



Biological control with IBCA's in a developing market

Overview

Key global challenges are shaping the agricultural market

BASF is redefining crop care with a strategic focus on biologicals in agriculture

New market opportunities are regularly being defined

IBCA's provide important IPM components when supported correctly



Global trends bring new challenges



Growing and aging world population



Urbanization



Energy demand and climate protection



Globalization and developing markets

By 2050 global food production must double to meet demand

BASF Functional Crop Care

harnessing scientific innovation in *chemistry and biology* to unlock agricultural potential from soil to seed to crop.



Soil Management

- Nutrient management products
- Water management products



Seed Solutions

- Conventional chemical seed treatments
- Biological seed treatments (including inoculants)
- Seed-applied polymers and colorants



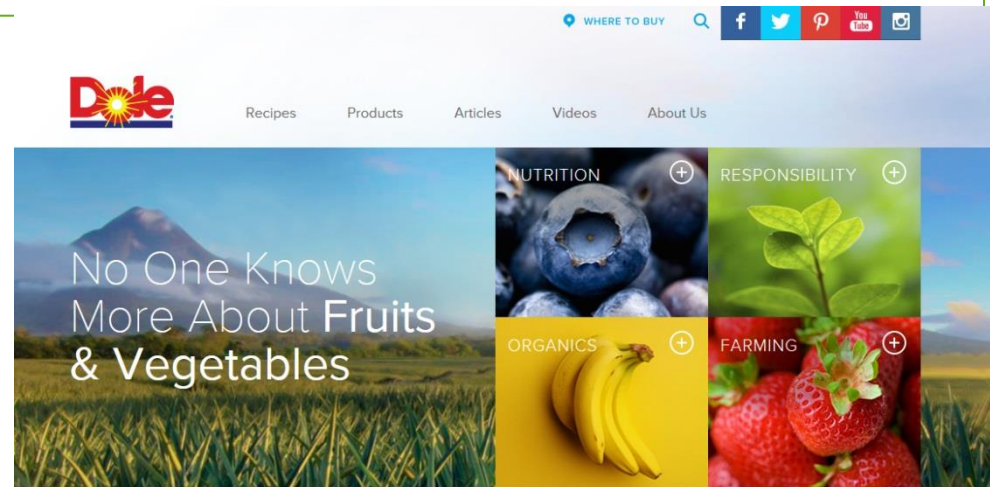
Crop Care

- Foliar biological products (including bioinsecticides and biofungicides)
- Biological and conventional plant health products
- Plant growth regulators

Developing Market opportunities

- Export market dominated by global organisations
 - Driven by quality, reliability and sustainability to meet customer demands
 - Robust IPM
 - Resistance management
 - Secondary standards

- Industrial perennial crops e.g. sugar cane, oil palm, fruit processors etc.
 - Higher tolerance to pest pressure
 - Opportunity to control pest population over time



Traditional crop targets for IBCA's: Protected cropping vegetables and ornamentals

- Targets:
 - Thrips
 - Whitefly
 - Spider mites
 - Aphids
 - Fungus gnats



Emerging opportunities: Sugarcane

- Organisations involved in use of parasitoid *Cotesia flavipes* for control of sugar cane borer
- Also potential for *Trichogramma* (Malaysia).



Sugarcane borer, *Diatraea saccharalis*
(Photo Univ. of Florida)



Emerging opportunities: Sugarcane

- Sugarcane weevil (*Sphenophorus levis*) Damage caused:
 - Larvae feed and create galleries in basal internodes eventually killing leaves and tillers
- *Steinernema* and *Heterorhabdits* EPN species used as soil drenches to target early stage larvae



Emerging opportunities: Fruits – pineapple

- White grubs (e.g., *Cyclocephala anomala*).
- Damage caused:
 - Feeding on roots delaying growth or death. Problem in countries like Ecuador and Costa Rica
- EPN's potential solution with soil drenches



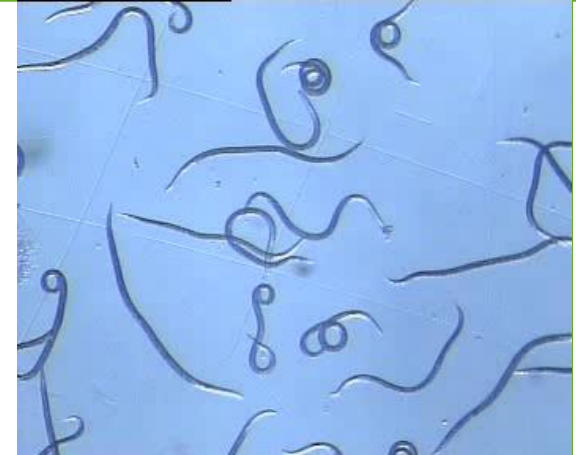
Emerging opportunities: Fruits – berries

