



# New Developments in Crop Nutrition and Crop Enhancement



# International R & D



THE QUEEN'S AWARDS  
FOR ENTERPRISE  
INTERNATIONAL TRADE  
2013

**OMEX**  
**AGRIFLUIDS**



# UK & Ireland Research



**Agrii**



Stockbridge Technology Centre





# Omex UK Research



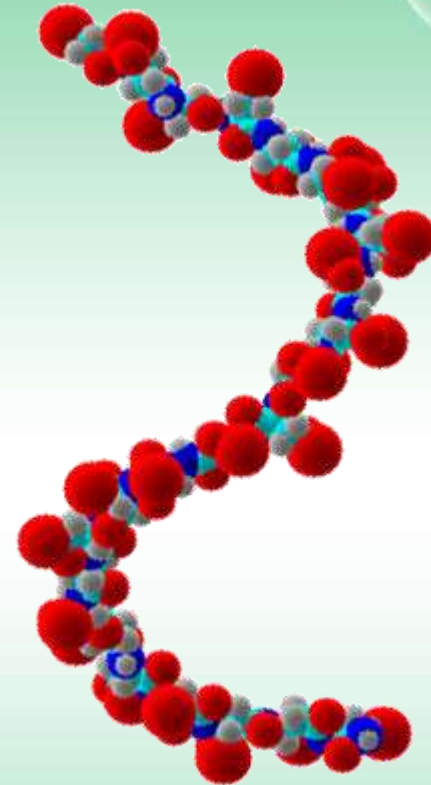


# TPA

## Fertigation and Nutrient Availability

# TPA phosphate enhancer

- Thermal Polyaspartate (TPA)
- Protects phosphate from immobilisation
- Prolongs phosphate availability
- Increases phosphate utilisation efficiency



PHOSPHATE

PHOSPHATE  
+TPA



Jars contain calcium solution to mimic soil solution

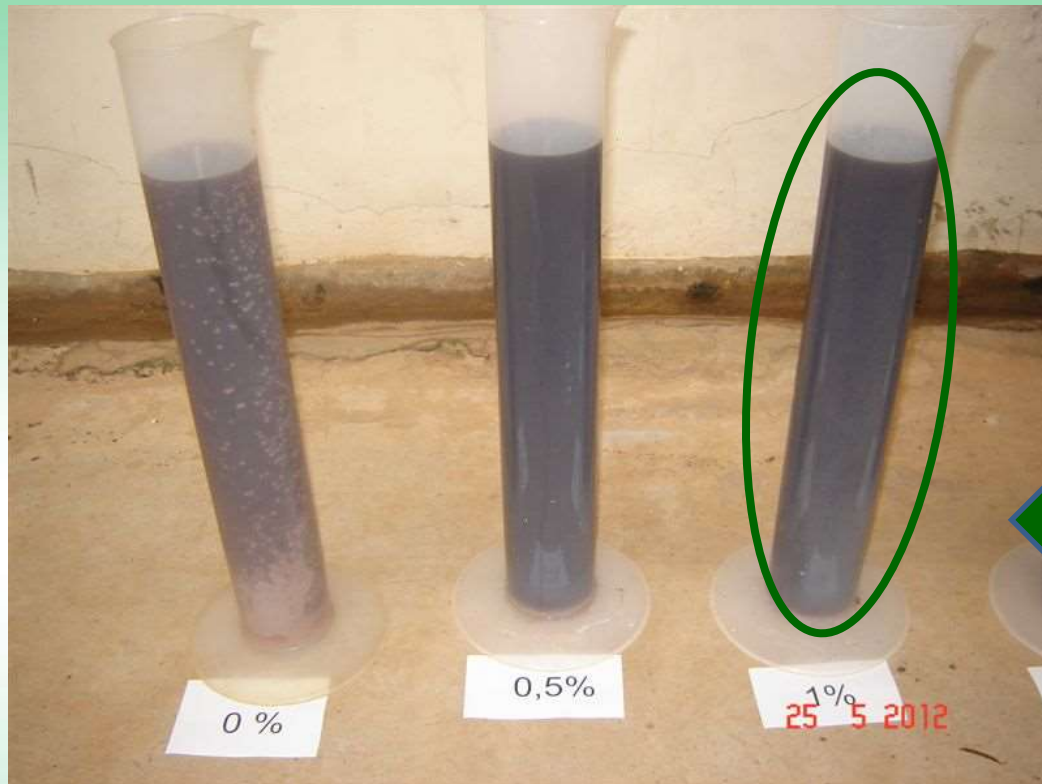
# TPA in Fertigation



- Objectives:
  - Fertigation:
    - Mixing Tank A and Tank B
    - No formation of insoluble deposits.
  - Nutrient Solution:
    - No formation of insolubles
    - Keep the nutrients freely available to plants.



# Results



**Best results:  
1% - 2% TPA**

**TPA:**

Less precipitate in the tank  
More nutrient in the soil solution



# Calmax Ultra

Enhanced Calcium  
Uptake

# Calmax Ultra



- Calcium Nitrate (21.8%CaO) + Trace Elements + **AXM (Calcium uptake activator)**
- Rates: 1-3.0l/ha, multiple applications
- Crops: Top fruit, soft fruit, leafy salads, tomatoes
- To reduce the incidence of a number of disorders including bitter pit in apples; fruit splitting and cracking; tip burn in lettuce; blossom end rot in tomatoes.
- Increasing fruit and leaf calcium promotes longer storage life and resistance to physiological break down.

