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## **FACTORS TO CONSIDER BEFORE TANK MIXING PESTICIDES**

Mixing pesticides together in the same tank can be risky. It can result in physical or chemical incompatibilities. It can increase or decrease the action of each or all ingredients. It can be toxic to the plants. Combinations can damage equipment.

**Chemical incompatibilities** are more common than physical incompatibilities. Chemical incompatibilities occur when the chemical reaction of the spray mixture increases the effectiveness of one or both materials, or when the chemicals react to form a precipitate. The results may be additive or synergistic (enhancing each other). Or, the action may be negative.

**Physical incompatibilities** of pesticides can result in scumming, lumping, and foaming and can damage equipment. Physical incompatibilities may result when: (1) mixing a granular formulation in water, or (2) mixing together wettable powders, oils, and water.

### **General principles for mixing pesticides:**

1. Mix only two pesticides whenever possible and be certain of compatibility.
2. Do not mix two emulsifiable concentrates (ECs) (two solvents). This often results in phytotoxicity, the deposit may be decreased due to excess runoff.
3. Do not mix two wettable powders (WPs) unless you know differently. It is commonly done and recommended. For example: benomyl WP and mancozeb WP. It is here not so much as an incompatibility problem, but sometimes a heavy and unsightly residue on the foliage is left. Flower producers are concerned with this as a marketing problem.
4. Do not mix alkaline materials with acidic materials.
5. Often EC formulation and WP formulations result in phytotoxicity. This is often due to the solvents, carriers, emulsifiers.
6. Do not mix granular formulations with liquids.
7. When mixing, use formulations from same manufacturer if possible.

8. Precipitate forms when anionic and cationic surfactants are mixed. So mixing a pesticide that contains an anionic surfactant with a cationic surfactant can produce a precipitate. Do not mix anionic surfactants with paraquat - a cationic material. Use non-ionic surfactants.

9. Lime or other highly alkaline materials with organic chemicals renders these organophosphates, carbamates ineffective. Coppers, lime sulfur, and bordeaux are alkaline.

10. Emulsions are often destroyed when mixed with pesticides that have high concentration of soluble salts.

11. Do not mix contact herbicides with translocation herbicides.

12. Compatibility may be improved with the use of a compatibility agent. We observed that compatibility was not always eliminated.

### **Specific mixtures to avoid:**

\*\*Fixed copper fungicides are not generally compatible with insecticides.

\*\*Roundup herbicide and residue soil applied herbicides result in decreased activity of Roundup.

\*\*EPTC followed by MCPA or 2,4-D or dinoseb could cause greater injury to desirable plants.

\*\*Captan, captafol (Difolotan), and folpet (Phaltan) and oil is phytotoxic even when sprayed on the plant separately but within 30 days.

\*\*Captan and dinitros, fixed coppers, and oils result in phytotoxicity.

\*\*Acti-dione should not be mixed with highly alkaline materials.

\*\*Do not use (dimethoate) Cygon or (Captan) Orthocide with oil--phytotoxicity results.

\*\*Benomyl decomposes in alkaline solutions so should not be mixed together, but can be mixed with fixed coppers if pH is not over 8.0.

\*\*Do not use Kelthane or Sevin with alkaline materials.

\*\*Do not combine Meta Systox-R with lime sulfur or fixed copper or Bordeaux. Meta Systox-R is compatible with most other pesticides.

### **Causes of phytotoxicity:**

1. Excessive amounts of pesticide can move into leaves and cause damage because the protective cuticle of the leaf has been damaged. Eptam mixed with triallate (TCA) causes destruction of the cuticle which allows herbicides (MPA, 2,4-D, dinoseb) applied later to cause greater injury.

2. A mixture of oil and captan fungicide causes injury due to increased oil penetration.

3. Phytotoxicity is increased when some herbicides and pesticides are combined. The application of propanil when followed within 14 days by an application of carbaryl (Sevin) results in injury to a rice crop. The same can occur if the materials are applied in reverse order or are mixed together.

4. Phytotoxicity can occur to the active ingredient or, more commonly, by the actions of solvents, wetting agents, or emulsifiers which increase penetration.
5. Physical wounding of plant tissues can occur if spray pressures are excessive.
6. Susceptibility to phytotoxicity often varies with age of plant or stage of growth. Young sorghum plants, for example, appear less susceptible to foliage burn than older plants from organophosphate spray.

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***Pesticide Use*** - Due to constantly changing laws and regulations, no liability for the suggested use of chemicals in this Newsletter is assumed by the ONW Newsletter. Pesticides should be applied according to label directions on the pesticide container.

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