868,265</td>
<td>891,265</td>
<td>$0.90/lb</td>
</tr>
<tr>
<td>Organic</td>
<td>335,032</td>
<td>243,434</td>
<td>255,860</td>
<td>224,760</td>
<td>196,489</td>
<td>$1.20/lb</td>
</tr>
<tr>
<td>Total</td>
<td>1,170,350</td>
<td>964,616</td>
<td>786,260</td>
<td>1,093,025</td>
<td>1,088,093</td>
<td></td>
</tr>
</tbody>
</table>

Weight of product after it was washed/dried/ and moulds & blanks removed

Yearly Average Production = 1,011,655 lbs
Issues

Wet weather during harvest
No disease problems other than EFB
Market development opportunities
Product for BC market –for cracking it is shipped to Oregon and returned
Should BC produce cracked-out nuts (Yamhill a cracked-out type)
High cost of land in relation to value of the crop
BC has mainly part-time farmers on smaller farms
Need higher-yielding varieties that have resistance to EFB
Restrictions by CFI on the import of Hazelnut trees to BC
The late Henry Wigand established a Nursery and promoted the B.C. hazelnut industry in the early 1980's and quickly developed close ties with the industry in Oregon.

Growers in 2012 represent about forty members that promote research, grower education, marketing and promotion of hazelnut and hazelnut products.

Henry won the Hazelnut Society of Oregon/Wash/BC "Grower of the Year" award because of his efforts to the Industry.

Likewise we now need to renew efforts to promote the Industry. How will we do this?
• BC had a few very small family sized processing facilities but they could not handle the volume coming on-stream and Barcelona Hazelnut Processors was now unable to do this.

• John VandenBrink established a processing facility in Chilliwack with a state-of-the-art drying facility; product however goes to the USA.

• This receiving station now processes about 60-70% of the BC production.
Canadian Hazelnuts – for local BC and Organic Sales

- Henry Wigand’s Barcelona Hazelnuts was purchased by Pentti Hanninen family and became Canadian Hazelnuts Inc.

- This original processing facility is now a source for B.C. Organic processing and sales including a store with a full range of products.
The Main Pests and Diseases in BC

- Leaf-rollers
- Aphids
- Scales
- Filbert blight (Bacterial blight)
- Eastern Filbert Blight (EFB)
EFB diseased branch in 2010
Variety trial

• When the threat of EFB became more real the BCHGA realized that alternative varieties for Barcelona, and Ennis are needed.
• Because of quarantine issues it was not possible to import plants from Oregon.
• Efforts were made to get EFB resistant trees produced & grown in BC
• Once that was in place we could start a variety Trial.
• Six orchards are in the trial which started the 1st phase in 2011.
• The 2nd phase starts in 2013 with plantings in early spring.
• Funding comes from grower’s levies and from IAF
New Varieties that are propagated in BC Trial

- Jefferson (in-shell market) with Eta and Theta (pollinators):
  for 2011 and also for 2013

- Yamhill & Sacajawea with Gamma and other pollinators (cracked-out market):
  for 2013
‘Jefferson’ Hazelnut
(OSU 703.007)

Rebecca L. McCluskey, Shawn A. Mehlenbacher, and David C. Smith

‘Jefferson’ (OSU 703.007) was developed and evaluated at Oregon State University in Corvallis, Oregon, and was released in January 2009. This variety combines very high resistance to eastern filbert blight (EFB) caused by the fungus <i>Anisognoma anomalum</i> (Peck) E. Müller with large nut size, good kernel quality, and high yields. ‘Jefferson’ was released for the in-shell market as an EFB-resistant replacement for ‘Barcelona’. Kernel quality is suitable for many end-uses. Like its predecessors ‘Santiam’ (February 2005) and ‘Fresnelli’ (January 2008), ‘Jefferson’ is suitable for planting in areas with high EFB disease pressure.

