

Creating Separate Environments to Improve the Grafting Success of Specific Evergreen Species

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INTRODUCTION

This paper will discuss in layman's practical terms the separate environments we try to create when grafting junipers, spruce, chamaecyparis, and pines. I will also touch on the similar environments we create to root hardwood cuttings of broadleaf and conifer species.

My observations come from many years experience grafting conifers in the central Ohio region. I am grafting during dormant winter months in double-poly greenhouses. I will be making observations based on practical experience, not extensive testing by scientific methods.

I want to thank you for allowing me to speak on the subject of creating separate environments for grafting selected species of conifers. This fancy title in essence means, "how do we treat grafted species differently after grafting?" I will discuss the different methods used based on the different species. I have learned the painful lesson that I am not nearly as smart as I used to think I was when I was younger. My recommendations are open to criticism and revision as we continually experiment and observe. I fully expect to be making changes should I be lucky enough to reach my senior years.

The reason we create separate environments for different species is painfully simple; the grafts survive with a higher percentage. For a small quantity grafter, it can be very difficult to create the different environments and maintenance conditions best suited for each genus. At our company, we strive to achieve large production numbers within a genus to gain the ease and efficiency of economies of scale. It often takes no more effort to hand mist 50,000 juniper grafts than it does to care for 100 grafts. Small quantity grafters often are forced to treat many different genera in the same fashion, in the same greenhouse, due to logistics. If, however, you have the luxury to adapt your production methods, I would suggest the following treatments.

CONIFER GRAFTING

***Juniperus* and *Chamaecyparis*.** At Decker Nursery, we graft about 50,000 upright juniper cultivars each year. We produce our own understock, *Juniperus virginiana* 'Hetz' (syn. *J. chinensis* 'Hetzi'), by rooted cuttings. The cuttings are stuck as hardwood cuttings in December with bottom heat, rooted, potted in the spring into a 2½-inch plastic pot, grown the entire summer to build caliper and root volume, and grafted the following winter. We produce our own understock as we cannot purchase plants of consistent quality. Understocks are trimmed in preparation for grafting, and warmed in the greenhouse for several weeks prior to grafting.

Juniperus and *Chamaecyparis* are genera that prefer the high humidity and warmth of a classic grafting case. Ours is a grafting bench with a clear plastic sweat

cover with ventilation holes cut into the plastic. In essence you are trying to create the terrarium that we made in grade school with a empty fish tank and a glass cover. During cloudy days and nighttime the holes are covered with plastic flaps. Optimum tent temperature is about 70 to 72F. Heat is provided to the bench via bottom heat — a hot-water system distributed via small black tubes under the flats.

The grafts are mulched with a peat and styrofoam mixture (1 : 1, v/v) to lightly cover the graft when they are placed in the bench. This peat and styrofoam mixture is very important for all our grafting. It is premoistened and provides a high humidity and dark microclimate immediately around the graft union. In addition, in a sweat case it provides the humidity reserve to constantly recharge the relative humidity level within the sweatcase. This high humidity case is kept intact until the scions begin to show about ¼ inch of new growth. At that time we slowly acclimate the grafts to regular greenhouse humidity. Over a 10-day period we gradually cut additional holes in the tent for ventilation and leave these open at night. When we are ready to remove the plastic tent, we begin at several times per day hand misting of the juniper grafts. This is done by a person rather than a time clock, as I prefer human observation to mechanical errors. We have a saying at our company that the true propagators have leaned to “think like a plant”. Learning to observe how the plant “feels” is critical to temperature and moisture control.

Pinus. White pine (*Pinus strobus*) cultivars are grafted in January in the same manner as junipers. They are placed in the same grafting benches, mulched, but left uncovered by the sweat tent. We have observed that the pine grafts prefer more air circulation and slightly lower humidity levels. They are hand misted as required to raise humidity levels on bright sunny days. As a side note, these pine grafts are misted on the same schedule as our winter hardwood cuttings.

Because we graft so many plants and root so many cuttings, it is easier for us to assign one person to monitor and be responsible for all misting duties. From our observation, graft care on a small scale can become a nuisance in early April.

Picea. Blue (*P. pungens*), white (*P. glauca*), and Norway (*P. abies*) spruce cultivars are treated differently from other graft crops. The process begins with a plug-produced seedling. We purchase a 1-year accelerated-growth plug seedling, pot into a 3-inch plastic pot, and grow the plant an entire summer to build roots and caliper. We have found plug produced plants very superior in cambium development and quantity over seedlings purchased bareroot. This vigor, juvenility, and cambium quality has resulted in 5% to 10 % improvements in grafting success.

Spruce grafting begins in February with scion gathering. We gather 1-year growth from vigorous, healthy plants. Poor scion quality will condemn you to about a 20% decrease in graft success. Understocks are cleaned and trimmed to clear the stem. A side veneer graft incision is made in the understock. Scions are trimmed of needles, and a matching incision and backcut is made on the scion. The scion is inserted into the understock and tied with a lightweight budding-rubber strip. The plant bleeds sap from the understock and this hardens into a seal which eliminates the need for grafting wax.

The unusual part of the environmental care begins at this point. The understocks are totally dormant prior to grafting, they are not forced in any heat. The greenhouse for post-graft care is an unheated double polyhouse with one white and one clear layer. The goal is to replicate a soft, cool, semishade environment of the floor of a

Pacific Northwest conifer forest. Remember, we are trying to learn to think like the plant. The grafts are mulched and placed on the floor of the polyhouse. Even globosa blue spruce on standards are laid on their sides to keep the graft near the peatmoss-induced, high-humidity microclimate. These are placed upright as soon as healing activity is apparent. Ventilation is by panels in the ceiling because spruce will die if they are in any draft. Never use fans to ventilate a house with grafted spruce. Spruce grafts will advance in time or slightly ahead of the outdoor season. Understocks will flush growth first, will be gently pruned back, and scions will flush growth. Post care on spruce is a delicate dance of spray maintenance for gray mold, gradual understock removal, temperature and moisture control, and judgement. Experience on this issue is critical to decision making concerning care. Expect many failures during a long and difficult road to calling yourself a successful spruce grafter. I am quite proud of the fact that we have averaged about 90% success for the last three seasons. Prior to some changes made 3 years ago, 50% was a typical crop. My family has been grafting spruce for 76 years and I still feel I have much to learn.

SUMMARY

I hope I have shown three distinct environmental climates we create to maximize conifer grafting success. They vary a great deal, and as you can see work best when dealing with large quantities that financially justify the specific care. If you cannot spare the time to have someone physically involved with your plants in post-graft care 7 days a week in the post-graft process, I think you should plan on purchasing your grafts. Grafting success is often equated with the knife skills in making the incisions, but I feel plant materials quality and post-graft care are just as crucial.

Good luck if you try some of the conifers I've discussed. If in doubt, ask yourself, "what would I like if I was a graft?"