



# 'Sacajawea' Hazelnut (OSU 540.130)

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'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 percent kernel, fewer kernel defects, and smaller nuts. Nuts mature and fall free of the husk 10 to 15 days before 'Barcelona.'

Trees of 'Sacajawea' were tested in outdoor exposure trials and expressed a level of quantitative resistance to eastern filbert blight (EFB) similar to the highly resistant 'Tonda di Giffoni.' This cultivar does not carry complete resistance to EFB.

## Horticultural characteristics

**Tree growth and habit.** Trees have an 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 percent 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' trees in their seventh leaf was greater than 'Barcelona' and similar to 'Lewis' trees. Yield efficiency, which adjusts for differences in tree size, is

intermediate between 'Barcelona' and 'Lewis' (Figure 5, page 2). In the 5 years that yield data have been collected, marketable kernel yield of 'Sacajawea' exceeded 'Barcelona' in all years, and the cumulative kernel yield was similar to 'Lewis' (Figure 6, page 2).

**Harvest time.** More than 95 percent of the nuts fall free of the husk at maturity, and nuts can be harvested 10 to 15 days before 'Barcelona.' In most years, the harvest of 'Sacajawea' will be completed before the beginning of the 'Barcelona' harvest.

**Nut and kernel quality.** 'Sacajawea' is being released for the kernel market, but nut size is acceptable for the in-shell market (Figure 2). Nuts and kernels of 'Sacajawea' are attractive and have few defects. Flavor is excellent. There are few poorly filled nuts and blanks, and the incidence of moldy kernels is low, similar to 'Barcelona.' In 2005 and 2006, kernel mold was a problem in 'Lewis' and 'Santiam,' but was minimal in 'Sacajawea.' Kernel size is slightly larger than 'Lewis,' but smaller than 'Barcelona,' similar to that of the Italian cultivars 'Tonda di Giffoni' and 'Tonda Romana.' Kernels blanch well, similar to 'Clark' and better than 'Lewis' or 'Barcelona.' On a blanching scale of 1 to 7 (1=best), 'Sacajawea' rates 2–3.

**Flowering characteristics.** Female bloom occurs at the same time as 'Barcelona' flowers, first emerging in mid-December and lasting until mid-February. Trees produce a large amount of pollen that sheds in early midseason, peaking in the second to third week in January, similar to 'Lewis.'

**Pollinizer selection.** Female flowers of 'Sacajawea' express alleles  $S_1$  and  $S_{22}$ , but only  $S_1$  is expressed in the pollen. The planting of three pollinizer



Figure 1.—Tree growth habit.



Figure 2.—Raw kernels, blanched kernels, and nuts of 'Sacajawea.'

cultivars that will provide pollen to cover the female bloom period from late December to mid-February is recommended.

'Lewis' ( $S_3 S_8$ ), 'Gamma' ( $S_2 S_{10}$ ), and 'Hall's Giant' ( $S_5 S_{15}$ ) are cross-compatible with 'Sacajawea' and with each other. 'Lewis' pollen would cover the early bloom of both 'Sacajawea' and 'Gamma,' and 'Hall's Giant' would cover the mid and later bloom of all three. Of these three recommended pollinizers, only 'Gamma' carries complete resistance to EFB.

Cultivars whose pollen expresses either  $S_1$  or  $S_{22}$  are not compatible with 'Sacajawea,' including 'Barcelona' ( $S_1 S_2$ ), 'Delta' ( $S_1 S_{15}$ ), 'Epsilon' ( $S_1 S_4$ ), and 'Zeta' ( $S_1 S_1$ ).

**Pest and disease tolerance.** Trees of 'Sacajawea' have a high level of quantitative resistance to EFB, similar to 'Tonda di Giffoni,' but the cultivar is not completely resistant and does not carry the 'Gasaway' gene. Trees have been evaluated for big bud mite, and ratings indicate a high level of resistance, similar to 'Barcelona.'

