TREE/SHRUB ESTABLISHMENT

Conservation Practice Standard 612 Guidance - B

Species Other Than Southern Pine

Natural Resources Conservation Service (NRCS) **October 2011**

Persimmon (*Diospyros viginiana*)

PURPOSE

To provide information and guidance for planting of shrubs, hardwoods and softwood trees other than pines. Any of the three methods may be used for commodity production, wildlife habitat restoration or enhancement, and environmental quality or aesthetic enhancement.

Species Selection

The species planted need to be of local stock when practicable, well adapted to Florida's climate and soil-site conditions, and be consistent with planting objectives. Common tree/shrub species grouped by soil type and indicator species are listed in Florida eFOTG Section II (a) (6). Recommended trees, shrubs and vines can be found on the Florida NRCS Plant List for Conservation Alternatives [FOTG Sect. II (g) (1)]. Consult with State Biologist or Plant Materials Specialist before using species not found on the approved list.

PLANTED TREES AND SHRUBS

Spacing and Stocking Rates

Trees should be spaced to allow growth at normal rates with normal form. Spacing should allow for and anticipate the need for future access in order to manage and protect plantings or harvest commercial product. On areas where survival will be low or there is an erosion hazard, the stocking rate should be increased. Shrubs may be planted at rates as high as 7,274 shrubs per acre. Wider spacing of trees is generally better for wildlife.

Recommended Spacing and Stocking Rates (SR) for Establishment of Selected Trees

	Spacing, ft	SR
Christmas Trees	6 x 6	1,210
Cypress (*Traxodium* spp.)	8 x 8 or wider	≤ 680
Red Cedar (*Juniperus* spp.)	6 x 6 or wider	≤ 1,200
Hawthorn (*Crataegus* spp.)	6 x 6 or wider	≤ 1,200
Holly (*Ilex* spp.)	6 x 6 or wider	≤ 1,200
Mixed Hardwood	9 x 12 or wider	≤ 403
Persimmon (*Diospyros viginiana*)	10 x 10 or wider	≤ 436
Dogwood (*Cornus* spp.)	10 x 10 or wider	≤ 436
Oaks for Wildlife (*Quercus* spp.)	20 x 20 or wider	≤ 100
Pecan Groves (*Carya illionensis*)	40 x 40	27

Note: *Planting configuration can vary depending on the intended purpose; consultation with a forestry, landscape, agronomy, or wildlife specialist is recommended.*

Stocking rate (SR) is used to express the number of trees per acre, and is determined by the between-row and in-row spacing chosen. It is calculated with the following formula:

$$SR = \frac{43{,}560\ ft^2/acre}{\text{Between-row spacing, ft} \times \text{In-row spacing, ft}}$$

When inter-planting in a scattered stand of desirable trees or shrubs, seedlings should not be planted closer than *diameter at breast height (DBH) plus 10 feet*. For example, inter-planting should be no closer than 20 feet from desirable trees having a DBH of 10. Otherwise tree and shrub spacing for inter-plantings will be the same as for open field planting of the same species.

Site Preparation

On most sites, some site preparation is usually necessary. The purpose of site preparation is to prepare a seedbed and minimize competition during or shortly after planting. The most common forms of site preparation are: 1) prescribed fire, 2) mechanical, and 3) chemical, or some combination of the different methods. Guidelines for herbicide use can be obtained from your local forestry professional.

For herbicides to work best after clearcutting, leave the site fallow for one growing season after the site has been clearcut.

When planting on crop or pastureland with soil compaction or where plow- or hard-pans exist, subsoiling in combination with scalping may be beneficial. Scalping is necessary when sod forming grasses, weeds, or forbs are expected to compete heavily with the pine seedlings. Bedding should be only used where high water tables exist and bedding is essential for pine survival. See Florida NRCS Conservation Practice Standards Tree/Shrub Site Preparation, Code 490; Bedding, Code 310; and Florida Technical Notes: Forestry FL-19, for more information.

