

2010 Florida Citrus Pest Management Guide: Use of Pesticides in Citrus IPM¹

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Chemical and a few biologically-based pesticides are available to the grower for the management of foliar and soil-inhabiting pathogenic fungi, plant parasitic nematodes, weeds and numerous species of insects and mites found on the plant or in the soil. Compared to other crops, few pesticides are registered for citrus due to its minor use status. Generally, new pesticides being registered today are safer to man and the environment. They have shorter residual effect on the tree, and must therefore be applied carefully to assure good coverage. Natural products such as petroleum oils and copper compounds are effective and widely used in citrus pest management to combat insects, mites and diseases. Synthetic chemicals and biologicals representative of different classes of pesticides are also available to the grower. These even include a few traditional organophosphates and carbamates. Most foliar pesticides are applied with high pressure delivery systems, whereas soil-applied pesticides use low pressure herbicide applicators or chemigation. Workers require protective clothing during mixing, loading, and/or application. In general, currently used

chemical pesticides have a short residual effect on their target; therefore, repeated application is often required to suppress a pest. Biological pesticides are generally more environmentally friendly, but often lack residual effect and can be strongly influenced by weather factors. Regular pesticide usage usually improves the appearance of a citrus tree; however, pests suppressed by pesticide treatment often have little, if any, effect on tree growth and yields. Consequently, judicious use of pesticides is highly recommended for Florida citrus.

Many of the insect and mite pests found in Florida citrus groves are under biological control where they merely co-exist in localized areas of the grove with other consistently injurious species. Growers will benefit greatly by identifying these innocuous pests and avoiding pesticide application for their control. By taking this action, growers can reduce pest control costs significantly. Growers can go a step further by selecting pesticides that are least disruptive to natural enemies. All foliar and soil applied pesticides listed in this guide affect natural

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

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enemy abundance; however, less toxic products with short residual action, such as petroleum oil, are least disruptive to natural enemies. Conversely, highly toxic pesticides that kill upon contact may be less disruptive than pesticides with moderate contact toxicity but a long residual effect. Based on our current knowledge, we believe that two applications of any product with a similar mode of action within a given year pose a minimal threat to natural enemies, provided applications are separated by several months. However, concern for pesticide resistance suggests a more conservative approach. Products with similar modes of action should be applied only once per season where alternative products are available. The petroleum oils may be an exception in view of their unique mode of action (See ENY-624 Pesticide Resistance and Resistance Management).

Copper is the most widely used fungicide in Florida citrus. Multiple applications of copper, year in and year out, have resulted in the localized soil accumulation of toxic levels in the soil. Copper will occasionally disrupt the action of certain natural enemies. Growers are cautioned to use copper products only for disease control at rates and frequencies necessary to maintain: 1) full tree canopy density; 2) fruit yield; or 3) high packout. Care should be taken when using copper fungicides in summer as they may darken and enhance existing wind scar, melanose, and other blemishes on fruit surface. Economic loss from reduced packouts can be substantial.

Grower use of soil-applied chemical pesticides with high potential for leaching should be avoided when possible, and used only with caution. Proper timing of application with good irrigation management will reduce the potential for groundwater contamination. Applications of these chemicals during periods of substantial rainfall should be avoided (See HS-185 Best Management Practices for Soil Applied Agricultural Chemicals).

Tank-mixing chemicals is an accepted practice that can reduce production costs. Growers should determine the compatibility of each pesticide, growth regulator, nutritional element, and surfactant before tank mixing. The practice of using partial rates of two compounds with similar activity instead of the

recommended rate of one is questionable in terms of efficacy and is not recommended. The pH and Total Dissolved Solids (TDS) of the water supply and the finished tank mix should be monitored routinely. Certain nitrate-based nutritional are known to greatly reduce pH and thereby contribute to fruit burn and affect the performance of other compounds in the tank mix (e.g., solubility of copper). For tree canopy sprays (pesticides, nutritional, and growth regulators) surfactants should be used only if recommended on the label, and adjuvants with strong penetrating properties should not be used. Some adjuvants may actually result in substantial enhancement of activity and penetration of certain compounds, particularly growth regulators. Tank mixes should be kept simple, as the potential for fruit burn increases with the number of products in the tank, particularly under conditions of water stress, high temperature and low humidity. The suggested mixing order of various formulations of agricultural chemicals is: water, wettable powders and dry flowables, water-soluble concentrates or solutions, emulsifiable concentrates and oil. Check with your chemical supplier for information regarding specialty chemicals and foliar nutritional.