Tree growth and habit

Compared with ‘Barcelona,’ ‘Jefferson’ trees are a little smaller and have a slightly more upright growth habit (figure 1). Trees are moderately vigorous and have an upright, spreading canopy. They will be easy for growers to manage with occasional pruning. In other hazelnut cultivars, good light penetration into the canopy has been shown to increase nut set, nut size, and kernel size and reduce the occurrence of single-nut clusters that are common inside densely shaded canopies.

Tree size is estimated by measuring the trunk cross-sectional area at 30 cm from the soil line (table 1). Using this estimate, ‘Jefferson’ trees are 30%–40% smaller than the vigorous standard ‘Barcelona’ and 5%–10% smaller than ‘Lewis.’ When canopy width and height were measured in the ninth leaf, ‘Jefferson’ was 15% smaller than ‘Barcelona’ in both height and width. There was less than 10% difference in canopy height and spread between ‘Jefferson’ and ‘Lewis.’ Tree anchorage is strong, and no tendency to lean has been noted.

During the 8-year evaluation period, trees were irrigated regularly for the first 5 years. Establishment and performance of this cultivar under dry conditions have not been tested.

Yield

Yield from 2004–2008 of trees planted in 2002 is the basis for comparison. Marketable nut yield is the sellable portion of the crop, after blanks and kernel defects are removed, and is calculated for each year. Marketable kernel yield is also calculated: marketable nut yield x percent kernel (see table 1, footnote b).

Figure 1. ‘Jefferson’ tree in ninth leaf (top) and in seventh leaf in mid-October (bottom).

Rebecca L. McCluskey, senior research assistant; Shawn A. Mehlenbacher, professor; and David C. Smith, senior research assistant; all of the Department of Horticulture at Oregon State University.

Photos by Rebecca L. McCluskey. © Oregon State University.
**Yamhill’ Hazelnut (OSU 542.102)**

R.L. McCluskey, S.A. Mehlenbacher, and D.C. Smith

"Yamhill’ (OSU 542.102) was developed and evaluated by the hazelnut breeding program at Oregon State University, Corvallis, Oregon, and was released in January 2008. Trees of "Yamhill’ are compact and resistant to eastern leaf blight (EBF) caused by *Antirrhinum americana*. Compared to ‘Barcelona’, trees of 'Yamhill' are smaller but more productive, and nuts mature at the same time as those of 'Saturn' and 'Comice', approximately 10-15 days ahead of 'Barcelona'. Marketable nut yields exceed 'Barcelona’ and kernels have few defects, although they are small and best suited for the local market.

**Tree growth and habit**

Compared to ‘Barcelona’, ‘Yamhill’ trees have a more compact but spreading growth habit. They are 30 percent shorter, and trunk size, expressed as trunk cross-sectional area in cm², is 50 to 60 percent smaller (Table 1). However, because the trees have a spreading growth habit, canopy width is only 12 percent smaller than that of 'Barcelona’. ‘Yamhill’ trees are less vigorous than ‘Barcelona’, and trees are not overcrowding, after 10 years on 15-foot row spacing.

The tendency toward flatter branch angles allows good light penetration without excessive canopy foliage, limbs, or bark (Figure 1). Young trees should be pruned to select scaffolds with the most upright habit to facilitate ground application of herbicides and fertilizers, as well as mechanical harvest. Trees anchorage is strong, and a tendency to lean has not been noted.

During the 5-year evaluation period, 'Yamhill’ trees were irrigated for the first 5 years. Establishment and performance of this cultivar under dry conditions have not been tested.

**Yield**

Yield from 2003-2007 of trees planted in 2000 is the basis for comparisons. Marketable nut and kernel yield of ‘Yamhill’ exceeded ‘Barcelona’ in all years of testing (Figure 3 and Table 1). Cumulative marketable nut yields (kg/tree) exceeded ‘Barcelona’ yields by nearly 5 kg/tree, even though tree size is smaller (Figure 3).

