UF IFAS Extension UNIVERSITY of FLORIDA

HS-107
doi.org/10.32473/edis-cg013-2023

2026–2029 Florida Citrus Production Guide: Weeds[1]

Ramdas Kanissery and Brent A. Sellers[2]

Weed management in Florida citrus is an important component of any successful integrated pest management (IPM) program. IPM programs utilize a combination of control practices including but not limited to cultural, preventive, mechanical, chemical, or biological methods. Weed management is expensive and a major component of the total citrus production program. Time spent developing this production program can provide significant economic and environmental returns. The goal of weed management is to minimize the competitive effect of weeds on the citrus tree, be it young or mature. An understanding of the growth and competitive nature of the weed is important. 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 neither necessary nor warranted.

When developing a weed management program, growers must consider the (1) application site (tree age, soil type, and location, including ridge vs. flatwoods and county limitations); (2) weeds present; (3) stage of weed growth; (4) herbicide selection; (5) spray nozzle and herbicide band width; (6) spray volume and pressure; and (7) amount of herbicide used. All these factors will directly affect cost and the success of the weed management program.

Tree Age and Variety

From years of experience and trials, growers know that weed growth is greater in young groves compared to mature groves. Generally speaking, young groves will require greater attention to material selection and rate because the areas around the trees are more sun-exposed and have greater weed pressure than do larger trees, which have greater shaded areas with lower weed pressure. An exception to lower weed pressure for mature trees is where vines are present. Vines can germinate in shaded areas and grow into the tree canopy, creating a host of problems for the tree and fruit-harvesting operations. Young trees generally will not tolerate herbicide rates as high as mature trees. Additionally, weeds compete with young trees for nutrients, water, light, and space at a greater rate as compared to mature trees.

When using herbicides for weed control, rates should be adjusted for tree age, with lower rates on young trees. Also, be aware that some herbicide products may only be labeled for nonbearing sites, which means that product can only be applied if a crop is not going to be harvested within 12 months.

Consideration should also be given to product selection based upon variety. Some products specify that they may only be used on oranges, thus prohibiting their use on tangerines.

Impact of Weeds on Tree Growth

Weeds can impact tree growth and subsequent yields by altering the spray pattern of low-volume irrigation systems, intercepting soil-applied chemicals (fertilizer and agricultural chemicals), reducing grove temperatures during freeze events, and interfering with harvesting operations. The presence of weeds in a grove can also affect insect populations and disease incidences.

Ground cover in the row middles also plays an important role in grove management by reducing soil erosion, sandblasting during windy conditions, and retaining nutrients, but it can also impact tree growth when allowed to compete with the citrus tree. Sod-forming bahiagrass and bermudagrass are typically used as ground cover between the tree rows, but bermudagrass can be more competitive than bahiagrass. Ground cover can be beneficial if it is less competitive than any weeds that may be present in the grove. Thus, the selection of row-middle vegetation is an important consideration in IPM.

Direct reduction in citrus tree growth and yield can occur when weeds compete with trees for light, water, nutrients, and space. However, not all weeds compete with citrus trees in the same way or with the same level of competition. Water requirements for vegetation regrowth after mowing can impact water availability within the grove. During this regrowth period, grasses use more water from the soil compared to broadleaf plants. Vines can be more competitive for sunlight than other plants. Weeds can also compete with citrus trees in many ways, but with varying intensities. The ability of plants to intercept varying levels of water, light, and nutrients makes some weeds more competitive with citrus than

other species. Therefore, highly competitive weeds should be of great importance to the production manager. Successful weed control is extremely important in groves containing weeds that are highly competitive. In an IPM program, the most competitive weeds are identified and removed before they produce seeds. With time, seeds in the soil can be reduced through suppression, cultural, and sanitation methods.

