# FLOOR HOT WATER HEAT FOR INDOOR PLANT PROPAGATION

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Our method of propagation at Plant Systems involves the use of ground heat. It is not a miraculous process, the plants do not spring up overnight. However, it is a natural process that speeds up the rooting of cuttings. This is a system I am sure other growers may wish to investigate. It is likely to become one of the most popular methods of plant propagation in the future.

Many references can be found in the history of plant propagation concerning the utilization of bottom heat to aid in stimulating rooting. Each firm might have different facilities available to them and in our case we had a conventional plastic covered quonset house which is 14 feet wide and 135 feet long. Since there is not a lot of head room for using conventional benches and since the greatest width is at the base it was decided that if the propagation trays could be set on the floor that the greatest return per square foot would result. It was decided that warm water circulated through plastic pipes in the floor could do a job of providing enough heat for propagation while allowing a cool temperature at the leaf surface and above so as to reduce respiration.

It was decided to use an A.O. Smith-Hydronic Boiler, model HW-100P, which has a maximum BTU input of 100,000, and a maximum BTU output of 80,000. The unit has the ability to throttle the flame so that on low demand there is a low flame, and with high demand a high flame. This provides for a much more uniform water temperature in the pipes than a full "on or off" type boiler. There is a circulating pump that runs whenever the flame is on. The energy to keep the crop roots at 72°F is 42% less than if under bench hot air unit heaters were used. The boiler is only 26-1/2 inches high, and occupies 4.5 square feet of floor space. The house will hold 50,000 cuttings in growing trays, and we turn the house over every 2 to 3 weeks.

We decided to use Celenese high temperature black polyethylene pipe. However, we have since found that probably any black plastic poly pipe will do since the top water temperature is only 110°F which is the lowest setting on the boiler. The pipes are spaced 1 ft apart on top of 5 inches of crushed stone. This type of situation ensures perfect drainage. You can make one large loop by starting at the boiler's hot outlet and looping

back and forth the length of the house until you have covered the floor and then returning the end to the inlet side of the boiler. We are going to do just that the next time. We did, in fact, make a header for both outgoing and return water. However, we now feel that it was a lot of work that was not needed. The pipes were then covered with 4 inches of coarse sand and then the crop set on that.

It is easy to hold good root temperatures, and we found during the winter that we could have 72°F root temperature with frost forming on the inside layer of the double plastic layer house, and a 48°F temperature at 4 feet above the crop. One problem was drip caused by the plastic being much colder than the air or the crop. We are not sure how to deal with this easily, however, it is clear that this moist air must be removed or heated.

The final results are excellent. The heat saving is significant, and the crop response is very good. It might, furthermore, be a very good and efficient house for cold storage where you might like to keep the roots at say 40 degrees, and yet let the tops of the plant freeze. It has been suggested to us that we insulate under and around the house but we did not find a great loss out the sides which would have melted the snow, and we could not have lost too much out the bottom and still heated the crop during the coldest winter on record and done it with 42% less heat than we would have expected to use by other means.

The items we have produced in this house is a list of 55 different types of indoor plants. Some of the faster would be well-rooted in 7 days after sticking with the slowest taking 30 to 40 days. This autumn is our first opportunity to try rhododendron under these conditions. We invite you to visit us in Mentor and look at the unit anytime.

ANDY KNAUER: Was there any other form of supplemental heat in these houses?

DICK BOSLEY: No there was not.

CHARLIE PARKERSON: Putting this hot water through lines 135 ft long, is it stone cold when it gets to the other end?

DICK BOSLEY: No there is very little difference from one side to the other.

TOM McCLOUD: What was the cost of this installation?

DICK BOSLEY: I don't recall, but the boiler is the most expensive part and I think it was around $400. The black plastic pipe is relatively inexpensive and I would anticipate quite a

number of years of use out of it. You can't leave it freeze, that would ruin the boiler.

PETE VERMEULEN: We have been using a house very similar to this for 8 years with very good results. We did, however, experience 8-10° difference in the temperature of the flats. This was a contact problem since at that time our pipes were set in gravel. We applied pebbles over this and it corrected the problem. You could get rid of the condensation by using double poly, this would also save heat.

DICK BOSLEY: Ours is double plastic.

DAVE BAKKER: In Canada we spray the insides of the house with a material called "Clear"; it reduces the surface tension and the condensate simply runs down the sides of the walls and does not drip on the foliage of your plants. The material is relatively inexpensive, I guess it would cost $4 to $5 to do a house such as yours.

## LEAF MOLD FOR CONTAINER CULTURE

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Using leaf mold for growing container plants on a commercial scale? It sounds like a return to the era of monastery gardening, or at least a capitulation to the organic gardening extremists — mumbling incantations about compost! However, the use of composted leaf mold is none of the above, but a very practical and inexpensive source of humus in certain parts of this country. In carrying out "clean air" programs, a number of the densely populated eastern states have enacted rigid no open burning regulations, which include among other things a total prohibition of leaf burning. This has posed a real problem for suburban municipalities with abundant shade trees. As the fallen leaves are collected each autumn they have perforce been dumped in large piles in vacant lots as they cannot be incinerated as was the practice in earlier times. These huges piles of decayed leaves can be a valuable source for nuseries and at the same time their removal can be of great benefit to the municipalities which have often faced inundation under an ever growing surplus of them.

Our firm has worked out a mutually satisfactory arrangement with several nearby towns which satisfies both our needs. The municipalities collect and pile the leaves on vacant prop-