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Growing Walnuts in the Pacific Northwest

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Growing Walnuts in the Pacific Northwest

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Early in this century, many acres of land in western Oregon and Washington were devoted to walnut production. These nuts all came originally from the Middle East and are known as Persian walnuts.

Because of severe fall and early winter freezes that occurred about once in every 20 years, wind storms, the black-line graft union disorder, walnut husk fly infestation, low-producing varieties, and strong competition from California, the Pacific Northwest's walnut industry has almost disappeared.

A few orchards remain, mostly in western Oregon and Washington, along with many trees in housing developments, along city streets, and elsewhere. These trees still need management, and homeowners are still planting new trees. This publication applies to both commercial and home plants.

The cool, wet growing season west of the Coast Range favors development of blight, kernel shrivel, and shell perforation. East of the Cascade Mountains, production is limited by low winter temperatures and late-spring and early-fall frosts.

Trees on river terraces or valley floors have sustained greater losses from late spring frosts than those on hillsides. Orchards on the valley floor, where soil is deeper, have borne more heavily than those on hillsides when late spring frosts did not occur.

Before planting new trees, either commercially or on a homesite, use an auger, soil tube, or posthole digger to determine if the soil is at least 6 feet deep. You may find solid rock a few feet beneath the surface, or compact subsoils with a mottled color, indicating poor aeration and drainage.

With few or no pores large enough for roots to enter, this kind of subsoil layer often supports a water table that restricts root growth. Some surface soils are underlain by loose gravel and coarse sand, which permit little or no root growth.

Excessively high temperatures usually are not a limiting factor in any part of western Oregon and Washington. However, occasional temperatures around 100°F may cause sunburn on the hulls of the nuts and may result in dark-colored kernels, kernels with black specks on them—or even complete failure to develop—depending on the time in the season when the high temperature occurs.

When the growing season has been unusually cool, thin shell perforation and shriveled kernels have been a problem. Under the mild climatic conditions of the western walnut-growing areas, trees are slow in attaining full dormancy in fall or early winter. As a consequence, early cold periods may severely injure many trees.

Spring frosts damage the walnut crops much more frequently than winter freezes injure the tree. Varieties that leaf out very early may be injured by spring frosts; do not consider them for this area. Even late-leafing varieties such as Franquette can be injured by late spring frosts if trees are located in a frost pocket.

Most walnut varieties may produce a few nuts when 5 to 6 years old, but they are not considered mature or in commercial production until they are 10 years old. Two-thirds of a ton per acre is considered a good yield for a healthy, mature walnut orchard in the Pacific Northwest. In a homesite, with controlled watering and fertilization, a good tree might yield about 100 pounds of nuts annually. Many produce only half that amount; the reasons for this variation may include variety selection, pollenization, fertilizer, water, soil type, and frost.

Varieties of walnuts

Satisfactory trees for planting should have l-year-old tops and 3-year-old roots. They should be 6 to 8 feet high. Trees satisfactory for western Oregon and Washington are only available from nurseries in the area. California varieties often come on black walnut roots and are not satisfactory for this area.

Franquette

Franquette, the principal walnut grown in Oregon and Washington, has been popular because of its good shell seal and very light kernel color. Franquette trees bloom much later than most varieties and thereby usually escape spring frosts. Franquette trees have been very severely injured or killed by winter freezes and have suffered less severe damage in mild freezes. They come into bearing slowly and produce less than a number of other varieties.

The nuts are quite variable in size, with a tendency to be small in heavy cropping years. They are highly susceptible to walnut blight. Shriveled kernels are more frequently encountered with Franquette than with other varieties.

Spurgeon

Spurgeon trees are more resistant to early fall and winter freezes than Franquette and are sufficiently hardy for this region. They leaf out with Franquette in spring, and the nuts mature at about the same time. The tree is moderately vigorous and moderately productive. It is less susceptible than Franquette to walnut blight.

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Franquette walnuts (natural size)

Spurgeon walnuts (natural size)

Hartley walnuts (natural size)

Adams walnuts (natural size)

The nut is larger than Franquette, elliptical in shape, and has a slightly higher percent of kernel. Since it has little tendency to shrivel, the kernel is usually more plump than Franquette. Spurgeon has been more productive than Franquette. It is especially attractive to the walnut husk fly.