To ensure competitive weeds are suppressed, proper plant identification is a critical first step in developing an effective program. Weed species will vary with location, climate, season, soil type, previous site history, and current and past management programs. Scouting should be conducted in all areas in and near the grove but not limited to tree rows, row middles, water furrows, ditch banks, fence rows, and adjacent off-site locations. Each of these sites may receive different cultural practices, but different weeds may be found. Scouting off-site locations may prevent small, isolated problems from becoming larger problems. Because weeds emerge throughout all growing seasons, schedule weed surveys throughout the year. Scouting should occur even if weeds are not easily visible or appear to be dead. A rapid regrowth from perennial plants that appear to be dead can occur and is particularly problematic when replanting new trees into weed-infested sites. Scouting should be conducted by walking throughout the groves, because small, easy-to-control weed seedlings may go unnoticed when driving through the grove. If weeds are properly identified while in the seedling or vegetative stage, then proper control can be achieved through (1) increased flexibility in timing control options; (2) possible reduced herbicide application rate; and (3) reduced impact from control measures.

When scouting for weeds, records should be developed and recorded as to species abundance, location, and identity. Changes over time can be tracked to provide control strategy effectiveness. When scouting a large area, it is common to find a large number of weed species. The species present will vary with season and location.

Weeds can be identified or grouped as (1) broadleaf (including vines); (2) grass; or (3) sedge. The identification of weeds can be aided by looking for specific characteristics of the plant. These specific characteristics can include shape of the leaves, stems, seed, seed head, plant size, root system, and the type and color of flowers, if present. Weeds can be classified by their life cycle: annual, biennial, or perennial. Annual plants have a one-year life cycle, growing from seed, maturing, and producing seed for the next generation of plants in one year or less. Annuals can be further divided into summer (sprout in spring, grow, mature, and produce seed and die before winter) or winter (sprout in the fall, grow, mature, produce seed and die before summer). Biennials have a two-year life cycle, growing from seed and developing a heavy root system the first year, followed by seed production in the second year and then plant death. Perennials live more than two years, with seed production occurring as early as the first year.

Detailed information on weed identification in citrus groves is available from the following UF/IFAS publications: HS926/HS185, "Identification of Vine Weeds in Florida Citrus"; HS896/HS150, "Identification of Broadleaf Weeds in Citrus"; HS955/HS175, "Identification of Grass Weeds in Florida Citrus"; and HS962/HS205, "Identification of Sedge and Sedge-Like Weeds in Florida Citrus."

Weed Management Options

Many approaches are used to suppress or control weeds (vegetation) within the grove. These practices will vary with location, time (season), tree spacing, vegetation species present, cost, and grower preference. Each method of weed control has its own advantages and disadvantages.

Preventive

Preventive programs are often overlooked as a method of weed control. Preventive programs entail the use of such practices as sanitation, spot spraying, or hand labor to prevent the source of weed infestation (seed or vegetative) from widespread dissemination throughout an area. By removing the undesirable weed species prior to seed development, dissemination by the wind or mechanical transport on equipment can be effectively delayed. While preventive programs will not stop the spread of new weed species, these practices may slow the spread of undesirable weed species, thereby reducing the cost of current weed control programs.

Mechanical

Cultivation or tillage has been used in the past for many years in citrus production. Tillage is an effective method of controlling annual weeds by severing stems and roots of the weeds, but it is not very effective on perennial grasses. Tillage use is decreasing as a weed control method as more groves are planted on raised beds, and tillage increases the chances for soil erosion. Additionally, tillage damages the fibrous roots close to the soil surface, which is the main reason for the reduction in use. These shallow fibrous roots close to the soil surface are very important in groves where the root systems are limited due to high water tables, *Phytophthora* root rot, or root weevils. With the use of low-volume irrigation systems and closer in-row planting distances, tillage in both directions is no longer possible.

Mechanical mowing is generally more expensive than tillage due to the cost of equipment and energy requirements. Mechanical mowing can also throw seed under the tree canopy, increasing weed pressure in the undercanopy area of the tree. The frequency of cultivation or mechanical mowing is dependent on the weeds present and the season.

Chemical

Chemical weed-control programs will vary from location to location within the state and can even vary within a given site based on specific conditions such as soil type, variety, method of herbicide application, and the presence of specific weed species. Herbicides used in a grove are generally divided into two groups: (1) soil-applied preemergence herbicides that should be applied to fairly clean soil surfaces prior to weed emergence, and (2) foliar-applied postemergence herbicides that are applied after germination of weed seed.

