

## 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.

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.

### Reduced Pests

Low tunnel system use can significantly reduce pest damage and the viral diseases pests may transfer. When 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 low tunnel system is an inexpensive and simple way to extend the growing season, protect crops from frost, and reduce pest pressure. Pictured: Homer Hilltop Farm in Homer, Alaska.*

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 about 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.



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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)
Heavy	1.5-2.2	30-50%	8 F
Medium	0.5-1.0	70-85%	4-6 F
Light	0.45	90-95%	2 F

Perforated or slit plastic covering creates a mini-greenhouse effect and is used for 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.

## 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 structure (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, remove the anchors on one side of the low tunnel and pull the cover to the other side.



*Salad greens are just one of many crops that grow well under a low tunnel in Alaska. Pictured: Homer Hilltop Farm in Homer, Alaska.*



*Low tunnels at Bushes Bunches Farm in Palmer, Alaska.*

## 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>