WASHINGTON STATE UNIVERSITY EXTENSION

VEGETABLE GRAFTING: THE HEALING CHAMBER

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Vegetable Grafting: The Healing Chamber

High value vegetable crops such as eggplant, heirloom tomato, and triploid watermelon are grafted to increase vigor, yield, tolerance to salinity and temperature extremes, and disease resistance. Commercial production and demand for grafted vegetable plants continues to increase across Asia and Europe, and has begun to expand to North America.

It takes an average of 5–8 days after grafting for the rootstock and scion (top of grafted plant) to establish vascular connection and 14 days for the graft union to fully heal. During the first week after grafting, the scion is unable to receive water from the rootstock. It is therefore important to maintain proper environmental conditions to prevent water loss from the scion and promote rapid formation of the graft union.

A healing chamber is a covered structure that maximizes humidity and reduces light to allow grafted plants to heal. The primary purpose of the healing chamber is to minimize transpiration (water loss) from the scion. The size and design of the healing chamber depends on the scale of production of grafted plants. A home gardener can create a small healing chamber from a seedling flat, a plastic propagation dome, and a large black plastic bag, but commercial growers may need a larger healing chamber to accommodate larger numbers of plants.

There is currently limited information available on healing chamber design and use. This fact sheet provides step-by-step instructions for constructing and managing a small healing chamber that can accommodate several hundred plants.

Healing Chamber Construction

A healing chamber is most commonly placed in a greenhouse, either on the floor or on a bench. The healing chamber should be 1.5–3 feet tall, and provide approximately 6–8 inches of air space between the top of the plants and the covering of the chamber. Increasing the height too much decreases the ability to maintain consistently high levels of humidity. Both the width and length of the healing chamber should be 5 feet or less to provide easy management when opening and closing and to maintain high humidity throughout the chamber (Figure 1). If the healing chamber is placed on a bench, the bench can serve as the floor of the healing chamber. Line the floor of the healing chamber, whether located on a bench or on the greenhouse floor, with plastic sheeting to prevent moisture loss from the chamber (Figure 2).

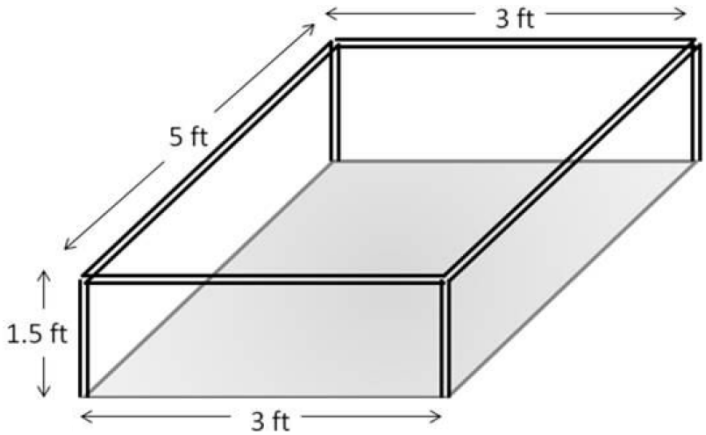

Figure 1. Approximate dimensions of a vegetable grafting healing chamber.


Figure 2. Healing chamber constructed on a bench in a greenhouse. Plastic sheeting holds in water to maintain high humidity, and shade cloth limits light to reduce photosynthesis and water loss from the scion.

Instructions for Constructing a Healing Chamber

1. Line the floor of the healing chamber with clear plastic sheeting.
2. Construct a lightweight frame to support the plastic and shade cloth. PVC pipe works well for the healing chamber frame.
3. Drape clear plastic sheeting over the frame so that the sides can be clipped to the floor plastic to prevent moisture loss from the chamber.
4. If using a PVC frame, cut 2-inch segments of slightly larger diameter PVC pipe and cut out a ¾-inch section to create a clip to secure plastic to the frame; this will help keep the plastic taut on the top of the chamber (Figure 3).
5. Drape two layers of shade cloth or one layer of black fabric over the plastic sheeting to block out all light.

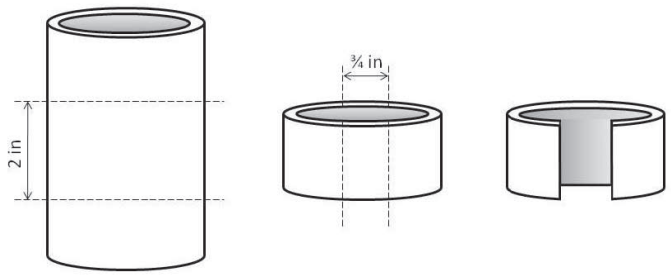

Figure 3. PVC clips can be cut from lengths of PVC and used to secure plastic to the PVC frame. The PVC for the clips needs to be slightly larger in diameter than the PVC used to construct the healing chamber frame.

Healing Chamber Management

A few hours before grafting, mist the inside of the healing chamber with water using a hose and spray nozzle or a hand-held spray bottle until the four walls, floor, and ceiling are wet and water begins to accumulate on the bottom of the healing chamber. Mist the plants lightly after grafting, and if needed, mist the healing chamber floor to ensure it is wet when placing plants into the chamber. Once grafted plants are placed in the healing chamber, seal the chamber tightly with clips to prevent moisture loss. Clothespins or binder clips work well for tightly closing the healing chamber.

The greenhouse (or any other location) where the healing chamber is located will have lower relative humidity than the healing chamber. Gradually introduce the grafted plants into the greenhouse environment to avoid causing stress and plant death. For information on acclimating plants from the healing chamber to the greenhouse, refer to Extension fact sheets Vegetable Grafting: Eggplants and Tomatoes, FS052E, and Vegetable Grafting: Watermelon, FS100E.

Healing Chamber Troubleshooting

If the humidity in the healing chamber is too low or plants are taken out of the chamber too soon or too abruptly, scion leaves will begin to wilt and plants are likely to die. If wilting is observed, mist the plants well and place them back in the healing chamber.

If the humidity in the healing chamber is too high or plants are left in the chamber for too long, plants may begin to develop physiological disorders. Adventitious roots may develop on the scion at the graft union (Figure 4). Remove adventitious roots with a sharp clean razor blade. Another problem that can develop under high humidity conditions is edema (callus growth) on the leaf veins (Figure 5). Edema is not reversible; however, it can be prevented on new growth if the plant is moved to a lower humidity environment.

Because the healing chamber is warm and moist, it provides an ideal environment for plant pathogens and mold. When the healing chamber is not in use, sanitize by removing the plastic and wiping it down with a disinfectant such as a 10% bleach solution or 70% isopropyl alcohol solution.

Figure 4. Adventitious roots forming from the scion that come into contact with the soil will eliminate resistance to soil-borne diseases.

Figure 5. Edema forming on tomato leaf veins. Photo courtesy of Paul Bachi, University of Kentucky Research and Extension (bugwood.org).

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