'Willamette' Hazelnut

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'Willamette' hazelnut (*Corylus avellana* L.) was released in 1990 for the blanched kernel market. Compared with 'Barcelona', the leading cultivar in Oregon, 'Willamette' yields 50% more marketable kernels. Nuts have thinner, more attractive shells with fewer defects. The pellicle is removed easily with dry heat, and the resulting white kernels are of excellent quality for use in pastries and confections. 'Willamette' is the first cultivar released by the hazelnut breeding program at Oregon State Univ. (OSU).

'Barcelona' and 'Ennis', the two leading cultivars in Oregon, produce large nuts and are well suited for the in-shell market. However, the in-shell market is limited, and currently half of the Oregon hazelnut crop is cracked and sold as kernels, even though the current cultivars are poorly suited for this purpose. Expansion of the hazelnut hectareage in Oregon requires the development of

new cultivars suited for the blanched kernel market. 'Willamette' was released to fill this need.

Origin

'Willamette' resulted from a cross of 'Montebello', the leading cultivar in Sicily, and 'Compton', a selection of O.C. Comp-

ton of Corvallis, Ore. 'Compton' appears to be a hybrid between 'Barcelona' and the pollinizer cultivar Daviana. The controlled pollination of 'Montebello' x 'Compton' was made in 1973 by M.M.T. and resulted in a population of 395 seedlings. 'Willamette' first set a crop of nuts in 1978, and subsequent testing demonstrated that it was the best selection in the progeny. Trees were propagated for further evaluation under the designation OSU 43-58. Nuts from the original tree and grafted trees have been evaluated in Corvallis annually since that time.

Description

'Willamette' is most easily described by comparing it with 'Barcelona', an old cultivar that represents 80% of the hazelnut trees in Oregon. Yield and size distribution data (Tables 1 and 2) are from a replicated trial of grafted trees established in 1983. Data on

Table 1. Yields of 'Willamette' and 'Barcelona' hazelnuts 1985-90.^z

Cultivar	Yield (kg/tree)						Total
	1985	1986	1987	1988	1989	1990	
Willamette	0.40 a	0.85	0.69 b	1.46	2.79	5.79	12.0
Barcelona	0.22 b	0.75	1.83 a	1.19	1.33	5.55	10.9

^zTrees grafted on 'Daviana' rootstocks and planted Spring 1983. Randomized complete-block design with three replications, five trees per block. Mean separation by LSD, *P* = 0.05. Difference not significant in 1986, 1988-90, or for total.

Table 2. Size distribution of in-shell 'Willamette' and 'Barcelona' hazelnuts.

Cultivar	Year	Percentage in each size category ^z			
		Small	Medium	Large	Giant-Jumbo
Barcelona	1988	1	8	72	19
	1989	0	5	93	2
	1990	1	15	79	5
Willamette	1988	7	40	53	0
	1989	5	52	43	0
	1990	5	54	41	0

^zSize categories in mm (diam.): small < 17.9 < medium < 19.4 < large < 22.2 < giant-jumbo.

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Fig. 1. Nuts and kernels of 'Willamette' hazelnut (scale, in centimeters).

Table 3. Nut and kernel defects in 'Willamette' and 'Barcelona' hazelnuts (%)².

Cultivar	No. trees	Marketable kernels	Blanks	Brown stain	Moldy kernels	Black tips	Shriveled kernels	Poor fill
Willamette	8	75.7	9.2	0.0	4.1	1.0	1.2	9.2
Barcelona	2	63.3	14.4	4.0	1.5	0.1	2.5	14.0

²Averages for 1987-90 crops. Grafted trees were in an unreplicated observation plot.

nut weight, percent kernel, ease of pellicle removal, and percentage of defective nuts and kernels (Table 3) are from an unreplicated observation trial. Trees are also currently being evaluated in several grower orchards in the Willamette Valley, Ore., and in Bordeaux, France, where performance data are nearly identical to those in Corvallis (E. Germain, personal communication).

Trees of 'Willamette' are vigorous, up-right-spreading, and similar in size and growth habit to 'Barcelona'. Layers root easily and abundantly and are easy to handle in the nursery.

