

NATURAL RESOURCES CONSERVATION SERVICE
MONTANA CONSERVATION PRACTICE SPECIFICATION
SILVOPASTURE ESTABLISHMENT (ACRE)

CODE 381

DEFINITION: An agroforestry application establishing a combination of trees or shrubs and compatible forages on the same acreage.

PURPOSE:

- To provide forage for livestock grazing and the production of wood products.
- To increase carbon sequestration.
- To improve water quantity.
- To reduce erosion.
- To enhance wildlife habitat.
- To reduce fire hazard.
- To provide shade for livestock.

SCOPE: Situations where silvopasture establishment applies includes: 1) pasture where trees or shrubs can be added; 2) forest where forages can be added; 3) land on which neither the desired trees nor forages exist in sufficient quantity to meet the land user's objectives.

This practice may be applied on any area that is suitable for the desired plants.

SILVOPASTURE ESTABLISHMENT 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 woody plants that produce a tree and/or shrub product (wood, nut, berries, fodder, mulch, etc).

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 woody species suited to the soils at the site. Also see the Forest Land Productivity table in the soil survey manual for a list of trees that are common to the site and would be suitable for planting at that site.

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

Establishment of woody species will be in accordance with the Tree and Shrub Establishment conservation practice standard (612).

Select forage species that are compatible and complementary to the woody plants and meets the land owner objectives. Select a forage species that will be suitable for the targeted livestock. Choose species that have shade tolerance and/or high net forage production.

Select forage species listed in the Pasture and Hayland Planting (512) or Range Planting (550) conservation practice standards.

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 weed fabric barrier in the woody plantings is recommended to control vegetative competition, increase plant survival, improve plant growth, and reduce maintenance measures.

Specification MT381-2

Design

Silvopasture establishment applies to:

- 1) Pastures where trees or shrubs can be added;
- 2) Forests where forages can be added;
- 3) Land on which neither the desired trees nor forages exist in sufficient amounts.

Pastures where trees or shrubs can be added:

Plant evenly spaced trees or shrubs in rows or randomly throughout planting. Rows will be single or multiple rows with forage species between the rows of woody plants.

Follow proper site preparation for establishment of trees or shrubs.

The distance between trees or shrubs will be determined by the following:

- Light requirements and growth period of the forage species.
- Tree and shrub environmental requirements.
- Machinery widths and turning areas.
- Landowner objectives.

Plant trees at an appropriate density to allow acceptable forage production and wood products. The spacing distance between tree or shrubs is found in [Table 1](#).

Soil erosion by wind or water shall be controlled by vegetative or other means until the design is fully functional. Tree or shrub rows shall be oriented on the contour and perpendicular to erosive winds 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.

Forests where forages can be added:

For existing forests and plantations remove a sufficient number of trees and/or prune existing trees to allow adequate light penetration for forage establishment and silvopasture use.

Maintain a 25 – 35% canopy cover for optimal forage production and livestock use. Follow Forest Stand Improvement practice (666) standard and specifications.

Tree pruning may be needed to adjust light levels, improve wood products, or provide adequate space for machinery. Follow Tree/Shrub Pruning practice (660).

Choose forage species that have shade tolerance and/or high net forage production. Establishment of forage species will be in accordance with Pasture and Hayland Planting (512) or Range Planting (550) conservation practice standards.

Use native forage species to maximize wildlife benefits.

Land on which neither the desired trees nor forages exist in sufficient amounts:

Follow proper site preparation for establishment of trees or shrubs and forages.

Plant evenly spaced trees or shrubs in rows or randomly throughout planting. Rows will be single or multiple rows with forage species between the rows of woody plants.

Plant trees at an appropriate density to allow acceptable forage production and wood products. The spacing distance between tree or shrubs is found in [Table 1](#).

Choose forage species that have shade tolerance and/or high net forage production. Establishment of forage species will be in accordance with Pasture and Hayland Planting (512) or Range Planting (550) conservation practice standards.

Tree/Shrub Spacing

New plantings

Establishment of woody species will be in accordance with the Tree and Shrub Establishment (612) conservation practice standard. Plant spacing is based on plant type (shrub versus tree). Shrubs shall be planted closer together than trees.

TABLE 1 – Spacing Distances

PLANT TYPES	HEIGHT (FEET)	PLANT-TO-PLANT SPACING (FEET)	NO. PLANTS PER ACRE
Shrubs	<10	3–6	4,840–1,210
Shrubs /Trees	10–25	6–10	1,210–436
Trees	>25	10–15	436–194

Existing forests

Maintain a 25 – 35% canopy cover for optimal forage production and livestock use.

Use the D+X spacing in even-aged stands. Use Basal Area in uneven-aged stand. Refer to the National Forestry Handbook, Part 636.2 for proper inventory methods.

D+X is defined as: Average stand diameter (D) after treatment plus a constant (X).

EX. -- If D = 9” and X = 10, then average spacing is 9+10, or 19 feet. Stocking at 19’x19’=121 trees/ac.

Ponderosa pine

Even-aged:	D+ 10
Uneven-aged:	84 ft ² /ac

Douglas-fir, Spruce, Fir, Cedar, Hemlock

Even-aged:	D+ 9
Uneven-aged:	88 ft ² /ac

Western larch

Even-aged:	D+ 10
Uneven-aged:	75 ft ² /ac

Lodgepole pine

Even-aged:	D+ 7
Uneven-aged:	110 ft ² /ac

Specification MT381-4

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.

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

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 during initial establishment. Defer grazing until the average height of the tree's terminal bud exceeds the browsing height of the livestock or of sufficient size to resist breakage.

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.

Forage Establishment

Establishment of forage species will be in accordance with Pasture and Hayland Planting (512) or Range Planting (550) conservation practice standards.

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. It shall be timely and frequent enough to keep the planting reasonably free from vegetative competition. The optimum time to perform this activity is several times throughout the growing season.
- 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.
- Thin the woody planting to maintain forage production.
- 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 75% of all trees or shrubs planted survive after "leaf out" during spring or summer of the second year with no two adjacent plants missing.