Control methods that can be used by homeowners are similar to those used by professional land managers. However, the scale can be very different, ranging from removal of a single tree to several acres of woody or herbaceous species. This brochure discusses methods and herbicides that can be readily used by homeowners for removal of invasive plants, and is intended as general information.

**Before beginning any invasive exotic plant removal project, please contact the Collier County Environmental Services Department at (239) 732-2505 to find out if a Vegetation Removal Permit is required. A permit is required to clear exotic vegetation by mechanical means with heavy machinery.**

**PHYSICAL REMOVAL**

Before resorting to herbicide applications for exotic plant control, homeowners should first consider physical removal. Complete physical removal is one of the most effective ways of controlling invasive exotic plants. If the tree or shrub is very large, start by cutting it down. Next dig up the roots. It is important that the entire root system be removed. If any large roots are left in the ground, they will more than likely lead to new plants. Once the tree or shrub is removed, it can either be taken to the landfill, or it can be put out as yard waste for curbside pick-up according to the following guidelines: “Yard waste is picked up on recycling day only. Place yard waste in clear plastic bags or in your old trash containers, or bundle appropriate types of yard waste. Do not put yard waste in your recycling or trash bin. Tie in bundles no longer than four feet. No branches thicker than four inches. Trees and logs are prohibited. Containers must weigh less than fifty pounds. Do not mix garbage and yard waste. No more than ten bags, bundles, or cans. Yard waste will not be picked up if not bundled properly.”

*Under Florida Statute, Chapter 556 “Underground Facility Damage Prevention and Safety Act” all underground facilities must be marked before digging. Call Sunshine State One Call of Florida, Inc. (800) 432-4770 or visit their website: www.callsunshine.com before you dig.*

**HERBICIDES**

Homeowners can play an important role in the fight against invasive species by removing them from their private properties. Appropriate use of herbicide products that are readily available in small quantities at garden supply stores can facilitate removal and prevent re-growth if physical removal of plants is not possible.

Herbicide products contain an active ingredient, a diluent (to dilute the product), and sometimes other additives that enhance the performance of the herbicide (such as surfactants, products that aid in the absorption of the herbicide). The active ingredient may be either oil soluble (diluted in special herbicide grade vegetable oil) or water soluble (diluted in water). Active ingredients contained in the majority of herbicide products used by professional land managers are Triclopyr amine (water soluble), Triclopyr ester (oil soluble), Glyphosate (water soluble) and Imazapyr (water and oil soluble) (Table 1). Herbicide products that contain Imazapyr are not recommended for use in home landscapes because of the potential for this chemical to be taken up by the roots of desirable plants that could be injured or
killed. Tracer color dyes can be added to herbicides so that applicators can ensure thorough treatment. Check with the herbicide retailer about which tracer dyes are available for each product.

Although the herbicides that are more readily available to homeowners have not been tested on all invasive species in Florida, products with the same active ingredients have been tested and used by professional land managers in Florida. However, herbicides that are more readily available to homeowners normally contain a much lower concentration of active ingredient. Multiple re-treatments will most likely be necessary to effectively control plants using these herbicides.

Table 1. Active Ingredients in Common Herbicides.

<table>
<thead>
<tr>
<th>Active Ingredient*</th>
<th>Products</th>
<th>Availability</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Glyphosate</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.4 lb/gal</td>
<td>Rodeo</td>
<td>Farm supply stores</td>
<td>Containers 2-1/2 gal and up</td>
</tr>
<tr>
<td></td>
<td>Roundup Pro, Glyphos, Glypro Plus, Touchdown Pro</td>
<td>Farm supply stores</td>
<td>Containers 2-1/2 gal and up</td>
</tr>
<tr>
<td>3 lb/gal</td>
<td>Roundup Super Concentrate</td>
<td>Retail garden supply stores</td>
<td>Containers small as 1-qt</td>
</tr>
<tr>
<td>3.7 lb/gal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Triclopyr amine</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.59 lb/gal</td>
<td>Garlon 3A</td>
<td>Farm supply stores</td>
<td>Containers 2-1/2 gal and up</td>
</tr>
<tr>
<td></td>
<td>Brush Killer</td>
<td>Retail garden supply stores</td>
<td>Containers small as 1-qt</td>
</tr>
<tr>
<td>0.54 lb/gal</td>
<td>Brush-B-Gon</td>
<td>Retail garden supply stores</td>
<td>Containers small as 1-qt</td>
</tr>
<tr>
<td><strong>Triclopyr ester</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.75 lb/gal</td>
<td>Garlon 4**, Remedy**</td>
<td>Farm supply stores</td>
<td>Containers 2-1/2 gal and up</td>
</tr>
<tr>
<td>0.75 lb/gal</td>
<td>Pathfinder II</td>
<td>Farm supply stores</td>
<td>Containers 2-1/2 gal and up</td>
</tr>
<tr>
<td>0.75 lb/gal</td>
<td>Vine-x</td>
<td>Internet</td>
<td>Pint and 12 oz Containers</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
| * Active ingredients are reported as acid equivalent.** Must be diluted with a penetrating oil for use with basal bark and cut stem applications.

