

Compatibility of Pesticides & Fertilizers and Tank Mixture Problems

By R.W. Miller and J.F. Wilkinson*

Mixing pesticides and/or pesticides and fertilizers in spray tanks reduce labor and equipment costs and in some cases, increase the effectiveness of the products. Unfortunately, mixing chemicals also may reduce the effectiveness of some materials and may cause damage to the target plant. There are no simple guidelines to use in mixing turfgrass chemicals. Good judgment and a great amount of caution are the best methods to avoid problems from tank mixtures of chemicals.

LEGALITY OF TANK MIXTURES

The Environmental Protection Agency has rules that tank mixtures of pesticides and fertilizers are permissible provided that:

1. The label of any produce in the mixture does not state that the pesticide should not be used in mixtures.
2. The use of the mixtures otherwise conforms to all other label restrictions.

The EPA has considered requiring a label for tank mixtures but wisely decided against it because of the inconvenience and unnecessary expense to consumers. It is likely that tank mixtures will remain legal unless problems develop from widespread misuse of them. Some states require that commercial applicators label tank mixtures of chemicals, however, this process seldom involves more than a simple reporting system in which the applicator registers his intent to use the mixture or mixtures, pays a small registration fee, and reports the content of the mixture on the customer invoice.

TYPES OF TANK MIXTURES

Today, with the vast number of pesticides and pesticide formulation, there are an almost endless number of combinations that someone may wish to use. General classifications are:

1. Mixtures of fungicides
2. Mixtures of insecticides
3. Mixtures of herbicides
4. Mixtures of fungicides and insecticides
5. Mixtures of fungicides and herbicides
6. Mixtures of herbicides and insecticides
7. Mixtures of fungicides, herbicides and insecticides
8. Mixtures of fertilizer and any one of the above chemicals or combinations of chemicals

COMPATIBILITY OF TANK MIXTURES

When pesticides are used in combinations or in a mixture, numerous problems may arise. In such cases the components of a mixture are compatible if they can be used together or incompatible if problems develop from using the combination. If two or more pesticides can be used in combination without impairment of toxicity, physical properties of plant safety, they are compatible.

PHYSICAL OR CHEMICAL INCOMPATIBILITY

When mixing two or more pesticides reduces the effectiveness of one or all components, the mixture is chemically incompatible. Most organic fungicides and insecticides should not be combined with alkaline compounds with a pH higher than 7.0. Alkaline reactions significantly reduce the effectiveness of carbamate fungicides and the insecticidal value of some compounds.

For this reason, lime for the control of algae should not be used with maneb fungicides such as Fore, Manzate, Tersan LSR and Dithane M-45. This is also true for Dyrene, Zineb, Thiram, Captan and most organic insecticides.

Dinocap (Karathane), suggested for the control of powdery mildew, is chemically incompatible with Sevin and oil-base sprays.

Chemical incompatibility is frequently the cause of poor performance of multiple pesticide combinations. Other problems may be excessive foaming, salting out, unstable mixtures, and the formulation of gelatin-like materials. Before combining any pesticides, read the label on

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the package or container. If information on compatibility is not specified, it is wise to avoid combination of products until other investigations are completed.

PHYTOTOXIC INCOMPATIBILITY

When two or more compounds used in combination result in plant injury, they are incompatible because of phytotoxic effects. Mixing organic fungicides with emulsifiable concentrates (EC) insecticide formulations with xylene as the solvent, may cause plant injury. When combining fungicides with liquid insecticides, check the label for compatibility and avoid problems of plant injury. When combining pesticides or unknown compatibility, it is always good to try them first on an expendable turf area before use on large turfgrass areas.

PLACEMENT INCOMPATIBILITY

Incorrect placement of pesticides is frequently the reason for poor disease and insect control. Placement incompatibility is less obvious than some other types of incompatibility and is sometimes overlooked. When two or more chemicals are used together and applied in one operation, each must end up in the proper place if it is to do the job for which it is intended. Some fungicides are protectants and must be uniformly distributed over the leaf surfaces to protect against invasions of pathogens such as *Piricularia* (Gray leafspot) and *Helminthosporium* leafspot of turfgrasses. Failure to establish a foliar blanket of fungicide protection results in poor control of destructive turfgrass diseases. In order to be effective, insecticides for grub control must be washed off the grass into the soil. Therefore, a combination of Maneb (Tersan LSR) for the control of leafspot and Diazinon for grub control is ineffective because of placement incompatibility.

