



Price Tree Farm Tour

Price Farms, LLC
Santa Rosa County, Florida

Date: October 25, 2018

2224 Ten Mile Road, Pace, FL

Registration begins at 8:30 am Central Time

Adjourn at 1:15 pm (lunch provided)

Join us at Price Farms as we tour the property, stopping along the way to discuss various aspects of forest management and wildlife habitat enhancement. Topics featured include thinning, prescribed burning, gopher tortoises, cogongrass treatment, cost-share programs, pine beetles, roads/erosion, creek crossing and BMPs, and food plots. Following the tour, representatives will have information on display and lunch will be provided.

This is a great opportunity to connect with the local professionals and resources that are available to assist in your land management. Most of the tour will involve riding in covered trolleys or vans, with several discussion stops and two walks. Please wear appropriate clothing and footwear and you may want to bring rain gear in case of wet weather.



Funding for this event is provided by the USDA Forest Service via the Florida Department of Agriculture and Consumer Service's Florida Forest Service, the Florida Sustainable Forestry Initiative Implementation Committee, American Forest Foundation, Florida Tree Farm Program, and the National Wild Turkey Federation.




Price Farms, LLC 2018 Property Tour Map 1,289 ac.

Santa Rosa County, FL
N 30.705, W -87.223



Legend

 Property Line - 1,289 ac.

Prepared by: Ashlee White
Florida Forest Service
Date: 8/10/2018

Sources: ArcGIS Online / ESRI Basemaps
NAD83 HARN FL GDL Aibers



0  3,300 Feet

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

DISCLAIMER

This map is the product of the Florida Forest Service. No warranties are provided for the data therein, its use, or its interpretation.



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<p>We appreciate the support of our Event Sponsors and Florida Tree Farm Program Donors -listed on the back cover-</p>		

Tree Farm Tour at Price Farms

October 25, 2018

Agenda

- 8:30 – 9:00 Registration and Meet ‘n Greet
- 9:00 – 9:15 Welcome and a Few Words from Mr. Price and His Consultant, Sonny Greene
- 9:15 Tour Begins:
- Stop 1 – Thinning and Logging Differences
Sonny Greene, Timber Creek Services, LLC
 - Stop 2 – Prescribed Burn Rotations and Stand Differences
Maria Wilson, Florida Forest Service
 - Stop 3 – Inactive and Active Gopher Tortoise Burrows
Don Buchanan, Florida Fish and Wildlife Conservation Commission
 - Stop 4 – Cogongrass and Cost-Share Programs
John Atkins, UF IFAS Santa Rosa County Extension
Trent Mathews, Natural Resources Conservation Service
 - Stop 5 – Prescribed Burn Hot Spot and Beetles
Ashlee White, Florida Forest Service
 - Stop 6 –
 - Walk 1: Road Restoration/Erosion and Longleaf
 - Walk 2: Creek Crossing and Best Management PracticesSonny Greene, Timber Creek Services, LLC
 - Stop 7 – Food Plot and Planter Demonstration
Don Buchanan, Florida Fish and Wildlife Conservation Commission
Sean Davis, Price Farms Management Crew
- 12:00 – 12:45 Arrive Back at Barn and Enjoy Lunch!
- 12:45 – 1:15 Peruse Booths and Q & A

