United States Department of Agriculture

Indiana Job Sheet (325)

Natural Resources Conservation Service - Indiana - March 2016 (ver. 2.0)

High Tunnel System

Definition

A High Tunnel System for Crops is an enclosed polyethylene, polycarbonate, plastic or fabric covered structure that is used to cover and protect crops from sun, wind, excessive rainfall, or cold to extend the growing season in an environmentally safe manner. This practice applies to land capable of producing crops where sun or wind intensity may damage crops, or where an extension of the growing season is needed due to climate conditions. Crops must be grown in the natural soil profile, although raised beds (maximum of 12 inches in depth) may be installed to improve the soil condition, fertility, and agri-ability access.

This practice does not apply to crops not grown in the natural soil profile (i.e. tables/benches, portable pots, hydroponically, etc.). High tunnel systems are not greenhouses or low tunnel systems. Structures cannot be used to provide shelter or housing for any livestock, or to store supplies or equipment.

Purpose

Tunnel systems are designed to improve plant health and vigor.

General Specifications

- Before you dig, contact the Indiana Underground Plant Protection Services, Inc. toll free at 1-800-382-5544 or 811, at least 48 hours in advance of construction, for location of underground utilities.
- Prepare the site to manufacturer's instructions. Tunnels are to be placed in sites with adequate drainage in full sun and, if possible, with protection from the wind.
- Lay out the structure location according to the site plan. The orientation of the tunnel is dependent on the season and crops that will be grown. Usually, a north-south orientation will optimize sun exposure.
- Locate the structure near a viable water source for irrigation. Runoff may be captured and used for irrigation purposes, if allowed by State law, though runoff should not be the only source of irrigation water.
- Design the structure to withstand the local snow and wind condition and/or follow manufacturers' recommendations on removal or management of tunnel cover.
- Tunnel systems are commercially available in many lengths, widths and designs. Structures must be planned, designed and constructed from a manufactured kit in accordance with manufacturers' recommendations. The structure, including post ribs, or hoops, purlins, ridgepole, coverings and all other components must be constructed and anchored according to the manufacturers' recommendations.
- The tunnel frame must be constructed of metal, wood or durable plastic; and be at least 6 feet in height at the peak of the structure. It should be tall enough to allow spraying, cultivation, harvest and other operations to occur.
- Select the high tunnel covering material

of a significant thickness to withstand the temperature changes for the period required and a 4-year minimum lifespan. For polyethylene covers, use a minimum 6-mil greenhouse grade, UV-resistant material.

- Baseboards, as applicable, should be treated lumber or rot-resistant wood. (Note: Treated lumber may not be acceptable in organic production. Check your organic plan for acceptable material.)
- Ventilation is important to moderate temperature and humidity within the tunnel. Taller structures allow for better airflow. Remove or manipulate side covers to control internal temperatures and humidity. Installation of vents, fans, or heaters should be considered and should be included in the manufacturer's design and recommendations. If available, consider installing a supplemental manufacturer's kit to provide additional structural support.
- To control the intensity or duration of sunlight, the appropriate thickness of shade cloth may be used in place, or in addition to impervious plastic covers.
- If tunnels are placed side by side, consider a minimum clearance of 10 to 20 feet for snow removal and cover installation.
- High tunnels can create drainage and ponding issues. Direct runoff away from the high tunnel structure to avoid ponding. Provide a detention basin, storage reservoir, or stable outlet when runoff from tunnel covers empties onto the ground surface with potential to cause erosion.
- Consider managing the high tunnel system to maintain or improve soil health by following a soil management system that creates a favorable habitat for soil microbes by:
  - Minimizing soil disturbance, physical, chemical and biological;
  - Using plant diversity in the rotation to increase diversity below ground;
  - Keeping a living root growing year round as much as possible;
  - Keeping the soil covered with residue and growing plants year round.
- It is the responsibility of organic producers to ensure that all permissible activities, design, materials used and material specifications are consistent with the USDA National Organic Program.
- All disturbed areas need to be seeded to control erosion.

Operation and Maintenance

Managing a tunnel requires intensive and vigilant attention by the producer.

High tunnels are intended to be "seasonal" structures. Remove the cover prior to the "snow season" unless the structure has been designed for expected snow loads. At a minimum, accumulated snow should be periodically removed to avoid structural weakening and/or collapse.

Periodically inspect the high tunnel and repair, reinstall, or replace, as needed to accomplish the intended purpose.

Surface and subsurface drainage and other associated conservation practices must be maintained and any drainage problems near the tunnel will be corrected.

Plans and Specifications

The plans and specifications and for high tunnels will follow the manufacture's recommendations and this job sheet.

References

- Indiana Field Office Technical Guide (FOTG) Standard (325) High Tunnel System.
- Purdue University Agriculture, Small Farms, High Tunnels.
- Community Garden Guide Season Extension – High Tunnel, NRCS – Rose Lake Plant Material Center.
- "High Tunnels: Using Low-Cost Technology to Increase Yields, Improve Quality and Extend the Season," Cornell Cooperative Extension/Vermont Center for Sustainable Agriculture.Blomgren,T. and Frisch, T.2007.
- "Minnesota High Tunnel Production Manual for Commercial Growers". Edited by: Terrance T. Nennich, Sr., University of Minnesota Extension and Suzanne Wold-Burkness, University of Minnesota. 2013.
- High Tunnels.org

High Tunnel System Job Specification Sheet

Name _____ Farm # _____ Tract # _____

Assisted by _____ Field Office _____ Contract # _____

Tunnel Information

Manufacturer _____

Height (min 6') _____ Width _____ Length _____ Total Square Feet _____

Materials

Cover – if polyethylene, use a minimum 6-mill greenhouse grade, UV-resistant material
Ribs, purlins, post and other components (size and type of materials):

_____

_____

High Tunnels funded through EQIP must be operated and maintained for the practice lifespan of four years. Planned crop rotation:

Year 1: Spring_____, Summer_____, Fall_____, Winter?_____

Year 2: Spring_____, Summer_____, Fall_____, Winter?_____

Year 3: Spring_____, Summer_____, Fall_____, Winter?_____

Year 4: Spring_____, Summer_____, Fall_____, Winter?_____

Optional Systems Planned

__ Supplemental Heating System __ Mechanical Ventilation System __ Electrical System

Layout, Location, Length/Width and Tunnel Orientation (site plan map)

Other conservation practices planned (site plan map)

__ Diversion	__ Underground Outlet	__ Roof Runoff Structure
__ Infiltration Trench	__ Crop Rotation	__ Cover Crop
__ Irrigation Water Management	__ Nutrient Management	__ Integrated Pest Management
__ Critical Area Planting	__ Mulching	_____

Seeding recommendations for erosion control on disturbed areas: (see attached specification sheet)

REQUIRED: Attach a site plan map.

Certification

This structure was constructed and installed using all manufacturers' recommendations. I have read and understand the operation and maintenance requirements associated with this practice.

_____ _____
Landowner Date

Practice has been installed. Supporting practices meet NRCS specifications.

_____ _____
NRCS Date

Attach Site Plan Map