Nut yields of 'Willamette' are slightly higher than those of 'Barcelona' (Table 1). Nuts of 'Willamette' are smaller (2.9 vs. 3.8 g) and have thinner shells (50% vs. 44% kernel) than those of 'Barcelona'. While most 'Barcelona' nuts fall into the large category, those of 'Willamette' are distributed about evenly between medium and large (Table 2). The shells are less pubescent than those of 'Barcelona', are a rich, chestnut brown and very attractive (Fig. 1). Nuts of 'Willamette' are acceptable for in-shell sales, although this market generally prefers larger nuts. Raw kernels of 'Willamette' have a small amount of fiber on the pellicle, while those of 'Barcelona' are heavily fibrous. This fiber is not only unattractive, but it also imparts a bitter flavor to the kernels. Most of the pellicle and attached fiber of 'Willamette' kernels is removed by dry heat blanching, while only

half of the pellicle of 'Barcelona' kernels is removed by this process. Pellicle removal ratings for 'Willamette' are similar to those of its parent, 'Montebello', and 'Tonda Gentile delle Langhe', and only slightly inferior to the ratings for 'Tombul', 'Tonda di Giffoni', and 'Negret' (Mehlenbacher and Smith, 1988). Kernel flavor and texture have been rated subjectively as very good by several scientists, growers, and processors, and similar to the leading cultivars in Italy and Spain.

'Willamette' trees have consistently yielded nuts with fewer defects than 'Barcelona', especially fewer blanks and fewer poorly filled nuts (Table 3). The kernels in these poorly filled nuts are about two-thirds the size of normal, plump kernels but are marketable. Brown stain disorder, which causes serious reductions in yield in some 'Barcelona' orchards in certain years, is extremely rare in 'Willamette'. 'Willamette' does have a higher frequency of moldy kernels than 'Barcelona', but most of this mold is on the pellicle surface and is removed by blanching. Yield of good kernels, the product of nut yield, percentage that is kernel, and percentage of good nuts, is 50% higher for 'Willamette' than for 'Barcelona'.

Nuts are borne in clusters of one to five in husks ≈50% longer than the nuts. Nuts are on the ground and ready to be harvested mechanically ≈1 week later than those of 'Barcelona'. Late maturity, which is the result of some of the nuts failing to fall free

'Willamette' has incompatibility alleles S₁ and S₂. Both alleles are expressed in the stigmas, but only S₃ is expressed in the pollen (Mehlenbacher, and Thompson, 1988). 'Willamette' sets many catkins that start to shed pollen early in the season, with 'Tonda di Giffoni' and 'Ennis'. The catkins continue to shed pollen over an extended period. Female anthesis is also early, so an early pollinizer is required. 'Barcelona' and 'Ennis' pollen are incompatible on stigmas of 'Willamette'. 'Negret' is an adequate pollinizer. 'Tonda di Giffoni' is the recommended pollinizer. Its use is particularly attractive, as both 'Tonda di Giffoni' and 'Willamette' are well suited for the blanched kernel market and mature at about the same time. They both flower early in the season and could serve as pollinizers for each other.

Big bud mites are serious pests in all of the world's major producing regions. 'Willamette' and the Spanish cultivar Casina have consistently been given intermediate ratings, while 'Barcelona' and 'Tonda di Giffoni' are highly resistant and 'Ennis' and 'Daviana' are highly susceptible. Chemical control of this pest on 'Willamette' will be unnecessary in most situations.

Eastern filbert blight, caused by the fungus *Anisogramma anomala* (Peck) E. Muller, is a serious canker disease in the northern third of the Willamette Valley. Preliminary results indicate that 'Willamette', 'Casina', 'Tonda di Giffoni', and 'Barcelona' have a moderate level of resistance to this disease (K. Johnson and J. Pinkerton, personal communication). With a combination of chemical and cultural control methods, 'Willamette' likely can be grown near infected areas. The highly susceptible 'Ennis', 'Butler', and 'Daviana' should not be planted in areas where eastern filbert blight is present.

Availability

'Willamette' was released as a public cultivar. There are no restrictions on its propagation. Trees are currently available from several nurseries. A list of these nurseries and limited quantities of scion wood are available from the senior author.

Literature Cited

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