So Many Cherry Rootstocks
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Prior to the mid-1990’s nearly all sweet cherries in the Pacific Northwest were grown on Mazzard rootstock. However, in recent years several new rootstocks have gained prominence, offering important attributes lacking in Mazzard. Some of these new rootstocks provide growers with the ability for early yields of premium quality fruit in high density orchards. In fact, rootstocks affect tree size, precocity, productivity, soil adaptability, disease susceptibility, fruit size, and fruit quality. It is for these reasons that it is important for growers to choose the rootstock wisely when planning a new orchard.

Selecting the proper rootstock depends not only on the management skills of the grower but also on the variety, training system and site selected for the orchard. For example, it is typical for size controlling cherry rootstocks to be very productive. However, when these rootstocks are combined with productive varieties, high yields can occur leading to poor fruit quality. Understanding proper management techniques is essential in order to produce premium quality fruit (see PNW 592 for proper pruning methods).

Precocity and Productivity

Cherry trees grown on productive rootstocks are significantly more precocious than trees on standard rootstocks such as Mazzard, Colt or even Mahaleb. With productive rootstocks it is not unusual for production to begin in the third leaf, with full production possible by the fifth leaf. This compares with standard rootstocks that typically produce a small crop in the fifth or sixth leaf but may not be into full production until the twelfth leaf.

This precocity, coupled with higher productivity, can provide an economic advantage to growers. In fact, in a 2007 Oregon State University study conducted among Oregon growers, it was found that growers could recover their entire cost of establishment in 8 years with a high density orchard on productive rootstocks, compared to 15 years for a standard density orchard on Mazzard rootstock.
Flowering and Fruiting Habit

Besides precocity, many productive rootstocks change the fruiting habit of the tree (See Fruiting Habit). This is expressed by higher flower densities and larger numbers of spurs on the trunk and in the center of the tree. In addition, productive rootstocks can encourage solitary flower buds on one-year-old wood. Since cherry buds are either vegetative or floral, a solitary floral bud will not develop into a spur; instead they will bloom for one year and die. Numerous solitary floral buds growing on one year old wood will result in blind wood that supports neither leaves nor fruit. Some cultivars such as Tieton, Lapins and Sweetheart have a greater propensity for this production of blind wood than others.

Research conducted by Dr. Anita Azarenko, OSU, suggests that this blind wood situation can be avoided by tipping all new branches on a tree in mid-June. This should be done for the first two growing seasons. When the heading cut is made just below the point where the internode length is shortening and prior to flower bud initiation for the next year, basal buds remain vegetative and develop into spurs rather than floral buds.

More than other commercial rootstocks, Gisela 5 has a tendency to advance both bloom and harvest timing by 3 or 4 days. This can obviously prove beneficial when early ripening brings a monetary benefit, but can be detrimental in a frost situation or when the harvest of a late ripening cherry is advanced. Where higher density plantings are desired with late maturing varieties, Gisela 12 or Krymsk 6 may be better choices than Gisela 5. Although these rootstocks are not as size controlling, fruit on these trees will ripen later than on Gisela 5.

Frost and Bloom

Non-replicated data collection following frost events indicates that trees on productive rootstocks are at least as sensitive to frost as those on standard rootstocks. However, trees on productive stocks will often produce more fruit after a severe frost due to initially higher flower counts. In both 2007 and 2008, growers in The Dalles, Oregon with trees on size controlling rootstocks, fared much better after a frost than those on standard rootstocks such as Mazzard.
**Growth Habit and Size**

Many of the productive rootstocks are also size controlling. However, the degree to which a tree is dwarfed depends not only on the rootstock but also the variety selection, soils, pruning severity, and training system choice.

When coupled with Bing, Gisela 12 is more dwarfing than Gisela 6. However, Regina/Gisela 12 produces a tree that is approximately 10 percent larger than Regina/Gisela 6. Other varieties may exhibit similar influence but observations are lacking to substantiate these affects at this time.

The location where the tree is grown can also play a role in the relative size of the tree. For example, in the Eastern U.S. Gisela 6 produces a tree that is only 60 percent the size of a standard tree, whereas in the Pacific Northwest it produces a more vigorous tree growing to 90 percent full size. Soil type and growing conditions probably play a factor in this discrepancy, as Maxma 14 grows more vigorously in the rich soils of the Northwest than in the calcareous soils of southern France. Likewise, Colt, released in Europe as a semi-dwarfing rootstock was found to produce a full sized tree on irrigated sites in the Northwest.

