

Protecting Plants from Cold Temperatures

Although we live in the South, winter sometimes brings cold temperatures that can cause severe damage to many of our landscape plants. A late freeze after the temperature rises in January or February could be more injurious than the same cold temperature in winter when these plants have become dormant and more resistant to changes in temperature. An example is the sudden drop in temperature in April 2019 that killed or severely damaged many plants. It is important to protect plants from these cold temperatures.

Temperature Changes and Plant Damage

A plant's ability to withstand cold temperatures depends on plant species and how low and how fast temperatures decrease. When temperatures gradually decrease, a plant can acclimate, or adjust itself, to withstand colder temperatures better. Sudden decreases in temperature cause more damage in fall or early winter than similar low temperatures well into winter. If temperatures increase during the winter months, some plants may break dormancy, or deacclimate, and begin leafing out or flowering. Plants that break bud dormancy become more susceptible to late frost because of their new, tender growth.

Cold injury can occur to all parts of the plant (flowers, fruits, leaves, stems, trunks, roots, and buds). Fruits and flowers are the least tolerant of cold injury because they have little ability to adjust or build up tolerance to colder temperatures. Leaf and stem tissues are injured and damaged when ice forms within the plant's cells, which typically occurs during a rapid freeze. When this happens, the plant's tissue dies; this is often characterized by plant parts turning brown and mushy. When the temperature drops slowly, ice sometimes forms between the walls of the plant's cells. Hardy or cold-acclimated plants can often withstand this type of ice formation.

Windy conditions can also cause plant damage by desiccation, or the drying out of the plant. Desiccation causes marginal or leaf-tip burn or totally brown leaves in severe cases and occurs when a plant loses more water than it absorbs, especially when the ground is frozen.

Preventive Measures

Homeowners in Mississippi can enjoy a wide variety of plants. They can increase their choice of available plants by careful selection based on growing conditions and location in the landscape. By planting a combination of tender and hardy plants and by protecting plants susceptible to cold temperatures, homeowners can have landscapes that survive cold temperatures.

Plant and Site Selection

The best way to prevent cold injury to plants is to choose plants that tolerate the cold temperatures in your area. Mississippi is in USDA Cold Hardiness Zones 7b, 8, and 9a. Northern regions of Mississippi are in Zone 7b, which means that plants need to be hardy to 5–10°F. Northwestern and central regions of Mississippi are in Zone 8a (10–15°F); southern Mississippi is in Zone 8b (15–20°F); and the coastal tips of Mississippi's three coastal counties are in Zone 9a (20–25°F). Select plants that meet the minimum cold-hardy requirements in your area; for example, if you live in Zone 8a, choose plants that are hardy to at least Zone 8a and preferably Zone 7 to ensure they can better withstand any sudden cold dips in temperatures in your area.

In addition to proper plant selection, proper site selection is essential. Assess your property to determine the location of the coldest and the warmest spots. During the winter, the coldest spots are often found on the north and northwest parts of the property and in low areas where cold air settles. The warmest spots are usually on the southern part of the property.

Assessing the microclimates of your property is also important. Elevation, landform, soil properties, canopy cover, and proximity to structures or other plants determine a microclimate. You can help protect plants by placing cold-sensitive plants near the part of the house that receives southern exposure or near larger plants or other structures.

Plant Nutrition

Maintaining proper plant nutrition also helps protect your plants from cold damage. Proper nutrition of plants is critical. A plant that has been given the appropriate nutrition tolerates cold temperatures, withstands sudden temperature drops, and recovers from cold damage better than plants that are nutritionally deficient.

Fertilizing plants at the proper time of year is also vital. Fertilizing plants in the fall (after August or September) with a fertilizer high in nitrogen can result in a flush of new growth that is more susceptible to cold temperatures.

During the fall and winter months, most plants enter a dormant period when they need less fertilization. Winterizing-formulated fertilizers, which are high in potassium and low in nitrogen, may be used.

Canopies and Shade

Tree canopies can reduce cold injury from radiational freezes. Radiational freezes occur on calm, clear nights when temperatures drop because of radiational cooling or heat loss from the earth and from the surfaces of objects. Canopies help reduce radiant heat loss from the ground to the atmosphere by raising the minimum night temperature beneath them.

Plants that grow in shaded areas are less susceptible to winter desiccation, or drying out, than plants that grow in open areas. However, plants that prefer full sun do not do well in the shade and will be unhealthy and less tolerant of cold temperatures if you plant them in the shade.

Windbreaks

Windbreaks such as fences, buildings, and temporary coverings can help protect plants from cold injury. Windbreaks are most useful in reducing injury resulting from cold winds and advective freezes (freezes that occur when temperatures drop because of the invasion of cold air masses into the area).

