

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE STANDARD**

**ALLEY CROPPING**

(Acre)

**CODE 311**

**DEFINITION**

Trees or shrubs 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.

**PURPOSE**

- Enhance microclimatic conditions to improve crop or forage quality and quantity.
- Reduce surface water runoff and erosion.
- Improve soil quality 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.
- Improve air quality.

**CONDITIONS WHERE PRACTICE APPLIES**

This practice applies to all cropland and hayland where trees, shrubs, crops and/or forages can be grown in combination.

**CRITERIA**

**General Criteria Applicable to All Purposes**

Select combinations of crops or forages and woody plants that are compatible and complementary.

Select plants that are adapted to the climatic region and the soil resource.

Determine the crop or forage sequence and woody species selection 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.

Apply moisture conservation practices and or provide supplemental watering for plant establishment and growth where natural precipitation is too low for one or more of the selected species.

Select pest resistant plant varieties.

Avoid selecting tree or shrub species that provide habitat for 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.

Determine the distance between the sets of trees or shrubs based on 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

Control soil erosion by vegetative or other means until the alley cropping design is fully functional.

Refer to Tree & Shrub Establishment (612) Conservation Practice Standard for further guidance on planting trees and shrubs.

### **Additional Criteria to Reduce Surface Water Runoff and Erosion**

Orient tree or shrub rows on or near the contour to reduce water erosion.

Establish herbaceous ground cover in conjunction with the tree or shrub rows to reduce surface water runoff and erosion.

Orient tree or shrub rows as close as possible to perpendicular to the erosive wind direction, to reduce wind erosion.

Select deep-rooted species of trees and shrubs to encourage infiltration.

### **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.

### **Additional Criteria to Improve Air Quality**

Leave residue from the alley-crop on the surface.

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

Orient tree or shrub rows as close to perpendicular as possible to the prevailing wind erosion direction, to reduce wind erosion.

### **CONSIDERATIONS**

Use of native species can help avoid loss of function due to species-specific pests, and enhance wildlife needs.

Select high value trees or shrubs to maximize economic returns.

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

Select crops, forages and woody plants for water requirements not to exceed available soil water.

Select crops, forages and woody plants with compatible rooting depths to better utilize available soil moisture.

Consider modifying microclimatic conditions and habitat to enhance biological pest management.

### **PLANS AND SPECIFICATIONS**

Prepare plans and specifications for each field or treatment unit according to the Criteria, Considerations and Operation and Maintenance sections of this standard.

Specifications shall describe the requirements for applying this practice to meet the intended purpose.

Record practice specifications on the Colorado Alley Cropping 311, Conservation Practice Job Sheet.

### **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 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**

Colorado Field Office Technical Guide, Section I,. [Plant Suitability and Seeding Rates for Conservation Plantings in Colorado](#). 2002. USDA, NRCS. Lakewood, CO.

Colorado Field Office Technical Guide, Section IV. [Alley Cropping 311, Conservation Practice Job Sheet](#), 2003. USDA, NRCS. Lakewood, CO.

Colorado Field Office Technical Guide, Section IV. [Tree/Shrub Establishment 612, Conservation Practice Standard](#). 2003. USDA, NRCS. Lakewood, CO.