THE ROLE OF MICROBES IN AGRICULTURE

SEMINAR LONDON, 23.06.2011

Increasing demands on agriculture

The challenges of the coming decades

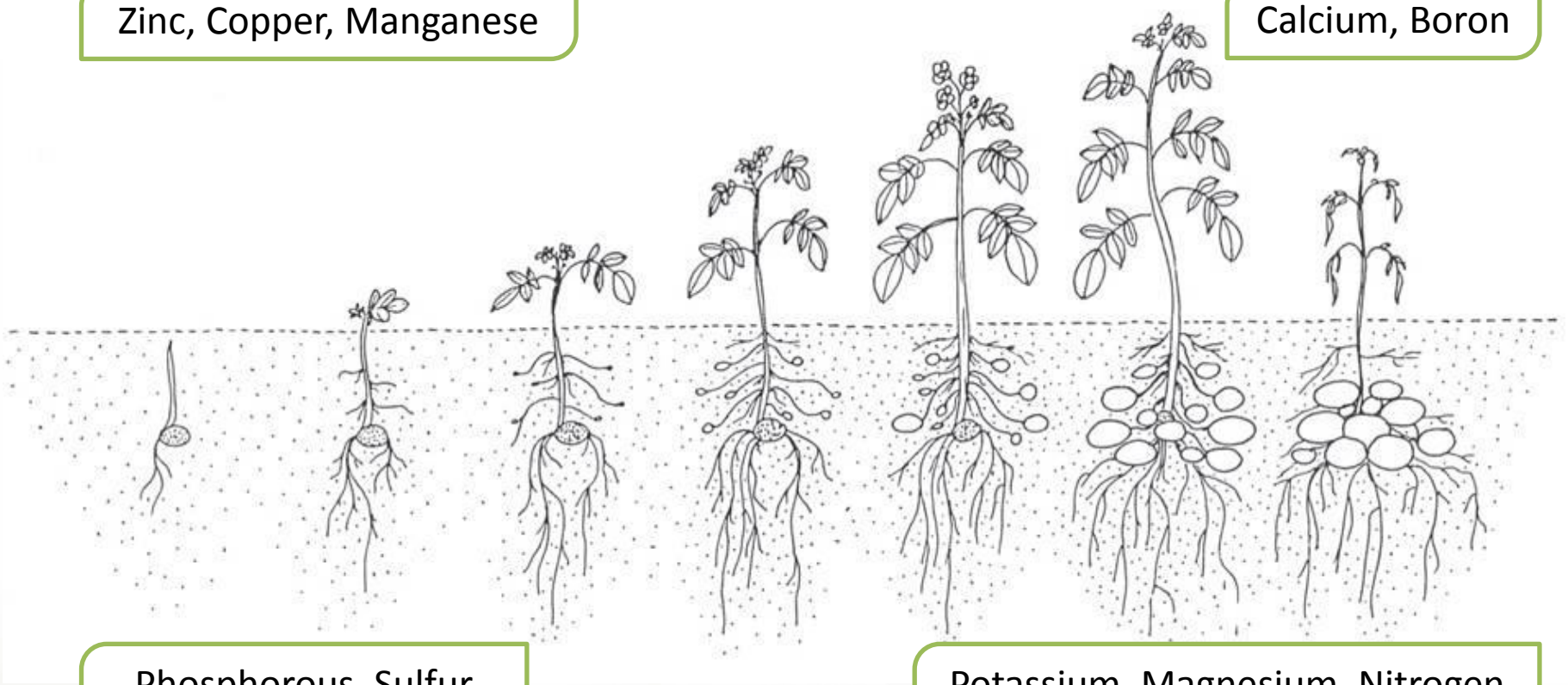
- **Population growth:** WHO: must double production with half the resources by 2050
- **Nitrate Directive**: Affects how much N we can use, from which sources and when
- **Phosphate Directive:** Sets limits for P in the soil
- **Pesticides Directive:** Limits active ingredients like carbamates, triazoles, metaldehyde
- **Soils Directive:** Targets 3,4% soil organic matter
- **Local targets:** DEFRA targets 40% reduction in CO_2 by 2020
  80% comes from NPK

