

TANK MIX ADDITIVES
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There is much interest in the turf profession regarding materials that can be added to a spray tank to improve pesticide performance. These additives are generally referred to as adjuvants. An adjuvant is any substance used with a pesticide that enhances the performance or handling of the pesticide.

Before adding any adjuvant to a spray tank keep in mind that most, if not all, pesticides are formulated with adjuvants. Examples of this include wettable powders which are formulated with adjuvants that affect flowability, wettability, dispersability, and suspendability. Flowables contain adjuvants that improve suspending, thickeners to prevent settling, and compounds to prevent freezing. Because of this, do not add any adjuvant to the tank unless it is recommended on the label. The adjuvant you add may counteract the action of an adjuvant added by the pesticide manufacturer.

Although adjuvants may be used with insecticides, fungicides or herbicides most of the interest comes with the use of adjuvants when attempting to control weeds. Because of this, the remainder of this article will focus on adjuvants used with herbicides.

For a postemergence herbicide to be effective controlling weeds it must be retained by the foliage and penetrate through the leaf cuticle. Certain adjuvants reportedly can help both processes. Wetting agents, which are a type of adjuvant, act to reduce the surface tension of water. This allows a spray droplet to spread over a leaf surface rather than bead up when the droplet comes in contact with the leaf. This results in more herbicide in direct contact with the leaf surface which will lead to improved weed control.

Wetting agents also act to solubilize the leaf cuticle. The leaf cuticle is comprised of several layers, including layers that contain wax. By partially solubilizing the wax in the cuticle, a herbicide can move more readily into the leaf. Once in the leaf, the herbicide will then be translocated by the weed to sites where it will act to control the weed.

Wetting agents are classified as anionic, cationic, nonionic, or amphoteric. Anionic wetting agents carry a negative electrical charge, cationic wetting agents have a positive charge, nonionic wetting agents have no charge, and amphoteric wetting agents have a pH dependent charge. Most wetting agents used in turf are nonionic. Nonionic wetting agents are good dispersing agents, stable in cold water, have low toxicity to turf, and are needed in low concentrations.

Occasionally, someone may say that a dishwashing soap or laundry detergent can be substituted for a nonionic wetting agent. This is not valid information. While a soap or detergent is a type of wetting agent, they do not function in the same manner as a nonionic wetting agent. A soap or detergent foams, contains a low amount of surfactant, and lacks EPA approval.

Another type of adjuvant used with postemergence herbicides is a sticker. A sticker helps the herbicide adhere to the leaf surface. By increasing the amount of herbicide that adheres to the leaf surface, herbicide uptake by the plant increases. Stickers are usually a type of gel or resin.

Although wetting agents and stickers are used in the turf industry there has been little research documenting their effectiveness. Research needs to be done to determine the conditions under which these adjuvants are most effective. Once this is known, then informed decisions can be made regarding the use of wetting agents and stickers.

Thickening agents are used by some segments of the agricultural industry to reduce herbicide drift. A thickening agent increases the viscosity of the spray solution. Although thickening agents help reduce drift they do not allow spraying to occur on very windy days.

Fertilizers are sometimes added at low rates to a herbicide spray solution to potentially increase herbicide activity. The fertilizers most commonly used are ammonium sulfate, ammonium nitrate, and urea. In a few cases, the addition of a fertilizer has been shown to increase herbicide activity but this response is not consistently seen. The mode of action of the fertilizer to increase herbicide effectiveness is not known.

The salts of calcium, sodium, potassium, and magnesium have been shown to reduce efficacy of 2,4-D, dicamba, bentazon, and glyphosate in some cases. Before adding any fertilizer to a herbicide solution read the label thoroughly and test the combination on a small area before proceeding further.

Adjuvants are used to enhance pesticide performance. Since most pesticides are formulated with adjuvants it is not necessary to add additional adjuvants in most cases. Only add adjuvants when it is recommended on the label. More research is needed to clearly understand the role of wetting agents and stickers when controlling weeds.