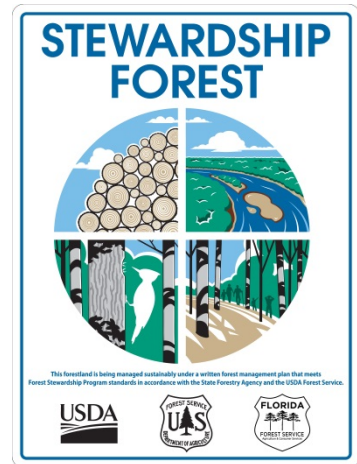
Tour Resource Contacts

<p>John Doyle Atkins Extension Agent UF/IFAS Santa Rosa Extension PO Box 37 5259 Booker Lane Jay FL 32565 (850) 675-6654 srcextag@ufl.edu</p>	<p>Phillip Eubanks Quality Deer Management Association 3691 Eubanks Road Walnut Hill, FL 32568 (850) 418-5615 philip.eubanks56@gmail.com</p>	<p>Maria Wilson Okaloosa County Forester Florida Forest Service 7050 N Hwy 189 Baker, FL 32531 (850) 689-7838 Maria.Wilson@freshfromflorida.com</p>
<p>Don Buchanan Landowner Assistance Biologist Florida Fish and Wildlife Conservation Commission 938 N Ferdon Blvd Crestview, FL 32536 (850) 682-3714 x. 122 Don.Buchanan@MyFWC.com</p>	<p>Sonny Greene Timber Creek Services, LLC 850-982-3620 2021 Eventide Road Milton, FL 32583 sonnygreene7@gmail.com</p>	<p>E. Jack Williams International Paper PO Box 87 375 Muscogee Rd. Cantonment, FL 32533 Cell: 251-454-1069 Fax: 901.334.3725 Jack.Williams@ipaper.com</p>
<p>Chris Demers Extension Program Manager UF/IFAS School of Forest Resources and Conservation PO Box 110410 Gainesville, FL 32611 (352) 846-2375 cdemers@ufl.edu</p>	<p>Trent Matthews District Conservationist USDA Natural Resources Conservation Service 3927 Hwy 4, Ste 102 Jay, FL 32565 (850) 623-3229 Trent.Matthews@fl.usda.gov</p>	<p>Scott Williams National Wild Turkey Federation 850-381-0105 swilliams@nwtf.net</p>
	<p>Ashlee White Santa Rosa County Forester Florida Forest Service 6095 Old Bagdad Highway Milton, FL 32583 (850) 626-3028 Ashlee.White@FreshFromFlorida.com</p>	

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 the degradation and sedimentation that can sometimes occur because of erosion during and immediately following recent 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 through reference of regulatory statute or rule.

SILVICULTURE BMP COURTESY CHECKS

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

SILVICULTURE BMP SITE ASSESSMENTS

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

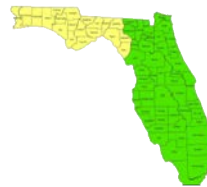
SILVICULTURE BMP NOTICE OF INTENT

The Silviculture BMP Notice of Intent (Rule 5I-6 F.A.C.) is a voluntary one-time pledge that a landowner signs to indicate his or her intention to follow 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* with state water quality standards during future bonafide ongoing forestry operations. This is very important if the 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**.

Panhandle Area
(850) 681-5942



Robin Holland
Peninsula Area
Robin.Holland@FreshFromFlorida.com
(352) 732-1781



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



Forestry Wildlife Best Management Practices



- 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

Panhandle Area
(850) 681-5942



Robin Holland
Peninsula Area
(352) 732-1781

Robin.Holland@FreshFromFlorida.com



Got Invasives?

Invasive exotic plant problem? Find a program to help by using 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 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 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 help you?

FISP has created a searchable database, the [Florida landowner incentives database](http://FloridaInvasives.org), accessible at 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 will help provide focus to your search so that you can get the right person at the right program.

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 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!

Thinning Southern Pines

Many landowners plant pines with the intention of harvesting them at some point in the future. When pulpwood markets are favorable, a complete stand harvest within 15 to 20 years is possible and may bring an acceptable return. However, longer rotations can bring higher financial returns on larger diameter trees if landowners are willing to begin thinning their pine stands when trees are 10 to 15 years old. Pine sawtimber, poles, and/or plylogs are most often the forest products with the highest value and, if economic returns are a priority, the most desirable products to come out of a timber stand. Thinning is a partial tree harvest in an immature stand to maintain or accelerate diameter growth of the remaining trees. If it is done properly, thinning can bring substantially higher revenues when trees are harvested at 25 to 40 or more years of age. Trees will respond to thinning best if they are thinned before 16 or 17 years of age.

