

significant differences in caliper size among the three chemical defoliation treatments. Of all defoliation treatments, only the first manual defoliation treatment resulted in nursery stem caliper lower than that of the spring dug treatment.

New shoot growth in the following year, was greater with later defoliation date. Conversely, earlier chemical treatment resulted in higher new shoot growth. The amount of stem damage appears to be dependent on cultivar and defoliation treatment and timing. The relationship between dormancy development and stem damage associated with early manual and chemical defoliation, however, is not clear. These results indicate that nursery production practices can significantly impact nursery stock quality and performance of trees in the orchard.

Tie-off Layering of Hazelnut

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Hazelnuts (*Corylus avellana* L.) have traditionally been propagated for commercial orchards in Oregon by simple layerage, wherein a year-old shoot from the mother plant is bent into a U-shape and is inserted into a slot opened in the ground with a shovel. Several of the specialty hazelnut nurseries in Oregon are now using a system of mound layering locally called tie-off layering. Current season's shoots are girdled with hog ring staples and sprayed with a rooting hormone. Sawdust is then placed around the shoots to a depth of 8 in. These nurseries have concluded that the tie-off method produces more saleable trees per stool that are more heavily rooted and straighter stemmed than trees propagated using simple layerage.

Cytokinins and Donor Plants Affect Regenerative Capacity of American Elm Leaves

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Adventitious shoots have been induced to form on leaf explants of American elm (*Ulmus americana* L.) with thidiazuron (TDZ) in the medium, but the effects of other cytokinins, donor plants, and basal media were unknown. The goal of this study was to examine factors that influence the regenerative capacity of American elm leaves. Excised leaves from 2-year-old seedlings were surface sterilized, and 1-cm² sections were taken from the midrib portion of the leaves. Three to six seedlings were used as donor plants in various experiments. Zero, 7.5, 15, or 22.5 μ M of benzyladenine (BA), TDZ, kinetin, zeatin, or 2-isopentenylaminopurine (2iP) were added to Driver Kuniyuki Walnut (DKW) medium. Basal medium (DKW or Murashige and Skoog [MS]) effects on shoot regeneration were also examined. Leaves placed on DKW media with BA or TDZ formed adventitious shoots, with TDZ inducing up to 100% regeneration. Donor plant also affected the efficiency of shoot regeneration, with