Covering and Heating

Protect plants that are in containers either by placing them inside a protective structure (house, garage, greenhouse, or shed) or by placing a protective covering over them. Container plants are more susceptible to cold temperatures than a similar plant growing in the ground. Their roots are more exposed because they are above the ground. Roots that are damaged by cold temperatures may not show immediate

signs of damage, but these plants will show signs of stress when temperatures increase.

Push together container plants that are left outside, and mulch or cover them to decrease heat loss from the sides of the containers. Wrap the bases of the containers in plastic, burlap, or blankets to reduce heat loss.

Plants that grow close to the ground are usually protected by heat radiating from the soil. Plants that are tall and more open do not receive this radiating heat and are not as protected from the cold.

Remember to mulch the soil. Mulching protects the roots of plants and helps reduce heat loss, thus minimizing temperature fluctuations. As with shrubs and trees, protecting the roots is necessary for them to survive the cold and come back in the spring.

Covering your plants helps protect them from frost as well as from extremely cold temperatures. Covers that reach the ground and do not come in contact with foliage form a layer of insulation from the cold temperature. To prevent foliage breakage, avoid having the covers (sheets, blankets) touch the foliage. Remember to remove these protective coverings from the plant canopy after cold temperatures have passed.

When extremely cold temperatures are predicted, place a light bulb (60-watt is sufficient) or other heat source under the cover to provide heat. Be very careful when using a bulb or other heat source, which can be a potential fire hazard. Do not let the bulb or heat source come in contact with the plant or the cover. Remove the cover and provide ventilation during the day to allow release of the heat that is trapped by solar radiation. This precaution is critical when using plastic covers.

Water Needs Before and After a Freeze

Watering plants before a freeze can help protect them from cold injury. Soil that is well watered absorbs more heat and then reradiates heat, helping to increase the elevated temperature around the plants. However, poorly drained soils result in plants that have weak and shallow roots, which are more susceptible to cold injury. Use mulch to help retain soil moisture.

Check the water needs of plants after a freeze. After very cold temperatures, water that is in the soil may still be frozen and unavailable to the roots. If plants are transpiring (losing water from their leaves) and water is unavailable to the roots, plants may dry out. To provide water for plants, apply water to thaw the soil and the ice.

Pruning

Pruning in late summer or early fall can result in new growth that is more susceptible to cold injury, so avoid pruning at this time of year.

Wait to prune plants until new growth appears in late winter or early spring. Cold damage will be more apparent, making it easier to remove the damaged portions of the plant. Severely injured plants may not break bud in the spring and may take on an overall weak appearance. Branch tips are more likely to suffer cold injury than older wood.

To determine if wood has been injured by the cold, check the cambium layer (layer directly under the bark). To do this, carefully scratch through the bark layer or carefully slice through this layer with a knife. Healthy, undamaged cambial tissue will be green; damaged will be brown or black. Prune this wood below the discoloration.

To determine if your fruit plants have been damaged by the cold temperatures, wait several days after a freeze and remove several flower buds from the plants. Use a sharp knife or razor blade to cut a cross section of the bud's top. If there is any discoloration in the bud, the bud has been damaged and will not produce fruit. Damage may be localized, however, and not all buds may have been damaged. Check several buds from different areas of the plant to get a better assessment of the damage.

Summary

Plants can be protected from cold temperatures by proper selection, placement, and care. Healthy plants are more resistant to cold injury than plants that are weakened by disease, by insect damage, or by improper care. You can take measures to protect plants during sudden and prolonged exposure to cold temperatures.

Publication 2303 (POD-03-25)

By **Jeff Wilson**, PhD, Associate Professor and State Master Gardener Coordinator, North Mississippi Research and Extension Center.

Copyright 2025 by Mississippi State University. All rights reserved. This publication may be copied and distributed without alteration for nonprofit educational purposes provided that credit is given to the Mississippi State University Extension Service.

Produced by Agricultural Communications.

Mississippi State University is an equal opportunity institution. Discrimination is prohibited in university employment, programs, or activities based on race, color, ethnicity, sex, pregnancy, religion, national origin, disability, age, sexual orientation, genetic information, status as a U.S. veteran, or any other status to the extent protected by applicable law. Questions about equal opportunity programs or compliance should be directed to the Office of Civil Rights Compliance, 231 Famous Maroon Band Street, P.O. 6044, Mississippi State, MS 39762.

Extension Service of Mississippi State University, cooperating with U.S. Department of Agriculture. Published in furtherance of Acts of Congress, May 8 and June 30, 1914. ANGUS L. CATCHOT JR., Director

