

SMARTGARDEN™ — Extending the Growing Season

There are many techniques for protecting plants from the first cold snap.

As the growing season wanes, gardeners often look for ways to delay demise of their annual vegetables and flowers. We all know that their fate is inevitable, yet the appeal of a few extra weeks of colorful blooms or fresh-picked produce inspires us to seek ways to thwart the cold—at least for a little while.

Because the first autumn frost is often followed by several weeks of mild weather, the protection provided to plants for a single night or two may extend the growing season significantly. By understanding what happens to plants when temperatures drop, we can better provide that season-lengthening care that may just result in fresh vegetables for the Thanksgiving table.

THE PHYSIOLOGY OF FROST DAMAGE

Plants have optimum growing temperatures at which they thrive, as well as limiting temperatures—both high and low—beyond which they cannot survive. Fortunately, these temperature ranges are not the same for all plants—so some species thrive in a tropical rainforest, while others inhabit the Arctic tundra.

As temperatures drop below freezing, the response in many plants is that the water between plant cells begins to freeze, forming crystals of ice. This causes the concentration of dissolved material in the intercellular solution to rise. In an effort to balance the solution, water from inside cells begins to diffuse out of the cell. If the freezing temperatures don't linger long, and rise gradually so that the ice melts slowly, water returns to the cells and little or no damage may result.

If the cold is extreme, however, or if it lasts a long time, cells may lose sufficient water to dehydrate and die. Or ice may form within the cell. This can cause the cell walls to rupture, again killing them. If the change in temperature is too rapid, cell walls may rupture as water diffuses out of, or back into the cell.

Critical factors influencing the occurrence and severity of cold damage to plants are: a) the tolerance to cold of the individual plant, b) the low temperature experienced, and c) the rate of the temperature change. Apart from select-

ing cold-tolerant species or varieties—a significant consideration—there is nothing the gardener can do about the first factor. But the second and third afford the gardener a few options to improve the chances of late-season harvests.

DELAYING THE DROP

One way to delay low temperature damage is to select planting locations carefully; microclimates can extend or cut short the growing season by weeks. Because cold air is heavier than warm air, it sinks to the lowest part of the landscape, which is where cold damage will usually occur first. Avoid putting plants that tend to have little tolerance for frost in such locations. On the other hand, walls and buildings that absorb heat offer a buffer to nearby plants from plummeting temperatures. If you garden in containers, you can often avoid damage to your plants by moving them to a protected location when frost is predicted. (For more on microclimates, see the SMARTGARDEN™ article in the July/August 2002 issue of *The American Gardener*.)

Another delay tactic involves trapping the Earth's heat with some kind of barrier. During the day, the sun's radiant energy is captured by the soil as heat, but when the sun goes down, that heat escapes. By placing a garden blanket, floating row cover, or a layer of bubble wrap over a row of tomatoes or a bed of annual flowers, some of the escaping heat is trapped, holding the temperature of the covered plants above freezing. Lighter covers can be spread directly over plants, heavier coverings can be supported by wire hoops. Sheets and light blankets—even loosely piled leaves—will do the job as well. If the cover is opaque, however, it should be lifted in the morning when the sun returns, so that more warmth can be absorbed by the soil.

A variety of products such as glass cloches, plastic plant sleeves, tubes, and teepees can be used to reduce heat loss around individual plants. Some are designed to be filled with water, which serves as a mini-solar heat collector. The sun-warmed water helps retain the day's warmth around the plant. Both the individual sleeves and the garden blankets



Straw mulch and an umbrella-style cloche protect tender plants from the damaging effects of autumn's first cold nights.

can also be used in spring to avoid late frost damage. And in addition to retaining warmth as cold weather approaches, both also help moderate temperature fluctuations.

MODERATING THE CHANGE

A rapid drop in temperature is generally far more damaging than a gradual drop. Many plants can adjust to a cold night if given time. Equally important, a fast rise in temperature can devastate plant cells trying to reabsorb water from those intercellular spaces.

Bark splitting on south facing fruit trees is an example of damage that occurs from rapid temperature fluctuations. The dark bark absorbs heat on a sunny day, causing the temperature to rise significantly higher than the ambient air temperature—just feel the bark on the south side of a tree on a sunny day in January.

When the sun goes down, the temperature drops fast, and the result is often a fissure in the bark. Whitewashing the south side of fruit tree trunks is a long-practiced damage avoidance technique—the white reflects rather than absorbs the heat, greatly reducing the rapid plunge in temperature from day to night.

Mulching helps reduce root damage to perennials and woody plants by moderating temperature fluctuations in the soil. A blanket of snow will do the same thing. The effectiveness of mulch increases when the soil is moist, because water changes temperature more slowly than air.

Watering plants—including their foliage—in the evening can increase the humidity immediately around the plant and reduce the probability of frost damage. It is important to water your garden thoroughly in the fall if rainfall is insufficient. The moisture helps buffer soil temperatures through the winter.

Winter watering is particularly critical for evergreen trees and shrubs. Because these plants never go completely dormant, they continue to lose water through their leaves, especially on sunny, windy days. If the water taken up by roots is insufficient to replace that lost by leaves, winter burn or scorch often results—leaves and needles turn brown or black along their margin or over the entire surface.

Evergreens planted in late summer or fall are particularly at risk for winter burn because their root systems may not become fully established before winter. In such cases, application of antidessicants may reduce the chances of damage. When sprayed on foliage, antidessicants (also called antitranspirants) form a thin, waxy film over the leaf surface, reducing moisture loss through stomata, the microscopic openings in leaves. Antidessicants can be applied in late fall, and reapplied in mid-winter, but only when temperatures are above freezing.

Rita Pelczar, Associate Editor

A selection of products for protecting plants in the garden in winter are profiled in "Seasonal Garden Goods" on page 54.

HANDS GIVING YOU A ROUGH TIME?



"Works wonders." –Denver Post
"Elsie's beauty secret." –Glamour

It's remarkable what big things are being reported about the stuff inside our little green can. Try some today. Your skin should be softer tomorrow.

DAIRY ASSOCIATION CO., INC.

P.O. BOX 145, DEPT. AG03, LYNDONVILLE, VT 05851/TEL. 802-626-3610/WWW.BAGBALM.COM
WEST OF ROCKIES: SMITH SALES SERVICE, 16372 S. W. 72ND ST., PORTLAND, OR 97223

©1994 EDF

Buy recycled.



It would mean the world to them.

Recycling keeps working to protect their future when you buy products made from recycled materials. For a free brochure, write *Buy Recycled*, Environmental Defense Fund, 257 Park Avenue South, New York, NY 10010, or call 1-800-CALL-EDF.

