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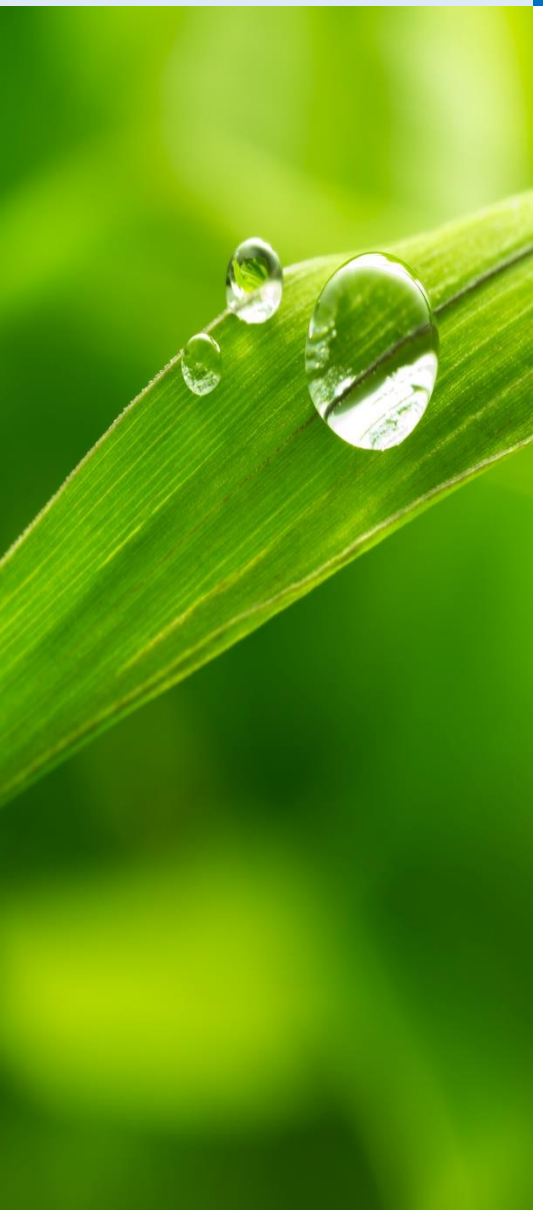

GO-pH

Water conditioner with colour indicator

An Environmental Impact Product from Global Adjuvants Company

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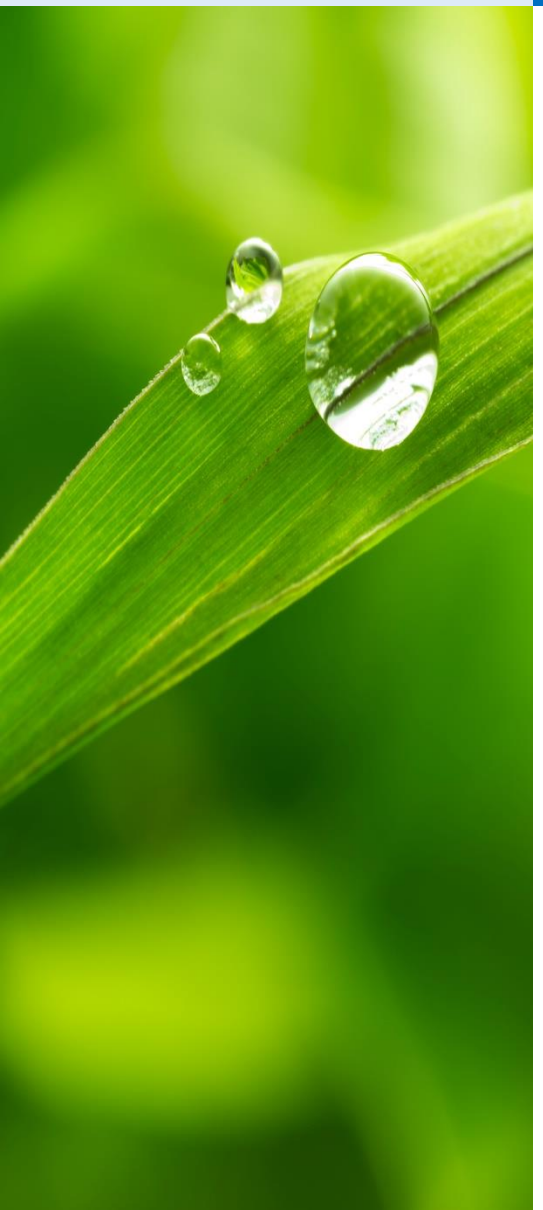

GO-pH

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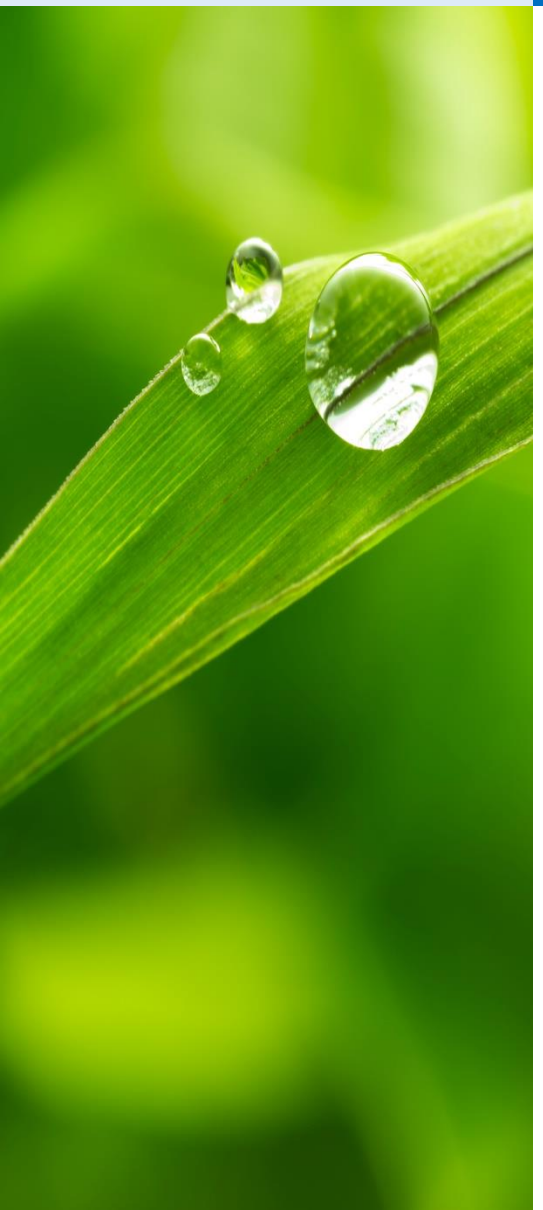
GO-pH – What is it?



- GO-pH is a water conditioner and pH corrector.
- For use in water outside of optimum pH or hard water areas
- Based on Phosphoric Acid (with added Nitrogen).
- Easy to use – has a pH indicator – the colour changes when the optimum pH is reached.
- Contains non-ionic wetting agent + anti-foam.

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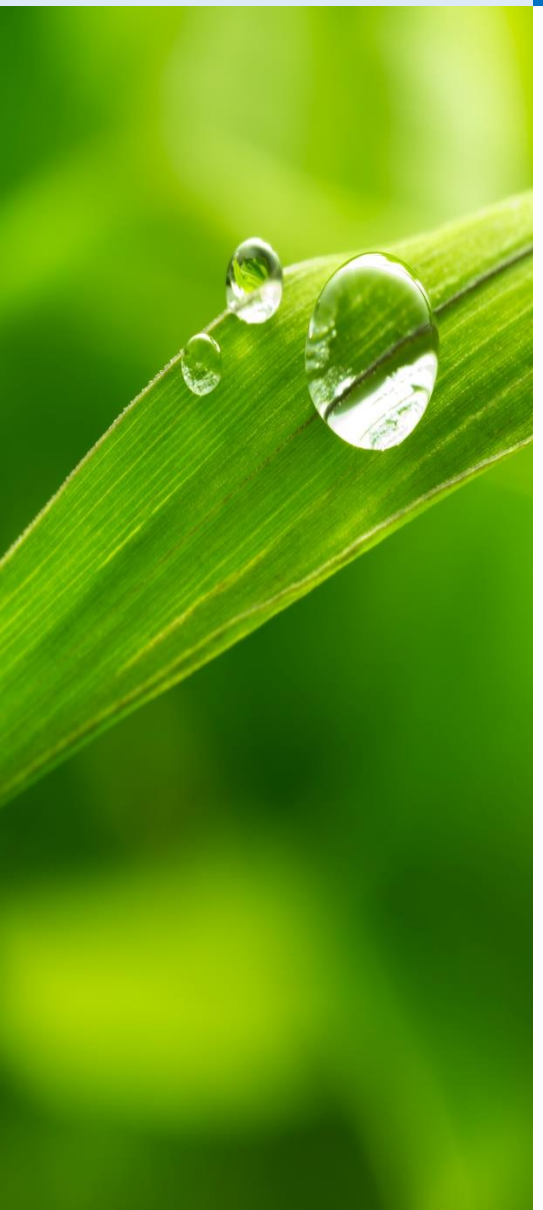
The facts about pH



The pH value describes the acidity (concentration of hydrogen ions) or alkalinity of any solution.

The pH scale ranges from 0–14 with 0 being the most acid, and 14 the most alkaline.

Because a logarithmic scale is used in measuring pH, a pH of 6 is 10 times more acidic than a pH of 7, and a pH of 5 is 100 times more acidic than a pH of 7.

pH < 7 ….. considered acid

pH = 7 ….. considered neutral

pH > 7 ….. considered alkaline

Most pesticides perform best in a pH solution which is slightly acid around 4.0-6.5.

(the main exception being some sulphonyl urea herbicides which like slightly alkaline conditions).

