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Controlling Invasive Exotic Plants in North Florida Forests¹

Chris Demers and Alan Long²

Of the 4,012 known plant species growing in Florida, 29% are not native to Florida or the Southeast. Some of these exotic plants are invasive weeds that form self-sustaining and expanding populations within plant communities with which they were not previously associated. These invasive exotic plants displace native plants and associated wildlife, and can alter processes such as fire and water flow. Invasive exotic plants have become serious problems for land managers. Despite the millions of dollars that have been spent on controlling the spread of invasive plants, the rapid and effective dispersal characteristics of these invaders make them extremely difficult to eliminate.

This publication describes current methods being used to control some of the more common and troublesome invasive exotic plants in north Florida forests. It is intended to assist private forest landowners in managing their existing forests or establishing new plantations. All of the control methods involve some combination of mechanical and chemical treatments. Biological control agents for some of these plants are currently under investigation. Pictures of each species can be found at the following Web sites: <http://plants.ifas.ufl.edu/> or

http://fleppc.org/ID_book.htm, or in Langeland and Burks' book, "Identification and Biology of Non-Native Plants in Florida's Natural Areas".

Disclaimer

The information given in this publication is for educational purposes only. Reference to commercial products or trade names is made with the understanding that no discrimination is intended against other products that may also be suitable and appropriately labeled. Treatment recommendations involve general herbicide prescriptions that have yielded acceptable levels of control in experimental trials. However, these recommendations are not guaranteed to work on every site. Most herbicides are applied in some combination with water and a surfactant (wetting agent). Always follow current herbicide label instructions for determining rates of application, necessary surfactants, approved application sites, safety gear, and use precautions.

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2. Chris Demers, Forest Stewardship Coordinator, Alan Long, Associate Professor, Forest Operations and Environmental Regulations, School of Forest Resources and Conservation, Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, FL 32611.

Use pesticides safely. Read and follow directions on the manufacturer's label.

Trees/Shrubs

Chinese tallow (*Sapium sebiferum*)

The Chinese tallow, a.k.a. popcorn tree, was introduced from China in the early 1900s and has since invaded most of the Southeastern states. It is a small tree whose seeds are widely dispersed by birds and water runoff. The tree's attractive light green, heart-shaped leaves that yield bright yellow and orange fall colors have rendered it an attractive ornamental. It is also used by beekeepers for honey production. However, this tree is threatening to become the prominent component of marshes, river margins, and dry uplands within its expanding range. Further planting of this tree is prohibited by the Florida Department of Agriculture and Consumer Services (FDACS), and it is listed as a noxious weed by U.S. Department of Agriculture (USDA) and the Florida Exotic Pest Plant Council (EPPC).

Control

Herbicide application is required to achieve adequate control of Chinese tallow. It can be cut down but will resprout from stumps if not also treated with herbicides. The treatments below will be most effective when applied from late summer to early fall. Follow-up treatments may be necessary in all cases (see Table 1).

Mimosa or silk tree (*Albizia julibrissin*)

Mimosa is a small- to medium-sized tree with attractive fern-like leaves and showy pink flowers. It vigorously establishes on disturbed areas, often spreading by seed from nearby ornamentals. It was introduced to the U.S. as an ornamental in 1745 and continues to be used as such because of its attractive form, foliage and flowers. It reproduces both vegetatively and by seed. If cut or top-killed, it will resprout quickly, growing 3 feet in a single season. Due to its ability to produce large seed crops and resprout when damaged, mimosa is a strong competitor to native trees and shrubs in open areas or forest edges. Dense stands of this tree can significantly reduce sunlight and nutrients available for other plants.

Control

Mimosa can be controlled with the use of mechanical and chemical treatments. Due to suckers and resprouts, chemical treatments are necessary for full control. Basal bark treatments are most effective if applied when seeds are present on the tree, which reduces seed spread. Seedlings up to 10 inches tall can be hand-pulled (see Table 2).

