

# Lipid Technology for Agriculture



**A Nutritional Approach to Plant Health**

**Global Boss International Pty Ltd**

# What is Ag-celerate™

- Ag-celerate™, a lipid-based 'organic colloidal concentrate', known as OCC, originates from the study of colloids within the humus portion of soils.
- The key ingredients of Ag-celerate™ is a plant-based lipid concentrate with ~1% organic nitrogen and 3% salicylic acid.
- The Ag-celerate™ lipids encapsulate \*active compounds, enhancing their effectiveness and sustained efficacy within the plant vascular system.
- In an aqueous environment, the Ag-celerate™ lipids encapsulate and disperse the active compounds to form micelles.
- The micelle has an electrokinetic charged lipid shell surface that facilitates its movement and distribution through the plants vascular system.
- When new active compounds are added into the aqueous environment, the lipids on micelles disperse and re-encapsulate the new combinations.
- The encapsulated active compounds efficiently mobilise the movement, penetration and absorption into the plant cells.
- In distilled water, micelles particle size ranges from 2 ~ 4 nm. When the concentration of active compounds is included, by adding the volume and type of active compounds in a pre-spray tank mix, the micelles size can enlarge to 200 ~ 500 nm.

**\*Active compound** – Any form of contact or systemic, plant, soil or compost applied products including:

- Plant Growth **PROTAGONISTS**: Live biology and biological nutrients; solid and liquid N. P. K. synthetic fertilisers; solid and liquid urea applications; macro and micro-minerals; enzyme, hormone and acid compounds; fungicides; viral and bacterial control agents.
- Plant Growth **ANTAGONISTS**: Biological and chemical herbicides including crop desiccation and growth inhibitors.

