



# Managing Pine Forests for Multiple Goals

Crescent Lake Hunt Club / Seminole Landing Property  
Putnam and Flagler Counties, Florida

**August 22, 2018**

**Meet & greet at 9:00 AM ET, adjourn after lunch (provided)**

This tour will feature examples of wildlife habitat enhancement (natural and food plots), silvicultural operations to improve pine forests, understory enhancement (saw palmetto and muscadine reduction), invasive species management, and discussions about cost-shares.

Join us to explore the possibilities that flatwood pine forest management has to offer, learn about sustainable forestry and wildlife habitat management, and connect with the local and statewide professionals and resources that are available to assist in your land management. Most of the tour will involve riding in open trailers with several discussion stops and a short walk or two.



Funding for this event is provided by the Florida Tree Farm Program, USDA Forest Service through the Florida Department of Agriculture and Consumer Service's Florida Forest Service, and the Florida Sustainable Forestry Initiative Implementation Committee.





# Crescent Lake Hunt Club/Seminole Landing Tree Farm Tour

Tract Size: 1,085.9 ± Acres



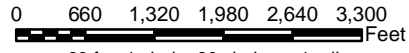
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S,T,R: 12, 13, 23, 24; 11S; 27E;  
18, 19, 30; 11S; 28E  
Putnam & Flagler County, FL



Prepared by:  
Conrad Wysocki, Florida Forest Service  
2017 Aerial Imagery  
NAD83, Harn FL Albers  
6/5/2018

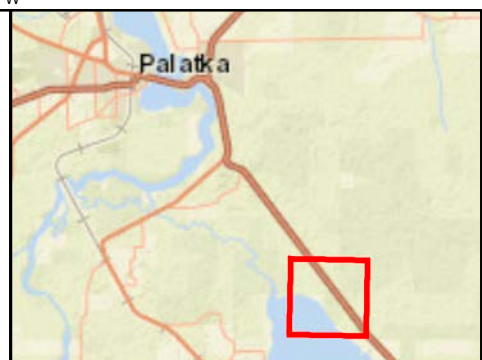
- Tree Farm Tour Stops
- Tree Farm Property Boundary
- Putnam / Flagler County Line

### American Tree Farm System



66 ft = 1 chain; 80 chains = 1 mile;  
10 sq. chains = 1 acre

**DISCLAIMER**  
This map is the product of the Florida Forest Service. There are no warranties made as to the fitness of this map for any unlisted purpose. Furthermore, no warranties are provided for state, federal, or foreign jurisdiction.



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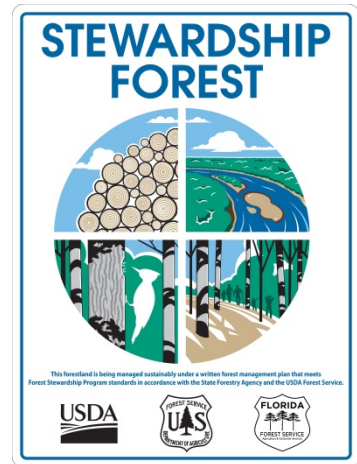
## Resource Contacts

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# Florida's Forest Stewardship Program

**Forest Stewardship** is active management of forest land to keep it in a productive and healthy condition for present and future generations, and to increase the economic, environmental and social benefits of these lands. Forest Stewards are landowners who manage their forest lands on a long-term basis by following a multiple resource management plan.

*The Forest Stewardship Program addresses the improvement and maintenance of timber, wildlife, soil and water, recreation, aesthetics, as well as forage resources.*



## Eligibility

Private forest landowners with at least 20 acres of forest land and a desire to manage their ownerships according to Stewardship principles can participate in the Forest Stewardship Program. Also, adjacent landowners, with similar management objectives, may combine their holdings to meet this acreage limitation.

## Benefits to Landowners

- A customized management plan that is based on the landowner's objectives. The plan will include forest stand characteristics, property maps, management recommendations, and a five-year time line for future planning. This plan also serves as documentation of active management on the property that may help reduce tax liability.
- An opportunity for public recognition as a certified "Forest Steward".
- Educational workshops, tours and the quarterly Florida Land Steward newsletter developed and distributed by the University of Florida, IFAS Cooperative Extension Service and other partners.

## How to Enroll

Contact your local Florida Forest Service County Forester and tell them that you would like to have a Forest Stewardship Plan prepared for your property. More information and application online at: <http://FreshFromFlorida.com/ForestStewardship>





## Tree Farm Program

The American Tree Farm System® is a program of the American Forest Foundation and was founded in 1941 to promote the sustainable management of forests through education and outreach to family forest landowners. Nearly 26 million acres of privately owned forestland and 80,000 family forest landowners in 46 states are enrolled in this program and committed to excellence in forest stewardship. About half of all Tree Farms are located in the South.

### Eligibility

Private forest landowners with at least 10 acres of forest land and have a desire to manage their ownerships according to sustainable forestry guidelines can participate in Tree Farm.

### Benefits to Landowners

Tree Farmers are good stewards of their forestland committed to protecting watersheds and wildlife habitat and conserving soil. They manage their forestland for various reasons, including timber production, wildlife, recreation, aesthetics, and education/outreach. Tree Farmers receive many benefits:

- Representation on local, state, and federal issues affecting forestland owners.
- Exposure to a network of forestry professionals and landowners committed to sustainable forestry.
- Invitations to workshops, tours and the quarterly Florida Land Steward newsletter produced by University of Florida IFAS and other partners.
- Certification that meets international standards of sustainable forest management.
- Participation in local, state, regional, and national Outstanding Tree Farmer of the Year awards and recognition.

### Getting into the Program

Contact your local Florida Forest Service County Forester and tell them that you would like to join the Tree Farm program. More information here:

<https://www.treefarmssystem.org/florida>



# Florida Forest Service

## Silviculture Best Management Practices

### Silviculture Best Management Practices (BMPs)

Silviculture BMPs are the minimum standards necessary to protect our state's waterbodies and wetlands from degradation and sedimentation that can sometimes occur because of erosion from forestry operations. Silviculture BMPs should be applied on all bonafide ongoing forestry operations, especially those adjacent to waterbodies and wetlands, and may be enforced by federal, state and local authorities.

### Silviculture BMP Courtesy Checks

Silviculture BMP courtesy checks are available for landowners, land managers, and loggers. These courtesy checks provide a "report card" on Silviculture BMP implementation for recent or ongoing forestry operations. This helps future management planning and evaluates the performance of contractors on your property.

### Silviculture BMP Site Assessments

On-the-ground Silviculture BMP site assessments are available to determine which Silviculture BMPs apply to planned operations on a specific site. This helps with harvest plan development, road layout, mitigation of existing problem areas, etc.

### Silviculture BMP Notice of Intent

The Silviculture BMP Notice of Intent (Rule 5I-6 F.A.C.) is a voluntary, one-time pledge that a landowner signs, indicating intent to adhere to Silviculture BMPs on their property. Once a landowner has signed the Notice of Intent, he or she will become eligible to receive a *presumption of compliance* based on reasonable evidence with state water quality standards during future ongoing forestry operations. This is very important if a landowner's property falls within an area covered by a Florida Department of Environmental Protection Basin Management Action Plan for impaired waters.

### Additional Services

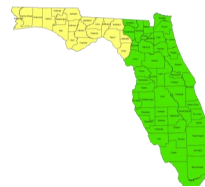
For information on the services listed above or any other services provided by the Florida Forest Service's hydrology section, please contact your local BMP Forester.