Nutrition

Not only NPK

Zinc, Copper, Manganese

Calcium, Boron

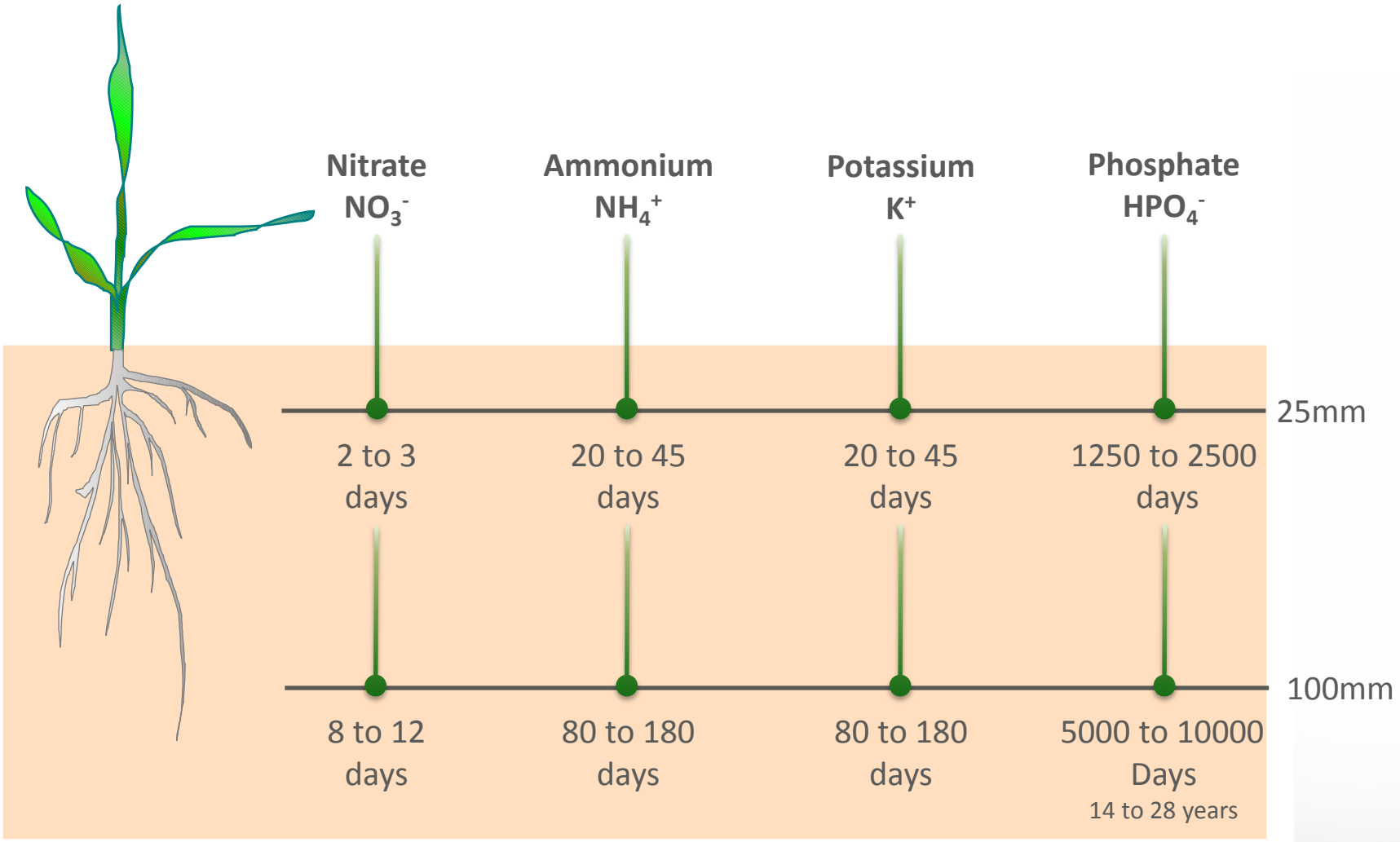


Phosphorous, Sulfur

Potassium, Magnesium, Nitrogen

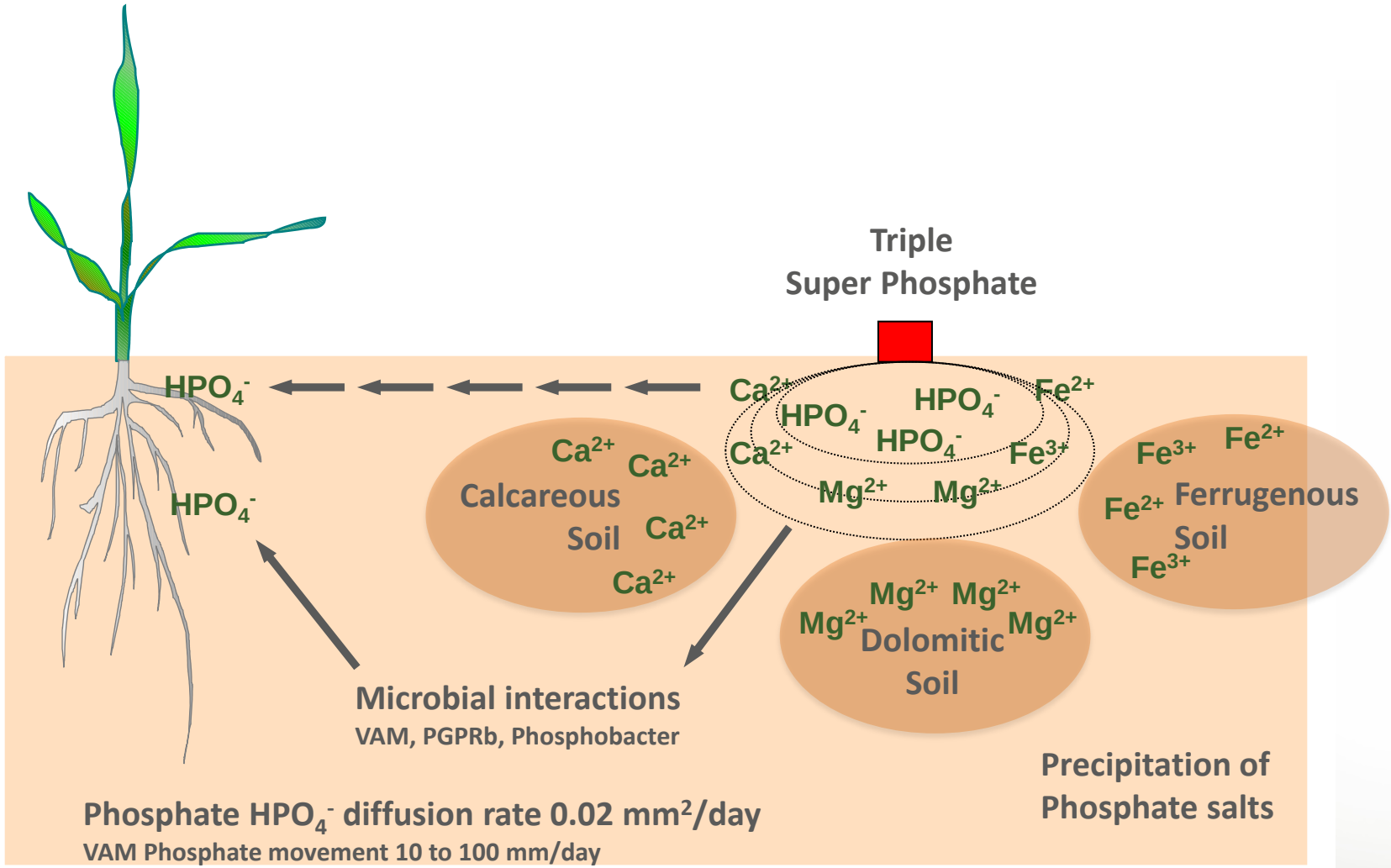
Yield potential is determined within 30-45 days from germination