The use of trade names in this publication is solely for the purpose of providing specific information. Collier County does not guarantee or warranty the products named, and references to them in this publication does not signify our approval to the exclusion of other products of suitable composition. Use herbicides safely. Read and follow directions on the manufacturer's label.
TRAINING AND CERTIFICATION

A license is not required to purchase or apply on your own (non-business) property any of the herbicides discussed in this brochure. It is essential and required by law for anyone using an herbicide (or any pesticide) to follow the “Directions for Use” on the manufacturer’s label. Because herbicide users are required by law to comply with all the instructions and directions for use contained in the herbicide label, no herbicide application should be based solely on information presented in this publication. Herbicide users must review and comply with all conditions set forth in the herbicide label. Training in herbicide application is recommended for anyone who applies their own herbicides and is provided at the Collier County University Extension Service, 14700 Immokalee Road, Naples, FL 34120; Phone: (239) 353-4244; website:  http://collier.ifas.ufl.edu/Horticulture/Commercial%20Hort2.htm

HERBICIDE APPLICATION METHODS

Cut Stem Application  Stumps of invasive woody plants will re-sprout after cutting if not treated with an herbicide. Re-sprouts can be continually cut off as they appear, but applying herbicide to the stump will kill it and prevent re-sprouting. Stumps should be cut as close to the ground and as level as possible so that applied herbicide does not run off. On large stumps, the herbicide should be concentrated just inside the bark. This is where the cambium layer, the living tissue of the trunk, is that will carry herbicide into the roots. Sawdust, which can absorb herbicide and prevent it from moving into the stump, should be removed. Apply the herbicide to the stump as quickly as possible after cutting. Best results are obtained if the herbicide is applied immediately after cutting and with no more than 15 minutes between cutting and applying herbicide, especially when using a water-soluble formulation. Options for yard waste disposal are addressed in the “Physical Removal” section of this document on page 1.

Foliar Application  Foliar application refers to applying herbicide to the leaves (foliage) of unwanted plants. Seedling trees, shrubs and herbaceous plants can be controlled in this way. All are diluted in water before application. The herbicide solution should be applied so that it contacts only the unwanted plants, because it will kill most plants with which it comes in contact.

Basal Bark Application  Woody plants can be killed without cutting the tree down by applying oil soluble herbicides to the bark. This is only recommended for trees or shrubs with stem diameters of six inches or less. This method is faster than cutting vegetation down and treating the stumps. It is useful for homeowners with larger numbers of woody plants to kill where it is acceptable to leave dying and dead vegetation standing. An oil soluble herbicide must be used for basal bark application to facilitate movement of the herbicide through waxy substances in the bark. Triclopyr ester is the only oil soluble active ingredient in Table 1. All herbicide sprayers and spray guns should have chemical resistant seals for the herbicides and carriers being used.

Frill or Girdle (sometimes called hack-and-squirt) Application  Basal bark applications will not be effective on trees with bark that is too thick for herbicide to penetrate. In this case, some bark must be removed before application of herbicide. A sharp implement such as a machete or hatchet is used to make cuts though the bark and herbicide is applied into these cuts. Cuts three inches apart completely around the circumference of the tree (frill) are sufficient for some species. A continuous cut around the trunk (girdle) is sometimes used for difficult-to-control species and large trees. Do not make multiple cuts directly above or below each other because this will inhibit movement of the herbicide. Incisions should be 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.
CONTROL METHODS FOR HOMEOWNERS

Control methods recommended for invasive exotic plants in Collier County are listed in Table 2. All methods listed have been found effective under certain circumstances. However, many factors can affect the performance of an herbicide application and results can vary. Choice of application method, herbicide, and rate for individual species depend on environmental conditions and personal experience. Experience has shown that treatment success may vary.

