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A LITTLE BIT COUNTRY
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Understanding Water Quality Reports

Water quality is important to herbicide effectiveness and spray problems. However, the issue is complex as each herbicide may respond differently to water quality.

Laboratory reports will usually include pH, total dissolved solids (TDS), electrical conductivity (EC), hardness, sodium absorption ratio (SAR), residual sodium carbonate and bicarbonates.

High and low pH can reduce effectiveness of pesticides and cause nozzle plugging with some herbicides. There are herbicides which are degraded rapidly in extreme pH water. Most sulfonylurea (SU) herbicides are hydrolyzed by high and low pH. This is not normally a problem when sprayed within a normal time period but effectiveness could be reduced when mixed in water with extreme pH for a day or more. Low pH forces salt formulated herbicides into the acid state that may not be soluble in the amount of water being sprayed and thus plug nozzles and reduce effectiveness.

High and low pH can also increase the effectiveness of certain herbicides. Some adjuvants for glyphosate formulations lower pH but glyphosate is soluble at low pH and maintains effectiveness. In addition, the low pH overcomes antagonism from salts in the water. Herbicides need to be in solution for absorption into plant foliage. SU herbicides are more soluble in high pH so water with high pH may increase their effectiveness. This is especially true for Accent, but some minerals such as sodium may not allow the total benefit from the high pH.

The TDS include calcium, magnesium, sodium, potassium, iron, sulfate, iron, chloride, bicarbonate and nitrate. The sum of all minerals dissolved in a water sample is referred to as TDS. The higher the TDS, the more electric current water can conduct. The measure of EC is often used to provide a quick, economical estimate of TDS. If the EC is less than 500umho/cm, water quality problems for herbicides are not likely to occur.

Water hardness is caused by potassium, calcium, magnesium and iron. These minerals can react and antagonize water soluble formulations of many weak acid herbicides like glyphosate, 2,4-D, amine, MCPA amine, dicamba and Curtail. The ester formulations of herbicides are oil soluble and do not react directly with the salts in water. However, these oil type formulations need an emulsifier so that the formulation will mix with water. Sometimes these emulsifiers may be ineffective when in water with salts and cause an oil-like scum or precipitate in the spray water thus reducing effectiveness and plugging nozzles.

Ammonium sulfate (AMS) is used to counteract the antagonism created by the minerals contributing to water hardness. The amount of AMS needed to overcome antagonistic ions can be determined with the following formula: lbs AMS/100gal = (0.002 x ppmK + (0.005 x ppmNa) + (0.009 x ppmCa) + (0.014 x ppmMg) + (0.042 x ppmFe).

Water quality test reports will usually give an SAR value. This is used to determine the water's value for irrigation purposes. Water high in sodium, when added to clay soils, will be detrimental to a plant's ability to extract water from the soil. Water quality standards for SAR are as follows: Excellent = 0-3, Good = 3-5, Permissible = 5-10, Doubtful = 10-15, Unsuitable = more than 15.

Water with bicarbonate levels greater than 500 ppm may reduce effectiveness of herbicides such as Achieve, Poast, Select, MCPA amine and 2,4-D amine. When using water with more than 500 ppm bicarbonates the high rate of these herbicides should be used and applied at the most susceptible weed stage for effectiveness.