

## Maximizing Weed Control in Florida Citrus<sup>1</sup>

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With decreasing prices for Florida citrus, growers and production managers need to consider every opportunity to reduce production costs to aid in maintaining profitability. Currently, weed control is an expensive and major component of Florida citrus growers' annual citrus production costs. In the central Florida citrus production region, annual weed control costs account for approximately \$220 or 28% of the total \$778 annual production cost per acre. Other citrus production regions' cost vary due to local conditions and management programs. These annual costs are reported by Ron Muraro, Farm Economist, University of Florida and can be found as "Budgeting Costs and Returns" at [www.edis.ifas.ufl.edu](http://www.edis.ifas.ufl.edu). The report estimates weed control costs as follows: herbicide material and application, \$136.01; middles management (including mowing and cultivation where applicable), \$59.66; and general vine and hand labor, \$24.70.

In an effort to improve weed control, the grower may begin by asking what is a weed? A weed is simply an unwanted plant or a plant growing out of place. In the grower's case, the same species growing in the row middles may be a desirable species whereas when growing around a tree it could be undesirable, thereby a weed. Thus, depending on

the plant's location, its importance as a weed may change.

Weeds compete with the citrus tree for water, nutrients, light and space. Weeds may reduce crop yield and increase production and harvesting costs.

The objective of today's weed management program is to suppress and control weeds so that they do not cause damage to the tree, impact yield, or impede grove and harvesting operations. Complete and total elimination of all weeds from the grove floor is not necessary nor warranted.

When developing a weed management program, growers must consider: 1) weeds present, 2) stage of weed growth, 3) material selection, 4) amount of herbicide used, 5) application site, method and timing, and 6) herbicide band width. These items are discussed in detail below.

### Weeds Present

Growers should survey the grove to determine if weeds are present and their name. If present, efforts should be made to identify the weed type, i.e., grass, broadleaf or sedge by name. By knowing the type of weeds present, the proper herbicide material(s) can be chosen to provide effective control. In many

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cases, preemergence herbicides which control grasses may not control broadleaf weeds or those which control broadleaf weeds may not control grasses. Thus, proper weed identification is an important first step in developing a successful weed control program.

### **Stage of Weed Growth**

The stage of weed growth also affects the ability to control the weed with herbicides. Weeds in a seedling stage are the easiest to control allowing lower rates for control as compared to mature weeds. Seedlings are small plants which are rapidly growing. Weeds which are in a vegetative stage are fast growing and actively producing stems, roots, and foliage. The rapid growth of both seedling and vegetative stages will aid in their control as systemic herbicide movement within the plant is rapid. Plants which are mature or are in seed production tend to be more difficult to control due to reduced plant growth and slower movement of materials within the plant, thus making control more difficult than when they are in the seedling or vegetative growth stages.

### **Material Selection**

When choosing a herbicide material or materials, growers need to be aware of and follow specific label restrictions and recommendations. An important step prior to the purchase or use of any pesticide is to read the label information to identify use recommendations and restrictions.

Herbicides are generally classified as either preemergence or postemergence herbicides. Preemergence herbicides are those materials which are applied to the soil surface and must be applied prior to weed emergence for maximum effectiveness. Preemergence herbicides generally do not control weeds which have emerged from the soil. Some preemergence herbicides may have limited postemergence activity, but this is limited mainly to small seedling plants which are actively growing. To be effective, preemergence herbicides generally require incorporation into the soil by irrigation or rainfall to move the product into the zone of seed germination. Examples of preemergence herbicides include bromacil (Hyvar), diuron (Diuron, Karmex), bromacil + diuron (Krovar), thiazopyr (Mandate),

simazine (Caliber 90, Princep, Simazine), and norflurazon (Solicam).

Postemergence herbicides are applied after the weed has emerged from the soil and generally lack soil activity or root adsorption/absorption against those weeds which will emerge after the herbicide application. In many cases, the grower may choose to mix both pre- and postemergence herbicides together to improve weed control. Examples of postemergence herbicides include glyphosate (many brand names), paraquat (Gramoxone), sethoxydim (Post Plus) and fluzafop (Fusilade). However, consideration should be given to the size of the emerged weeds' potential for blocking the placement of the preemergence herbicides to the soil surface which thereby reduces future weed control.