Planting Dates

Although bareroot trees can be planted between November and March, the best survival and growth rates have been observed for plantings made during the months of December and January due to better soil moisture. Shrubs have a narrower planting

Recommended Spacing and Stocking Rates (SR) for Establishment of Selected Shrubs

	Spacing, ft	SR
Gopher Apple (*Licania michauxii*)	3 x 4 or wider	≤ 3,600
Wild Plum (*Prunus* spp.)	3 x 4 or wider	≤ 3,600
Red Chokecherry (*Photinia pyrifolia*)	3 x 4 or wider	≤ 3,600
American Beautyberry (*Callicarpa americana*)	6 x 6 or wider	≤ 1,200
Southern Blackhaw (*Viburnum rufidulum*)	6 x 6 or wider	≤ 1,200
Crab Apple (*Malus augstifolia*)	6 x 6 or wider	≤ 1,200
Strawberry Bush (*Euonymus americanus*)	6 x 6 or wider	≤ 1,200
Chinqapin (*Castanea pumila*)	6 x 6 or wider	≤ 1,200
Arrowwood (*Viburnum dentatum*)	6 x 6 or wider	≤ 1,200
Coco-Plum (*Chrysobalanus icoa*)	6 x 6 or wider	≤ 1,200
Florida Swampprivet (*Forestiera segregata*)	6 x 6 or wider	≤ 1,200
Florid Anise (*Illicium floridanum*)	6 x 6 or wider	≤ 1,200
Dog-Hobble (*Leucothoe* spp.)	6 x 6 or wider	≤ 1,200
Wild-Coffee[a] (*Psychotria* spp.)	6 x 6 or wider	≤ 1,200
Azalea[a] (*Rhododendron viscosum*)	6 x 6 or wider	≤ 1,200
May Haw (*Crataegus aestivalis*)	10 x 10 or wider	≤ 436
Wax Myrtle (*Myrica cerifera*)	10 x 10 or wider	≤ 436
Sparkleberry (*Vaccinium arboreum*)	10 x 10 or wider	≤ 436
Possum Haw (*Viburnum nudum*)	10 x 10 or wider	≤ 436
Water Viburnum (*Vibrnum obovatum*)	10 x 10 or wider	≤ 436

Note: *Planting configuration can vary depending on the intended purpose; consultation with a forestry, landscape, agronomy, or wildlife specialist is recommended.*

[a]Native varieties only.

window. Late fall is the best time of the year to plant evergreen shrubs and late winter is the best time for deciduous species.

Containerized tree or shrub seedlings or burlapped (a.k.a. “balled”) stock can be planted just about any time of the year as long as the plants are stored, handled and planted properly, and receive adequate water post-planting.

Planting Methods

Hand Planting

Hand planting involves the use of planting dibbles, hoedads, planting shovels, or power augers to dig a hole in the ground or a prepared bed in which the plant is placed. Proper use of these tools can be found in several of the references listed at the end of the document.

Machine Planting

Seedlings are planted, usually in a prepared seedbed, in furrows created by a coulter-type planter. It is important to use the proper-sized coulter (at least 32 inches) and the planting foot and trencher plate can create the proper furrow size (see Planting Directions).

Prepared Beds

Beds are usually leveled and disked, or otherwise tilled, to a depth of 8 to 12 inches. It is best to prepare the bed several months prior to planting to allow for some soil settling.

In prepared beds, soil amendments (e.g., peat, compost, etc.) can be added to native soil in a one to three ratio, respectively. Amendments allow moisture to more readily reach trans-planted trees or shrubs.

