‘Hansen 2168’ and ‘Hansen 536’: Two New Prunus Rootstock Clones

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Two new, patented, vegetatively propagated Prunus rootstocks are being released for commercial use. These rootstocks are hybrids of an almond selection, Almond B, crossed with Peach Selection 1-8-2 by the late Carl J. Hansen. These rootstocks are being released primarily for use with almond but also can be used as rootstocks for peach, plum, and prune.

Origin
‘Hansen 2168’ and ‘Hansen 536’ were selected from a seedling population of the cross Almond B x Peach Selection 1-8-2 made by the late Carl J. Hansen in 1962 and 1964, respectively (Fig. 1). The almond parent was a chance seedling, thought at first to be nematode-resistant but later found not to be. Selection 1-8-2 originated from a cross of ‘Okinawa’ peach x H91 peach. H91 was from a peach seedling line involving Prunus davidiana (Carr) Franch. and a Chinese peach PIl6582. Selection 1-8-2 was heterozygous for immunity to the 2 root-knot nematode species Meloidogyne incognita acrita and M. javanica (no galls were produced on the roots) (5, 8). The 2 ‘Hansen’ clones were selected as immune seedlings in greenhouse tests where the seedlings were subjected to high populations of both nematode species. Selection was subsequently made of those successfully propagated vegetatively by hardwood cuttings in the nursery (2). ‘Hansen 2168’ and ‘Hansen 536’ have rooted consistently at 75% to 80% in most years in central California conditions, cuttings should be collected before 15 Dec., preferably in October or November (4). Leaves are usually present at this time and are removed. Nursery trees can be produced by June budding, either onto current-season shoots of the cutting or directly onto the cuttings itself. Spring budding may be practiced by using collected dormant buds in the winter, stored at low temperatures (just above freezing) and budded onto the cuttings as soon as the bark is slipping and sufficient new shoots have started. Fall budding one-year-old nursery trees produces too large a tree in the following season in central California but may be of use in other geographic areas, if used for peach, plum, or prune. Some staking may be necessary for spreading cultivars as ‘Nonpareil’ almond.

Micropropagation. Both hybrid clones can be propagated by in-vitro culture with relative ease (1, 9). The method is similar to that used by Zuchereilli (10).

Root Systems

Appearance of the root system of the 2 clones is distinctive (Fig. 2). Individual branch roots of ‘Hansen 2168’ are larger in diameter and lesser in number than these of ‘Hansen 536’. In both clones, the roots extend out and downward without the flatness of other clonal root systems such as ‘Marianna 2624’.

The root system of ‘Hansen 536’ has a large mass of medium to small fibrous roots in addition to large branch roots. Root systems of mature trees resemble almond seedlings more closely than those of peach seedlings.

Description

Unbudded trees are somewhat more vigorous than either of the 2 parental species, as is true for other hybrid populations of this cross (7). They have an intermediate growth habit between almond and peach, although tending more toward the long, vigorous, terminal-growth habit of the peach. When pruned sufficiently, as in a hedgerow, large amounts of desirable cutting material is produced. Folliage is intermediate in appearance between the 2 parents. Both clones bloom early, producing large, whitish, showy flowers. ‘Hansen 536’ has a tendency to produce more red pigmentation in the newly developing shoots, as well as more pinkish flowers, than does ‘Hansen 2168’. These rootstocks have a chilling requirement similar to or slightly less than ‘Nonpareil’ almond about 400-500 hr and should not be grown in cold, winter regions without prior testing. The fruits are intermediate between peach and almond. The pits are hard and resemble peach.

The budded tree is vigorous and larger in size than trees on almond or peach rootstock (Table 1). Yields have been in proportion to size but the trees have been more efficient in yield than several peach rootstock selections. Kernel weight has been larger than on almond or peach rootstock. Because of high vigor as a young tree, it is important to es-
establish a proper framework early. Nut maturity tends to be later than that of trees of either almond or peach rootstock. The root system extends wide and deep, producing excellent anchorage.

Both clones are immune to the 2 root-knot nematodes (M. incognita acrita and M. javanica (do not produce galls on roots) in contrast to 'Nemaguard', which is resistant (produced galls, no reproduction), and 'Lovell', which is highly susceptible. 'Hansen 2168' is susceptible to root-lesion nematode (Pratylenchus penetrans, B.F. Lownsberg, personal communication). Presumably, 'Hansen 536' is similar but has not been tested. 'Hansen 536' was selected as the most tolerant to Phytophthora syringeae of the group of hybrid clones tested, as well as almond seedlings being somewhat better than 'Hansen 2168'. In these tests, both clones ranked close to 'Nemaguard' and 'Lovell' (6). These rankings have tended to follow in field tests but some field susceptibility has appeared. Trees on both hybrid rootstock cultivars are more drought tolerant than trees grown on peach rootstocks. Hybrid rootstocks are more tolerant to lime-induced chlorosis and show lesschloride uptake than peach. Likewise, hybrid rootstocks show less sodium uptake than almond. Although not specifically tested for these conditions, these clones should follow the same patterns.

Compatibility

These rootstocks, 'Hansen 536' and 'Hansen 2168', are graft-compatible to almond, peach, and Japanese plum cultivars, although the range of cultivars tested has not been extensive (6). They are not compatible with apricot and should graft union breakdown in the nursery or within a few years.

Adaptability

These rootstocks are most useful in calcareous soils and under marginal or stressful conditions, assuming good drainage is available. They provide the opportunity to avoid conditions to which peach rootstocks are unadapted and to capitalize on increased plant vigor. Growth on finely textured soils may be satisfactory, except that Phytophthora problems may increase. On highly fertile, deep, well-irrigated soils, trees may become too large for good orchard practice unless some modification of irrigation and other cultural practices are used. For almond-growing in California, hybrid rootstocks appear to be most useful in the San Joaquin Valley, where moisture and high temperature stress exists, particularly in the latter part of the growing season during harvest, and where few problems from Phytophthora crown and root rot problems occur. Likewise, hybrids should be adapted to shallow, marginal soil areas on the margins of valleys, again assuming good drainage. Hybrid rootstocks should be most useful with less-vigorous varieties, particularly those that are late and subject to drought stress during the harvest period in multicultivar orchards.

Availability

Virus-tested source material is available from the Foundation Seed and Plant Materials Service, Univ. of California, Davis, CA 95616 through specific licensing with the Univ. of California Patent, Trademark, and Copyright Office, Univ. of California, Berkeley, CA 94720.

Table 1. Yield parameters of hybrid rootstock as compared to almond and peach. Cultivar was 'Mission' almond in test plot at Univ. of California, Davis orchard. Trees were 7 and 8 years old.

<table>
<thead>
<tr>
<th>Rootstock</th>
<th>Year</th>
<th>No. trees</th>
<th>No. nuts/ tree</th>
<th>Avg kernel wt (gm)</th>
<th>Kgm/tree</th>
<th>Trunk circumf. (cm)</th>
<th>No. nuts/cm^2 area</th>
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<tr>
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<td>2</td>
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<td>3848</td>
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<td>3.9</td>
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<td>1.06</td>
<td>7.6</td>
<td>31.9</td>
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1In this soil location, trees of 'Lovell' seedling grew less than expected.
2Experimental clone.