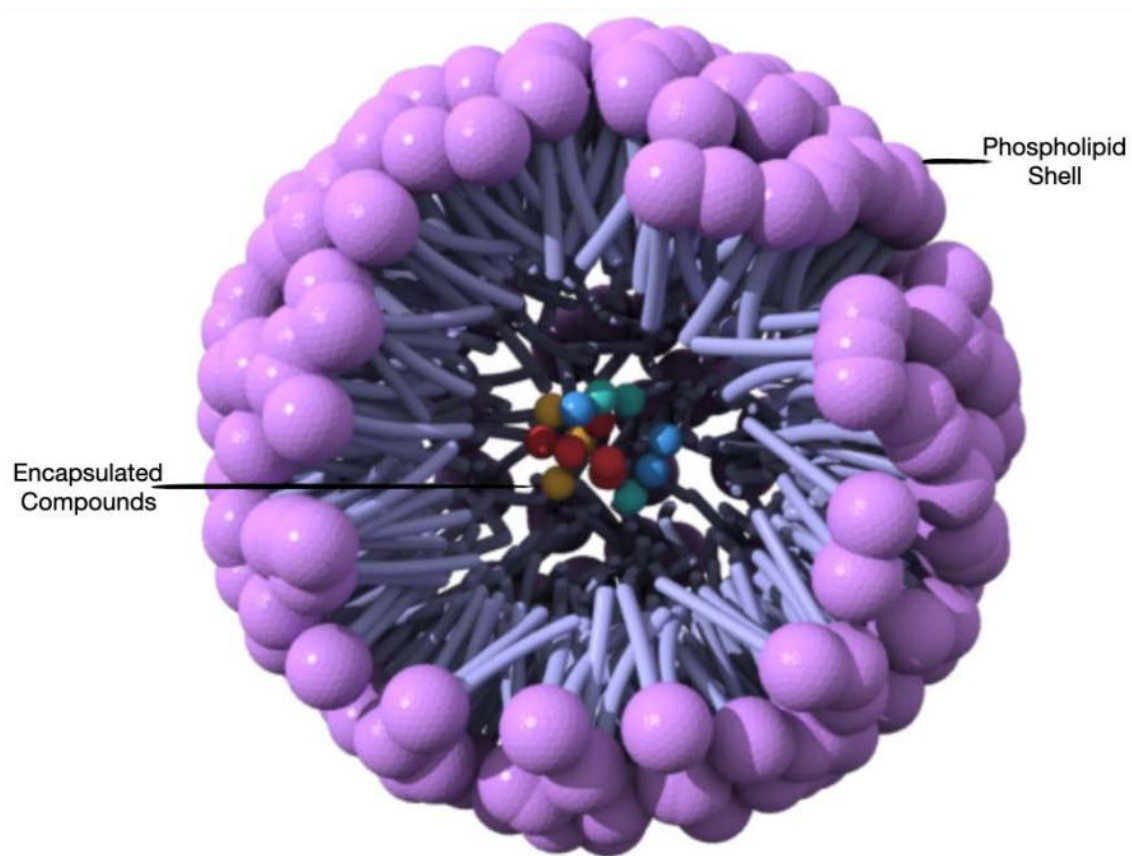


Illustration of OCC Micelle

# Ag-celerate™ is multi-function

## Ag-celerate™:

- Enhances plant performance as a:
  - **Stand-alone** product enabling the swift uptake and vascular distribution of naturally occurring soil and atmospheric available nutrients and biological stimulants  
AND
  - **Companion** product to active compounds introduced by management.
- Reduces reliance on synthetic chemical and compounds detrimental to the environment
- Reduces the cost of cultivation over time
- Helps improve food safety and enhance environmental sustainability
- Is a compound approved for Australian agricultural use WITHOUT requiring Australian Pesticide & Veterinary Medicine Authority (APVMA) accreditation
- Is approved for use in USDA NOP and under registration No. 29678
- Is CAAE Organic Input Accredited

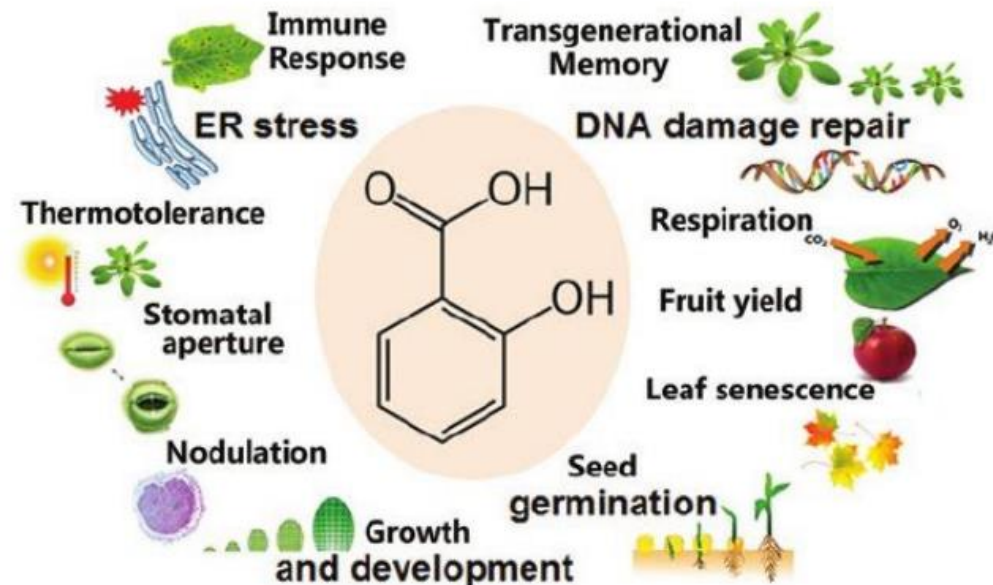
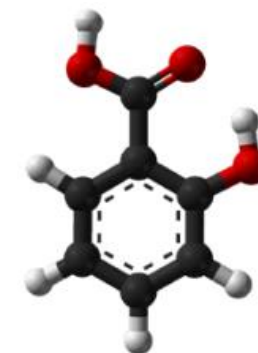
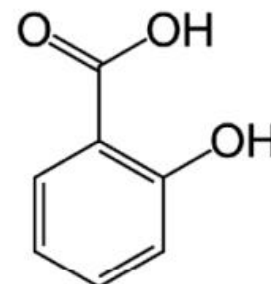


Approved for use in USDA NOP  
and under registration no. 29678.  
ACO pending.

# About Salicylic Acid

## Salicylic Acid is:

- A naturally occurring phenolic substance widely found in plants
- Vital to plant growth and development
- An important plant hormone for mediating host responses upon pathogenic infection
- Beneficial in:
  - Inducing flowering
  - Inducing the formation of female flowers
  - Promoting high-quality and high-yielding crops
  - Increasing resistance and tolerance to crop pathogenic and environmental adversity
  - Improving the cold tolerance of crops
  - Improving fruit storage and shelf life
  - Inhibiting the growth of post-harvest bacteria



Above: *Biological functions of Salicylic Acid in Plants* \*\*

\*\* *Salicylic acid signalling: New insights and prospects at a quarter-century milestone.* Liu, Rockett, Komer, Pajeroska-Mukhtar, University of Alabama, The U.S.A., September 2015.