Planting Directions

Hand Planting or Machine Planting of Bareroot Seedlings

1. Seedlings should be planted so that the root collar is at or within ½ inch below ground level. When hand planting, dig a hole 1 foot wider than the root spread and about the same depth as the root system. If machine planting, create a trench 4-inches wide and at least 15-inches deep.
2. Soak roots in water, inspect the root system, and cut off roots broken or damaged.
3. Make a shallow, rounded mound of soil in the bottom of the planting hole and place the plant on the mound and spread the roots to their natural, nearly horizontal position. Avoid creating L- or J-shaped rooting or twisted and balled roots. Set the plant upright and at the same depth it was grown in the nursery.
4. Hold the plant upright and fill the hole half to two-thirds full of soil. Work the soil around the roots to eliminate air pockets.
5. Settle the soil around the roots with water before filling the remainder of the hole. **Fill just to or slightly below the root collar.** Do not compact the soil around the roots with your foot because it could damage the root system.
6. Form a saucer-like catchment basin around the edge of the planting hole to aid in watering. Apply organic mulch over the top of the planting hole if available, but keep mulch at least 3 inches away from stem(s).

Hand planting of Containerized or Balled/Burlapped Seedlings

1. Dig the planting hole 1 foot wider and as deep as the container is tall.
2. Remove container of containerized plants prior to planting. Removal of all the burlap before planting is not necessary, although the top one-third of the burlap should be pulled back from the stem (see illustration). Remove woven plastic wraps and any other plastic material completely after setting the plant in the hole.

3. Place the plant straight in the hole and be sure the top of the root ball is no deeper than the existing landscape

soil surface. Fill around the ball with soil and gently firm the soil. Do not pack the soil. Water thoroughly while planting to remove air pockets.

4. Form a saucer-like catchment basin around the edge of the root ball with a soil ridge 3 to 6 inches high to facilitate watering. Do not mound soil over root ball.
5. Mulch with 3- to 4-inch layer of organic material but be sure to keep the mulch layer about 3 inches away from the plant stem.

Planting Considerations

Pick up seedlings immediately prior to planting to minimize the storage period prior to planting. Longleaf and sand pines are highly perishable and need to be planted within three days of lifting from the nursery. No seedlings should be stored for longer than 10 days after lifting. Maximum storage conditions are achieved when temperatures are maintained between 34 and 38°F and 85 to 90% relative humidity.

During transportation, storage, and planting keep seedlings:

- loosely covered,
- out of direct sunlight,
- protected from wind and temperatures below freezing or above 50°F,
- separated from petroleum products or fumes,
- stacked no more than two bundles deep and provided with adequate ventilation,
- moist by watering root collars twice a week unless coated with clay slurry or otherwise treated.

Optimum planting conditions include:

- daytime temperatures between 35 to 60°F,
- relative humidities greater than 40%,
- windspeeds of less than 10 mph,
- adequate, but not excessive, soil moisture.

Take from storage only enough seedlings for one day's planting. Do not allow planters to carry seedlings in their hand while planting. Tree roots can be killed by as little as 5 minutes exposure to the wind. Carry bareroot seedlings in a bucket or bag with a moist medium surrounding the roots. Carry containerized stock by the container, never the stem.

When planting on sloped ground, be sure to follow topographic contours.

Evaluating Planting Success

Monitor the planting operation to ensure the seedlings are planted properly. Seedlings should be vertically aligned and firmly packed.

Determine stand survival at the end of the first growing season. Survival checks are usually done by the Florida Division of Forestry; however, a survival monitoring plot technique can be found in the National Forestry Handbook (Part 636.5) or in the Southern Regional Extension Forestry publication SREF-FM-001 (http://www.sfrc.ufl.edu/extension/florida_forestry_information/forest_management/files/SREF-FM-001_measuring_seedling_survival_planting_quality.pdf).

Acceptable survival criteria are provided in Florida NRCS Conservation Practice Standard Tree/Shrub Establishment, Code 612. If more than 500 trees per acre survive two years post planting, a future timber thinning may be required.

NATURAL REGENERATION OR DIRECT SEEDING OF HARDWOODS

Natural Regeneration

Definition

Harvesting merchantable trees, which are either financially or biologically mature, in a way that will provide for regeneration of a forest stand.

