

Pear Rootstocks for Oregon

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In establishing a new pear orchard, the proper choice of rootstock is as important as the choice of variety and site. The orchard can be a commercial failure simply because trees on the wrong rootstocks were planted. This is true because the rootstock is involved in determining the susceptibility to pear decline and because rootstocks vary in tolerance of fire blight, root aphid, bacterial canker, heavy soils, cold winter temperatures and other factors. The success of dwarf hedgerow orchards rests in part on the degree of growth control imparted by the rootstock.

Research on pear rootstocks was begun at Oregon State University more than 50 years ago and has progressed considerably in recent years. Out of this program have come pear rootstocks adapted to a wide variety of sites, producing trees either larger or smaller than standard and resistant to pear decline and a number of other problems.

Rootstocks for Dwarf and Semi-Dwarf Orchards

All trees on dwarfing rootstocks must be planted with the graft union above ground to prevent scion rooting and resultant loss of dwarfing. See Table 1 for susceptibility of pear rootstocks to specific problems.

Old Home x Farmingdale clones

These are numbered clones reproduced from cuttings from certain seedling trees whose parents were the two blight resistant *Pyrus communis* varieties, Old Home and Farmingdale (OHxF). Trees on OHxF clones 217, 9, 87, 333, and 69 have been smaller than standard but larger than most trees on quince root. These semi-dwarfing stocks were selected for their high productivity relative to tree size. Depending on site and other conditions, trees on these stocks will ultimately be from 50 to 75 percent as large as trees on fully vigorous stocks.

Trees on Old Home x Farmingdale clone 51 are slightly smaller than trees on East Malling Quince A. This winter-hardy dwarfing clone is suggested for high-density pear hedgerows with very close spacings.

All of the major pear varieties are graft compatible with Old Home x Farmingdale clones. These clones have not performed well on unusually fine-textured clay soil. They are not prone to suckering or unusually susceptible to bacterial canker or lime-induced chlorosis.

Quince rootstocks

Because it is not cold hardy, quince is a satisfactory rootstock for pear only where winter injury is not likely

to occur. Comice, Rogue Red, and Anjou can be worked directly on quince, but the original Bartlett, Bosc, Seckel, Forelle, Packhams Triumph, Winter Nelis, and Eldorado need a compatible interstock. Bartlett on Old Home on quince has been more productive than Bartlett on Hardy on quince. In some cases Hardy interstems may be preferred because of the susceptibility of Old Home to bacterial (*pseudomonas*) canker. If shoots are not allowed to grow on the interstem, there is no problem with *pseudomonas*.

French Bartlett (PI 241968) and Swiss Bartlett (PI 267940) are compatible with quince. The length of interstem needed as a compatibility bridge is not important. In propagation of Bartlett on quince, a thin plate of Old Home stem may be inserted as a sandwich between the scion shield-bud and the quince stem. This can be done in a single operation and thus saves the nurseryman both time and money.

Only two clones of quince have been shown to be suitable for use in Oregon—virus-free East Malling Quince A and Provence quince, Lepage type C. While other clones of quince may be available, one cannot be assured of their performance. Trees on Quince A are smaller, less vigorous, but more productive for their size than trees on Provence quince. Due to their greater size and vigor, trees on Provence quince should be planted on wider spacing than trees on Quince A. Provence quince is better for small-fruited and high-yielding varieties like Seckel and Bartlett, while Quince A should be used for Comice and Bosc.

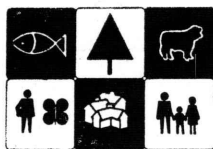
While quince-rooted trees performed exceptionally well on one clay-adobe soil, they are not as tolerant of "wet feet" as most pear rootstocks. Quince root does best in an open well-drained soil. Pears on quince roots are susceptible to lime-induced chlorosis, to oak root fungus, verticillium wilt, and phytophthora infection. They often sucker, but are moderately tolerant of bacterial canker. Because quince root systems are less well-anchored than pear, quince-rooted trees may require support on windy sites.

Rootstocks for Standard Orchards

European (*Pyrus communis*) types

P. communis types have performed poorly on heavy clay soil following an old pear orchard, compared with shallow-planted quince, *P. calleryana* and *P. betulaefolia*.

Quite commonly pears have been propagated on *P. communis* rootstocks which are seedlings of Bartlett,



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the seed being obtained from canneries. Ten to fifteen percent of orchard trees with this root show pear decline. For this reason Bartlett seedlings are not considered to be a satisfactory rootstock for use in Oregon.

Imported French and *P. caucasica* from Eastern Europe are not suitable because they are susceptible to decline. Another seedling type from Germany 'Kirchensaller Mostbirne' is satisfactory but has no advantage over domestic seedlings.