Materials can be further classified as either systemic/translocated or contact herbicides. Systemic materials will move within the plant reaching all plant parts, i.e., roots, stems and leaves, thus providing complete weed control, if applied at an adequate rate and coverage. An example of systemic herbicide includes the many formulations of glyphosate. Contact herbicides do not move within the plant and kill only the plant part which the herbicide actually contacts. Contact herbicides usually provide partial plant control, allowing the roots or untreated plant parts to regrow. Example of contact herbicide includes various formulations of paraquat.

### **Amount of Material Applied**

The amount and type of herbicides applied to a given location varies with the age of the tree as well as its location within the state (ridge vs. flatwoods). For most of the recommended herbicides, a range of rates will be provided on the label. These rates will offer recommendations based upon tree age as well as soil conditions. Rates are usually lower for trees less than one year of age or where the soil is poorly drained. For recommended application rates of herbicides, please refer to ENY601, Pesticides Registered for Use on Florida Citrus at <http://edis.ifas.ufl.edu/CG013>.

## Application Site, Method, and Timing

Some herbicides have application restrictions that prohibit use in specific locations such as well-drained soils of the central Florida ridge area. Additional label restrictions may prohibit the intended use for specific tree age, with young trees receiving lower application rates than mature trees. Materials may also be classified as non-bearing which would prohibit use where a crop would be harvested within twelve months of application. This would limit material application to the first 18 to 24 months after planting depending on tree growth and when the first crop will be harvested.

Application method is also important. When applying preemergence herbicides via a herbicide boom, complete uniform coverage of the soil surface is important for improved weed control. Factors that can affect uniformity of coverage include worn or damaged nozzle tips. As nozzles become worn, delivery rates increase and distribution patterns from the individual nozzles become distorted. Additionally, weeds present will also affect spray coverage as these emerged weeds affect spray patterns as well as blocking the herbicide from reaching the soil surface when preemergence herbicides are being applied. The herbicide label may also state special application equipment requirements. These requirements may include special herbicide boom designs which minimize material drift or potential contact with tree foliage.

Application pressure is also important as pressure affects the size of the spray droplets. Higher pressure decreases the spray droplet size, thus increasing the chances of off-target damage due to spray drift. Manufacturer's specified operation pressure range should be considered when selecting nozzles.

Timing of herbicide application is important. Preemergence herbicides should be applied to a relatively weed-free soil surface. If significant weed growth is present, consideration should be given to applying a postemergence herbicide, then followed by a preemergence application after weed growth has been reduced.

## Band Width

Application band width has a major impact on the amount of herbicide material applied per grove acre, thus directly affecting total weed control costs. When trees are small, herbicide band width should be rather narrow, only covering an area of 3 feet on each side of the tree. As the tree canopy width increases, the herbicide band width should likewise increase. This narrow band width, when the trees are small, will aid in minimizing soil erosion and assists in maintaining water quality in bedded grove situations. For example, where trees are planted with 25-foot row spacing and the band width varies from 4 (8 foot total band width) to 7 feet (14 feet total band width) on each side of the tree, the soil surface treated area increases from 32 to 56% per grove acre (Figure 1). In this scenario, the material cost per grove acre increases from \$57.06 to \$99.86 per grove acre, respectively (Muraro, Budgeting Costs and Returns, <http://www.crec.ifas.ufl.edu/Extension/CentralFloridaSum04.pdf>).

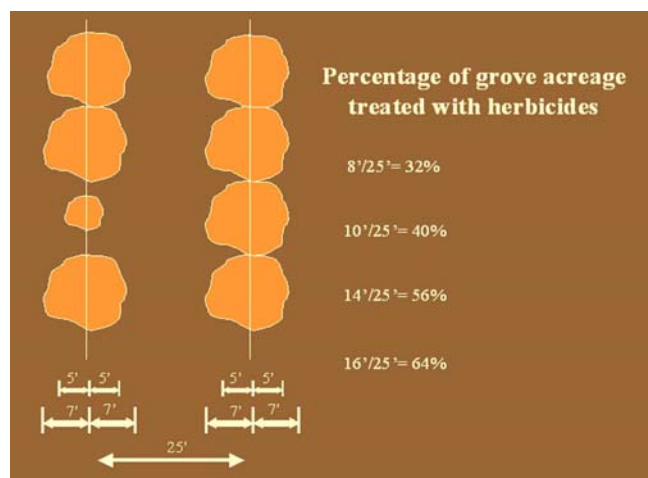


Figure 1. Band width.

Growers need to be aware of all factors to minimize weed control costs while improving weed control in Florida citrus groves. Consideration of the above factors will aid in weed control decision making.