

Water quality and spraying issues for 2007

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Take Home Messages

Water quality can vary greatly between water sources. Poor quality water can affect pesticide performance. Understand the quality of water you are using and manage accordingly to maximise your pesticide performance.

Introduction

Pesticide formulations are generally designed to be used with water as the primary diluent and carrier. Consequently water compromises a large percentage of the volume of the spray solution. Water is an active chemical and its quality can vary greatly between water sources.

With dry conditions and limited water flows occurring during Season 2006, various water sources are being assessed with the option of using them for agricultural spraying purposes in Season 2007.

The following factors are important to understand as they may have an influence on pesticide performance.

Hardness

Water Hardness is a common problem influencing water quality and pesticide performance. Hardness is caused by the abundance of positively charged metal ions in water, usually Ca^{2+} . These ions can bind strongly to negatively charged weak acidic pesticides such as glyphosate and hinder their performance.

Ammonium sulphate either granular or as a liquid, (for example Liase) is generally added to the spray solution to help alleviate the effect of water hardness.

pH

Most pesticides perform best in slightly acidic conditions. This can create problems when the water used for spray applications is alkaline (for example, majority of bore water sources or water out of concrete tanks). In alkaline water, some chemicals are broken down rapidly by irreversible chemical reactions, commonly referred to as alkaline hydrolysis. An example of this is Dimethoate. Half of the product is irreversibly destroyed in an alkaline spray solution of pH 9 in only 48 minutes.

A pH buffer (for example LI-700) is often used to buffer the spray solution back to a more acceptable acidic level.

Bicarbonates

Bicarbonate is released from chemical weathering of rocks into the ground water. An every day bicarbonate is Sodium Bicarbonate (baking powder). Bicarbonate concentrations as low as 175 ppm can affect the efficacy of Group A dim herbicides and 2,4-D Amine. Work undertaken by Nufarm R&D in 2005 showed a 25 percent reduction in Aramo (Group A dim) efficacy at 350 ppm.

The addition of Ammonium Sulphate (for example Liase) is very effective when managing bicarbonates and 'dim' herbicides.

Total Dissolved Salts

A common problem in spray water may be salinity caused by Sodium Chloride in solution. Saline water (> 1,000 ppm) can upset product specific surfactants and solvents, particularly EC formulations. The product may not bloom and can lead to the breakdown of emulsion, separation, thus uneven distribution.

An alternate water source (or blend) is recommended.

Total Suspended Solids

The effect of Total Suspended Solids can be two-fold.

1. Physical effect of blocking filters and nozzles – this may be alleviated by filtering water prior to being pumped into the spray tank (use a 50 mesh filter).
2. Chemical effect of clay or organic matter causing a deactivation and absorption of chemicals eg. Paraquat and clay. The old rule of thumb is that if you can see a 20 cent coin at the bottom of a 10 litre bucket, it will be OK to use. However, it needs to be applied immediately, using robust rates and is not to be left in the spray tank overnight.

Temperature

Very cold water can be common during the frosty winter period. If water temperatures are too low and the correct mixing order is not adhered to, certain products may ‘drop out’ and cause problems, blocking filters.

Following the correct mixing procedure is important when using cold water to minimise the chance of products ‘dropping out’ of solution.

Quantity

With potentially tight supplies of water available for spraying in 2007, applicators may have to use minimal water volumes. As spray water volumes decrease, the importance of the spray application process increases. Using less water may be counter-acted by using a finer spray quality - halving a droplet's size produce 8 times more droplets. The down-side of using a finer droplet is its ability to move around more (increased potential for drift or loss) and be more prone to environmental conditions (may evaporate prior to reaching the target). Therefore spraying conditions are much more critical as the impact that wind and Delta T have will be magnified.

Understand the mode of action of the chemistry that you are using, your target and spray quality to help determine an ideal water rate.

General rules of thumb are:

- Contact Pesticides = More Water
- Translocated Pesticides = Less Water
- Soil Applied Pesticides, No Stubble = Less Water
- Soil Applied Pesticides, Through Stubble = More Water
- ‘Fine’ to ‘Medium’ Spray Quality under ideal spray conditions = Less Water
- ‘Coarse’ to ‘Very Coarse’ Spray Quality under ideal spray conditions = More Water

Further information on water rates can be found on the product label or Nufarm’s “Boom Spray Application Guide 2006”.

Water Management

Some products are more susceptible to poor quality water than others. When using different water sources, the poorer quality water can be used for those less affected (i.e. Triflur X) and use the better quality water for the products, which may be affected (i.e. Roundup CT).

Testing

Water quality can vary over time. It is suggested that the quality of water being used for agricultural spraying be tested on an annual basis. A simple 'Test-Strip' is available from most chemical re-sellers, which will give a guide for Hardness & pH. More comprehensive tests need to be sent away to a laboratory to quantify. Such a test should cost no more than \$100 – a small price to pay when compared to the cost of agricultural chemicals being put through the boom-spray.

Summary

While not being ideal, poor quality water can be used for agricultural spraying. To maximise performance of the pesticide being used, remember the following:

- Test the various water sources to be used to understand the water quality
- Alleviate any potential issues with a water conditioner(s)
- Understand the mode of chemistry being used
- Minimise water rate
- Keep chemical rates robust
- Do not leave mixes in the spray tank over-night
- Apply with the right water rate and droplet size to suit the chemical

NOTE: Town water is currently being delivered to a large percentage of Wimmera/mallee farms. Town water has very low levels of fluoride and chloride present which should pose no problems for spraying.

Good Luck!