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# Agriculture & Natural Resources

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## Frost Protection in the Garden

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**Frost** is a local condition, which occurs on a still night, when temperatures usually go no lower than 29-30 degrees F, and it warms up again the next day. A **freeze** involves an entire region, has significantly lower temperatures, and may last from several days to a couple of weeks. Frosts occur on still, clear nights. Heat from the ground radiates to the sky, and the surface becomes colder and colder. When the surface reaches the freezing point, the layer of water vapor just in contact with the surface freezes into ice, and then the next layer above that, and so on. Fog or cloud cover usually will prevent a frost by trapping the heat that otherwise would radiate outward to the open sky.

Since a small amount of heat is released as the water vapor converts to ice, the temperature usually stops dropping at about 30-31 degrees F for a while. Most plants can sustain 30 degrees without damage. With less water vapor, the temperature continues to drop to levels that can damage many plants. With very little water vapor, plants can be killed by low temperatures without visible frost on the ground; this is sometimes called "black frost."

Protecting plants from frost damage usually is accomplished by trapping the heat that is radiating from the ground with clear plastic or similar materials, by moving the plant to a sheltered location, or by directly providing heat via light bulbs. Additionally, anti-transpirant sprays will provide a couple of degrees of protection if applied at least a few hours before you expect frost. Each of these methods gives about 2-3 degrees of protection, so try them all on a tender plant you value. Keeping plants well watered is important in freezing weather. While there is usually enough rainfall for plants in the ground, container plants are especially vulnerable to the desiccating effects of freezing.

Plants always killed by frost include summer annual flowers and vegetables, such as impatiens, coleus, marigolds, tomatoes and peppers. There's no point in trying to protect these plants; simply replace them next spring. Any houseplants that have been growing outdoors need to be brought inside. Check them first for aphids, ants, or other pests to make sure you don't include any uninvited guests. A quick spray with a soap solution can prevent unpleasant surprises!

Subtropical plants will be damaged if they aren't protected, and may be killed. These include bougainvillea, hibiscus, and some of the tender jasmines. Most of these are best grown in containers so they can be moved to a protected microclimate, such as an east or south-facing wall, preferably with an overhang; this traps heat and both of these exposures warm up earliest in the morning. If such plants are to be planted in the ground, east/south exposures provide the best chance of survival from year to year. Covering these plants with plastic or "floating row cover" (a light fabric, sometimes sold as "seedling blanket") can make a big difference. If plastic touches the leaves, each point of contact will freeze, so it may be better to make a light frame and staple the plastic to that. Remember: you are trying to keep the plant alive, not looking perfect!

While most cacti are cold hardy outdoors in this area, many succulents will be damaged or killed, including crassulas (Jade plants), kalanchoes, some aloes, and many euphorbias. The water in the succulent stems and leaves can crystallize, expanding dramatically. The plant bursts ... and then turns to mush. This is interesting to watch, but very bad for the plant; they are safest indoors for the winter.

Many subtropical plants will sustain severe damage to the leaves and stems, but will resprout in the spring and thus need no protection. Lantana, tecomaria, passiflora vines, and Lycianthes rantonnei (purple potato vine) are good examples. They look bad, but will recover. Wait until all danger of frost is past in the spring before you cut them back.



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Citrus trees are a special case! Young citrus trees that have been in the ground less than one season are vulnerable, and should be protected if temperatures are expected to drop into the upper 20's. Older trees of most varieties will only have cosmetic damage from temperatures in the upper 20's. Limes and lemons are the most tender, and the fruit may be damaged at about 26 degrees F. Avoid harvesting it all if you can, because it doesn't store very well. Fruit on outer branches is more exposed and is worth picking; fruit inside the tree is more protected, and usually can be left. Draping the plants with "floating row cover" can provide enough protection to save the fruit, and stringing Christmas lights on the trees -- the big ones, not the little twinkle lights -- can save foliage and twigs from severe damage.

Some plants love winter, which enable us to have flowers in our garden all year. Pansies, violas, snapdragons, and ornamental cabbage and kale laugh off the frost and provide us with color in the gloomiest months. Cyclamen is especially bright and rewarding; it's a bulb that blooms in bright red, white, pink, and lavender tones throughout the winter and early spring. Most cyclamen have little scent, but an occasional plant has flowers with a strong sweet lemon fragrance. All can be planted even during freezing weather.

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