Chinese privet (*Ligustrum sinense*), Japanese privet (*Ligustrum japonicum*), glossy privet (*Ligustrum lucidum*)

These members of the olive family are shade-tolerant, tall, evergreen-leaved shrubs that can grow to about 30 feet in height. They spread by bird-dispersed seeds or underground runners, and form dense stands that prevent pine and hardwood regeneration and/or land access. These plants were introduced from Asia.

Control

Adequate control of these shrubs can be achieved through herbicide application (see Table 3).

Coral ardisia (*Ardisia crenata*)

Coral ardisia, or spice ardisia, is an evergreen shrub, 2-6 ft tall, with dark green scalloped-margined leaves. Flowers and fruit are produced in axillary, not terminal, clusters, usually drooping below the foliage. Fruit are small, bright red, one-seeded drupes. It was introduced into Florida for ornamental purposes in the early 1900s and has spread and become naturalized in hardwood hammocks across the north part of the State. Seedlings of native plant species are shaded out where it forms dense thickets of more than 100 plants per square meter.

Control

Adequate control of this plant can be achieved through herbicide application. Seedlings can be hand-pulled (see Table 4).

Vines

Kudzu (*Pueraria montana*) (= *Pueraria lobata*)

Although restricted to northern portions of Florida, kudzu is perhaps the worst weed problem for forest managers in the southeastern U.S. Kudzu was introduced into the U.S. at the Philadelphia Centennial Exposition in 1876. By 1900 kudzu was available through mail order as an inexpensive livestock forage, and was later sold by the USDA to be planted for erosion control purposes along rights-of-way and gullies. It now exists in impenetrable patches as large as 100 acres in size, and will overtop and kill trees, even after they are mature. Kudzu is an aggressive leguminous vine capable of growing 1 foot per day and can easily grow 60 feet in a single growing season. It also establishes roots sporadically as it covers an area, layering vines and foliage on top of each other. One key to this plant's efficiency is its ability to orient each leaf so that the maximum amount of sunlight possible is absorbed. This multidirectional orientation of leaves also poses special problems with sufficiently wetting the top sides of foliage with herbicide.

Control

Special effort is required to control kudzu. The older the patch, the harder it will be to control and the longer it will take to completely eradicate the plant. In severe cases, follow-up spot treatments may be required for 5 to 10 years.

It is best to first evaluate the kudzu problem by determining the age of the patch. Do this by looking at the root crowns (the top of the primary root). If the root crowns are 2 inches or larger in diameter, the patch is about 10 years of age or older. In some cases, patches of kudzu greater than 10 years old may require higher concentrations of herbicide for adequate control. For easiest access, it is best to evaluate kudzu problems in winter when vines and foliage are withered.

Due to their potency, Tordon™ products are the most effective herbicides for kudzu control.

However, the active ingredient - picloram - has a long period of soil activity and the products are not labeled for use in the State of Florida. Acceptable control can be achieved with the use of other herbicides.

Where kudzu is draping trees, a foliar application of Garlon 4™, as shown in Table 5, provides effective control. If kudzu is in a drain or around open water, Veteran 720™ or Vanquish™, both labeled for ditch banks, is the best choice. Where kudzu invades hardwoods or young pine stands, a broadcast application of Escort™ may be effective without harm to pines and most hardwoods (with the exception of cottonwoods, elms, and legumes such as redbud or locusts). Transline™ is specifically formulated to control legumes and other plants. All treatments will likely need to be followed by a second treatment 1 year after the initial treatment. Repeat follow-up treatments until acceptable control is achieved (see Table 5).

Air potato (*Dioscorea bulbifera*)

This invasive vine from Africa was introduced into Florida in 1905, when a horticulturalist discovered the vine's rapid growth into dense masses. Aside from kudzu, it is the most aggressive invasive vine in Florida. It quickly grows to 60-70 feet in length, high enough to overtop and shade out native trees. The air potato is a member of the yam family and produces many aerial tubers (potato-like growths) called *bulbils* that are attached to the stems, which eventually fall off and grow into new plants. It is listed as invasive by EPPC.

Control

Begin by collecting all bulbils, if any, from the ground and removing them from the site. Once this is done, adequate control can be achieved with the use of herbicides. Guidelines for herbicide control are listed below. Follow-up treatments may be necessary in all cases (see Table 6).

