

LANDSCAPE PLANNING

Practical Techniques for the Home Gardener

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ARTICLE

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Cold hardiness is a genetic trait plants inherit from their ancestors.

Garden Science:

Cold Hardiness and Dormancy

Cold hardiness is a genetic trait plants inherit from their ancestors. Cold-hardy plants sustain all their parts above and below ground through the lowest winter temperature in their zone rating.

Hardiness is a dramatic three-part process beginning with acclimatization in late summer. Fewer hours of daylight and lower air temperatures trigger physiological and biochemical reactions over several weeks; green chlorophyll production stops, making bright gold and red leaf pigments visible; dormancy-promoting abscisic acid levels increase, softening stem tissues, thereby allowing wind and rain to detach leaves; and pliable young twigs and canes begin to harden by drying their exposed surfaces and moving water out of cells and into intercellular spaces, concentrating the living cell parts (nucleus, membranes and organelles) to prevent freeze-and-thaw damage.

By the time deep frost arrives, plants are ready to enter a dormant state and a mid-winter hardiness phase, where plants resist the warmth of sudden winter thaws, which might spark untimely sprouting. Dormant buds inhibit growth in all parts of the plant, preventing root extension, shoot elongation and expansion of the living cambium layer just beneath the woody bark.

To overcome dormancy, woody plants must have four to eight weeks' exposure to low temperatures, 25 to 45 F (−4 to 7°C). This is necessary preparation time for eventual spring bloom. Spring bulbs also require a cold period for 10 to 16 weeks before their contained flower buds will rise.

Sustained rising temperatures and longer days in late winter and earliest spring signal the deacclimatization phase. Buds are still growth-dormant but are biologically active with the production of hormones. Temperatures must reach 50 F (10°C) before the buds crack. (Flower buds have less hardiness than vegetative leaf buds and are vulnerable to late spring frost.) Roots begin pumping water back into plant cells, softening tissues and preparing for a resumption of photosynthesis. Growth and growth-regulating hormones (auxins) are being produced by swelling buds and activating root extension. And so the plant has made it through another winter unscathed (we hope!), and things look good for big spring growth.

To encourage plant hardiness, here are some things you should, or shouldn't do.

- Do give plants a monthly treat of liquid kelp spray applied to foliage. The potent auxins and hormones in kelp increase cold hardiness.

- Do check for soil moisture in spring and provide irrigation if necessary. Hardiness relies on plants making vigorous spring and early summer growth.
- Don't prune woody plants severely. Pollarding trees (drastically shortening limbs to control size) or cutting back shrubs to ground level removes carbohydrate resources stored in wood and needed for winter hardiness. Buy the appropriate size plant and let it grow.
- Don't apply nitrogen fertilizer after the end of July. It will stimulate tender growth that won't have time to harden before frost, causing winter dieback.
- Do mulch autumn plantings after the ground has frozen. Roots have little cold hardiness and can be exposed by thaw and heave action in mid-winter. The mulch will keep them safely underground.
- Do select plants with at least one or two levels of lower cold hardiness rating than your zone to prevent winter losses. For instance, in Zone 6, select plants hardy to Zones 5 and 4. For large containers and raised beds, select plants with 2 or 3 zones of lower hardiness rating.

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