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**Florida Department of Agriculture and Consumer Services**  
**Adam H. Putnam, Commissioner**



# Forestry Wildlife Best Management Practices for State Imperiled Species



- Forestry Wildlife Best Management Practices for State Imperiled Species (WBMPs) were adopted into Florida Administrative Code (Rule 5I-8) on October 21, 2014.
- WBMPs were developed through a partnership between the Florida Department of Agriculture and Consumer Services' Florida Forest Service and the Florida Fish and Wildlife Conservation Commission (FWC).
- WBMPs are **voluntary** practices designed as a practical approach for avoiding and minimizing the loss of **State Imperiled Species** due to silviculture operations.
- WBMP practices address the 16 State Imperiled Species which are considered to be potentially vulnerable to silviculture operations including ten aquatic species, two burrowing animals, and four nesting birds.
- WBMPs are designed to supplement the existing water quality-based Silviculture BMPs which already provide many valuable benefits to the conservation and management of fish and wildlife in Florida.
- Landowners and other forestry resource professionals can enroll in the voluntary program by completing a WBMP Notice of Intent. Those who do not wish to enroll will continue to be subject to all current laws and regulations regarding State Imperiled Species.
- Once enrolled, applicants who **properly implement** WBMPs will no longer be required to obtain a permit authorizing the incidental take of State Imperiled Species during bonafide ongoing forestry operations. In addition, they will not be subject to any fines or penalties associated with an incidental take of the State Imperiled Species covered by the WBMP Manual.
- WBMPs are not designed to facilitate wildlife habitat restoration or species recovery and expansion. Also, they do not address any Federally Listed Species. For information on Federally Listed Species, refer to FWC's online "Florida Wildlife Conservation Guide."
- To obtain more information or a copy of the WBMP Manual and Notice of Intent, contact your local Florida Forest Service BMP forester (see below) or a FWC Landowner Assistance Program biologist (850) 488-3831.

## Florida Forest Service BMP Foresters

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# Got Invasives?

## Invasive exotic plant problem? Find a program to help by using [FloridaInvasives.org](http://FloridaInvasives.org).

The Florida Invasive Species Partnership has collected, evaluated and categorized assistance programs into a single resource, making it easier to find the financial and/or technical assistance available to Florida landowners to prevent or control invasive exotic species problems. [FloridaInvasives.org](http://FloridaInvasives.org) has an online resource of management assistance programs to help in your fight against problematic plant species. This resource takes the guesswork out of finding the agencies or organizations offering assistance and will direct you to available programs. The Landowner's Incentives Database will also provide the requirements for each program, to help you decide if they are a good match for your needs.

### Why was [FloridaInvasives.org](http://FloridaInvasives.org) developed?

Invasive species have been identified as being costly ecologically and economically statewide in Florida. The Florida Invasive Species Partnership (FISP) is a collaboration of public and private entities in Florida, formed to link efforts at preventing and controlling invasive exotic plants across agency and property boundaries. FISP has developed an on-line tool of available financial and technical assistance sources to make it easier for landowners and land managers to find them.

### How does [FloridaInvasives.org](http://FloridaInvasives.org) help you?

FISP has created a searchable database, the [Florida landowner incentives database](http://FloridaInvasives.org), accessible at [FloridaInvasives.org](http://FloridaInvasives.org) that allows you to find an assistance program for your needs. Search by your county, target species or other pertinent information into the online tool, and you will retrieve a current list of available programs.

[FloridaInvasives.org](http://FloridaInvasives.org) will help provide focus to your search so that you can get the right person at the right program.

[FloridaInvasives.org](http://FloridaInvasives.org):

- Builds community awareness,
- Leverages limited resources through cooperation and
- May reduce individual land management costs.

This resource will be regularly updated with the most current program information to provide you the most up-to-date opportunities.

Go to [FloridaInvasives.org](http://FloridaInvasives.org) to find out more.

Species Shown from top to bottom:

Mexican Petunia, Boston Fern, Mimosa, Cogongrass, Camphor



*Think Locally, Act Neighborly*

invasive species know no boundaries!

## **Herbaceous Weed Control Recommendations for Planted Slash Pine Sites**

*Revised 19 April 2013*

E. David Dickens – Forest Productivity Professor, David J. Moorhead – Silviculture Professor, The University of Georgia - Warnell School of Forestry and Natural Resources, and Pat Minogue – Silviculture Assistant Professor – University of Florida School of Forest Resources and Conservation

- ◆ Herbaceous weed control (HWC) during the spring following planting slash pine seedlings can be critical to growth and survival on old-field, pasture, hayfield, and cut-over sites, particularly in droughty years.
- ◆ A four to six foot wide band is often as effective as a broadcast treatment.
- ◆ Wait at least one to two months after planting prior to over-the-top herbicide application to obtain best pine tolerance and growth response.

### **HERBICIDES FOR CONTROL OF BROADLEAF WEEDS AND GRASSES**

(all treatments applied over-the-top of pines unless noted otherwise)

#### **ARSENAL® AC (BASF; 53% imazapyr; 4 lb per gal)**

- ◆ Very effective on perennial grasses, including difficult to control species like Bermudagrass, seedling Johnsongrass, and Panicums
- ◆ Weak on broadleaf weeds in the composite group (see Oust® XP®)
- ◆ Effective on established weeds
- ◆ Apply 4 – 6 fluid oz product per acre
- ◆ Do not add surfactant
- ◆ Imazapyr may cause severe slash pine stunting at excessive rates, ensure proper sprayer calibration to apply precise herbicide rate per acre
- ◆ Optimum timing: Early post to post emergence of weeds (April to May)
- ◆ Grass and broadleaf weed control including, but not limited to: bahiagrass, barnyardgrass, bluegrass (annual, Kentucky), Bermudagrass, crabgrass, fescue, foxtail, Italian ryegrass, Johnsongrass, lovegrass, panicums, sandbur, wild oats, witchgrass, camphorweed, carpetweed, chickweed, clovers, cocklebur, dandelion, dogfennel, horseweed, goldenrod, knotweed, lambsquarters, milkweed, ragweed (common, giant), pepperweed, pigweed, plantain, pokeweed, purslane, pusley (Florida), shepard's purse, sowthistle, stinging nettle, annual spurge, sunflower, tansymustard, wild carrot, wild parsnip, wild turnip

**OUST® XP®** (DuPont; 75 % sulfometuron methyl)

- ◆ Very effective on a broad spectrum of broadleaf weeds, including composites
- ◆ Weak on perennial grasses including Bermudagrass, some panicums, and broomsedge species (see Arsenal® AC)
- ◆ 1<sup>st</sup> Year plantings: apply 2-4 oz Oust product per acre
- ◆ Optimum timing: Pre-emergence to early post emergence (March-April)
- ◆ Do not use Oust when soil pH > 6.2
- ◆ Grass & broadleaf control including, but not limited to: chickweed, crabgrass, dogfennel, fescue, fireweed (willowweed), goldenrod, horseweed, Kentucky bluegrass, nutsedge (yellow), Panicum (broadleaf), pokeweed, ragweed, shepherd's purse, white snakeroot, yellow sweetclover, annual bluegrass, barnyardgrass, foxtail barley, foxtail fescue, Italian ryegrass, jointed goatgrass, bromes (red, ripgut), reed canarygrass, signalgrass, yellow foxtail, mustard, pepperweed, pigweed, sunflower, vetch, wild carrot, wild oats

**LINEAGE® HWC** (DuPont; 37.5% imazapyr + 28.1% sulfometuron methyl + 7.5% metsulfuron)

- ◆ Apply 5.3 oz product per acre
- ◆ Do not add surfactant
- ◆ Optimum timing is early post emergence (March – April)
- ◆ Very broad spectrum control of grasses and broadleaf weeds
- ◆ Imazapyr may cause excessive slash pine seedling stunting, ensure proper sprayer calibration to apply precise herbicide rates per acre
- ◆ See weeds controlled in Arsenal AC, Oust XP, and Escort XP sections

