



# Yamhill Hazelnut

## (OSU 542.102)

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'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 completely resistant to eastern filbert blight (EFB) caused by *Anisogramma anomala* (Peck) E. Müller. Compared to 'Barcelona', trees of 'Yamhill' are smaller but very productive, and nuts mature at the same time as those of 'Santiam' and 'Gamma', 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 kernel 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 cm<sup>2</sup>, 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 crowding after 10 years on 15-foot in-row spacing.

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

During the 8-year evaluation period, 'Yamhill' trees were irrigated for the first 6 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 comparison. Marketable nut and kernel yield of 'Yamhill' exceeded 'Barcelona' in all years of testing (Figures 3 and 4 and Table 1). Cumulative marketable nut yields (kg/tree) exceeded 'Barcelona' yields by nearly 5 kg/tree, even though tree size is smaller (Figure 5).

### Nut and kernel quality

Nuts of 'Yamhill' average 49 percent kernel. They are thin-shelled, round, and smaller (2.3 g) than either 'Lewis' (2.9 g) or 'Barcelona' (3.8 g) nuts (Figure 2, Table 1). Raw kernels have little fiber, are attractive, and weigh 0.8–1.1 g. Kernels blanch similar to those of 'Lewis' and 'Barcelona', and kernel texture, flavor, 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



Figure 1.—'Yamhill' tree in 10th leaf. Height is 9.2 feet, and canopy spread is 11 feet.



Figure 2.—Nuts, raw kernels, and blanched kernels. Left to right: 'Barcelona', 'Lewis', and 'Yamhill'.

‘Santiam’. Poorly filled kernels were noted in 2007, the second successive year without irrigation, but they were still of marketable quality. Overall, kernel defects are very low in ‘Yamhill’.

### Harvest

Nuts fall free of the husk at maturity and can be mechanically harvested 10 days ahead of ‘Barcelona’. In most years, ‘Yamhill’ harvest will be completed before the beginning of ‘Barcelona’ harvest.

### Propagation

Layers root well and are easy to propagate, although they are smaller in height and caliper than those of ‘Barcelona’. Survival rate in the trial orchard was excellent under irrigated conditions. Cultures have been established *in vitro* for micro-propagation on a commercial scale. ‘Yamhill’ was released as a public cultivar and may be propagated without restriction in the United States.

### Pest and disease tolerance

‘Yamhill’ is the second kernel variety released by Oregon State University to carry complete resistance to EFB conferred by a dominant gene from ‘Gasaway’. Growers will **not** need to use chemical sprays to protect trees from EFB.

Susceptibility to bacterial blight caused by *Xanthomonas campestris* pv. *corylina* has not been determined, although no trees in the initial test trials were lost due to disease. Trees of ‘Yamhill’ appear to have a high tolerance to big bud mite infestation, as annual ratings for 4 years indicated that blasted buds were rare.

### Flowering characteristics

Female flowers of ‘Yamhill’ begin to emerge in late December and remain red until early February, a pattern very similar to that of ‘Barcelona’ (Figure 6). Pollen shed duration is more variable, depending on winter temperatures and tree age. Trees produce large numbers of catkins that begin shedding pollen in the first week of January, with peak pollen shed typically occurring in the third week. In some years, however, catkins will continue to shed pollen into February. Pollen quality and quantity is very good.

### Pollinizer selection

Pollinizer recommendations for ‘Yamhill’ include only cultivars that are completely resistant to EFB. Female flowers of ‘Yamhill’ express incompatibility alleles  $S_8$  and  $S_{26}$ , but only the  $S_8$  allele is expressed in the pollen.

A mix of at least three pollinizers is recommended, with one-third each of ‘Gamma’ ( $S_2 S_{10}$ ) and ‘Santiam’ ( $S_3 S_{15}$ ) to provide compatible pollen during the midseason flowering period. Both ‘Gamma’ and ‘Santiam’ mature nuts at about the same time as ‘Yamhill’ and are compatible in a harvest mix. A combination of later-shedding types is recommended for the remaining third, including

‘Jefferson’ ( $S_1 S_3$ ), ‘Delta’ ( $S_1 S_{15}$ ), and ‘Epsilon’ ( $S_1 S_4$ ) (Figure 6). To ensure good pollination, a *minimum* of 6 to 10 percent of the trees in the orchard should be shedding compatible pollen throughout the female bloom period.

