

NATURAL RESOURCES CONSERVATION SERVICE

ALLEY CROPPING (ACRE)

CODE 311

MONTANA CONSERVATION PRACTICE SPECIFICATION

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

PURPOSE:

- Produce tree and/or shrub products (wood, nuts, berries, fodder, mulch, etc.) along with crops or forages.
- Improve crop or forage quality and quantity by enhancing microclimatic conditions.
- Reduce surface water runoff and erosion.
- Improve utilization and recycling of soil nutrients.
- Reduce subsurface water quantity or alter water table depths.
- Provide or enhance wildlife habitat.
- Create habitat for biological pest management.
- Improve crop diversity, quantity, quality and economic returns.
- Decrease movement offsite of nutrients or chemicals.
- Enhance the aesthetics of the area.
- Increase carbon storage in plant biomass and soils.
- Improve air quality.

SCOPE: This practice applies on all lands where trees, shrubs, crops, and/or forages can be grown in combination.

ALLEY CROPPING SPECIFICATIONS: Specifications for applying this practice shall be prepared for each site and recorded using approved specifications sheets, job sheets, and narrative statements in the conservation plan, or other acceptable documentation.

Plant Selection.

Select crops or forages that combined with the woody plants will provide a product that meets the land owner objectives. Select woody plants that produce a tree and/or shrub product (wood, nut, berries, fodder, mulch, etc). Select a crop or forage that will be compatible and complementary with the woody plants.

Plants shall be marketable and suited to the landowners' equipment and management capabilities.

Species must be suited and adapted to the soils, climate and purpose. See Conservation/Tree 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.

Specification MT311-2

Moisture conservation or supplemental watering shall be provided for plant establishment and growth where natural precipitation is too low for the selected species. The use of a woven fabric barrier in the woody plantings is recommended to control vegetative competition, increase plant survival, improve plant growth, and reduce maintenance measures.

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.

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.

The spacing distance between tree/shrub sets are found in TABLE 1. It is the distance from the center of one set to the center of the next set.

Soil erosion by wind or water shall be controlled by vegetative or other means until the alley cropping design is fully functional. Tree or shrub rows shall be oriented on the contour and perpendicular to erosive winds to control erosion. On erosive sites, the FOTG, Section IV–Practice Standards and Specifications, 589C–Cross Wind Trap Strips, 422A–Herbaceous Wind Barriers, or a supplemental herbaceous cover may be needed to control erosion.

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.

Alley width is the distance available for crop or forage production between the tree/shrub sets and the cultivated strip used to reduce the amount of plant competition. It is equal to multiple agricultural equipment widths.

Spacing.

Plant spacing within row is based on plant type (shrub verses tree). Shrubs shall be planted closer together than trees. The plant spacing between multiple rows of woody plants shall be wide enough to accommodate cultivation equipment to control plant competition and allow enough space for the plants crowns to grow and mature. The plant spacing distances within row, between row and between sets are in TABLE 1.

TABLE 1. Spacing Distances

PLANT TYPE	WITHIN ROW (ft.)	BETWEEN ROWS (ft.)	BETWEEN SETS (ft.)
Shrub	3–6	15-24	60–100
Tree	6–12	15-24	60–100

Specification MT311-3

Site Preparation.

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

The planting area shall be free of living sod and perennial plants 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.

Care, Handling, and Size for Woody Planting Stock.

Only viable, high quality and adapted planting stock or seed will be used.

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.

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.

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

Planting Stock Grade Specifications.

SPECIES	CALIPER 1 INCH ABOVE ROOT COLLAR (INCHES)	HEIGHT RANGE (INCHES)	AGE (YEARS)
Broadleaf	3/16–3/8	12–24	1–3
Evergreen	1/4–1/2	6–12	2–4

Specification MT311-4

Planting.

The planting shall be done at a time and manner to insure survival and growth of selected species.

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. Water thoroughly. Make the hole deep and wide enough for all roots to avoid causing "L" or "J" root and compacted root plantings.

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

In large plantings, consider planting bare root conifers first for they are more susceptible to roots drying out.

Protection.

The planting will be protected from adverse impacts such as livestock damage, wildlife damage or fire.

Protect plantings from livestock with fence.

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.

Operation and Maintenance.

The following actions shall be carried out to insure that this practice functions as intended throughout its expected life. These actions include normal repetitive activities in the application and use of the practice (operation), and repair and upkeep of the practice (maintenance):

- Replacement of dead trees or shrubs will be continued until the practice is functional.
- Plants that have failed to grow shall be replaced not later than the second year. Void spaces are difficult to fill after the planting is over two years old. Gaps in the tree or shrub rows seriously reduce effectiveness and appearance of the planting.
- Regular vegetative competition control is needed to maintain the establishment, health, and vigor of the plantings. Vegetative competition control is needed for the life of established windbreak.
- Between the rows, cultivate down to 2–6 inch depth. It shall be timely and frequent enough to keep the planting reasonably free from vegetative competition.
- Within the rows, cultivate no deeper than 3 inches and no closer than 2 feet from the base of the plant. The optimum time to perform this activity is several times throughout the growing season.
- Some hand hoeing in the rows is desirable to remove weeds near the trees for at least 3 years after planting.

Operation and Maintenance CONTINUED.

- Use caution in the application of chemical weed sprays in the vicinity of woody plantings. Strict adherence to label recommendations is essential to avoid damage to plantings.
- Mulches, fabrics, and tree mats will reduce the amount of maintenance needed to keep the planting growing and to control vegetative competition. Periodically inspect woven fabric to ensure tree girdling is not occurring.
- On sandy textured soils that will blow if left exposed, some light weed growth or a cover crop, 2–4 feet wide, maybe left between the rows to control soil blowing.
- Provide at least a 12 foot cultivated strip on all sides of the planting to control vegetative competition.
- Thin the barrier to maintain its function.
- Prune to eliminate weak or infected branches and repair injured trees.
- Damaging pests will be monitored and controlled.
- Maintaining the planting in a vigorous growing condition will aid in control of damaging pests. Early detection and application of control measures can often prevent extensive damage.
- Control deer and rodent damage by using fencing, repellents, or poisoning.
- Periodic applications of nutrients may be needed to maintain plant vigor.
- Protect plantings from fire by clean cultivation or the use of vegetative fire breaks.
- Supplemental watering may be desirable to ensure adequate survival.
- Replanting will be required when survival is inadequate.

Survival Percentages.

For a successful tree or shrub planting, it is required that 85% of all trees or shrubs planted survive after “leaf out” during spring or summer of the second year with no two adjacent plants missing.