

# Nursery Crop Science

College of Agriculture and Life Sciences • NC State University

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## Practices to Reduce Winter Injury on Nursery Crops

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December 18, 2000 had a high temperature of 46° F and that was the highest temperature in the Raleigh area until January 5, 2001 (Lake Wheeler Road Field Laboratory climate data; <http://www.nc-climate.ncsu.edu/>). Low temperatures during the same period ranged from 36° F to 14° F. You might say that these temperatures don't seem all that cold and if you are focused upon record low temperatures, they are not record setters! But such an extended period of unusually low highs, winds everyday gusting from 15 to 33 mph and a total of only 0.31 inches of precipitation caused considerable nursery and landscape damage and plant death. Greatest losses in nursery stock occurred in newly planted broadleaved and conifer liners in fields and in containers. If new liners were not thoroughly irrigated before and during this period, they dried out and died. More crops are lost every year to "Winter Kill" which is desiccation than are lost to "Freeze Injury. However, we enjoyed both as the first flush of growth was lost in many nurseries by freeze injury April 17,18 &19, 2001 when temperatures near Raleigh were 34°F, 33°F, 31°F, respectively.

So What's New with Winter Protection?? A panel moderated by, Mike Hudson (Sampson Nursery), and including Carlton Hinnant (Hinnant Nursery), Jeff Adcock (Adcock's Nursery), Richard Currin (Currin's Nursery) and Ted Bilderback (NCSU Nursery Extension Specialist) were quizzed at the September meeting of the Johnson County Nursery Association. The following comments were discussed during this forum.

\*Nurserymen in Eastern NC focus on winter protection procedures between Thanksgiving and Christmas. If winter protection structures are to be covered, it is completed before Christmas. If plants will be covered with winter protection blankets or shade cloth, this is usually done before Christmas and covers left on until at least late January.

\* Water before a cold front!! The number one rule was to irrigate before a front. This is probably the only reasonable winter protection technique for field grown nursery stock. When the weather forecast is for a cold front bringing freezing temperatures, be sure to irrigate and make sure the irrigation system drains. This accomplishes two goals. First to fully hydrate plants so if the air temperatures are cold and root systems not able to take up water, plants have the highest amount of water in the foliage to resist desiccation as long as possible. Also, if containers are at container capacity, as temperatures drop and as ice forms from water molecules, heat is released, thus resisting rapid drop in temperatures in the root zone.

\*Jamming containers into blocks or not moving containers? There are still two choices regarding moving or not moving containers but either choice is just a preliminary step to additional winter protection practices. Moving containers into blocks in late fall and spreading blocks back out in spring is very labor intensive and therefore very expensive, costing possibly as much as 10% to 12% of a nurseries production budget. An alternative that is becoming popular in the piedmont and eastern NC is to use shade cloth or winter protection blankets to cover production blocks in place. There is also precedent for not moving containers late in the fall because the bottoms of the containers are more or less sealed to the growing surface and have a continuum to the soil. During the cold December and January days mentioned above where ambient air temperatures dropped to 14°F, ground temperatures only dropped to 37°F during the entire period. Dr. Stu Warren and I have a study in progress that will provide information this winter comparing container temperatures setting on plastic, fabric and plastic or gravel surfaces.

In contrast, if containers are moved and placed into winter protection structures, they will be jammed (tightly spaced) to eliminate air pockets and get as many containers in the house as possible. Even if most nursery crops are left outside, some crops, such as loropetalum and nandina seem to be best protected in winter protection structures. During periods of extreme cold temperatures, some growers use winter protection blankets to cover the least hardy and tender crops inside the plastic covered winter protection structures.

\*Winter Protection Houses- Clear plastic or white copolymer covering?? There are still pro's and con's for either covering! White copolymer plastic has become somewhat standard because it reduces wide fluctuation in temperatures inside houses on sunny days during the winter. Doors can be opened on winter protection structures during sunny days to ventilate houses, thus avoiding de-acclimation of crops. However a definite con for white poly is when houses are kept closed during cold, cloudy days. Conditions inside become damp and condensation rains from the plastic onto the foliage of crops creating ideal conditions for many disease problems. Interest was sparked when a product called "Sunclear" was mentioned by Tony Avent. This product can be power sprayed on white poly on the inside of a house to reduce condensation drip. A house can be sprayed for about \$25 according to Tony.

The argument for using clear plastic is to reduce the damp conditions and maintain high light conditions that reduce defoliation and normal foliage if new growth does occur. The problem with clear plastic is that very high temperatures are a problem under clear poly unless the house has an active ventilation systems that can remove heat effectively.

\*Winter protection blankets or shade cloth for covering container blocks??

An automatic advantage for structure-less winter protection is that winter protection houses do not have to be constructed. Snow causes problems for both. Believe it or not--the best answer for each nursery may be dependent upon how automated the irrigation system is. If the irrigation system is not automated, then winter protection choices seem to become either, put crops in winter protection structures or leave them out (jammed or not) and cover blocks with a 4 oz winter blanket that is anchored to prevent it from blowing off blocks. The blanket may need to be removed and folded up adjacent to growing blocks during warm periods or temperatures can build up under the fabric causing plants to de-acclimate. Very seldom can a nursery get by with

only covering the plants once during a winter. Winter protection blankets are available in several weights, however the 4 oz weight is recommended when it is used as the primary winter protection practice. However, growers do not feel that water moves through the 4 oz weight well enough for uniform irrigation below the fabric.

If the irrigation valves at the nursery must be manually turned on, then irrigating crops for winter protection should be limited to irrigating crops before cold periods and draining the system to avoid frozen pipes. Occasionally, tender shoot growth can be protected in late fall or early spring by irrigating when temperatures drop to 32°F and leaving the water on until temperatures rise above freezing the next morning. This practice is the same as strawberry and fruit tree growers use to protect flowers on crops.

Automated irrigation valves with a temperature sensor start up adds a new dimension to winter protection in nurseries. Light weight 2 oz winter protection blankets can be used but 75% to 80% shade cloth seems to be preferred as a cover over container blocks. One caution is that new shade cloth must be weathered for at least 2 weeks in the sun or possibly washed with a detergent that will remove the oily film. Otherwise, irrigation will not freeze on the shade cloth and crops will be damaged.

Covering blocks with shade cloth and irrigating to form a coating of ice over an entire block is the newest winter protection strategy. Irrigation is turned on at approximately 37°F to 35°F if windy or at 32°F with still conditions.

Cyclic irrigation is used to form a uniform coat of ice over blocks as a cold front moves in. Each of 2 or 3 cycles may apply water over each block for 5 to 15 minutes per cycle. After the shade cloth is completely covered with ice, irrigation can be shut off and lines drained. When temperatures are dropping rapidly, it is important to drain the system quickly to prevent freezing.

Considerable pre-planning for rapid draining of the irrigation line is required to be successful with the “icing in” winter protection system. Draining the lines quickly requires some engineering at the lowest point in irrigation line. Two adaptations can be installed to accomplish quick draining. First of all, beneath the lowest riser a dump valve is installed. A metal check valve is altered by drilling a 1/32 inch hole into the housing and the spring in the valve is reversed. Also, a weep hole in the irrigation line at grade helps release back suction and allows the valve to drain rapidly. (If you don't understand this description, the second to the last named panel member may be able to help you understand the engineering). One last point on icing over blocks is that irrigation droplets must not be too coarse or they pass through the shade cloth and do not freeze on the surface. Gear drive nozzles are not very effective with this system. A #25 impact sprinkler seems to be very satisfactory for icing shade cloth.

Best of Luck this Winter!!