Any cultivar that expresses  $S_8$  or  $S_{26}$  in its pollen is **not** compatible with flowers of ‘Yamhill’. ‘Lewis’ and ‘Clark’ express  $S_8$  in their pollen and thus are **not** compatible with ‘Yamhill’. Although pollen of ‘Barcelona’ ( $S_1 S_2$ ) and ‘Hall’s Giant’ ( $S_5 S_{15}$ ) is compatible, these cultivars are susceptible to EFB and planting them is not advised.

### Development

‘Yamhill’ (OSU 542.102) was developed by Dr. Shawn Mehlenbacher and David Smith of Oregon State University in Corvallis, Oregon. It resulted from a cross of OSU 296.082 x VR 8-32 made in 1990. Its pedigree includes Sicilian, Spanish, and Turkish grandparents. EFB resistance was inherited from ‘Gasaway’, an obsolete pollinizer. Data in this report were obtained from two trials planted in 2000 and 2001 in Corvallis, Oregon.

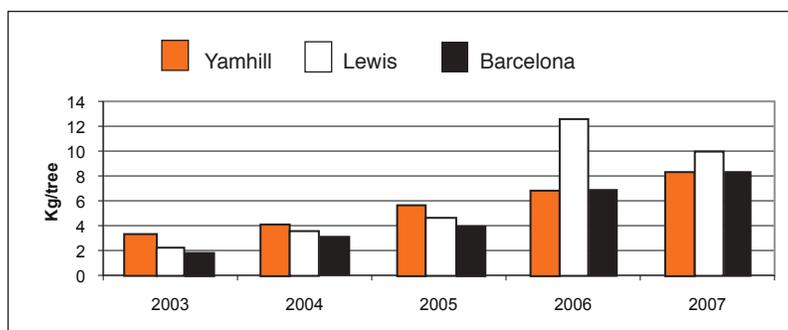


Figure 3.—Marketable nut yield (trees planted in 2000).

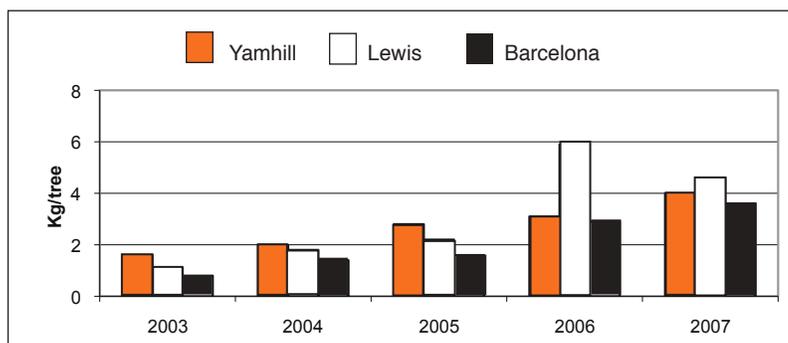


Figure 4.—Marketable kernel yield (trees planted in 2000).

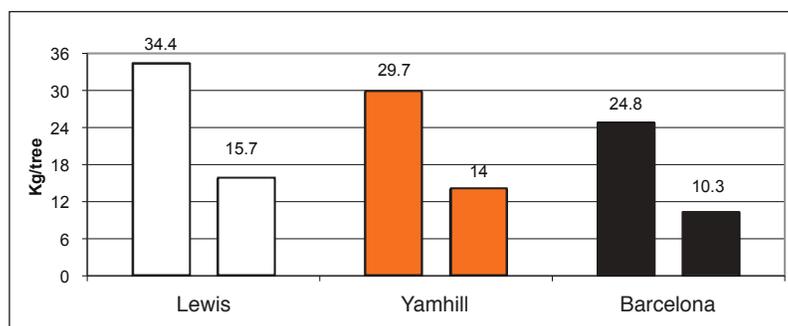


Figure 5.—Cumulative marketable nut and kernel yield, 2003–2007 (trees planted in 2000).

