

Propagation at Monrovia Nursery

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INTRODUCTION

Monrovia has had an excellent history of producing the best quality containerized nursery stock in the United States and has an exciting future ahead of it. There are now three company locations.

The site in Azusa is 500 acres, of which 400 are used in production. This site is in a Zone 10 area on the U.S.D.A. hardiness map, so all of the tropical plants are grown here. The Oregon site was purchased in 1984 and is at present 510 acres. This site is used to grow the hardier plants. The nursery has recently purchased a third property in Visalia, in central California, which is approximately 1,500 acres in size. One thousand-two hundred of the acres have a slope of less than five percent which is usable for nursery stock. By 1995, all the production in Azusa will have been moved to Visalia, and in December 1995, a total of 900 acres is planned to have been developed. In 1995, the nursery plans to have 1,660 acres in production in comparison to 425 acres in 1984. This is an increase of 267% in 12 years.

Monrovia currently produces 42-million plants annually and offers over 1,200 plant taxa to the trade. It has developed and introduced over 150 new plant cultivars, and has been granted over 100 plant patents and trademarks on special introductions. The company has its own research department and, to assure quality and improve growing methods of container stock, 30,000 soil and tissue tests are run each year. Much of the success of the company is due to its ability to attract and retain quality employees. Over 25 percent of its 1,000 plus employees have worked for the company more than 10 years.

In the late 1970s, a water recycling and treatment plant was built to preserve that precious resource. The plant is capable of processing 35 million gallons of irrigation runoff per day. The treated water is blended with an equal amount of fresh water before it is injected with fertilizer and reused. Incorporated into the plant is a sophisticated fertilizer injection system. The system assures that every plant on the nursery is fertilized with each irrigation. It is completely automatic utilizing electronic proportioners, and monitors itself 24 hours a day. In addition to the nutrients supplied through the irrigation water, slow release fertilizers are added to the soil. The compost contains redwood and fir sawdust and stable manure and this is combined with native top soil to make up some of the nine different soil mixes used at the nursery.

The nursery has a sales staff of 60 which help sell the \$60 million worth of plants sold annually out of the Azusa location alone.

CUTTING PROPAGATION

The propagation department occupies almost 30 acres and has 3.5 acres of greenhouses. It is the most labour intensive area of the nursery, employing between 200 and 250 workers depending on the season.

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Propagation by cuttings accounts for 80% of the propagation at the nursery. Depending on the time of year, between 25 and 100 people work in the cutting shed. Producing cuttings is a year round operation. The cutting shed is supplied with propagation material by a specialized crew and by the pruning crews which do the required pruning on the containerized plants in production for this reason.

All pruning on the nursery must be coordinated with the needs of the propagation department. Material for propagation is stored in refrigerated storage units kept between 40 and 45°F. Cutting material is generally stored for no longer than three days. Some plants are cut and flatted immediately. Chippers and knives used to prepare cuttings are dipped in Consan disinfectant at 200 ppm. All prepared cuttings are washed in chlorinated (15 ppm chlorine) water.

IBA is the principal rooting hormone, mainly at concentrations of 1,000 and 3,000 ppm. The different solutions are coloured with dyes for identification purposes. Rooting hormone solutions contain 55% methanol and 45% water. Methanol is used to dissolve the IBA and NAA, to preserve the solution and to assist in disease prevention.

The general propagation mix contains 90% coarse perlite and 10% peat moss. A mix containing 70% fine perlite and 30% peat moss is used for azaleas and other fine-rooted plants. All propagation media and flats are pasteurized at 145°F for 45 minutes.

Sixteen million cuttings are produced annually with *Juniperus* being the biggest group of plants propagated. Each person makes 2,500 to 3,500 cuttings per day. Cuttings are rooted under intermittent mist in greenhouses or in the outdoor mist beds. Greenhouses and mist beds are heated by hot water supplied by two 250 hp boilers. Bottom heat is maintained at an average of 68°F. The intermittent mist systems are turned on one hour after sunrise and off one hour before sunset by 24 hours master clocks. The mist is not used at night unless it is windy. Pairs of six-minute clocks allow for a variable mist frequency of once every hour to once every two minutes. The duration of each misting is normally six seconds.

Between 20 and 45 people work in the potting shed depending on the time of year. The general potting mix contains three parts bark, two parts peat, one part sand and one part perlite. Four other mixes are also used for various crops with special soil needs. All potting mix is fumigated prior to use. New potting is hand-misted for 3 to 4 weeks to reduce transplant shock.

OTHER PROPAGATION METHODS

Other methods of propagation at the nursery are by seed, grafting and tissue culture. Seed represents 15% of propagation and the others combined total 5%. The seed flat media consists of four parts peat moss, one part sand and one part perlite. Flats with media are pasteurized prior to sowing. Flats are topped with a thin layer of silica sand to provide good surface aeration and drainage. Tropical and subtropical species are germinated indoors, while most hardy species are sown outdoors in a shade house.

Ferns are produced from spores or vegetatively (i.e. by division or rooting plantlets). Fern spores are sown in new flats containing shredded sphagnum moss. The flats and sphagnum moss are sterilized at a minimum temperature of 180°F for three hours. Spores germinate in 3 to 6 months producing the prothallus. Once the prothallus goes through the sexual stage, plantlets (sporophytes) are pro-

duced. After an additional 3 to 6 months, they are planted into pots. A 3 in. pot requires 18 months to 2 years to produce from the sowing date.

Grafting is a very important propagation method at Monrovia. I spent most of my time working in this department. Approximately 350,000 grafts are made each year and the most important plants grafted are *Acer palmatum* cultivars and evergreen magnolia. Most grafting is done during winter although some grafting takes place year round. Grafts are made in liners or in 1- and 5-gallon cans. There are also patio tree items which are grafted, with weeping mulberry and weeping juniperus being examples.

All the *Mahonia aquifolium* 'Compacta' are air-layered.

The tissue culture department is used to bulk up new and hard to propagate items. The main plants propagated here are neriums and syringas.

CONCLUSION

Of the 18 million liners produced annually by the propagation department, about one-third are sold to customers. The remaining liners are used for the nursery's own production. Monrovia Nursery Company is the largest and most successful containerized nursery in the United States of America. And I can without doubt say that I thoroughly enjoyed my stay with the company. I would like to take this opportunity to thank the I.P.P.S. and everybody responsible with the Mary Helliar Travel Scholarship for their help in making my trip to Monrovia possible.