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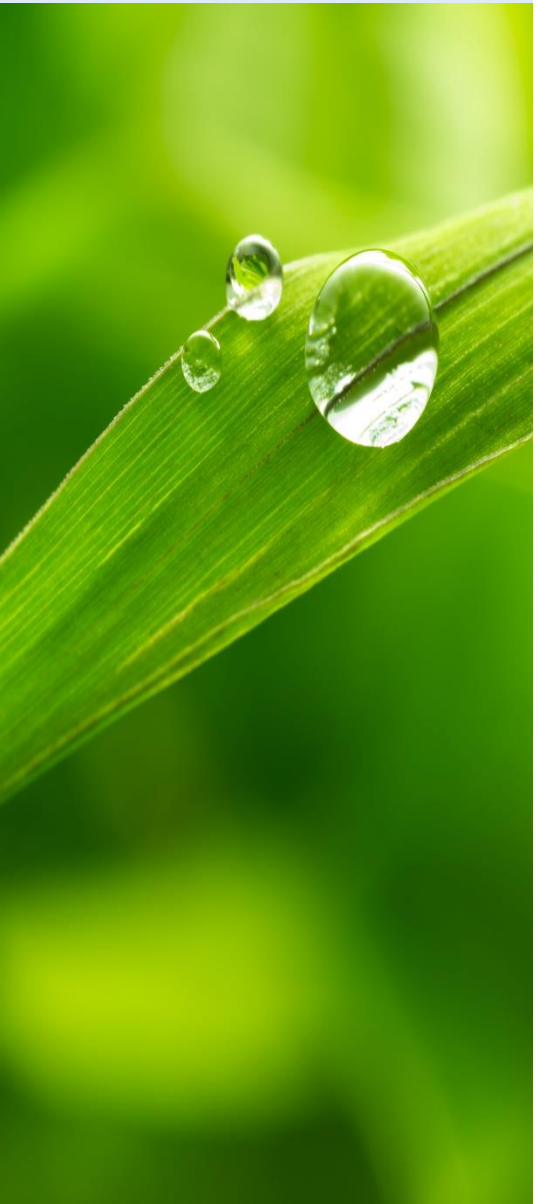
Why is pH important



- The quality of the water used in preparing the spray for application may have a significant impact on the performance of the pesticide being used.
- Under alkaline (pH 7+) conditions, alkaline hydrolysis occurs which degrades the pesticide to non-toxic (inactive) forms.
- The end result is less active ingredient applied and poor pesticide performance.
- The ideal water pH for most pesticides (including fungicides, herbicides, miticides) is between 4.0 and 5.5.

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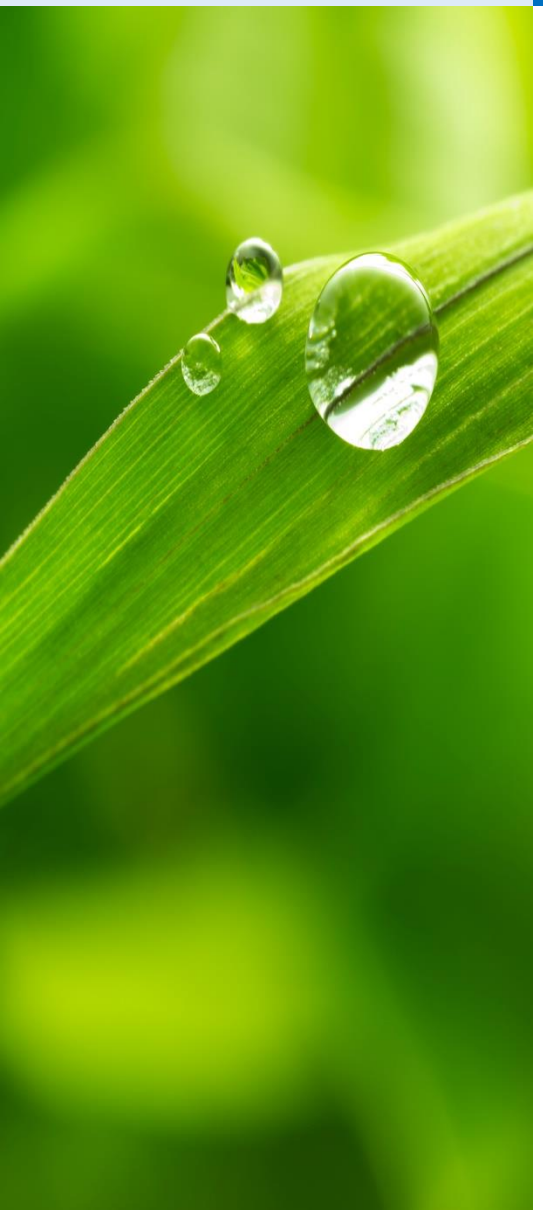
Why use a water conditioner?



- Water comprises about **95%** of the spray solution by volume.
- Water quality affects pesticide performance so it is important to **check it regularly**.
- Reduced pesticide performance may not be noticeable to the farmer BUT it can be enough to **reduce the efficacy** of your pesticide.
- You may put the lack of performance down to weather, resistance, or other factors.

pH can have a big impact on pesticide performance!

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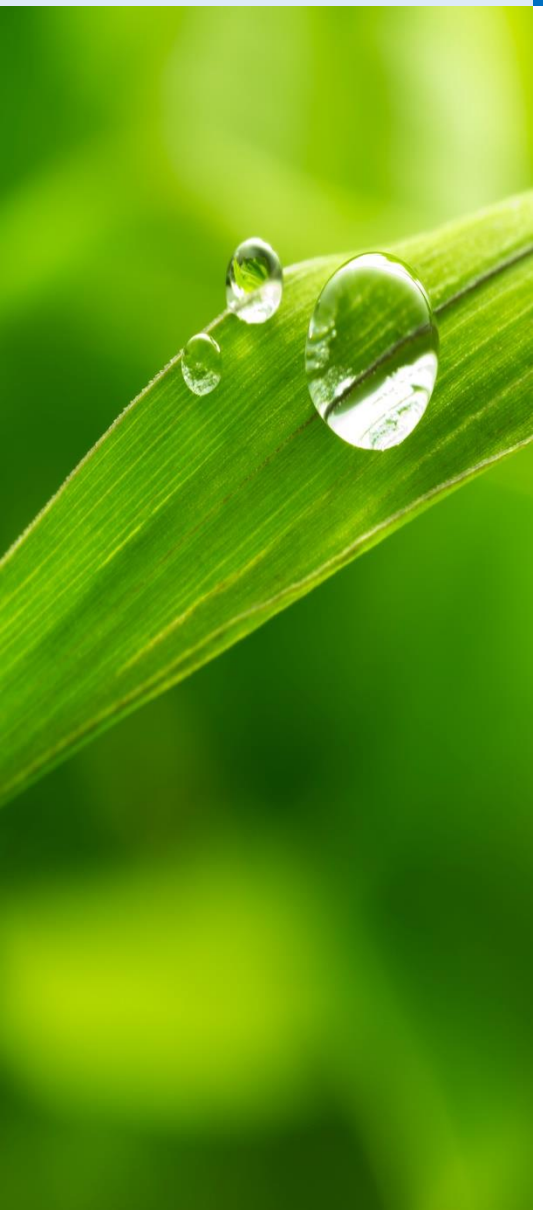
How does pH affect my pesticide?



Pesticides are usually formulated as weak acids (although some are weak alkalines).

When the pH is outside the optimum range, pesticide performance can be compromised.

In the Tank

In some cases, the pesticide starts to dissociate – this is called "hydrolization" and effectiveness is lost. **The pesticide loses activity even before you have applied it!**

In the Field

Some pesticides have a weak electrical charge. The pH can also change the chemical charge of the pesticide molecule, limiting its ability to penetrate the leaf cuticle and reach the site of action, thus reducing its efficacy.

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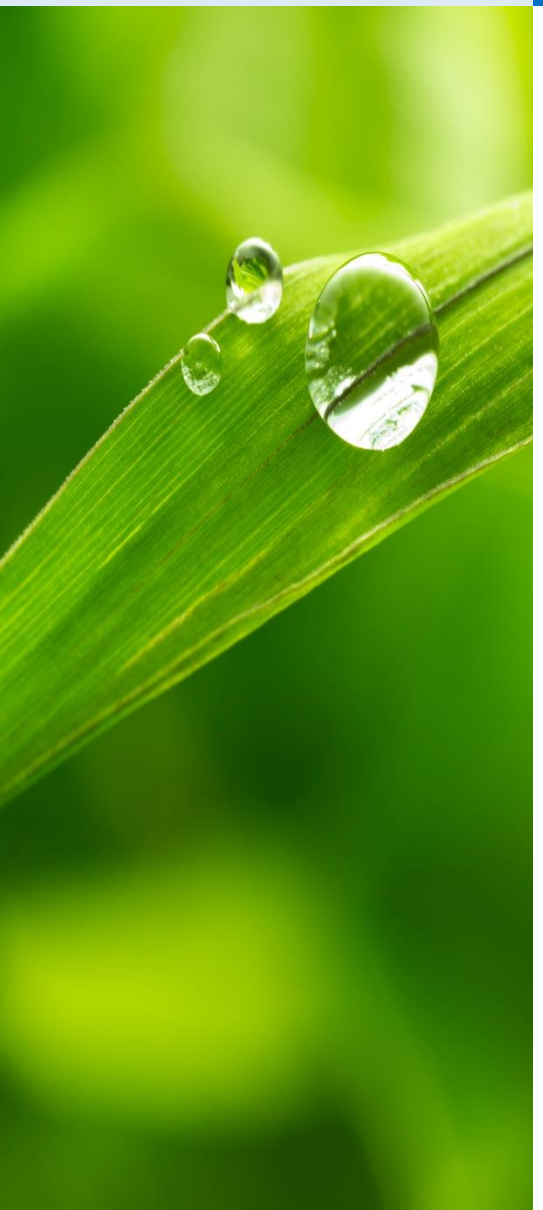
How does pH affect my pesticide?



