

**NATURAL RESOURCES CONSERVATION SERVICE**  
**CONSERVATION PRACTICE STANDARD**

**ALLEY CROPPING**

**(Acre)**

**CODE 311**

**DEFINITION**

Alley cropping is the planting of trees or shrubs in sets of single or multiple rows with agronomic or, horticultural crops or forages produced in alleys between the sets of woody plants.

**PURPOSES**

Alley cropping is used to:

- Produce tree and/or shrub products (wood, nuts, berries, etc.) along with crops or forages
- Enhance microclimate conditions to improve crop and 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
- Develop renewable energy systems
- Improve air quality

**CONDITIONS WHERE PRACTICE APPLIES**

On all lands where trees, shrubs, crops and/or forages can be grown in combination for the improvement of the economic or environmental conditions.

**CRITERIA**

**General Criteria Applicable To All Purposes**

Plant Selection:

Combinations of crops or forages and woody plants shall be compatible and complement each other while providing the products and crops that meet landowner objectives.

Plants shall be adapted to the climatic region and the soil resource, marketable, and suited to the landowner's equipment and management capabilities.

Crop or forage sequence and woody species selection shall be determined using crops, forages and woody plants that maximize the utilization and recycling of soil nutrients and that maintain soil organic matter content.

Moisture conservation should be a consideration in developing an alley cropping system.

Crops or forages and woody plants shall be selected for rooting depths and water requirements not to exceed available soil water.

Select pest resistant plant varieties. Avoid selecting tree or shrub species, which provide habitat to pests of the accompanying crop or forage.

*Design:*

The distance between the sets of trees or shrubs will be determined by tree or shrub management objectives. Nut producing trees require wider spacing than fruit trees or trees being grown for wood products.

The distance contained in the alley should consider the light requirements and growth period of the crops or forages.

Erosion control needs.

The width of the alley should consider the width of the machinery and the area required for the machinery to operate.

Crops (woody and herbaceous) shall be grown in a planned conservation management system.

Soil erosion will be controlled by vegetative or other means until the alley cropping design is fully functional. See standards for Conservation Cover (327) or Cover and Green Manure Crop (340).

Avoid planting trees or shrubs where they will interfere with structures and above or below ground utilities.

Planting dates, care in handling, and planting the seed, seedlings, or cuttings will be accomplished to assure acceptable plant survival (See Tree and Shrub Establishment 612).

Only viable and high quality planting stock or seed will be used for establishing the tree or shrub rows.

Site preparation shall be sufficient for establishment and growth of selected species and appropriate for the site.

Comply with applicable laws and regulations, including the state's Best Management Practices (BMPs).

**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. See standards for Forage and Biomass Planting (512), Range Planting (550) and Conservation Cover (327) for species to use for species selection and planting specifications.

**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.

**Additional Criteria to Increase Carbon Storage**

Select tree and shrub species with rapid growth rates.

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

Minimize soil disturbance through the use of no-till methods. (See Residue and Tillage Management Practices 329, 345 and 346).

### **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 purposes and functions.

### **Additional Criteria to Develop Energy Conservation**

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

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

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

### **CONSIDERATIONS**

Crop, forage, tree and/or shrub varieties selected should be tolerant to agricultural chemicals that will be used in the management of the crops, forages, trees or shrubs.

Species diversity including use of native species should be considered to avoid loss of function due to species-specific pests.

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

Consider cultural resources when planning this practice. This practice may adversely affect cultural resources and should comply with GM 420, Part 401, during planning, prior to installation and during maintenance.

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. 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 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. Use the standards for Nutrient Management (590) and Pest Management (595).