Clearcut Method

Clearcutting is one method of regenerating bottomland hardwoods. Merchantable trees are removed and small trees removed either mechanically or by the use of herbicides. Site preparation is usually needed to enhance regeneration. See Florida NRCS Conservation Practice Standard Forest Site Preparation, Code 490, and Florida Technical Notes: Forestry FL-19.

Shelterwood Method

The shelterwood system, which is the preferred method from a wildlife standpoint, can be used to obtain oak regeneration. Stand density is reduced to 60% stocking to allow seedling establishment. When a stand of 500 or more seedlings per acre is 4.5 feet or higher, remove the overstory stand. It may take 15 to 20 years to obtain the desired reproduction once stand density is reduced.

Direct Seeding

Definition

A known amount of seed is applied directly to the land resulting in a stand of desired species.

Seed

Use locally produced seed with greater than 85% viability and a minimum of 95% sound seed. Float test acorns collected for seed. Except for overcup oak, unsound acorns will float when placed in a large container of water. Discard any acorns that float.

Store seed at between 34 and 36° F prior to sowing. Seeds may be treated with repellant prior to planting to deter seed eating insects, birds, and mammals.

Sowing Rates, Conditions, and Season Site Preparation

As with transplanted seedlings, the purpose of site preparation is to prepare a seedbed and to minimize vegetative competition during and shortly after seed establishment. Several weeks prior to seeding or seed fall, the seedbed should be prepared.

For direct seeding of oak acorns, the seedbed is usually prepared by disking. Two passes with a plow or harrow at a depth of at least 6 inches, but preferably 8 to 15 inches, is usually sufficient.

Direct Seeding Specifications - Oaks			
Acorns per Acre	Spacing, ft	Temp ^{o}F	Season
1,000 to 1,500	3 x 15 to 2 x 15	< 75	Fall
Planting Depth: ≥ 2 but ≤ 3 inches			

Evaluating Stand Establishment

Oak stands are considered adequate when there are between 500 and 600 free-to-grow seedlings per acre.

MAINTENANCE

Stake trees or shrubs, if necessary, but for no longer than one year.

For individual tree or shrub plantings, weed development under the canopy the first two years is the greatest cause of mortality. Mulch with two to four inches of material of choice three or more times the width of the rootball. Do not allow mulch to be within two or three inches of the trunk.

Within plantations, weeds should be controlled for at least two years post-planting. Mowing, chopping, or chemical herbicides can be applied to control over weeds and affect stocking rates. Herbicides can only be used as labeled.

If natural rainfall does not provide at least one inch per week the first few months, plantings should be irrigated. Irrigation is most often needed during April, May, and in October.

Irrigate during the early morning to conserve water. Do not irrigate at night because this encourages disease development.

Do not add fertilizer at time of planting or earlier than six weeks after planting. For best results fertilize according to soil test results or use one pound of nitrogen per 1000 sq feet of bed area using a general purpose formulation (e.g., 12-4-8 or 16-4-8).

Protect stands from wildfire and grazing. Exclude cattle until terminal buds of the mainstem are above the normal browse line (≈ 5 to 6 ft). If necessary, exclude browsing wildlife through installation of electric fencing. See Florida NRCS Conservation Practice Access Control, Code 472, for more information.

Permits can be issued to control wildlife causing damage to commercial crop trees. Contact the appropriate Regional Office of the FL Fish and Wildlife Conservation Commission for more information (http://myfwc.com/conservation/you-conserve/assistnuisance-wildlife/).

As trees and shrubs mature and competition among trees increase, timber thinning will likely be required to reduce canopy closure and to allow canopy development of remaining trees. Remove trees and shrubs of poor form, exhibiting low vigor, disease, etc., and leave the most valuable and the most vigorous specimens (See Florida NRCS Conservation Practice Standard Timber Stand Improvement, Code 666; FL Technical Notes: Forestry FL - 20; and or consult with a professional forester. When practical, leave snags (i.e., dead standing trees) and cavity trees for wildlife.

REFERENCES

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