**OUST® XP®** (DuPont; 75% sulfometuron methyl) + **VELPAR L®** (DuPont; 25% hexazinone, 2 lb ai/gal) or **OUST® XP®** + **VELPAR® DF** (DuPont, 75% hexazinone)

- ◆ Broad spectrum weed control of broadleaf weeds and most grasses, weak on Bermudagrass, broomsedge, and some Panicums
- ◆ Hexazinone may cause pine seedling mortality on sandy sites, ensure proper calibration and follow label directions regarding appropriate rates for various soil types
- ◆ Apply 2-4 oz Oust product + VELPAR L 2 - 3 pints (or Velpar DF 10 – 16 oz product) per acre depending on soil texture (see product label)
- ◆ Optimum timing: Pre to early post emergence of weeds (March - early May)
- ◆ Do not use Oust when soil pH > 6.2. Use low rate of Oust + Velpar L or Velpar DF on coarse textured (sand, loamy sand, and sandy loam) soils and where soils are low in organic matter (see label)
- ◆ Grass & broadleaf control including, but not limited to: chickweed, crabgrass, dogfennel, fescue, fireweed (willowweed), goldenrod, horseweed, Kentucky bluegrass, nutsedge (yellow), Panicum (broadleaf), pokeweed, ragweed, shepherd's purse, white snakeroot, yellow sweetclover, annual bluegrass, barnyardgrass, foxtail barley, foxtail fescue, Italian ryegrass, jointed goatgrass, bromes (red, ripgut), reed canarygrass, signalgrass, yellow foxtail, mustard, pepperweed, pigweed, sunflower, vetch, wild carrot, wild oats, asters, brackenfern, fleabane



**OUSTAR®** (DuPont; 11.8% sulfometuron methyl and 63.2% hexazinone)

- ◆ Similar to Oust XP + Velpar products as above, but in a packaged mixture
- ◆ The ratio of active ingredients is set; hexazinone rate tends to be too high on sandy sites
- ◆ 1<sup>st</sup> Year weed control application product rates per acre:
  - 10-12 oz Course textured soils (sand, loamy sand, sandy loam)
  - 12-16 oz Medium textured soils (loam, sandy clay loam, silt loam)
  - 16-19 oz Fine textured soils (clay loam, sandy clay, silty clay loam, silty clay)
- ◆ After 1<sup>st</sup> year weed control application product rates per acre:
  - 12-16 oz Course textured soils
  - 16-19 oz Medium textured soils
  - 18-24 oz Fine textured soils
- ◆ Do not use Oustar when soil pH > 6.2
- ◆ Optimum timing: Pre to early post emergence (March - early May)
- ◆ Grass & broadleaf control including, but not limited to: chickweed, crabgrass, dogfennel, fescue, fireweed (willowweed), goldenrod, horseweed, Kentucky bluegrass, nutsedge (yellow), Panicum (broadleaf), pokeweed, ragweed, shepherd's purse, white snakeroot, yellow sweetclover

**OUST® XP® + AATREX® 4L** (Syngenta; 42.6% atrazine)

- ◆ Apply 2-4 oz Oust product + 4-8 pints Aatrex 4L product per acre (lower rate on coarse textured soils and higher rate on medium to fine textured soils)
- ◆ Pre to early post emergence weeds <1.5" tall over dormant pines in early spring
- ◆ For grass & broadleaf weed control including plants listed by Oust XP as well as: barnyardgrass\*, giant foxtail\*, green foxtail\*, large (hairy) crabgrass\*, wild oats, witchgrass\*, yellow foxtail\*, cocklebur\*, groundcherry, jimsonweed, lambsquarters, annual morningglory, mustards, nightshade, pigweed, purslane, ragweed, sicklepod\*, velvetleaf (buttonweed)\* using Attrex 4L.  
\* indicates partial control using Attrex 4L

**OUST® EXTRA** (DuPont; 56.25 % sulfometuron methyl + 15% metsulfuron methyl)

- ◆ Apply 2 2/3 to 3 oz Oust Extra product per acre
- ◆ **Pre to** early post emergence
- ◆ Note Escort XP + Oust XP for plants controlled

**ESCORT® XP®** (DuPont; 60% metsulfuron methyl)

- ◆ Apply 1/3 - 2 oz Escort XP product
- ◆ Pre to early post emergence
- ◆ Blackberry control + broadleaf weeds & grasses; annual sowthistle, aster, bahiagrass, beebalm, bittercress, bitter sneezeweed, blackberry, blackeyed-susan, blue mustard, bull thistle, buttercup, chicory, cocklebur, common chickweed, common groundsel, common purslane, common yarrow, common sunflower, conical catchfly, corn cockle, crown vetch, curly dock, dandelion, dewberry, dogfennel, false chamomile, fiddleneck tarweed, field pennycress, garlic mustard, goldenrod, henbit, honeysuckle, multiflora rose and other wild roses,

lambquarters, lettuce (miners, wild), maretail/horseweed\*, maximilian sunflower, mustard (transy-, treacle, wild), oxeye daisy, Pennsylvania smartweed, plantain, pigweed (redstem, smooth), plumless thistle, prostate knotweed, redstem filaree, sericea lespedeza, sheperd's purse, silky crazyweed (locoweed), falseflax, sweet clover, tansy ragwort, teasel, wild carrot, wild garlic, woolly croton, wood sorrel, yankeeweed.

\* Certain biotypes of maretail/horseweed are less sensitive to Escort XP.

#### **OUST® EXTRA + ARSENAL® AC**

- ◆ Apply 2 oz Oust Extra + 4 oz Arsenal product per acre
- ◆ Early post to post emergence
- ◆ Imazapyr may cause severe slash pine stunting at excessive rates, ensure proper sprayer calibration to apply precise herbicide rate per acre
- ◆ Refer to list of plants controlled for Escort XP and Arsenal

#### **ESCORT XP + VELPAR L or VELPAR DF**

- ◆ Apply ½ - 1.0 oz Escort XP product + Velpar L or Velpar DF product (see label for specific VELPAR rates) per acre
- ◆ Early post to post emergence
- ◆ Blackberry control + broadleaf weeds and grasses (refer to Escort and Velpar for lists of plants controlled)

#### **VELPAR DF** (DuPont; 75% hexazinone)

- ◆ May cause mortality where excessive rates are applied on sandy soils, ensure proper sprayer calibration to apply precise herbicide rate per acre, following label recommendations regarding specific herbicide rates for various soil types
- ◆ 1<sup>st</sup> Year weed control application product rates per acre (the same amounts can be applied in years 2, 3, and 4):
  - 1 1/3 lb Course textured soils (loamy sand, sandy loam)
  - 1 1/3 – 1 ½ lb Medium textured soils (loam, sandy clay loam, silt, silt loam)
  - 1 ½ - 1 4/5 lb Fine textured soils (sandy clay, silty clay loam, silty clay, clay, clay loam)
- ◆ Weed control application product rates per acre for established trees (≥ 4-yrs-old):
  - 1 1/3 – 1 2/3 lb Course textured soils
  - 1 2/3 – 2 1/3 lb Medium textured soils
  - 2 1/3 – 2 2/3 lb Fine textured soils
- ◆ Optimum timing: Pre to early post emergence (March – early May)
- ◆ Grass & broadleaf control including, but not limited to: Asters, barnyardgrass, annual bluegrass, brackenfern, bromegrass, fleabane, foxtail, horseweed, ragweed, ryegrass

#### **VELPAR L** (DuPont; 25% Hexazinone)

- ◆ May cause mortality where excessive rates are applied on sandy soils, ensure proper sprayer calibration to apply precise herbicide rate per acre, following label recommendations regarding specific herbicide rates for various soil types