Nutrient movement



Microbes and phosphate

Conventional chemistry



High Yield Technology - HYT™

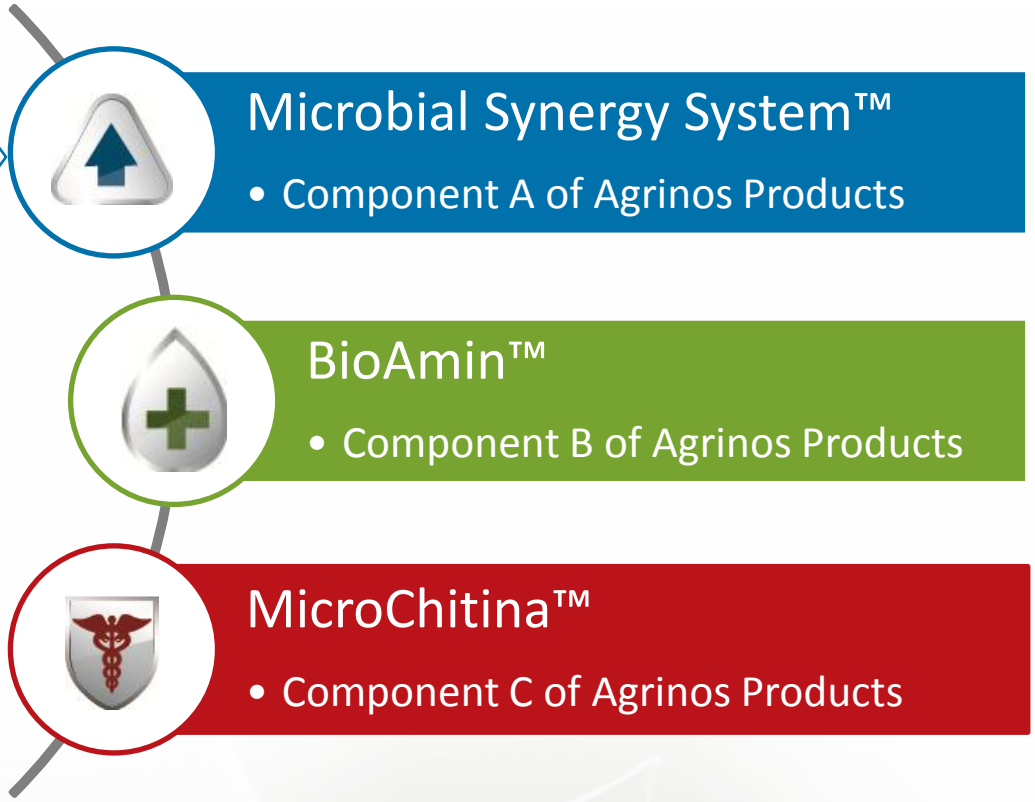
Components and underlying technologies

COMPLEX MICROBIAL INOCULANT

Unique encapsulation method
- Prevents cannibalization and loss of effectiveness
- Allows for transport and storage up to 2 years

Only naturally occurring soil based microbes
- Includes both aerobic and anaerobic nitrogen fixing microbes plus all the other elements to boost Nitrogen fixation
- Boosts the local microbial flora and leaves an excess amount of nutrients behind as organic matter for long-term soil fertility

Complex, self-sustainable ecosystem
- Works over a wide range of temperature and acidity levels
- Supporting elements for high efficiency