Table 2. Control Methods for Collier County’s Prohibited and Restricted Invasive Exotic Plants.

<table>
<thead>
<tr>
<th>Plant Name</th>
<th>Manual Method</th>
<th>Chemical Method</th>
</tr>
</thead>
</table>
| Air potato (Dioscorea bulbifera) | MANUAL – Pick/dig up potatoes in winter. Cut and remove above ground vines. | CHEMICAL – **Basal bark**: Pathfinder II (undiluted) or 10% Garlon 4 in oil applied to the stems.  
**Cut stem**: Brush-B-Gon (undiluted), Pathfinder II (undiluted), 50% Garlon 3A in water or 10% Garlon 4 in oil.  
**Foliar**: 2% Roundup in water, 2% Garlon 3A in water or 50% Brush-B-Gon in water |
| Australian inkberry (Scaevola frutescens) | MANUAL - Hand pull and remove, at least fruit, from site whenever possible. | CHEMICAL - **Basal bark**: Pathfinder II (undiluted) or 10% Garlon 4 in oil.  
**Cut stem**: Brush-B-Gon (undiluted), Pathfinder II (undiluted), 50% Garlon 3A in water or 10% Garlon 4 in oil.  
**Foliar**: 20% Pathfinder II in water or 4% Garlon 4 in water, using care not to allow drift to non-target vegetation. |
| Australian pine (Casuarina spp.) | MANUAL – Hand pull seedlings, making sure to place them in such a way as so they do not re-root. | CHEMICAL - **Basal bark**: Pathfinder II (undiluted) or 10% Garlon 4 in oil.  
**Cut stem**: Brush-B-Gon (undiluted), Pathfinder II (undiluted), 50% Garlon 3A in water or 10% Garlon 4 in oil.  
**Foliar**: For seedlings and small trees, 20% Pathfinder II in water or 4% Garlon 4 in water, using care not to allow drift to non-target vegetation. |
| Bishopwood (Bischofia javanica) | MANUAL – Hand pull seedlings, making sure to place them in such a way as so they do not re-root. | CHEMICAL - **Basal bark**: Pathfinder II (undiluted) or 10% Garlon 4 in oil.  
**Cut stem**: Brush-B-Gon (undiluted), Pathfinder II (undiluted), 50% Garlon 3A in water or 10% Garlon 4 in oil.  
**Foliar**: For seedlings and small trees, 20% Pathfinder II in water or 4% Garlon 4 in water, using care not to allow drift to non-target vegetation. |
**Brazilian pepper (Schinus terebinthifolius)** MANUAL – Hand pull seedlings, making sure to place them in such a way as so they do not re-root.

CHEMICAL - **Basal bark**: Pathfinder II (undiluted) or 10% Garlon 4 in oil.

**Cut stem**: Brush-B-Gon (undiluted), Pathfinder II (undiluted), 50% Garlon 3A in water or 10% Garlon 4 in oil.

**Foliar**: Foliar application of Pathfinder, Garlon 4, Brush-B-Gon, Garlon 3A, Roundup Pro, Roundup Super Concentrate, or Rodeo, according to label directions may be used where appropriate. Glyphosate products are less effective when used alone in spring and early summer. Use Rodeo where plants are growing in aquatic sites.

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**Carrotwood (Cupaniopsis anacardioides)** MANUAL – Hand pull seedlings, making sure to place them in such a way as so they do not re-root.

CHEMICAL - **Basal bark**: Pathfinder II (undiluted) or 10-30% Garlon 4 in oil.

**Cut stem**: Brush-B-Gon (undiluted), Pathfinder II (undiluted), Rodeo or Roundup Pro (undiluted), 10% Garlon 3A in water or 5% Garlon 4 in oil.

**Foliar**: For seedlings and small trees, foliar application of Pathfinder, Garlon 4, Brush-B-Gon, Garlon 3A, Roundup Pro, Roundup Super Concentrate, or Rodeo, according to label directions may be used where appropriate. Use Rodeo where plants are growing in aquatic sites.

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**Catclaw mimosa (Mimosa pigra)** MANUAL – Hand pull seedlings, making sure to place them in such a way as so they do not re-root. Thorns may make hand pulling difficult. Thick gloves and long sleeves should be worn.