- ◆ 1<sup>st</sup> Year weed control application product rates per acre (the same amounts can be applied in years 2, 3, and 4):
  - 21 to 32 oz Course textured soils (loamy sand, sandy loam)
  - 24 to 40 oz Medium textured soils (loam, sandy clay loam, silt, silt loam)
  - 28 to 48 oz Fine textured soils (clay, clay loam, sandy clay, silty clay loam, silty clay)
- ◆ After 4<sup>th</sup> year weed control application product rates per acre:
  - 21 to 40 oz Course textured soils
  - 28 to 56 oz Medium textured soils
  - 36 to 64 oz Fine textured soils
- ◆ Optimum timing: Pre to early post emergence (March - early May)
- ◆ Grass & broadleaf control including, but not limited to: Asters, barnyardgrass, annual bluegrass, brackenfern, bromegrass, fleabane, foxtail, horseweed, ragweed, ryegrass

Also consider:

(1) The herbicide purchaser and applicator need to look closely at the herbicide label to make sure that the herbicide product used is: (a) labeled for the particular use site (e.g. “for use in forest sites”, “for use in conifer plantations”, etc.) (b) labeled for the pine crop species (or genus in some cases), and (c) labeled for the particular application (“herbaceous weed control in pine plantations”, “herbaceous release”, etc.). Herbicide products, even those with the same trade name (such as “Roundup”), may have different amounts of the active ingredient per gallon, so always follow the rates specified on the label of the particular container being used.

(2) Remember rates are per acre treated. Here are two examples of calculating the herbicide needed for a banded herbicide application using 10 oz Oustar product per acre treated, assuming 12 feet between the rows: (a) spraying a 4 foot wide band, 10 oz Oustar will take care of 3 acres total land area. In effect, one acre is banded and two acres are untreated, so herbicide is applied to one-third of the area. A total of 400 oz (25 lbs) of Oustar would be needed for a 120 acre field where one-third the area is treated in bands. (b) When spraying a 6 foot wide band on rows 12 feet apart, 10 oz Oustar will take care of 2 acres total land area. One acre is banded and one acre is untreated, so herbicide is applied to half the area. A total of 600 oz (37.5 lbs) of Oustar would be needed for a 120 acre field where herbicide is applied to one-half the area in bands.

(3) There are generics for some of the above listed herbicides and various product labels for the same active ingredient do vary. Read the product labels to make sure that your intended use is consistent with labeling.

Please read and follow all label recommendations. Inclusion of a product trade name or a company name in this publication does not constitute an endorsement of a product or a company, as other products manufactured by different companies might be equally suited for the intended herbicide use.

**HERBICIDES FOR CONTROL OF ANNUAL & PERENNIAL GRASSES ONLY**

- (1) All grass control herbicides listed below are postemergence, foliar active herbicides.
- (2) Best control for all grass species is obtained when grasses are in an early growth stage. For Texas panicum, apply when the grass is less than 4 inches tall. For Bermudagrass two applications are usually needed; the first when less than 6 inches tall and a second when re-growth is less than 4 inches. Multiple applications are also needed for



Johnsongrass.

- (3) Herbicides in this group generally do not mix well with other herbicide products. However, it is very important to add surfactants (wetting agents) to improve plant uptake. See information below and product labels for details.
- (4) Herbicide spray solution (water) volumes are typically between 10 to 20 gallons per sprayed acre (GPA) with a range 5-40 GPA; read label for specifics.
- (5) Do not apply herbicides when pine seedlings and desirable grasses are under drought or other stress
- (6) Do not apply herbicides when rainfall is expected within one hour.

**ENVOY® PLUS** (Valent; 12.6% clethodim, 0.97 lb clethodim per gallon, contains petroleum distillates)

- ◆ Apply 9 to 16 fluid oz per acre for annual grasses, 12 to 32 oz/acre for perennial grasses
- ◆ Add crop oil concentrate which contains at least 15% emulsifier at 1% volume/volume (1 qt per 25 gallons spray solution, but no less than 1 pint per acre) or non-ionic surfactant at 0.25% volume/volume (1 qt per 100 gallons)
- ◆ Apply in 10 to 40 gallons of water per acre
- ◆ Do not apply more than 64 oz/ac/ per season, make a minimum 14 day interval between applications, do not apply more than 32 oz/ac per application

**FUSILADE® DX** (Syngenta; 24.5% fluazifop-P-butyl, 2 lb per gallon fluazifop-P-butyl)

- ◆ Apply 16-24 fluid oz product per acre per application
- ◆ Use a lower dose for annual grasses, a higher dose for perennial grasses
- ◆ Add 1% crop oil concentrate (1 quart per 25 gal) or 0.25% nonionic surfactant (1 quart per 100 gal)
- ◆ Do not apply more than 72 fluid oz Fusilade DX per acre, per season

**ARROW® 2EC** (Makhteshim Agan of North America (MANA); 26.4% clethodim, 2.0 lbs clethodim per gallon, contains petroleum distillates)

- ◆ Apply 6 to 8 fluid oz product per acre for annual grasses and 8 to 16 oz/acre for perennial grasses
- ◆ Add crop oil concentrate which contains at least 15% emulsifier at 1% volume/volume (1 qt per 25 gallons spray solution, but no less than 1 pint per acre) or non-ionic surfactant at 0.25% volume/volume (1 qt per 100 gallons)

#### **WEED TOLERANCE TO SELECTED HERBICIDES**

<b>Herbicide</b>	<b>Weeds tolerant to the herbicide listed</b>
ARSENAL	sicklepod, tropic croton, blackberry, most legumes
AATREX	Bermudagrass, lespedezia, Johnsongrass, broomsedge, blackberry

ARROW 2EC, ENVOY Plus	All broadleaf weeds
FUSILADE DX	All broadleaf weeds
OUST	bermudagrass, croton, Johnsongrass, trumpetcreeper, broomsedge
VELPAR	bermudagrass, broomsedge, cocklebur, Johnsongrass, sicklepod, trumpetcreeper, morningglory

### GRASS WEED RESPONSE TO HERBICIDES

<b>WEED</b>	<b><sup>a</sup>Fluazifop-P-butyl</b>	<b><sup>b</sup>Clethodim</b>
<b>Perennial Grasses</b>		
bermudagrass	G - E	G - E
Bahiagrass	G	
Johnsongrass (rhizome)	E	E
tall fescue	F	
nutsedge	P	P
<b>Annual Grasses</b>		
broadleaf signalgrass	E	E
crowfootgrass	F	G
crabgrass	F	G
fall panicum	G	G
goosegrass	F - G	F - G
Johnsongrass (seedling)	G - E	E
sandbur	G	G - E
Texas panicum	G - E	G

E=Excellent (>90% control); G=Good(80-89% control); F=Fair(70-79% control); P=Poor(<70%). Citations: Guillebeau, P. (ed). 2005 & 2008. Georgia Pest Mgmt. Handbook. Special Bulletin 28. UGA Coop. Ext. Service. Athens, GA 30602. pp. 112, 156-57, 198-99. <sup>a</sup>Fluazifop-P-butyl rating based on Fusilade DX trials, <sup>b</sup>Clethodim ratings based on Select® and Arrow® trials.

Old-field non-scalped post-plant herbaceous weed control timing considerations for the Georgia Coastal Plain and Central to Northern Florida

Soil drainage class	Pre- to early post emergence herbicide	Early post to post emergence herbicide
Somewhat excessively to excessively well	March	March to early April
Moderately well to well	March to early April	mid-March to mid-April
Poorly to somewhat poorly	April to early May	mid-April to mid-May

\* Do not apply herbicides over longleaf for at least 2 months after planting and when there is 1 to 2 inches of new feeder root growth off 2 or more lateral roots and wait at least 1 to preferably 2 months after planting for slash pine.

\*\* For scalped sites, herbicides applied from mid-April into mid- to late May have given good survival and growth results based on recent studies as long as seedlings are not under stress (especially drought stress).

