



Natural Resources Conservation Service

CONSERVATION PRACTICE STANDARD

MULTI-STORY CROPPING

(Acres)

CODE 379

DEFINITION

Existing or planted stands of trees or shrubs that are managed as an overstory with an understory of woody and/or non-woody plants that are grown for a variety of products.

PURPOSES

- Improve crop diversity by growing mixed but compatible crops having different heights on the same area.
- Improve soil quality by increasing utilization and cycling of nutrients and maintaining or increasing soil organic matter.
- Increase net carbon storage in plant biomass and soil

CONDITIONS WHERE PRACTICE APPLIES

On all lands where trees, shrubs, woody or non-woody crops can be grown in combination. The practice does not apply on land that is grazed.

CRITERIA

General Criteria Applicable to All Purposes

Use of this standard requires compliance with all applicable federal, state, and local laws and regulations.

Native plant species will be used whenever possible. Known invasive species will not be used.

Combinations of overstory and understory woody and/or non-woody plant species will be compatible and complementary and work synergistically together (plant guild).

Plants will be selected based on their adaptation to the climatic region and soil properties and capabilities. A precondition for any tree/shrub establishment is appropriately prepared sites. Refer to Indiana (IN) Field Office Technical Guide (FOTG) Standard (490) Tree/Shrub Site Preparation.

The planting and care of selected tree and shrub species will comply with IN FOTG Standard (612) Tree/Shrub Establishment.

Canopy covers will be balanced/managed to optimize health and growth of plants in each story or level as determined by client objectives for each story of vegetation.

Plants selected for purposes of protection, growth and production will, at a minimum, maintain soil organic matter content.

Moisture conservation or supplemental watering will be provided for plant establishment and growth where natural precipitation is too low for one or more of the selected species.

Select pest-resistant plant varieties.

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service State Office, or download it from the Field Office Technical Guide for your State.

Select species that enhance habitat for beneficial insects including pollinators.

Avoid selecting tree or shrub species which provide habitat to pests of the accompanying crop or forage.

The overstory canopy density will be determined by the following tree or shrub management objectives:

- Light requirements and growth period of the managed crops dispersed in the understory.
- Erosion control needs.
- Machinery widths and turning areas.

For areas with frequent or periodic high to severe winds, leave denser canopies towards the windward side(s).

To reduce surface water runoff and erosion on erosion-prone sites, ground-level vegetation will be of sufficient coverage and oriented on or near the contour. Use mulch as needed to cover bare areas. Any bedding for any story of vegetation will be placed on the contour.

Heights and widths of trees or shrubs will be controlled so they will not interfere with structures and above or below ground utilities.

Additional Criteria to Improve Crop Diversity by Growing Mixed but Compatible Crops having Different Heights on the Same Area

Choose understory plant species that will increase plant diversity, thrive under planned or existing canopy, and be complementary to other plants in the guild.

Choose plants that are not allelopathic to other desired species.

Manage the appropriate density for the site that will maximize above and below ground plant diversity without excessive competition for long term desired plant species.

Minimize soil disturbance during cultivation of the understory crop(s) to prevent damage to overstory.

Additional Criteria to Improve Soil Quality by Increasing Utilization and Cycling of Nutrients and Maintaining or Increasing Soil Organic Matter

Plants selected for purposes of protection, growth and production will improve soil organic matter content.

Select species with varying rooting depth in the understory and overstory to maximize nutrient and moisture availability while decreasing competition.

Include nitrogen fixing species in the overstory and/or understory.

Retain disease and insect-free thinning and pruning material on-site.

Additional Criteria to Increase Net Carbon Storage in Plant Biomass and Soil

For optimal carbon storage, select plant species that are adapted to the site to assure strong health and vigor and plant the full stocking rate for the site.

Manage the appropriate density for the site that will maximize above and below ground biomass production.

Minimize soil disturbance during establishment of the site.

Minimize soil disturbance during cultivation of the understory crop(s).

CONSIDERATIONS

The considerations section contains information that is optional to the planner.

Select crop, forage, tree and/or shrub varieties based on their tolerance to agriculture chemicals that will be used at the site.

Species diversity including use of native species should be considered to avoid loss of function due to species-specific pests or to enhance pollinator and wildlife needs.

High value trees or shrubs should be selected to maximize economic returns.

Consider selecting plants that are culturally important.

For areas with frequent or periodic high to severe winds, consider the use of IN FOTG standard (380) Windbreak/Shelterbelt Establishment on the windward side(s) of multi-story cropped areas.

Anticipate possible off-site effects and modify the practice design accordingly.

Coppice ability of selected species of trees and shrubs should be considered when they are to be pruned periodically.

PLANS AND SPECIFICATIONS

The plan will include:

- planting dates;
- planned stocking rate after mortality;
- site preparation and weed control methods;
- designed plant spacing, species, type of stock used and planting and storage guidelines;

OPERATION AND MAINTENANCE

The trees, shrubs, crops, and/or forages will be inspected periodically and protected from adverse impacts including insects, diseases or competing vegetation. Newly planted trees or shrubs will also be protected from fire and damage from livestock or wildlife.

All other specified maintenance measures and techniques of tree/shrub establishment will continue until plant survival and establishment are assured. This includes replacement of dead and dying trees or shrubs, pruning of dead or damaged branches for safety reasons, periodic pruning of selected branches for control of product quality, and control of undesirable competing vegetation.

Any removals of tree or shrub products, use of agricultural chemicals, and maintenance operations will be consistent with the intended purpose of the practice. Avoid damaging the site and soil and comply with applicable federal, state and local regulations pertaining to on-site and off-site effects

REFERENCES

Bentrup, Gary. 2008. Conservation buffers: design guidelines for buffers, corridors, and greenways. Gen. Tech. Rep. SRS-109. Asheville, NC: Department of Agriculture, Forest Service, Southern Research Station.

Josiah, Scott. 1999. Farming the forest for specialty products. Proceedings of the North American Conference on Enterprise Development through Agroforestry. University of Minnesota, Minneapolis, MN.

Josiah, Scott. 2001. Productive Conservation: Growing Specialty Forest Products in Agroforestry Plantings. National Arbor Day Foundation. Nebraska City, NE.

Thomas, M.G. 1993. Income Opportunities in Special Forest Products: Self-help Suggestions for Rural Entrepreneurs. Ag. Info Bulletin 666. USDA Forest Service. Washington, D.C.

Useful Plants for Permaculture Guilds – Indiana NRCS Fact Sheet.