Low Tunnels For Beginners

About Low Tunnels

Are you looking for a way to extend your growing season? Do you not want to invest a lot of money? Is a permanent structure not appealing? If you answered yes to any of these questions, low tunnels might be right for you!

Extending the traditional growing and marketing season should be a high priority for West Virginia produce growers. One low-cost method of accomplishing this is to use low tunnels. Low tunnels are temporary structures that are approximately 4 feet tall and 3 to 6 feet wide. Hoops constructed of wire (9-gauge) or pipe (metal or plastic) can be used to support row cover spunbond fabric or polyethylene plastic to create a mini greenhouse over the crops.

Low tunnels are inexpensive, easy to construct and can fit into any size garden. These temporary, easy to move structures allow for increased crop production by utilizing season extension and overwintering of cool-season crops. Low tunnels can be used in the winter and early spring to protect crops from cold injury and wind. These structures also can be used during the summer with shade cloths to protect crops from insects and high temperatures.

Materials and Construction

Low tunnels can be constructed over already established crops and raised beds or before planting. Be sure to have your groundwork and tilling completed prior to installation of a low tunnel.

Most low tunnels are 3 to 4 feet wide. A 6-foot wide low tunnel is an option for vining crops. You can construct your own low tunnel in an afternoon with supplies purchased at your local hardware store or from a kit.

Materials that can be used in the construction of hoops are:

PVC or Conduit

Materials: ½- or ¾-inch PVC pipes, 8 feet long, and ½-inch steel rebar, 18 inches long

How to Construct: Begin by placing the steel rebar 6 inches into ground at a 35-degree or 45-degree angle. If leaving rebar in the ground, make noticeable by either painting, placing flags or using rebar caps to prevent tripping hazards. Place rebar 3 to 4 feet apart in rows parallel to one another. Using 8-foot sections of PVC pipe, place one end of the pipe over the rebar, bend the pipe and place the other end of pipe over rebar directly across, creating a hoop. Continue to place rebar and PVC every 4 to 5 feet apart in a row.

Note: PVC pipes do have a shorter lifespan than metal hoops.

Metal Hoops

Materials: 10-foot metal hoops (typically known as Quick Hoops) and a metal hoop bender

How to Construct: Metal hoops are bent into a half circle using a hoop bender to assure they are identical. Depending on the style of the metal hoop bender, different widths can be created to cover the row or rows. The hoops are placed 5 to 6 inches directly into the ground. Each hoop is spaced 5 feet apart in a row .

A top rail of pipe connecting the bows can be added to strengthen the metal hoops.

Note: Hoops that are 4 feet wide are the best low tunnel structures since they efficiently cover a 4-foot-wide raised bed which is accessible from 2 feet on either side.

Livestock panels

Materials: 16-foot livestock panels and landscaping pins or rebar stakes

How to Construct: Secure one end of the wire panel into the ground with landscaping pins or rebar stakes, bend panel and secure the other end. Panels can be used for a shorter low tunnel. If a taller tunnel is desired, reinforcement may be needed.

Low Tunnel Row Covers

Agriculture floating row covers come in different grades to protect against frost, heavy freezes and pests. You will need to decide what your plan is with your low tunnel and purchase appropriate grade row covers. One major advantage of using hoops with row covers is it keeps the weight of the snowfall off your crops.

A 10- to 14-foot-wide row cover blanket is placed over the hoops and secured taut and tightly to avoid winds removing cover and snowfall crushing. Typically, the ends are tied down with stakes and string. There are row cover snaps or clips that can be constructed from PVC tubing or purchased to hold the row cover to the individual bows. At each hoop, the sides of the row cover can be secured with bricks, heavy rocks or sandbags. Consider using objects heavy enough to hold down sides but are not permanent (at least on one side), as you will need to get into the low tunnel to check and work crops. If just overwintering crops and not harvesting, you can secure the cover more permanently by burying the sides or weighing it down with heavier objects.

Most row covers, depending on grade, will provide protection down to 24 to 28 F and are water, air and light permeable. During colder temperatures, a second layer of row cover or a heavier weight row cover can be used to provide greater protection. During the winter, a layer of 4-mil or 6-mil agriculture grade plastic is placed over row cover and secured to allow snow to slide off the structure. On warmer, sunny days, the plastic will need to be lifted to allow ventilation of the tunnel to avoid plants becoming

overheated. Low tunnel clips can be used to secure the lifted sides to the hoops. The plastic can cause moisture build-up inside the tunnel, therefore use only as needed.

Row covers can be removed when sunny and ambient temperatures are above 55 F for cool-season crops, but may need to be placed back on in the evenings and overnight when temperatures drop into the 30s.