The increased diameter growth after thinning results from the greater availability of light, water, and nutrients to the remaining trees. Ideally, the best and biggest trees should be retained to assure the most rapid increase in timber value. For best results, thinning should favor the tallest, best-formed trees over those that are overtopped, crooked, forked, diseased or otherwise undesirable. Timberland owners who wish to harvest high-value sawtimber-, plylog-, or pole-sized products at the end of the rotation should consider thinning a necessity.

For the landowner, thinning can bring

1. increased return on investment from the sale of higher-value forest products;
2. periodic income from the multiple harvests that lead to those higher-value forest products;
3. improved access for equipment, people, and wildlife;
4. a healthy, vigorous forest with less risk of insect infestation, destructive fire, and wind damage; and
5. enhanced wildlife habitat with increased herbaceous ground cover

More on thinning: <http://edis.ifas.ufl.edu/fr159>

Biology and Control of Cogongrass (*Imperata cylindrica*) in Southern Forests¹

Patrick J. Minogue, Brent V. Brodbeck, and James H. Miller²

Cogongrass Biology

Cogongrass (*Imperata cylindrica* (L.) Beauv.) is a warm-season perennial grass species found throughout tropical and sub-tropical regions of the world (Hubbard 1944). Native to Southeast Asia, cogongrass is an aggressive invasive plant that has spread to all continents except Antarctica (MacDonald 2004) and is considered among the worst problematic weeds on a global scale (Holm et al. 1977). In the United States, it is naturalized in Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Texas, and Oregon (USDA Plants 2017). It was first accidentally introduced in the United States near Mobile Alabama in 1912 (Tabor 1949 and 1952, Dickens 1974) and subsequently intentionally introduced from the Philippines into Mississippi as a forage crop in 1921 (Tabor 1949 and 1952, Patterson et al. 1979, Tanner and Werner 1986). Plants from Mississippi were replanted in Florida for forage and soil stabilization in the 1930s (Tabor 1949, Hall 1983, USDA NISIC 2017), though its high silica and low protein content made cogongrass an inadequate forage crop (Coile and Shilling 1993, Garrity et al. 1993). These early regional introductions contributed to the establishment of cogongrass in the Southeast. Points of introduction, including forage trials, are often areas where cogongrass remains most well established (Willard et al. 1990). Cogongrass is regulated as a federal noxious weed (USDA Plants 2017).

Control of cogongrass is difficult because it spreads in two ways: by extensive rhizome systems and by seeds (Holm et al. 1977, Brook 1989). Cogongrass rhizomes can comprise more than 60% of the total plant biomass. The rhizomes support rapid re-growth following mowing or burning (Sajise 1976). The fibrous root system grows from nodes on branched rhizomes that form a dense mat able to exclude most other vegetation (Ayeni 1985), and may contribute to rapid re-growth following cutting, disking, or burning (Sajise 1976, Ramsey et al. 2003). Rhizomes are tough and white and are covered with light brown colored cataphylls (scale leaves), which form a protective sheath. They have short internodes and sharp root caps (Ayeni 1985). The aboveground plant has no stems, although individual leaves may reach nearly 5 feet in length (Holm et al. 1977, Bryson and Carter 1993). Leaves exhibit a distinct lime green color and are slender, flat, and linear-lanceolate with serrated leaf margins and a prominent, typically off-center white mid-rib (Hubbard 1944, Holm et al. 1977).

The importance of seeds in the spread of cogongrass in the southeastern United States is less clearly established than the importance of roots (Dozier et al. 1998, Willard et al. 1990, MacDonald 2007, Ludovic et al. 2008). Cogongrass produces prolific seeds (c 3,000 per plant) from compacted, cylindrical, shortly branched, spike-like, fluffy, white plumes 4 to 8 inches long. Seeds can travel long distances

1. This document is FR342, one of a series of the School of Forest Resources and Conservation, UF/IFAS Extension. Original publication date March 2018. Visit the EDIS website at <http://edis.ifas.ufl.edu>.
2. Patrick J. Minogue, associate professor; Brent Brodbeck, senior biological scientist, School of Forest Resources and Conservation, UF/IFAS North Florida Research and Education Center; and James H. Miller, emeritus scientist, USDA Forest Service, George Andrews Laboratory; UF/IFAS Extension, Gainesville, FL 32611.