# The Ag-celerate™ Advantage #1

- Ag-celerate™ has a systemic mode of action that can prolong the impact of active compounds in the plant system.
- Ag-celerate™ is NOT an adjuvant but can match the performances of adjuvants in the market.

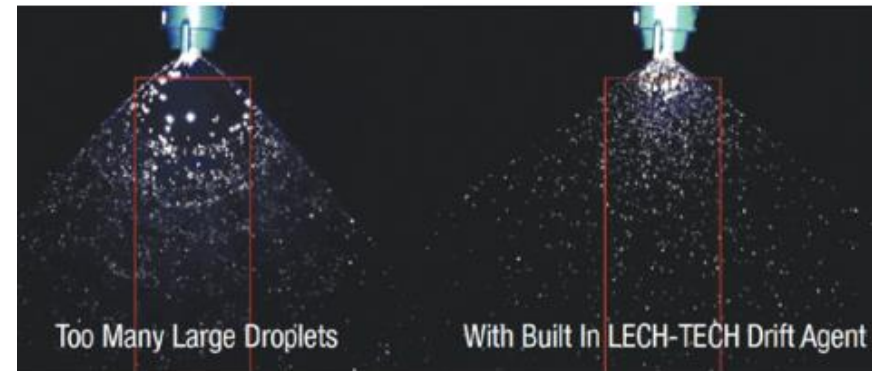
Typically, the premium adjuvants in the market can assist both in the sticking and swift penetration of compounds through the surface of plants, typically through the cuticles of foliage (right top).

Ag-celerate™ can take the next step to improve the absorption into the plant cells, hence sustaining the efficacy of the active compound.

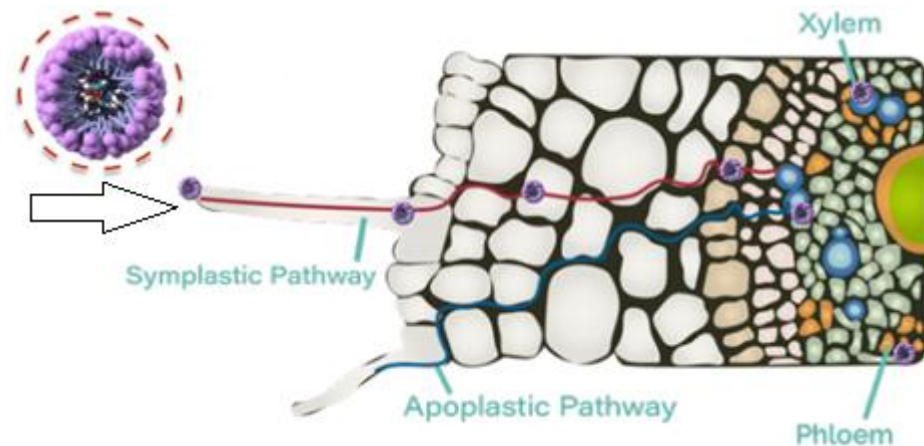
*A trial conducted by Kalyx Australia Pty Ltd (May 2022) compared the performance of Ag-celerate™ against the Nufarm adjuvant BS1000 as companions with Glyphosate (active compound) for desiccation of a sorghum crop and a fallow ground knockdown herbicide.*

- Ag-celerate™ matched the performance of the adjuvant, despite being a fertiliser. This results in savings of adjuvant costs when combining nutrient and protection sprays in routine management programs without compromising performances
- Glyphosate with Ag-celerate™, at all rates, showed equivalent dry down of sorghum compared to glyphosate plus BS1000.
- Glyphosate at 0.5L/ha with Ag-celerate™, at all rates, showed equivalent control of fleabane, compared to glyphosate at a rate of 0.5L/ha plus BS1000.
- Glyphosate at 0.5L/ha with Ag-celerate™ at a rate of 0.1%v/v, showed equivalent control of sow thistle when compared to glyphosate at 0.5L/ha plus BS1000.

- Kalyx Australia Pty Ltd, May 2022.



