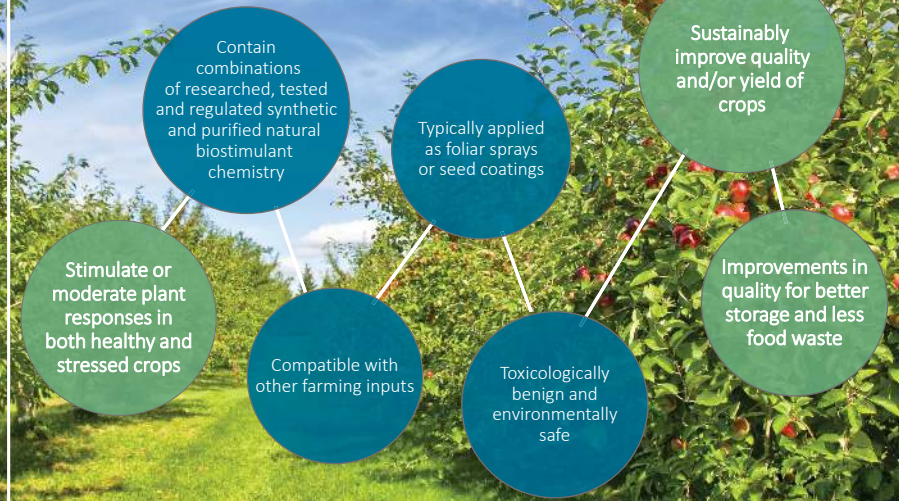


InCa treatments to improve the firmness of blueberries

Laura Bishop, Market Application Specialist



Key facts about our products...



Smart science to improve lives™

As part of Croda, Plant Impact delivers on this purpose by improving crop quality, yield and profitability for growers, while helping to cut food waste

CRODA

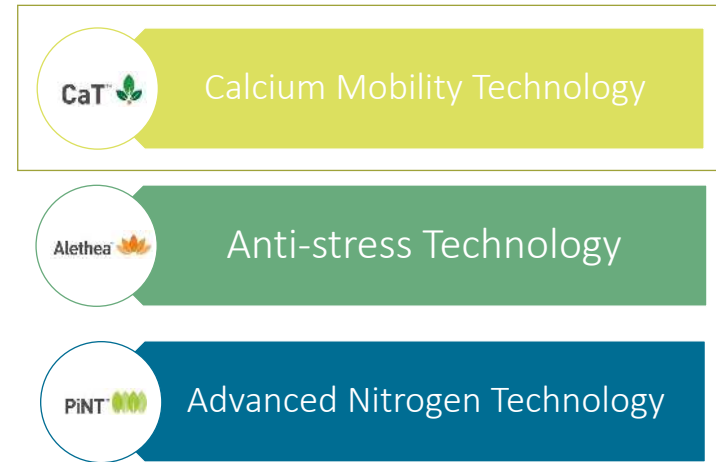


Innovative products for yield, quality and profitability





Improving crop quality and yield for growers worldwide



CaT™ calcium mobility benefits in horticultural crops

Crops

- Tree fruit, soft fruit, field veg and salad veg

Better crop quality and marketable yield

- Improved crop quality, calcium levels and shelf life
- Reduction of common calcium disorders e.g bitter pit, tip burn and blossom end rot
- Less crop waste

Application flexibility

- Compatibility with other AgChem foliar sprays allows easy and safe application without additional effort or resource

Convenient and cost effective

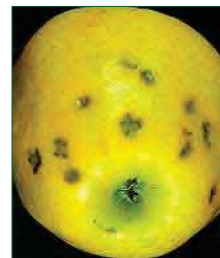
- Competitive total product cost and return on investment



Calcium, crop quality, yield and storage

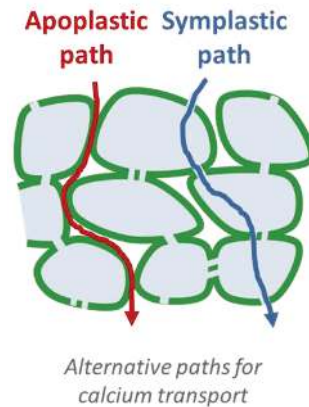
Calcium...

- is principally taken up with water in the transpiration stream (so is not readily phloem mobile)
- is essential for cell wall and membrane structure
- deficiencies can cause cellular collapse and disorders that reduce yield, quality and shelf life



Mode of action of CaT™ biostimulant chemistry

- Stimulates selective ion transport channels in membranes, increasing the calcium concentration within cells
- Improves localised calcium movement via the symplastic pathway, which will be important in tissues with low transpiration and hence little apoplastic flow



MoA study: imaging cytoplasmic Ca²⁺ concentrations

Light-controlled environment creates total black-out to allow camera to record light (bioluminescence) emitted in proportion to calcium concentration in cells

LANCASTER UNIVERSITY

Method
Low light camera captures 120 still images over 4 hours


Formulations applied directly to a single leaf

Arabidopsis thaliana plant transformed with the anquorum calcium reporter system in which bioluminescence under low light conditions shows calcium levels

APPLICATION PROCEDURE

Control (calcium applied)

Slight increase in calcium concentration where applied directly

CaT™ 

CaT™ formulation applied

Systemic increase in cytoplasmic calcium concentration

Significant increase in calcium concentration where applied directly

COMBINED IMAGES TAKEN OVER 4 HOURS

“...the active in CaT is improving access of the calcium or otherwise enhancing the calcium response in the plant”