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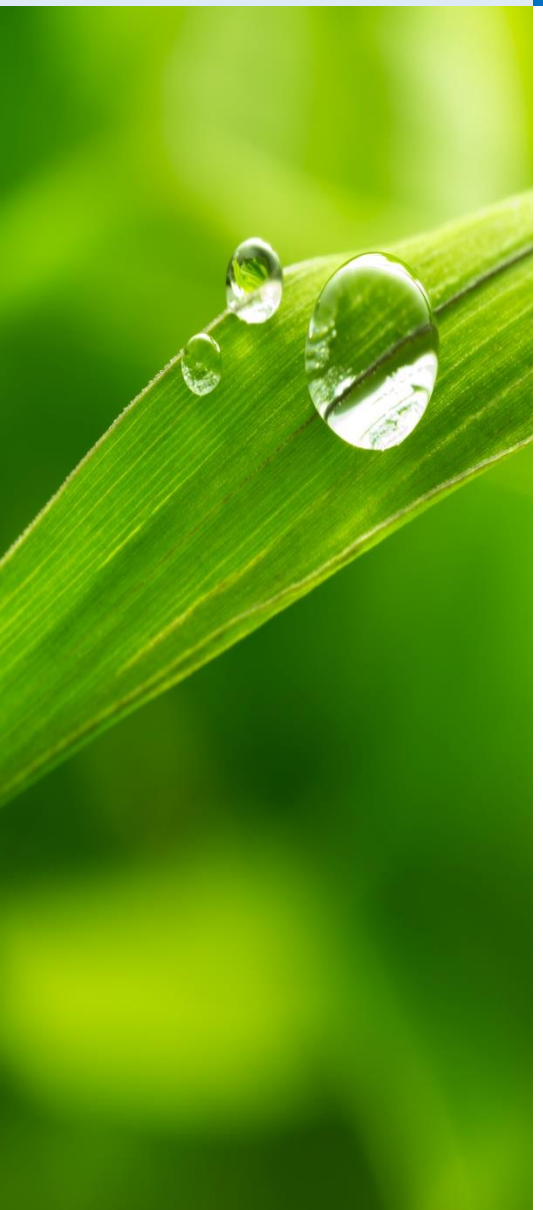

PRODUCTS where pH of spray water is important:

- pH susceptibility

  Insecticides

  Fungicides

  Herbicides

Increasing susceptibility to pH

Speed of breakdown measure by half-life of typical pesticides:

Pesticide	Product/Chemical	Half Life
Insecticide	Dimethoate	½ life **48 minutes** at pH 9
	Captan	½ life **10 minutes** at pH 8
Fungicide	Iprodione	½ life **55 minutes** at pH 9
Herbicide	Phenmedipam	½ life **10 minutes** at pH 9

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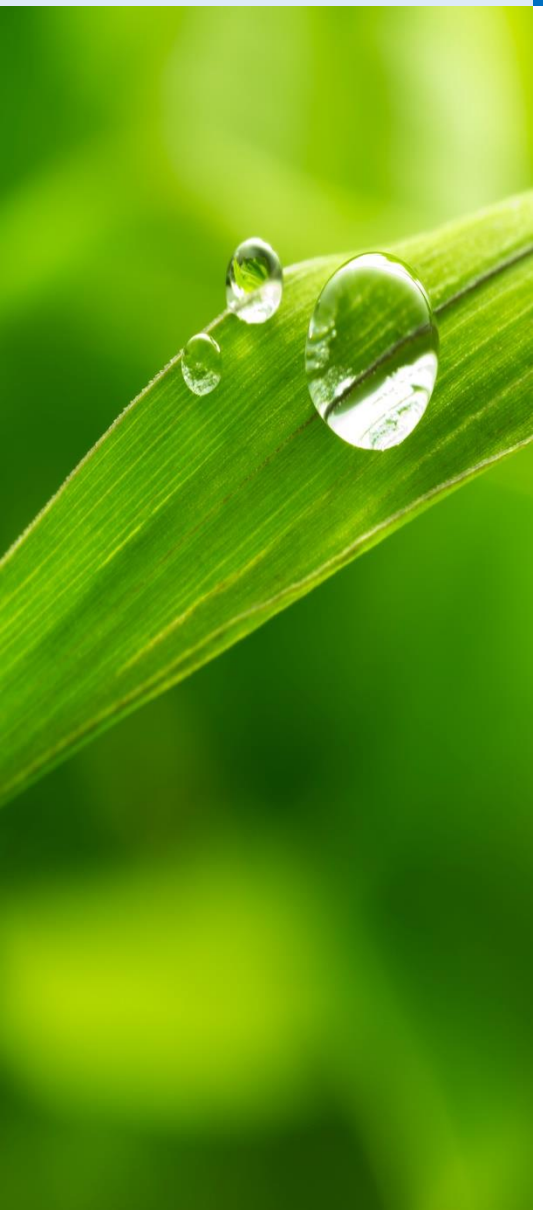
Which pesticides are affected most?



Pesticides formulated as weak acids include **glyphosate** and **glufosinate**.

Up to **30%** of glyphosate can be locked up in the sprayer tank by hard water with high pH.

"Locked up" means it is wasted and not in the form that will kill weeds!

Other Products Susceptible to High pH:

2.4-D, Acetamiprid, Chlorpyriphos, Clethodim, Cymoxanil, Desmedipham,

Diquat, Iprodione, Mancozeb, MCPA, Phenmedipham, Propiconazole,

Pyrethroids, Sethoxydim, Tebuconazole, other 'fop' & 'dim' herbicides and

other OP insecticides.

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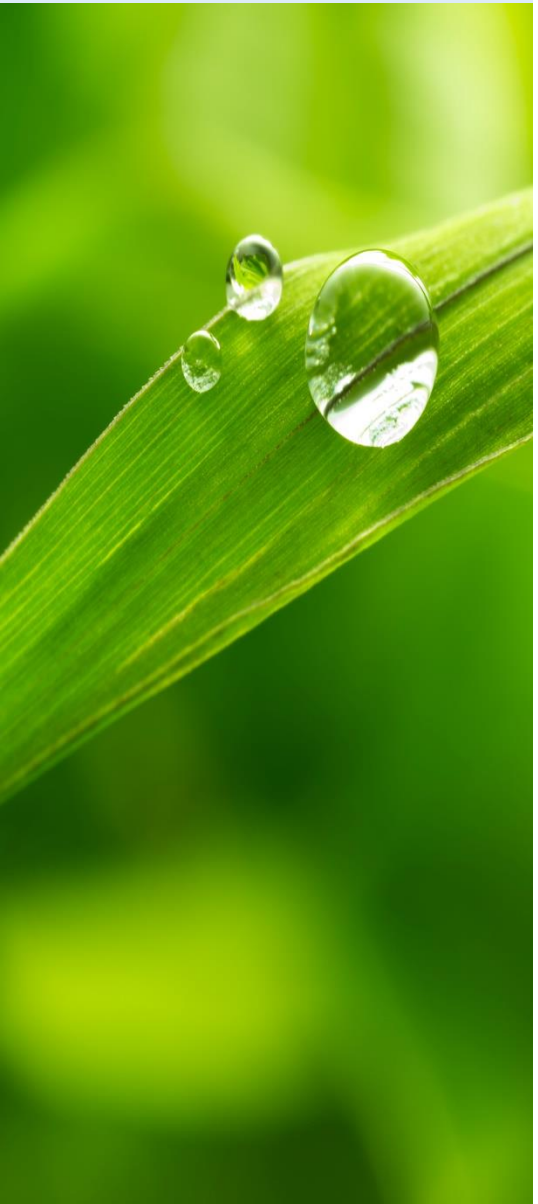
Pesticide Half Life



- Pesticide Half-Life is the time it takes for half the amount of chemical to be decomposed (made inactive).
- After this time pesticide will only be 50% as effective
- pH has a major impact on half life
- Half life example:
  - Flumioxazin
  - At pH 5, flumioxazin is very stable and will persist in water for several days.
  - At pH 7 the half-life decreases to 24 hours
  - At pH 9 the half-life is a only 15 minutes

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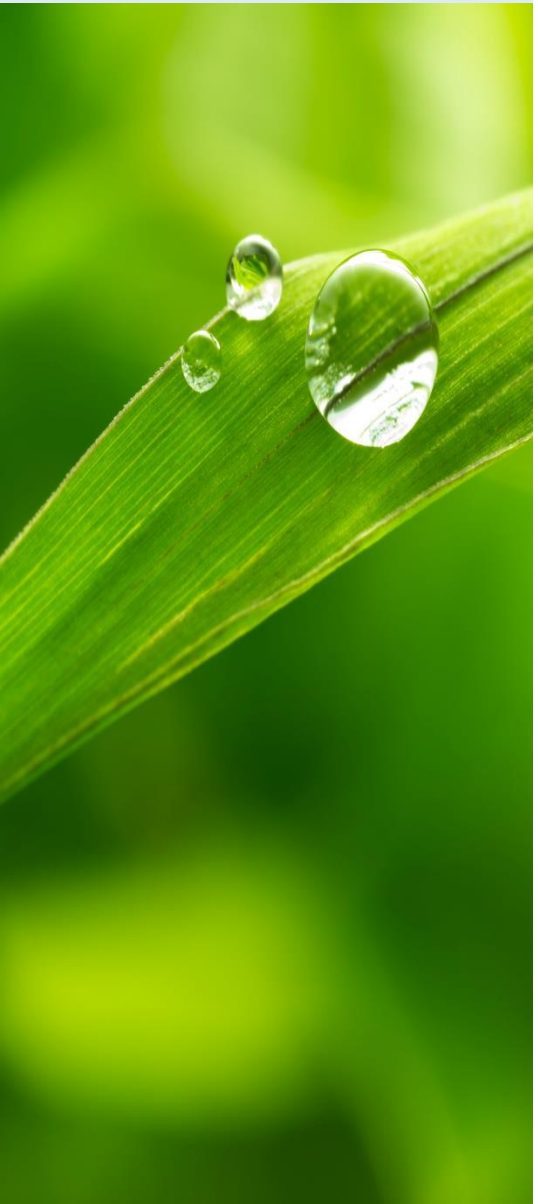
Water Hardness



- Hard water is generally high pH.
- Hard spraying water, containing dissolved salt, calcium and magnesium ions, locks onto pesticide active ingredients to form insoluble complexes. At this point, the pesticide active ingredient becomes insoluble and cannot be taken up by target plants or insects.
- Many products are susceptible to this lock-up process including SU's, insecticides, fungicides, hormones weed killers and particularly glyphosate.
- Glyphosate is negatively charged and will combine with soluble salts, calcium and magnesium, to form glyphosate-magnesium and glyphosate-calcium compounds.
- These compounds are not as easily absorbed by the plant and the result is poor uptake and poor weed control.

