Tank Mixing Poses Considerations

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Little information exists regarding the chemical interactions of tank mixes. Most chemical incompatibilities, however, are noted on pesticide labels. In this article, the types of fungicide incompatibilities and testing for compatibility will be reviewed.

There are two general types of incompatibilities: chemical and physical. Chemical incompatibilities generally occur when pH or the presence of one of the compounds reduces the efficacy of a pesticide or when the mixture injures, that is, is phytotoxic to the turf.

Some examples of chemical incompatibilities are:

- mixing an alkaline reacting fertilizer such as Formalene (pH about 10) reduces the efficacy of benomyl;

- mixing lime with Dyrene, Fore, Tersan LSR, Thiram or Aineb reduces their effectiveness.

- mixing Trimec or Trexsan with Daconil wettable powder (WP) may cause formation of a precipitate (i.e., solid particles separate out of the suspension or solution, forming a solid material at the bottom of the tank).

- mixing organic fungicides (most fungicides, with the exception of Actidione, and cadmium or mercury-containing fungicides, are organic) with emulsifiable concentrate (EC) formulations of insecticides can be pyhtotoxic;

- Karathane (Dinocap) is not compatible with Sevin (an insecticide) and oil-base formulations of other pesticides.

Dr. Paul Sartoretto of the W.A. Cleary Corp. has extensively studied chemical incompatibilities of pesticides and has established four general rules that should be considered before tank mixing. These rules are as follows:

Rule 1. Never tank mix emulsifiable insecticide concentrates.

Rule 2. Mix only one soluble chemical (i.e., EC and L liquid formulations) with any number of insolubles (i.e., WP and F formulations).

Rule 3. When mixing two soluble chemicals with or without insolubles, the rate of each soluble should be halved to avoid phytotoxicity.

Rule 4. Soluble fertilizers and trace elements can be added individually or mixed, provided the amount will not exceed one ounce solid per gallon tank spray mix.

Physical incompatibility is normally an equipment-related problem. For example, wettable powders mixed without sufficient agitation or without a sufficient amount of water will clog screens. Pre-wetting and creating a slurry is helpful in getting wettable powders into suspension, especially when spraying with a small quantity of water.

Other tank mix considerations: insecticides and pre-emergence herbicides are generally watered-in after application. Conversely, turf treated with fungicides should not be irrigated for at least 24 hours, and preferably 48 hours. Hence, tank mixing fungicides with insecticides and pre-emergence herbicides would greatly reduce efficacy.

It is important to mix only enough material to be sprayed in one day. Chemicals will interact in the tank, and if enough time elapses, the effectiveness of the pesticides will diminish.

Temperature also influences pesticide effectiveness. As temperature in the tank increases 10 degrees Celsius, the reaction rate of chemicals will double and thereby increase the likelihood of phytotoxicity or reduced efficacy.

Time and temperature affect the performance of insecticides and fertilizers more significantly than fungicides.

COMPATIBILITY

Many incompatible combinations are listed on pesticide labels. Frequently, however, compatibility questions arise, especially when dealing with new formulations of pesticides or when unusual pesticide combinations are being considered. It therefore becomes necessary to test the compatibility of a mix yourself.

This is best achieved through a simple, two-step test. Step 1 merely involves placing a mixture of the precise dosage of pesticide plus the appropriate amount of water in a quart jar for 30 minutes. If separation of chemicals occurs or if materials settle out, it is probably unwise to use the mixture.

Step 2 should be performed regardless of results acquired in Step 1. In Step 2, the mixture is applied to turf. Preferably, the mixture should be applied during adverse environmental conditions such as hot, dry weather and overlapped to insure the phytoxicity does not occur. A minimum of 48 hours should elapse before the response can be properly evaluated.

When mixing pesticides of different formulations, the order of mixing should be as follows: wettable powders - flowables - soluble powders - surfactants - emulsifiable concentrates[2]. Pesticides should only be placed into a tank that has been half-filled with water and with the agitation system running. ■

Reprinted from Turf and Verdure, March 1986.