

Plant Management in Florida Waters : An Integrated Approach

[Home](#) [Control Methods](#) [Chemical Control](#) **Adjuvants**

Adjuvants

For more than a century, pesticide applicators have mixed adjuvants into their herbicide spray tanks in order to facilitate or modify the action of the applied chemical, and make the herbicide application more effective. Like the water that is mixed with most aquatic herbicides, these commercial additives are combined with the herbicide in small quantities, causing it to spray with less drift, stick better to leaves, spread more evenly over the plant, and so on. The earliest adjuvants were made from whale oils that were meant to enable a chemical to stick to the targeted species. In the mid-twentieth century, soaps and detergents were popular adjuvants. Research in the 1950s led to the development of more sophisticated adjuvants.

Today, several manufactured herbicides contain specially formulated adjuvants pre-mixed in the herbicide container. Or, herbicide applicators may select and mix adjuvants themselves to meet site specific needs. Modern adjuvants are made from complex synthetic formulations that are designed for specific purposes. Most have no toxic effect on the plants or the environment. In the United States, there are several hundred name brand adjuvants that have various effects on aquatic herbicides. The EPA regulates ingredients ("inert ingredients") that are added to pesticide products but adjuvants, by themselves, do not require testing by the Environmental Protection Agency or the Florida Department of Agriculture and Consumer Services in order to be used. There are generally three categories of adjuvants.

Adjuvants can be used to reduce herbicide drift by modifying spray droplet size.

Table 1: General Adjuvant Types

Activator Adjuvants	Activator adjuvants increase the effectiveness of herbicide by altering spray droplet size, distribution and/or viscosity of the spray, evaporation rate, rate of uptake (absorption) by the plant, and solubility of the herbicide.
Surfactants (surface-active agents)	promote the penetration of the chemical into the leaves of the plant.
Wetting agents	increase the ability of water to displace air or liquid from the plant's surface so the herbicide will spread more evenly over the plant.
Oils	increase the retention time of the sprayed material on the plant and enhance uptake through the leaf surface.
Spray Modifier Adjuvants	Spray-modifier adjuvants affect the delivery and placement of the spray solution. They make the herbicide spray easier to aim, reduce herbicide drift in the air, and cause the spray to more readily adhere to the plant.
Stickers and spreaders	are made of gels, oils, and waxes that help herbicide spray droplets spread and adhere to foliage.
Foams	make it easier to control drift so non-target damage is less likely.
Polymers	are used for drift control and to help break surface tension on the water, thus allowing the herbicide to sink onto submersed aquatic weeds.
Inverting oils	form a viscous blend that reduces drift during application, increases contact time on the plant, and sinks the herbicide onto submersed plants.

Utility-modifier Adjuvants	Utility-modifier adjuvants make the herbicide more useful in certain environmental conditions.
Buffering agents	adjust the pH of the herbicide spray solution for alkaline or acidic water.
Anti-foam agents	enable the herbicide to mix with soft water.

When used properly, adjuvants are relatively harmless compounds that enhance herbicidal properties and can decrease the overall quantity of [herbicide](#) needed for plant control. Some adjuvants, primarily surfactants, can impact fish and aquatic vertebrates and are to be avoided for aquatic [herbicide](#) applications. Although many manufactured [herbicides](#) already contain adjuvants and provide application information on the label, each plant management project is unique and requires an assessment by a professional plant manager before the appropriate adjuvant can be selected and utilized. See this University of Florida, IFAS publication #SS-AGR-104 **“Safe Use of Glyphosate-containing Products in Aquatic and Upland Natural Areas”** by Kenneth Langeland for a further discussion on polyethoxylated tallowamine (POEA) surfactant.

For a compendium of adjuvants and a glossary of terms, go to:
<http://www.herbicide-adjuvants.com>

See publication **SS-AGR-109, “Adjuvants”**, from the Agronomy Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida for additional information on adjuvants and their use in chemical applications.

Last updated: 28 November 2011