

## ALLEY CROPPING (ACRE)

### CODE 311

#### MONTANA TECHNICAL GUIDE

#### SECTION IV

#### DEFINITION

Trees or shrubs planted in a set or series of single or multiple rows with agronomic, horticultural crops or forages cultivated in the alleys between the rows of woody plants.

#### PURPOSES

Produce tree or shrub products (wood, nuts, berries, fodder, mulch, etc.) along with crops or forages to improve or optimize the economic viability of the operation. This purpose may be accomplished alone or concurrently with one or more of the following purposes:

- Improve crop or forage quality and quantity by enhancing microclimatic conditions.
- Reduce excess surface water runoff and erosion.
- Improve utilization and recycling of soil nutrients.
- Reduce excess subsurface water or control water table depths.
- Provide food and cover habitat for wildlife.
- **Reduce wind erosion.**
- **Decrease nutrient/chemical loss.**
- **Improve aesthetics.**

#### CONDITIONS WHERE PRACTICE APPLIES

On all lands where crops or forages are grown and improvement of the economic or environmental conditions is desired.

#### CRITERIA

##### General Criteria Applicable To All Purposes

The location, layout, species and density of the trees and shrubs will accomplish the purpose and intended function for both the agronomic or horticultural crop or forage as well as the trees or shrubs.

#### SPECIES SELECTION

**Species must be suitable and adapted to the soils, climate and purpose. See Conservation Tree/Shrub Suitability Group (CTSG) in Section II of the Montana Field Office Technical Guide (FOTG) for a detailed listing of species suited to the soils at the site.**

Plant species selection will be based on the following:

- Combinations of crops or forages and woody plants shall be compatible and complementary, and provide the products and crops that meet landowner objectives.
- Combination of crops or forages and woody plants shall be compatible with the activities associated with the woody plants.
- Crops or forages 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 an acceptable nutrient balance procedure. Select crops, forages and woody species to maximize the utilization and recycling of soil nutrients, animal wastes and plant residues and to maintain soil organic matter content.

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**NOTE:** This type of font (**AaBbCcDdEe 123..**) indicates NRCS National Standards.  
This type of font (**AaBbCcDdEe 123..**) indicates Montana Supplement.

- Crops or forages and woody plants shall be selected for rooting depths and water requirements not to exceed available soil water.
- Select pest resistant crop/forage and tree/shrub varieties.
- Avoid selecting tree or shrub species which provide habitat to animal, bird, or insect species considered to be pests of the accompanying crop or forage.
- Crop, forage, tree and/or shrub varieties selected shall be tolerant to herbicides that will be used in the management of the crops forages, trees, or shrubs.

Refer to FOTG, Section IV, Practice Standards and Specifications, 550—Range Planting and/or 512—Pasture and Hayland Planting, for suitable forage species.

#### DESIGN

**Plant trees or shrubs in a set or series of single or multiple rows with crops or forages cultivated in the alleys between the rows of woody plants.**

Tree or shrub rows will be oriented on the contour to control water erosion or perpendicular to troublesome winds to control wind erosion.

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

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

**Provide at least a 12 foot cultivated strip on all sides of the planting to serve as a fireguard, aid in the control of weeds, and reduce the amount of competition for available moisture.**

#### SPACING

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, and machinery widths.

**In multiple rows of woody plants the space between these rows of woody plants will be wide enough to accommodate cultivation equipment to control weeds. A minimum spacing is 15 feet.**

**TABLE 1. – General Spacing Guidelines**

PLANT TYPE	SPACING WITHIN ROW (ft.)	BETWEEN SETS (ft.)
Shrub	3–6	60–100
Tree	6–12	60–100

#### SITE PREPARATION

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

**The planting area must be free of living sod and perennial weeds before planting.**

**One of the following methods will qualify for proper site preparation:**

1. **One year of summer fallow for cropland and idle land with little or no grass sod. Two years of summer fallow for sod and alfalfa.**
2. **A combination of cultivation and chemical weed control can be employed to destroy competitive vegetation.**
3. **Any land leveling or smoothing needed to facilitate irrigation must be done prior to planting. The irrigation system should be designed to provide water control independent of the adjoining fields.**
4. **Where cultivation is not feasible as with wet lands, steep slopes, erosive soils, or other areas, the vegetation will be scalped or killed on a 3-foot wide strip or spot on which the trees will be planted.**

#### CARE, HANDLING, AND SIZE FOR WOODY PLANTING STOCK

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

Planting dates and care in handling and planting the seed or seedlings will assure acceptable plant survival.

**Planting stock must be of known origin. Named varieties are recommended over common varieties and should be used when they are available. Utilize local nurseries for planting stock and check with the local dealers for availability of forage species.**

**Planting stock will be stored in a cool, moist environment (34-38 degrees F). Keep stock tops dry**

**and free of mold and roots moist and cool. Moist means roots are exposed to both water and air.**

**Roots of bareroot stock shall be kept moist during planting operations by placing in a partially aerated water-soil slurry, peat moss, super-absorbent (e.g. polyacrylamide) slurry or equivalent material.**

**Rooting medium of container stock shall be kept moist at all times by periodic watering.**

**Prior to planting seedling shall not be less than 1/4-inch in caliper at 1 inch above the root collar.**

**Use transplants that are 2 to 4 years old and at least 6 to 10 inches in height.**

#### **PLANTING**

**Stock shall not be planted when the soil is frozen. Plant into dry soil only if there is a way to irrigate or water woody plant materials afterwards.**

**Plant only when air temperatures are above freezing.**

**Do not plant on hot, windy days to avoid excessive drying.**

**Planting shall be done in early spring or late fall with dormant seedlings. A planting machine should be used if available and if the site allows.**

**Plant seedlings in a vertical position with root collars at or about inch below the soil surface. Pack soil around seedling to eliminate air pockets.**

**On sloping sites, locate the plantings on the contour or as nearly on the contour as possible.**

#### **PROTECTION**

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

**On hot, dry south and west aspects, protect evergreens with shingles or burlap shades for the first two growing seasons. To protect evergreens from winter desiccation, place shingles or burlap shades on the sides the prevailing winds are coming from.**

## **CONSIDERATIONS**

Spacing between the rows of trees or shrubs may be adjusted, within the limits listed above, to accommodate equipment widths and turn-arounds.

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.

Anticipate possible off-site effects and modify the practice design accordingly.

**Fencing may be necessary to protect plantings from livestock and/or wildlife.**

**Consider the use of fabric barrier in woody plantings to control vegetative competition, increase plant survival, improve plant vigor and growth, and reduce maintenance measures.**

## **PLANS AND SPECIFICATIONS**

Specifications for applying this practice shall be prepared for each site and recorded using approved specification sheets, job sheets, 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.

All other specified maintenance measures and techniques of tree/shrub establishment will be continued 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 and use of fertilizers, pesticides, and other chemicals shall be conducted in a manner that maintains the intended purpose.

The type, use and timing of maintenance equipment will be appropriate to accomplish operation and maintenance tasks while not damaging or degrading the site and soil conditions.

**Provide at least a 12 foot cultivated strip on all sides of the planting to serve as a fireguard, aid in the**

**control of weeds, and reduce the amount of competition for available moisture.**

**Root pruning of the tree/shrub row may be necessary to control moisture/nutrient competition with adjacent crop or forage.**

**Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.**