ask ? us

About Insects

By
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Insects
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Q What is the best pH for pesticide applications?

A I was asked this question at a recent roundtable with about a dozen growers and remembered that I had been asked this question a number of times before, so it makes sense to address a wider audience here.

Alkalinity and pH can have a significant effect on the performance of many pesticides, and even moderate departures from normal may cause phytotoxicity. As a general rule, buffering to a pH as close to 7.0 as possible or being a little acidic (6.5) is a good practice for good pesticide performance for the majority of pesticides.

Water has an electrical charge, both a positive (H+) and a negative (OH-). When the two charges are in balance, the pH is 7. If it is acidic, there are more H+ ions in solution and the pH is less than 7. Conversely, if it is basic, there are more OH- ions than H+ and the pH is greater than 7. The OH- negatively charged ion is typically more active in the breakdown of pesticide molecules. That's why, when you are cleaning a spray-tank, bleach (sodium hypochlorite, NaOCl-) is commonly recommended. When the pH of the water is greater than 8 or 9, as some of the agricultural water supplies are here in Southern California, many common pesticides will become ineffective in a short period of time and buffering or acidifying is recommended. You certainly shouldn't store an unused portion of an insecticide mixture if the pH is high because much of the active ingredient will be hydrolyzed.

Hydrolysis is a chemical reaction where molecules are broken down in water. Many pesticides are affected by hydrolysis, but how quickly the reaction occurs is determined by how susceptible the pesticide is to hydrolysis, its pH level and the temperature of the solution. For example, pesticides such as organophosphates, synthetic pyrethroids and carbamates undergo hydrolysis when added to water with a pH greater than 7.

Test your water source regularly. If it needs adjusting, the common practice is to acidify or buffer the tank solution. There are many good websites that explain why you need to adjust your water and provide methods to accomplish pH adjustment. A great website that describes things very well can be found at the following address: www.umass.edu/umext/floriculture/fact_sheets/greenhouse_management/ph_pesticides.htm.

Always read the label for any specific information regarding the pH of the spray solution. Optimum pH ranges for common pesticides can be found at the following website provided by The Ohio State University, Ohio Floriculture Online: floriculture.osu.edu/archive/apr04/InsecticidesPHZ.html.

Q I hear the term "nonionic surfactant" all the time. What does it mean?

A First of all, surfactants have many purposes, but they are typically known for their ability to fully wet pesticide-treated foliage. Technically, surfactant molecules have a water-loving (hydrophilic) end and a water-repelling (hydrophobic) end. They can be used as dispersants, solubilizers, emulsifiers, wetting agents, etc. With the addition of surfactants, oil — which normally does not dissolve in water — becomes dispersible and can be sprayed. The EC (emulsifiable concentrate) formulations of pesticides contain a surfactant and oil.

There are two common types of surfactants based on their chemistry, nonionic and ionic. Surfactants that carry a positive (anionic) or negative (cationic) charge are known as ionic surfactants. They are specialty adjuvants that are used in certain situations and with certain products. They are readily used with oppositely charged herbicides, increasing the solubility of herbicides in water. Ionic surfactants are frequently used in agriculture with glyphosate.

Nonionic surfactants are composed of alcohols, fatty acids and silicones, and tend not to have an electrical charge. They are compatible with most pesticides and are the most widely recommended surfactants. For example, LI 700 is a penetrating surfactant that can be used as a pH adjuster/acidifier. LI 700 neutralizes or slightly acidifies the spray solution and prevents the breakdown hydrolysis of pH-sensitive products in the spray tank. Silicone-based surfactants, also known as organosilicones, are increasing in popularity thanks to their superior spreading ability. Some of these surfactants are a blend of nonionic surfactants and silicone, while others are entirely silicone. GPN

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