Hartley

Hartley, which originated in California, is not cold-hardy enough for Oregon and Washington, except on frost-free hillsides. Hartley leafs out 10 to 14 days before Franquette and matures its nuts from 12 to 14 days earlier. It is more susceptible to spring frosts than

Franquette. Catkins (pollen-producing male flowers) of Hartley are often lost to frost, but female flowers are perfectly timed for Franquette catkins.

The tree is moderately vigorous, often with weak crotches. The limbs tend to be flexible and drooping, and the tree is more difficult to train. Hartley is a heavy producer. Franquette or Spurgeon are suggested as pollinizers. Hartley is susceptible to blight.

Selections of Manregian parentage

Numerous seedling selections from open-pollinated seed of the Manregian walnut have been made. All of these selections bloom earlier than Franquette during a time when, if planted on a river bottom or other frosty sites, they would suffer frequent crop loss due to frosts. Most are hardy enough for western Oregon and Washington hillside sites.

Chambers No. 9 and Wepster No. 2 are among the better Manregian selections. All have large nuts and light kernels. Chambers No. 9 is an outstandingly heavy producer. Its nuts are consistently large and round to elongate in shape. They have a moderate tendency to shrivel. Wepster No. 2 has large nuts with a high percent kernel and has little tendency to shrivel.

Adams trees leaf and bloom 10 to 14 days before Franquette, and the nuts mature 12 to 14 days earlier. It is hardy enough for this region, but spring frosts often eliminate the crop.

The Adams tree is vigorous, upright, and very slow to come into production. It is comparatively unproductive and bears on terminal and lateral shoots. It is slightly tolerant of walnut blight. The nut is larger than Franquette, with good flavor and moderate tendency to shrivel.

California varieties and selections

Most California commercial varieties leaf out too early in the spring to escape frost injury in Oregon and Washington. Frost injury reduces yields. Among these varieties are Eureka, Payne, Serr, Lompoc, Gustine, Trinta, Chico, Amigo, Pedro, Tehama, Nugget, and others. No California varieties tested have proved cold-hardy enough for this area.

Carpathian varieties and selections

Some Carpathian varieties and selections are reputed to be sufficiently cold-hardy to be grown in certain localities east of the Cascades.

Rootstocks

Because of their vigorous growth, northern California black walnut (*Juglans hindsii* Jeps.) seedling rootstocks were commonly used for Persian walnuts.

A girdling of the wood at the union between the black walnut rootstock and the top, known as *blackline*, has killed many trees—some after years of production. A thin, black line develops in the graft union and slowly extends around the entire tree until it eventually girdles it and causes its death.

Sometimes this girdling is rapid (3 to 4 years), and sometimes it is slow (8 to 10 years). However, once it starts, it never disappears, and no treatments tried so far have corrected it. The use of black walnut rootstock in the Northwest is not recommended.

Rootstocks grown from seed of the Manregian varieties grow vigorously, are of the Persian species, and are not susceptible to blackline. They are being used as rootstocks for Persian varieties in the Northwest. Carpathian seedlings are also used.

Pollination and set of nuts

All walnut varieties will set a full crop of nuts when self-pollinated, provided pollination takes place when the female flowers are receptive. Self-pollination means that the pollen comes from male flowers (catkins) of the same variety, but not necessarily the same tree.

Inadequate pollination may occur because the catkins shed pollen either before or after the female flowers are receptive. In such cases, it is necessary to plant a pollinizer variety that sheds pollen during the peak period of female-blossom receptivity of the main variety.

In some unusually warm seasons, the Franquette variety sheds all of its pollen before most of the female blossoms are receptive. This results in low yields in such years. This tendency is especially evident in young Franquette trees.

As the tree ages, there is a greater spread in time of male and female bloom. The older the tree is, the more overlap of male and female bloom there will be in a given season. The varieties Moyer and Meylan are satisfactory pollinizers for Franquette, but they have other undesirable characteristics.

Planting the trees

Plant walnut trees in early winter, as soon as possible after receiving them from the nursery. Do not let the roots dry out before planting. The earlier a tree is

planted, the more chance it has to develop a working root system before it leafs out in the spring.