Preemergence herbicides can be absorbed through emerging stems in the soil or through roots. Preemergence herbicides are most effective before germination and early seedling growth stages.

Postemergence herbicides can be further divided into systemic or contact. Systemic herbicides are translocated within the target plant, killing the foliage and root system of the contacted plant. Contact herbicides kill only the plant parts that are contacted by the spray application. All herbicides used in citrus are selective in that they kill some plants (weeds) without significantly injuring other plants (citrus trees) if applied at the correct rate and manner.

Preemergence herbicides are generally applied two to three times per year, and the total annual amount of herbicide materials will be nearly the same, regardless of the application frequency. For preemergence materials, application should be properly timed so that the maximum amount of herbicide is in the upper soil profile (0–2 inches) slightly before peak weed emergence. Material applied too early will not have enough herbicide concentration to provide adequate weed control due to herbicide losses caused by leaching or degradation on the soil surface or within the soil profile.

Chemical Mowing

Chemical mowing use is increasing each year as the cost of mechanical mowing increases due to rising equipment, maintenance, and fuel costs. Chemical mowing consists of sublethal rates of systemic herbicide (glyphosate) to suppress the growth or regrowth of grasses and broadleaf weeds that grow in the row middle for up to 45–90 days. Prior to the chemical mowing application, the vegetation within the row middle is mowed and allowed to slightly regrow.

Chemical Weed Control Programs

Successful herbicide programs start with selecting the right herbicide or herbicide mixtures. All herbicides have a label that states the use requirements, application rates, weeds controlled, and personal protective equipment required during mixing and application. Remember that the label is the law and must be followed.

The herbicide use rate, the stage of weed growth, climate, and method of application can affect control. Climatic extremes that stress plants, including drought, flooding, and extreme temperatures, could result in reduced herbicide performance. Stressed plants take up and translocate less herbicide than nonstressed plants. Poor herbicide performance is minimized when the proper herbicide is selected and applied at recommended rates in the correct spray volume to the right stage of the seedling's growth.

Selecting the proper herbicide requires an understanding of how herbicides work on plants. Herbicides applied to the soil before weed emergence are referred to as preemergence (Table 1). Other herbicides can be applied directly to weeds and are referred to as postemergence (Tables 2–5). These tables are found in booklet 2 of the *Florida Citrus Production Guide*.

Environmental Considerations

Herbicide selection should be based upon a number of factors, including weed species that are present or anticipated from weed surveys, vegetation developmental stages, product solubility and leaching potential, soil type at the location of application, rainfall distribution, county location, and other factors present on the product label.

Herbicides may move through the soil to groundwater if used improperly. Factors influencing the rate of herbicide movement in the soil include but are not limited to irrigation practices, rainfall, herbicide solubility, soil type, and organic matter.

Additional consideration should be given to products containing bromacil, which are prohibited on deep, sandy, ridge-type soils. Also, some product labels restrict the annual application of diuron within Highlands County. Consult your local UF/IFAS Extension or USDA-NRCS office for information on soil type restrictions.

Application Technology

Advances in herbicide application technology have resulted in the development of sophisticated equipment for the precision application of selected products within a grove setting. This sophisticated equipment is capable of selective delivery of multiple herbicide products, each directly injected or contained in multiple tanks that are injected into multiple lines or controlled by electronic sensors.

When applying preemergence herbicides via an herbicide boom, complete uniform coverage of the soil surface is important for improved weed control. Factors that can affect the uniformity of coverage include worn or damaged nozzle tips, boom height, and vegetation present. As nozzles become worn, delivery rates increase and distribution patterns from the individual nozzles become

distorted. Weeds present will also affect spray patterns as well as block the herbicide from reaching the soil surface when preemergence herbicides are being applied. The herbicide label may also state application equipment requirements. These requirements may include special herbicide boom designs that minimize material drift or potential contact with tree foliage.