CHEMICAL - **Basal bark**: Pathfinder II (undiluted) or 30%-50% Garlon 4 in oil

**Cut stem**: Pathfinder II (undiluted) or 30%-50% Garlon 4 in oil

**Foliar**: Repeat foliar applications of 1.5% Rodeo in water, 2%-3% Garlon 3A in water or 50% Brush-B-Gon in water.

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**Chinaberry tree (Melia azedarach)** MANUAL – Hand pull seedlings, making sure to place them in such a way as so they do not re-root.

CHEMICAL - **Basal bark**: Pathfinder II (undiluted) or 15% to 30% Garlon 4 in oil. Treat 1-2 ft of trunk for larger trees. Trees > 3” dbh may require re-treatment.

**Cut stem**: Fell trees over 6” DBH and treat stumps with Pathfinder II (undiluted) or up to 30% Garlon 4 in oil.

**Foliar**: Not recommended.

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**Chinese tallow tree (Sapium sebiferum)** MANUAL – Hand pull seedlings, making sure to place them in such a way as so they do not re-root.

CHEMICAL - **Basal bark**: Pathfinder II (undiluted) or 15%-20% Garlon 4 in oil

**Cut stem**: Pathfinder II (undiluted) or 20% Garlon 4 in oil.

**Foliar**: Not recommended.
**Climbing fern (Lygodium spp.)**  MANUAL – Not recommended.

**CHEMICAL** - **Basal bark**: Not recommended.

**Cut stem**: Not recommended.

**Foliar**: Thoroughly spray foliage to wet with 0.6% Roundup Pro in water, 1.0%-3.0% Rodeo in water, 10% Pathfinder II in water or 1.25% Garlon 4 in water. Only Rodeo can be used if plants are growing in an aquatic site. For plants growing high into trees, cut vines and treat lower portions; or pull vines from the canopy into a pile, spray the pile with herbicide and leave the pile in place – checking within 1 month to ensure successful treatment. Do not apply herbicides when plants are under environmental stress, such as severe drought conditions.

**Downy rosemyrtle (Rhodomyrtus tomentosa)**  MANUAL – Hand pull seedlings, making sure to place them in such a way so they do not re-root.

**CHEMICAL** - **Basal bark**: Pathfinder II (undiluted) or 10%-20% Garlon 4 in oil.

**Cut stem**: Brush-B-Gon (undiluted), Pathfinder II (undiluted), 50% Garlon 3A in water or 10% Garlon 4 in oil.

**Foliar**: Not recommended.

**Earleaf acacia (Acacia auriculiformis)**  MANUAL – Hand pull seedlings, making sure to place them in such a way as so they do not re-root.

**CHEMICAL** - **Basal bark**: Pathfinder II (undiluted) or 10% Garlon 4 in oil.

**Cut stem**: Brush-B-Gon (undiluted), Pathfinder II (undiluted), 50% Garlon 3A in water or 10% Garlon 4 in oil.

**Foliar**: For seedlings and small trees, foliar application of Pathfinder, Garlon 4, Brush-B-Gon, Garlon 3A, Roundup Pro, Roundup Super Concentrate, or Rodeo, according to label directions may be used where appropriate. Use Rodeo where plants are growing in aquatic sites.

**Ear tree (Enterolobium cyclocarpum)**  MANUAL – Hand pull seedlings, making sure to place them in such a way as so they do not re-root.

**CHEMICAL** - **Basal bark**: Pathfinder II (undiluted) or 10% Garlon 4 in oil.

**Cut stem**: Brush-B-Gon (undiluted), Pathfinder II (undiluted), 50% Garlon 3A in water or 10% Garlon 4 in oil.

**Foliar**: Not recommended.

**Indian rosewood (Dalbergia sissoo)**  MANUAL – Hand pull seedlings, making sure to place them in such a way as so they do not re-root.

**CHEMICAL** - **Basal bark**: Pathfinder II (undiluted) or 10% Garlon 4 in oil.

**Cut stem**: Brush-B-Gon (undiluted), Pathfinder II (undiluted), 50% Garlon 3A in water or 10% Garlon 4 in oil.

**Foliar**: Not recommended.

**Java plum (Syzygium cumini)**  MANUAL – Hand pull seedlings, making sure to place them in such a way as so they do not re-root.

