GROWERTALKS

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Perennials Section: Cold Has a Purpose

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As I get older and spend less time outdoors during the winter months, I don't like cold nearly as much as I did in my younger years. Besides enjoying the seasonal changes and the snowy landscapes, my tolerance and appreciation of cold temperatures has definitely lessoned over the years. However, one thing I do appreciate about the cold is the benefits it has on perennials.

Vernalization

Many perennials either benefit from or require cold in order for them to flower or to bloom more profusely. Vernalization is the word commonly used to describe this cold requirement. Many perennials have an obligate cold requirement, meaning they won't flower unless the plants receive a cold treatment. Numerous perennials are cold-beneficial or flower best (more blooms per plant, more uniform flowering and/or faster flower times) when they've been vernalized. Other perennials will bloom without receiving this cold treatment.

It's often beneficial and/or necessary to use protective blankets inside unheated structures to prevent cold injury during the coldest weeks of the year.

In the landscape, perennials naturally receive this cold treatment during the winter months (especially in the northern states) while they're dormant. Research shows plants will become vernalized when exposed to various durations of temperatures at or below 40F (4.4C). The majority of perennials will become vernalized after receiving a minimum of 1,000 hours (six weeks) of continuous cold exposure.

I typically aim to provide at least 10 weeks of cold—this helps compensate for fluctuating temperatures and for periods the temperatures are above 40F. It's not harmful and can actually be beneficial to provide more cold than the minimal amount a plant requires. *In fact, providing longer durations of cold should be your goal.*

Dormancy



From an over-simplified perspective, dormancy is a resting phase for perennials. During these resting phases, there are many physiological processes within the plant, such as vernalization, that allows the plant to grow and flower better following a dormancy period. Dormancy is also a method for plants to protect themselves from becoming damaged or killed from exposure to freezing temperatures.

It's beneficial to remove the protective blankets in the early spring to allow the plants to grow, however, it's recommended to remove the protective blankets in a manner that they can be quickly reapplied to the crops (after they've deacclimated or are actively growing) if cold spells occur.

A plant enters dormancy gradually over a period of several weeks as the days become shorter and the temperatures become cooler. This process is called acclimation. Perennials become acclimated to the temperatures they're exposed to and a plant's specific ability to tolerate cold will vary from location to location. For example, an echinacea acclimated in Minnesota will be able to withstand colder temperatures than the same echinacea acclimated in South Carolina.

Unfortunately, once a plant gets acclimated, it doesn't mean it will tolerate cold temperatures throughout the entire dormancy period. Over time, plants lose their ability to withstand cold temperatures (deacclimation); this is especially common in the late winter as the daily temperatures tend to fluctuate more. When deacclimation occurs, plants are susceptible to cold temperatures, especially when the temperatures suddenly drop to below freezing.

Once perennials enter dormancy, they have to remain dormant for a period of time before they can perceive the environmental cues (namely warm temperatures) for them to begin growing. *When* plants break dormancy is a function of time and cold temperatures. Similar to vernalization requirements for flowering, each perennial has its own required duration of cold needed to break dormancy.

Fortunately, the same temperature and duration rules typically apply to both vernalization and dormancy; most perennials require a minimum of 1,000 hours (six weeks) of temperatures below 40F. If you don't really have good control of temperatures, consider allowing for 10-week-long cold periods to ensure the cold period is long enough to achieve both the vernalization and dormancy requirements. This usually satisfies the plants' cold requirements for dormancy.

Providing cold

I've made references that the processes of vernalization and dormancy can be accomplished when providing six to 10 weeks below 40F, but how important are these temperatures? Don't get hung up on the absolute temperature of 40F; this is the temperature at which much of the vernalization research was conducted. It's not necessary to concentrate on delivering this specific temperature.

Plants can be vernalized at colder temperatures with acclimatization. Temperatures around (or even slightly below) freezing are better during the overwintering period. These colder temperatures ensure the plants go into a deeper dormancy, making them less susceptible to deacclimation or getting cold injury.

The important details when it comes to providing cold during dormancy are to take active measures to maintain temperatures below 40F, while also providing adequate cold protection from temperatures below freezing.

Cold protection

One of the most important aspects of successful overwintering is to provide adequate protection from the cold. *The main goal of overwintering is to ensure the survival of the root system.* The amount of protection to provide will vary widely by geographic location, with southern growers needing little to no additional protection and northern growers needing extensive amounts of cold protection.

Overwintering plants inside structures provides several degrees of cold protection. I usually anticipate structures will provide temperatures about five to 10 degrees warmer than outside. In many locations, growers use blankets to provide cold protection for their perennials. Depending on the type of blanket used, they can provide approximately five to 10 degrees of protection.

Late-winter cold protection

Perennials are most susceptible to cold injury during the late winter and early spring. As days become longer, periods of above-freezing temperatures are more common and wide temperature fluctuations between day and night occur frequently. When this occurs, perennials become deacclimated. Once plants begin to deacclimate, they're more sensitive to cold exposure and can become severely injured or die. The majority of cold damage and plant mortality occurs in the late winter as the result of deacclimation.

I recommend growers take active measures in the late winter to maintain plants in a dormant state by delaying deacclimation and reducing fluctuating temperatures. White poly on the outside of a structure can help reduce temperature fluctuations within the house during the day. Even with white poly, it'll be necessary to manage the ventilation either automatically (with environmental control systems) or manually (by opening vents and/or end doors on freestanding structures). Aim to keep temperatures inside structures around freezing (30 to 35F /-1 to 2C). Evaluate weather conditions daily and manage houses accordingly.

Plants will begin to deacclimate at some point in late winter. They may still appear dormant, but can be very susceptible to below-freezing conditions once they're deacclimated. At some point, the goal shifts, as you'd like to keep the houses cool, but once the plants become deacclimated, it's important to not only keep them cool, but to keep plants *above freezing* to prevent cold damage from occurring.

When the outside temperatures are expected to be well below freezing, consider using minimum heat (30 to 35F) and/or protective blankets inside structures to provide protection during cold spells.

Bundling up this cold conversation

Clearly, cold plays a valuable role in perennial production. For most perennials, vernalization is either highly beneficial (or even required) to optimize flower development. When it comes to dormancy, delivering the right amount of cold is important to allow plants to wake up uniformly. Fortunately, the cold requirements or *how* cold is provided to satisfy the vernalization and dormancy requirements can be considered one and the same. At a minimum, aim to provide six weeks at temperatures below 40F. And 10 weeks is almost always better than six.

To enter dormancy (the acclimation phase) it's important to gradually expose plants to colder and colder temperatures. Once they're dormant, it's important to keep them acclimated to cold, while protecting plants from extreme cold. In late winter, it's not uncommon for plants to deacclimate to cold from their exposure to fluctuating and warmer temperatures. During this period, keep temperatures cold (but not below freezing) and be prepared to provide cold protection even if you don't see visible signs that dormancy has been broken (active growth) and when below-freezing temperatures are expected. **GT**

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