# Bitterpit trial: USA

*Oregon USA 2011*



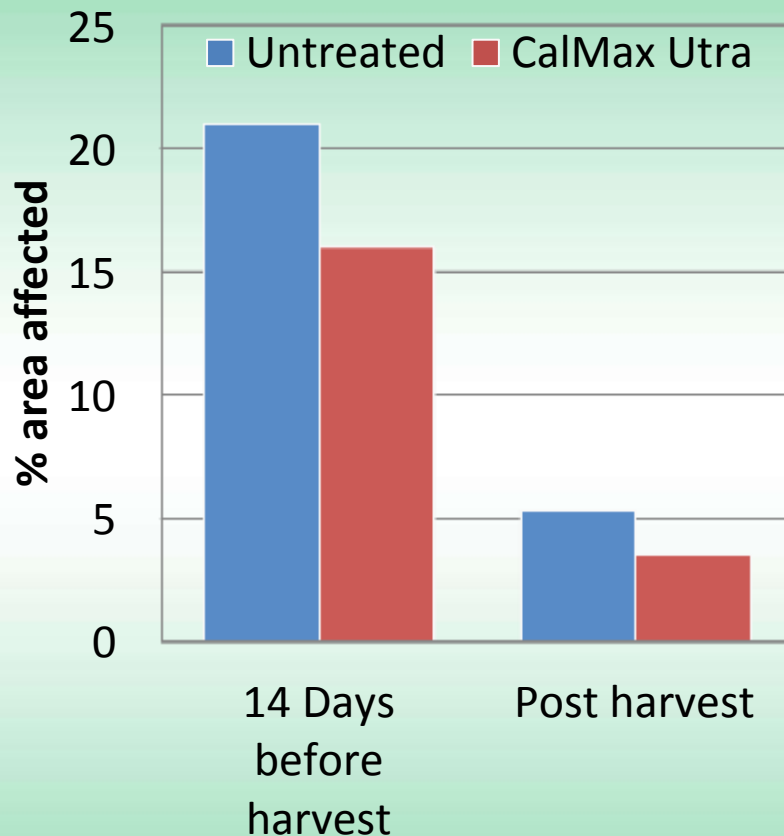
**Calcium standard**



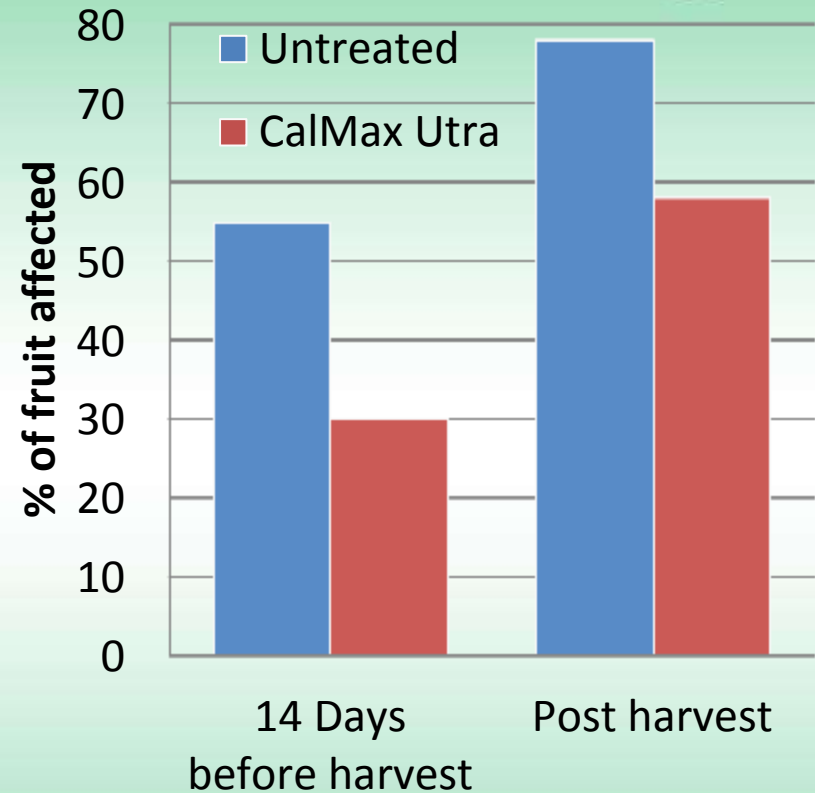
**CalMax Ultra**

# Calmax Ultra: Apples, USA

**Apples USA: Bitterpit  
Severity**



**Apples USA: Bitterpit  
Incidence**

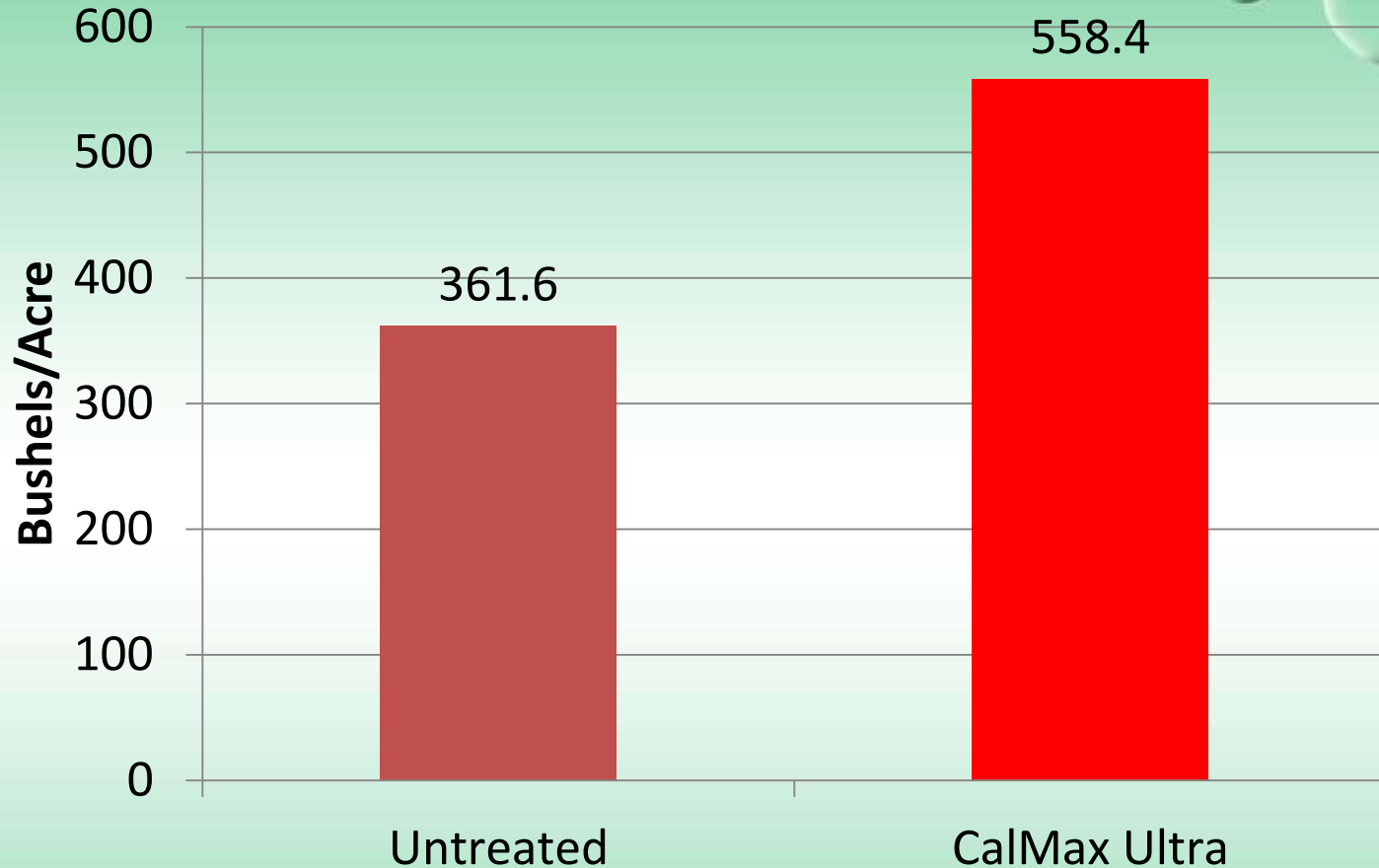


Location: Oregon  
Apple variety: Honeycrisp  
2 reps/treatment, 100 fruit assessment/rep  
Application rate: 3.5 litres/Ha, 8 apps



# Calmax Ultra: Apples, USA

## Apples, USA: Harvested Yield



Location: Oregon

Apple variety: Honeycrisp

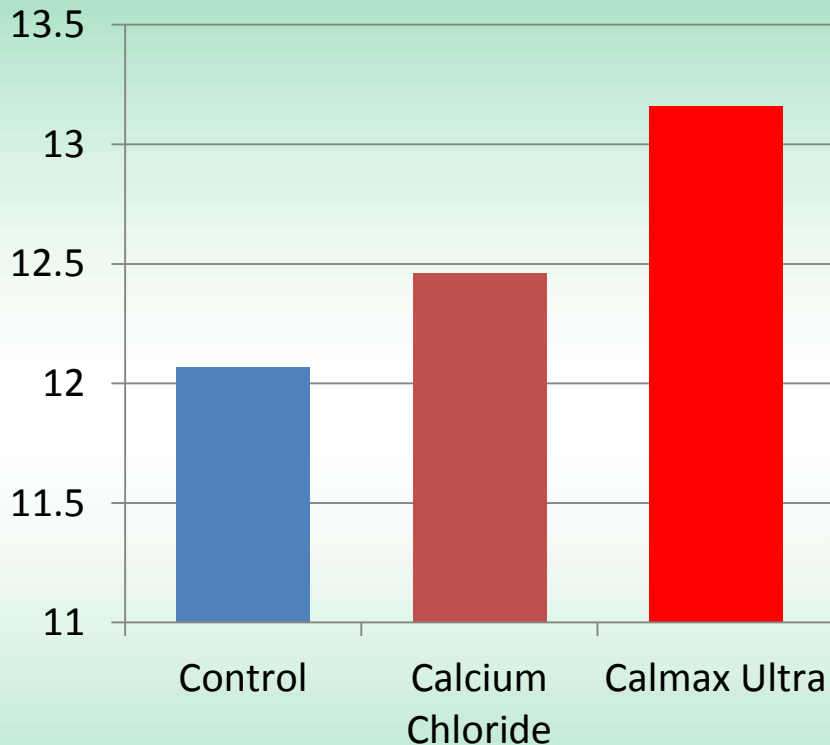
2 reps/treatment, 100 fruit assessment/rep

