Tank-mixing tactics

To get the most mileage out of your pesticides and fertilizers, follow these tank-mixing principles.

by Dara Park, Ph.D. and Juang-Horng 'J.C.' Chong, Ph.D.

Tank-mixing pesticides and fertilizers is a convenient and cost effective way to apply two or more chemicals at once. When done appropriately, tank-mixing can reduce labor and equipment cost, and save time and energy. However, chemicals can potentially react with each other and/or change the characteristics of the carrier water. These interactions can change the efficacy of pesticides in both positive and negative ways.

POSITIVE EFFECTS

Enhancement occurs when an additive is mixed with a pesticide to provide a greater response than if the pesticide was applied alone. Adjuvants are common enhancements added to tank-mixes. Adjuvants include spreaders, stickers and other materials.

Additive effects result from the addition from each chemical added. The additive effect simply equals the sum of the effect if the chemicals would have been applied alone.

Synergism is when the product of two chemicals interacting with each other provides increased efficacy (control). This may allow for lower rates of chemicals to be used.

NEGATIVE EFFECTS

Antagonism is the opposite of synergism. The components react chemically with each other so one or both chemicals are rendered less effective than if they were applied separately. In addition to poor performance, an increase in plant phytotoxicity may occur.

Incompatibilities can occur from chemical reactions as mentioned above, or as the physical product of mixing chemicals. For example, if flocculants form, screens and nozzles may be clogged and the desired rate of chemical may not be applied. Flocculants and precipitants also can leave a residue on leaf surfaces. Other chemical incompatibilities occur from mixing chemical(s) with inadequate carrier water. Also, carrier water that is too low or high in pH and temperature, contain salts, or organic particulate can chemically alter the compound that is to be applied.

Pesticide resistance to two or more chemicals within a tank-mix may develop if the same chemical combination is used repeatedly over a long period of time. Pests may develop resistance faster when the chemicals used in the same tank-mix are of the same mode of action (for example, cyfluthrin and bifenthrin are both synthetic pyrethroids and target the activity site in an insect's nervous system). Resistance also may occur when the chemicals are of different modes of action if they are used frequently.

To make sure that only positive effects occur when tank-mixing, follow these guidelines for developing new tank-mixes:

1 Know the temperature, pH and salinity of your carrier water. Adjust your carrier water temperature and pH to the optimal range of each chemical before mixing in a tank or for a jar test.

2 Read the label of all chemical products considered to be tank-mixed. The product labels will give you information on what type of chemical and carrier to avoid and potential problems that may occur. If you are still unsure about a mix, contact the manufacturer.

3 Perform a jar test following proper mixing procedures (see sidebar). This will determine physical incompatibilities.

4 Many chemicals require constant agitation; be sure to follow all label instructions. Many labels will instruct you in the sequence for adding products to the tank mix.

5 Tank-mix enough to make a test application on part of the target site (preferred) or on a non-target site. Schedule the application to allow enough time for any negative effects (chemical incompatibilities) to be apparent before the actual application is made.

6 When making an actual application, spray as soon as possible. Do not use a spray solution that has been sitting for a long time. Some chemicals may degrade in spray solution after several hours. **GCI**

Dara Park, Ph.D., and Juang-Horng 'J.C.' Chong, Ph.D., are assistant professors at Clemson University's Pee Dee Research and Education Center in Florence, S.C.

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