To be sure roots do not dry out before planting, keep them in moist sawdust or peatmoss. Dig the holes 18 to 24 inches wide and 10 to 12 inches deep. Digging in wet ground with a power auger may cause compaction of the sides of the hole. If this happens, break down the edges of the hole to eliminate the compacted area and partially fill the hole. Prune off any broken roots, then plant the trees so that the uppermost root is 2 to 3 inches below the soil surface. Spread the roots out and press down into the bottom of the hole. Tamp the soil firmly around the roots to exclude air pockets.

Do *not* put chemical fertilizer or barnyard litter in the holes. Trees have been injured or killed by fertilizers placed in tree holes at planting time. Head the trees as described under training.

Staking the trees

Staking newly planted trees is necessary because the new wood is often too soft to withstand the wind, especially if the wind usually blows from the same direction. Place stakes 7 to 10 feet long on the windward side, 6 to 8 inches from the tree, and tie with strips of burlap, unbleached muslin, or similar material.

Loop the strips around the tree, crossing between the tree and stake, and tie firmly to the stake with a double wrap. Use care and recheck occasionally to see that ties are not too tight, girdling the tree.

Cultivation

The purposes of cultivation in a commercial orchard are to destroy a cover crop, to control weeds, and to prepare for harvest.

The amount of moisture in that part of the soil where active walnut roots are located is usually just enough to supply the tree's needs from the last effective rains in the spring until the fall rains begin. In unusually dry seasons, this stored moisture may not be enough. The highest concentration of walnut roots is found in the top 3 feet of soil. The roots of the cover crop will usually penetrate at least half of this depth.

A cover crop turned under too late, weed growth, or an intercrop will seriously reduce the amount of moisture remaining for the trees. Unless you provide irrigation, the result will be a stunted tree and a light crop of small nuts.

When the trees are in a home lawn, chances are water will be adequate. Close mowing and a clean area under the trees will make harvest easier.

Use pesticides safely!

- **Wear** protective clothing and safety devices as recommended on the label. **Bathe or shower** after each use.
- **Read** the pesticide label—even if you've used the pesticide before. **Follow closely** the instructions on the label (and any other directions you have).
- **Be cautious** when you apply pesticides. **Know** your legal responsibility as a pesticide applicator. You may be liable for injury or damage resulting from pesticide use.

Weed control

Use of chemical herbicides around the tree trunk or in the tree row eliminates the need to cultivate or flail-mow close to the tree. This prevents damage to the tree trunk during cultivation. If you treat a continuous strip in the tree row, there is no need for cross-cultivation. Both preemergence and contact herbicides are registered for use in walnut orchards. Consult your Extension agent for current information on herbicides, insecticides, and disease control in walnut orchards.

Nontillage orchard management

Under commercial orchard nontillage management, a tractor-driven flail mower is used to cut weed growth or cover crop close to the ground, starting in early spring. By the time effective rains are over, the cover is mowed within 1/2 inch of the ground. Because of this close mowing, the cover crop is shallow-rooted and dies early in summer. Perennial weeds remain alive all summer and gradually become dominant. About five flailings per year are needed.

This system reduces erosion, soil compaction, and mechanical damage to tree roots. It reduces the amount of work needed to prepare for harvest. Under wet conditions, harvesting on flailed ground is much easier than on cultivated ground. Tree roots can grow undisturbed in the more fertile upper 6 inches of soil.

Chemical weed control in the tree row is part of nontillage orchard management. All equipment should have high-flotation tires to avoid creation of wheel ruts

or cleat marks. In a home setting, good lawn maintenance will take the place of cultivation and assure adequate water.

Insects and diseases

The most troublesome insect pest of walnuts in the Northwest is the walnut husk fly. White maggots, the larval or immature stage of this insect, up to 3/16-inch long, feed in the husk. This destroys the husk tissue and stains the nut shell and kernel, reducing nut quality. Sprays used to kill husk flies may also kill aphids and aphid predators. Although aphids do occur in Northwest walnuts, their damage to the nuts and the trees is not severe enough to be of concern.

Walnut blight, caused by *Xanthomonas juglandis,* a bacterium, is the most serious disease of walnuts in Oregon. The bacterium overwinters on infected buds and to a lesser extent in holdover cankers on twigs of the previous year's growth. During the spring growth period, bacteria are spread by raindrops from these sources to current season's growth.