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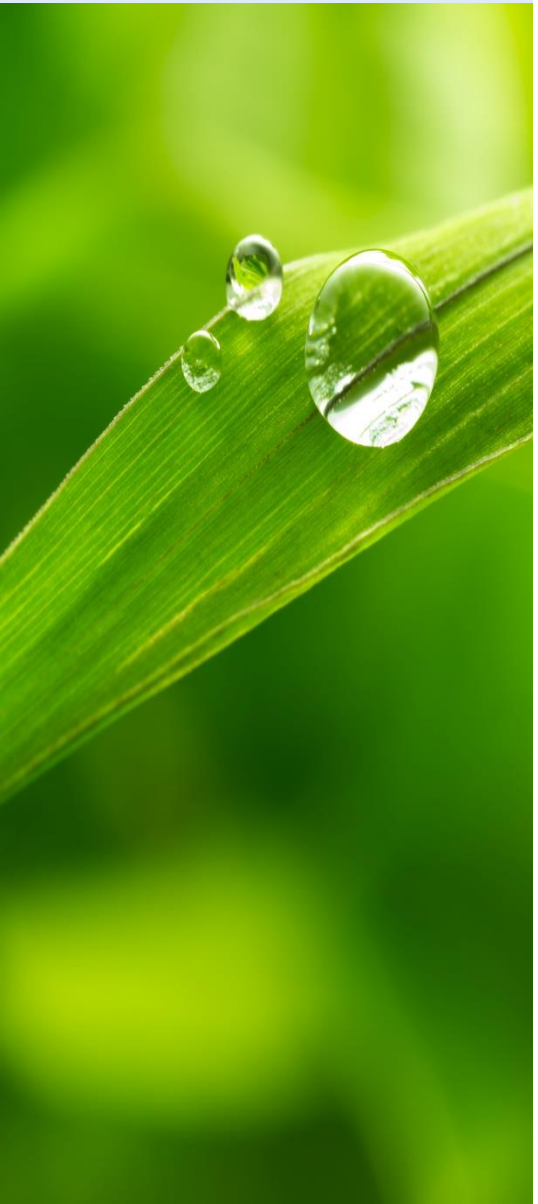
Water Hardness



Classification	hardness in mg/L	hardness in ppm
Soft	0–60	less than 60
Moderately hard	61–120	60-120
Hard	121–180	120-180
Very hard	≥ 181	> 180

mg/L = mg of calcium carbonate ($CaCO_3$) per L water
Seawater = very hard due to various dissolved salts - 6630 ppm
Freshwater = range of 15 - 375 ppm

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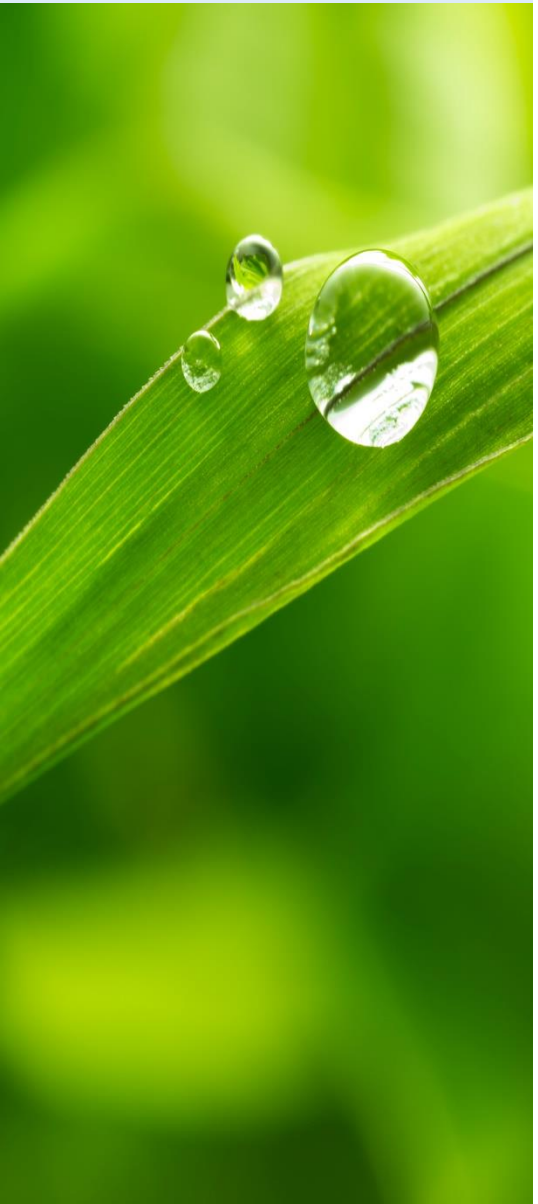
Water Hardness



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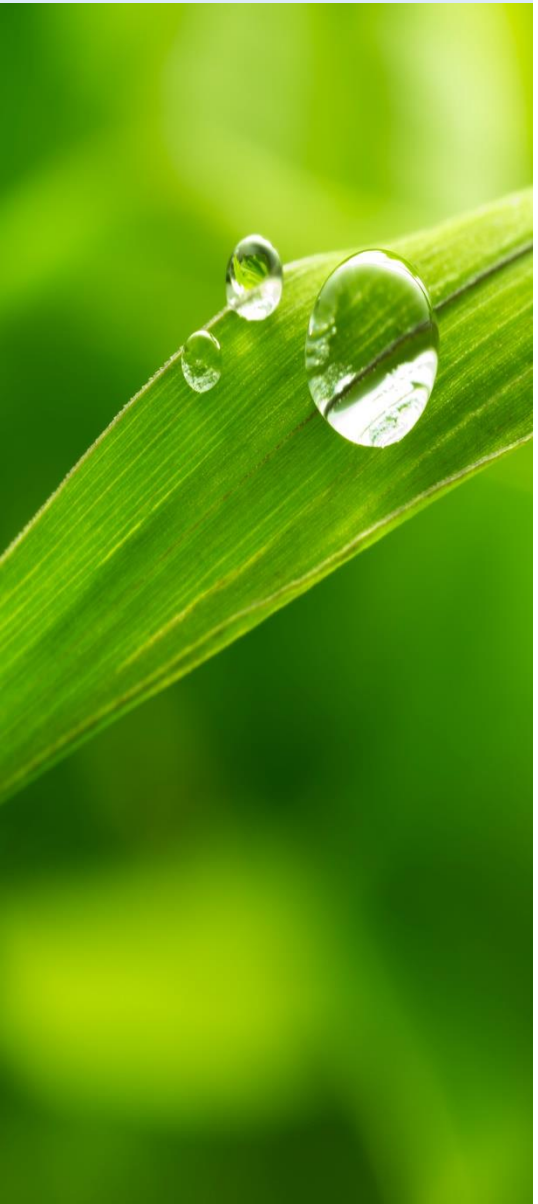
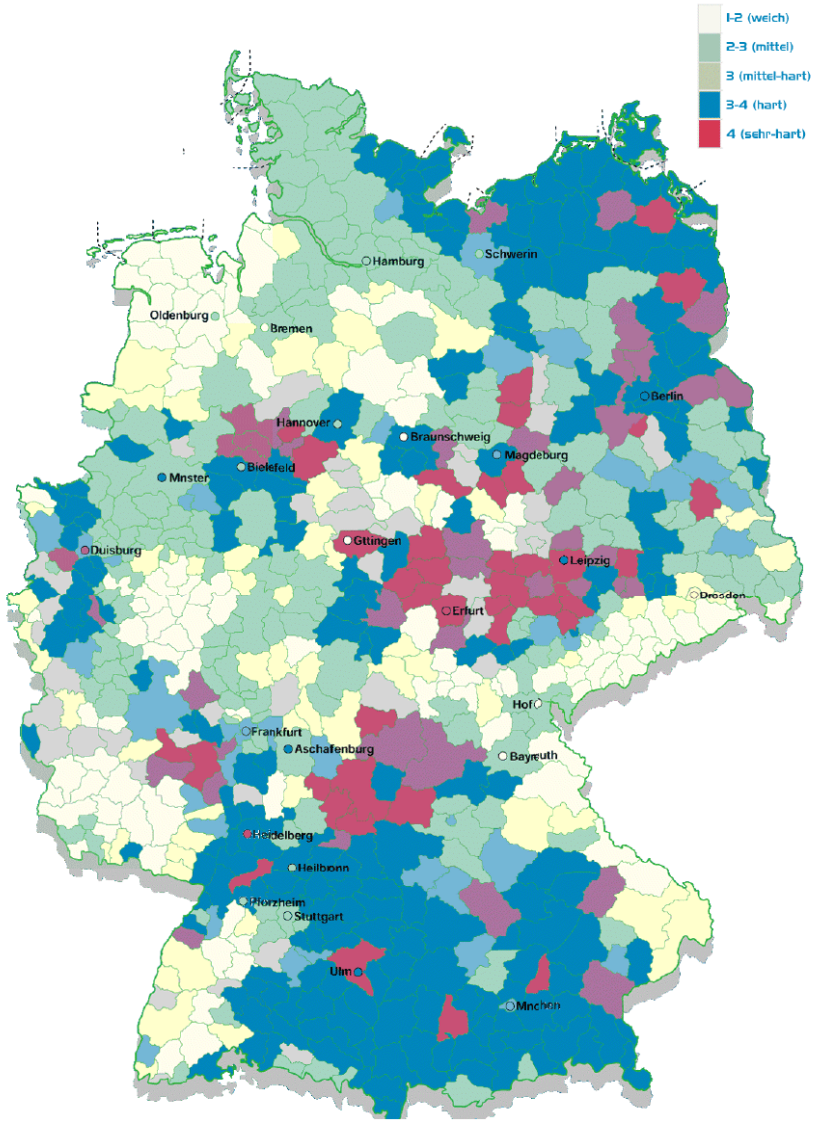
Water Hardness