**CHEMICAL** - **Basal bark**: Pathfinder II (undiluted) or 10% Garlon 4 in oil.

**Cut stem**: Pathfinder II (undiluted), Brush-B-Gon (undiluted), 50% Garlon 3A in water, or 10% Garlon 4 in oil.

**Foliar**: Not recommended.
| **Latherleaf (Colubrina Asiatica)** | MANUAL – Hand pull seedlings, making sure to place them in such a way as so they do not re-root.  
CHEMICAL - **Basal bark**: Pathfinder II (undiluted) or 20% Garlon 4 in oil.  
**Cut stem**: Pathfinder II (undiluted), Brush-B-Gon (undiluted), 50% Garlon 3A in water, or 10% Garlon 4 in oil.  
**Foliar**: 3% Garlon 3A or Garlon 4 in water or 50% Brush-B-Gon or Pathfinder II in water. Follow up for three to four weeks. |
| :---: | :---: |
| **Laurel fig/ Cuban laurel (Ficus Microcarpa/ Ficus Nitida)** | MANUAL – Hand pull seedlings, making sure to place them in such a way as so they do not re-root.  
CHEMICAL - **Basal bark**: Pathfinder II (undiluted) or 10% Garlon 4 in oil.  
**Cut stem**: Brush-B-Gon (undiluted), Pathfinder II (undiluted), 50% Garlon 3A in water or 10% Garlon 4 in oil.  
**Foliar**: Not recommended. |
| **Melaleuca (Melaleuca Quinquenervia)** | MANUAL – Hand pull seedlings, making sure to place them in such a way as so they do not re-root.  
CHEMICAL - **Frill and girdle (basal bark not recommended)**: Pathfinder II (undiluted) Brush-B-Gon (undiluted), Rodeo or Roundup (undiluted), 20% Garlon 4 in oil or 50% Garlon 3A in water.  
**Cut stem**: Pathfinder II (undiluted) Brush-B-Gon (undiluted), Rodeo or Roundup (undiluted), 20% Garlon 4 in oil or 50% Garlon 3A in water.  
**Foliar**: For seedlings and small trees, 5% Rodeo or Roundup, using care not to allow drift to non-target vegetation. Melaleuca is very difficult to control. Frequently check treated plants for re-growth. |
| **Paper mulberry (Broussonetia Papyrifera)** | MANUAL – Hand pull seedlings, making sure to place them in such a way as so they do not re-root.  
CHEMICAL - **Basal bark**: Pathfinder II (undiluted) or 10%-30% Garlon 4 in oil.  
**Cut stem**: Brush-B-Gon (undiluted), Pathfinder II (undiluted), 50% Garlon 3A in water or 10% Garlon 4 in oil.  
**Foliar**: Not recommended. |
| **Shoe button ardisia (Ardisia Elliptica)** | MANUAL – Hand pull seedlings, making sure to place them in such a way as so they do not re-root.  
CHEMICAL - **Basal bark**: Pathfinder II (undiluted) or 10% Garlon 4 in oil.  
**Cut stem**: Brush-B-Gon (undiluted), Pathfinder II (undiluted), 50% Garlon 3A in water or 10% Garlon 4 in oil.  
**Foliar**: Not recommended. |
| **Wedelia (Wedelia Trilobata)** | MANUAL – Plants may be pulled up by hand, but will more than likely require herbicide treatment.  
CHEMICAL - **Basal bark**: Not recommended.  
**Cut stem**: Not recommended.  
**Foliar**: Treat small patches with 2% Roundup or Rodeo; large, dense populations may be treated by broadcast-spraying 5% Roundup, 5% Rodeo, 0.25%-1.0% Garlon 4 in water or 5% Pathfinder II in water (with follow-up treatments as needed). |
**Woman's tongue (Albizia lebbeck)**

MANUAL – Hand pull seedlings, making sure to place them in such a way as so they do not re-root.

**CHEMICAL - Basal bark:** Pathfinder II (undiluted) or 10% Garlon 4 in oil.

**Cut stem:** Brush-B-Gon (undiluted), Pathfinder II (undiluted), 50% Garlon 3A in water or 10% Garlon 4 in oil.

**Foliar:** Not recommended.

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**After treating any invasive exotic, re-check the plant within two months to ensure effective removal. Many plants will require multiple treatments with herbicide before they are completely controlled.**

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**HERBICIDE DISPOSAL**

Always try to estimate the amount of herbicide it will take to treat a given plant or area. Only buy what is necessary for treatment. If, however, any unused herbicide is left, it should be disposed of properly. Collier County residents may dispose of their household hazardous waste (including herbicides) at no cost at the Household Hazardous Waste Collection Center, located at:

**NAPLES LANDFILL**

3901 White Lake Blvd.
Phone: (239) 455-2830
Hours: Tues - Fri, noon - 1 P.M. & Saturday, 8 A.M. - noon

**Sources:**