**Organization of GA (FL, AL, and SC in some cases) Coastal Plain Soil Series in Management Groups** (Larry Morris "Forest soils and management decisions" workshop 2005)

Subsoil Type:		None (Sandy to loamy sand)	Loamy	Clayey	Spodic		
Drainage	Surface Depth (inches)				+ Arg	- Arg.	
Very poorly		Rutledge	Torhunta Surrency	Bayboro		Murville Wesconnet	
Poorly to Somewhat Poorly	0-10	Chipley Osier Scranton	Rains Lynchburg	Bladen Coxville Grady	Rigdon	Ridgeland	
	10-20				Mascotte Sapelo	Leon Mandarin	
	20-40		Pelham	Nanhunta			
	40-80		Albany Plummer	Kanapaha		Hurricane Pottsburg	
Moderately Well to Well Drained	0-10	Resota Pactolus Ortega	Goldsboro Tifton Dothan	Faceville Nankin Greenville	Onslow		
	10-20				Seagate	Baymeade	
	20-40		Lucy Fuquay Stilson				Echaw
	40-80		Bonifay				
Somewhat to Excess. Well	40-80	Lakeland Kershaw	Troup			Rimini Kureb	

Citation: Dickens, E.D. D.J. Moorhead, and P. Minogue. 2013 (Revised). Herbaceous weed control for planted slash pine sites. [www.bugwood.org](http://www.bugwood.org) and [www.forestproductivity.net](http://www.forestproductivity.net) 8 p.

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# Ten Tips for Encouraging the Use of Your Pine Plantations by Game Species<sup>1</sup>

Holly K. Ober, Stanton Rosenthal, and William Sheftall<sup>2</sup>

Many forest landowners are interested in managing their property to achieve more than one objective. A common combination of objectives for Florida forest landowners is producing timber products while also providing habitat for wildlife that can be hunted. These two objectives are compatible, but some tradeoffs may be required because strategies that maximize timber production are not always the same as those that provide superior habitat for game species.

Before implementing any forest management activities, it is important to think through your objectives and decide which is the higher priority: wildlife or timber production? Individuals who prioritize wildlife over hunting may sacrifice some income that could have been attained through timber, but they may recoup this if they charge for hunting leases after they have improved the habitat for game species.

Habitat is a species-specific concept. What makes a particular area good habitat for one species may make it less useful for other species. Therefore, it is impossible to manage a single stand of trees to provide quality habitat for all wildlife species simultaneously. However, many of the popular game species in Florida have similar habitat needs, so it is possible to implement strategies that are likely to benefit several of the species you may want to attract across your entire acreage. Here we provide brief tips on how to

make pine plantations more suitable for game species, and list additional resources where further details can be found. Information on increasing the wildlife diversity in pine plantations is available in *Ten Tips for Increasing Wildlife Biodiversity in Your Pine Plantations* (<http://edis.ifas.ufl.edu/UW319>).



Figure 1. Pine plantations can provide habitat for game such as white-tailed deer.

Credits: Holly Ober, UF/IFAS

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U.S. Department of Agriculture, UF/IFAS Extension Service, University of Florida, IFAS, Florida A & M University Cooperative Extension Program, and Boards of County Commissioners Cooperating. Nick T. Place, dean for UF/IFAS Extension.

## Tip #1—Increase Spacing among Trees

Forest owners interested in maximizing growth rates of pines typically plant at high densities (often 726 trees per acre, or tpa). Stands planted at high densities allow little sunlight to reach the forest floor. This greatly limits the amount and variety of herbaceous plants (i.e., grasses, legumes, and forbs) that can grow within the stand. Because most game species rely on herbaceous plant growth on the forest floor for food (grazing, seed eating, bugging) or cover, dense tree spacing may prevent use of these stands by these animals.

Two modifications can increase the suitability of pine plantations for game species. First, pines can be planted initially at lower densities (350 to 500 tpa). Alternatively, pines can be planted at high densities and then thinned several times early in the life of the stand. The first thinning should occur when trees reach a merchantable size (usually around 15 years for pulpwood). Subsequent thinning can be planned every 5 to 10 years thereafter. Thinning according to this schedule will not only increase food availability and cover for game, but will also improve growing conditions for the remaining trees.

## Tip #2—Use Herbicides to Selectively Control the Hardwood Midstory

Pine stands with wide spacing can develop a dense midstory of hardwood shrubs and trees if these are left to grow. A dense midstory prevents sunlight from getting to the ground. It also creates competition between the pines, the hardwoods, and the non-woody plants that occur at the ground level. As mentioned in tip #1, the herbaceous plants that occur at the ground level provide an extremely important source of food for game species.

Herbicides can be used to selectively remove the midstory hardwood layer while not disturbing the desirable plants.

## Tip #3—Use Fire to Stimulate Non-Woody Groundcover and to Control Hardwoods

Natural fires were historically a common occurrence in Florida, and they alter forests in ways that benefit wildlife. Prescribed burning is a technique that can be used to

obtain the same benefits that would occur after a wildfire, but under more controlled conditions.

Fire increases habitat quality in pine stands for game species in several ways: it reduces the hardwood midstory, increases the quantity and diversity of herbaceous plants, and improves the quality of herbaceous plants as wildlife food. Younger herbaceous plants tend to be more palatable and more nutritious than older plants, so fire benefits wildlife by creating a flush of highly nutritious food plants. Also, fire increases seed, fruit, and flower production of many species, which results in a greater diversity and increased quantity of food for wildlife. Varying the time of year when burns are implemented and the return intervals between fires will favor different plants. See *Prescribed Burning Regulations in Florida* at <http://edis.ifas.ufl.edu/FR055>, for additional information on prescribed burning.

## Tip #4—Maximize the Amount of Edge Habitat

Game species thrive in areas where multiple habitat types meet. Most game species feed on herbaceous plants that are typically more abundant outside of planted pine stands than within, but they rely on the forest to provide cover from predators. Thus, by creating numerous small forest stands rather than a few large stands, a large amount of this transition area—called “edge habitat”—is created. Forest stands planted next to one another should be at least 8–10 years apart in age to maximize the difference in food and cover resources available from each.

Edges can be either “hard” or “soft”. Hard edges are abrupt transitions between habitats, whereas soft edges are more gradual transitions. Because abrupt habitat transitions are less beneficial to game species than more gradual transitions, efforts should be made to make hard edges softer. This could involve a gradual thinning of trees between a dense forest stand and a grassy area or the promotion of weedy and shrubby areas between grassy areas and forest stands.

## Tip #5—Maintain a Diversity of Food Sources

Certain hardwood trees and shrubs provide hard mast (nuts) and soft mast (fruit) that serve as important sources of food for game species. Hardwood drainages and bottomland forests are examples of areas where hardwoods naturally predominate, and where a variety of food sources are typically available to wildlife. These areas should not be

converted to pines, but should be allowed to stay as is so that a sequence of varying food resources becomes available throughout the year. If any hardwoods are harvested from these areas, care should be taken to retain those individual trees that consistently produce large crops of mast. See *Managing Oaks to Produce Food for Wildlife* at <http://edis.ifas.ufl.edu/UW293>, for additional information on managing oaks for wildlife.

## Tip #6—Create Travel Corridors

Most animals do not feel comfortable moving through exposed, treeless areas during the day, which can limit their ability to obtain food and find cover. Planting narrow lanes of trees to connect isolated stands of trees in open agricultural landscapes will increase animal movement among stands. Similarly, if trees and shrubs are allowed to grow along fence lines, these linear routes will be used more frequently as travel corridors than if all natural vegetation is regularly removed.

## Tip #7—Create and Maintain Permanent Forest Openings

As mentioned in tips #1 and 2, naturally occurring herbaceous plants are an important source of food for game species. Because the amount of groundcover that will grow within pine stands is limited, the areas next to pine stands can be managed to provide additional food resources. Roads, firebreaks, power line easements, and rights-of-way are areas that need to be maintained in fairly open conditions to serve their primary purpose, and can easily be managed in ways that increase food availability for wildlife.