Early Spring Use

After the coldest temperatures of winter have passed, low tunnels can be used to get an early start on spring planting. Cool season spring crops, such as broccoli, spinach, kale, cabbage, lettuce, strawberries and peas, thrive in a low tunnel. Low tunnels can also be used to get a two-week early start on summer crops, such as peppers, tomatoes or sweet corn.

Low tunnels also can be used for protection against frost on plants in the spring. Cover tunnels with row covers in the evenings during threats of frost and uncover the next day once temperatures warm back up. If several days of frost is forecasted, you can ventilate the tunnel during the day by clipping or raising up the sides.

Cool-weather Crops and Variety Selection

Crop	Varieties	Comments
Beets	Baby Beet, Golden Beet, Kestrel, Bull's Blood, Red Ace, Chiogia	• Perfect for planting in spring and late summer • Thrive with warm days and cool nights

Broccoli	Arcadia, Gypsy, Emerald Crown, Lieutenant, Green Magic	• Sweetest when matured in cool weather • Frost-tolerant
Cabbage	Red Dynasty, Deadon, Caraflex, Savory Ace, Bronco	• Sweeter when matured in cool weather • Will burn in intense sunlight, need row cover
Carrots	Hercules, Nectar, Bolero, Mokum, Napoli	• Succession plantings of early, main crop and storage varieties can expand your harvest window
Collards	Champion, Vates, GA Green	• Excellent cold tolerant leafy green
Kale	Red Russian, Winterbor, Redbor *All varieties are suitable, curl-leaf varieties are hardier for winter.*	• Sweeter when matured in cool weather • Easy to grow and can be harvested throughout the winter

Leeks	Tadorna (winter), King Richard, Lancelot, Bandit	• Can be grown year-round • Early varieties can be planted in January and February
Lettuce	Buttercrunch, Sierra, Read Sails, Monte Carlo, Winter Density, Cherokee	• Difficult to overwinter • Ideal to harvest before the coldest temperatures of winter and plant a new crop for early spring harvest
Onions	Candy, Candy Apple, Guardsman, Red Wing, Nabechan	• Sensitive to temperature • Frost-hardy • Cool temperatures needed to produce tops and warm weather to produce bulbs
Spinach	Emperor, Space, Auroch, Carmel, Corvair, Regiment, Melody	• Sweeter when matured in cool weather • Hardy for overwintering • Easy to grow and can be harvested throughout the winter

		• Plants die when temperatures drop below 15°F
Swiss Chard	Fordhook, Bright Lights, Rainbow, Argentata	• Tolerates frost; thrives in warm temperatures • Harvest outside leaves; plant will continue to produce till snowfall

*Adapted from Vegetable Varieties Recommended for West Virginia-2019[zx], Lewis Jett, 2019

*Always purchase your seeds and transplants from a reputable source.

Considerations

- Most cool-season crops need a soil temperature greater than 40 F for seeds to germinate and transplants to thrive. Constructing and using a low tunnel in the fall and throughout the winter into the spring creates the soil temperatures needed for production.
- If constructing the low tunnel during the winter, cover the tunnel and let it sit empty for a few weeks to allow the soil to reach the desired temperature.
- Heavy snowfall can collapse a low tunnel. To prevent this, cover with a plastic sheeting, construction-grade plastic is acceptable, for snow to slide off of the hoop structure. Reinforcing with a top railing also provides strength against snow and wind.
- Livestock-panel-style low tunnels can be left year-round and used as a trellis system for vine crops, such as beans, cucumbers, melons and peas during the warmer months without the row cover.

Although unheated, low tunnels can be used to grow cool-season vegetables throughout the winter. The soil inside the tunnel is much warmer than the snow-covered ground outside. Spinach and kale are cold-hardy vegetables and can be

harvested throughout the winter in a low tunnel. Other cool-season vegetables will need to be harvested before the coldest temperatures of winter or left to overwinter in the tunnel to get an early start in the spring.

To learn more about low tunnels and how you can use them for your operation, contact your local WVU Extension Service agent.

References:

Focus on CROPS for WINTER GROWING. (n.d.). Retrieved May 12, 2020, from https://www.johnnyseeds.com/growers-library/vegetables/winter-growing-guide-recommended-crops-varieties.html

Lewis, J. 2019. *Low Tunnels for Fall and Winter Vegetable Production*. West Virginia University Extension.

Tasha Harris, WVU Extension Service Agent – Upshur County, Jesica Streets, WVU Extension Service Agent – Tucker County, Jody Carpenter, WVU Extension Service Agent – Barbour and Randolph Counties

To protect the health and safety of our employees and community, many WVU and WVU Extension Service employees are working remotely. While we may not be physically in our brick and mortar offices, we are working hard to assist our fellow West Virginians in all 55 counties. For information about WVU's efforts, check **coronavirus.wvu.edu** for more.