Gisela 5 is the most dwarfing commercially available rootstock in the Northwest, reducing the tree to only 50 percent that of standard size. Reading that a rootstock will decrease tree size to 50 percent or 90 percent the size of a standard tree can be helpful to know, however, it doesn’t tell the whole story. For example, with the proper pruning and training system, a tree on Gisela 6 can easily be maintained at a height of only eight feet. When severely pruned, many of the productive rootstocks such as the Gisela and Krymsk series respond with moderate, controlled growth, whereas a tree on Mazzard will become invigorated through the growth of water-sprouts. This moderate response, in conjunction with a naturally wider branch angle makes trees on many of these productive rootstocks much easier to manage.

**Anchorage**

Although typically grown without support, trees on Gisela 6 and sometimes Gisela 5 will often tilt away from the prevailing winds. This is especially true for the
more top-heavy central leader trees. Support, through stakes or a trellis system, may be beneficial with these two rootstocks. Anchorage seems to be adequate for all other commercially available stocks.

**Planting Depth**

Although scion rooting has been noted in limited cases, it does not seem to be as serious or as prevalent in cherries as in apples where the benefits of the rootstock are lost. Nevertheless, except for trees grown on Mazzard rootstock, it is wise to plant the graft union several inches above the soil level in order to prevent scion rooting.

**Root Suckers**

Most commercial cherry rootstocks used in the Northwest express limited to no root suckering. Occasionally, depending on the conditions, Mazzard can show low levels of suckering. This has also been observed with Krymsk 5, Krymsk 6, and several of the Weiroot clones such as Weiroot 158. However, this does not seem to be a problem with the other commercially available cherry rootstocks.

**Bacterial Canker**

Bacterial canker, caused by *Pseudomonas syringae*, is a pathogen of sweet cherries found in all cherry production areas around the world. Infection rates of 50 to 80 percent have been reported in some of the wetter regions of the Northwest, such as Oregon’s Willamette and Hood River Valley. Even in the drier regions of Central Washington and Oregon, infection and mortality rates can approach 10 percent or more in some years.

The *P. avium* clone, F12/1, has shown tolerance to this pathogen. Therefore it is used in the Willamette Valley as a high budded stock in order to slow down or stop a branch infection before the pathogen moves to the trunk and threatens the entire tree. In this situation, the stock is grown out to the point of branching and scion wood is budded onto the branches of the rootstock. Research, as well as limited grower experience, would indicate that Colt rootstock may have greater tolerance to the disease than Mazzard.
Rootstock significantly affects cultivar susceptibility to bacterial canker. Death of trees on Mazzard was 30% but increased to 77% when trees were on Gisela 6® rootstock. While no ‘Bing’ on Colt® rootstock died, mortality of ‘Bing’ on Gisela 6 was 90% in one study. Trees on Gisela rootstocks have shown increased susceptibility in field observations. Bing on Krymsk 5 had smaller heading cut cankers than trees on Mazzard or Gisela 6, and 43% of trees died on Krymsk 5 compared with 50% on Mazzard (Spotts, et al).

**Virus Susceptibility**

Prune dwarf virus and Prunus necrotic ring spot virus are commonly found in mature orchards throughout the Northwest. Most strains of these two viruses show few if any symptoms when trees on Mazzard, Mahaleb or Colt rootstocks are infected. However, some of the newer rootstocks, such as Gisela 7 and Weiroot 158 show varying degrees of sensitivity to one or both of these viruses when inoculated in controlled trials. In this same trial, Gisela 5, 6, and 12 were shown to have varying levels of tolerance to these two viruses, with only a slight reduction in vigor when infected.

Recently, two Russian rootstocks, VSL 2 (Krymsk 5) and LC 52 (Krymsk 6) were found to be hypersensitive to these viruses. Much debate has taken place over the last few years concerning the importance of these findings. Since hypersensitive trees die quickly when infected, some scientists believe that hypersensitivity may ultimately be beneficial to an orchard block because infected trees die before the virus can be transmitted to surrounding trees. In addition, a limited number of the hypersensitive Gisela 7 trees were planted by Northwest growers in the mid-1990s without reports of widespread mortality. However, it would be wise not to plant trees on hypersensitive rootstocks in an interplant situation among mature trees or close to blocks of older trees that may be infected with one or both of these viruses.

Literature Cited