Since relatively few of the trees propagated on seedlings from the variety Winter Nelis are susceptible to pear decline, it is an acceptable vigorous rootstock. The largest seedlings of any given lot of Bartlett or Nelis seedlings will be more resistant to decline than nursery-run trees. However, more decline-resistant rootstocks are available. In addition to the items listed in Table 1, Bartlett and Winter Nelis seedlings are moderately susceptible to bacterial canker, oak root fungus, and Phytophthora root rot; some have a tendency to sucker. They are more susceptible to crown gall than other stocks.

Old Home x Farmingdale

Seedlings of Old Home x Farmingdale show less decline than other seedling *P. communis* and are winter hardy. About 30 percent of Old Home x Farmingdale seedlings are resistant to fire blight. Many are tolerant of pear root aphid and Phytophthora root rot. They have performed well on a variety of soil types and sites but are best adapted to medium to light textured soils. The OHxF clonal rootstocks 97, 340, 18, and 136 are superior selections for a vigorous pear tree.

Old Home

Old Home is a stock of French pear parentage originating in Illinois. It is propagated as cuttings or with a quince nurse root and has been used as a decline-resistant rootstock. If the union between Old Home and the nurse root is 2-4 inches below ground level, the Old Home roots readily. Old Home-rooted trees tend to be vigorous and slow to begin bearing. Prolific root suckering is a considerable nuisance. The trunk is susceptible to bacterial canker which sometimes kills young trees. Old Home is resistant to oak root fungus, relatively tolerant of heavy wet soils, and more resistant to *Phytophthora cinnamomi* root rot than Bartlett or Winter Nelis seedlings.

Bartlett cuttings

On medium-textured, well-drained soils rooted cuttings of Bartlett have grown into productive trees about the same size as trees on Quince A. Bartlett cuttings have not grown well on clay soils.

Other Pyrus Species

Pyrus Calleryana

Trees on seedlings of *P. calleryana* have shown about as much decline as trees on Winter Nelis seedling and somewhat less decline than trees on Bartlett seedling. *P. calleryana* is not sufficiently winter hardy for use in areas where winter injury has been a problem. Trees on *P. calleryana* are vigorous, but in contrast to most vigorous stocks, they begin bearing at an early age. The mature trees are slightly smaller than those on *P. communis* seedling. *P. calleryana* is resistant to oak root fungus, Phytophthora root rot, and crown gall. It also tolerates wet soil better than other stocks. It is subject to lime-induced chlorosis. Seedling *P. calleryana* is often the best choice of seedling rootstock for any pear variety but particularly for Comice, Bosc, and Seckel.

Pyrus betulaefolia

Seedlings from trees of OSU No. 1, 2, 3, and 5 *P. betulaefolia* are resistant to fire blight and much more cold hardy than *P. betulaefolia* obtained from Italy. *P. betulaefolia* seedling rootstocks from both sources are more resistant to pear decline than any other seedling type. The trees are more vigorous than trees on *P. communis* seedlings, which makes *P. betulaefolia* a good choice where soils are so heavy or poor that low tree vigor may become a problem. Seckel on *P. betulaefolia* has set heavy crops of good quality fruit. Since the fruit of d'Anjou grown on *P. betulaefolia* often have cork spot, d'Anjou should be grown on other stocks. Confusion between true *P. betulaefolia* rootstock and seedling which were probably hybrids of *P. serotina* x *P. betulaefolia* has led to the erroneous belief that fruit from trees on *P. betulaefolia* are susceptible to "hard end" or "black end."

Because of the deep-rooting habit of *P. betulaefolia*, trees on this rootstock are more tolerant of drought but less tolerant of lime-induced chlorosis than most. *P. betulaefolia* is tolerant of bacterial canker, oak root fungus, and Phytophthora root rot.

Table 1. Relative susceptibility of rootstocks to damage from various causes (0 = not susceptible, 4 = highly susceptible)

Rootstock	Pear decline	Fire blight	Cold damage	Pear root aphid	Nematodes
Old Home x Farmingdale clones	0	1	0	1	3
Quince	0	3	4	0	0
Imported French <i>Pyrus caucasica</i>	3	4	0	4	3
Bartlett seedling	2	4	0	4	3
Winter Nelis seedling	1	4	0	4	3
Old Home x Farmingdale seedling	1	2	0	2	3
Old Home	0	0	0	4	3
Bartlett cuttings	0	4	0	4	3
<i>P. calleryana</i>	2	0	4	0	0
<i>P. betulaefolia</i> (Reimer's)	0	0	2	0	3