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Assessing Pesticide-Fertilizer Compatibility (Jar Test)

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Pesticides and fertilizers are normally tank-mixed to save time and application costs. However, some pesticides may not be compatible with fertilizers or may be affected by water quality. Fertilizers can influence the pH of the mixture and thus the suitability of using a pesticide with a fertilizer. Further, the water source is also very important because it may be more difficult to mix with water that is hard and contains large amounts of minerals compared to water with fewer minerals. It is also important to avoid letting pesticide/fertilizer mixtures sit for extended periods as this can increase the chance of reactions occurring that may impact the compatibility or efficacy of the mixture.

Often, the pesticide product label will include specific instructions for mixing that need to be followed. The label also lists a telephone number or website for technical support and safety concerns. Chemical and fertilizer companies spend considerable amounts of money researching and developing their products, and specific information on mixing and compatibility is often available.

If the label does not state any recommendations, you will need to perform your own compatibility test when large batches are to be mixed. The incompatibility of pesticides and fertilizers can be both chemical and physical. Chemical incompatibility may result in changing pesticide properties and result in increased crop injury or reduced efficacy. Physical incompatibility, on the other hand, can cause the formation of lumps, precipitates, gels, or foams. The result may be total loss of the products and use of the tank and/or sprayer. Surfactants and compatibility agents may be added to help maintain component dispersion and improve mixing.

It is always prudent to conduct a compatibility test for physical compatibility before mixing any pesticide with fertilizer. This can save time, money, and the spray equipment. The following "Jar Test" is a compatibility test that can be used to test the physical compatibility of pesticides and fertilizers.

Always check the pesticide or fertilizer product label for instructions on mixing order. If no instructions are stated on the label or given by the chemical dealer upon purchase of the products, begin by adding products in the order from the most diluted to the most concentrated, allowing enough time for agitation between each product. For example, a product slurry, a dry product premixed in the spray solution, would be added to the tank and agitated before a concentrated liquid product is added.

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Jar Test Instructions

Materials Needed:

- 2 one-quart glass jars with lid.
- A ¼-teaspoon, a ½-teaspoon, and a 1-teaspoon measuring utensil; a 5-cc syringe with 0.2-cc graduations can be used for liquids (1ml = 1 cc).

1. Add 1 pint of carrier (water, liquid fertilizer) to each of 2 one-quart jars.

2. To one of the jars add ¼-teaspoon or 1.2 milliliters of a compatibility agent approved for this use (¼-teaspoon is equivalent to 2 pints per 100 gallons of spray). Shake or stir gently to mix.

3. Add each product to the jar in the approximate ratio and order that you will add them to the spray tank. Be sure to thoroughly rinse measuring devices between products. Use the W-A-L-E-S sequence when mixing pesticides:

Wettable powders or water-dispersible granules

Agitate then add adjuvants such as anti-foaming compounds and buffers

Liquids (flowable liquids)

Emulsifiable concentrates

Surfactants

- Dry pesticides: For each pound to be applied per acre, add 1.5 level teaspoons to each jar.
- Liquid pesticides: For each pint to be applied per acre, add ½-teaspoon or 2.5 milliliters to each jar.

4. Add the lid and simulate continuous agitation, by gently shaking the jar for 10 seconds after each addition.

5. When all ingredients have been added, add the lid, gently shake for 30 seconds, and let stand for 30 minutes or so.

6. After standing for 30 minutes, inspect the mixture for precipitates, sludges, or separations of liquid phases, all of which may indicate incompatibility.

- If the components in the jar are dispersed, the pesticide and fertilizer are compatible. If the components are not dispersed in the jar, the pesticide-fertilizer mixture is not compatible and should not be used. One should always keep in mind that certain pesticides require constant agitation, particularly wettable powders and dry flowable products.

7. Determine if the compatibility agent is needed in the spray mixture by comparing the two jars. If either mixture separates but can be remixed readily, the mixture can be sprayed as long as good agitation is used.

- If the mixtures are incompatible, test the following methods of improving compatibility: (A) Slurry the dry pesticide(s) in spray solution before addition, or (B) add 1/2 of the compatibility agent to the fertilizer and the other 1/2 to the emulsifiable concentrate or flowable pesticide before addition to the mixture.

8. It is important to note that a jar test only tests physical incompatibilities, not chemical incompatibilities. The best way to test for chemical incompatibility is to spray the mixture in a small area and check for crop damage or reduced performance.

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