

A PROPAGATING **EXPERIENCE** **Bob McFarlane**

When Val asked if I would write an article on my penstemon propagation experiences this past year I agreed but only with some trepidation, since so many of you have had so much more experience in this area than I. By way of some background, my wife and I have been growing penstemons for the past ten years. We also have been collecting wild penstemon seed for several years and I have been trying to propagate penstemon from seed for the past five or six years.

My original efforts were very spotty and not particularly successful. Major problems included no or very low germination, damping off of new seedlings, losing many plants after pricking up due, I think, to lack of water and too much direct hot sunlight. In addition, I never had a comfortable place to grow the plants after they were pricked up into small plastic pots. I tried a number of different things, mostly suggested by many of you, and things improved but I was still not satisfied. I also felt very tied down in raising the small plants during late spring and early summer when I would like to have been doing other things, such as traveling to see wildflowers in bloom.

After doing more reading, talking with others, and study I decided that I would try two approaches to improve propagation. First, I would try a hopefully more scientific approach in attempting to improve seed germination and secondly, I would build a hoop house complete with a sun screen and watering system to try and reduce the loss of the smaller plants. Both of these were accomplished and reported on here.

Hoop House.

Hoop houses have been used for many years, mainly to extend the growing season for plants in some areas. They are constructed quite simply with twenty foot lengths of PVC pipe bent into the shape of an inverted "U" by placing one end of the pipe over a two foot long piece of iron or steel rod that has been hammered into the ground and then bending the pipe to fit over another similar rod placed about ten or twelve feet away. By using several such "hoops" spaced six feet or so apart and connecting these by fastening two or three smaller diameter PVC pipes to the larger ones one has constructed a basic hoop house.

The final steps are to cover the structure with some material and in many cases construct a simple door on one end to enclose the hoop house. This is the procedure used by many who use these houses to extend the growing season. They generally use a clear plastic material for the covering material.

There are several good designs on the internet. I simply googled "hoop house" and found several. I used the basic design from one developed at New Mexico State University at Las Cruces. However, my objective was not to extend the growing season but to provide a better place to grow penstemons. For this reason, my hoop house was quite a bit easier to construct and not very expensive.

I didn't use any of the plastic covering or any doors but used only a 50% sunlight reduction green knit material, used by nurseries and growers, to cover the top in order to reduce the amount of sunlight reaching the plants. It is tied on to the house with plastic strip

ties and easy to take down in the winter and put up again in the summer. The hoops and the connectors stay up in all year. With nothing on the sides or ends air can circulate freely inside the house. Also, the top, while made of net material does protect the plants from heavy rainfall. I'm not sure about heavy hail but believe that it will handle moderate size hail without a problem.

I reduced the size of the materials recommended in the New Mexico State design because of the reduced size of the structure. I reduced the diameter of PVC hoops to two inches and the smaller connecting PVC to one inch. The hoop house is about twelve feet square and just over seven feet at its tallest point. It is quite roomy and has good head room.

I added a simple watering system with three sprinklers hanging from plastic piping (the type used in garden drip systems) connected to the top of the structure. It is connected to our garden watering system and can be set to water independently from the rest of the system.

The final addition was the purchase of four used six by three foot collapsible tables (the type used by many churches) for about \$5. each. The total cost of the hoop house including everything was just under \$300.



Propagation Procedures.

Seed was soaked 24 to 48 hours or until it sank. Seed requiring stratification was placed in a zip-lock baggie with a little vermiculite and enough water to dampen the mixture thoroughly, labeled and placed in the refrigerator. Seed that didn't require stratification was placed in a plastic pot underneath a small covering of and on top of a soilless mixture of peat and vermiculite, labeled, and placed under florescent lighting in the garage.

The timing of starting the seed was determined by the stratification or germination times listed in "Growing Penstemons: Species, Cultivars, and Hybrids", by Wilde and Lindgren. I tried to schedule the plants to show themselves around the first of April.

Seed requiring stratification was removed from the frig at the end of the estimated time required for stratification placed in a plastic pot in the same manner as described above for non stratified seed, labeled, and placed outside on the north (shady) side of our house and left there until about April 1 when it was transferred to the hoop house.

Another source of seed was some planted last year which didn't germinate. There were 22 pots of this which, after spending the summer and fall in a dry place in the garden were transferred again to the north side of the house for further stratification.

In inspecting the seed that was removed from the refrigerator, if there were signs of germination then the seeds were treated as above but put under lights in the garage instead of placing outside.

When the inside plants showed two sets of leaves and were about an inch high they were pricked out into 2

1/2 inch plastic pots or plastic cones about one inch in diameter and 8 inches long and kept under the florescent lighting in the garage. I used about 2/3 soilless mixture and 1/3 scoria for all pricked out plants and watered them almost every day but did not use any fertilizer or chemicals. All were removed to the hoop house around the first of April.

Problems.

Damping off of the tiny seedlings while under lighting in the garage was the only major problem encountered. There were significant plant losses until a friend suggested that air circulation may be the problem. He suggested using a fan to keep the air circulating and this proved to be very successful. I researched anti-fungus chemicals but found out that ones that worked were too expensive. Some were over \$200 a gallon.

After solving the damping off problem I started additional seed from the species lost and was able to propagate all of them again.

Plant Development

After moving all the pots to the hoop house plant development accelerated although the rate for different species varied a great deal. Some species did not produce their first plant for quite a time after germination was supposed to occur. Many species took over 100 days. At the time of this writing (July) there are still plant species too small to prick out. One pleasant surprise has been that 20 out of the 22 species that didn't germinate in 2008 have germinated successfully this year.

We have had an unusually wet spring and early summer so the hoop house watering system has not been used

on a daily basis. But it has been a great comfort to be able to set a schedule for watering and then be able to go off and look for flowers in the wild without worrying about the plants drying out. Also, our spring weather this year has been noticeably cooler than average so I'm not sure if the hoop house cover has been necessary up to now.

The great majority of plants in the hoop house are developing nicely and there have been few pricked out plants lost - probably less than 50 out of several hundreds. The hoop house has proved to be a comfortable place to work and provides conditions agreeable to penstemon plant development. The roof has worked well to protect the small plants from sun as well as from damage from our heavy rains.

Results

The propagation results for 2009 are shown below and compared with results from 2007 and 2008 which didn't include the hoop house or refrigerator procedures.

Year	Year	No.	No.	No.
	Seeds	Species	Species	Species
	Started	Started	Gerrminated	Planted
'07	'07	65	46(71%)	37(57%)
'08	'08	61	37(60%)	31(51%)
'09	'08	22	20(91%)	20(91%)
	'09	96	89(93%)	85(89%)

Conclusions

1. Germination can be improved for plants requiring stratification with a combination of using time both in the refrigerator and outside.
2. 24 to 48 hours of soaking seeds seems to help in improving their germination.
3. Stratification often requires longer than one year and non-germinating seed should be held over for at least one more year for further stratification.
4. The use of a relatively inexpensive hoop house can improve the number of pricked out plants surviving to be planted in the garden and provides a more comfortable place to raise them in.
5. Damping off of plants in confined space such as in a closed garage can be improved by using a fan to improve air circulation.