

# Seed Germination and Soil Temperature

Contact: Diane Relf, Extension Specialist, Environmental Horticulture

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With the first warm days of spring, gardeners are anxious to get their vegetable seed in the ground. Unfortunately, it is not the air temperature, but the soil temperature that controls seed germination. We have to wait for the soil temperature to reach the optimum for a specific crop if we hope to get a good stand of vigorous seedlings.

## **Planting at Minimum Temperature for Germination Means It Will Take Longer**

Some books give minimum temperatures for germination. This is the lowest temperature at which germination will occur for that crop, but the length of time for germination will be much longer than at optimum temperatures. Seed can be planted when the soil temperature reaches minimum level for that seed on the assumption that the temperature will continue to rise and germination will proceed at a rapid rate. Planting at a lower temperature results in greatly reduced germination.

Some crops require fluctuating temperatures that may be on a daily or seasonal basis. In addition, temperature is interrelated with light in certain crops. For example, celery requires temperatures below 50F to germinate if held in the dark at a constant temperature, but even in diffused light, will germinate at 70F; and with a 10 degree day/night fluctuation, will germinate at an 85F day temperature.

## **High Temperatures Can Be Problems, Too**

While many experienced gardeners have come to recognize this minimum temperature limit in the spring (often by trial and error), it remains difficult to understand that soil temperature is equally important in the summer when high temperature can cause dormancy, even death of seeds. The upper limits of soil temperatures for vegetable seed survival range between 86F and 104F. No crops tested at 113F survived more than 24 hours. Even when seeds do germinate in high temperature soil, the seedlings may die from the heat. The impact of excessively high temperature is not limited exclusively to soil temperature. Seed stored at high temperatures, such as in a car with all the windows closed on a late spring or summer day, may result in slow, erratic germination or in poor development of the seedlings. The home gardener who wishes to get off to an early and

vigorous start has several options at hand. Seed may be pregerminated indoors to overcome the soil temperature problem, then planted outside as long as the air temperature remains high enough to avoid frost or cold damage.

### **Raise Soil Temperature by Using Black and Clear Plastic**

The outdoor soil temperature may be manipulated by covering the ground first with black plastic, then clear plastic with an air layer between formed by a series of thin strips of wood. The clear plastic traps solar heat, the black plastic absorbs it, and the air layer insulates and reduces loss due to convection and radiation. A good soil thermometer is important so you can see when the soil has warmed sufficiently to allow planting of the seed.

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More gardening information is available in the [Virginia Gardener Newsletter](#).