News Release: January 10, 2017
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FOR IMMEDIATE RELEASE

Chilling Out, How Plants Cope With Cold

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As you sip your hot drink, warm your toes by the fire, and study seed catalogs, do you wonder how (or if!) your perennial and woody plants are surviving out there in the cold?

You may have cut firewood, put on winter tires, and preserved food to get ready for cold weather. While you did that, your plants were quietly preparing for winter, too. If all went well, you got your wood in and your plants safely entered dormancy uninterrupted by some freakish early cold snap.

You can increase their chances of thriving. Choose perennials and woody plants carefully, using the USDA zone map to guide you. Plant marginally hardy plants in warmer microclimates:

- Slopes, which provide good air drainage, letting cold air sink
- Against brick or stone walls
- Near large bodies of water

Above and below ground survival strategies differ. First, let's look underground.

Roots are resting but ready, (quiescent) keeping the plant anchored and alive. To do this, they need to breathe! Supply oxygen with:

- Moist soil
- Humus
- A layer of loose mulch (remember to remove it in the spring so the soil can warm back up)

Soil condition is the key to healthy roots. Drought, flooding, or soil compaction will cause root anoxia (oxygen depletion), resulting in root damage or death. Soil should not be:

- Water saturated
- Desiccated
- Compacted
- Saline
- Excessive in nitrogen
- In uninsulated pots aboveground

Outdated concepts:

- It's been said that applying potassium will give marginally hardy plants greater frost hardiness. However, studies have not shown any clear relationship between fall application of potassium, magnesium, and other mineral nutrients and frost hardiness. Unless you know you have a deficiency, don't waste time and money on fertilizers.
- A fall nitrogen application, formerly recommended, can trigger leaf growth, delaying dormancy and not allowing the roots their needed rest.
- It was once thought that withholding water in the fall would help a plant enter dormancy, but plants are equipped to enter dormancy by other means, namely light/dark ratio and weather changes. Water also helps the soil hold warmth. Withholding water will potentially harm the plant's roots unless fall rains are sufficient.

Dormancy is the winter nap, rather like hibernation, that allow plants to survive through the winter. Dormancy happens in three phases:

1 Predormancy

Chlorophyll is a green pigment in plant leaves which absorbs the sun's rays (light photons) and transforms the energy into sugars which it stores for use later.

This continues as long as there is sufficient light (long days). As the ratio between light and dark changes, with nights getting longer, chlorophyll decreases and growth slows. When a certain light/dark ratio is reached, another plant pigment, phytochrome, at the red end of the spectrum,

signals the plant that it is time to begin producing the hormone abscisic acid. Abscisic acid begins building a thin cell wall between the leaf stem (petiole) and the branch of the tree or plant. Without access to the nutrients flowing through the vascular system, the leaves begin to change color and loosen from the branch, a process called abscission. Abscisic acid seals the spot where the leaf dropped off, and stomata close, protecting the plant from dehydration. Growth stops, and true dormancy begins.

Danger: like a bear waking up and lumbering out of its den before winter, predormancy is reversible, leaving plants unprepared in a cold snap. Reversal can be triggered by:

- Street or yard lights which confuse the plant's internal clock
- A spell of unseasonably warm weather in late fall
- Adding nutrients, especially nitrogen, inducing renewed growth

2 Full Dormancy:

When the leaves have fallen, the plant enters the full dormancy phase and will not begin a new growth cycle until spring. Dormancy will not guarantee that a certain plant will be cold hardy, but it will become increasingly cold resistant as the cold continues. Two mechanisms protect plants from freezing:

Supercooling- The presence of soluble material that lowers the freezing temperature of the liquid in the cells keeps the cells from freezing (rather like antifreeze).

Intracellular Dehydration- The water that is in the spaces between the cells draws water out from the cells. The pores in the cell walls are too small to allow the ice to enter. The water outside the cells can freeze without the cell membranes being damaged.

Chill Units and Fruit Trees:

Stone fruits such as peaches and cherries develop new vegetative and fruiting buds under the surface of the bark during the summer. These buds rest throughout dormancy, and don't respond to warm spells during the winter. Without enough chilling, spring budding will be subject to:

- Delayed foliation
- Reduced fruit set
- Reduced fruit quality

A chill unit can be measured as one hour at above freezing and below 45 F. Nursery catalogs should list the chill units required by a tree. For Ferry County:

- Choose high chill hour fruits
- Select late flowering varieties to decrease chance of frost damage

3 Post Dormancy:

Release from dormancy requires the reverse of the process followed to enter dormancy; shortening nights and warmer weather. Buds won't break until the weather warms up even after the dark/light ratio has been met. Once growth begins, plants lose the ability to adapt to sudden freezes after a warm spell. Before any growth can be seen, the bud begins being vulnerable. That vulnerability increases over time. A barely open bud will survive a more severe frost than a blossom in full bloom. To tell if post dormancy has begun, you can bring a branch of the tree into a warm room and place it in water. If it begins breaking bud within a few days, it has entered post dormancy and needs protection if you anticipate a spring frost.

Protect from spring frosts by:

- Cover the plant with a frost blanket or sheet, using stakes to avoid having it touch any leaves or blossoms
- Water or mist with an overhead sprinkler continuing the entire time the temperature is below freezing.

Resources:

How Plants Work Linda Chalker Scott, Timber Press
Horticultural Myths, Linda Chalker Scott, WSU Extension Horticulturalist
https://puyallup.wsu.edu/lcs
The Garden Explored Mia Amato and the Exploratorium an Owl book, Henry Holt

"Chilling Accumulation: Its Importance and Estimation" Byrne, D.H. and Bacon, T. Dept of Horticulture Texas A & M,
http://aggie-horticulture.tamu.edu/stonefruit/chillacc.html
"Freeze Damage Depends onTree Fruit Stage of Development" Mark Longstroth, Michigan State University
msue.anr.msu.edu
"What Do Tree Roots Need In Winter?"
northernwoodlands.org
Happy gardening everyone. 509-775-5225, x1116, jordant@wsu.edu, 350 E. Delaware Ave. #9 Republic, WA 99166 in the basement of the Courthouse. For Extension publications go to https://pubs.wsu.edu//.

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