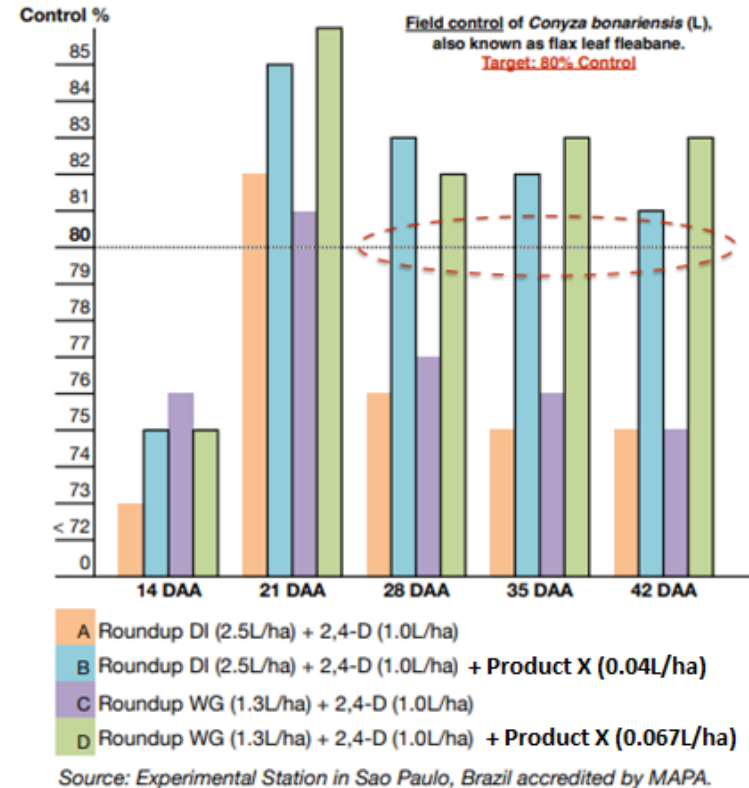
Above: Typical functions of a premium brand adjuvant in the market



# The Ag-celerate™ Advantage #2

Ag-celerate™ complements many active compounds in the market, both nutrient and protection compounds.

- Ag-celerate™ is NOT a microbial product. Microorganisms in microbial products mineralise nutrients in the soil. These products facilitate the mineral absorption and uptake into the roots and the plant vascular system.
- Ag-celerate™ COMPLEMENTS these microbial products, encapsulating nutrients created in the soil and from the atmosphere, enhancing their uptake by the plant and prolonging nutritional needs.
- Ag-celerate™ COMPLEMENTS chemically based synthetic protection compounds (active compounds) to extend the efficacy of protection of crops over a longer time period. This leads to fewer applications. Growers can adjust the dosages of active compounds to minimise the chemical stress on plants, leading to higher yield, better quality and lower costs.



# The Ag-celerate™ Advantage #3

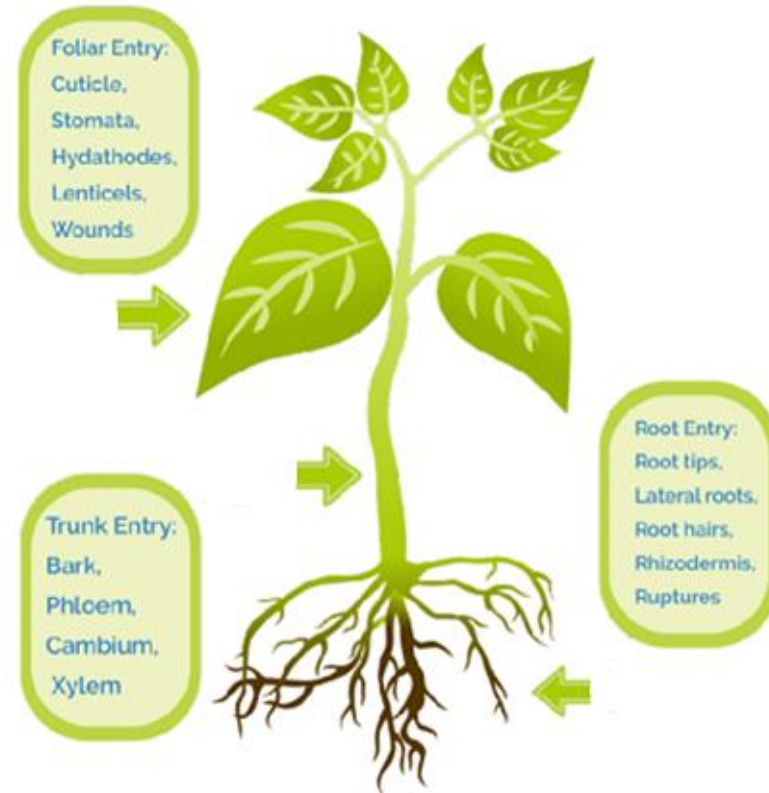
Typical agricultural sprays enter the plant system via the foliage or the root zone. Atypically, Ag-celerate™ has a special characteristic to penetrate and be absorbed into any surface of the plant, compost or soil.

