Adjuvant

Tip of the Month

March 2019

pH – A SMALL DIFFERENCE CAN HAVE A HUGE IMPACT

pH-reducing buffers are used extensively in South Africa. The most frequent use of buffers is with certain insecticides to limit a process called alkaline hydrolysis (degradation in high pH spray mixtures). However, buffers are also used to optimize the absorption and efficacy of certain crop protection products (CPP).

The pH-scale can be very confusing, therefore it is important to understand how it works, because just a small decrease in pH can have a huge impact on CPP efficacy.

How the pH scale works

It is important to understand that the pH scale is logarithmic and that it is numbered from 0 to 14. Values below 7 are acidic and values above 7 are alkaline, with 7 being neutral. What people often don't realize is that with each 1-point decrease in pH, there is a 10-fold increase in acidity! Most pH-reducing buffers normally reduce the pH to a range of between 4 and 6 where alkaline hydrolyses of many sensitive insecticides is reduced. The spray solution pH will then stabilize and should remain in this range.

Certain products have a colour indicator to show when the correct pH level has been reached. However, when a buffer is used that doesn't ensure the correct pH range, the spray solution may be too acidic or even too alkaline for the CPP.

The consequences of an incorrect pH

If the target pH is 5 but the spray solution is reduced to a pH of 3, there could be disastrous consequences. At a pH of 3, the spray solution is 100-times more acidic than at a pH of 5!

Firstly, the CPP may be unstable at such a low pH or it may be converted to an ineffective or phytotoxic form.

Secondly, certain tank-mix partners that are less effective at an extremely low pH will be affected. Thirdly, absorption of certain systemic CPP in the spray mixture may be retarded resulting in much more time spent on the leaf surface that could contribute to leaf scorching. Fourthly, physical incompatibility of spray mixtures is sometimes caused by an extremely low pH. This could result in flocculation, jelly-like spray mixtures and blocked sieves and nozzles.

Obviously, the opposite is also true when a buffer may fail to decrease the pH enough. Remember, just a small difference on the pH scale could mean a massive difference in acidity of the spray solution.

Villa's stance

pH is one of the most misunderstood aspects of spray solutions and a small mistake with pH-manipulating adjuvants can make a huge difference to efficacy and physical compatibility. Make sure what the requirements of the pH-sensitive product are and use premium quality buffers.

Don't forget the tank-mix partners and take all the CPP into account when acidifying spray solutions. Don't acidify all spray mixtures as a standard practice but rather stick to label recommendations.

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