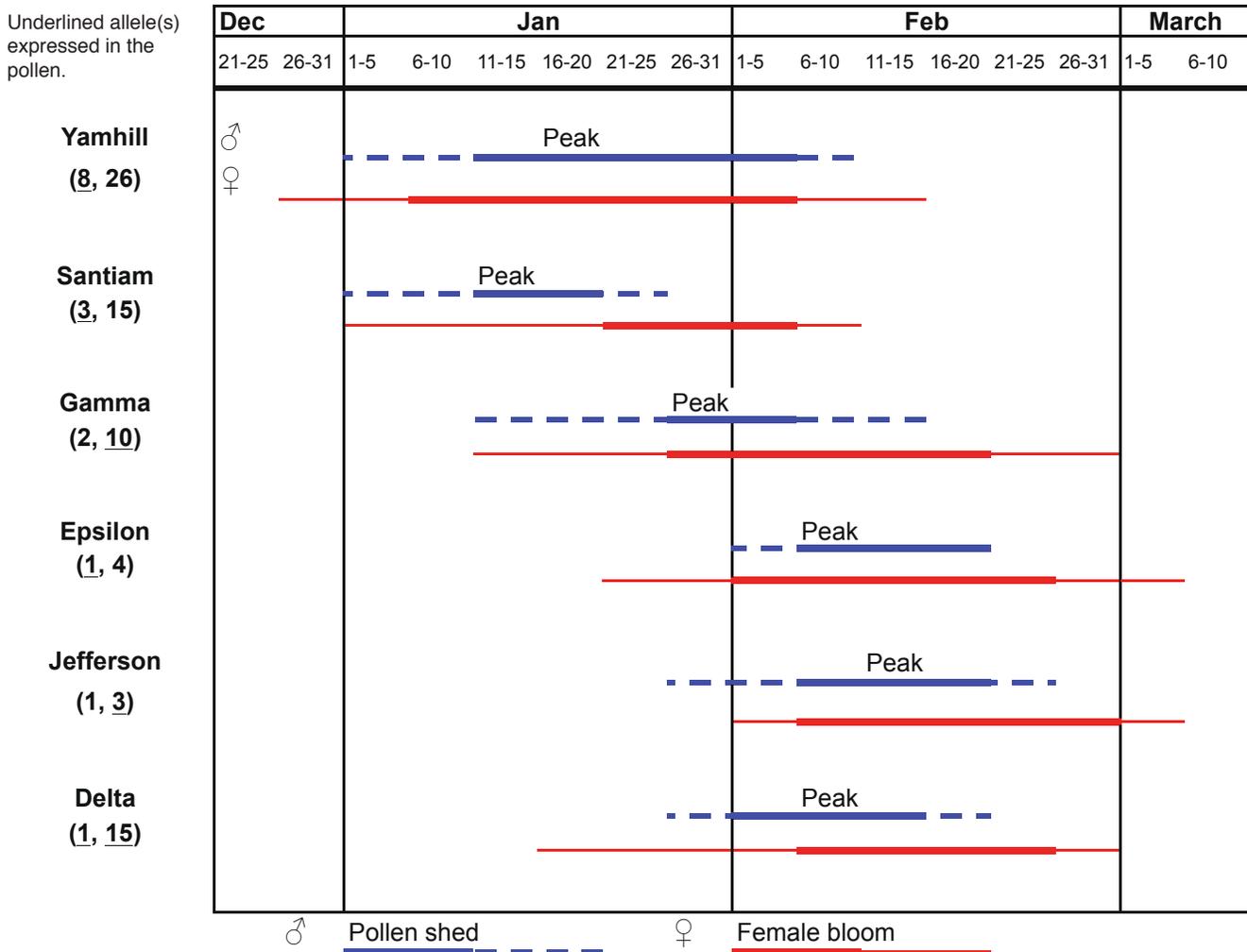


Figure 6.—Typical pollen shed periods of 'Yamhill' and recommended pollinizers in the Willamette Valley of Oregon. A mix of pollinizers is recommended to ensure adequate pollination under variable weather conditions. A suitable pollinizer mix would be one-third 'Gamma', one-third 'Santiam', and the remaining one-third a mixture of late-shedding types such as 'Epsilon', 'Jefferson', and 'Delta'.