Another example of placement incompatibility is broad-leaf weed control materials mixed with insecticides that should be watered into the grass or soil.

TIMING INCOMPATIBILITY

Another type of incompatibility sometimes overlooked is the need to apply each component of the mixture at the proper time. An example of this type of incompatibility is the use of a pre-emergence herbicide for crabgrass control and an insecticide for grub control. If the herbicide for crabgrass control is applied at the proper time, the insecticide for grub control will not be effective because the application is made too early in the year.

DAMAGE POTENTIAL OF MIXTURES

Although a combination of materials is compatible, its use increases the probability of turfgrass injury compared to using each component a few days apart. This additive effect occurs if each component is applied separately at one time or if they are applied in a mixture. Under adverse conditions, such as high temperatures or moisture stress, a mixture of chemicals, safe to use under good conditions, may cause injury. There is no replacement for common sense in determining when mixtures can be used without undue risks.

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Because you have successfully mixed chemicals in the past is no guarantee that you can continue to in the future. Active ingredients are seldom incompatible. It usually is the chemicals used to formulate the product and formulation change from time to time.

COMPATIBILITY TESTS

The first thing to do to determine compatibility is to read the label. If the label states that the pesticide should not be mixed, discard the idea. However, the label will not always tell you if it can be mixed with other chemicals. In these cases, first make a jar test. Simply make the mixture in a quart jar and observe what happens over the next half hour. If unusual separation or settling out of materials occur, it probably is not wise to make the mixture.

The second test is to first try the mixture on a small area of grass where you will not be disturbed if problems occur. You always should follow this procedure when using a mixture for the first time.

Compatibility charts are available from several sources and serve as a valuable aid. They are not all inclusive and they do not include all formulations of a product. It is wise to use the grass test even if the chart shows the mixture to be compatible.

PRECAUTIONS FOR MIXING PESTICIDES

1. Never mix pesticides in concentrated form. Mix them in the tank already filled with water and with the agitation system running.
2. Do not mix organic fungicides with other pesticides that contain xylene as a solvent.
3. When mixing pesticides of different formulation, the order of mixing should be wettable powders followed in order by flowable products, water soluble powders, surfactants and emulsifiable concentrates.
4. Do not mix pesticides with materials that cause high tank pH levels without thoroughly investigating compatibility.
5. When using a pesticide mixture for the first time, do a jar and a grass test before using the mixture on critical grass areas.

6. When tank mixing pesticides and fertilizers, use urea in preference to other water-soluble nitrogen sources.

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from Florida Turf Digest, Vol. 3, No. 5, May 1986

Superintendents to Participate in New Championship

Golf course superintendents are pleased to be involved with PGA professionals, manager and presidents of the nation's country clubs in a national golf championship recently created by the John Deere Company.

The announcement was made by Riley L. Stottern, CGCS, president of the 7,000-member Golf Course Superintendents Association of America (GCSAA), with headquarters in Lawrence, Kan.

The event — the John Deere/PGA Professional-Superintendent Championship — will feature four-man teams competing in a scramble format at the 41 PGA Sections throughout the country.

Qualifying is scheduled between June and September, with the 36-hole Championship in November. The date and site will be announced later. Teams will be made up of the PGA Professional, the club's course superintendent, club president and club manager.

"It is gratifying, and fitting," observed Stottern, "that superintendents are recognized as among the most important people in the game of golf. It is they who make and keep our nation's golf courses playable. Many superintendents play golf frequently not only because they enjoy the game and are good, but also because they know it is the best way to understand how to keep their courses in the best possible condition. "GCSAA thanks John Deere for its development of the tournament. Our members are looking forward with great enthusiasm to playing in it with the PGA professionals, club presidents and managers, who also are so essential to the game and industry."

Gary Gottschalk, manager of John Deere's Golf and Turf Division, said the firm is "excited about the concept. This program provides an opportunity for the club professional and club superintendent to play together on a team with other club officials. I am not aware of any other competition like it." ■

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