Periodic disking, mowing, or prescribed burning will prevent growth of trees and shrubs while stimulating herbaceous plants as well as the seeds and insects associated with them that are food for young turkey and quail. Disturbing the soil at different times of year will stimulate different plants: October disking will promote heavy-seeded annuals, April disking will promote seed-producing grasses, and June disking will promote plants that attract insects. Disturbing different areas at different times of the year makes a variety of food available to wildlife.

## Tip #8—Use Logging Decks Strategically

Make decisions regarding the location of logging decks carefully. These areas can serve as permanent openings that provide food for wildlife. They should be positioned strategically—to intersperse food and cover into large

blocks of forests; to increase edge; to add contrasting habitat in areas where upland forest and drains converge; and to encourage aggregation in locations convenient for hunting and viewing and in places where the soil is conducive to grow the type of cover or forage desired.

You will reap the greatest benefits from logging decks that are properly maintained. It is wise to assess what you can do to your logging decks up-front to reduce your maintenance costs later on. Carefully consider soil conditions when siting your decks and invest in up-front weed control and liming if needed. Be sure to discuss with loggers how stumps will be removed and where debris will be piled for later burning. If you do not plan this out before the logging begins, a great deal of time and effort may be required to clear stumps and debris later.

## Tip #9—Create Food Plots

Poor soil fertility tends to produce natural vegetation which is low in nutritional quality. Most of Florida's soils are low in fertility compared to soils elsewhere in the United States, which is part of the reason Florida has relatively small-bodied deer relative to more northern states. Planting food plots with nonnative varieties known to be palatable to game species can be a good strategy to provide nutrients known to be limiting to wildlife, such as high protein foods during warmer months when animals are reproductively active, and carbohydrates during the cooler months. Food plots are also an option for aggregating game for viewing and hunting. It is important to keep in mind that Florida's low soil fertility makes it difficult to grow some forages that thrive in other regions of the country, so be sure to select forages appropriate for the soils in your area

A great deal of information is available on how, where, and when to plant food plots as well as which plants to include in a food plot. See *Establishment of Food Plots for White-Tailed Deer in Central and South Florida* at <http://edis.ifas.ufl.edu/UW262>; *A walk on the wild side: 2013 cool-season forage recommendations for wildlife food plots in North Florida* at <http://edis.ifas.ufl.edu/ag139>; and *Supplemental Feeding and Food Plots for Bobwhite Quail* at <http://edis.ifas.ufl.edu/UW264> for information tailored to specific species and regions of the state.

## Tip #10—Leave Some Brushy Areas

Although it is important to prevent hardwoods from forming a continuous, tall canopy under your pines across large acreages, leaving a few small, scattered areas of brushy



vegetation is a good idea. Turkey hens seek out areas with dense brush 2–3 feet high that provides overhead cover to conceal their nests from predators during nesting season (April through June). Although quail prefer warm-season bunch grasses 1–2 feet tall when nesting (May through August), small patches of low brushy vegetation in and around pine stands will provide escape cover and food resources. Disturbing such areas on a periodic basis (every 3 to 5 years) will stimulate early-successional mast-producing species such as blackberries and dewberries, while preventing the establishment of woody trees.

Institute of Food and Agricultural Sciences. <http://edis.ifas.ufl.edu/UW262>.

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# Establishment of Food Plots for White-Tailed Deer in Central and South Florida<sup>1</sup>

Emma. V. Willcox, Brandon J. Schad, William M. Giuliano, and James F. Selph<sup>2</sup>

The establishment of food plots has become a popular white-tailed deer management practice. Although food plots should never be viewed as a substitute for properly managed, natural deer habitat, when used in combination with other habitat management techniques their establishment on private and public lands has proven beneficial.

In Florida, poor soil fertility, cool winters, and frequent droughts can restrict plant growth, resulting in natural forages of low nutritional quality and causing seasonal fluctuations in the quantity of food available to deer. In well managed habitats, food plots and supplemental plantings can compensate for seasonal fluctuations in food availability and the poor nutritional quality of natural forages. This may help raise the carrying capacity of an area for deer and maintain or improve the nutritional status, productivity, and quality of a deer herd (Figure 1). In addition to improving deer health and condition, food plots can increase the chance of successful deer viewing or harvest. Deer often shift their center of activity to locations where food plots have been established, causing them to become concentrated in a particular area and increasing the chance they can be successfully observed and/or hunted. Finally, the establishment of food plots can show a landowner's commitment to deer management, potentially aiding in the marketing of hunting leases and other programs to prospective hunters.



Figure 1. Food plots and supplemental plantings can compensate for seasonal fluctuations in deer food availability and the poor nutritional quality of natural forages.

Credits: K.M. Gale, [www.forestryimages.org](http://www.forestryimages.org)

## Location, Size, Shape, and Distribution of Deer Food Plots

The location, size, shape, and distribution of deer food plots are important considerations, particularly if their effect is to be maximized.

### Location

The location of a food plot determines its size and growing conditions, as well as the likelihood it will be utilized by deer. Deer are unlikely to use food plots located a long

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distance from escape cover. Therefore, plots should be established near natural cover regularly frequented by deer. Other considerations when establishing a food plot should include its proximity to water and distance from areas of high human activity. If the primary purpose of the food plot is to attract deer for hunting, it may also be desirable to consider wind direction when deciding on location. Deer will often avoid plots upwind of escape cover. Lower elevation sites should also be avoided as flooding will make foods less available and inhibit establishment. Establishment costs are typically minimized if deer food plots are located in existing openings, e.g., natural meadows, abandoned or fallow fields, edges of interior roads, utility rights of way, and firelanes.

## Size

Food plots for deer are typically between 1 and 3 acres. Deer are an “edge species,” preferring to occupy the area where different habitats meet. These areas provide them with access to cover and food resources. As a result, they are usually reluctant to feed in the center of large plots during daylight hours, especially if they are subject to regular disturbance or hunting. Therefore, several small food plots are usually preferable to one large one.

## Shape

When considering the shape of a deer food plot, the objective should be to maximize the amount of edge. This is most easily achieved through the establishment of long narrow plots (Figure 2). These have considerably more edge than square or circular plots of similar size. Irregularly shaped food plots planted in natural openings also increase the amount of edge. However, in areas where a fence must be erected to prevent consumption and damage of deer forage by grazing livestock or feral hogs, a square plot may be preferable as such a design minimizes fencing costs. Fencing costs can also be reduced by designing food plots so that they utilize existing fences or gates, e.g., those often found separating native and improved pasture, on one or more sides. Square plots may also be more appropriate when the sole aim is to attract deer for hunting. A square plot concentrates deer in a smaller area than does a long narrow plot making them easier to harvest.

## Distribution

Depending on the availability and quality of native wildlife forages, deer food plots containing warm- and cool-season forages should comprise between 1 and 3 percent of the land area utilized by deer. This is equivalent to 1 to 3 acres

per 100 acres of deer habitat, with no less than one plot per 160 acres.



Figure 2. Long, narrow food plots are favored by deer as they maximize the amount of edge while minimizing the distance to escape cover.

Credits: E. V. Willcox

## What to Plant

To overcome seasonal fluctuations in the quantity and quality of deer food in Florida, it is necessary to plant both warm- and cool-season supplemental forages. These provide deer with a high quality food source year round.