Application rate: 3.5 litres/Ha, 8 apps

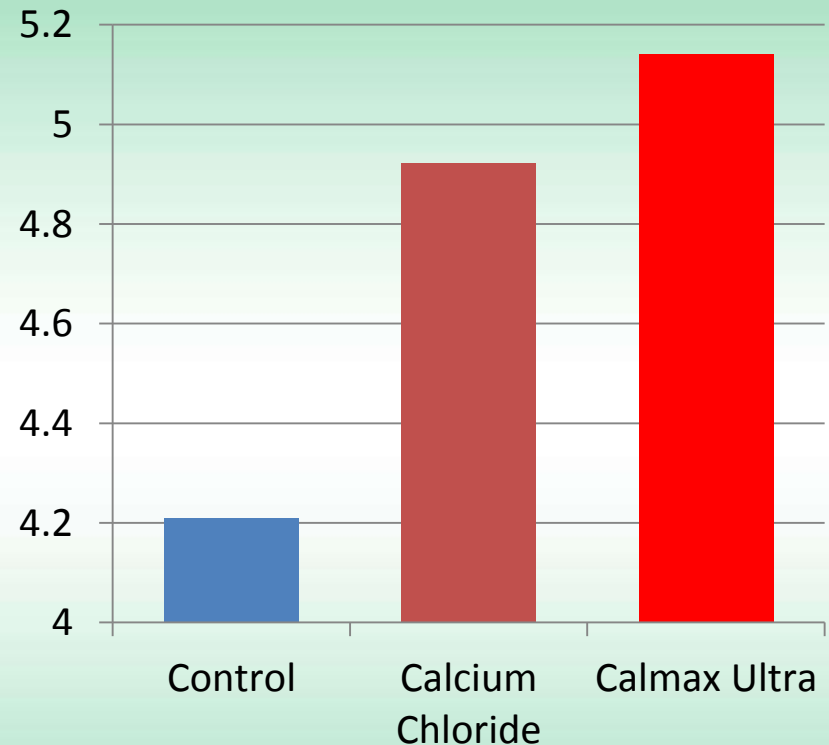


# Calmax Ultra: Apples, UK

**Apples UK:  
Brix**



**Apples UK:  
Fruit Firmness**



Location: Kent

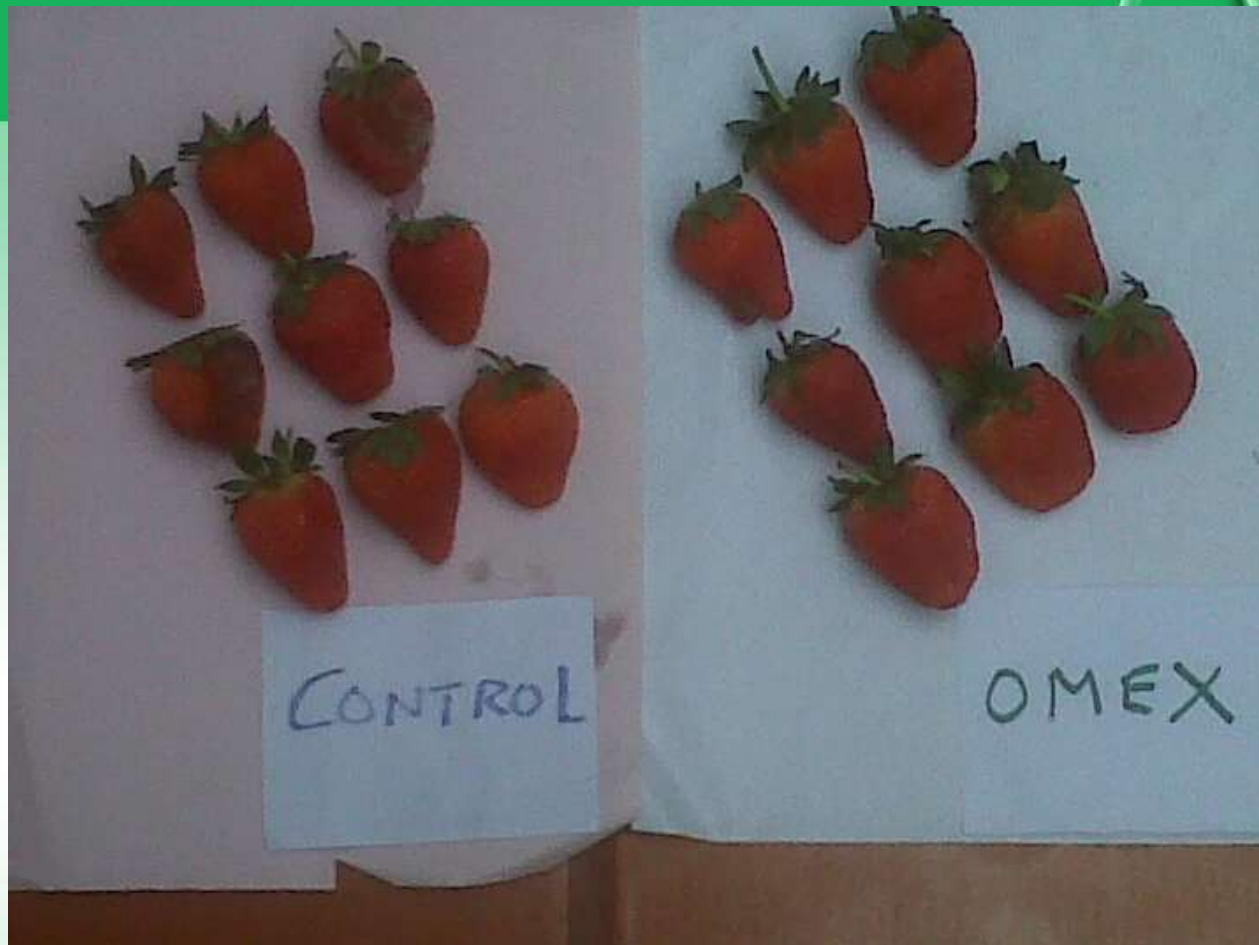
Variety: Cox

Application Rate : 3.5 litres/ha





# Calmax Ultra on strawberries Colombia 2012



Average fruit rots – 4 days post harvest

Control 18%

Calmax Ultra 11%





Fruit firmness : pressure in Kg

Control 1.02

Calmax Ultra 1.24





Fruit brix : Sugar levels