**Propagation.** Layers root easily and abundantly, and are slightly smaller in caliper than 'Barcelona.' Tissue cultures have been made available to private companies for micro-propagation on a commercial scale.

**Development**

'Sacajawea,' tested as OSU 540.130, resulted from a cross of OSU 43.091 x 'Sant Pere' made in 1990 by Shawn A. Mehlenbacher and David C. Smith at the OSU research farm in Corvallis, Oregon. In 1999, trees were included in a replicated yield trial that included 'Barcelona' and 'Lewis' as standards. Additional trees were grown and observed by grower Wayne Chambers in Albany, Oregon. His observations are consistent with those from the Corvallis trial.

■ Sacajawea    ▨ Lewis    ■ Barcelona

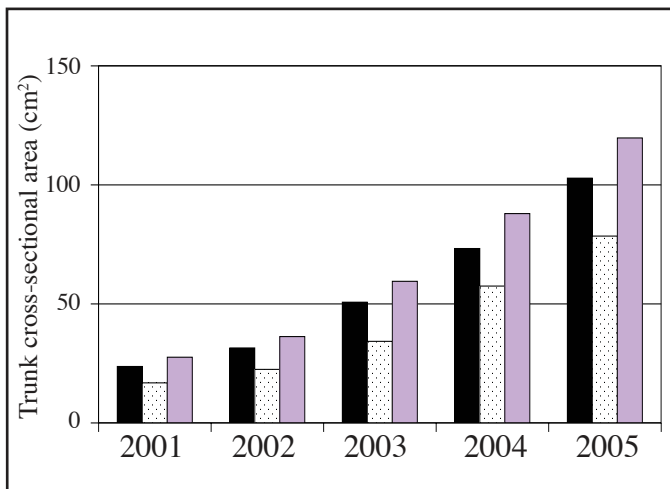


Figure 3.—Trunk cross-sectional area.

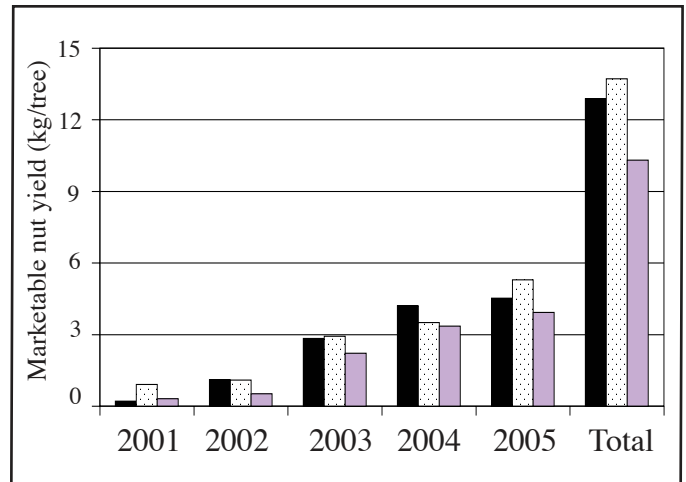


Figure 4.—Marketable nut yield.

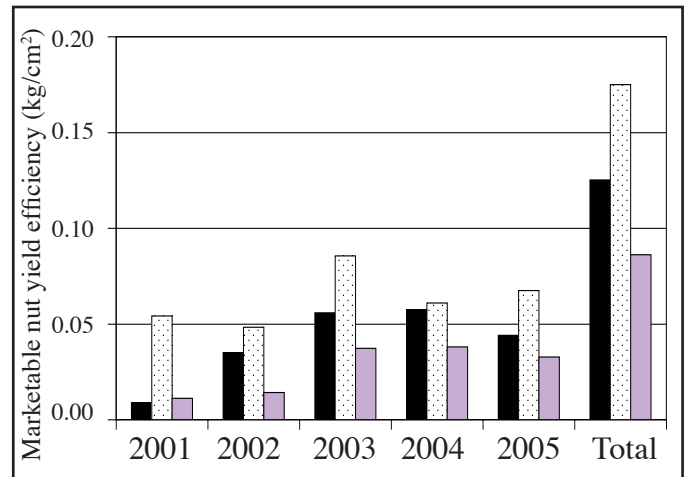


Figure 5.—Marketable nut yield efficiency.