Applications of Ag-celerate™ can enter the plant through:

- Foliage
- Trunk and stem surface
- Roots and root zone active compounds

This allows Ag-celerate™ applications on targeted sections of a plant canopy, trunk, branches or the root zone. This minimises the residue risk of active compound contamination on produce yet to be harvested, while allowing control of plant antagonists that may require treatment.

- Example 1: Applying soil drench systemic pesticides where efficacy may be reduced after applying into the soil and relying on moisture and root uptake to bring the compounds into the plant system, without impacting the fruit.
- Example 2: Bark penetration of compounds with Ag-celerate™ allows quicker action with enhanced efficacy, allowing a lower application cost.



# The Ag-celerate™ Advantage #4

Ag-celerate™ can penetrate biofilms formed by pathogens in the vascular system of plants, mitigating fatal and chronic vascular conditions that lead to low production or the eventual demise of plants.

Some fungal and bacterial vascular conditions in agriculture have no effective cure.

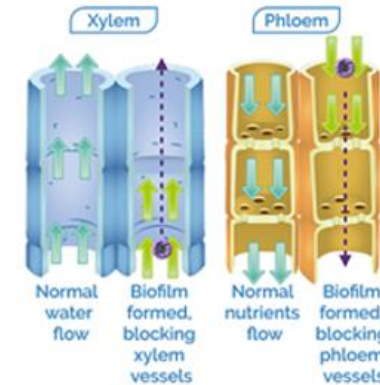
Examples:

- **North and South America:** Citrus Greening Diseases on citrus, lemon and lime fruit trees
- **Europe:** Xylella fastidiosa on olives and almonds
- **Internationally:** ESCA on grapevines and Eutypa dieback

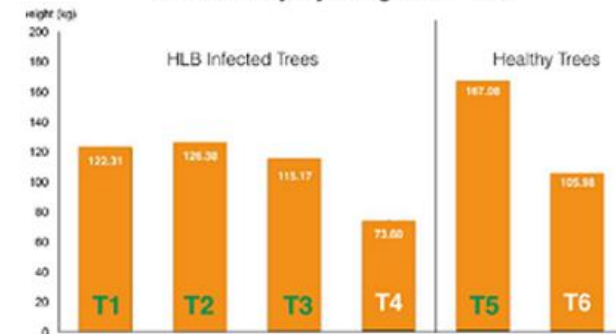
Examples of less severe conditions that lead to vascular conditions:

- Phytophthora
- Verticillium Wilt
- Fusarium root rot, amongst others.

Ag-celerate™ can mitigate these conditions, bring nutrients through the affected vascular systems and nourish the plant through its symplastic pathways to productive health.



Productivity By Weight Per Tree



Ag-celerate plots returned with higher productivity on both healthy trees (T5) and trees infected with citrus greening diseases (T1, T2 and T3) against controls (T4 and T6) under standard management protocols. Data from Sao Paulo, Brazil



# The Ag-celerate™ Advantage #5

## Zero-residue protection with Organic Colloidal Concentrate (OCC)

Ag-celerate™, combined with a 3% concentration of Hydrogen Peroxide, provides a zero-residue control of fungal, viral, and anaerobic bacterial conditions.

Hydrogen Peroxide (H<sub>2</sub>O<sub>2</sub>) is a natural Reactive Oxygen Species (ROS) cell signalling molecule for normal biological processes when humans, animals and plants come under stress.