Control 6.34

Calmax Ultra 6.41



BEFORE



AFTER

Control: fruit before and after  
penetrometer and refractometer  
readings



BEFORE



AFTER

Calmax Ultra: fruit before and after  
penetrometer and refractometer  
readings

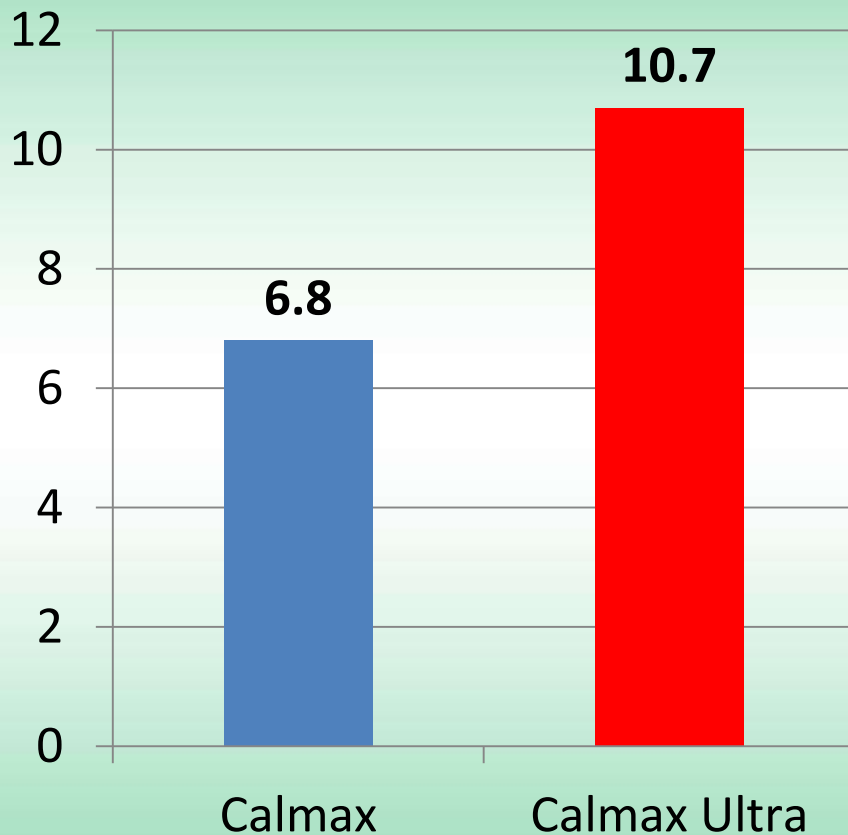


# Calmax Ultra on Strawberries

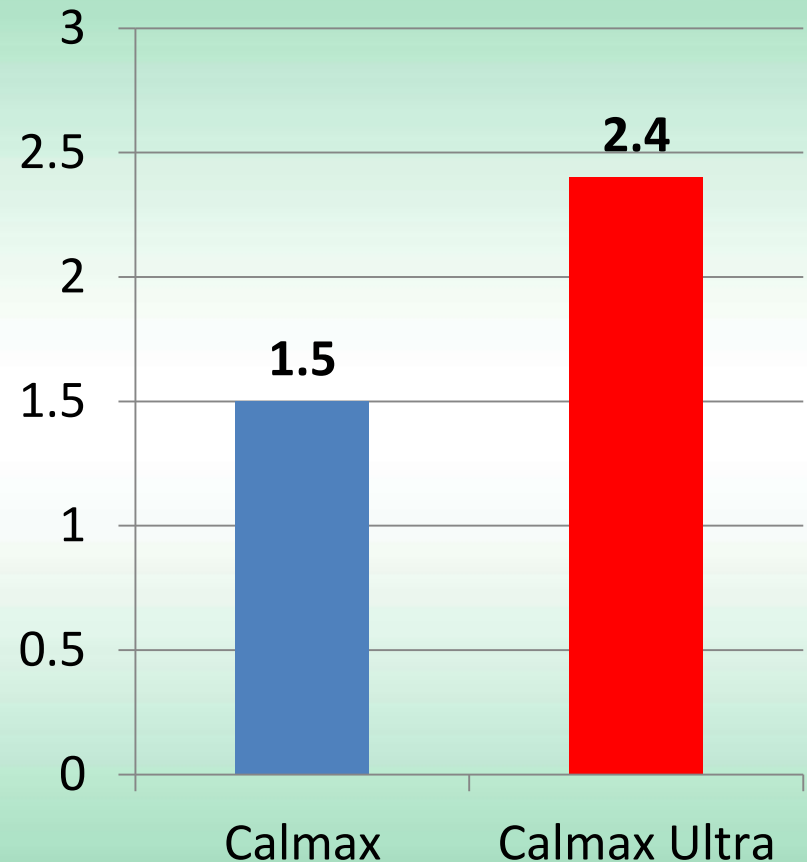
La Huaca, Huaral, Peru  
2012

# Calmax Ultra: Strawberries

**Average No. Fruit per Plant**



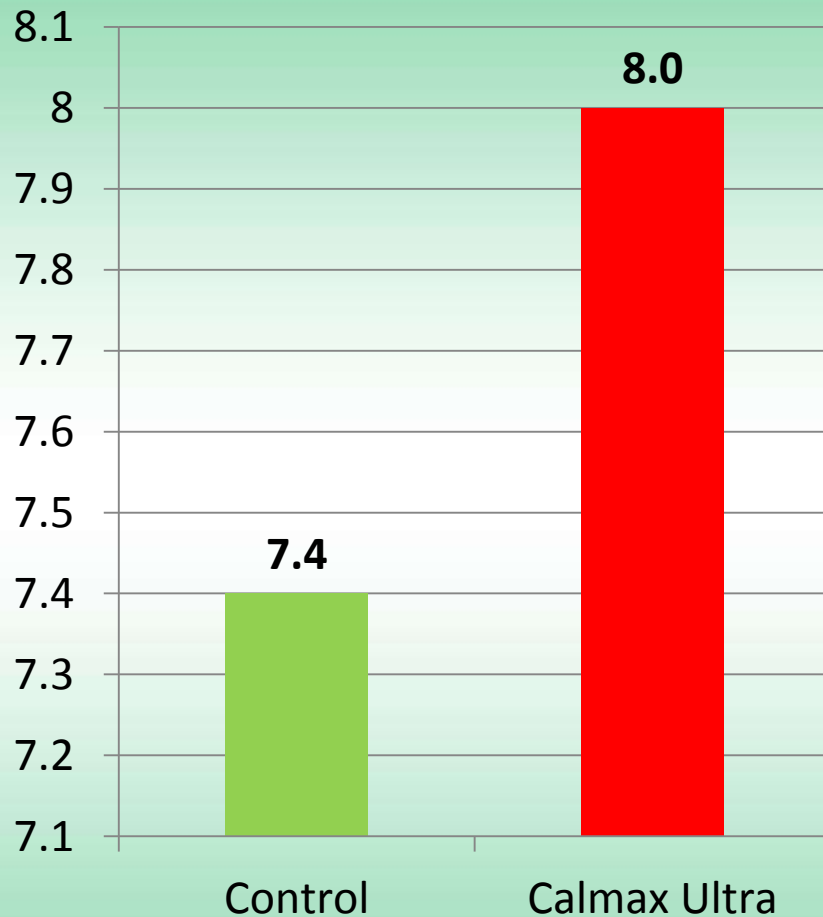