High Yield Technology - HYT™

Components and underlying technologies

L-AMINO ACID COMPLEX

Patent pending extraction process

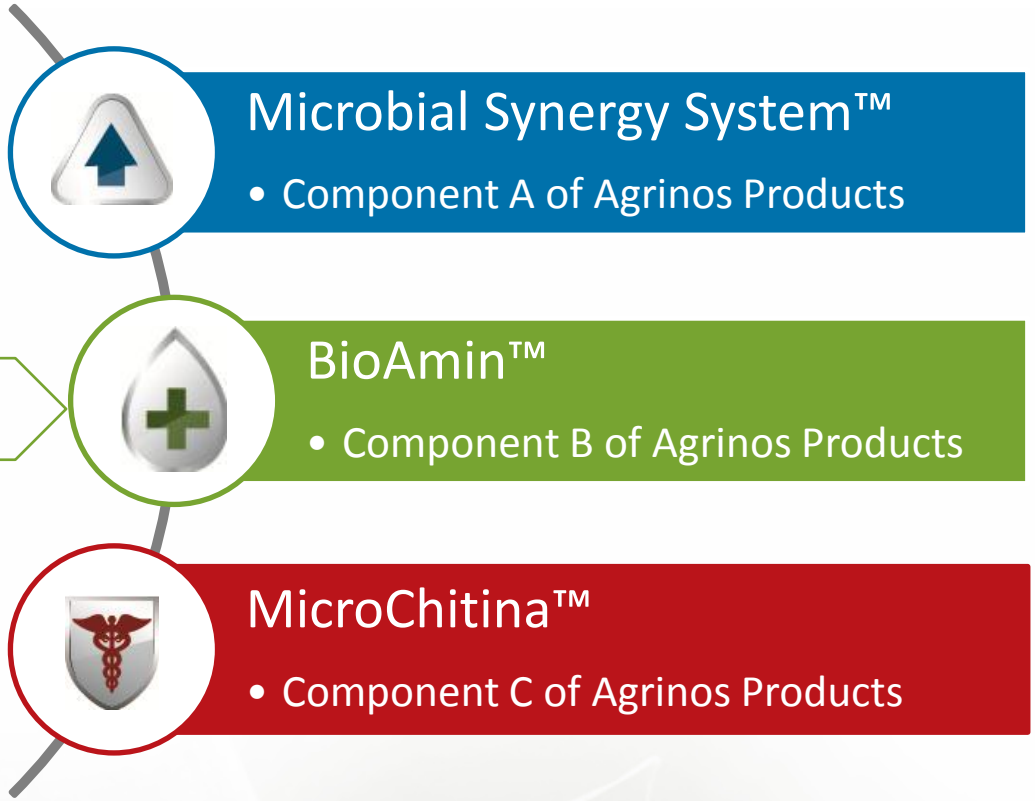
- Organic, based on waste streams from the commercial aquaculture industry
- 100% organic fermentation process free of high temperatures and harsh industrial chemicals
- Resulting compounds highly bio-available – no D-amino acids

BioAmin™ effects

- Bio-stimulant and nutrition source consisting of free L-amino acids and trace minerals
- Increased photosynthetic activity, improved rates of successful pollination and better fruit formation
- Boost activity and effect of HYT-A, Microbial Synergy System

