Natural Resources Conservation Service

CONSERVATION PRACTICE STANDARD

ALLEY CROPPING

Code 311

(ac)

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.

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.

CONDITIONS WHERE PRACTICE APPLIES

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

CRITERIA

General Criteria Applicable to All Purposes

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

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

Crop or forage sequence and woody species selection must 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 must 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—

- 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 criteria in Conservation Practice Standard (CPS) Tree/Shrub Establishment (Code 612) for further guidance on planting trees and shrubs.

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.

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 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 must be accomplished in a manner that will not compromise the other intended purpose(s) and functions.

Additional Criteria to Improve Air Quality

Residue from the alley-crop must 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 period.

CONSIDERATIONS

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

Consider the invasive potential when selecting plant species.

High value trees or shrubs should be selected 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

Plans and specifications for applying this practice must 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 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 must 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 onsite and offsite effects.