**Nut and kernel quality**

Nuts of ‘Yamhill’ average 40 percent kernel. They are thin-shelled, round, and smaller (2.3 g) than either ‘Lewis’ (3.8 g) or ‘Barcelona’ (3.8 g) nuts (Figure 3, Table 1). Raw kernels have little fiber, are attractive, and weigh 0.5-1.1 g. Kernels blanch similar to those of ‘Lewis’ and ‘Barcelona’, and kernels' flavor, texture, and appearance are very good.

The incidence of kernel mold is very low, even in 2005 and 2006, when it was very high in kernels of ‘Lewis’ and

**Sacajawea’ Hazelnut (OSU 540.130)**

S.A. Mehlenbacher, D.C. Smith, and R.L. McCluskey

'Sacajawea’ (OSU 540.130) was developed and evaluated at Oregon State University, Corvallis, Oregon, and was released in February 2006. Compared to ‘Barcelona’, ‘Sacajawea’ is a slightly smaller tree but has a higher yield efficiency, a higher percentage kernel, fewer kernel defects, and smaller nuts. Nuts mature and fall free of the branch 10 to 15 days before ‘Barcelona’.

Trees of ‘Sacajawea’ were tested in outdoor exposure trials and expressed a level of quantitative resistance to eastern leaf blight (EBF) similar to the highly resistant ‘Tonda di Giordano’. This cultivar does not carry complete resistance to EBF.

**Horticultural characteristics**

**Tree growth and habit**

Trees have upright, rounded habit with multiple scaffolds that should be easy to maintain, although some pruning is required to allow adequate light into the canopy (Figure 1). Compared to trees of the same age, ‘Sacajawea’ trees are approximately 15 percent smaller than ‘Barcelona’ but larger than ‘Lewis’ as measured by trunk cross-sectional area (Figure 3, page 2).

**Yield and yield efficiency**

Field-run nut yield of ‘Sacajawea’ is similar to ‘Barcelona’, but nuts have fewer defects and a higher percentage kernel than either ‘Barcelona’ or ‘Lewis’, resulting in a consistently higher marketable yield than ‘Barcelona’ (Figure 4, page 2). ( Marketable nut and kernel yield is the field-run yield less the weight of nuts with defects.)

Cumulative marketable nut yield of ‘Sacajawea’ is less than that of ‘Lewis’ and ‘Barcelona’, and nuts exceed those of ‘Lewis’ in quality. Efficiency, which adjusts for differences in tree size, is

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**Additional information:**

Rebecca L. McCluskey, senior research assistant in horticulture; Shawn A. Mehlenbacher, professor of horticulture; David C. Smith, senior research assistant in horticulture; and Rebecca L. McCluskey, senior research assistant in horticulture, all of Oregon State University.
Trial Data collection and observation will include:

- Bud break
- Trunk diameter
- Dates for pollen shedding
- Flowering dates
- Harvest data
- Nut quality
What a Healthy Orchard should look like
A diseased EFB Orchard
Another EFB diseased Non-Maintained Orchard
And a third Orchard in the Fraser Valley
So how do we get from infected trees to these?
By Removing and Replanting? When should we do this? meanwhile… (during 6-7 year growth time)…

How do we Manage Orchards & Plan for Sustainability?
by Planting in phases

by Double Density

.... then in 5 yrs doubling orchard size

.... my 500 trees on 2.5 acres will become 5 acres

by Intercropping
Phase 1 planted 2011; phase 2 to be planted in 2013
Plantings at Double Density – every 2\textsuperscript{nd} tree to be removed after 2017 … picture taken July 2011
by value added markets

by selling intercropped harvests as well as the main crop
by Chipping Trees & Prunings … by Mulching Leaves

by adding Chips to Manure for compost
Those are some of the ways to have diverse agriculture, to be productive, to be more profitable, to have healthy farms and healthy ecosystems… thus creating a sustainable land-use system… all on Poplar Grove Arbour Hazelnut farm in Agassiz.
Acknowledgements

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