

PROPAGATION OF WOODY ORNAMENTALS USING FLOOR HEAT

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The purpose of this paper is to show that floor heat in propagating ornamentals can be advantageous in several ways. First of all, let me point out that nearly all our propagation is done indoors in fiberglass quonset greenhouses. The reason for this is that during the early summer months, and again in the fall, the temperature fluctuates rapidly and can cause damage to the young crops. We use quonset fiberglass houses because these endure more severe weather than either glass or plastic. In the quonset houses we grow two crops per year: a summer crop consisting of deciduous shrub and perennial cuttings and a winter crop of coniferous evergreen cuttings.

Until last year these crops were rooted on raised benches. We, too, have been looking for ways to cut our fuel consumption and construction costs so we decided to use floor heat in our next house. Let me emphasize that this project is not a new thing in horticulture but I think that we have gained a few insights that I would like to pass on to you.

All our houses are heated by hot water which is circulated from a boiler by a circulating pump in each house. This enables each house to operate at a different temperature.

The greenhouse is a tedlar-coated fiberglass clad quonset type, 30 × 100 ft., and the sub-floor was tile drained and leveled before construction began. A 4 in. layer of $\frac{3}{4}$ " crushed stone was spread to form the base for the heating pipes. The heating pipes (1" galvanized steel to ensure longevity) were laid 15 in. apart throughout the entire length of the greenhouse. Each set of 8 pipes were connected to a 3 in. header and a 3 in. return line, thus dividing the floor area into 3 beds. The importance of having 3 separate sections is to ensure an even heat distribution to all areas of the house. An Armstrong 3 in pump was situated in the return line to the boiler. The circulator is activated by a thermostat, the probe of which is inserted in the rooting medium.

After the pipes were leveled and secured another 4 in. of crushed $\frac{3}{4}$ in. stone was spread and leveled over the 1" pipes. Concrete was then poured over the entire floor in sections in such a manner as to leave three 7 foot beds sloping on each side to a path. The paths which act as drainage gutters and walks at the same time are sloped to one end of the house. The

slope of the beds from the centre to the sides is approximately 3 degrees.

The edges of the beds have a 4" high plank to keep the medium from spilling on the walks and are slightly raised to allow for drainage.

The following are some observations that we have made during the first two crops in this house:

1. The temperature is remarkably stable in the floor heated beds. The mass of crushed stone and concrete give it the ability to retain heat for a long time. Very little boiler heat is needed to keep the mass at the required temperature.

2. The floor heated beds are easier to wash and clean and need practically no maintenance, except for the 4" board along the edges, perhaps every five years.

3. There is very little waste of space using this type of bed.

4. The floor beds seem to have a cooling effect during the hot summer months. Deciduous shrub cuttings have more top and root growth than similar cuttings on raised beds.

5. Construction of the floor beds is easier than the raised beds and somewhat less costly.

There are also a few disadvantages with floor heat. The heat loss from the beds is so little that we had to install one heating line above ground to keep our mist lines from freezing during the coldest nights. Also, it is much more difficult to plant the cuttings sitting down than standing by a raised bed.

We have rooted quite a variety of plants using floor heat during the first year. Plants rooted by this method include: *Juniperus scopulorum* 'Wichita Blue', *J. scopulorum* 'Admiral', *J. chinensis* 'Mountbatten', *J. virginiana* 'Skyrocket', *J. chinensis* 'Spartan', *Mahonia*, *Ilex opaca* and *Thuja occidentalis* 'Spiralis'. From the experience we have had with floor heat, we think it has a lot of merit.