

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.

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## **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-cm<sup>2</sup> 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  $\mu$ 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

certain seedlings having 1.5 to 7 times more explants forming shoots compared to other plants. Leaf explants from donor plants with the highest regenerative capacity had a higher percentage of regeneration on DKW than MS medium. Explants from productive donor plants should be placed on DKW medium supplemented with TDZ to improve shoot regeneration efficiency from American elm leaves.

## **Evaluating Pulp and Paper Sludge as a Substitute for Peat Moss in Container Media**

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Pulp and paper sludge is a byproduct of paper production, yet this fibrous material may be suitable as an alternative amendment for peat moss in container media. Newsprint mill sludge was composted 6 weeks and cured before use. One-year-old seedlings of lilac (*Syringa vulgaris* L.) and amur maple (*Acer tataricum* ssp. *ginnala* syn. *A. ginnala*) as well as rooted cuttings of cistena plum (*Prunus ×cistena* Hansen) were planted in 3-liter pots containing a bark : sand (2 : 1, v/v) mix, 25% or 50% peat-amended media, or 25% or 50% sludge-amended media. After 14 weeks outdoors, shoot dry weight and changes in plant height were measured. All species planted in sludge-amended media grew as well as those potted in peat-amended or the bark : sand media. In fact, some species grew best in sludge-amended media. Lilac seedlings planted in 25% sludge produced almost double the amount of shoot dry weight and were 80% taller than plants in the bark and sand mix or 25% peat. Maple plants grown in 50% sludge produced over 100% or 35% more shoot dry weight than those grown in 25% or 50% peat-amended media, respectively. Plum cuttings potted in 25% sludge grew at least 53% taller than plants grown in either peat-amended medium. These results indicate that composted newsprint sludge can be used as a peat moss substitute in a container medium for the landscape plants tested.

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## **Alaskan Natives: More Potential for Ornamental Nursery Crops**

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The purpose of this project was to:

- Collect native Alaskan species.
- Develop the propagation techniques for these selected species as potential new introductions in the Idaho nursery industry.
- Include some species in the small fruit breeding and demonstration trials at the University of Idaho-Sandpoint Research and Extension Center in Sandpoint, Idaho.