Japanese climbing fern (*Lygodium japonicum*)

Japanese climbing fern is a perennial, delicate looking, climbing vine that forms dense clumps that can cover trees and shrubs. Introduced from Japan as

an ornamental, it is scattered throughout the lower portions of Alabama, Georgia, Louisiana, South Carolina and south into central Florida. Further planting of this vine is prohibited by FDACS.

Control

Adequate control of this plant has been achieved with multiple applications of Accord™ (see Table 7).

Grasses

Cogongrass (*Imperata cylindrica*)

Cogongrass is a fast-growing, rhizomatous, perennial grass that has become one of the most troublesome weeds in non-agricultural areas in Florida. It was accidentally introduced as packing material from Japan in Mobile, Alabama in 1911. It was later intentionally introduced from the Philippines into Mississippi as forage. The Mississippi population was shared with the University of Florida, USDA Plant Introduction Station, and Soil Conservation Service in 1937 for forage and soil stabilization. It has proved to be an excellent soil stabilizer but it is extremely difficult to prevent its escape into unintended areas, spreading predominantly by wind-blown seeds. Cogongrass is listed as a noxious weed by FDACS and USDA, and it is ranked among the 10 most invasive weeds in the world.

Control

Research has shown that imazapyr (Arsenal™) is the most effective herbicide for cogongrass control. Glyphosate (Accord™) and fluazifop (Fusilade™) are also effective options. Guidelines for herbicide control are shown in Table 8.

Bahiagrass (*Paspalum notatum*), Bermudagrass (*Cynodon dactylon*), giant fescue (*Festuca arundinacea*), Johnsongrass (*Sorghum halepense*)

These grasses have been widely planted and continue to provide forage for livestock, but they can present problems for forest landowners wanting to establish pine stands on sites dominated by them. Introduced as improved pasture grasses from the

Mediterranean region of Europe and Africa, they are now distributed worldwide.

Control

Adequate control of these grasses can be achieved with a summer application of Accord™ followed by a spring application of an Arsenal AC™ and Oust™ tank mix (see Table 9).

Conclusion

The invasive exotic species described in this publication represent those most likely to be found in forestlands in north Florida. More complete information on these and other non-native plants can be found in Langland and Burks' "Identification and Biology of Non-native Plants in Florida's Natural Areas" (1998) and Langland and Stocker's "Control of Non-native Plants in Natural Areas of Florida" (1997).

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Table 1. Chinese Tallow (*Sapium sebiferum*)

Herbicide	Treatment
Garlon 4 TM	Basal-bark treatment with 15-20% concentration. ¹
Garlon 3A TM	<u>Cut down tree</u> or treat entire girdle cut with 50% concentration. ² <u>Foliar</u> : treat foliage with 3% concentration
Arsenal AC TM	Treat foliage of seedlings with 1% concentration. ³ (<i>Caution: Arsenal is very soil active and has a high potential for non-target tree damage</i>)

¹Kline and Duquesnel, 1996²Langeland and Stocker, 1997³Miller, 1999**Table 2.** Mimosa or silk tree (*Albizia julibrissin*)

Herbicide	Treatment
Garlon 4 TM	<u>Basal-bark</u> : treat with 15% concentration 12-15 inches from ground. ¹ <u>Cut stem</u> : apply 10% solution covering the outer 20% of stump. ¹ <u>Foliar</u> : treat all leaves until wet with 2% solution and a wetting agent. ²
Garlon 3A TM	<u>Cut stem</u> : apply 25-50% solution covering the outer 20% of stump. ^{1,3} <u>Foliar</u> : treat all leaves until wet with 2% solution and a wetting agent. ²
Accord TM	<u>Cut stem</u> : apply 25% solution covering the outer 20% of stump. ³ <u>Foliar</u> : treat all leaves until wet with 2% solution and a wetting agent. ²

¹Langeland and Stocker, 1997²Miller, 1999³Remaley, 1998**Table 3.** Chinese privet (*Ligustrum sinense*), Japanese privet (*Ligustrum japonicum*), glossy privet (*Ligustrum lucidum*)