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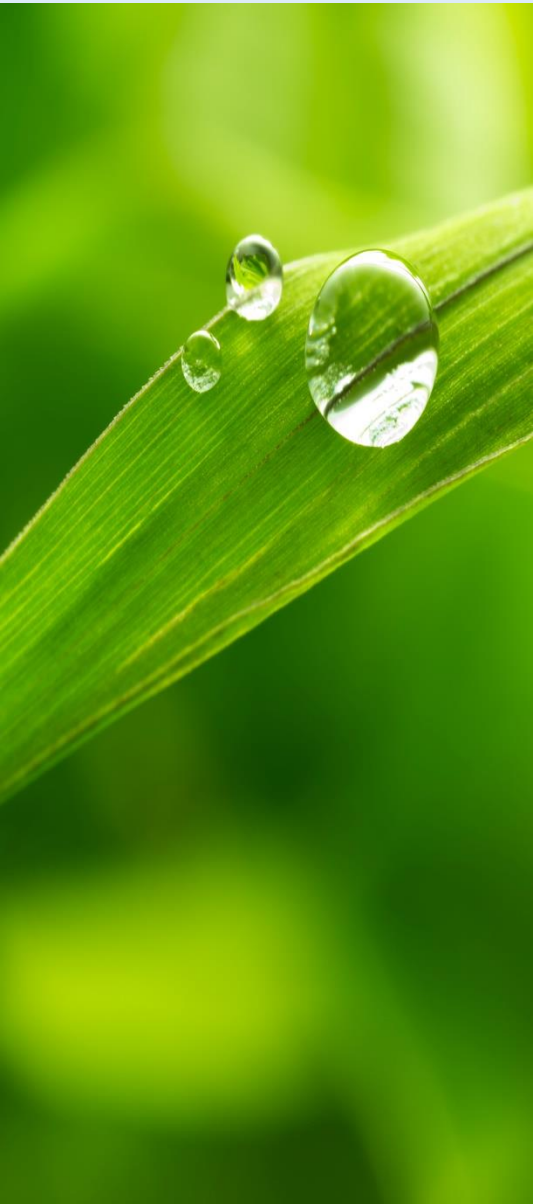
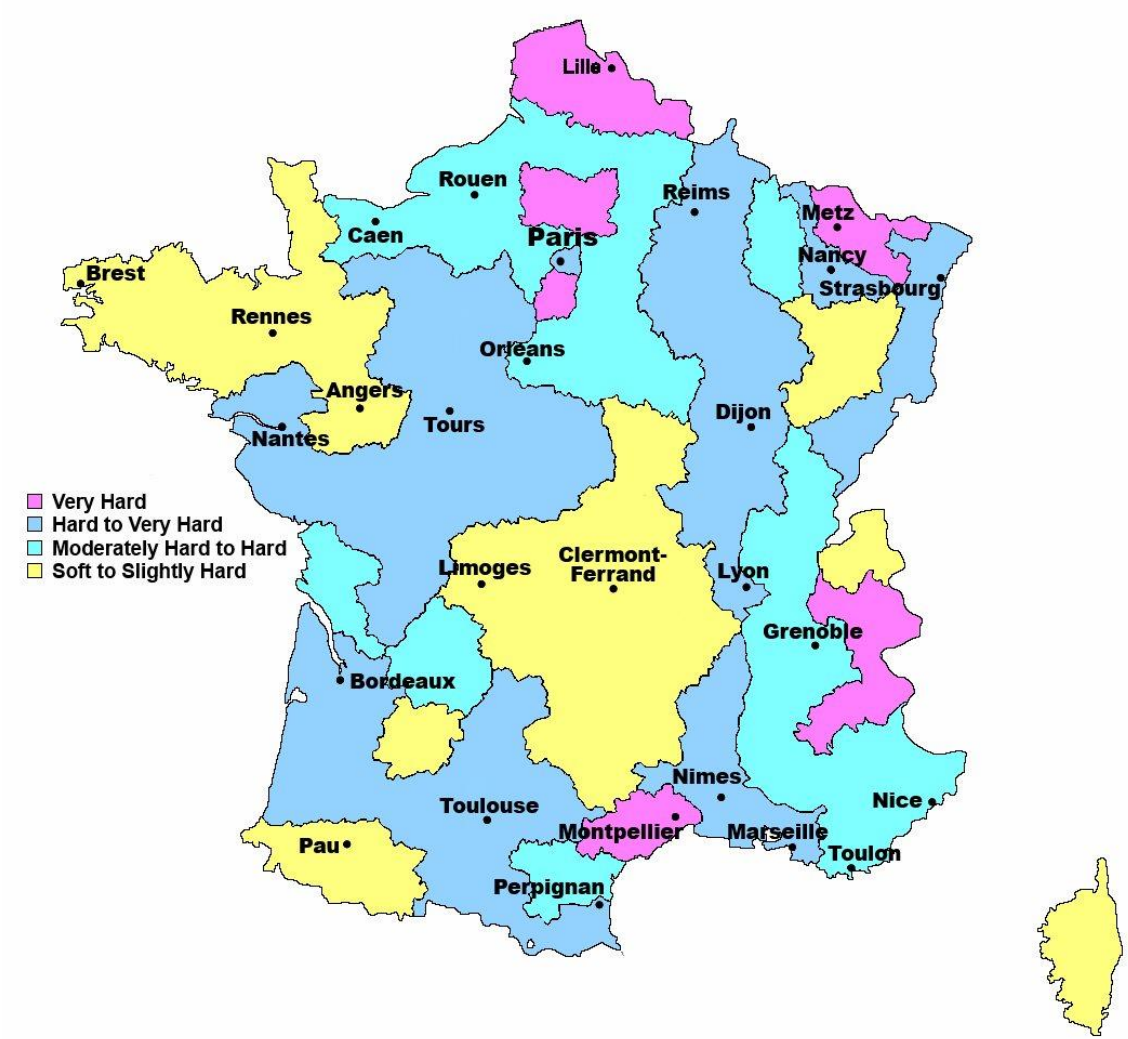
Water Hardness





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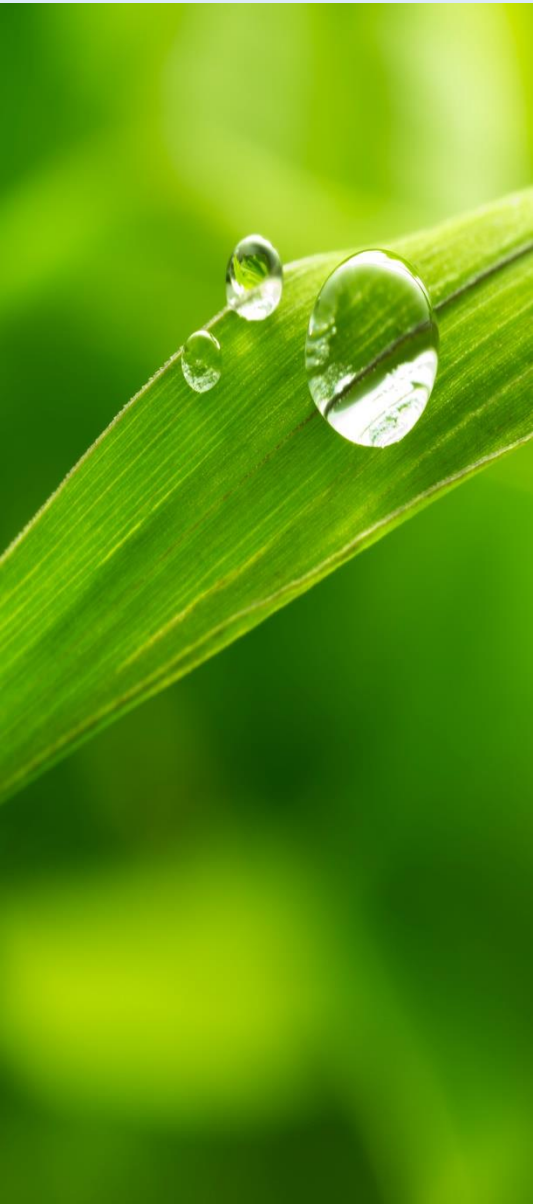
How do water conditioners work?



- Basic water conditioners are acid based. They lower the pH.
- Although effective, can result in extremely acidic spraying water (<pH 4) which is also not optimal.
- Buffer products, are not only acid based, they form chelated complexes with the calcium and magnesium ions and buffer water to an optimum pH level.

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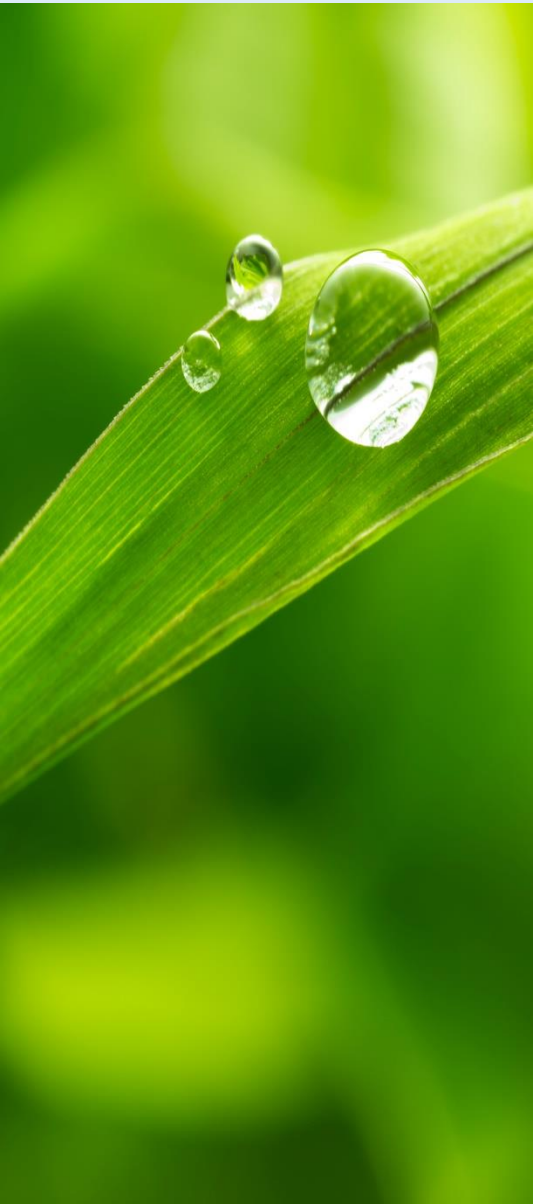
AMS Ammonium Sulphate



- The most commonly used water conditioner is ammonium sulfate (AMS).
- It could be described as a buffer, the sulphate ions tie up calcium in hard water.
- AMS is most effective with calcium as it is fairly insoluble the other compounds are more soluble and go back into solution, freeing up the cations again.
- Has limited effect on spray pH.

