Low Tunnel System
Practice Code 821

Low Tunnel System Overview

Description
A Low Tunnel System (LTS) is an enclosed plastic, polyethylene, fabric, or polycarbonate covered structure that protects crops from sun, wind, excessive rainfall, or cold, extends the growing season and/or reduces pest pressure.

Low tunnels are small, portable structures that are no more than 4 feet in height. They are inexpensive, easy to construct and, if cared for, will last multiple growing seasons. They provide benefits in high tunnel systems and field conditions.

- Improved plant productivity and health
- Reduced plant pest pressure

Plant Productivity and Health
Low tunnels extend the growing season by increasing soil and air temperatures, protecting crops against mild freezes and promoting vegetative growth.

Depending on the covering used and crops grown, low tunnels can extend the growing season by at least two weeks in the spring and fall and up to year-round production.

Low tunnels reduce plant stress by modifying the microenvironment within the tunnel. In addition to increasing temperatures, low tunnels reduce light intensity and block wind. These environmental modifications reduce evapotranspiration rates and decrease water stress in plants, resulting in healthier and more productive plants.

In areas where winter weather is significant, low tunnels can provide a physical barrier to ice and snow, enabling crops to successfully overwinter.

Reduced Pests
Low tunnel system use can significantly reduce pest damage and the viral diseases pests may transfer. Low tunnels exclude pest access to the crop. When

Season extension and pest exclusion of cool season crops using a low tunnel system.

covers are applied immediately after planting, they decrease populations of cabbage worms, loopers, onion maggots, Colorado potato beetles, aphids, cutworms and flea beetles. Low tunnels are also used to exclude birds from ripening fruit.

A decrease in pesticide use, labor and crop loss can occur when low tunnels are used as a pest management strategy.

For crops that depend on insect pollination, it may be necessary to remove the row cover during the flowering stage to allow for pollination.

Materials and Construction
A low tunnel system is comprised of three components: the structure, covering and anchors.

Structure
A low tunnel structure is typically constructed of hoops placed every 4-5 ft down the row or bed. The

end of the hoop is placed ~6 inches in the soil on either side of the row or bed. Examples of materials used to construct long-lasting hoops include electrical conduit, 9-gauge wire or PVC. A top rail can be added to connect and strengthen the hoops.

Covering

The type of covering selected will depend on the purpose of the low tunnel. Commonly used coverings include spun fabric, perforated or slit plastic, fine insect netting and shade cloth.

Spun fabric is the most frequently used covering for season extension. Spun fabric is permeable and allows airflow, preventing condensation within the low tunnel. Fabric weight determines the temperature increase within the tunnel, light transmittance and durability of the fabric (see Table 1). A lightweight fabric is also commonly used for pest exclusion.

Table 1: Spun Fabric Specifications

Weight	Density (oz/yd)	Light Transmittance	Degrees Protection (below freezing)	Best For
Heavy	1.5-2.2	30-50%	8°F	Overwintering
Medium	0.5-1.0	70-85%	4-6°F	Spring/Fall crops Overwintering
Light	0.45	90-95%	2°F	Light frost protection

Perforated or slit plastic covering creates a mini-greenhouse effect and is used for winter season extension. This covering is best used for low growing crops as condensation can accumulate in the tunnel and cause plants to decay if they touch the plastic. This covering sheds snow and is commonly used in northern latitude fields.

Fine insect netting is mainly used for pest exclusion. This material can be light or dark in color, depending on the time of year it is applied.

Shade cloth can decrease the temperature within a low tunnel. In Indiana, it is primarily used to extend cool season crop production by decreasing bitterness and preventing crops from bolting.

Anchors

An anchor is placed at the base of each hoop and at the end of each tunnel to secure the covering. Sandbags, bricks, logs, rocks and boards can all be used as anchors. Select anchors that will not compromise the integrity of the LTS (Ex: anchors that could puncture the cover). Anchors and clips are also available for purchase.

To manage the crop for weeding, harvest, fertilizing and scouting the anchors on one side of the low tunnel are removed and the cover is pulled to the other side.

Managing crops under a low tunnel.

More In-Depth Reading

- Oregon State University Extension. 2021. Low Tunnels for Season Extension in Oregon: Design, Construction and Costs. https://extension.oregonstate.edu/pub/em-9333
- University of New Hampshire Extension. 2020. Using Row Covers in the Garden. https://extension.unh.edu/ blog/2020/10/using-row-covers-garden
- Virginia Tech. 2018. Low Tunnels in Vegetable Crops: Beyond Season Extension. https://www.pubs.ext.vt.edu/HORT/ HORT-291/HORT-291.html