Different plant species are adapted to different soil and growing conditions. Therefore, if planting deer forages for the first time, within each 1-3 acre plot start by planting 1/8 to 1/2 acre each of a wide variety of seeds and seed mixtures. This will allow for the determination of which plant species are most productive on a particular piece of land. Once productive species are determined for an area, combination plantings, i.e., mixtures of two or more species planted at the same time, should be used. Combination plantings provide a diverse food source for deer and, as different plant species grow at different rates and times, ensure new species are available to replace those that have matured. This lengthens the period of time over which food is available and, when both warm- and cool season forages are planted, ensures food is available to deer throughout the year. In addition, combination plantings provide a more diverse food source for wildlife and reduce the risk of losing entire food plots to poor weather, insect pests, or disease. There are many commercially available deer food plot seed mixes that may provide nutritious and preferred deer foods. However, the establishment of most such mixes under Central and South Florida soil and climatic conditions has not been evaluated. The following sections list the different warm- and cool-season legume and grass species readily consumed by deer that could potentially be grown in food plots in Central and South Florida. In addition, for each species recommended, it details the soil and growing



conditions needed for successful establishment, along with information on planting. Seeding rates listed below are for single species plantings. When planting multiple species together, adjust seeding rates proportionately. Care should be taken to ensure that, if planting legumes, they are properly inoculated with nitrogen-fixing bacteria prior to seeding. Inoculant varieties vary depending on the legume species being planted. Therefore, care should be taken sure to use the appropriate inoculant. For additional information on inoculation, see <http://edis.ifas.ufl.edu/ag140>.

## Highly Preferred Legumes

**Deer Vetch/*Aeschynomene***—*Aeschynomene americana*: Warm season annual; seeding rate: 5–8 lbs/acre of de-hulled seed or 20–25 lbs/acre of seed with hull; plant: ½–1½ inches deep prior to beginning of summer rains in April and May; pH: 5.0–6.0; new land requires inoculation (cowpea type); tolerates flooding.

**Alyceclover**—*Alysicarpus vaginalis*: Warm season annual; seeding rate: 15–20 lbs/acre; plant: ¼–½ inches deep from April 15 through June; pH: 6.0–7.0; new land requires inoculation; currently available varieties are susceptible to nematode damage.

**Cowpeas**—*Vigna sinensis/Vigna unguiculata*: Warm season annual; types: black eye peas, Crowder peas, cream peas, iron/clay peas; seeding rate: 60 lbs/acre; plant: ¼–½ inches deep from March through September; pH: 5.5–6.5; excessive nitrogen levels stimulate vine growth and prolong the period to harvest; new land requires inoculation (cowpea type).

**Soybeans**—*Glycine max*: Warm season annual; recommended varieties: Donegal and Hinson Long Juvenile; seeding rate: 35–100 lbs/acre; plant: ½–1 inches deep from March through June; pH: 5.8–6.5; new land requires inoculation (soybean type); Hinson Long Juvenile: soybean released by UF has resistance to the southern root-knot nematode and pod and stem blight.

**Vetch**—*Vicia spp.*: Cool season annual; recommended varieties: Americus, Cahaba White, Hairy, and AU-Early Cover; seeding rate: 20–30 lbs/acre; plant: 0–½ inch deep from September 15 through November 15; pH: 5.5–7.0; requires inoculation (pea and vetch type) grows best on well-drained, fertile, loamy soils; has a spreading, viney growth habit; reseeds itself fairly well.

**Austrian Winter Pea**—*Lathyrus hirsutus*: Cool season annual; seeding rate: 50 lbs/acre; plant: ½ inch deep from

September through October; pH: 6.0–7.5; requires inoculation (pea and vetch type).

**Rhizoma Peanut**—*Arachis glabrata*: Warm season perennial; recommended varieties: Florigraze and Arbrook; seeding rate: 80 bushels (rhizomes)/acre; plant: 1½–2 inches deep during February; pH: 5.0–7.5; requires inoculation (cowpea type); adapted to the well-drained soils.

**Alfalfa**—*Medicago sativa*: Cool season perennial, but will often act as an annual in Central and South Florida; recommended variety: Florida 99; seeding rate: 18–22 lbs/acre; plant: ¼–½ inches deep from October 15 through November 15 in Central and South Florida; pH: 6.0–6.5; requires inoculation (alfalfa type); does best on high clay soils and does not tolerate wet soil conditions.

**Red Clover**—*Trifolium pretense*: Cool season perennial, but may not perenniate in Florida; recommended varieties: Cherokee, Southern Belle, Kenland, and Redland III; seeding rate: 8–10 lbs/acre under good conditions, but 12–15 lbs/acre under less favorable conditions; plant: ¼–½ inches deep during October and November; pH: 6.0–7.0; requires inoculation (clover type); some varieties tolerate nematodes.

**White Clover**—*Trifolium repens*: Cool season perennial; recommended varieties: Osceola and Louisiana S-1; seeding rate: 3–4 lbs/acre; plant: 0–¼ inches deep between October 1 and November 15, when soil moisture is adequate for germination; pH: 6.0–7.0; requires inoculation (clover type); susceptible to nematode damage; to allow for natural re-seeding, rest during bloom period and disturb soil in fall.

## Moderately Preferred Legumes

**Partridge Pea**—*Cassia fasciculata*: Warm season annual; seeding rate: 10–15 lbs/acre (scarified seed); plant: ½ inch deep (may be broadcast) in warm, moist soil between early March and early June; pH: wide range and tolerant of acidic soils; requires inoculation (cowpea type); will grow on a wide range of soils, however, moist, sandy soils are best.

## Highly Preferred Grasses

**Oats**—*Avena spp.*: Cool season annual; recommended varieties: Horizon 314, Horizon 474, Horizon 321, Plot Spike LA 9339, and LA604; seeding rate: 96–128 lbs (3–4 bushels)/acre; plant: 1–2 inches deep during October in Central Florida and November in South Florida; pH: 6.0; does not tolerate wet conditions; Horizon 474, Horizon 321, and Plot Spike LA 9339 are relatively new varieties that have



improved crown rust resistance, winter hardiness, and good grain and forage production in Central and South Florida.

**Rye—*Secale cereale*:** Cool season annual; recommended varieties: Wrens 96, Florida 402, Wrens Abruzzi, Bates, Elbon, Bonel, Oklon, Maton, Pennington Wintergraze 70, Early Graze, Wintermore, and AGS 104; seeding rate: 84–112 lbs (1.5–2.0 bushels)/acre; plant: ½ inch deep during October in Central Florida and November in South Florida; pH: 6.0; drought but not wet tolerant.

**Wheat—*Triticum aestivum*:** Cool season annual; recommended varieties: AGS 2000, Pioneer 26R61, Pioneer 2684, Coker 9835, Roberts, GA-Gore, GA-Dozier; AGS 2000, and Pioneer 26R61 (only Hessian fly-resistant varieties should be used); seeding rate: 90–120 lbs (1.5–2 bushels)/acre; plant: 1–2 inches deep during October in Central Florida and November in South Florida; pH: 6.0.

## Moderately Preferred Grasses

**Japanese Millet—*Echinochola crusgalli*:** Warm season annual; seeding rate: 24–30 lbs/acre; plant: ½–1 inch deep between February 15 and August 15; pH: 6.0; tolerates moderately wet conditions.

**Ryegrass—*Echinochloa crus-galli* var. *frumentacea*:** Cool season annual; recommended varieties: Jumbo, Jackson, Gulf, Attain, and Beefbuilder III; seeding rate: 20–30 lbs/acre; plant: 0–½ inch deep during October in Central Florida and November in South Florida; pH: 6.0; tolerates moderately wet conditions.