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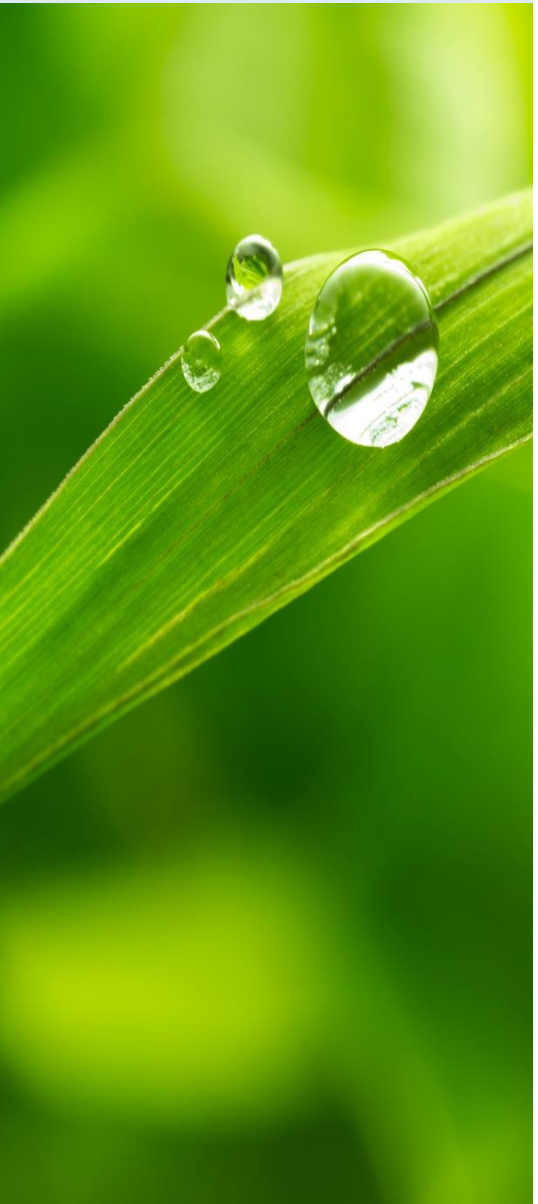
Advanced Water conditioners



- Acidic + Surfactant based water conditioners based on polybasic acids and sequestrants.
- This strategy relies upon structures to hold cations very securely and prevent attachment to herbicides. This action makes the cation unavailable to antagonize weak-acid pesticides.
- Very effective in hard water areas where there are high levels of metallic irons.

GO-pH

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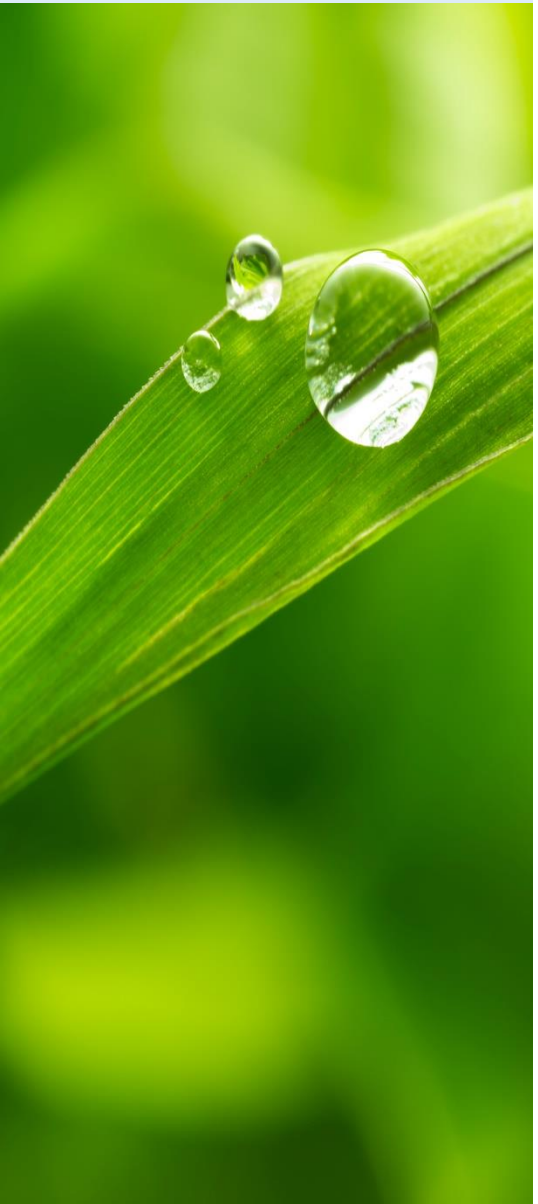
GO-pH mode of action



- GO-pH is a polybasic acids and sequestrants based chemistry.
- Sequestrants lock up harmful ions.
- Acid safely lowers the pH.
- Added to this is a colour changing indicator which show when the correct pH has been reached.
- Allows for precise application.
- Contains a non-ionic wetting agent – no need for additional adjuvant.
- Contains anti-foam for easy preparation of the spray solution.
- Contains 4% N to help the plant recover from stress during pesticide treatments.

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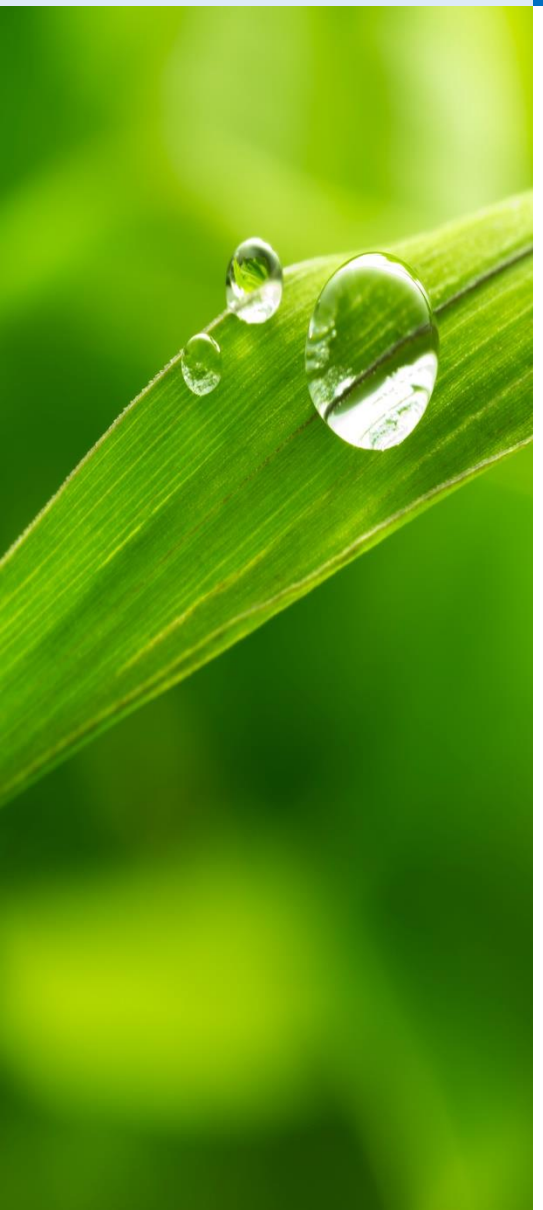
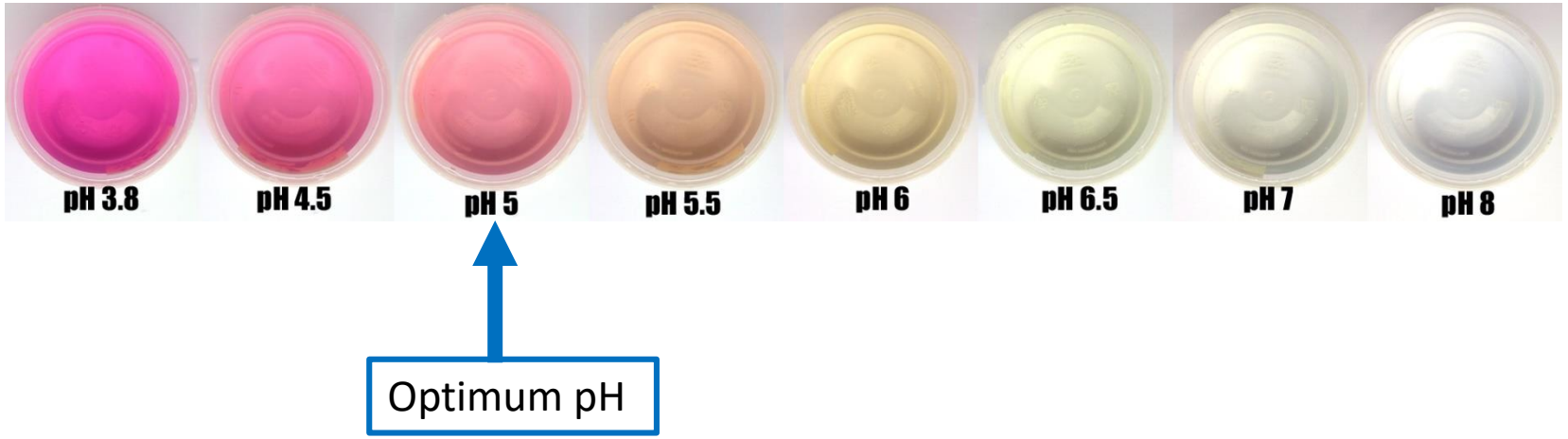
How to Use GO-pH



The colour of the spray solution changes when the optimum pH is reached.



