

NATURE'S INFLUENCE ON PLANT REPRODUCTION

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Nature has a big hand in plant reproduction and any article about this would not be complete without a discussion of dormancy. Most of us recognize trees in their dormant state. But, did you know that a seed is considered to be in a dormant state as well?

Seeds are dormant in order to survive unfavorable environmental conditions, and day length, temperature and moisture are all factors that break seed dormancy so that germination can begin. Dormancy is both a physical state, as evidenced by the hard seed coat, and a physiological one made up of internal hormonal growth inhibitors. Plant growth is dependent on both the plant's biological clock and the natural environment. To break environmental dormancy, the right amount of light (often stated in terms of day length), temperature, moisture and oxygen must be present. Day length is a key component of dormancy break because the plant's leaves "read" the light levels which in turn trigger the development of flower buds. The combination of day length and temperature decrease the plant's growth inhibitors and stimulate hormones in the plant to break dormancy.

Another temperature factor in the dormancy equation is chilling hours. The number of cold hours at less than 45 degrees Fahrenheit and the relative distribution of the hours in the season are essential before dormancy will break on certain fruit and nut trees. This condition is referred to as the plant's chilling requirement or vernalization. Apples require approximately 1,500 hours at temperatures below 45 degrees Fahrenheit, and cherries require about 1,300 hours. Locally, chilling requirements are typically met before temperatures begin to increase. The more chilling hours that accumulate, the less heat is required to initiate bud break in the tree.

Just as air temperature is vital for bud break on trees, soil temperature is a factor for seed germination. Every seed has an optimal soil temperature for germination; that is, the temperature at which the greatest number of seeds will germinate. For cucumbers, it is between 68 and 86 degrees, for spinach it is 41 degrees and for tomatoes, temperatures between 59 and 68 degrees are best. If you plant your tomato seeds in soil that is too cold, it is likely that a greater percentage of seeds will rot rather than germinate.

In addition to light and temperature, the plant requires sufficient moisture to take up nutrients and oxygen from the soil. For seeds, dormancy is broken when water is taken up and ends when the seedling is self-sustaining. During germination, hormonal changes occur, the plant structure is modified and tissue begins to be differentiated. Seeds are transformed by either scarification or stratification. Scarification is the act of physically altering the seed coating. Stratification means that the inner seed tissues are altered as a result of warmth or cold. Seeds over-wintering in the chilled ground will germinate when environmental conditions become favorable and the proper amount of moisture is present. For these types of seeds, successful germination occurs when temperatures have been sufficiently cold to decrease growth inhibitors. Seeds release enzymes that break down carbohydrates, proteins and fats, which in turn release free sugars, amino acids and fatty acids that are essential for growth. If germination is premature and light

and temperature factors do not remain favorable, these early germinating seeds easily spoil. The seeds become vulnerable to fungi and insects, and cannot remain stored in the ground for any length of time.

Pollination

Another way nature assists in plant reproduction is through pollination which enables fertilization of the plant's reproductive parts. It is through the development of flowers that the plant produces fruit and/or seeds to continue the reproductive cycle. Corn and trees are pollinated by the wind. Tomatoes, peppers and eggplants are self-pollinating, meaning that pollen from a flower on the plant can fertilize itself or another flower on the same plant. Other flowering crops such as orchard fruits, melons and squash are pollinated by the likes of syrphid flies, bees, hummingbirds and even humans.

A Note About Oaks

Oaks reproduce annually during the fall as long as drought conditions do not prevail and the tree has sufficient food and energy stored. Every four to ten years, oaks cycle through a year of strong acorn production which serves as food for insects, squirrels, chipmunks, scrub jays and mice. Acorns often get disseminated once they drop, and germination occurs with adequate moisture.

Fire

Fire stimulates seed germination, sprouting and flowering for some species of plants. For these types of plants, fire weakens the seed coat, allowing water to penetrate the seed. In addition, fire releases seeds from the cones of sequoias and pines. Wildfires can thin or clear under-story vegetation which creates open space and allows light, moisture and nutrients to be more available for germinating seeds. Ironically, fire may eliminate animals that feed on seeds, thereby promoting their survival and growth.

No class is scheduled this Saturday, February 13, due to the Presidents' Holiday Weekend. Our next class will be held on Saturday, February 20th. UCCE Master Gardeners will present a class on Spring and Summer Vegetable Gardening. The class starts at 9 a.m. and will be held in Government Building C located at 2850 Fairlane Ct. in Placerville. Master Gardeners are available to answer home gardening questions Tuesday through Friday, 9 a.m. to noon, by calling 530-621-5512. The office is located at 311 Fair Lane in Placerville.