United States Department of Agriculture

NRCS Natural Resources Conservation Service

Plant Materials Program

COMMUNITY GARDEN GUIDE
SEASON EXTENSION

FIELD TUNNELS

Extending the growing season in many Great Lakes States' gardens is essential if quality vegetables and seed are to be successfully grown. A number of season extension techniques are available to the gardener. Costs for season extension range from tens of dollars to tens of thousands of dollars, depending on the type of season extension employed.

Field Tunnels are small, temporary structures assembled in the field that create a micro-climate favorable for plant growth when properly used and managed. The environment created by Field Tunnels provides frost protection, insect protection, and season extension benefits to the plant. There are several types of Field Tunnels available that can be used. The Field Tunnel structure consists of hoops of heavy gauge metal wire, woven wire, or plastic tubing anchored in the ground and covered with season extension material. The cost of these structures averages approximately $.48 per linear foot of installation.

COVERING MATERIAL

Recommended covering materials include hole-perforated, clear or white plastic, slitted clear or white plastic, spunbonded polyester, or polypropylene. The type of covering has a direct bearing on the internal heat of the structure. Following is a general guide as to how warm a covering will be in relative terms.

HOOP MATERIAL

Several types of hoop support material may be used for Field Tunnels. Pre-cut, 76-inch 10-gauge wire hoops and uncut wire roles are available. Black plastic pvc water pipe may also be used to fashion hoop supports. The cost differential between wire and plastic hoops is negligible. Welded wire may also be used to fabricate tunnel supports. Costs associated with welded wire are usually significantly higher and the stability of this hoop support structure is similar to metal and plastic hoops. Plastic water pipe and welded wire hoop supports are more resilient in windy conditions. Wire hoops have a tendency to deform in very windy conditions, compromising their original shape.

ADVANTAGES/DISADVANTAGES

Advantages Using Field Tunnels

1) Frost protection, +2-4 F.
2) Wind protection for plant seedlings.
3) Insect protection.
4) Low cost, $.48/lin. ft.
5) Transmits light (85-90+%), water, and air.
6) May be reused 2 to 3 years.
7) Slitted row cover allows pollination.
8) Works well in conjunction with plastic mulch.

Clear slitted plastic Field Tunnel supported by wire hoops.

Disadvantages Using Field Tunnels

1) Disposal costs of season extension material.
2) Weeding under covering requires removal and reinstallation of staples.
3) Installation time required per linear foot of row is significantly higher than unprotected crops.
4) Pollination of crops is prevented when using polyester and polypropylene coverings unless the fabric is periodically folded back to expose flowering plants.
5) Plastic water pipe hoops are more difficult to install, requiring the excavation of a small hole in which to place the pipe end.

FIELD TUNNEL INSTALLATION

Planting sites exposed to winds, should have Field Tunnels oriented parallel to the prevailing winds. Sites protected from wind should be oriented in a north-south direction to maximize sun exposure to plants. Two types of staples are available for anchoring Field Tunnel cover material. Plastic staples are easier to install in soft soils. Plastic staples are more expensive and may be reused for many years. Metal staples are easier to install in firm soils using a hammer and usually last about 2 to 3 years. They tend to accumulate rust scale

Metal wire staple left. Plastic staple right. Used to secure covering material.

below the ground. The rust scale tends to make it difficult to reuse the staples as they are more difficult to drive into the ground because of increased friction. Metal staples that are not retrieved at the end of a growing season could provide a potential source of tire punctures.

Field Tunnels are designed for use over plants in beds 3 to4 feet wide. Pick a calm day to install the Field Tunnel structure. If the winds are over 2 to3 mph, delay installation. The plant bed to be covered should be fertilized and planted prior to installation of the Field Tunnel. The first step to installing a Field Tunnel is placement of the hoop structures. The closer to a straight line the hoop structures are, the easier the entire installation. Measure 1.5 to 2 feet away from the plant row and place the hoop ends in the ground on about a 5-foot spacing. Install one side completely. Then affix the other side. Install the row cover material by doubling up the cover material and pierce both layers with the staple and press firmly into the ground. This will help protect the fabric from ripping in windy conditions. Staple first one side with approximately 5 feet between staples. Then pull the fabric lengthwise to remove any folds. Anchor the opposite side with several staples to hold it in place. Complete stapling the first side, then secure the other side in a similar fashion. When properly installed, the Field Hoop material should fit snuggly across the field hoops. Leave the ends of the Field Tunnel open to allow for adequate air exchange and ventilation. The ends may be closed when frost threatens.

MANAGEMENT OF FIELD TUNNELS

Field Tunnel cover materials will last up to three years with proper care and if the season length is not too long. The hoop supports last several years. Watering of plants is relatively difficult when using Field Tunnels. The use of trickle irrigation is recommended when employing this extended season production technique.

Weeds will grow very well in the micro-climate created under the Field Tunnel and control is essential for maximum production. To weed the covered plant beds, remove staples from one side (preferably the leeward side if there is any breeze). After pulling weeds, reinstall all staples. To minimize the need to weed under the Field Tunnel, a plastic mulch can be used (see guide sheet on garden mulches). The Field Tunnel can remain in place until the plants fill the tunnel. At this point, the Field Tunnel must be removed to enhance plant growth. Remove the Field Tunnel cover material when dry and roll it up, paying attention not to damage it and store for the next season. Store in a dry place that is free of rodents. Many cover materials are attractive bedding sources for mice.

RECOMMENDED PLANTS

The following plants will perform well when using Field Tunnels for plant protection and season extension: broccoli, cabbage, carrots, chard, cucumber, green beans, lettuce, muskmelon, peppers*, pumpkin, strawberries, summer squash, tomatoes* watermelon, and winter squash.

* Field Tunnel must be removed when plants begin to flower because high tunnel temperatures will cause blossom drop.

FIELD TUNNEL COMPATIBILITY

Greenhouse	High Hoophouse	Hoophouse	Plastic Mulch	Floating Row Cover	Trickle Irrigation	Overhead Irrigation
Yes	Yes	No	Yes	No	Yes	No

SOURCES

Field Tunnel components can be found in gardening and vegetable seed catalogs, hardware stores, and on the web.

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