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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.

(Hubbard 1944, McDonald et al. 1996), but generally seed movement averages 16 ft (Holm et al. 1977, McDonald et al. 1996). Although seeds are potentially highly germinable (more than 90% of the seeds will sprout), low spikelet fill often results in much lower germination rates (Schilling et al. 1997, Dozier et al. 1998, Burnell et al. 2003). There may be regional differences in seed viability. Viable seeds have been reported in Florida, Mississippi, and Alabama, but large areas of cogongrass infestation in central Florida do not produce fertile seed (MacDonald 2007). Cogongrass is an obligate outcrossing species; therefore, populations arising from rhizomes persist vegetatively until they grow in close proximity to genetically different populations and produce viable seed (McDonald et al. 1996, Dozier et al. 1998, MacDonald 2007). Seeds have no dormancy, and seed viability declines rapidly, with a complete loss in viability after one year (Schilling et al. 1997, Dozier et al. 1998). Patterns of molecular analyses of stands of cogongrass in different locals suggests that successful long-range dispersal may be due to human activity rather than typical wind dispersal of seeds (Ludovic et al. 2008).

Control of Cogongrass

Although cogongrass has many natural pests, including more than 80 pathogens, 90 insects, and several nematodes and mites reported worldwide (Van Loan et al. 2002), in biological control studies insects and fungi have been shown to be generally ineffective (Ivens 1980, Brook 1989, MacDonald 2007). Recently, surveys in Asia and East Africa for potential biological control agents, identified several insect herbivores, including several genera of stem borers and gall-forming midges, that show some promise. Based on life histories and field collection data, it appears these genera may have restricted host ranges (Overholt et al. 2016).

Establishment of competing vegetation has been more successful in controlling the spread of cogongrass. Bahiagrass (*Paspalum notatum* Fluegge) sod cover has been effective in managing cogongrass infestations in the southeastern United States (Shilling et al. 1997, Willard and Shilling 1990). Common hulled bermudagrass (*Cynodou doctylon* (L.) Pers.) and hairy indigo (*Idigofera hirsuta* Harvey) have also inhibited cogongrass establishment (Gaffney 1996), but bahiagrass, bermudagrass, and hairy indigo are non-native and are also potentially invasive in forests and natural areas. In Indonesia, establishment of forests with understory cover crops has been effective in suppressing, but not eradicating, cogongrass (Macdicken et al. 1997). Deep shade has been shown to reduce cogongrass establishment (Otsama et al.

1995, Ramsey et al. 2003); fast-growing legumes such as velvetbean have been used successfully in other countries (Chikoye et al. 2002).

Mechanical control alone has been shown to be ineffective once cogongrass is established. Burning of cogongrass produces unusually hot fires because of the fuel characteristics of the aboveground biomass. The sandhills of the southeastern United States support a pyrogenic pine savanna ecosystem sustained by relatively frequent low-intensity fires fueled by native grasses and pine needle-fall. Lippincott (2000) found that cogongrass invasions into this ecosystem significantly increase fine fuel loads, resulting in fires that are more horizontally contiguous and have greater fire heights and higher maximum temperatures. These cogongrass-fueled fires kill juvenile longleaf pine (*Pinus palustris* Mill.). The cogongrass rhizome system is able to persist following fire, whereas many other types of vegetation do not (Eussen and Wirjahardja 1973; Seavoy 1975). Cogongrass patches have been shown to be more numerous and larger in recently burned plots (Holzmueller and Jose 2012). Mowing can temporarily inhibit and remove cogongrass biomass above the ground, but mowing does not suppress cogongrass long-term (Willard et al. 1996). Repeated disking and deep plowing have been shown to be effective in suppressing or eradicating cogongrass in intensive agricultural settings, but these practices are impractical in many habitats such as forests or natural plant communities (MacDonald 2004).