Diverse range of L-amino acids

- 19 L-amino acids



High Yield Technology - HYT™

Components and underlying technologies

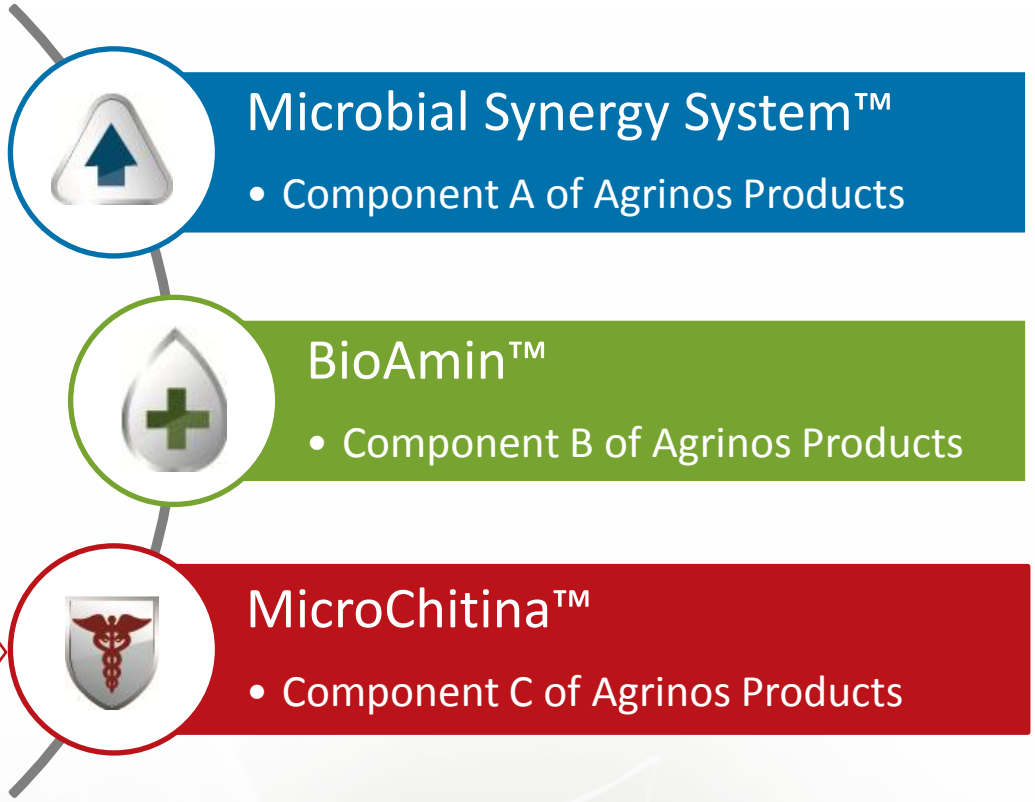
MICRONIZED CHITIN

Patent pending extraction process

- Organic, based on waste streams from the commercial aquaculture industry
- 100% organic fermentation process free of high temperatures and harsh industrial chemicals
- Resulting chitin highly bio-available

MicroChitina™ effects

- Strengthens plant's own natural pathogen defense mechanisms
- Improves root system formation
- Invokes synergistic response from chitinolytic microbes in HYT-A

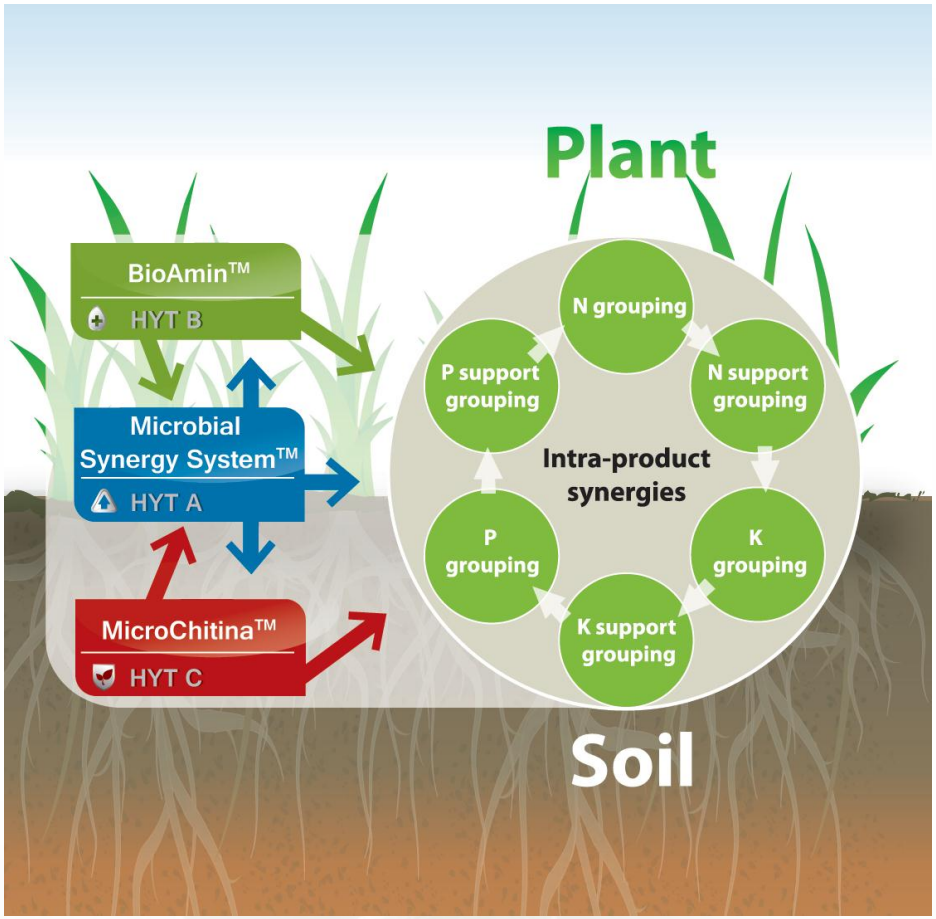


HYT™ Products

Inter-component synergies maximizing effects

Inter component synergies drive processes that:

- Greatly improve the efficiency of conventional fertilizer use
- Biologically fix atmospheric nitrogen for use by crop plants
- Solubilize nutrients locked up in soil, making them plant available
- Decrease crop productivity losses due to periods of plant stress
- Increase water retention and penetration of soil
- Actively and passively combat plant pathogens



Case Study

Oil palm seedling trial - Mados Sermin

- **February, 2010**: Seeding in pre-nursery
- **May, 2010**: Seedlings transplanted to main nursery
- **June, 2010**: First HYT™ application:

HYT™ Concentration:	**1 litre HYT A** **1 litre HYT B** **100 litre water**
HYT™ Dosage per Seedling:	**250 ml**

- **October, 2010**: Second HYT™ application:

HYT™ Concentration:	**1 litre HYT A** **1 litre HYT B** **1 kg HYT C** **100 litre water**
HYT™ Dosage per Seedling:	**250 ml**

- **December 2010**: Field planting

Case Study

Oil palm yield trial – vegetative growth measurements

- Potential/capacity of palms to produce FFB
- Random sample of 32 palms were measured
- Treated palms girth 7.25% bigger than the untreated palms

