CORN TALK NEWS
PENNSYLVANIA MASTER CORN GROWERS ASSOC., INC.

Adjuvants Enhance

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herbicides. Not only does cuticle composition vary between species, but also the age of the plant has been associated to differences in leaf wax chemistry over time.

The most common types of activator adjuvants employed are surfactants, oils, and salts. Activator adjuvants influence the physicochemical properties of the spray solution including surface tension, density, volatility, and solubility. These properties will in turn modify the spreading, wetting, retention, and penetration of the spray solution. It is important that the appropriate adjuvant is selected for a particular pesticide product. The type of adjuvant added to the spray tank can enhance or reduce the performance of the pesticide. The relative effectiveness of several adjuvants on herbicide performance is shown in Table 2. In both these trials, nonionic surfactant was less effective than other types of adjuvants; however, with other weeds or herbicides nonionic surfactant might be the more appropriate choice.

The first step in choosing the correct additive for a specific product is to read the pesticide label. The wrong adjuvant may increase the risk of poor performance and/or crop injury.

Surfactants

The primary purpose of a surfactant or "surface active agent" is to reduce the surface tension of the spray solution in order to allow more intimate contact between the spray droplet and the plant surface. Any substance that brings a pesticide into closer contact with the leaf surface has the potential to aid absorption.

Surface tension is a measure of the surface energy in terms of force measured in dynes/cm. Water has a surface tension of 73 dynes/cm. Surfactants lower the surface tension of water to that of an oil or solvent which spread more readily than water on plant surfaces. Surfactants typically lower the surface tension of a solution to between 30 and 50 dynes/cm.

The interaction between surfactant, herbicide, and plant surface is far more complex than simply lowering the surface tension of the pesticide solution. Surfactant molecules may also alter the permeability of the cuticle. Surfactants form a bridge between unlike chemicals such as oil and water or water and the wax on a leaf surface.

There are many different types of surfactants. In general, they are constructed of a long chain hydrocarbon group on one end which is considered lipophilic (fat loving) and a more hydrophilic (water loving) group of atoms on the other end. The structure of surfactants is often represented by a tadpole or polliwog type of arrangement such as seen in Figure 1.

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