In forests, the only effective method for suppression or elimination of existing patches of cogongrass is chemical control. A body of research in the southeastern United States has identified glyphosate, imazapyr, and combinations of these herbicides as effective in managing cogongrass, although complete control is achieved only with repeated applications (Willard et al. 1996 and 1997, Shilling et al. 1997, Dozier et al. 1998, Johnson 1999, Ramsey et al. 2003). Both glyphosate and imazapyr are readily absorbed and translocated to rhizomes (Townson and Butler 1990). Used alone, imazapyr is more effective than glyphosate (Willard et al. 1996, Dozier et al. 1998, Ramsey et al. 2003), but imazapyr is a broad-spectrum, persistent, soil-active herbicide that often causes damage to non-target vegetation, particularly hardwood trees and shrubs. Cogongrass control is most effective at the higher labeled rates of glyphosate or imazapyr, and the most effective time of application is in late summer or fall (Shilling et al. 1997, Willard et al. 1997, Ramsey et al. 2003). Combinations of glyphosate and imazapyr in various proportions were equally effective as the highest rate tested for these

herbicides used alone (Willard et al. 1997). Additions of surfactants and the adjuvant methylated seed oil (MSO) also increase efficacy of chemical control (Ramsey et al. 2012). Mechanical techniques (such as tillage) or burning about six weeks before herbicide application may also enhance suppression by glyphosate and imazapyr (Willard et al. 1996, Ramsey et al. 2003, Enloe et al. 2013). Aulakh et al. (2014) reported progress toward complete eradication of patches of cogongrass using mixtures of glyphosate and imazapyr, but only after multiple applications over a 3-year period. However, most studies result in suppression rather than eradication, suggesting the need for examination of multiple applications and/or higher rates of glyphosate and imazapyr.

Recommendations

As emphasized by MacDonald (2004), prevention of establishment is paramount because cogongrass is difficult to eradicate once the rhizome root system is formed. Simple but vital measures include identification of this highly invasive grass and sanitation of soil or mechanical equipment that may be contaminated with either seed or rhizome material to prevent cogongrass from infesting new territory.

Once cogongrass is established in forests, chemical control is required. Glyphosate, imazapyr, and combinations of the two herbicides are most effective, but eradication requires multiple applications. In many instances, selective control of cogongrass without damage to desired vegetation is not possible, but where the canopy of shrubs and trees is above that of cogongrass, glyphosate sprays may be directed to cogongrass in the understory with fair selectivity to the taller vegetation. Imazapyr, however, used in the quantities and at the application frequencies necessary to eradicate cogongrass, will kill hardwood trees and shrubs.

Cogongrass Management in Mixed Pine-Hardwood Forests

To avoid injury to hardwood trees or shrubs in mixed pine-hardwood stands, glyphosate alone is commonly used at 3 to 4 lb ai/acre (3 to 4 quarts per acre for many common 4 lb ai/gallon product formulations), and selectivity is obtained by spraying cogongrass in the understory and avoiding any spray contact near the crowns of trees and shrubs. Typically, cogongrass excludes other ground cover plants, but herbaceous plants growing at the same height as cogongrass will be sacrificed when sprayed. Cogongrass infestations start as a small patch, and this is the best time to begin eradication. For patches, a “spot treatment” using 4% percent

glyphosate product (a product formulation containing 4 lb ai glyphosate per gallon) in water is commonly used. Rates of ai applied per acre will increase as spray volumes used increase. Selectivity is obtained by not spraying the foliage of desirable plants. Glyphosate is strongly absorbed by the soil, so uptake through root systems is not a concern.

Glyphosate products contain varying amounts of surfactants, which improve herbicide uptake by the foliage of treated plants. The addition of 1% methylated seed oil (MSO) to the spray solution is recommended to slow drying time on the leaf surface and further improve herbicide uptake by cogongrass foliage (Ramsey et al. 2012). The best time to apply glyphosate depends on location. It is best to make applications before cogongrass begins to go into dormancy. For infestations along the Gulf Coast, late summer (September) is the best time, but later applications may be more effective in the Florida peninsula.