Marker	Trial	Control
Mean (Cm) - July 2010	52.22	48.69

Case Study

Oil palm yield trial – vegetative growth measurements

- LAI (“Leaf Area Index”) - ratio of the leaf area per unit ground area.
- LAI reflects the palm’s photosynthetic capacity
- Treated palms LAI 17.7% more than untreated palms

Marker	Trial	Control
LAI - July 2010	6.52	5.54

Case Study

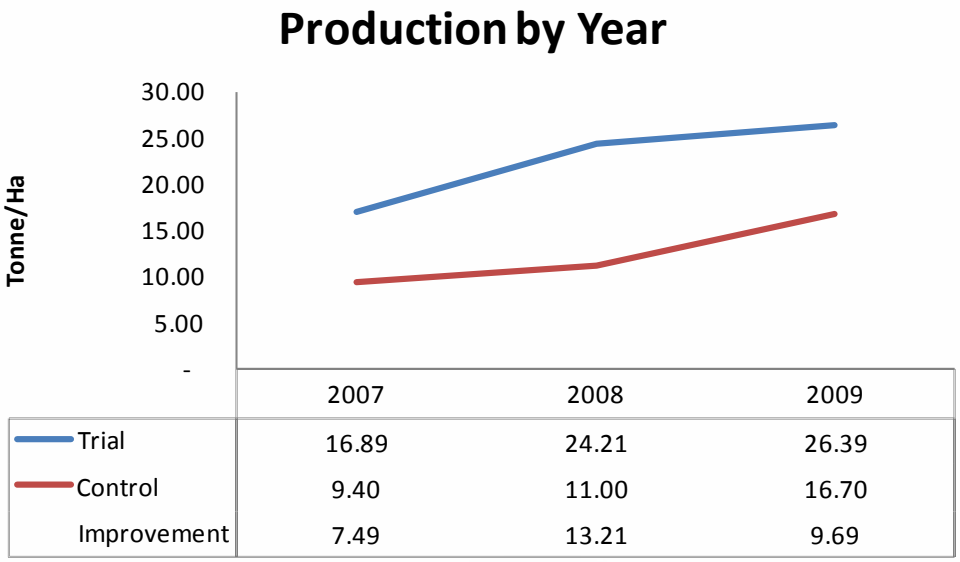
Sustained yield improvement in oil palm – Aumkar Plantations

TRIAL PLOT:

Planting Date:	December 2004
Stand per Hectare:	129
HYT™ application:	2004 to 2010
	One HYT™ application of one litre per hectare per year

CONTROL PLOT:

Planting Date:	December 2004
Stand per Hectare:	129
HYT™ application:	None

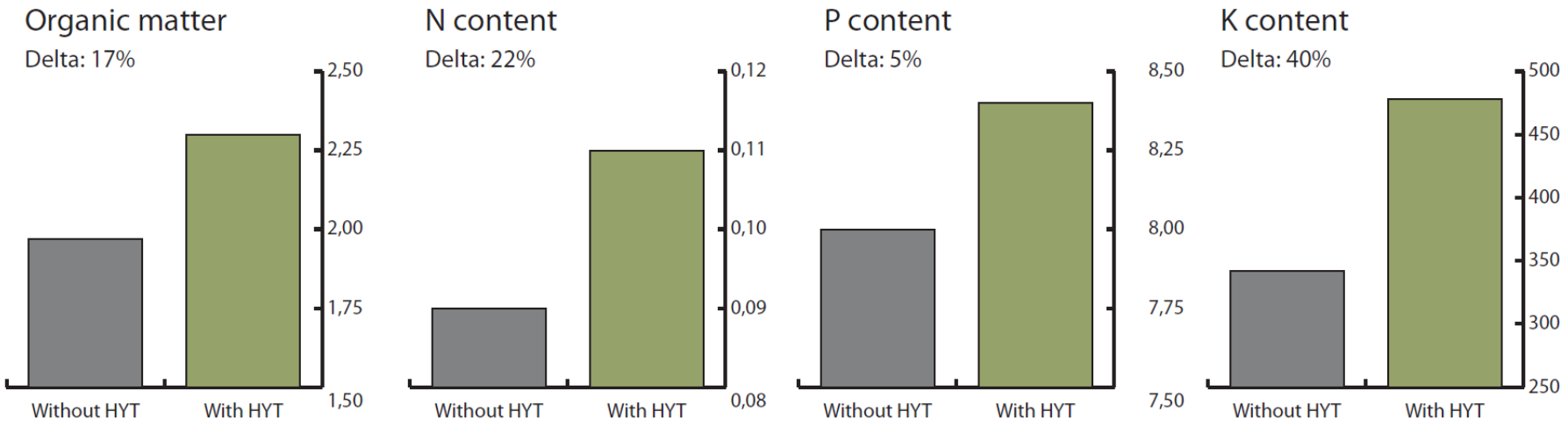


	2007	2008	2009
Trial	16.89	24.21	26.39
Control	9.40	11.00	16.70
Improvement	7.49	13.21	9.69