**For more information**

Many OSU Extension Service publications are available online at no charge. Visit the online Publications and Multimedia catalog at <http://extension.oregonstate.edu/catalog/>. Enter the word "hazelnut" to bring up a list of publications relating to hazelnuts.

- EC 1219 *Growing Hazelnuts in the Pacific Northwest*
- EC 1499 *Detecting and Controlling Eastern Filbert Blight*
- EM 8328-E *2009 Hazelnut Pest Management Guide for the Willamette Valley*
- EM 8640-E *Hazelnut Cultivar: 'Lewis' (OSU 243.002)*
- EM 8727-E *New Hazelnut Cultivar 'Clark' (OSU 276.142)*
- EM 8786-E *Hazelnuts Nutrient Management Guide*
- EM 8836-E *Hazelnut Pollinizer Cultivars: Gamma, Delta, Epsilon, Zeta*
- EM 8890-E *'Santiam' Hazelnut (OSU 509.064)*
- EM 8914-E *'Sacajawea' Hazelnut (OSU 540.130)*
- EM 8946-E *Identification of Invasive and Reemerging Pests on Hazelnuts*

## ‘Yamhill’ (OSU 542.102) in a nutshell

**Table 1. Tree, nut, and kernel characteristics.**

	‘Yamhill’	‘Lewis’	‘Barcelona’
Tree size after 10 years			
Height, ft (m)	9.2' (2.8 m)	11.7' (3.5 m)	12.9' (3.9 m)
Canopy width, ft (m)	11.0' (3.3 m)	10.9' (3.2 m)	12.5' (3.7 m)
TCSA <sup>a</sup>	77	109	153
Cumulative yield, 2003–2007 (kg/tree)			
Field-run (nut)	31	40	28
Marketable (nut)	30	34	25
Marketable (kernel)	14	16	10
Nut weight (g) <sup>b</sup>	2.3	2.9	3.8
Kernel weight (g) <sup>b</sup>	1.1	1.4	1.7
Percent kernel (%)	49	47	43
Blanch rating (1–7; 7 = doesn't blanch)	4.1	4.1	3.9
Nuts free of defects (%)	84	64	64
Kernel defects (%) <sup>b</sup>			
Blank + brown stain	4.9	4.2	12.3
Moldy kernels	1.0	9.0	2.4
Shrivel	1.0	2.0	1.1
Poor fill	9.3	22.3	17.0

<sup>a</sup>TCSA = Trunk cross-sectional area (cm<sup>2</sup>), measured 30 cm (12 inches) above the soil line.

<sup>b</sup>Nut and kernel weight based on 10 well-filled nuts; percentage of defects used 100-nut samples and is an average of 4 years.

### Flowering characteristics

Female flowers express incompatibility alleles S<sub>8</sub> S<sub>26</sub> and bloom from late December to the end of January, about the same time as ‘Barcelona’. Pollen expresses only S<sub>8</sub>.

### Time and duration of pollen shed

Pollen shed normally begins in the middle of January and lasts about 3 weeks, but may start a week earlier or later depending on the weather.

### Pollinizer recommendations

One-third each of ‘Gamma’ (S<sub>2</sub> S<sub>10</sub>) and ‘Santiam’ (S<sub>3</sub> S<sub>15</sub>)

One-third of later-shedding cultivars such as ‘Epsilon’ (S<sub>1</sub> S<sub>4</sub>), ‘Jefferson’ (S<sub>1</sub> S<sub>3</sub>), and ‘Delta’ (S<sub>1</sub> S<sub>15</sub>).

All recommended pollinizers are completely resistant to eastern filbert blight.

### Time of harvest

Early, same as ‘Gamma’ and ‘Santiam’, about 10–14 days ahead of ‘Barcelona’.

### Pest and disease tolerance

*Eastern filbert blight (EFB)*: Complete resistance from ‘Gasaway’.

*Big bud mite*: High level of resistance (rated 1.1 on a scale of 1–5; 1 = few damaged buds).

*Bacterial blight*: Trees have not been tested, but no blight has been observed in test trees.

*Kernel mold*: Frequency is consistently low, even in years when it is high in ‘Lewis’.

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