**Average No. Flowers per Plant**



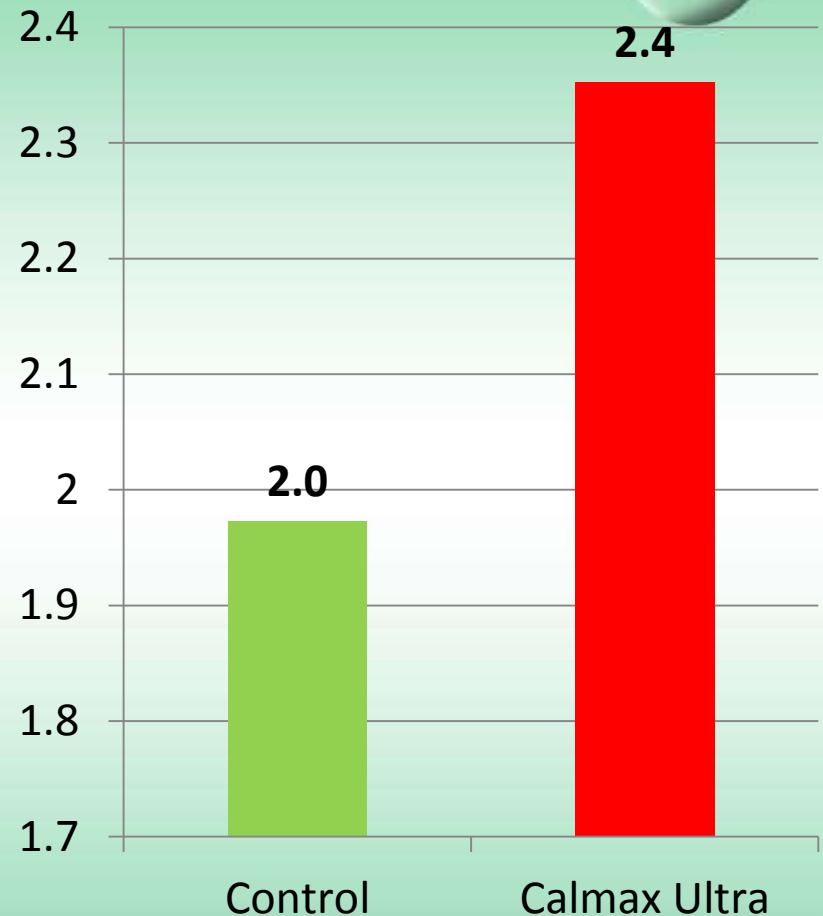


# Calmax Ultra: Strawberries

**Soluble Solids %**



**Firmness**





# Potential Development Products



# GLD

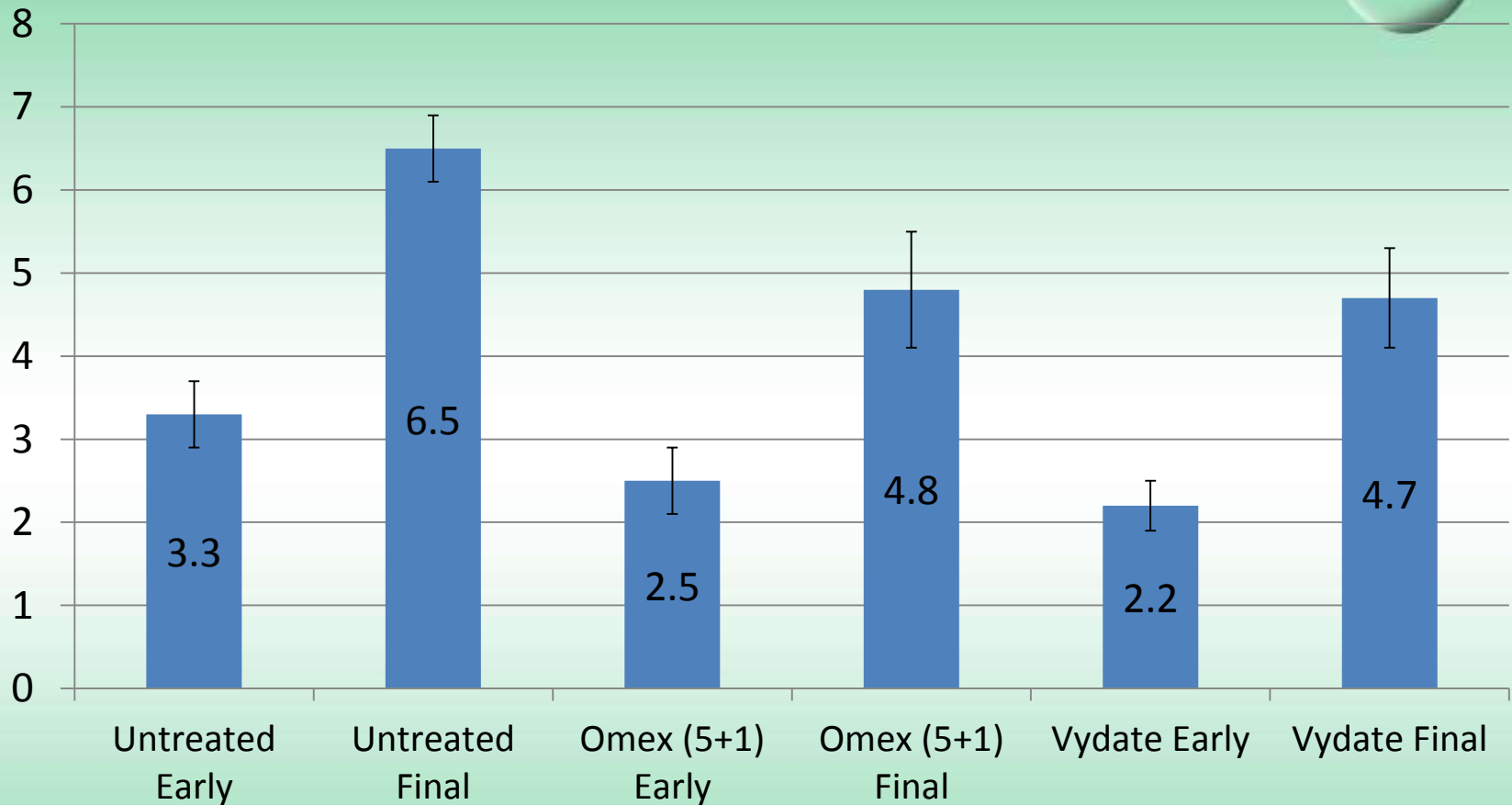
# GLD



- New nematicide
- Plant-derived ingredients, better environmental profile
- Active on wide range of nematodes
- Initial registration for Root Knot Nematodes on protected tomatoes (S. Europe) 2014-2015
- Potential on other soil-grown crops?

