Biologics – a key element in integrated crop solutions
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- What are Biologicals?
- Integrated Crop Solutions
- Biologicals as part of integrated approach
What are Biologicals?

Biologicals consist of microorganisms such as bacteria and fungi; beneficial macroorganisms (e.g. predatory mites); semiochemicals (e.g. pheromones); or natural compounds (e.g. plant extracts).

They are increasingly being used for targeted control of a wide range of pests and diseases.
Example of a mode of action

Bacteria (*Bacillus firmus*) form a thin film around a young root before voracious threadworms can discover the new source of nutrients.

As a result, the nematodes have no chance to suck up sugar or amino acids. The bio-protector also forms enzymes and produces phytohormones.

Bacteria absorb plant sugar and release enzymes that attack the nematode eggs. Bacterial phytohormones also stimulate plant growth.
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Integrated Crop Solutions: The context of food market trends

- Demand for safe and “sustainably-sourced” food
- Stronger focus on food quality, healthy nutrition and well-being
- Year-round demand increases global trade of fresh produce
- Global retailers expect sustainable agricultural production
- Rising importance of partnerships along food value chain
- Innovation needed to drive integrated crop solutions
Integrated Crop Solutions meet the challenges of today

Challenges
- Weed, pest & disease control
- Resistance management

Sustainable agriculture

Benefits
- Across the food value chain
  - Integrated Pest Management (IPM)
  - Good Agricultural Practices (GAP)
  - Yield & Quality
  - Tradeability
  - Convenience

Contribution to Food Security

Services
- Sharing knowhow
- Optimizing yield and quality
- Improving farm management

Seeds & Traits
- Canola
- Cotton
- Rice
- Soybean
- Wheat
- Vegetables

Chemicals
- Herbicides
- Fungicides
- Insecticides
- SeedGrowth

Biologials
- Microbial fungicides
- Microbial insecticides
- Microbial nematicides
Integrated Crop Management

- Integrated Crop Management relies on non-chemical methods as first resort, but it is not necessarily a low pesticide-input system.

- Growing healthy crops goes beyond fighting weeds, pests and diseases (general farm management, choice of crop/variety, crop nutrition, tillage...).

- Taking into account interdependencies between different farming practices.

A holistic approach is needed to understand and shape crop management adequately and in a sustainable manner.
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Example 1: Integrated Spray Program on Grapes

Biologic program performs as well as all-chemical program on grapes

Example 2: Integrated approach for control of white mold

Control of *S. sclerotiorum*: Carrots

- Location 1: 64%, 45%, 73%
- Location 2: 47%, 73%, 87%

Control of *S. sclerotiorum*: Green bean

- Location 1: 5%, 50%, 78%
- Location 2: 89%, 38%, 99%

Efficacy in %

Disease incidence untreated:

- 65%
- 85%
- 18%
- 73%

Trials conducted by UNILET in France in 2006. The biological was applied soil directed at sowing; the chemical was a foliar spray.
Biologicals are becoming an additional tool in sustainable agriculture

**Benefits for Growers, Consumers and the Food Value Chain**

- Enhance integrated pest management (IPM)
- Improve resistance management
- Increase efficacy of spray programs
- Flexibility in use – short re-entry and pre-harvest intervals
- Properties that help increase yield, improve quality and tradeability of fresh produce
Conclusions

Integrated Crop Management focusses on complementarity of solutions (chemical, biologics, decision support tools etc.).

Targeted spray programs combining chemicals and biologicals improve quality, market access and tradeability of fresh produce.

Biologicals form part of Integrated Crop Solutions and Management that contribute to sustainable agriculture by providing environmentally sound solutions and meeting high-quality and health requirements.

Growing R&D efforts in this segment by Bayer CropScience and the whole industry-
Integrated crop solutions allow to offer differentiated solutions

- Chemicals
  - Herbicides
  - Fungicides
  - Insecticides
  - SeedGrowth products

- Biologicals
  - Microbial fungicides and insecticides
  - Microbial nematicides

- Seeds
  - Canola, cotton, rice, soy, wheat, vegetables

- Weed, pest & disease control
- Resistance management

Benefits:
- Supreme quality
- Higher consumer acceptance
- Higher demand in food chain
- Increased options for resistance management

Customers and consumers benefit from combining products and technologies with services and decision-support systems for targeted disease and pest control.