Lancaster University confirms that these results indicate that:

Calcium movement v01 - calcium control only

Calcium movement v02 - with CaT

MOA: Lancaster University study summary

- CaT gives elevations in cytoplasmic calcium concentration in the application area
- It also results in systemic increases in cytoplasmic calcium concentrations in other leaves, to which no product was directly applied
- The effect of CaT is far more pronounced than that of calcium nitrate alone
- *CaT is designed to mobilize calcium, it is not a supplement for soil calcium deficiencies*

CaT™ 
Calcium mobility technology

Trial data



Chile R&D trial

- Dr. Rodrigo Cazanga - Project Director Specialist in ecophysiology, soil and climate. Ing. Agr. M. Sc. Dr
- Conducted in Ñuble Region, Chile
- The two trial locations were La Cantera field, Quinchamalí (Central Valley) and Danquilco field, El Carmen (Piedmont)
- High input site management (drip irrigation, fertigation and professional agronomic management)
- Four varieties tested – Star, Suzie Blue, Legacy and Brigitta

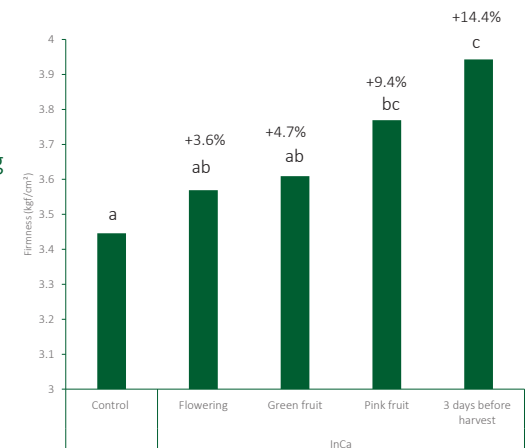
Experimental design

- Three replications per variety
- Each plot consisted of 3 rows (60 plants) and samples were collected from the central 20 plants from the middle row
- A total of 3kg of fruit was collected per plot for firmness analysis
- Firmness was assessed in kilogram-force per centimetre square (kgf/cm²) with a digital penetrometer (Make: Silverado, Model: FHT-801)

Treatment	Application	Timing
T0	Standard management	-
T1	6L/ha of InCa in 600L water	Flowering
T2	6L/ha of InCa in 600L water	Green fruit stage
T3	6L/ha of InCa in 600L water	Pink fruit stage
T4	6L/ha of InCa in 600L water	3 days before harvest

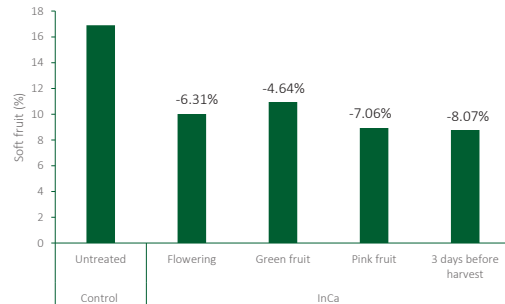
InCa significantly improves firmness in cv. Brigitta

- The application of InCa significantly increased the firmness of the berries (P=0.021)
- The application at flowering and at green fruit did not significantly increase firmness
- The application at pink fruit and 3 days before harvest were significantly firmer than the control



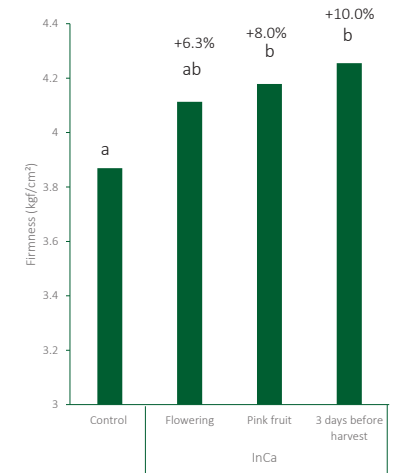
Quality control assessment after transport to UK

- Sample of cv. Brigitta were sent to the UK to a processor for soft fruit assessment
- Harvest Date: 17 Dec 2019
- Samples arrival: 6th Feb 2020
- Days from harvest to assessment: 52 days
- Fruit treated by InCa has up to 8% less soft fruit than the control



InCa significantly improves firmness in cv. Legacy

- The application of InCa significantly increased the firmness of the berries (P=0.014)
- The application at flowering did not significantly increase firmness
- Samples from InCa applied at green fruit stage were lost due to harvest error
- The application at pink fruit and 3 days before harvest were significantly firmer than the control



Samples lost due to challenging weather conditions

There was no significant difference between any treatments for Star and Suzie blue

This was mainly attributed to a failed harvest due to poor weather conditions. All fruit from the fields where these trials were conducted was failed by the processor (split skin) and not exported

InCa improves berry firmness and shelf life

- Promising results showing a significant effect on firmness and shelf life when InCa is applied at Pink fruit stage
- Continuing research into the effects of InCa on blueberry quality
- The results from this trial are similar to data generated in other trials where shelf life has been increased by 3 days and firmness increased by 4%
- Plant Impact and Hortifeeds are working closely with a leading berry processor to further investigate InCa on soft fruits in growing areas such as Spain, Peru, Poland and Scotland

Thank you for your time

For any queries, please contact Laura Bishop (Market Application Specialist)

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