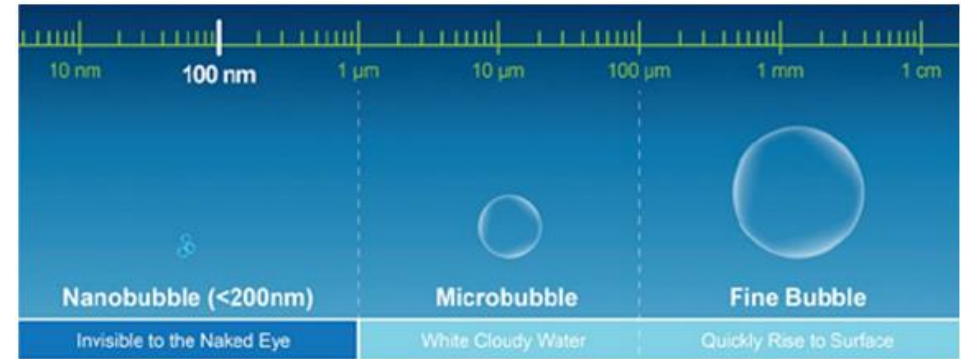
- Hydrogen Peroxide, as ROS, is an allowed substance for use:
  - In The National Organic Program in the United States Department of Agriculture under rule 7 CFR S205.601 (a)(4).
  - In Australian agriculture without the need for permits from APVMA.

When Ag-celerate™ combines with H<sub>2</sub>O<sub>2</sub>, the solution produces a sustained emission of oxygen bubbles in nano, micro and tiny oxygen bubbles that can sustain, depending on conditions, for more than 120 hours.

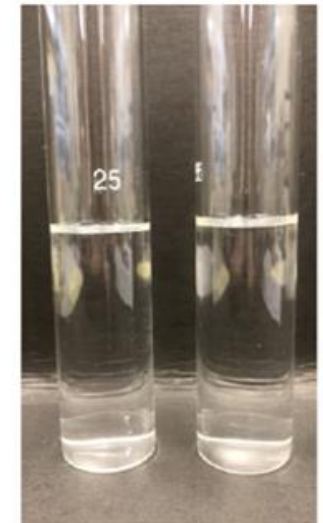
- This enhances the use and efficacies of H<sub>2</sub>O<sub>2</sub> in agriculture to mitigate multiple pathogenic conditions caused by fungal, viral and anaerobic bacteria and nematodes in soil.

Ag-celerate™ controls multiple disease conditions with zero residue.

- European vineyards have overcome grapevine trunk disease.
- South Australian Research & Development Institute in-vitro test proved Ag-celerate™ plus 3% H<sub>2</sub>O<sub>2</sub> completely controlled *Eutypa lata* and *Diplodia seriata*; Both are pathogens that cause *Eutypa* dieback and *Botryosphaeria* dieback
- Singapore National Park's Division of Plant Sciences and Health in-vitro tests confirmed Ag-celerate™ plus 3% H<sub>2</sub>O<sub>2</sub> completely controlled *Colletotrichum gloeosporioides*, *Curvularia* species, *Pestalotiopsis* species, *Fusarium oxysporum*, and *Rhizoctonia solani*.
- Major Mexican fruit grower has controlled fusarium root rot and mitigated soil nematode infestations



Various sizes of oxygen bubbles emit after Ag-celerate is mixed with a 3% H<sub>2</sub>O<sub>2</sub>



Ag-celerate with 3% (left) and 5% (right) concentration of H<sub>2</sub>O<sub>2</sub> after **138** hours continues to emit bubbles visible on the surface layer of the test tubes.

# When to use Ag-celerate™

## Use Ag-celerate™:

- In irrigation sprays to enhance the uptake of soil nutrients into plants or crops
- With nutrient or mineral sprays to improve uptake and absorption into the plant system
- To complement protection sprays to prolong sustained control, especially sprays with a systemic mode of action
- To complement a 3% concentration of hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) to mitigate pathogenic viral, fungal and anaerobic bacterial conditions - leaving no undesirable chemical residues on plants, crops and soil
- To complement H<sub>2</sub>O<sub>2</sub> or protection chemicals to mitigate fatal diseases that affect the vascular system of plants - leading to their demise
- To complement routine spray or irrigation management to raise quality and yield of crops
- To reduce long term cost of cultivation
- To reduce residue loads and improve sustainable production practices in the environment
- To enhance the production capacity of soil microbiome in the rhizosphere
- To enhance plant protein synthesis and functional photosynthetic efficiency
- To improve plant intravascular water use efficiency



## Ag-celerate™ is effective in:

- Tropical and temperate climates
- Annual and perennial crops and pastures
- Irrigated and dryland farming
- Housed and unhoused environments
- Leguminous, cereal, fruit, vegetable, root, vine, hedgerow, tree and mushroom crops

