

## Tips for the Installation and Operation of Seasonal High Tunnels

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### Vermont

Seasonal High Tunnels is a pilot project under the “Know Your Farmer, Know Your Food” initiative for farmers to establish high tunnels to increase the availability of locally-grown produce in a conservation-friendly way.



### **Tunnel Selection**

Gothic designs have higher light transmission and shed snow easier. Most high tunnels are built of galvanized steel tubing and are available from many manufacturers throughout the U.S. See partial list at end. Steel makes a strong frame to carry snow and wind loads and still allow about 80% of the light to enter. Individual, free standing tunnels are best suited for heavy snow areas as multi-span tunnels need heat to melt snow from the gutters. Individual tunnels are easier to build and maintain. They are less expensive to build and site preparation and erection costs are less. In addition, expansion of growing area is easier without disturbing plant production.

### **Orientation**

The ideal site would have a slight southerly facing slope for good winter light and protection from northerly winds.

### **Expansion**

Make provisions for expansion. Land should be available for additional tunnels and to better accommodate materials handling, farm traffic, snow removal, and parking. Water should be installed with expansion in mind.

### **Installing Wirelocks**

To prevent the single layer of greenhouse plastic on the high tunnels from wearing out at the pinch points of the wirelock, do the following. Before attaching a wirelock, cut long strips of plastic (old greenhouse plastic will work) 12” wide that are folded to 6” wide and stapled along the edge. Place this folded strip of plastic over the plastic on the high tunnel and force the wire through it. It is a little hard to get started, and you have to hold the extra piece so it doesn’t wander out of the channel. Having the 6” wide or wider double layer gives you some leeway. You also can add another wire into the channel, which gives you more staggered pinch points.

## **Plan for Wet Conditions**

In rainy years, many farms struggle with excess water flowing into tunnels because perimeter drainage is insufficient. That can cause delayed planting, slow growth due to cold soil and can cause root rots. Growers doing winter production should keep in mind that water flowing under a tunnel can remove heat from the ground. Some farms don't have water problems inside the tunnel, but outside, the driveways and walkways were not designed to deal with high traffic in the early spring when the ground is really wet. Plan ahead for effective water diversion to prevent mud, ruts, and soil erosion.

## **Preventing Wind Damage**

Do not roll up both sides of the high tunnel if there is a cross wind. This will cause the wind to get under the high tunnel and lift it out of the ground. Keep the side against the cross wind rolled down if the wind is over 10 mph.

## **Change the Cover**

Greenhouse films last longer than regular construction plastic since they contain additives that make them resistant to ultraviolet degradation. Anti-drip agents and infra-red inhibitors are added to give better service and reduce heat loss. Most greenhouse covers are only designed to last three or four growing seasons. After that, the amount of light under the cover that can be used by plants (photosynthetically active radiation) may decline significantly. Some of this loss is due to changes in the plastic that reduce transmission of certain light wavelengths, but a lot is due to accumulation of soil particles, mold, scratches, and other blemishes that collect on the plastic over time, both inside and out. Pushing the lifespan of your greenhouse cover may be penny-wise and pound-foolish if it reduces crop growth or quality.

## **Know Your Growing Media**

When growing in compost, it's tricky to get consistency from batch to batch. Ask your compost supplier for the nutrient analysis and have a saturated media test done well in advance of planting. That gives you a record of compost characteristics from year to year, and allows you to make adjustments if needed. Most land grant university testing labs offer this as a 'greenhouse soil' or 'potting soil' test.

## **Know Your Water**

Many university testing labs offer a greenhouse water test, which includes pH as well as alkalinity (dissolved carbonates and bicarbonates). To maintain proper pH (and thus nutrient availability) in your growing media, you need to avoid pH problems with your water. If the pH is too high, you can add some type of acid, but it takes more acid to decrease the pH of water with high alkalinity. Water can also contain excess soluble salts, which harm roots and can lead to nutrient deficiencies. High sodium is another possible problem. Annual water testing is an inexpensive management tool to help optimize crop nutrition.

## **Be Vigilant for Pests**

Growers keep an eye out for pests as they work in their tunnels, but a more systematic approach is to have a scouting form and a person assigned to fill it out on a weekly basis. That makes sure all tunnels and crops are examined closely and frequently, increasing the chances of catching insect or disease problems early, when they're easier to control. Another good tool is a low-cost hand lens to aid in the observation of small problems, before they become big ones. Hang one of these up in each high tunnel. Placing sticky yellow cards throughout the tunnel is another low cost way to stay ahead of potential insect pests.

## **Natural Ventilation**

Tunnels need the right set up to maintain good ventilation naturally. Smaller, narrow houses can get away with roll-up sides as their only form of ventilation, but even these may suffer when there is little or no wind, since that's what drives sidewall ventilation. Larger tunnels really need both sidewall and ridge vents to assure good air movement. That way, the tunnel is vented by both wind and thermal gradients. Small roof vents, cut into the plastic, with heat-activated openers are a low-cost alternative to a ridge vent.

## **Sanitation Pays**

Make tunnel cleanliness a priority in your efforts to prevent pest problems. Recommended sanitation activities include regular washing of tools, containers, and equipment that comes in contact with plants or growing media using a greenhouse disinfectant. Employees should be aware that they can carry pests from one tunnel to another and know how to minimize that risk.

To avoid the spread of disease, hose ends should not be left lying on the floor. It's pretty easy to set up hooks to keep these hung up. Trash containers in the tunnel should be emptied daily. If any plants are discovered to have insect or disease problems they should be put in a plastic bag to minimize spread of spores or insects and then removed from the tunnel.

Outside the tunnel, weeds should be removed and turf kept closely mowed to limit the habitat for pests. Compost piles, dead plants, old pots and other breeding sites for insects and disease should be located as far from the tunnel as practical.

## **Excellent Web Sites**

UMass Extension Greenhouse Crops and Floriculture, [www.umass.edu/umext/floriculture](http://www.umass.edu/umext/floriculture)

Northeast High Tunnel Manual, [www.uvm.edu/sustainableagriculture/hightunnels.html](http://www.uvm.edu/sustainableagriculture/hightunnels.html)

## **Partial List of High Tunnel Manufacturers**

1. Growers Supply (Iowa), (800) 476-9715, [www.GrowersSupply.com](http://www.GrowersSupply.com)
2. Griffin Greenhouse (Mass./NY), (800) 888-0054, [www.griffins.com](http://www.griffins.com)
3. Greenhouse Supply (Maine), (207) 989-1585, <http://www.manta.com/c/mmsthw9/greenhouse-supply-inc>
4. Ledgewood Farm (New Hampshire), (603) 476-8829, [www.ledgewoodfarm.com](http://www.ledgewoodfarm.com)
5. Rimol (New Hampshire), (877) 746-6544, [www.rimolgreenhouses.com](http://www.rimolgreenhouses.com)

[www.vt.nrcs.usda.gov](http://www.vt.nrcs.usda.gov).

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