



# Information Sheet

## 10.5 Water quality for herbicides

To achieve effective herbicide applications, attention needs to be given to several factors that influence product performance. Water quality is an important factor that influence the efficacy of chemicals used in spraying crops. Growers often overlook the importance of water quality when applying herbicides, and this may lead to poor weed control and contribute to economic losses.

Water used for herbicide application may be sourced from dams, boreholes, springs, rivers, and municipal supplies. As a result, water quality and suitability vary throughout the industry. Poor water quality can increase chemical breakdown in the spray water, reduce herbicide activity, precipitate the herbicide out of the solution and it may cause spray line blockages.

### Water quality factors that affect chemical performance include:

- water cleanness (silt load);
- the acidity or alkalinity of the water (pH);
- water hardness (amount of dissolved calcium and/ or magnesium); and
- the electrical conductivity of the water (EC);

#### **Water cleanness**

Raw water from dams, springs and rivers contains suspended clay and silt particles. Clay and silt particles have the potential to absorb and bind some herbicides i.e. glyphosate, and reduce the efficacy. It is essential that growers use the cleanest water available and/ or check the water quality and the silt content. As a rule of thumb, if a R2 coin can be seen at the bottom of a 10 litre bucket of water, then that water is clean enough for use. Furthermore, dirty water can block nozzles, lines and filters and affect equipment performance and lifespan.

#### **Water pH**

pH is a measure of the concentration of hydrogen (H<sup>+</sup>) and hydroxyl (OH<sup>-</sup>) ions in the spray water. On a pH scale (1-14), water can be classified as being acidic, alkaline or neutral. Solutions with a pH of 7 are classified as neutral, less than 7 are acidic and greater than 7 are alkaline.

Generally, herbicides work best when water pH levels are slightly acidic with a pH of 4-7, however, a value of 5.5 - 6.5 is ideal. There are some expectations such as sulfonylurea herbicides which work best at water pH values above 7.0. Some herbicides are alkaline sensitive whereby the pH is above 7 on the scale. Adding herbicides that are sensitive to alkaline water conditions may cause the chemical to undergo hydrolysis, causing the breakdown of the active ingredient to an inactive compound. This results in reduced herbicidal activity and efficacy. It is vital to have the optimum pH for mixing.



### **Water hardness**

Water hardness is caused by the presence of certain minerals in the water including calcium and magnesium bicarbonates, sulphates, chlorides, iron and nitrates. Water hardness is measured in parts per million (ppm) and values of 115 and above are characterised as moderately hard, hard or extremely hard. These ions can interfere with herbicides through the process of inactivation, breakdown, or precipitation. Hard water is undesirable for use with herbicides as it resists pH changes, and more acidifier is needed to reduce pH to optimum levels. Furthermore, salts may cause incompatibility between products that have been tank-mixed and could reduce weed control efficacy of products such as MCPA and glyphosate. To test for hard water, apply water to soap and see if it lathers. Hard water will not lather with soap.

### **Electrical conductivity (EC)**

Conductivity describes the water's ability to conduct electricity. Pure water is a poor conductor, but conductivity improves with the increase of dissolved salts. The optimum range for carrier water is less than 200 millisiemens per meter. A high EC does not necessarily mean that the water is hard. The more dissolved salts present in the water, the greater the potential problem with herbicides. Diuron, for example, is known to be unstable in water with high EC levels irrespective of pH. Water samples analysed from the northern areas very often have high EC values.

## **What can growers do to achieve good quality spray water?**

### **Water choice**

Always use the cleanest water available. Get your water quality tested by a reputable water laboratory. Water properties may fluctuate in some areas, therefore testing a water sample two to three times a year might be useful. Following the detailed water test, a handheld pH meter may be used.

### **Test water pH**

Chemicals are available to adjust pH, some of which have colour indicators that show the user when sufficient product has been added (e.g. Bladbuff turns the entire spray mixture pink at the desired pH). Some acidifiers have a buffering action therefore the product does not only lower the pH but maintains it at the desired range. If an acidifier without a colour indicator is used, a grower may then use pH test strips or a digital pH meter to check acidity levels.

### **Test water hardness and electrical conductivity (EC)**

Water hardness can be tested using soap to determine whether lather (indicating soft water) or insoluble scum (indicating hard water) is formed. An electrical conductivity meter can be used to establish conductivity of spray water. As water quality is a function of pH, water hardness and water conductivity, it is essential that the product used can rectify these problems. Certain products may reduce electrical conductivity and water hardness by binding or tying up the responsible ions and salts.

**Table 1. Products available to reduce pH.**

Product Trade Name	Properties**
Aquabuff	buffer
Armoblen 650	buffer, wetter and penetrator
Beefabuff	buffer
Beefabuff Plus	buffer and wetter
Bladbuff 5*	buffer, wetter, penetrator and spreader
Buffernat	buffer and spreader
Commodobuff	buffer
Curabuff	buffer and spreader
Hygrobuff 4	buffer
Insure	buffer
Kynobuff	buffer
Kynobuff Super	wetter, buffer and spreader
Qwemibuff	buffer
Reverbuff	buffer
Sunbuff	buffer
Surebuff	buffer
Volcano Blend	buffer, wetter and penetrator

\* contains a patented colour pH indicator

\*\* as listed in National Department of Agriculture's 'A Guide to the use of Herbicides'

**Note:**

- \* Not all of the above products are able to rectify electrical conductivity and water hardness.
- \* It is very important to read the product label thoroughly, as mixing instructions differ between products.
- \* Water quality does not remain at a fixed level, therefore, growers are urged to test water repeatedly throughout the season.

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