Retreat after a year, or after two years, to control regrowth in persistent patches. Established cogongrass stands may require additional applications but can be eradicated with persistence (Aulakh et al. 2014). Following cogongrass eradication, revegetation with other competitive grasses or groundcover and fast-growing, shade-producing shrubs and trees may reduce the likelihood of cogongrass becoming re-established.

Cogongrass Management in Pine Forests

Because southern pines are tolerant to imazapyr, this herbicide may be used alone or in combination with glyphosate to control cogongrass selectively in pine forests. We conducted field research in pine plantations to examine herbicide rate response over a wide range for both glyphosate and imazapyr (Minogue et al. 2012). We tested 1.5 to 12 lb ai/acre glyphosate and 0.25 to 2.0 lb ae/acre imazapyr, using higher rates than had been used in previous research. We also examined the efficacy of a common combination of 3.0 lb ai/acre glyphosate and 0.5 lb ae/acre imazapyr with varying application volumes from 10 to 40 gal/acre. All treatments included 0.5% non-ionic surfactant. To refine previous research, we examined two late growing season application timings, when herbicide treatments have been shown to be most effective (mid-September versus mid-October). Lastly, effects of retreatment one year after the initial treatment were quantified. The study was duplicated in southwest Alabama at a location where cogongrass had been present for over twenty years in a planted slash pine forest and at a new infestation in a two-year-old loblolly pine plantation. Both sites had similar, near-complete

cogongrass cover (96–100%) at the initiation of the experiments. The sites were chosen because they were within 40 miles of the site where cogongrass was first introduced in the United States, and this area still contains some of the most abundant infestations of cogongrass in the Southeast.

Our research in these pine stands showed that, for both glyphosate and imazapyr, control of cogongrass increased linearly with increasing herbicide rate (Figure 1). In general, a single application of the highest rate of each herbicide, far above labeled rates, resulted in only 53 to 89% control, and, with retreatment, control ranged from 77 to 89% after two years, indicating the need for additional treatment to attain eradication. Retreatment improved control with glyphosate at both the new and old infestations. Retreatment with imazapyr improved control at the new infestation, but at the old infestation, differences in control following retreatment diminished with increasing imazapyr rate. Whereas cogongrass control improved with increasing herbicide rate, increasing application volume from 10 to 40 gallons per acre for the glyphosate plus imazapyr combination treatment did not improve control. When averaged over all treatments, efficacy was greater when treatments were applied in September compared to October.

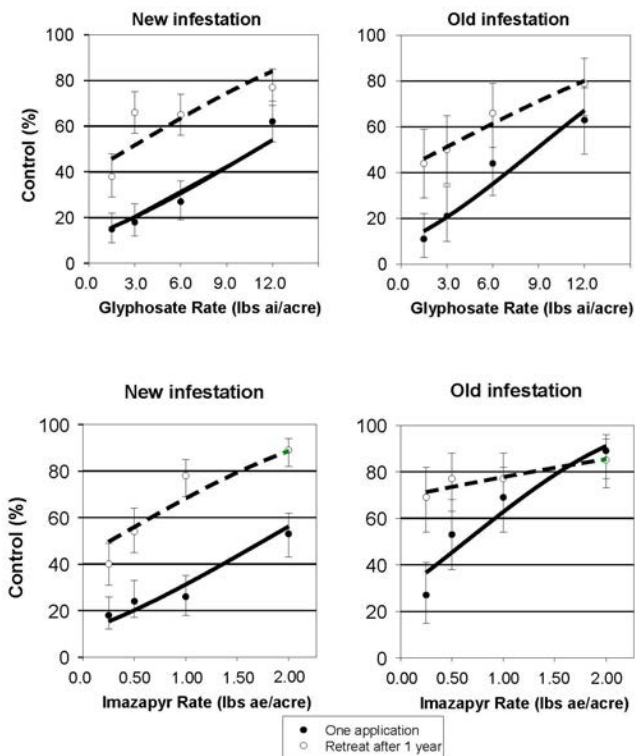


Figure 1. Percent control of cogongrass 2 years after treatment and 2 years after retreatment for various rates of glyphosate and imazapyr in old and new cogongrass infestations. Error bars are ± 1 standard error. Credits: Abstracted from Minogue et al. (2012). *South. J. Appl. For.* 36:19–25