Case Study

Soil restoration using HYT™ technology

Soil conditions after 2 wheat crop cycles

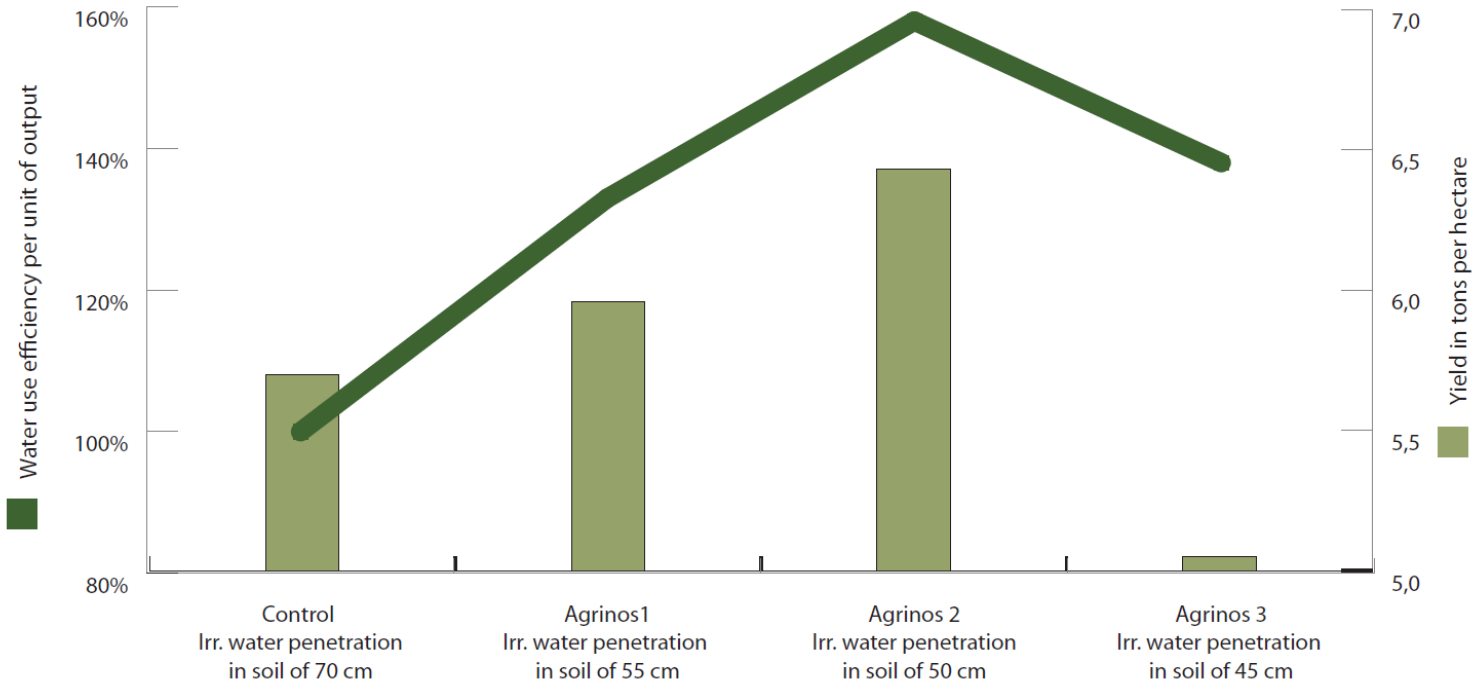


Trials performed by the University of Guanajuato, Mexico; 2006

Case Study

Water use efficiency using HYT™ technology

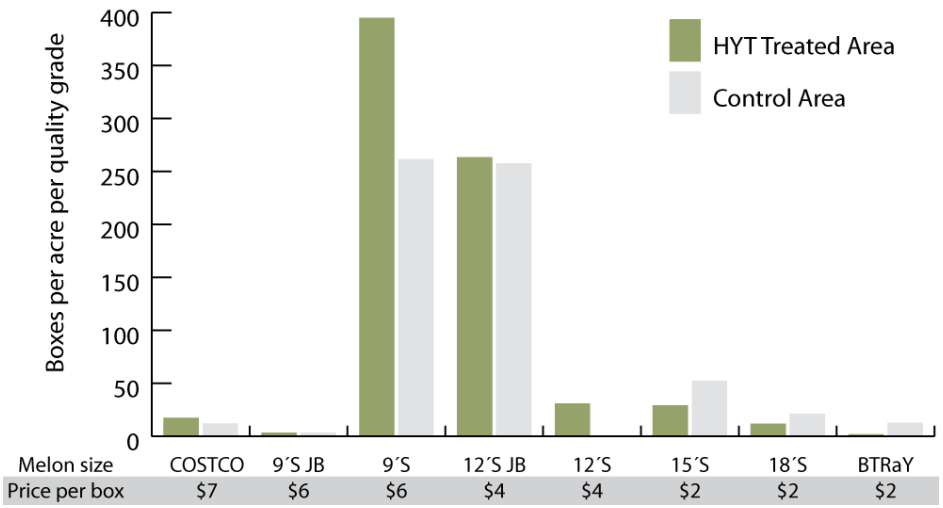
Water efficiency in wheat production

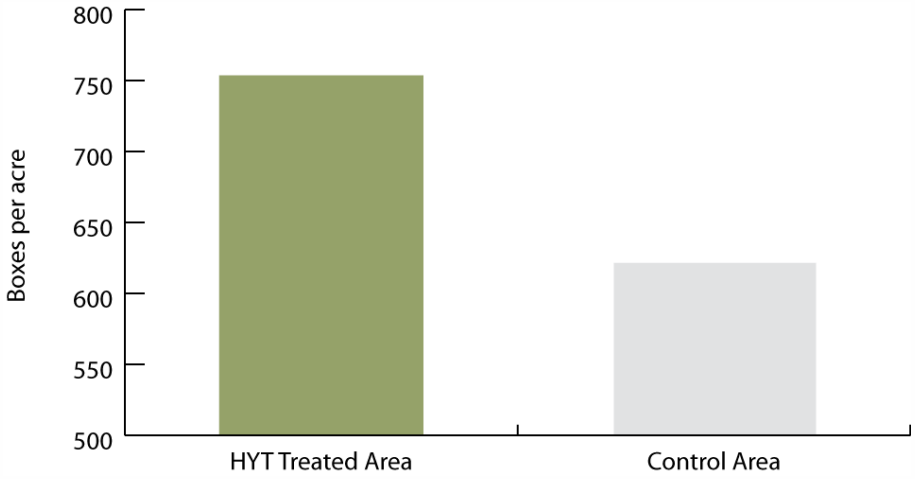


Trials performed by the University of Guanajuato, Mexico; 2006

Case Study

Cantaloupe melon trial – boxes per acre

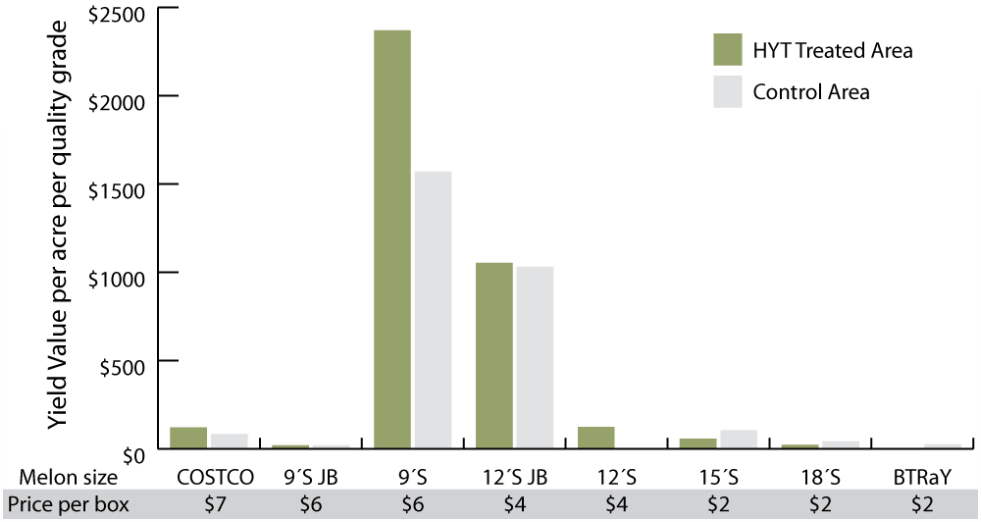


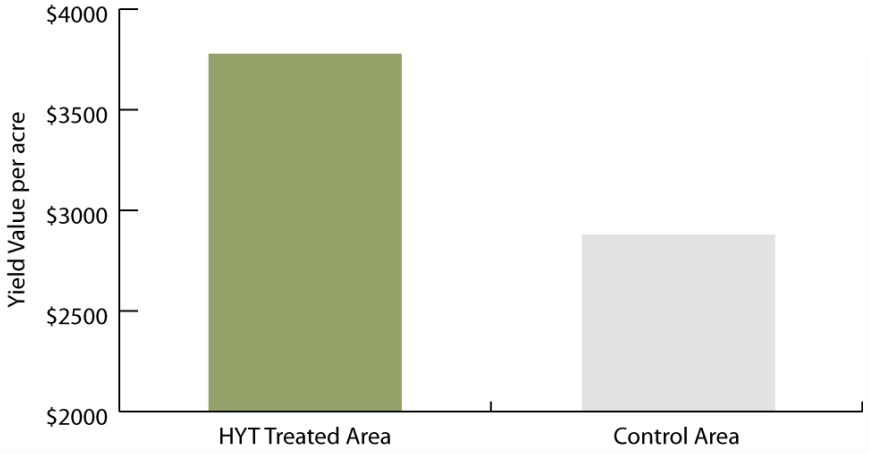


Trial performed by internationally recognized fruit / vegetable company at one of its production farms in Arizona; 2011

Case Study

Cantaloupe melon trial – value per acre





HYT Trial - Financial Analysis p/Acre	
Desc.	***Result***
Gross yield increase	$ 898.36
HYT cost p/acre	$ -176.00
Gross result	$ 722.36
% increase in profit p/acre	25%
% ROI in HYT technology	410%

Trial performed by internationally recognized fruit / vegetable company at one of its production farms in Arizona; 2011

Agrinos vision

Producing more with less

Create an agricultural model where growth and expansion results in:

- More output per hectare / acre
- Improved soil conditions
- Cleaner environment

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