



Winter protection for plants

Growers have a variety of options to deploy against the worst conditions winter has to offer

Pot-in-pot (PIP) production systems protect the root systems of young trees against wintry conditions much better than regular containers. However, there are other methods available to protect container plans, as well.

By Miles McCoy

Even a mild-climate growing region such as Oregon's Willamette Valley can experience damaging cold, unseasonable freezes, and late spring cold snaps. For evidence, look no further than the Northwest's last two winters.

Cold protection has become a standard production process. Decades of research have helped create many options for protecting sensitive plants.

"Growers have several choices for protecting crops," said George Mecure of Crop Protection Services in Gresham, Ore. "It depends on what crop is being protected."

According to Mecure, today's choices include over-the-top covers, made of fabric or poly, simple poly-covered

hoop structures, or anti-transpirants.

Historically, other plant protection methods include pushing the containers together and applying an organic mulch, covering plants with freezing water, and more modern approaches such as retractable roofs and pot-in-pot (PIP) systems.

Protection methods become standardized

Protecting valuable crops was obviously one of the earliest concerns for ornamental plant growers. This led to the development of many successful winter protection techniques that have become standard production practices.

Early nursery operators first pushed their containers together and placed them in sheltered, shaded locations. Straw bales were placed around the perimeter of the pots. The air trapped around the containers is warmer than around the tops of the plants. The

shade prevents water loss on bright, cold winter days, and also protects the plants against spring frost burn. Some growers use plastic or paper to wrap the containers.

Then, the use of small hoop houses became a popular option. These structures are more permanent, and they protect the entire plant. This is a definite advantage with delicate varieties. "Many larger growers use the cold-frame, hoop house structures to protect sensitive species," Mecure said.

Other growers take a more economical approach. "They save their used poly from their greenhouses or hoop house structures and place it near the crops," Mecure said. If damaging weather is predicted, they can quickly cover the crops.

"This saves both time and money," Mecure said.

Yet another structure-less strategy



Quail Ridge Shade Trees in Sherwood, Ore. is among the OAN member nurseries using socket pots as part of its production practices. Films, blankets, retractable structures and even carefully-placed bales of hay are other methods of protecting hardy plants against the rare extreme cold events that occur in Oregon.

many growers have used over the past several decades involves blanketing the plants for the winter. Growers will cover them with various fabrics or cloths, white copolymer film, or thermal blankets, all of which generally are easy to use.

There are some minor drawbacks to these blanketing methods. The plants can take damage from flapping plastic, heavy ice or snow breakage. They can also suffer the effects of heat and moisture buildup. Still, adequate maintenance and inspection will help growers avoid most of these issues.

“We conducted research many years ago using floating row covers with cabbage growers in the Skagit Valley, Wash.” said researcher Rita Hummel of the Washington State University Puyallup Research and Extension Center, located in Puyallup, Wash. Their work showed the technique was effective and provided about 5 degrees F of protection.

“The covers were, again, just using the soil’s stored heat to warm the cabbage plants’ environment,” she said.

Oregon research

Another protection option is using an existing sprinkler system to apply water that then freezes on the plants. This actually releases a small amount of heat and keeps the covered plant at near 32 degrees F. It generally requires starting the sprinklers before freezing temperatures are reached. Sprinklers should remain on, at least sporadically, until it warms well above freezing.

“It is effective against both radiation and advection frosts,” said Rich Regan, an extension nursery specialist with the North Willamette Research and Extension Center (NWREC) in Aurora, Ore.

Regan studied the concept several decades ago and said that properly applied, it can be an effective system to protect plants. Some nurseries plan to use this system for only a portion of the production area. They adjust based on the width and length to get proper irrigation delivery rates and adequate coverage. This method often is used with hardier species that often can survive the winter without protection.

Another Oregon researcher, Dr. Sven E. Svenson, studied retractable roof structures for use as unheated cold-protection structures for container-grown nursery crops when he was at NWREC.

Svenson found that the plants protected under these retractable structures required fewer irrigation applications and fewer pesticide applications. Rhododendron flowering was delayed about four weeks in the retractable roof structure, providing an opportunity to ship blooming plants at a later date. Based on delayed initiation of vegetative growth, crops grown in the retractable roof structure maintained cold hardiness for a longer period of time.

Crops grown in the seasonally-covered Quonset structure were susceptible to frost damage before Nov. 1, and after Feb. 16 and suffered some damage, while crops grown in the retractable roof structure were always protected from extreme temperatures and had no frost damage.

Other new approaches

The ability to spray some sort of compound on plants to protect against freeze damage would simplify the process. Anti-transpirants are compounds that prevent water loss while adding a protective layer. This happens by several different mechanisms. During cold periods, much of the damage is due to desiccation. This occurs when frozen water in the soil cannot be drawn up into the plant.

The chief advantage of anti-transpirants is the ability to apply them over acres of containers quickly. For example, growers can apply them when there is an unexpected drop in temperatures and the plants are not protected.

