

Bench Grafting, When Is the Best Time?

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INTRODUCTION

There are many factors to consider when grafting a wide range of hardy ornamental nursery stock. This paper will outline some of the factors that we at J. Frank Schmidt and Son consider when setting up our grafting calendar for the year.

TIMING

First, know the plants and quantities to produce for the year. Look at the “windows” or times of the year when each crop can be successfully propagated. These windows will vary greatly depending on the facilities available. Heated greenhouses or bottom heat may extend the windows for some crops, but not for others.

Some crops such as *Acer palmatum* have very large windows. They can be grafted successfully without heat between March and September, but using heat would allow you to graft in the winter months.

Other plants have very small windows. For example, I have seen *Fagus sylvatica* can be successfully grafted in the autumn, winter, and spring, but we can only successfully propagate them during two short intervals, late-January and late March.

If a new crop is to be added to production, we graft it at several times during the year to see when it grafts best. Often, it may take several years to find out when the best time is for our propagation methods. A plant may graft particularly well in the late summer or autumn; however, it may not overwinter well leaving you worse off than if you had waited until the following spring.

Once we know the windows available we then fit the grafting calendar together, at this time there are many other factors that come into play:

Available Facilities. Is greenhouse space available at the time we want to graft? Will we need to use a heated house or bottom heat?

Available Labor. What other work is being done at that time? Do we already have other crops to propagate? Perhaps there is a time this crop can be grafted when there is not so much other work to be done. One of our goals is to keep the labor curve as flat as possible so we do not require twice as many grafters one month as the next.

Scion Wood Availability. Summer may be a great time to graft *Acer palmatum*, but if we are short on scion wood for a particular cultivar we may have to throw too much of the softwood away and it would be better to wait until the spring.

Rootstocks. Are established rootstocks being used? Can the plants be grafted on bare-root dormant stocks?

Ease of Propagation. If the crop is difficult to propagate we may want a second chance. If it is easy, it may be possible to graft it during its last window for the year.

Table 1. Months of the year when the listed species can be grafted successfully in the greenhouse.

Crop	Month												
	J	F	M	A	M	J	J	A	S	O	N	D	
<i>Abies</i>	X	X											X
<i>Acer palmatum</i>	X	X	X	X	X	X	X	X	X	X			
<i>Carpinus</i>	X	X	X	X							X	X	
<i>Cedrus</i>	X	X	X						X				
<i>Cercis</i>		X	X	X			X	X					
<i>Cornus</i>	X	X	X						X	X			
<i>Fagus</i>	X	X	X	X					X	X	X		
<i>Ginkgo</i>	X	X	X	X				X	X				
<i>Hamamelis</i>	X	X	X	X				X	X	X			
<i>Larix</i>	X	X											
<i>Liriodendron</i>		X	X						X	X			
<i>Liquidambar</i>		X	X					X	X				
<i>Picea</i>	X	X					X	X					X
<i>Pinus</i>	X	X									X	X	
<i>Wisteria</i>	X	X	X	X									

METHODS

Once the time has been determined, the next thing to consider is the method. There are many variations of grafting and budding, but we use three in our greenhouse propagation:

1) Side veneer grafting: The scion is placed on the side of a rootstock that is later removed.

2) Whip grafting: The excess rootstock is removed at the time of grafting and the scion placed on top of the plant or the root.

3) Chip budding: A single bud shield is placed on the rootstock.

With many crops one method is much more successful than others. With other crops however, the difference may not be so great and other factors may influence the decision of which system to use.

Side Veneer Verses Whip Grafting. The side veneer graft is our default graft. It can be used for almost all crops and is easily learned. Whip grafting does not work on all crops; removing all the excess rootstock at the time of grafting will often kill the plant. It often takes a new grafter longer to learn. It does, however, have certain advantages over veneer grafting for some crops.

- Less rootstock preparation is required before grafting, the rootstock is simply cut off 3 or 4 in. above the pot.
- Heading back and thinning of the rootstock tops after grafting is not required.
- The scion will often grow faster in the spring because all the energy is going to the scion and not being shared with the remaining rootstock.

- Of the crops we grow, *Aesculus*, *Carpinus*, and *Fagus* are whip grafted.

Chip Budding. Chip budding is a common form of field propagation, but it can also be used in the greenhouse. It is especially useful for tree propagation where a single straight stem is required. It is easier to straighten one bud growing out the side of a rootstock than one of several buds growing out the side of a scion. Chip budding requires less scion wood since only one bud is used. It is also a faster operation than grafting.

The main crops we greenhouse chip bud are *Liquidambar* and *Ginkgo*.

Tying. After deciding what method to use we can decide on what tie to use. Options include: rubber strips, plastic chip bud tape, flagging tape, Max tape, and biodegradable tape.

What we use depends on our grafting environment and what works well in each case; more humid grafting environments will probably get very good results with rubber strips, drier environments may get better results with tape.

We tie all our deciduous plant grafts with some form of plastic tape. In the past we used chip bud tape for veneer grafts and stronger flagging tape for whip grafts. However, we now use the Medel grafting tape for all our deciduous plant grafting since it does not have to be tied at the time of grafting and, if applied properly, does not have to be cut off later.

While many growers get excellent results using rubber strips, we get better results with tape. We do, however, use rubber strips for our coniferous material. This allows the sap to run out between the rubber and not be trapped in the graft area.

Sealing. Whether grafts require sealing or not depends on the crop and the environment of the facilities. A more humid environment may make sealing unnecessary. However, if overhead irrigation is being used in conjunction with a plastic tie, sealing the top of the graft may be necessary to prevent water from running down inside the graft.

We seal the tops of all our deciduous plant veneer grafts since we use overhead irrigation and a plastic tape. However, we do not seal our coniferous plant veneer grafts.

ENVIRONMENT

Once grafted, the plant must be placed in a suitable environment. These can vary, from very simple poly greenhouses with no heat systems to more sophisticated greenhouses with ventilation and heating systems. The environment required will depend on the plant, time of year and method used.

Heating. Supplemental heat is generally required during the winter months, but by paying attention to timing and method its use can be limited. Bottom heat may be more expensive to install but may be more economical to run. Attention must be paid to how much heat is used and where. If the air temperature is too high the scion may break bud before it has callused to the rootstock.

We heat our propagation houses to between 40 and 45 F during the winter propagation months.

Ventilation. Ventilation and air circulation are most important when the scions begin to break bud. If the plants are still very close together, poor air circulation and

ventilation could quickly lead to the delicate new shoots rotting off.

Shading. Preventing too much heat build up in the spring is very important, while too much shade on cool overcast Spring days will retard growth and increase fungal attacks. Too little shade on sunny spring days may cause the emerging delicate foliage to burn or dry up. Depending on the crop and the day we will use shading of between 30% and 70%.

Tenting. Tenting is a widely used technique with new grafted plants. A thin 1-mil, clear polyethylene tent is put over the grafts, this has the effect of raising the humidity and the temperature without heating the whole house. It can be a particularly useful technique with autumn, winter, and spring grafting.

The poly is put over the grafted plants in the greenhouse. Shading will also be required on sunny days to prevent excessive heat build up. Even so, it will become very hot under the poly tent. What prevents the plants from burning is the 100% relative humidity. If the tent is not sealed properly and the humidity drops, the plants will burn.

Weaning the plants off the poly tent is very important. After callus formation has begun, weaning can begin by opening the tents in the cool mornings and closing them again for the hotter parts of the day. Weaning will take between 5 and 10 days depending on the crop.

We use tenting on almost all our crops grafted between October and April; the time tented will vary between 4 and 6 weeks depending on the crop.