



Flipper® insecticide with Align® water conditioner

FLIPPER

- FLIPPER contains 479.8 g/L C7-C20 unsaturated carboxylic fatty acids, which are hydrophobic (i.e., they do not readily mix with water). To overcome this, the formulation is initiated by using potassium hydroxide to create a "salt" of the active ingredient.
- When FLIPPER is added to a spray tank containing water of suitable quality (typically under 300ppm) a true solution will be formed and can be applied as a foliar spray.
- However, the ionic bonds between the potassium salt and unsaturated carboxylic acids are not particularly strong. In hard water, calcium, magnesium (and iron) cations and bind to the fatty acids and form salts that are less soluble and less effective as insecticides. In extreme cases (particularly high concentration spray solutions) a wax-like deposit may form.
- The FLIPPER product label indicates:
 - Not to use with hard water containing metallic ions (calcium, magnesium, iron etc.) with concentrations >300 ppm
 - If required, a buffering agent may be added to the water prior to mixing in order to prevent precipitation.
 - When using a buffering agent do not lower the pH of the final spray mixture below 8.0.

Align

- Align is an advanced **non-acidifying** water conditioner which works by strongly sequestering the hard water cations preventing them from being accessible by the plant protection product to form insoluble complexes.
- unlike Ammonium Sulphate which works by simply displacing hard water cations and acidifying the spray solution
- Align is designed to soften water and has minimal impact on water pH. FLIPPER is alkaline in nature, and the use of Align with it does not reduce pH significantly.

Testing to date

- Bayer Crop Science, AlphaBio Control (the FLIPPER approval holder) and IntraCrop have all undertaken physical and chemical testing. To date, of approximately 30 commercially available water conditioners tested, only Align is effective at reducing water hardness without a detrimental reduction in pH.
- Bayer Crop Science has conducted testing on aphids on protected tomatoes and found Align to have a positive impact on efficacy in hard water with no impact on selectivity.
- Given limited trials by Bayer testing the efficacy and selectivity of Align with FLIPPER it should be noted that Bayer Crop Science and IntraCrop give no warranty and accept no liability in respect of physical compatibilities; therefore, pending further trials, **use is at grower's own risk** and individual tests should be undertaken prior to widespread commercial adoption.

Guidelines for use

- Follow the FLIPPER label instructions. Typically, FLIPPER is used at 1% spray volume and 400L/Ha water volume i.e. 4L/Ha.
- If water hardness is unknown it should be tested before use. Rapid test strips are readily available for this purpose. IntraCrop recommend the use of Aquadur® or MQuant® Total Hardness test strips.
- Align should be used at 0.1% v/v per 100ppm water hardness (e.g. for a hard water of 400ppm add 400mls Align per 100L water). Where water hardness is in excess of the maximum test strip result (some strips only measure up to 400ppm) add 0.4% v/v Align to water sample, re-test and re-calculate dose accordingly.
- Tank mix sequence:
 1. Half fill spray tank, begin agitation
 2. Add required amount of Align
 3. Continue to fill spray tank to the required volume
 4. Add plant protection product (also adding IntraCrop NoFoam at this stage if excessive foaming occurs)
 5. Continue agitation during filling and spraying
- Caution:
 - Do not tank-mix with foliar fertilisers (due to the high concentration of cations present).
 - While Align is formulated with an antifoam to control normal foam production during mixing in the spray tank it does not purport to suppress excessive foam (associated with certain pesticides). In case of excessive foaming, please use a suitable antifoam agent (e.g. IntraCrop NoFoam), adding it to the tank during filling when the spray tank is at least half full, and before excessive foam is produced.