Frequent and prolonged rains, just before and during bloom and for about 2 weeks thereafter, result in severe blight outbreaks. This is the time when the nuts are most susceptible. If you follow the spray program for walnut blight, it will not be necessary to apply any supplementary spray for control of moss and lichens, as the growth is killed at the same time as blight is controlled. When spraying, thoroughly saturate the mosses and lichens.

Deer damage

Deer are particularly serious pests of young walnut trees in outlying areas next to wooded areas. So far, no completely satisfactory answer to deer damage has been found. Deer fencing around the entire orchard or individual trees is the most reliable solution, but it is expensive.

Special hunting licenses may be obtained for some rural locations. Chemical repellants have been partially successful in some instances. Bags of dried blood and bone meal hung in the trees are the most commonly used repellants. When replaced every 2 or 3 months, they have been relatively successful.

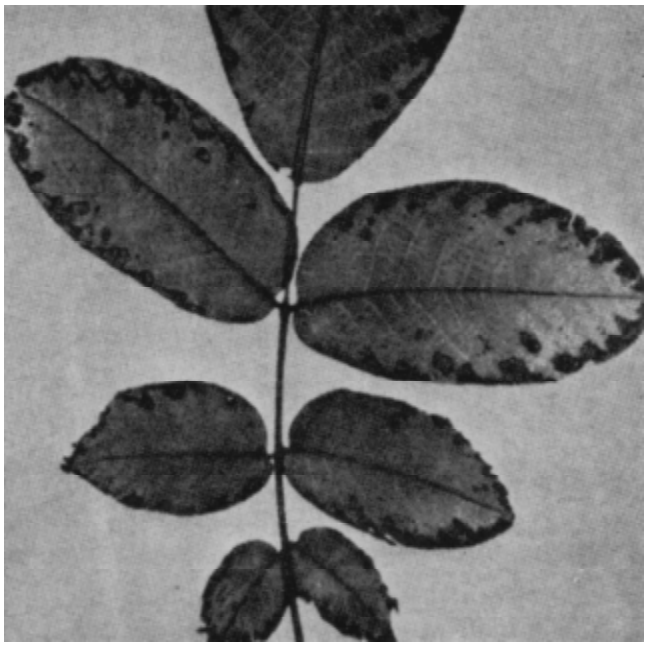

Figure 1.—Injury to a walnut leaf caused by an excess of boron

Tree fertilization

Young trees

Apply nitrogen only after one growing season has passed. As long as young trees are growing 18 to 30 inches annually, no applications of nitrogen (N) fertilizer are needed.

If you want additional growth, apply nitrogen this way:

- ⅓ to ½ pound per tree to trees 2 to 5 years old (1 to 4 inches trunk diameter);
- ½ to ¾ pound per tree to trees 6 to 7 years old (4 to 7 inches trunk diameter); and
- ¾ pound per tree to trees 8 to 10 years old (7 to 10 inches trunk diameter).

Boron is another element walnuts need, though young trees generally *don't* need it—and you may injure them if you apply it to them (see figure 1).

Table 1.—Fertilizer guide according to leaf analysis

% leaf N in August	Apply this amount (lb) per tree
Under 2.0 (severe deficiency)	6 to 8
2.0 to 2.3 (below normal)	4 to 6
2.3 to 2.8 (optimal)	0 to 4
More than 2.8 (excess)	None

Mature trees

Observations of annual shoot growth and size and color of leaves will aid in determining the fertilizer requirements of walnut trees. Fertilizer will not replace pruning, especially in older orchards.

Leaf analysis is the best guide to walnut tree fertilization. See your Extension agent for information on how to take a sample and obtain a laboratory analysis. Table 1 provides a leaf analysis guide for nitrogen (N) application.

Apply the nitrogen about the middle of the dormant season (February or early March). In addition to the possibility of loss by leaching, application in the fall may stimulate the cambium, resulting in increased susceptibility to winter injury. Broadcast application in the outer half of the limb spread is most desirable.

Excessive boron applications can be toxic to the tree. Symptoms of B toxicity are round, brown dead spots along the margins of the leaflets, and in severe cases these spots appear between the veins approaching the midrib. Nitrogen applications will gradually reduce boron toxicity symptoms, and in about 3 years they may be completely eliminated.

If a laboratory leaf analysis shows boron levels are below 80 ppm, apply 0.25 to 0.5 pound of boron per mature tree to the soil. Do not band soil-applied boron; broadcast it. Applications are usually effective for 2 to 3 years. If boron deficiency has occurred, a foliar spray application will give more rapid recovery than soil application, but it is used up during the season in which you apply it.

