

Herbicides: Use 'Em, Don't Abuse 'Em, to Protect Our Native Flora

by Ken Langeland, University of Florida, Institute of Food and Agricultural Sciences (IFAS),
Agronomy Department, Center for Aquatic and Invasive Plants

You can only put so many things into one place - including plant species! When non-native plant species spread in our natural landscape, the regrettable consequence is dilution and displacement of our native flora, either on an individual species basis or at the community level. The number of foreign taxa now naturalized in Florida is cause for concern. According to Richard Wunderlin's *Guide to the Vascular Plants of Florida* (1998), 1,180 of the 3,834 species found in Florida have arrived here since the occupation by Europeans. The Florida Exotic Pest Plant Council (EPPC), in their 1987 list, identified 62 non-native invasive species that are invading and disrupting native plant communities in Florida. Another 57 have shown the potential to disrupt Florida's native plant communities.

Land managers throughout Florida continuously battle invasive plant species. While some insects have been released as biological control agents and researchers continue to explore overseas for new biological controls, herbicides are and will remain essential in the fight to protect our native flora from the onslaught of foreign plant species. When used correctly, herbicides are safe and effective for controlling invasive non-native plants in our natural areas.

HERBICIDE REGISTRATION AND LABELS

Herbicides are chemical substances (or cultured biological organisms) used to kill or suppress the growth of plants. The herbicide is referred to as the active ingredient when it is prepared (formulated) in a herbicide product. The active ingredient can be



Herbicide is applied to frilled melaleuca tree.

dissolved in a solvent such as oil, water, or alcohol, or adsorbed to clay particles. Products sometimes contain additives called *adjuvants* that improve the performance of the herbicide. All herbicide products must be registered with the United States Environmental Protection Agency (EPA). Registration requires extensive testing of both the active ingredient and the herbicide product under strict protocols by the manufacturer. Testing includes but is not limited to acute (shortly after exposure) and chronic (repeated exposure of an extended period of time) toxicity on test animals, including wildlife species, and environmental fate under various conditions. These tests are conducted for the parent herbicide as well as any major break-down products that may occur in the environment. The data are carefully reviewed by EPA and further reviewed by the Florida Department of Agriculture and Consumer

Services (FDACS) before the product is registered for use in the state. FDACS may require additional testing or deny registration. An herbicide is only registered if it will perform its intended function without unreasonable adverse effects on the environment when used in accordance with widespread and recognized practices (FIFRA Sec 3(d) (5) APPROVAL OF REGISTRATION).

The EPA requires every herbicide product that it registers to have a label that contains certain information based on the testing required as part of registration. Included on the label are the product name, the name and amount of active ingredient and other contents of the product, precautionary statements, directions for use, including personal protective clothing; and other pertinent information. Additional information on the content and interpretation of pesticide labels can be found in "Applying Pesticides Correctly", IFAS publication SM 1 (contact IFAS Publications 800/226-1764).

PESTICIDE APPLICATOR CERTIFICATION

A pesticide or some of its uses may be classified as *restricted use* if it could cause harm to humans or to the environment unless it is applied by certified applicators who have the knowledge to apply these pesticides safely and effectively. Certified pesticide applicators are trained in general knowledge of pesticides and for specific applications, such as aquatic sites or rights of ways. While none of the herbicides or their uses are restricted in natural areas, virtually all applicators who work for agencies or companies are certified or work under the direct supervision of a certi-

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TABLE 1. HERBICIDES COMMONLY USED IN NATURAL AREAS OF FLORIDA. (alphabetical by active ingredient and product name)

PRODUCT	MANUFACTURER	ACTIVE INGREDIENT	COMMENTS
Rodeo	Monsanto	Glyphosate 53.8%	Can be applied directly to water.
Roundup Pro	Monsanto	Glyphosate 41.0%	May be applied to ditch banks, dry ditches, dry canals. May not be applied directly to water.
Roundup Super Concentrate	Monsanto	Glyphosate 41.0%	Homeowner packaging readily available in retail stores. May not be applied directly to water.
Arsenal	American Cyanamid	Imazapyr 28.7%	May be applied to non-irrigation ditches and low lying areas when water has drained but may be isolated in pockets due to uneven or unlevel conditions. Otherwise, may not be applied directly to water. May be applied by government agencies or their contractors in Florida, under SLN, by injection, frill and girdle, or cut stump to melaleuca and Brazilian pepper when growing in water. Nontarget plants can be damaged by root absorption.
Brush-B Gone	Monsanto/Solaris (formerly Ortho)	Triclopyr amine 8.0%	Homeowner packaging readily available in retail stores.
Brush Killer	Enforcer	Triclopyr amine 8.8%	Homeowner packaging readily available in retail stores.
Garlon 3A	DowElanco	Triclopyr amine 44.4%	May be applied to non-irrigation ditch banks, seasonally dry wetlands, flood plains, deltas, marshes, swamps, bogs, and transitional areas between upland and lowland sites. May not be applied directly to water.
Garlon 4	DowElanco	Triclopyr ester 61.6%	Same comments as Garlon 3A.
Pathfinder II	DowElanco	Triclopyr ester 13.6%	Same comments as Garlon 3A. Ready to use.

fied applicator. Training and testing programs to certify applicators are provided by The University of Florida Institute of Food and Agricultural Sciences (IFAS) and FDACS issues licenses for a fee. Certification helps ensure that herbicides are applied safely and correctly. For additional information on herbicide application training and certification, contact your County Cooperative Extension Service office.