# GLD: RKN in Tomatoes

**Tomatoes: Mean Root Galling Scores (n=13)**

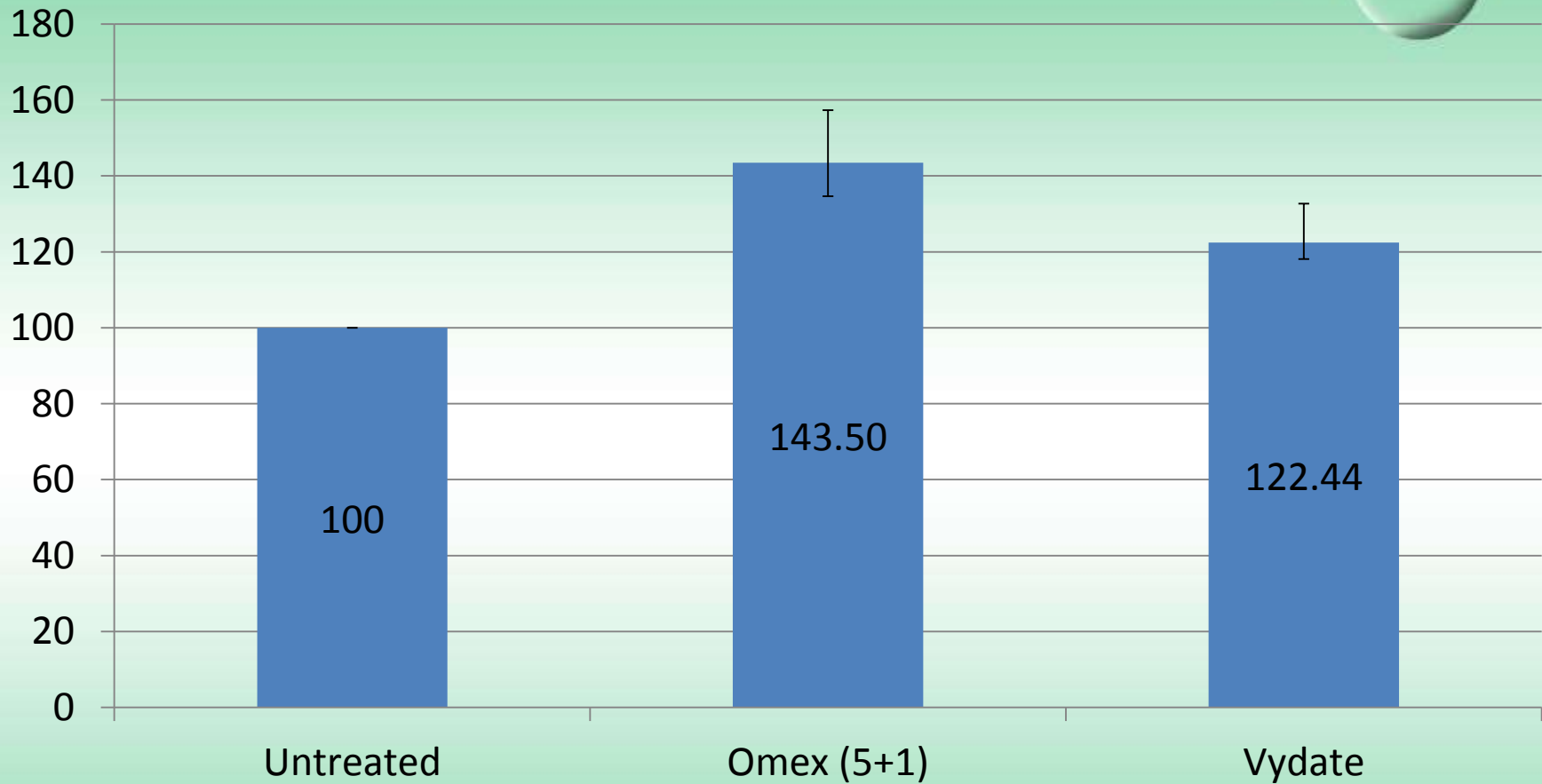


Error bars = standard error of mean



# GLD: RKN in Tomatoes

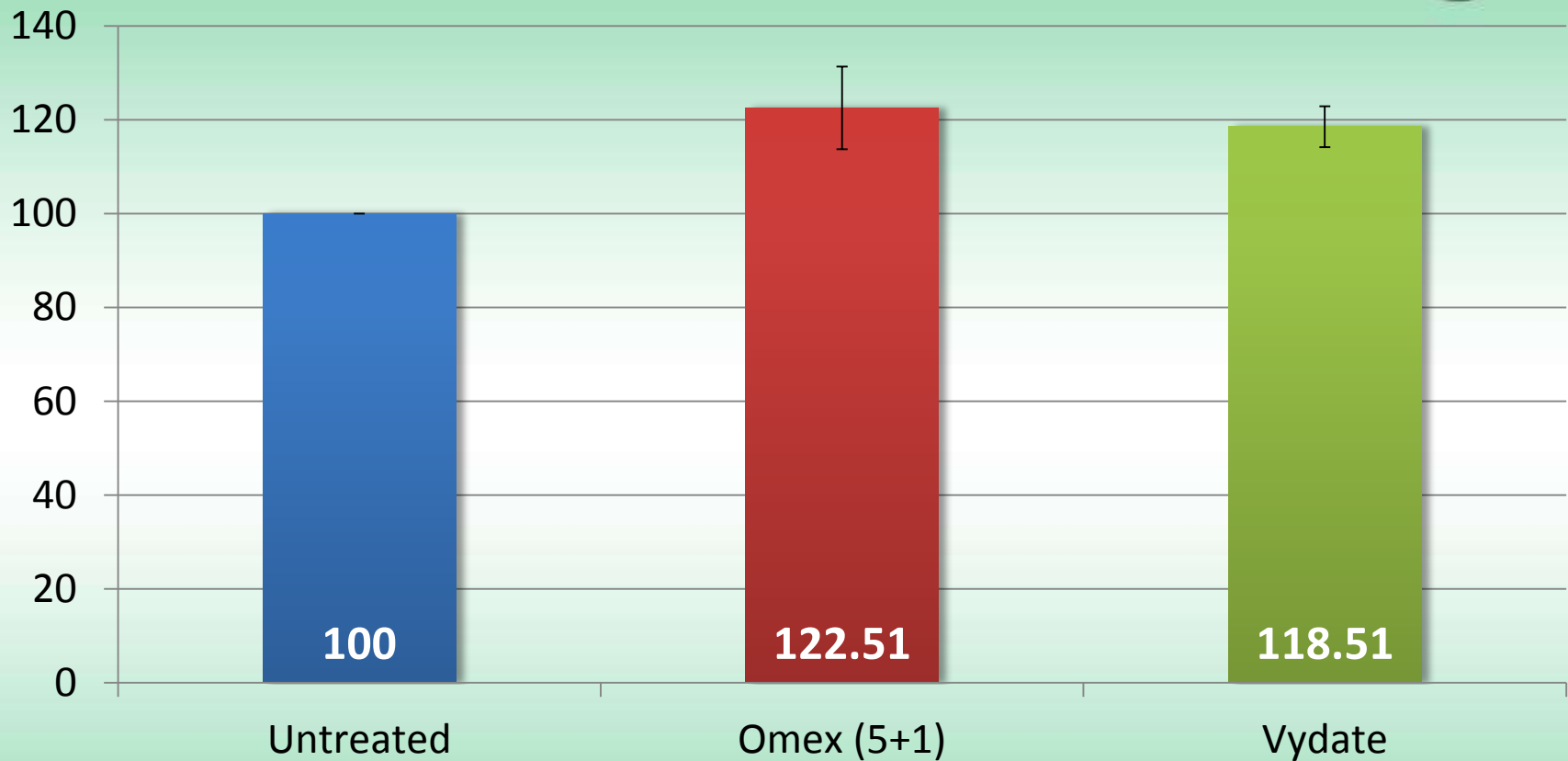
Tomatoes: Early Yield, % of Control (n=9)



Error bars = standard error of mean

# GLD: RKN in Tomatoes

Final Yield, % of Control (n=13)



