USDA United States Department of Agriculture

High Tunnel System - 325

Conservation Practice Fact Sheet — *December 2015*

Introduction

A high tunnel is a polyethylene, polycarbonate, plastic, or fabric-covered structure at least 6 feet in height that uses passive solar heating to create more favorable growing conditions for fruits, vegetables, and other specialty crops. Electrical and/or mechanical ventilation and heating systems may also be used to assist with climate control.

The high tunnel structure covers several crop rows, is wide enough to allow crop growth to full maturity under the tunnel, and is tall enough to allow spraying, cultivation, and harvest to occur with the tunnel intact.

To be eligible for financial assistance, the high tunnel must be constructed from a manufactured kit in accordance with the manufacturer's recommendations. It must meet NRCS minimum materials and lifespan requirements, and be installed, operated, and maintained as described in the *High Tunnel System Implementation Requirements* worksheet.

Where and How Can This Practice Be Used?

A high tunnel can be installed on land where crops are capable of being grown in the ground, where sun or wind intensity may damage crops, or where an extension of the growing season is needed due to climatic conditions. Crops must be grown in the natural soil profile, and not on benches or tables, in portable containers, hydroponically, etc. Permanent raised beds (up to a maximum 12 inches deep) may be installed to improve soil condition, fertility, and access. In addition, high tunnels cannot be used to: (1) provide shelter or housing for livestock or poultry, or (2) to store supplies or equipment.

The seasonal high tunnel has an expected practice life of 5 years, and needs to be maintained at least for that period of time if financial assistance is received from NRCS.

Features of High Tunnels

Commercially available high tunnel systems are available in a wide variety of widths and lengths. Frames are constructed of metal, wood, and/or durable plastic that is anchored to the ground. Cover material

must be sufficiently thick to withstand seasonal temperature changes, and have a minimum 4-year manufacturer's warranty. For polyethylene covers, use a minimum 6-mil greenhouse grade, single (or double) layer, UV-resistant material. End wall coverings can be greenhouse-grade plastic, poly-carbonate, wood, or other suitable material.

Shade cloth may be used in place of, or in addition to, the impervious plastic cover to lengthen the growing season for cool-season crops. When shade cloth is used alone, end walls may not be needed.

For adequate ventilation, the high tunnel must have side covers that can be completely removed or manipulated (i.e., rolled up or pulled aside) to control internal temperatures and humidity. End walls are usually framed-in to enclose the structure, and include doors and additional ventilation openings. For optimum ventilation, the high tunnel should be no more than 26 feet wide. If vents, fans, or heaters are attached to the high tunnel frame, they must be installed in accordance with the high tunnel manufacturer's design and recommendations.

Selection of the high tunnel type depends on local climatic conditions, crops to be grown, and budget. Consider working with vendors in the same general geographical area because they should be familiar with local conditions that must be addressed. High tunnels

Land owners and managers please note: *If you receive financial assistance for the high tunnel, be sure to check with your funding agency/organization for specific maintenance or management requirements.*

are typically available with 4 to 6-foot bow spacing, and in two styles: "Gothic arch" (peaked roof) and "Quonset hut" (rounded). In the mid-Atlantic region, heavy snow and ice storms can overload covered structures, resulting in collapse. Experience has shown that Gothic-style high tunnels with a bow spacing of 4 feet shed snow more effectively and are less likely to collapse under a heavy snow/ice load. Also, with their vertical side walls and peaked roofs, Gothic-style tunnels usually provide more interior space and better ventilation. For structures that receive NRCS financial assistance, keep in mind that the producer is responsible for properly managing snow/ice loads to ensure the integrity of the high tunnel structure for the 5-year lifespan of the practice, so it's important to select a sturdy structure.

Consider setting end posts in concrete, using heavier 12 to14 gauge steel for the frame, and providing a double layer for the plastic cover to improve the integrity of the structure. If available, consider installing a manufacturer's supplemental kit to provide additional structural support.

Conservation Management Systems

Water runoff from the high tunnel can cause problems that require the implementation of other conservation practices such as critical area planting, heavy use area protection, mulching, roof runoff structures (infiltration trenches), and underground outlets. When needed, additional practices must be planned and installed along with the high tunnel. Other practices that should also be considered as a part of a conservation management system include crop rotation, nutrient and pest management, micro-irrigation, and irrigation water management.

Producers who want to install a high tunnel will also need a reliable source of water near the structure, and a method for watering the crops (e.g., hand watering, drip irrigation, or sprinkler irrigation). Financial assistance may be available for installation of a micro-irrigation system and a water well, in addition to other conservation practices.

Additional References

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