Herbicide	Treatment
Garlon 4 TM	<u>Basal-bark</u> : treat with 15-20% concentration 16 inches from ground. ^{1,2}
Arsenal AC TM	<u>Foliar</u> : treat all leaves until wet with 1% solution and a wetting agent August to September. ²
Accord TM	<u>Foliar</u> : treat all leaves until wet with 3% solution and a wetting agent August to September. ²

¹Langeland and Stocker, 1997²Miller, 1999

Table 4. Coral ardisia (*Ardisia crenata*)

Herbicide	Treatment
Garlon 4 TM	Basal-bark treatment with 10% concentration.
Garlon 3A TM	Cut stem treatment with 50% concentration.

Langeland and Stocker, 1997

Table 5. Kudzu (*Pueraria montana*) (= *Pueraria lobata*)

Herbicide	Treatment
Garlon 4 TM	<u>Cut stem</u> : cut the stem 5 cm. (2 in. above ground level. Immediately apply a 25% solution to the cross section of the stem. A subsequent foliar application (2% concentration) may be necessary to control new seedlings. ² <u>Vines</u> : 4% solution in diesel sprayed to cover vines on pines > 6 inches dbh in late winter or early spring. ¹
Accord TM	<u>Cut stem</u> : cut the stem 5 cm. (2 in.) above ground level. Immediately apply a 25% solution to the cross section of the stem. This may require a subsequent foliar application (2% concentration) during the late growing season. ²
Vanquish TM	For areas near water, broadcast 2 gal. per acre (growing season), or 3 gal. per acre if patch is > 10 years old. Do not spray into water. ¹
Veteran 720 TM	For areas near water, broadcast 2 gal. per acre (growing season), or 3 gal. per acre if patch is > 10 years old. Do not spray into water. ¹
Escort TM	<u>In hardwood stands</u> : broadcast 4 oz. per acre in mid-summer as a foliar spray. ¹ <u>In young pine stands</u> : broadcast 2-4 oz. per acre in mid-summer as a foliar spray. ³
Transline TM	<u>Broadcast</u> : 0.2% solution (1 oz. in 3 gal. sprayer) in July to September as a foliar spray. ³ <u>In young pine stands</u> : broadcast 22 oz. per acre. ¹

¹Ezell, 1998²Johnson, 1998³Miller, 1999

Table 6. Air potato (*Dioscorea bulbifera*)

Herbicide	Treatment
Garlon 4 TM	<u>Frill/girdle</u> : treat girdle cuts with 10% concentration. ¹ <u>Stems</u> : treat stems emerging from bulbils with 10% concentration. ²
Garlon 3A TM	Treat girdle cuts with 50% concentration. ¹

¹Kline and Duquesnel, 1996²Langeland and Stocker, 1997**Table 7.** Japanese climbing fern (*Lygodium japonicum*)

Herbicide	Treatment
Accord TM	<u>Foliar</u> : treat all leaves until wet with 2% solution and a wetting agent July to October. Repeat until controlled.

Miller, 1999

Table 8. Cogongrass (*Imperata cylindrica*)

Herbicide	Treatment
Arsenal AC TM	Treat with 1% concentraion in September or October. Mowing, burning and/or disking earlier in the year often enhances the effectiveness of the herbicides. ^{2,3}
Accord TM	Treat with 2% concentration in September or October. ^{2,3}
Fusilade TM	Treat with 0.5 qt. per acre. ¹

¹Langeland and Stocker, 1997²Miller, 1999³Jose et al. 2002

Table 9. Bahiagrass (*Paspalum notatum*), Bermudagrass (*Cynodon dactylon*), giant fescue (*Festuca arundinacea*), Johnsongrass (*Sorghum halepense*)

Herbicide	Treatment
1. Accord TM	Treat with 2% concentration in water with wetting agent in late summer before planting. Then follow up with tank mixture of Arsenal AC TM + Oust TM (see below).
2. Follow-up tank mix	Over-spray mixture of 1% arsenal AC TM + 1-2 ounces Oust TM in water and wetting agent the following May for pine release.

Miller, 1999