

EFFECT OF OVERWINTERING METHOD ON ROOT-ZONE TEMPERATURES IN CONTAINER NURSERY STOCK

Philip Ronald, Ph.D.

OBJECTIVE:

In the fall of 2002 we set out to accomplish some basic research relating to overwintering methods for container-grown nursery stock. The primary objective of this study was to monitor the root-zone temperature for container-grown stock protected under different coverings.

MATERIALS & METHODS:

The following overwintering treatments were tested:

1. Plants laid down, then covered with Poly, Straw & Poly
2. Plants laid down, then covered with Poly & Insulation Blanket
3. Plants laid down, then covered with Poly & Straw
4. Plants consolidated pot to pot but left standing up

For treatments 1 to 3, plants in 2 gallon containers were laid on their side and piled in a group 3-4 layers high. The resulting pile was overlaid with a single layer of clear plastic poly. For treatment 1, a layer of straw (3-4 inches) was added followed by an overlay of poly. For treatment 2, a six ounce insulation blanket (HJS Wholesale, Winnipeg, MB.) manufactured from non-woven polypropylene was added and held in place on either side with cement blocks. For treatment 3, a layer of straw (3-4 inches) was added. For treatment 4, the plants were left standing up, but containers were pushed tightly against each other. No covering was applied to treatment 4.

The root-zone temperature for each treatment was monitored with two independent sensors. For treatments 1 to 3, one sensor was placed in a pot in the center of the pile (covered by at least one layer of containerized shrubs), the other sensor was placed in a pot on the edge of the pile. For treatment 4, one sensor was placed in a pot in the middle of the group, the other sensor was placed in a pot at the edge of the consolidated group of plants. All sensors were placed in contact with the root-zone (between pot wall and soil).

All temperature readings in this study were collected with the Watchdog DataLogger Model 100 (Spectrum Technologies, Plainfield, IL). These sensors were put in place on October 28, 2002. Straw and blankets were put in place on October 29 – 31, 2002. Sensors were activated on November 1, 2002 at 1 P.M. and recorded root zone temperature every two hours for five months.



RESULTS & DISCUSSION:

Of the methods tested, the highest monthly minimum temperatures were recorded in the root-zone of containers under treatment 1 (poly-straw-poly). Of the methods tested, the lowest monthly minimum temperatures were recorded in the root-zone of containers under treatment 4 (plants left standing, containers pushed tightly together) (Table 1).

For all treatments, root-zone temperatures were lower in containers at the edge of the pile or group (Table 1). The greatest variation in root-zone temperature occurred under treatments 2 (poly-insulation blanket) and 4 (plants left standing, containers pushed tightly together).

Table 1. Monthly minimum root-zone temperature (°C) and standard deviation (in parenthesis) for each of four overwintering treatments measured every two hours over a five month period.

Month	Poly-Straw-Poly (edge pot)	Poly-Straw-Poly (center pot)	Poly-Blanket (edge pot)	Poly-Blanket (center pot)	Poly-Straw (edge pot)	Poly-Straw (center pot)	Standing (edge pot)	Standing (center pot)
November 2002	-2.0 (0.4)	-1.5 (0.3)	-9.0 (2.8)	-4.0 (0.8)	-5.5 (1.3)	-0.5 (0.2)	-27.0 (5.8)	-14.5 (4.0)
December 2002	-4.0 (0.7)	-1.5 (0.3)	-26.0 (4.3)	--	-6.5 (1.6)	-1.5 (0.4)	-32.0 (6.3)	-18.5 (4.1)
January 2003	-6.0 (1.5)	-4.0 (1.1)	-27.0 (5.4)	--	-12.5 (2.7)	-6.0 (1.3)	-41.0 (10.2)	-16.0 (4.3)
February 2003	-6.5 (1.1)	-5.0 (0.7)	-23.0 (2.9)	--	-16.0 (2.2)	-5.5 (0.8)	-41.0 (5.9)	-11.5 (1.5)
March 2003	-6.0 (2.1)	-4.5 (1.5)	-26.5 (7.9)	--	-16.0 (4.3)	-6.5 (2.1)	-23.0 (4.0)	-9.0 (3.2)

Overwintering methods that include a layer of straw offer the best means to protect container nursery stock. Further investigation is required to determine the value of synthetic insulation blankets. They may offer sufficient insulative value to protect the hardiest of shrubs.

There appears to be benefit in the use of an additional layer of poly at the outside of the pile. Not only did this layer result in a significant increase in edge pot temperature, it could potentially keep the straw layer dry facilitating easy removal. This year, we will test the effect of an outer layer of poly on the effectiveness of the insulation blanket as well as a new product known as Foampak (expanded polyethylene foam).