## Forages with Questionable Growth in Central and South Florida or of Unknown Value as Deer Feed

**Aeschynomene—*Aeschynomene evenia***

**Buckwheat—*Fagopyrum esculentum***

**Chicory—*Cichorium* spp.**

**Chufas—*Cyperus esculentus* (Ocala North)**

**Crimson Clover—*Trifolium incarnatum* (Pasco County North)**

**Carpon Desmodium—*Desmodium heterocarpon***

**Leucaena—*Leucaena* spp.**

**Lespedeza—*Lespedeza* spp. (*Bicolor lespedeza* may become invasive)**

**Maku Lotus—*Lotus pedunculatus***

**Savanna Stylo—*Stylosanthes guianensis***

## Planting

Proper site preparation is crucial for successful food plot establishment. Inadequate site preparation can lead to crop failure. Ideally, seedbed preparation should begin several months prior to food plot establishment to provide sufficient time for fertilization and/or liming, to be conducted and have an effect. The most appropriate method for seedbed preparation depends on a number of factors such as the forage planted, condition of the planting site, and equipment available. However, with any preparation method employed, the ultimate aim should be to provide a moist, firm, level, weed-free seedbed.

Tilling is the practice most commonly used in food-plot seedbed preparation. Tilling methods involve the plowing, turning, or loosening of the soil prior to seed sowing (Figure 3), with the objective of removing all vegetation and providing a bare soil surface for planting. Seeds are then broadcast over the area or planted with a seed drill, usually followed by cultipacking or rolling. As all competing vegetation is removed, crops are usually most productive if soil is fully tilled prior to planting. In addition, as tilling incorporates organic plant material in to the ground, the process can improve the nutrient status and water holding capacity of the soil for future crops. Nevertheless, this method of land preparation requires considerable labor and mechanized equipment, and establishment costs can be considerable. In addition, cool- and warm-season forages must usually be grown in separate plots to permit tilling prior to each planting. As a result, twice the land area must exist for food plot establishment. If both are to be planted in the same food plot, warm-season plantings must be plowed under in preparation for cool-season forage plantings and vice versa. However, this does not provide an even forage supply and deer are left without a supplemental food source until new crops grow. Unfortunately, tilling also removes native weeds, some of which may be as nutritious to deer as the forage crop being planted, increases the risk of seed loss to drying, leaves soil prone to erosion, and removes habitat important to other game and non-game wildlife species.

Overseeding provides an alternative to tillage. This method can be used when there is a desire to maintain perennial pasture grasses or to leave some native vegetation standing.

Typically, when overseeding, the area to be planted is first lightly disked or chopped. This causes disturbance to the soil surface and can provide a suitable seedbed for some larger seeded species. After disking, seeds are broadcast over the plot area or planted using a seed drill. If seed is to be drill planted, simply mowing the area prior to planting may also be appropriate



Figure 3. A disk can be used to prepare the seedbed of a food plot for planting.

Credits: E. V. Willcox

Overseeding reduces the risk of soil erosion and seeds drying out prior to germination, as well as helping to maintain wildlife habitat in the area while food plot crops are initially growing. In addition, it is easier to grow both warm- and cool-season forages on the same site using this practice. As one season nears an end, the food plot can be lightly re-disked and seeds of the new seasons crop broadcast or planted. This leaves some of the previous seasons forage standing while new plants germinate, providing deer with a continuous food supply. However, certain methods of overseeding require specialized equipment, e.g., cultipacker, pasture drill, or no-till drill. In addition, native vegetation and perennial pasture grasses often compete for resources with germinating seedlings resulting in lower crop production than on fully tilled sites. To help overcome this, the seeds planted should be of a competitive species or variety. This is especially important during the warm-season when application of fertilizer enhances the growth of perennial grasses and native vegetation. Planting seeds before already established vegetation gains enough height to crowd out new seedlings, can aid in food plot establishment, as can mowing or bush hogging tall grass and weeds. The use of a mower or bush hog may also be needed if crops planted in the previous season limit the germination of new plantings.

Whether tilling or overseeding a food plot, it is essential the area be leveled and firmed before and/or after seeds are planted. A cultipacker or roller is often most useful for leveling and firming the seedbed prior to and/or after planting (Figure 4). However, if neither of these are available, dragging a weighted board or section of chain-link fence over the area serves as a good alternative. A firm seedbed ensures good soil-seed contact and enhances water movement to the seed while leveling helps maintain a consistent planting depth. This is especially important for many of the small-seeded legumes, e.g., white clover, which can fail to successfully germinate if planted too deep. Site leveling is also important for water management as it helps avoid the formation of standing water in low areas. This can be important in areas of South Florida prone to seasonal flooding.



Figure 4. A cultipacker or roller can be used to level and firm the seedbed of a food plot before and after planting.

Credits: E. V. Willcox

## Fertilization and Liming

Very few sites in Florida naturally contain appropriate amounts of nutrients to permit the successful establishment and growth of forage species typically planted in deer food plots. Deficiencies in nitrogen, phosphorus, and potassium are most common. However, several other nutrients essential for plant growth but required in smaller amounts can also limit plant growth, e.g., calcium, magnesium, and sulphur. Soil testing is the best way to determine which soil nutrients are deficient and may potentially limit plant production. By conducting soil tests on food plot sites, the appropriate type and quantity of fertilizer can be added to the site and plant growth and performance enhanced.

In Florida, many food plots are also unlikely to have a pH suitable for growth of deer forage species. Liming raises soil pH to a level that permits or improves plant growth and

performance, which is particularly for legumes. Again, soil tests are essential to determine the pH of food plot soils and the amount of lime that should be applied.

It should be emphasized that periodic soil testing, followed by liming and fertilization according to soil test recommendations, is very important if food plots are to be productive. The first of these soil tests should ideally be conducted 4 to 6 months prior to the food plot being planted. This will allow appropriate quantities of fertilizer and lime to be added during site preparation. If food plots are being tilled prior to planting, fertilizer and lime should be broadcast and disked into the soil as the seedbed is being prepared. If a no-till system is used, fertilizer and lime will be broadcast but not mechanically incorporated into the soil. Soil tests should be repeated at least every 3 years to ensure additional fertilizer or lime application is not necessary.

**The UF/IFAS Extension Soil Testing Laboratory can supply information on how to take soil samples. For a nominal charge, they also conduct soil tests for landowners and provide fertilization and liming recommendations. For more information, visit their website at <http://soilslab.ifas.ufl.edu>.**

## Food Plot Economics

Generally, it is cheaper to establish food plots in existing openings, e.g., natural meadows, abandoned or fallow fields, edges of interior roads, utility rights of way, and fire lanes, than in wooded areas. Clearing an area of trees can significantly increase site preparation costs.

Table 1 provides an estimate of the establishment costs for a one acre deer food plot. If land must be cleared of trees prior to site preparation, an additional \$200–400 per acre should be added to this estimate. Seed costs have not been included as they will vary considerably depending on the seed combination or variety selected and the seeding rate. However, you should expect to spend between \$30–100 per acre on seeds. Therefore, depending on the condition of the site where the food plot is to be located, the amount of land preparation needed, and the seeds planted, you should budget between \$287 and \$357 per acre plus the cost of seed for food plot establishment. There will be an additional cost associated with those plots that need to be fenced to prevent grazing and damage by livestock and feral hogs.

There will be annual maintenance costs associated with established food plots. It will usually be necessary to conduct a soil analyses and fertilize and lime according

to soil test results. As many deer forages are annuals, you should be prepared to renovate and reseed food plots on a yearly basis. Although many annuals will re-seed naturally, the artificial application of some seed is usually necessary.

**Table 1. Estimated establishment costs for a 1-acre deer food plot where tree removal is not required.**

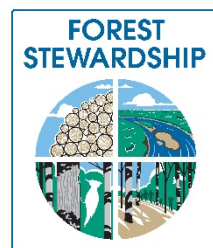
Activity	Unit	Cost/Unit (\$)
Soil analyses	Plot	7.00
Fertilizer	Acre	50.00
Liming	Acre	75.00
Plowing	Acre	45.00
Disking	Acre	44.00
Mowing	Acre	19.00
Seeding	Acre	17.00
<b>Total</b>	Acre	257.00



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