Final Report to
The Agricultural Research Foundation
and the
Nursery Regulatory Committee

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Project Title: Determining the influence of water quality on container crop production

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The objective of this research was to determine the influence of water quality characteristics common in the Willamette Valley on the nutrition and growth of container crops produced in Douglas fir bark.

We distributed 12 containers each of Japanese maple (*Acer palmatum*), holly (*Ilex* x *meserveae* 'Blue Girl'), rudbeckia (*Rudbeckia fulgida* 'Goldsturm'), Norway spruce (*Picea abies*), blue spruce (*Picea pungens*), euonymus (*Euonymus elatus*), mugo pine (Pinus mugo), and hydrangea (*Hydrangea macrophylla* 'Nikko Blue') to 21 participating container nurseries throughout the northern Willamette Valley. We monitored water quality at each nursery and how that water quality affected: (i) substrate chemistry, (ii) plant foliar nutrient levels, and (iii) plant growth. Samples of irrigation water (all dissolved minerals as well as alkalinity, hardness, pH, EC, and total dissolved solids), substrate nutrition (all extractable nutrients and pH), plant nutrition (foliar nutrient levels of all macro- and micro-nutrients), plant size, and plant quality were measured on May 9, July 25, and September 5.

Results:

A tremendous volume of data has been generated from this trial, and it is still being analyzed; however, our initial analysis is complete. When the trial was initiated, we attempted to place our plants in nurseries with varying degrees of water quality. We hypothesized that we would see differences in growth of plants located in nurseries with 'good' water vs. 'bad' water. Our goal was to measure how much these varying water quality issues affected plant growth. We initially surveyed nursery growers to identify locations with a range of 'good' to 'bad' water prior to selecting the production sites.

After completion of the experiment, we determined that irrigation water from all the nurseries was of high quality, even those that claimed to have 'bad' water. As a result of this, we observed no correlations between plant growth and water quality. All of the species analyzed grew similarly, regardless of where they were located. We measured height and caliper of the spruce and maples, and shoot biomass of the other species. Regardless, water quality at the nurseries surveyed in this experiment did not affect plant growth. There were significant correlations between irrigation water chemistry and foliar nutrition levels, as expected. For example, as sodium (Na) levels in irrigation water increased, so did foliar Na levels within the plants. However, even the highest Na levels in plant foliage were still relatively low and not enough to reduce plant growth.

Another aspect of irrigation water quality that we were able to observe is how water quality changes throughout the growing season. The commonly held belief is that water becomes worse as the season progresses. Many believe that as ground water levels become lower, dissolved mineral concentrations become higher. Across the 21 production sites, none of the water quality parameters that were measured had changed much. For example, water alkalinity rose from 90 to 95 ppm over the coarse of the season; Na rose from 13 to 17.5 ppm; irrigation pH stayed nearly constant at around 7.1.

In conclusion, it can be stated that water quality throughout the nursery producing region of Oregon (northern Willamette Valley) is of high quality with respect to its use in crop production. Furthermore, the concept that water quality gets worse as the season progresses is not substantiated by our data. These data are still being analyzed. If additional discoveries are made from the data, they will be published in the Digger magazine so that they are available for all nursery growers.