- Vine weevils and lepidopteran girdlers
 - EPN's potential solution with soil drenches
- Mealy bugs, mites and scales

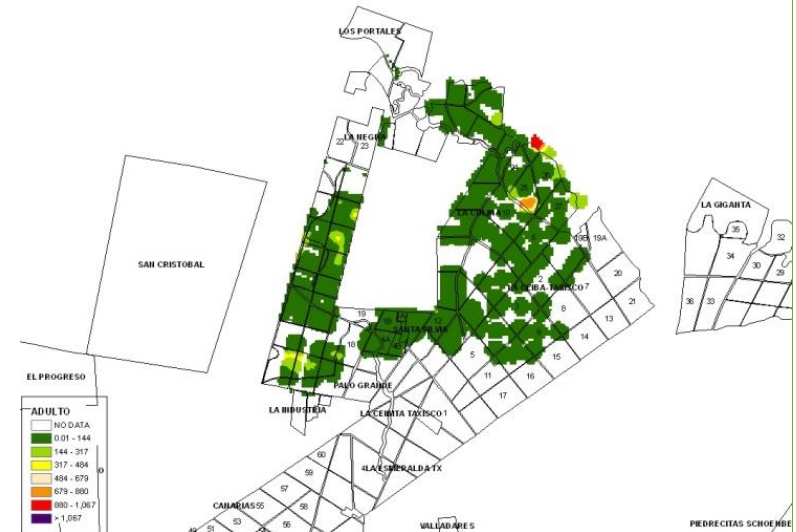


Opportunity to be cost effective: Sugarcane

- The Plague Spittlebug (*Aeneolamia postica*)
- Damage caused:
 - Nymphs attack roots
 - Adults feed on leaves injecting toxins that can kill the plant
- GPS mapping to identify plagues allow targeted EPN applications to nymphs in the ground



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Challenges for IBCA's: Environment and application

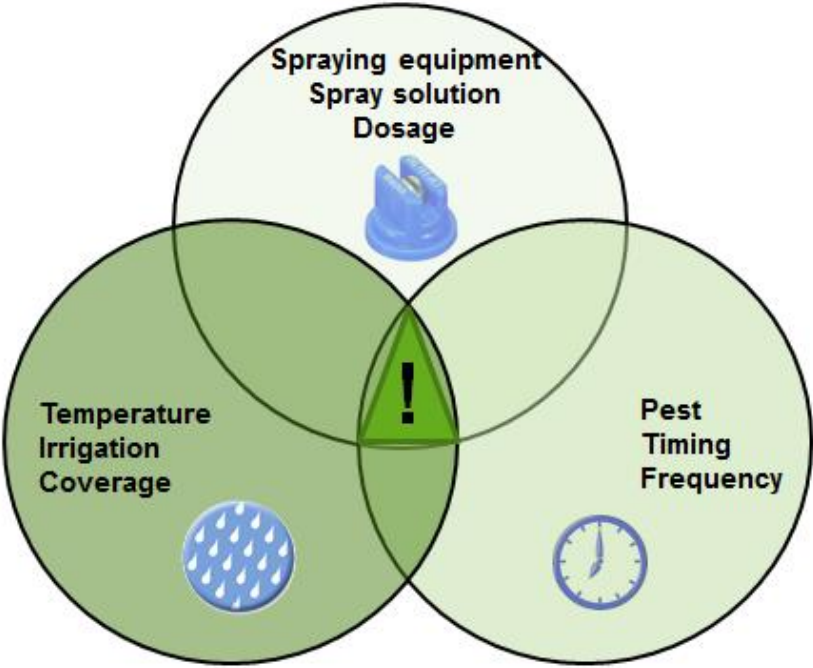
Potentially harsh environment
for biologicals



EPN's can be applied through
standard application or
irrigation equipment

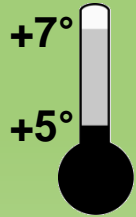


Challenges for IBCA's: Establishing technical expertise



Challenges for IBCA's: Logistics

Products requiring refrigeration



Formulated products provide stability



Ensuring quality control in market



Other challenges?



Concluding remarks

There are opportunities!

- Exporters have high demand for robust IPM to meet stringent goals with reliability, quality, secondary standards and sustainability
- IBCA's can support these goals when used in combination with traditional crop protection strategies.
- IBCA's can improve pest population management strategies

But

- Products must be truly compatible with existing practices
- Environmental conditions must be defined
- Technical training and support are key
- Attention to products that can work with manageable logistics; shelf life, stability
- Targeted approach to meet economics

Thank you!





The Chemical Company

Developing market opportunities: Export of fresh produce to Europe and North America

Demands

- Reliability of supply
 - Robust IPM programs providing multiple approach
 - Resistance management of chemistry portfolio
- Conformance with secondary standards
 - Residue management
 - Quality produce
- Suitable logistics
 - Fresh produce transported globally