While there are many anti-transpirants on the market, their results seem mixed. *Digger* has published several stories in which Oregon growers said they had success with these products. But others in the industry are more cautious.

Dr. Ken Tilt, nursery specialist at Auburn University, wrote about them in his newsletter. “I get a few calls each spring about using anti-transpirants to protect small seedlings (2 inches tall) in the row from late frosts” he stated.

Tilt has heard of successes as well as failures. In his opinion, the anti-transpirants “may not have helped at all,” he stated in the newsletter. The anti-transpirants may sometimes receive credit for protecting plants in instances where the soil temperatures actually were not low enough to cause injury. The species, plant size, actual temperature at the soil line, humidity and wind are all factors, he indicated.

Finally, many years ago, Mark Halcomb, a nursery extension specialist in Tennessee, wrote about a grower suggestion. The grower had asked about feasibility of a snow-making system to work within a container yard. He wondered, if it can be done on a large scale for skiing, why not for a nursery?

Just like using freezing water, the

benefit of snow is that it would provide a layer of insulation, holding the temperature at roughly 32 degrees F. It would be a temporary fix, because warm weather will melt the snow. However, the snow should last through any cold snap.

For tougher material, where damaging weather happens only every few years, this might be an economical option. But, the most economic and effective strategy might be the increasingly popular PIP systems (also known as socket pots).

"The PIP systems solve most of the problems with cold protection," Hummel of WSU-Puyallup said. She said that, as a grad student, she worked with Dr. Harold Pellet, who was already experimenting with a crude PIP growing system. He showed that socket pots protect the roots from lower temperatures. Cold becomes much less of a significant problem.

"He returned the roots to the soil," Hummel said. "They cannot survive the same temperatures that the shoots can, and the soil's heat holding capacity (mainly from water) keeps them warm."

While these systems are more expensive to install, their ability to protect root systems can partially pay for their cost.

A few cautions

Any cold protection system has its drawbacks. Here are a few caveats, depending on the system a grower decides to use:

- **Diseases.** Any "coverings" strategy can create a combination of lower temperatures and high humidity. This in turn can promote diseases and infections. Before plants are covered, they should be thoroughly watered and a fungicide applied. The plant foliage should be allowed to dry thoroughly before coverings are applied.

- **Heat.** A clear, plastic film can result in wide temperature swings. Higher temperatures can damage



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plants. The use of a white copolymer plastic film, instead of clear film, can prevent wider temperature swings by providing some shade.

- **Ventilation.** Overwintering structures need fresh air. Ventilation can be provided by a fan/thermostat system, or by opening the end doors. Fan systems need to be carefully designed to work with the structure and wind exposure.

With doors, try to direct ventilation upward, and reduce the air movement around plants. Some growers ventilate houses by cutting progressively larger holes in the film on the sides of the houses.

- **The arrival of spring.** What's appropriate in the winter may be dangerous as temperatures warm up. The Nursery Crops Production Manual from Pennsylvania State University, Extension Service cautions growers to remove covers as early as possible so they don't cause heat buildup, which can result in excessive bud swelling.

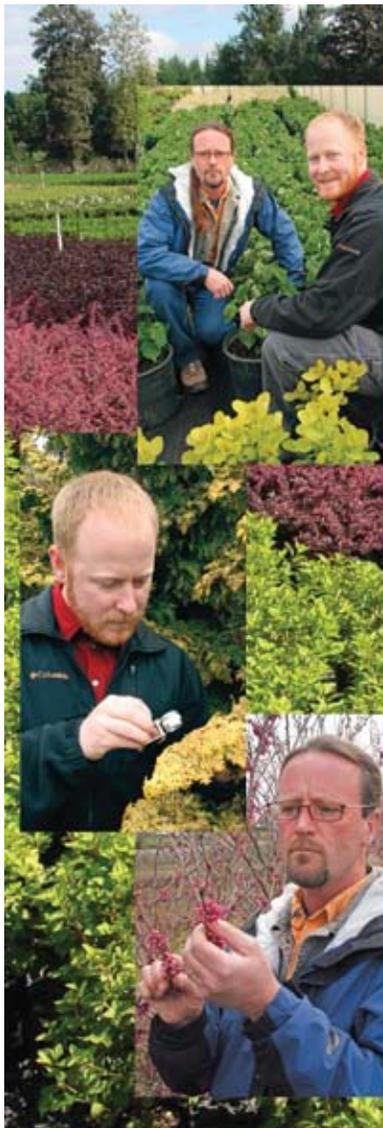
There's a balance, however. Covers should also be removed late enough to avoid any subfreezing conditions. The Penn State manual also notes that the "leaf and shoot expansion under the low light conditions of white copolymer film will be wide and thin."

Watching your plants

In the end, there is no cold-protection technique that is foolproof. All of them require the grower to follow weather conditions and forecasts very closely.

Growers must carefully and consistently monitor and inspect their plants, and the equipment protecting those plants, to avoid problems, either during a cold weather emergency, or under normal conditions. ☺

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