## Ag-celerate™ is easy to apply, safe and equipment friendly

| Method | Concentration Range | Tank Mix Ratio         | Per 100 litres of Solution |
|--------|---------------------|------------------------|----------------------------|
| Spray  | 0.03% to 0.05%      | 1 : 3,000 to 1 : 2,000 | 33 ml to 50 ml             |
| Aerial | 0.05% to 0.075%     | 1 : 2,000 to 1 : 1,000 | 50 ml to 100 ml            |
| Drip   | 0.03% to 0.05%      | 1 : 2,000 to 1 : 3,000 | 33ml to 50 ml              |

**Analysis:**                      **N – 0.7%**                      **P – 0.0%**                      **K – 0.0%**

- Shake the container well before diluting the contents
- Conduct a compatibility test before use
- Always apply Ag-celerate™ according to the recommended concentration range
- When combining with agrochemicals, add Ag-celerate™ into the diluted chemicals
- Apply Ag-celerate™ in the early morning or late afternoon when sunlight is weak
- Avoid application in rainy conditions

## Environmental consideration:

- Ag-celerate™ is non-toxic and without harmful effects to human, marine and animal health

## Storage and disposal:

- KEEP OUT OF REACH OF CHILDREN
- Avoid direct sunlight and store in a cool, well-ventilated place
- The alkaline and non-toxic nature of Ag-celerate™ may cause skin irritation

## Ag-celerate™ Application Guidelines:

| Crops & Situations  | Application / Concentration Rate                     | Timing & Frequency  |
|---|--|---|
| <b>Nursery Stock - Containerised and field grown:</b> Deciduous and evergreen trees, annuals and perennials, herbs and vegetables | 40ml / 100ml water or 0.04% v/v of spray application | Apply every 30 days or as needed commencing at transplant or 3 to 5 leaf stage.   |
| <b>Fruits and Berries:</b> Plums, apricots, cherry, peach, blueberries, blackberries, raspberries, strawberries                   | 50ml / 100ml water or 0.05% v/v of spray application | 3 to 4 applications commencing at 75% petal drop and repeating with 21 to 28day intervals.  |
| <b>Apple and Pears:</b>   |  | 3 to 4 applications commencing at 50% flowering and repeating with 21day intervals.   |
| <b>Fruiting vegetables:</b> tomatoes, peppers, beans, peas, onions.   |  | 1 <sup>st</sup> Application prior to fruits set and repeat every 14days.  |
| Lettuce, cauliflower, cabbage, and similar.   |  | 1 <sup>st</sup> Application at 3 to 5 leaf stage and repeat after 14days  |
| <b>Potatoes:</b>  |  | 1 <sup>st</sup> Application at tuber initiation and repeat after 14days   |
| <b>Cucurbits:</b> Pumpkin, squash, melons, cucumber   |  | 1 <sup>st</sup> Application at flowering and repeat after 21days  |
| <b>Grapes:</b> Table and wine   |  | Apply every 4 to 6 weeks when plants begin to grow  |
| <b>Herbs:</b> Basil, chives, coriander, dill, parsley, sage   |  | Apply every 4 to 6 weeks when plants begin to grow  |
| <b>Field and broadacre crops:</b> Barley, corn, oats, soybean, sugarbeet, alfalfa, canola   |  | Apply after plants reach 3 to 5 leaf stage. Apply with sufficient water to cover the crop   |
| <b>Grasses</b> grown for seed, sod, pasture, forage, alfalfa, hay   |  | Apply after plants reach 2" to 4" (inches) tall. Apply with sufficient water to cover the crop  |
| <b>Compost and Soil:</b>  |  | 40ml / 100ml water or 0.04% v/v of irrigation volume  |
| <b>Other liquid nutrients:</b> Worm juice, liquid seaweed fertilisers, humic and fulvic acids, micronutrients                     | 40ml / 100ml water or 0.04% v/v of spray application | Mix into the spray solution that contains the liquid nutrient and apply in accordance with the frequency required for the principal nutrients |
| <b>Other chemicals:</b> Insecticide, fungicide, herbicide   | 40ml / 100ml water or 0.04% v/v of spray application | Mix into the spray solution that contains the chemicals and apply in accordance with the frequency required for the principal chemical        |
| <b>Hydroponics and Aeroponics:</b>  | 30ml / 100ml water or 0.03% v/v of spray application | Apply to roots bi-weekly through grow and bloom, beginning at transplant  |



## **Project Manager**

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