

# ALLEY CROPPING

(Ac.)  
Code 311

Natural Resources Conservation Service  
Conservation Practice Standard

## I. Definition

Trees or shrubs are planted in sets of single or multiple rows with agronomic, horticultural crops or forages produced in the alleys between the sets of woody plants that produce additional products.

## II. Purpose

- Enhance microclimatic conditions to improve crop or forage quality and quantity.
- Reduce surface water runoff and erosion.
- Improve soil health by increasing utilization and cycling of nutrients.
- Alter subsurface water quantity or water table depths.
- Enhance wildlife and beneficial insect habitat.
- Increase crop diversity.
- Decrease offsite movement of nutrients or chemicals.
- Increase carbon storage in plant biomass and soils.
- Develop renewable energy systems.
- Improve air quality.

## III. Conditions Where Practice Applies

On all cropland and hayland where trees, shrubs, crops and/or forages can be grown in combination.

## IV. Federal, Tribal, State, and Local Laws

Users of this standard should be aware of potentially applicable federal, tribal, state and local laws, rules, regulations or permit requirements governing alley cropping. This standard does not contain the text of federal, tribal, state, or local laws.

## V. Criteria

### A. General Criteria Applicable to All Purposes

Combinations of crops or forages and woody plants shall be compatible and complementary.

Plants shall be adapted to the climatic region and the soil resource.

Crop or forage sequence and woody species selection shall be determined using an acceptable nutrient balance procedure. Plants selected will maximize the utilization and cycling of soil nutrients and plant residues to 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 the selected species.

Select pest resistant plant varieties.

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

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

The distance between the sets of trees or shrubs will be determined by the following.

- Tree or shrub management objectives.
- Light requirements and growth period of the crops or forages in the alleys.
- Erosion control needs.
- Machinery widths and turning areas.

Soil erosion will be controlled by vegetative or other means until the alley cropping design is fully functional.

Refer to Wisconsin NRCS Field Office Technical Guide (FOTG), Section IV, Standard 612, Tree/Shrub Establishment, for further guidance on species selection, site preparation, and trees and shrub planting methods.

**B. Additional Criteria to Reduce Surface Water Runoff and Erosion**

Tree or shrub rows will be oriented on or near the contour to reduce water erosion.

To reduce surface water runoff and erosion, herbaceous ground cover will be established in conjunction with the tree or shrub rows.

To reduce wind erosion, tree or shrub rows will be oriented as close as possible perpendicular to erosive winds.

Selected species of trees and shrubs will be relatively deep rooted to encourage infiltration.

**C. Additional Criteria to Increase Carbon Storage**

Select tree and shrubs species with rapid growth rates.

Plant/manage the appropriate density for the site that will maximize above and below ground biomass production

Minimize soil disturbance through use of no-till methods on cropland.

**D. Additional Criteria to Develop Renewable Energy Systems**

Select plants that can provide adequate kinds and amounts of plant biomass to supply identified bioenergy needs.

Intensity and frequency of energy biomass removals will be managed to prevent long-term negative impacts on the system.

The harvesting of energy biomass shall be accomplished in a manner that will not compromise the other intended purpose(s) and functions.

**E. Additional Criteria to Improve Air Quality**

Residue from the alley-crop shall be left on the surface.

Select and maintain tree/shrub species with foliar and structural characteristics that optimize interception, adsorption and absorption of particulates.

Tree or shrub rows will be oriented as close to perpendicular as possible to prevailing wind

direction during the critical air quality impairment period.

**VI. Considerations**

Additional recommendations relating to design that may enhance the use of, or avoid problems with, this practice but are not required criteria to ensure its basic conservation functions are as follows.

- A. Species diversity including use of native species should be considered to avoid loss of function due to species-specific pests or enhance wildlife needs.
- B. Consider the invasive potential when selecting plant species.
- C. High value trees or shrubs should be selected to maximize economic returns.
- D. Coppice regeneration ability of selected species of trees and shrubs should be considered when they are to be pruned or harvested periodically.
- E. Select crops, forages and woody plants for water requirements not to exceed available soil water.
- F. Select crops, forages and woody plants with compatible rooting depths to better utilize available soil moisture.
- G. Consider modifying microclimatic conditions and habitat to enhance biological pest management.

**VII. Plans and Specifications**

Specifications for applying this practice shall be prepared for each site and recorded in the conservation plan using Wisconsin Job Sheet 143, Tree/Shrub Planting; and Wisconsin Forestry Technical Note 1, Tree and Shrub Establishment - Native Tree and Shrub Planting Recommendations for Wisconsin.

Documentation will include:

- site preparation requirements,
- tree/shrub species planned,
- spacing,
- width of cropping alley between the alleys.
- number of trees/shrubs per acre or seeding rates,
- purpose of planting,
- planting or seeding methods,
- cultural practices,
- maintenance requirements, and
- location on the conservation plan map.

## **VIII. 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. The trees or shrubs will also be protected from fire and damage from livestock or wildlife.

All 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.

## **IX. References**

USDA, NRCS Wisconsin Field Office Technical Guide (FOTG), Section IV, Practice Standards and Specifications.