Error bars = standard error of mean

# GLD: Tomatoes, RKN



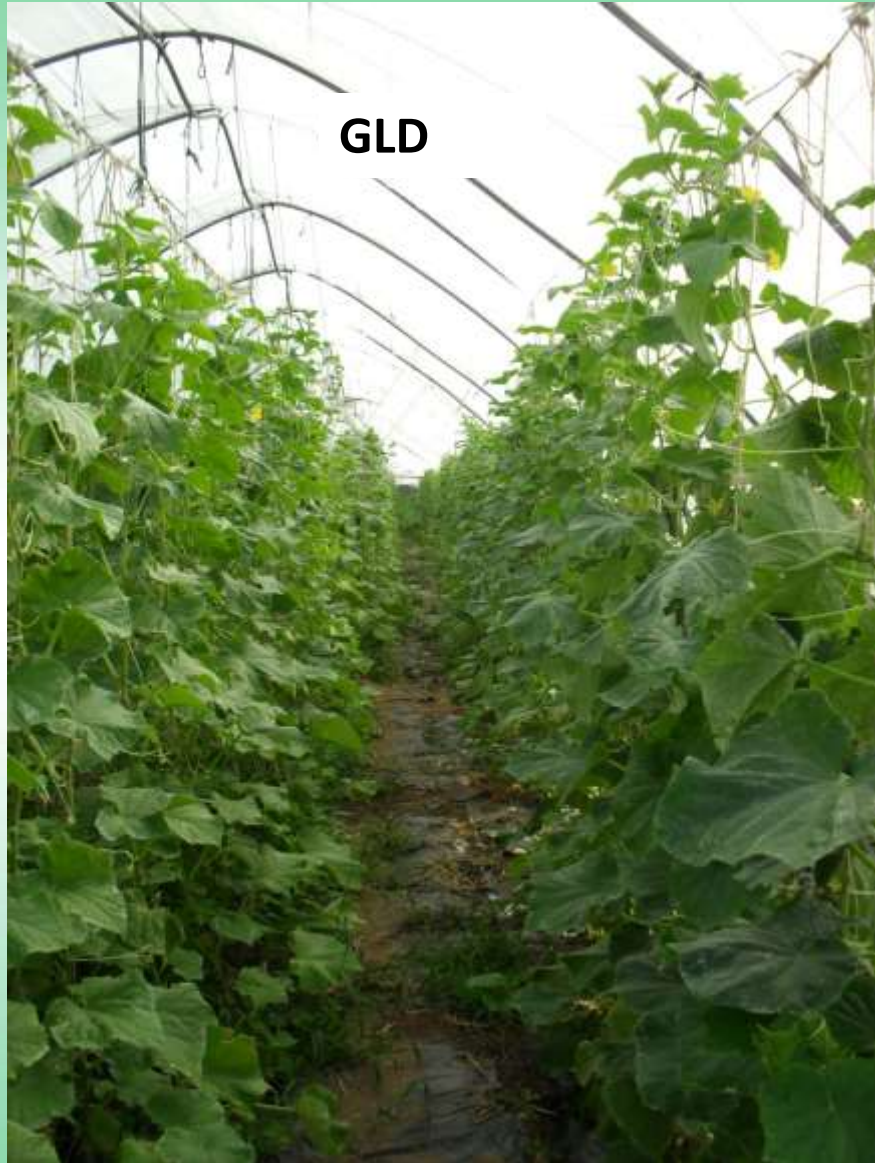
**Untreated**



**Treated**



# GLD: Cucumbers





# GLD: Cucumbers

GLD

Vydate



GLD treated plots showed far greater vigour with no patches of heavy crop damage

# GLD: Melons



GLD treated stalks were thick and strong, leaves open and turgid.



# VNX

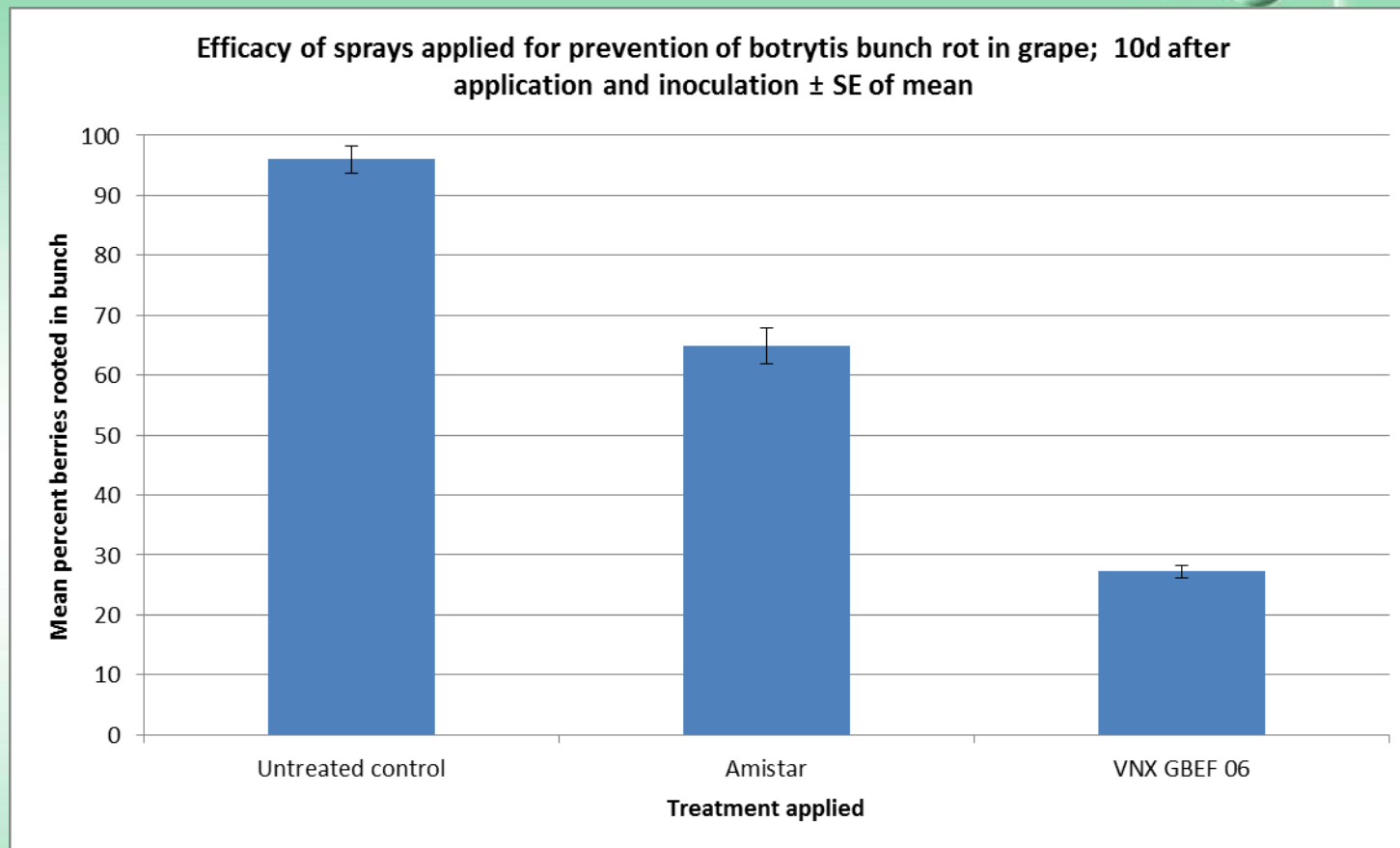


# VNX



- Derived from a food ingredient
- Initially seen as a late-use insecticide
- Also active on a range of fungal diseases
- Potential for late use with short or no harvest interval, no residue issues
- Market potential v. development cost currently under evaluation

# Grapes, Botrytis: 10 DAT



# Visual Symptoms

**7 DAT**



Control



Amistar



VNX

**10 DAT**



Control



Amistar



VNX

# VNX: Tomatoes, Botrytis

	Infected petiole stubs (n/8)			Infected stem wounds (n/16)		
Days after inoculation	Untreated	Rovral	VNX	Untreated	Rovral	VNX
7	5	0	0	5	0	0
10	7	1	1	7	0	0
14	7	1	1	9	0	0