Spray at the rate of 8 pounds sodium pentaborate per acre.

Pruning and training walnut trees

The objective of training is to develop a tree with a strong system of main scaffold branches that can support a heavy crop of nuts, ice, or other stress. The limbs should be developed at a sufficient height to allow passage of equipment under them. When limbs develop at narrow angles between the trunk or main scaffold limb, they are structurally weak.

Limbs that develop from buds on the end of a very short shoot or “neck” always have weak crotches, which break out easily. Remove these necked buds and all side-branches developing from new wood that grew during the same season.

At planting, remove about half of the tops of the trees. Cut a 10-foot tree back to 5 feet and a 6-foot tree to 3 feet. Gradually raise the height of the first limbs to the desired level by subsequent pruning.

Avoid large pruning cuts later by making cuts when shoots are small. Removal of a shoot just after growth starts causes much less loss to a tree than when the shoot is allowed to grow for one or more seasons and is then removed. The less a tree is pruned, the larger it will be. However, you must do some pruning in order to build a strong, sturdy tree.

Select three to five branches that are to form the main framework of the tree during the first, second, and third growing seasons, and remove excess branches. Cut off any buds that start to grow near the base of the tree. The top bud after the tree has been headed back will form an upright terminal shoot upon which to develop desired scaffold branches.

Space scaffold branches a foot or more apart vertically. When all main branches arise just below the point where the tree is headed at planting, a structurally weak, vase-shaped tree is formed.

Pruning nonbearing trees

Pruning of nonbearing trees is simply a continuation of training. If shoot growth seems excessively long, head the terminals, especially in lower scaffold branches. Without this pruning, they may grow so long that in later years the end of the first scaffold branches will rest on the ground when weighted with a heavy crop; cultivation and harvesting will be difficult.

Pruning bearing trees

Moderate pruning is needed every 2 or 3 years after trees come into bearing. Thin out the shoots in the tops of trees to maintain production throughout the trees. Remove drooping limbs that interfere with cultivation. Remove some but not all of the weak wood in the center of the trees. Often late-developing catkins are produced on weak wood and they shed pollen late, which may pollinate late-pistillate flowers.

Old, mature trees will benefit from more severe pruning. These trees are often so tall that a mechanical pruning tower is required to get into the tree tops to do the kind of limb thinning that is needed. Cut many branches back 2 to 4 feet to strong side limbs. This will stimulate new growth near the cuts and allow more sunlight into the lower portions of the tree. Repeat this kind of pruning every 3 to 5 years, depending on the tree's growth and light distribution.

Rejuvenation pruning of winter-injured trees requires cutting back to good, live wood. Wait a full year after the freeze, when it is more nearly possible to determine the extent of the injury. Retain all live wood.

When you remove a limb, cut just outside the "branch collar." This is the point where the smaller side branch tapers larger as it joins the larger branch or trunk. The cut surface will be smaller than if you make a "flush cut. "

Wound paints are not helpful and are not recommended.

Harvesting and drying plants

Walnuts are mature as soon as the husk can be separated from the nut easily, but they are usually not harvested until the rains have cracked the husk to the point of letting the nut drop to the ground. If nuts are blown off by the wind before the hulls crack, the hulls will ripen on the ground, and you can usually remove them after a week or two. Leave them on the ground until the hulls are loose.

Harvest husk-free walnuts as soon as possible after they drop. Kernels of nuts that are allowed to remain on wet ground rapidly become discolored. Harvested, undried nuts left in the sack for more than a day or so may heat and become moldy.

Start the drying process within 24 hours of harvest. Nuts are usually dried in the shell, but you can save a considerable amount of drying time and you will need less heat if you shell the nuts before drying.

Best drying temperatures are 95° to 105°F. Air circulation is as important as (or more important than) temperature, so it is desirable to dry the nuts on a screen-bottomed tray, in an onion sack, or in any other container that will permit free air passage. You can dry small lots in the warm air stream above a furnace or radiator, as long as the temperature does not exceed 105°F. This may require 3 to 4 days. You can dry nuts at lower temperatures, but you will need more time. If the temperature exceeds 110°F, nut quality will be impaired.

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