

**NATURAL RESOURCES CONSERVATION SERVICE**  
**CONSERVATION PRACTICE STANDARD**  
**MULTI-STORY CROPPING**

(Ac.)

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.

**PURPOSE**

- 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 (*See 381 Silvopasture Establishment for grazed lands*).

**CRITERIA**

**General Criteria Applicable to All Purposes**

Combinations of overstory and understory woody and/or non-woody plant species shall be compatible and complementary.

Plants shall 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 practice standard Tree/Shrub Site Preparation (490).

The planting and care of selected tree and shrub species will comply with Tree/Shrub Establishment, 612.

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 shall 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.

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. (*i.e. Current or gooseberry (Ribes) bushes are in the life cycle of White Pine Blister Rust, so you would not plant Current or Gooseberry bushes under Western White Pines.*)

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 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 deep-rooted species for the overstory.

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

Retain 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**

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 Windbreak/Shelterbelt Establishment-380 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**

Plans and Specifications for applying this practice shall be prepared for each site and recorded using approved specification sheets, job sheets, technical notes, and narrative statements in the conservation plan, or other acceptable documentation.

**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 shall 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**

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<http://www.unl.edu/nac/morepublications/sfp2.pdf>

*USDA Plants Website:* <http://plants.usda.gov>

*USDA Websoil Survey Website:*

<http://websoilsurvey.nrcs.usda.gov/>

*National AgroForestry Center:*

<http://www.unl.edu/nac/publications.htm>

*Working Trees for Agriculture*

*AgroForestry Notes: (Forest Farming Series)*

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**Vance, Nan C.; Borsting, Melissa; Pilz, David; Freed, Jim. 2001.** *Special forest products: species information guide for the Pacific Northwest. Gen. Tech. Rep. PNW-GTR-513. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.* 169 p.

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