Knowledge  
Transfer  
Partnerships

# Elicitor project

Lea Wiesel, Ingo Hein, Adrian Newton,  
Ian Elliott, David Booty

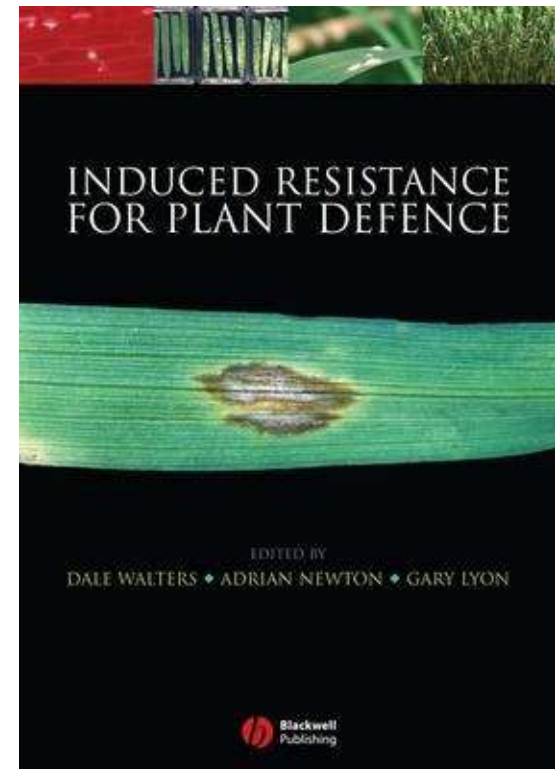
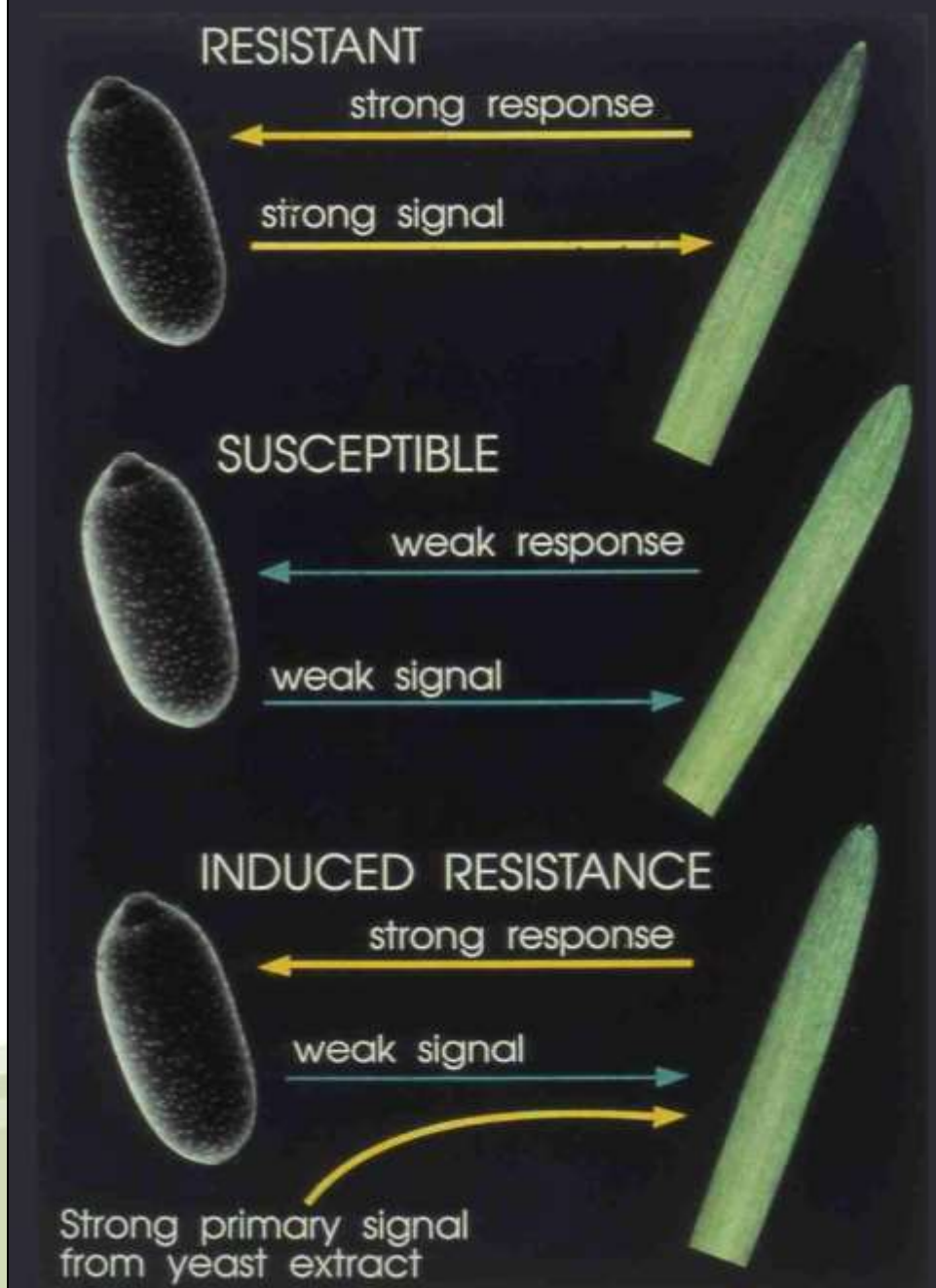


The James  
**Hutton**  
**Institute**

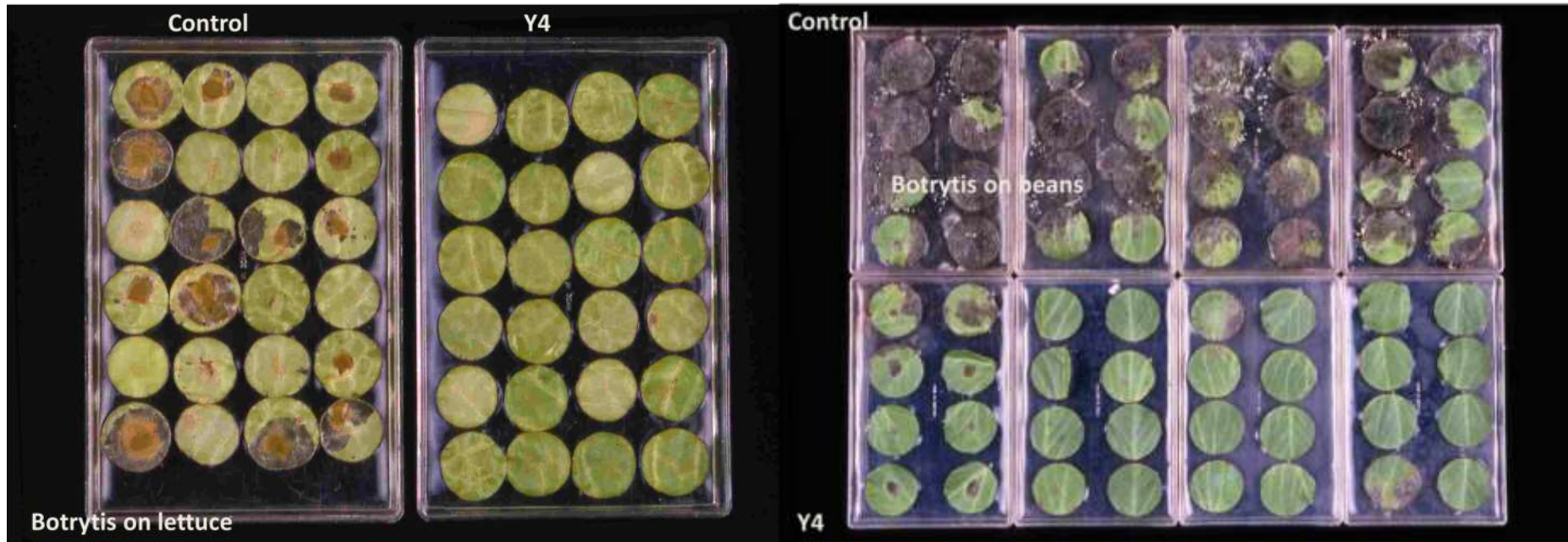




# Why use resistance elicitors?



# Detached leaf screening systems





# Summary

## Elicitors:

- **Work through the plant's own defence mechanisms**
- **Prime the mechanisms to work faster**
- **Usually have no direct toxic effect**
  
- **Crop and variety dependent**
- **Pathogen dependent**
- **Agronomy, nutrition, formulation and environment interactions**
  
- **Use in Integrated Pest Management systems**

# Potato assay





Thank You!

[www.omex.co.uk](http://www.omex.co.uk)