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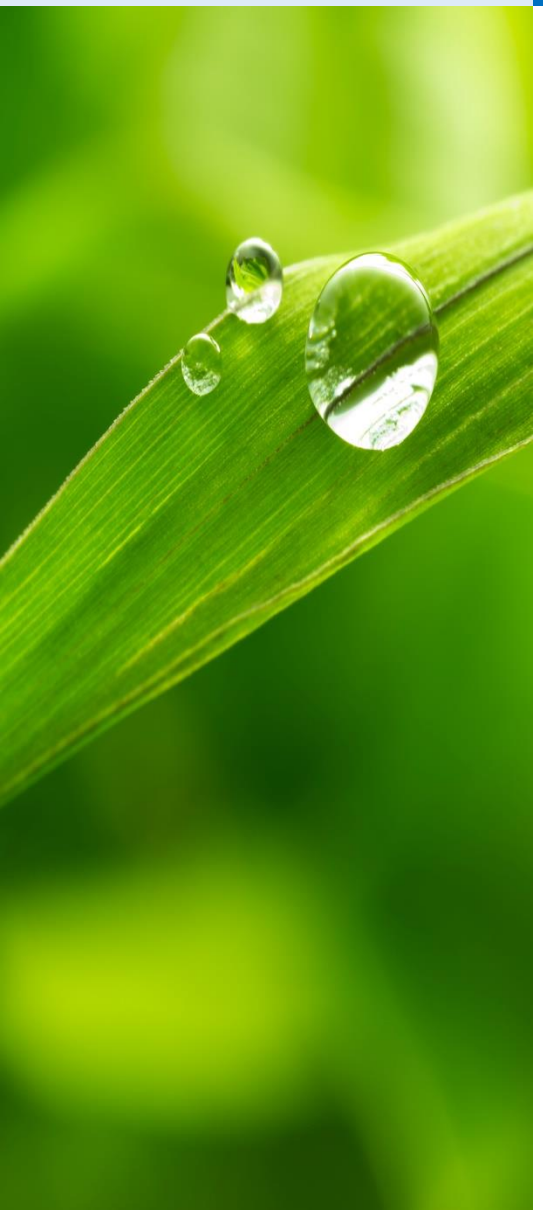

You can conduct a test in 10 litre can of water, carefully measuring the volume of GO-pH added, then scale up by the number of litres per hectare in your sprayer.

ALWAYS ADD GO-pH TO THE SPRAY TANK FIRST.

Start adding the product to the alkaline pH water (pH>7).

→

Continue adding the product until the solution reaches approximately pH 6.5.

→

Stop adding the product when the solution reaches pH 5.5.

→

Then add the pesticide.

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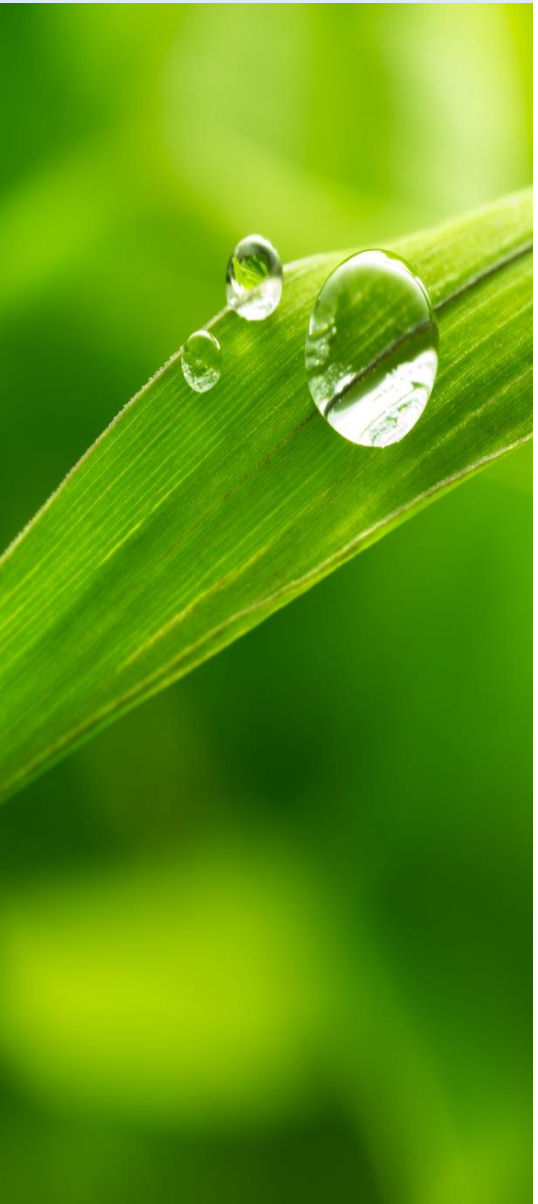
Application rate



- **Water Hardness Rating Application rate ml/100 litres of Spray water**
- Soft: 40-50 ml
- Medium: 50-60 ml
- Medium-Hard: 100-180 ml
- Hard: 180-200 ml
- Very Hard: 220 ml
- Example rate – 200 L/Ha spray volume, hard water = 360-400 ml of GO-pH.

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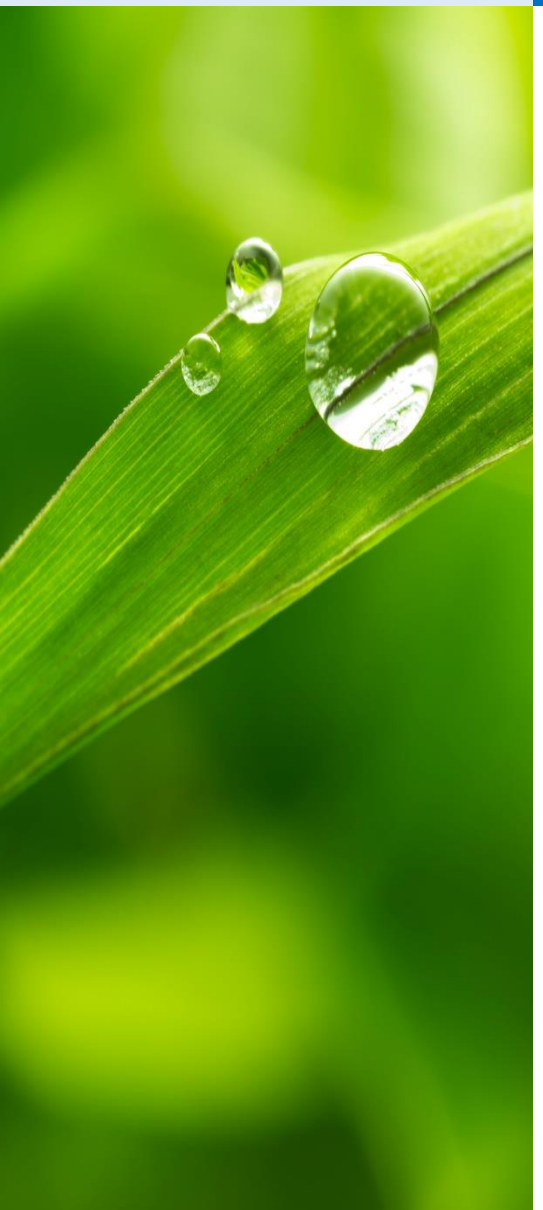
Application Rates Guide



Initial water pH	Guide dose	200 L/Ha water	300 L/Ha water
7.5 - 8	75 ml/100 L water	150 ml GO-pH/Ha 1 L GO-pH treats 6.67 Ha 5 L pack of GO-pH treats 33.33 Ha	225 ml GO-pH/Ha 1 L GO-pH treats 4.44 Ha 5 L pack of GO-pH treats 22.22 Ha
8 - 8.5	100 ml/100 L water	200 ml GO-pH/Ha 1 L GO-pH treats 5 Ha 5 L pack of GO-pH treats 25 Ha	300 ml GO-pH/Ha 1 L GO-pH treats 3.33 Ha 5 L pack of GO-pH treats 16.67 Ha
8.5 - 9	150 ml/100 L water	300 ml GO-pH/Ha 1 L GO-pH treats 3.33 Ha 5 L pack of GO-pH treats 16.67 Ha	450 ml GO-pH/Ha 1 L GO-pH 2.22 Ha 5 L pack of GO-pH treats 11.11 Ha

GO-pH

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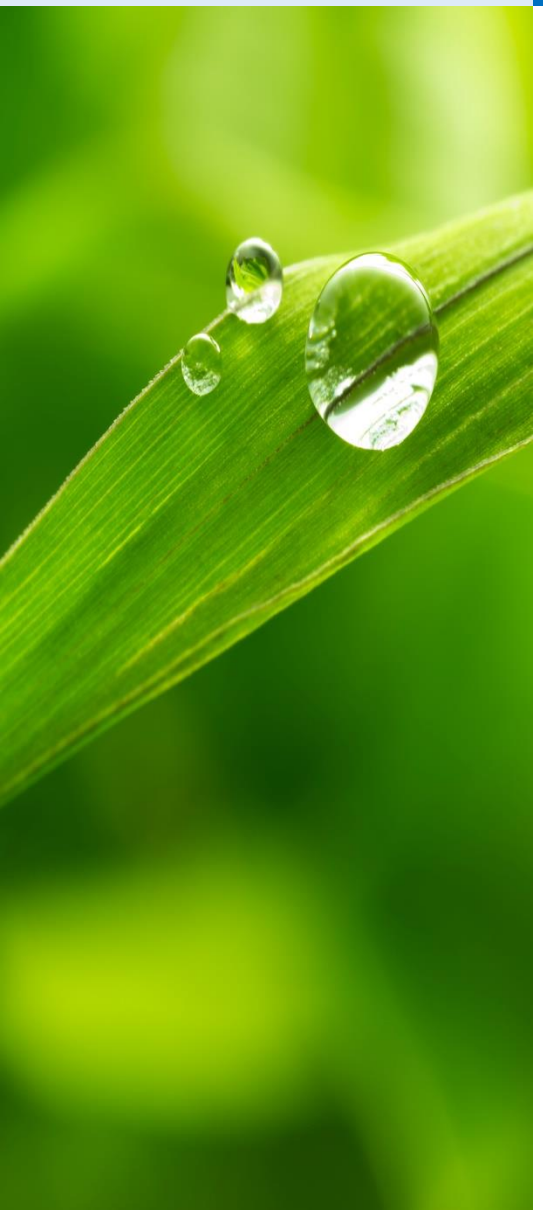
Environmental Benefits



GO-pH maximises efficacy of the pesticide in the spray tank and in the field.