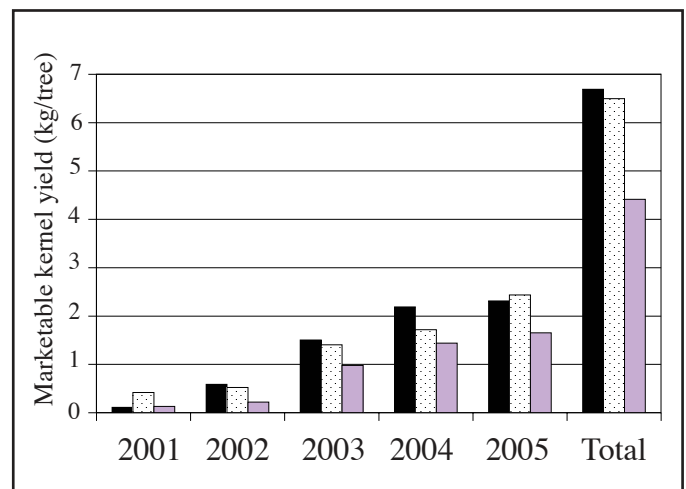


Figure 6.—Marketable kernel yield.

## ‘Sacajawea’ (OSU 540.130)

### Flowering characteristics

Incompatibility alleles:  $S_1S_{22}$ —both alleles are expressed in female flowers, but only  $S_1$  is expressed in the pollen

### Time of pollen shed

Early midseason (about the same time as ‘Barcelona’ and ‘Gamma’)

### Catkin density

Produces large amount of good-quality pollen

### Duration of pollen shed

Short to intermediate (similar to ‘Clark,’ ‘Santiam,’ and ‘Gamma’; shorter than ‘Barcelona’)

### Pollinizer recommendations

‘Gamma’ ( $S_2S_{10}$ )—midseason

‘Lewis’ ( $S_3S_8$ )—early midseason

‘Hall’s Giant’ ( $S_5S_{15}$ )—late

Note: The four VR pollinizers for ‘Barcelona’ have  $S_3$  pollen and would be compatible with ‘Sacajawea.’

### Estimated time of harvest

Same as ‘Santiam,’ about 10 to 15 days earlier than ‘Barcelona.’ Nuts fall free from husk.

### Nut and kernel quality (average results from 2002–2005)<sup>a</sup>

	‘Sacajawea’	‘Lewis’	‘Barcelona’
Nut weight (g)	2.8	2.9	3.8
Kernel weight (g)	1.4	1.4	1.7
Kernel percentage (%)	52.0	48.0	43.0
Blanching rating (1–7; 1=100% removal of pellicle)	2.9	4.0	4.2
Cumulative marketable yield (2001–2005)			
Nut (kg/tree)	12.9	13.7	10.3
Kernel (kg/tree)	6.7	6.5	4.4
Nuts free of defects (%)	87.0	76.0	61.0
Defects (%)			
Blank + brown stain	5.1	3.1	11.2
Mold	2.6	7.4	2.4
Shrivel	1.1	0.8	4.4
Poor fill	3.5	11.8	18.9

<sup>a</sup>Nut and kernel weight based on 10 well-filled nuts; remainder based on 100-nut samples.

### Pest tolerance

Eastern filbert blight: High level of quantitative resistance, similar to ‘Tonda di Giffoni’

Kernel mold: Low incidence of mold (similar to ‘Barcelona’)

Big bud mite: High level of resistance, like ‘Barcelona’ (rated 1.1 on a scale of 1–5; 1=best)