Application pressure is also important because it affects the size of the spray droplets. Higher spray pressure decreases the spray droplet size, thereby increasing the chances of off-target damage due to spray drift. The manufacturer's specified operating pressure range should be considered when selecting nozzles.

Additional information about herbicide equipment and its calibration can be found in UF/IFAS publication HS-1012/HS252, "Citrus Herbicide Boom Sprayer Calibration."

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 3–4 feet on each side of the tree. As the canopy width increases, the herbicide band width should likewise increase. Narrow band widths on small trees will aid in minimizing soil erosion and assist in maintaining water quality in bedded-grove situations.

Position of the Off-Center Nozzle on the Herbicide Boom

Herbicide applicators should think about the angle of the off-center (OC) nozzle on the end of the herbicide boom. The nozzle angle as well as the distance from the end of the boom will have a major impact on where the spray is directed. The greater the nozzle angle, the higher and farther beyond the end of the boom the spray is directed, greatly increasing the chances of phytotoxicity occurring in the tree canopy. The height of the boom and its angle will also impact the distance and height that the spray is directed into the canopy of the citrus tree.

Herbicide Resistance Management

In many crops, the discovery of resistance to various herbicides has been well documented. Resistance is the ability of a specific weed to survive treatment with a given herbicide to which the species is normally susceptible. With repeated use of the same herbicide, the risk of resistance is increased. Due to its frequent and widespread use, glyphosate is a particular concern in Florida citrus. Weed resistance to glyphosate is a documented issue in numerous crop systems and should be expected. Rotating between herbicide classes will minimize the potential for development of herbicide resistance. A listing of the recommended herbicides is provided in Table 7, which identifies the chemical class of each herbicide material. Table 7 is found in booklet 2 of the *Florida Citrus Production Guide*.

Chemical Control of Root Sprouts

Various forms of glyphosate and triclopyr currently have label recommendations allowing these products to be used on recently cut citrus stumps. Triclopyr (Remedy Ultra) has an EPA 24(c) special local need registration for application to citrus stumps in Florida. This product should be applied in a manner that minimizes the application to the soil surface adjacent to the cut tree trunk.

Complete coverage of the cut surface will enhance control of vegetative regrowth from the stump. Stumps should be treated as soon as possible after cutting because effectiveness is reduced with time. If root grafting with desirable adjacent trees is present, the material may be translocated to healthy trees, causing significant damage.

Products should be applied in a manner that minimizes drift from the application site (cut stump) to the adjacent tree(s).

Be sure to read and follow all label requirements.

Recommended herbicide tables for weed management in citrus are in booklet 2 of the *Florida Citrus Production Guide*.

Web Addresses for Links

UF/IFAS publication HS-896/HS150, "Identification of Broadleaf Weeds in Citrus": https://doi.org/10.32473/edis-hs150-2003

UF/IFAS publication HS926/HS185, "Identification of Vine Weeds in Florida Citrus": https://doi.org/10.32473/edis-hs185-2003

UF/IFAS publication HS955/HS175, "Identification of Grass Weeds in Florida Citrus": https://doi.org/10.32473/edis-hs175-2004

UF/IFAS publication HS962/HS205, "Identification of Sedge and Sedge-Like Weeds in Florida Citrus": https://doi.org/10.32473/edis-hs205-2004

UF/IFAS publication HS-1012/HS252, "Citrus Herbicide Boom Sprayer Calibration": https://doi.org/10.32473/edis-hs252-2005

[1] This document is HS-107, one of a series of the Department of Horticultural Sciences, UF/IFAS Extension. Original publication date December 1995. Revised annually. Most recent revision August 2026. Visit the Ask IFAS website at https://ask.ifas.ufl.edu for the currently supported version of this publication.

[2] Ramdas Kanissery, associate professor, weed science, Department of Horticultural Sciences, UF/IFAS Southwest Florida Research and Education Center, Immokalee, FL; Brent A. Sellers, center director and professor, Department of Agronomy, UF/IFAS Range Cattle Research and Education Center, Ona, FL; UF/IFAS Extension, Gainesville, FL 32611.