Higher efficacy / Less resistance → Less pesticide used overall. → Fewer applications per season. → Less water used (lower water rates per Ha). → Less water and fewer applications means less fuel used, and more hectares covered per day. → More hectares per day means less spraying in unfavourable conditions – less drift, evaporation etc. → Less pesticide means less packaging waste. → Positive environmental effect

All of the above mean money saved by the farmer!

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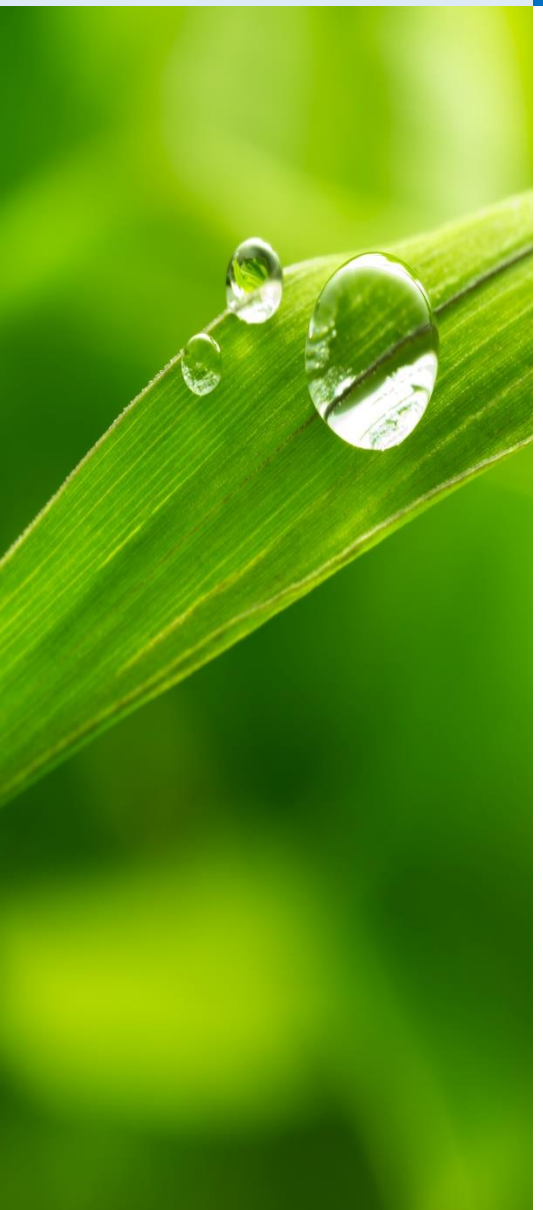
Free pH meters with every pallet



GAC offers free pH Meters with every pallet of product, to ensure accurate measurement of the pH of the spray solution.

GO-pH

pH can have a big impact on pesticide performance!

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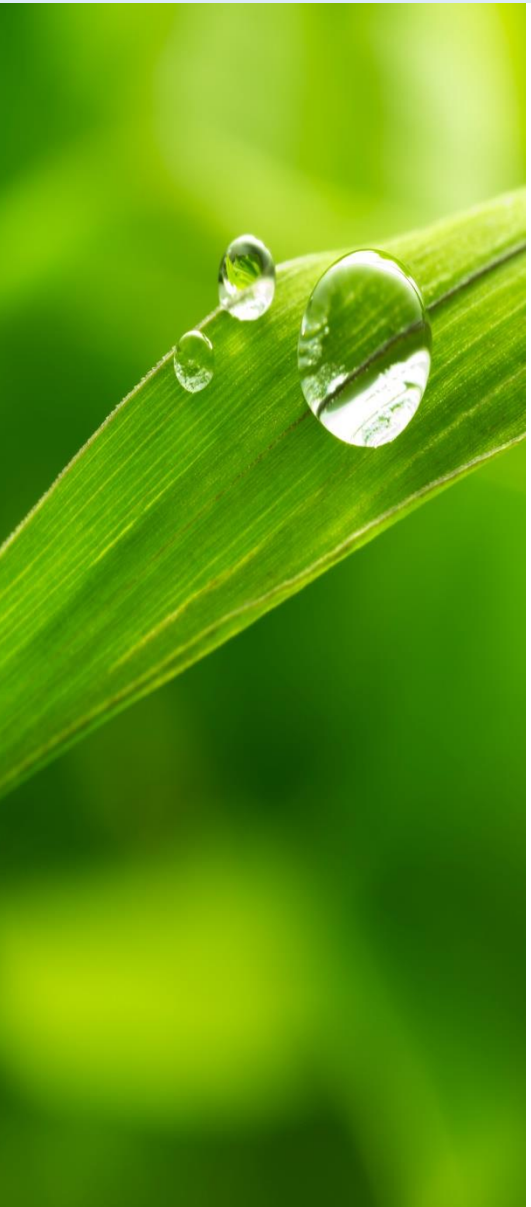
Summary



The best 5 WAY ACTION in 1 PRODUCT with VALUE FOR MONEY:

pH corrector with built-in indicator

Also treats Hard Water

Non-ionic wetting agent

Anti-Foam

4% Nitrogen Foliar Fertilizer

Go-pH corrects the pH while also acting as an non-ionic wetting agent/adjuvant/anti-foam, improving the performance of all the products in the tank, while the added 4% N helps the crop recover from pesticide stress.

GO-pH

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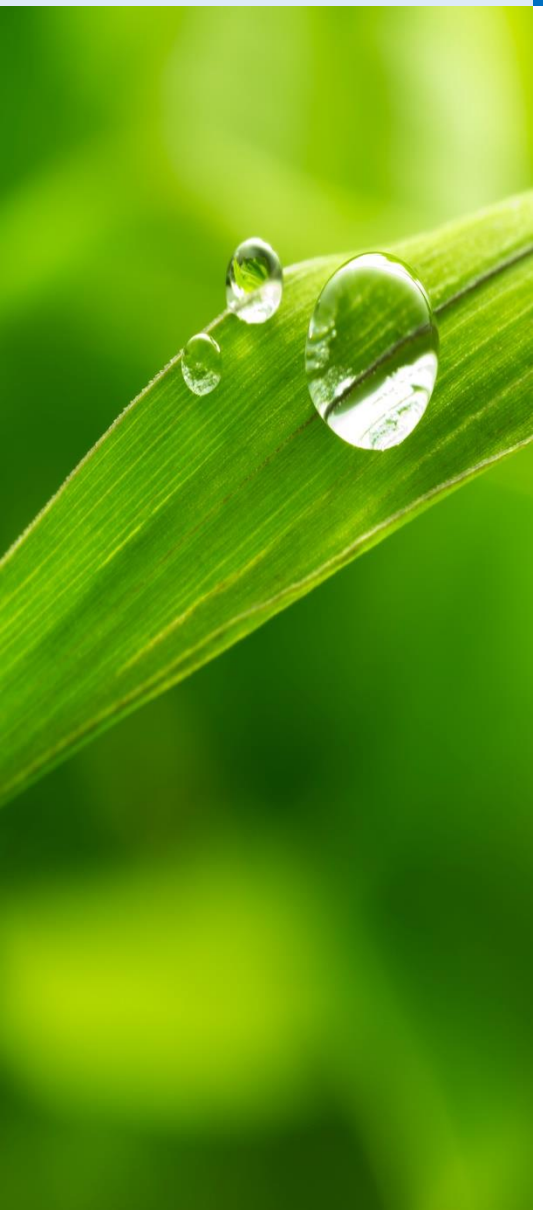
Sources/References



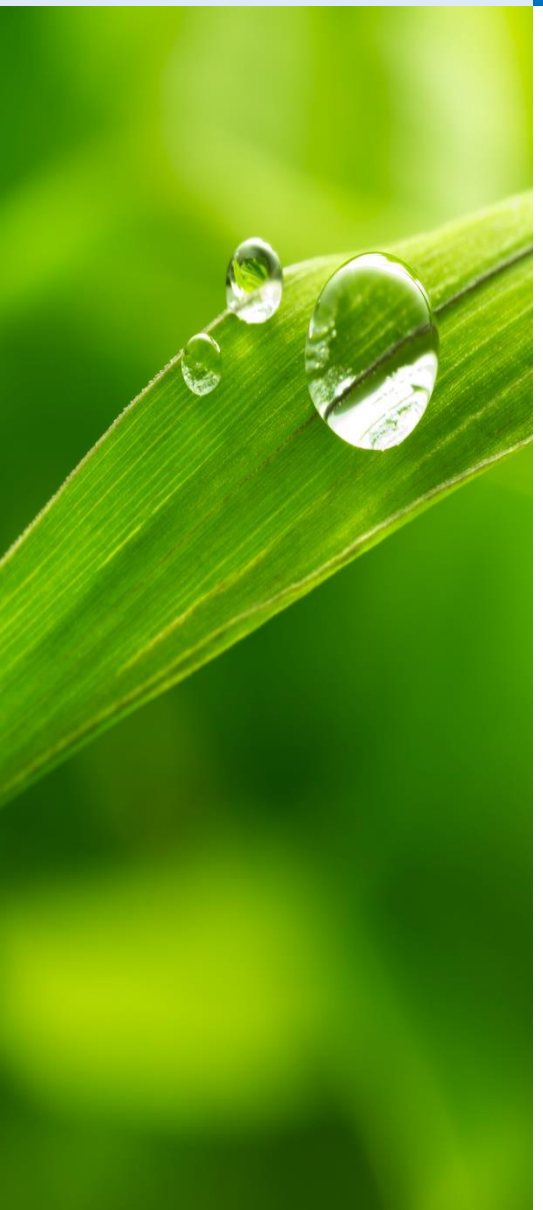
Loveland Industries, Inc. 11/91

Wilbur-Ellis 3/30/94

British Columbia Ministry of Agriculture

University of Florida, IFAS Extension

GO-pH



Global Adjuvants Company Ltd.

Registered Company No. 09206828

Registered Company Address:

20-22 Wenlock Road

London

N1 7GU

United Kingdom

Tel: 01480 810137

Email: office@global-adjuvants.com