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 CO2 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

- **Nitrate ($\text{NO}_3^-$):**
  - 2 to 3 days

- **Ammonium ($\text{NH}_4^+$):**
  - 20 to 45 days

- **Potassium ($K^+$):**
  - 20 to 45 days

- **Phosphate ($\text{HPO}_4^{2-}$):**
  - 1250 to 2500 days

  - 5000 to 10000 Days
    - 14 to 28 years

- **Root Growth:**
  - 25mm
  - 100mm
Microbes and phosphate
Conventional chemistry

Phosphate $\text{HPO}_4^-$ diffusion rate 0.02 mm$^2$/day
VAM Phosphate movement 10 to 100 mm/day

Microbial interactions
VAM, PGPRb, Phosphobacter
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

**Microbial Synergy System™**
- Component A of Agrinos Products

**BioAmin™**
- Component B of Agrinos Products

**MicroChitina™**
- Component C of Agrinos Products
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

Microbial Synergy System™
- Component A of Agrinos Products

BioAmin™
- Component B of Agrinos Products

MicroChitina™
- Component C of Agrinos Products
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

<table>
<thead>
<tr>
<th>Marker</th>
<th>Trial</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean (Cm) - July 2010</td>
<td>52.22</td>
<td>48.69</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
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<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAI - July 2010</td>
<td>6.52</td>
<td>5.54</td>
</tr>
</tbody>
</table>
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

Production by Year

<table>
<thead>
<tr>
<th>Year</th>
<th>Trial (Tonne/Ha)</th>
<th>Control (Tonne/Ha)</th>
<th>Improvement (Tonne/Ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>16.89</td>
<td>9.40</td>
<td>7.49</td>
</tr>
<tr>
<td>2008</td>
<td>24.21</td>
<td>11.00</td>
<td>13.21</td>
</tr>
<tr>
<td>2009</td>
<td>26.39</td>
<td>16.70</td>
<td>9.69</td>
</tr>
</tbody>
</table>
Case Study
Soil restoration using HYT™ technology

Soil conditions after 2 wheat crop cycles

- Organic matter
  - Delta: 17%
  - Without HYT: 1.50
  - With HYT: 2.25

- N content
  - Delta: 22%
  - Without HYT: 0.08
  - With HYT: 0.11

- P content
  - Delta: 5%
  - Without HYT: 2.50
  - With HYT: 8.50

- K content
  - Delta: 40%
  - Without HYT: 7.50
  - With HYT: 8.25

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

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

**HYT Trial - Financial Analysis p/Acre**

<table>
<thead>
<tr>
<th>Desc.</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross yield increase</td>
<td>$ 898.36</td>
</tr>
<tr>
<td>HYT cost p/acre</td>
<td>$ -176.00</td>
</tr>
<tr>
<td>Gross result</td>
<td>$ 722.36</td>
</tr>
<tr>
<td>% increase in profit p/acre</td>
<td>25%</td>
</tr>
<tr>
<td>% ROI in HYT technology</td>
<td>410%</td>
</tr>
</tbody>
</table>
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
For further information please contact:

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