Imazapyr may be applied to selectively control cogongrass in the understory of pine stands using selective “Pine Release Treatments” described on the product labels. Rates up to 0.625 lb ae/acre imazapyr (20 oz Arsenal AC or 40 oz Chopper product) may be used in loblolly pine stands, and rates up to 0.5 lb ae/acre imazapyr (16 oz Arsenal or 32 oz Chopper product per acre) may be used in slash or longleaf pine (see product labels for other pine species). However, on sandy soils, pine damage may occur at these rates because of greater herbicide uptake from the soil by pine roots. On sandy sites, 0.5 lb ae/acre imazapyr should be the upper limit for loblolly pine, and rates should not exceed 0.4 lb ae/acre in slash or longleaf pine stands. Sequential annual applications of imazapyr will also lead to pine injury because the effect of this residual herbicide is cumulative, so it is best to use glyphosate alone in alternate years. Common recommendations for spot treatment of cogongrass patches in pine stands include the use of 3 to 4% glyphosate product (containing 4 lb ai/gallon) plus a 0.5 to 1.0% solution of Arsenal AC or 1.0 to 2.0% solution of Chopper (Chopper is less concentrated). To ensure selectivity to pines, observe the limits to the rates of ae imazapyr per acre.

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Bark Beetles Affecting Southern Pines

Southern Pine Beetle

While native to the region, the southern pine beetle, *Dendroctonus frontalis* Zimmermann, can be one of the most destructive insect pest of pine in the southern United States. This aggressive beetle lives predominantly in the inner bark of pine trees. Trees attacked by southern pine beetle often exhibit many dime-size resin masses (i.e., pitch tubes) on the outer tree bark. Southern pine beetle feed on phloem tissue where they construct winding S-shaped or serpentine galleries. The galleries created by both the adult beetles and their offspring can effectively girdle a tree, causing its death. Southern pine beetle also carry, and introduce into trees, blue-stain fungi. These fungi colonize xylem tissue and block water flow within the tree, also causing tree mortality. Consequently, once southern pine beetle have successfully colonized a tree, the tree cannot survive, regardless of control measures. Thinning dense pine stands. More about Southern pine beetle: <http://edis.ifas.ufl.edu/IN333>

Black Turpentine Beetle

The black Turpentine Beetle, *Dendroctonus terebrans* (Olivier), or BTB, bores into the inner bark of stressed or injured pine trees, where they breed and feed on phloem tissue. Adults are strongly attracted to volatile pine odors and readily breed in fresh stumps. Attacks on standing trees usually occur on the lower 3 to 6 feet of the trunk or on large roots. Light attacks may kill only localized sections of phloem tissue, but numerous attacks per stem result in tree mortality. Infestations commonly occur in pine stands affected by recent logging activity (e.g., thinning), fire, mechanical injury, storm damage, climatic stress, or competition. More about black turpentine beetle: <http://edis.ifas.ufl.edu/IN636>

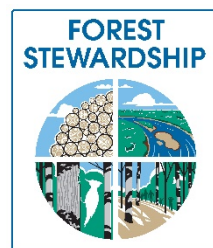
***Ips* Engraver Beetle**

Like other pine bark beetles, *Ips* pine engravers live predominantly in the inner bark, where they breed and feed on phloem tissue. Pines successfully colonized by *Ips* engravers, if not already dead, are killed by adult and larval feeding in the phloem (which can girdle the tree) and by colonization of the sapwood with blue-stain fungi that the beetles introduce. *Ips* beetles usually colonize only those trees that are already stressed, declining, or fallen due to other environmental or biotic factors. *Ips* also readily colonize cut logs and slash, and are attracted to fresh pine odors. Infestations may occur in response to drought, root injury or disease, timber management activities, lightning strikes, or other stresses, and sometimes occur in association with attacks by Southern pine beetle and black turpentine beetles. More about *Ips* beetles: <http://edis.ifas.ufl.edu/in701>

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