



# FACT SHEET

## Hardening Vegetable Transplants

Fact Sheet 552

Charles A. McClurg  
Extension vegetable specialist  
Department of Natural Resource Sciences and  
Landscape Architecture  
University of Maryland at College Park

Many home gardeners want to grow their own vegetable transplants rather than purchase plants from a commercial supplier. In order for homegrown plants to best survive the transplant process and their subsequent exposure to adverse conditions, they should be hardened first. Hardening is a treatment that limits growth by exposing plants to conditions that are less than optimum for growth.

### Helping Plants Protect Themselves

Hardening can help protect plants from adverse conditions including varying temperatures, drying winds, bright sunlight, lack of soil moisture, physical injury from handling, and transplant shock. Certain vegetables such as cabbage and lettuce also gain greater resistance to frost or freezing temperatures from hardening.



Several changes occur in the plant during the hardening process. One of these is an accumulation of the carbohydrates that are produced by photosynthesis. These stored carbohydrates are then readily available to the plant for growth of roots and foliage after transplanting. Proper hardening shortens the



*Educating People To Help Themselves*

Local Governments • U.S. Department of Agriculture Cooperating

delay in the resumption of growth after transplanting, especially if environmental conditions are unfavorable.

## Slowing Plant Growth

In order for carbohydrates to accumulate, the growth of the plants must be slowed. The following methods will slow plant growth.

1. Gradually reduce the water supply. As growth slows, water only lightly and increase the length of time between watering. Be careful not to let the plants dry out suddenly and wilt.
2. Expose the plants to temperatures lower than those which give optimum growth, but not more than 5°F lower than the recommended night temperature. Very low temperatures are not needed. Optimum day and night temperatures are given in Fact Sheet 551, "Growing Vegetable Transplants."
3. Use a combination of reduced water and lower temperatures (this method is probably the most effective).
4. Withhold nitrogen fertilizer during the final two weeks of transplant production.



## Outdoor Hardening

A simple method for hardening transplants is to set flats or containers outdoors in a sunny location. If the plants are in a cold-frame or hotbed, the covering could be opened or removed during the day. Warm-season plants that would be injured by frost chilling or freezing temperatures need to be taken indoors or protected when temperatures of less than 55°F are predicted.

A hardening period of 7 to 10 days is usually sufficient, so you should start the process that many days before transplanting. Hardening for a longer period does not provide any additional benefit to the plants and may even result in a delay in the resumption of growth.

Large transplants of cabbage, broccoli, and cauliflower should not be exposed to cold temperatures for more than a few days, or the plant may begin to produce a seedstalk rather than the desired vegetative growth. Exposure of tomato transplants to temperatures of 50°F-60°F for more than one week may result in misshapen fruit later in the season. Vine crops such as cucumber, muskmelon, and watermelon may be injured by exposure to chilling temperatures of 55°F or lower.

## Reviewed by

Dr. Stephen A. Garrison  
Extension vegetable specialist  
Rutgers, The State University of New Jersey

Dr. Michael D. Orzolek  
Extension vegetable specialist  
The Pennsylvania State University