HERBICIDES APPLICATION METHODS USED AGAINST INVASIVE PLANTS IN NATURAL AREAS

The active ingredients most commonly found in herbicide products used for invasive plant control are glyphosate, imazapyr, triclopyr amine, and triclopyr ester (Table 1). Based on toxicity, environmental fate data, and use patterns, these herbicides are not of concern to wildlife, the environment, or public health when used for invasive plant control in natural areas (Langeland and Stocker 1997). In order to have the maximum impact on target invasive plants and minimum impact on the native plant communities,

careful application methods are used, including cut-stump applications, basal bark applications, or spot foliar applications. Broadcast ground or aerial applications are used in extreme situations such as when a monoculture of an invasive plant occurs.

Herbicides have unique properties and vary in the way they are absorbed by plants, therefore, they may be used somewhat differently. Glyphosate and triclopyr amine are soluble in water but not oil. They are absorbed by the leaves or green bark of plants. Little to none is absorbed by roots or corky bark. Imazapyr is soluble in water and it is absorbed by both leaves and roots. It must be used very carefully when applying near the roots of non-target plants. Imazapyr can also be absorbed through bark when it is applied in specially manufactured products (not discussed here). Triclopyr ester is soluble in oil and absorbed through the leaves as well as through the bark of certain trees.

STUMP TREATMENTS

After cutting and removing large trees or shrubs, herbicide (concentrated or diluted)

is applied to the cut surface of the stump. The final cut is made as level to the ground as possible to minimize run-off and sawdust should be removed before applying herbicide. The herbicide is directed toward the cambium layer on large stumps, especially when using concentrated herbicide solutions. The cambium is a thin layer of cells, just inside the bark and around the entire circumference of the stump where food and water is transported in a tree. Water-soluble or oil-soluble herbicides can be used for cut-stump applications. Best results are obtained if the herbicide is applied immediately after cutting, especially when using a water soluble herbicide (seconds can count with less susceptible species). Oil-soluble herbicides can be effective when applied after some time has passed but are applied to the bark as well.

BASAL BARK APPLICATIONS

Basal bark applications are less labor intensive than cutting and removing vegetation. Basal bark applications are used when it is acceptable to leave standing dead veg-

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etation. Herbicide is applied, commonly with a backpack sprayer, hand-held pump-up sprayer, or spray bottle, directly to the bark around the circumference of each stem or tree up to 24 inches above the ground. The herbicide must be oil-soluble to pass through the bark, and it is mixed with a special penetrating oil. Low nozzle pressure should be used to minimize splashing and non-target damage.

FRILL OR GIRDLE

APPLICATIONS

Frill or girdle applications, sometimes called "hack-and-squirt," are used in place of basal bark applications on trees with thick or corky bark, such as melaleuca. Cuts into the cambium are made completely around the circumference of the tree with no more than three-inch intervals between cut edges. Continuous cuts, or girdles, are sometimes used for difficult-to-control species and large trees. Incisions, often made with a machete, are angled downward to hold herbicide and must be deep enough to penetrate the bark and cambium layer. Herbicide (concentrated or diluted) is applied to each cut until the exposed area is thoroughly wet. Water-soluble or oil-soluble herbicides can be used for frill or girdle applications. Spray-bottles are commonly used to apply the herbicide.

SPOT FOLIAR APPLICATIONS

Spot foliar applications are used to apply herbicide to seedlings, small shrubs, or herbaceous vegetation. Diluted herbicide, usually a 1% to 5% solution, is applied to wet the foliage, but not

to the point of run-off. A wetting agent or surfactant is often added to the spray mixture, according to label instructions.

WHAT HOMEOWNERS CAN DO

Homeowners can help allay the problem of expanding numbers of non-native plant species in our natural areas by removing them from their yards. Glyphosate and triclopyr amine containing herbicides (Table I) can be purchased in small quantities at hardware stores and garden supplies. By following the instructions on the label, these herbicides can be used safely and effectively in home landscapes to prevent resprouting of stumps after invasive non-native plants are cut down. These herbicides are often ready to use from the container, so mixing or special equipment is not needed for applying them. Do not discard cuttings from exotic plants in the woods, because seeds or even pieces of some invasive plants can take root. Removing an invasive plant from your yard may be a short-term sacrifice of shade or aesthetics, but replacing it with a native plant will give long-term satisfaction and help protect Florida's native plant communities in the wild. ☀

REFERENCES

- Langeland, K. A. and R. K. Stocker. 1997. *Control of Non-native Plants in Natural Areas of Florida*, IFAS Circular SP242. Univ. of Florida, Cooperative Extension Service, IFAS. 38 pp.

Ken Langeland is a well-known expert on invasive exotic plants and the author of a new field guide on the subject (held up in publication for a year, but still eagerly awaited and needed. Hope we see it soon!).