

Tank Mixing Products Impact More Than What You See. Causes, Watch-Outs, Preventative Measures.

Causes for Incompatibility

Physical Incompatibility (How products mix)

The inability of pesticides, fertilizers, plant growth regulators and biostimulants to mix together is referred to as physical incompatibility. Physical incompatibility can be caused by several factors that include improper mixing, inadequate agitation, inadequate water carrier volume, poor water quality, or lack of stable emulsifiers in some emulsifiable concentrates. In most cases, solids settle out of the mixture or the mixture separates into layers after agitation. Sometimes, the mixture may curdle, gel, or become sludge like. For example, when wettable powders and emulsifiable concentrates are improperly mixed, they can form a putty or paste with an oily layer that floats on the top of the tank.

Chemical Incompatibility (How products perform)

Chemical incompatibility is a change in the performance or safety of products resulting from chemical interactions that occur in the spray tank. In these cases, the products can be mixed together and applied with no visible signs of incompatibility, however, the effectiveness of the products is affected. However, some product combinations may injure the turf. Refer to the product label for any cautionary statements concerning tank mixing (Figure 1).

Figure 1

Daconil Weather Stik Tank Mixing Cautionary Statement:

DO NOT combine Daconil Weather Stik® in the spray tank with pesticides, surfactants or fertilizers, unless prior use has shown the combination physically compatible, effective and noninjurious under your conditions of use. DO NOT combine Daconil Weather Stik with Dipel 4L, Foil, Triton AG-98, Triton B-1956, Latron B-1956 or Latron AG-98 as phytotoxicity may result from the combination when applied to some species on this label.

Watch-Outs — *The carrier you use can impact both physical & chemical incompatibility*

Water Quality and Pesticide Compatibility/Performance

Water quality in the spray tank can influence the performance or compatibility of pesticides. It is important to test your water source. High levels of pH, aluminum, iron, magnesium, calcium and sodium molecules in hard water can attract negatively charged pesticide molecules. Well water can contain sediments and elements that reduce pesticide performance and inhibit compatibility. City water is treated to remove suspended and dissolved solids, but this can cause a high pH that may decrease pesticide effectiveness. The binding of pesticide to minerals can render the pesticide ineffective if it isn't able to enter the target pest or precipitate out of solution.

For fungicides and insecticide, maintaining a spray tank mixture at a pH between 4.0 and 6.5 is generally considered ideal. When the pH is either too acidic or alkaline, product performance can be compromised. In some cases the fungicides and insecticides break down in alkaline solutions. If the pH is above 7.0, use acidifiers and buffers to lower pH of the solution. Pesticide labels may or may not specify a need for buffers.

Fertilizers and Bio Stimulants

Some of these products have very high or very low pHs that can influence the pH of the spray solution that may negatively impact pesticide performance. Some contain amino acids, humates, or other suspended solids that can interact with pesticide active ingredients and reduce their activity or cause them to precipitate out of solution which impacts both performance and compatibility.

Preventive Measures – *The order of the process is important*

WALES Method – Follow this simple process when adding products

Since many factors influence pesticide compatibility, it is best to conduct your own jar test to determine compatibility, especially when applying a new mixture for the first time. The compatibility of pesticide-fertilizer combinations should also be tested on a small scale before large batches are mixed. If compatibility issues are detected, adding a compatibility agent may help maintain the dispersion of the mixture. Always wear label-required personal protective equipment when pouring or mixing pesticides. Do a jar test in a safe work space.

Mixing Order (WALES Method)

Figure 2

1. **W**ettable Powders (WP) then flowables (F, DF)
2. **A**gitate then add adjuvants such as anti-foaming compounds, buffers
3. **L**iquid and Soluble products
4. **E**mulsi-fiable concentrates (EC)
5. **S**urfactants

Conduct a Simple Physical Compatibility Test

Incompatibility of tank mixtures is more common with mixtures of fertilizer and pesticides

Test Procedure

1. In a clean quart glass jar with a tight, sealable lid add 1-pint of carrier (water or liquid fertilizer if this is to be used as the carrier). **Note: Use the same source of water that will be used for the tank mix and conduct the test at the temperature the tank mix will be applied.**
2. Add a compatibility agent if required. Shake or stir gently to mix.
3. Next add the appropriate amount of pesticide(s) in their relative proportions based on the rate(s) to be applied. Add 1 teaspoon per ounce of product to be applied per 1000 ft². For example, if the planned application rate is 3.5 oz, add 3.5 teaspoons to the test mix. If more than one pesticide is used, add them separately following the WALES Method described above in Figure 2. After each addition, invert the jar 10 times to thoroughly mix and simulate agitation in the spray tank.
6. Put lid on and tighten. Invert the jar ten times to mix. Let the mixture stand 15–30 minutes and then look for separation, large flakes, precipitates, heat, gels, heavy oily film on the jar, or other signs of incompatibility.
7. If the mixture separates, but can be remixed readily, the mixture should be able to be sprayed as long as good agitation is used.
8. **If the mixtures are incompatible, test the following methods of improving compatibility: (a) slurry the dry pesticide(s) in water before addition, (b) add a compatibility agent if one was not used or (c) add ½ the compatibility agent to the fertilizer or water and the other ½ to the emulsifiable concentrate or flowable pesticide before addition to the mixture. If incompatibility is still observed, do not use the mixture.**
9. After compatibility testing is complete, dispose of any pesticide waste in accordance with the Storage and Disposal section on the label.

Note: This procedure will only test for physical incompatibility of various products. It is still possible for some mixtures to be chemically incompatible i.e. efficacy may be impacted despite no physical evidence of mixing problems.

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