NATURAL RESOURCES CONSERVATION SERVICE

INTERIM CONSERVATION PRACTICE STANDARD

SEASONAL HIGH TUNNEL SYSTEM FOR CROPS

(ft^2.)

CODE 798

DEFINITION

A seasonal polyethylene covered structure that is used to cover crops to extend the growing season in an environmentally safe manner.

PURPOSES

- Improve plant quality
- Improve soil quality
- Reduced nutrient and pesticide transport
- Improve air quality through reduced transportation inputs
- Reduce energy use through local consumption

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to cropland where extension of growing season is needed due to climate conditions and crops can be grown in the natural soil profile.. Permanently raised beds may be installed to improve soil condition, fertility, and agri-ability access, but does not apply to crops not grown in the natural soil profile (i.e. tables/benches, portable pots, etc.).

The practice does not include greenhouses or low tunnel systems that may cover single crop rows.

CRITERIA

General Criteria Applicable to All Purposes

Plan supportive conservation practices to address all environmental concerns associated with the use of tunnel systems.

The seasonal tunnel structure must be planned, designed, and constructed in accordance with manufacturer's recommendation. The tunnel frame must be constructed of metal, wood, or durable plastic; and be at least 6 feet in height.

Seasonal tunnel structures shall be selected and applied over the crop area. The material shall be of a significant thickness to withstand the temperature modification for the period required. As a minimum, a 6-mil greenhouse-grade, UV resistant polyethylene cover will be used.

In climate conditions where snow loads may damage the structure, the tunnel cover shall be removed or rolled up at the end of the growing season unless the structure is designed to withstand expected snow loads.

Runoff shall be directed away from the tunnel structure to avoid ponding. Runoff may be captured and used for irrigation purposes. The minimum design capacity for runoff structures shall be a 10-year storm frequency, 5-minute rainfall precipitation event. Runoff may empty into surface or underground outlets, or onto the ground surface when properly protected. Surface and underground outlets shall be sized to ensure adequate capacity. Provide for clean-out as appropriate. When runoff from tunnel covers empties onto the ground surface, a detention basin, storage reservoir, or stable outlet shall be provided.

Surface or ground outlets such as rock pads, rock filled trenches with subsurface drains, concrete and other erosion-resistant pads, or preformed channels may be used.

Seeding and vegetation shall be established on all disturbed earth surfaces.

Additional Criteria to Reduce Nutrient and Pesticide Transport

The irrigation water applied under the covered area shall not exceed the available water capacity of the soil to avoid runoff and leaching

below the root zone.

Additional Criteria to Improve Soil Quality

The area inside the seasonal structure shall have soil loss within the soil tolerance level (T) using currently approved agency wind and water erosion technology.

Additional Criteria to Improve Air Quality and Reduce Energy Consumption

The crops produced for sale and consumption shall be within commuting distances of farmers markets, fruit/produce distribution centers, or other community facilities.

CONSIDERATIONS

Locate the tunnel cover convenient for ingress/egress of plant materials.

Remove or manipulate side covers to control internal temperatures.

Rotate the location of the tunnel to allow rain, wind, sun, and cold temperatures to cleanse the soil from disease build up. Rotation allows growing cover crops on the site during the uncovered period.

Plan the appropriate measures to address:

- crop rotation
- irrigation water management
- nutrient management
- pest management
- runoff from the structure

Have a reliable source of good quality water near or in the tunnel.

PLANS AND SPECIFICATIONS

Plans and specifications shall be prepared in accordance with the criteria of this standard.

As a minimum, the plans and specifications shall provide the following:

- Layout and location of the tunnel cover; erosion control, runoff, and vegetative cover practices.
- Materials list and structural details of the cover including all necessary appurtenances as appropriate for the complete system.
- Procedure and timing for installing the tunnel cover (construction sequence), erosion control, runoff, and vegetative practices.
- Procedure and timing to remove or roll up the tunnel cover prior to inclement weather conditions.
- Site preparation.

OPERATION AND MAINTENANCE

An operation and maintenance (O&M) plan must be prepared and reviewed with the landowner or operator responsible for the application of the practice. The O&M plan shall provide specific instruction for proper operation and maintenance of each component of this practice and shall detail the level of repairs needed to maintain the effectiveness and useful life of the practice.

Covered area will be periodically inspected, and shall be reinstalled or repaired as needed to accomplish the intended purpose.

Removal of cover materials shall be consistent with the intended purpose and site conditions.

Operation of equipment near and on the site shall not compromise the intended purpose of the cover.

REFERENCES

Community Garden Guide Season Extension - High Tunnel, NRCS http://plant-materials.nrcs.usda.gov/mipmc

Community Garden Guide Season Extension – Hoophouses, NRCS. http://plant-materials.nrcs.usda.gov/mipmc/communitygardens.html

University of Minnesota, http://hightunnels.cfans.umn.edu/resources.htm" Part I: Introduction to High Tunnels". Spaw, M. and William, K. http://www.hightunnels.org/foreducators.htm

High Tunnel Production Manual". Penn State University College of Agriculture, Department of Horticulture. White, L. and Orzolek, M. 2003 http://www.nasga.org/publications/pubs_hightunnel.htm

"High Tunnels". Ted Blomgren of Cornell Cooperative Extension and Tracy Frisch of the Regional Farm and Food Project.