Sustainable and resilient biological plant health

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What is wrong with the current agricultural system?

**Surface look**
- Availability of effective fertiliser & PPP tools
- More reliability of production
- Cheap food
- Good quality food
- Plentiful choice of food since 1st green revolution

**In depth look**
- Resistance development
- Increase of invasive pests and diseases
- Pendulum of pest and disease occurrence
- Overreliance on engineered inputs
- Imposed quality standards
- Direct costs only accounted for
Problem solving needs to change

- Incident based problem solving
- Holistic problem solving
Consequences of problem thinking

Under control

Out of control

Natural enemies

Intercropping

Secondary pests and diseases
External costs and benefits

• Direct costs are helpful for cost of production when inputs have only positive effects
• However farmers do more than act as a food factory
• If we look at agriculture as produce from our environment we have to account for the benefits to us as a society and also account for the costs to society of our methods of production.
• As custodians of the environment we need to account for environmental costs and benefits
• In order to be complete also account for human health costs and benefits
Change of consumer quality perceptions

• What makes produce of good or higher quality?
• Is size a good measure of quality?
• Is shape a good measure of quality?
• Is blemish free a sign of quality?
• Is absence of insects a sign of quality?
• Do some or all of these quality measures happen to assist multiple retailers in having standardised produce for buyers and customers?
• Are such measures of quality of use to farmers and consumers?
Holistic Agriculture

• Understanding of crop and place in the environment
• Maintaining a healthy soil
• Maintaining healthy plants
• Keeping in balance with minor corrections
• Thinking ahead
• Working with nature not fighting it
• Remaining part of the environment
Holistic Agriculture

• Prevention of pest & disease explosion
• Use of all available tools
• Minimise risk to human health and the environment

Only through use of true IPM

A new true green revolution
What “tools” are currently available from the Biocontrol industry?

- **Microbials**
  - Viruses, Bacteria & Fungal Pathogens
  - Found naturally in soil, used in food, feed & and unregulated uses

- **Macrobials**
  - Predators, parasites & nematodes
  - Living organisms found to naturally protect crops

- **Semiochemicals**
  - Pheromones, Plant volatiles
  - Communication tools found in nature with no killing effect

- **Natural & Biochemical Products**
  - Botanicals & Other Natural substances
  - Products derived from nature

Not usually regulated as PPPs
Regulated as PPPs
What biological inputs contribute to sustainable and resilient plant health?

Biopesticides

Biostimulants for biotic stress

Fermentation products biosimilars

Endophytes
mass trapping monitoring

Predators parasites nematodes

Other biological inputs
Biofertilisers
Biostimulants
Plant Srengtheners
Soil Conditioners

Disruptive innovations
Safety of inputs sourced from nature

- It is natural therefore it is safe
- Just because it is natural does not mean it is safe
- Proportionate assessment of the risks of introducing something into the environment needs to be assessed for human and environmental effects
- However coming from nature means we already possess some relevant historical knowledge and this is better than any models and should be used
- A level of confidence in those observed compartments can be established
- Problematic natural substances can be avoided
Learning from successful agricultural systems

**Organic**
- Holistic Systems based
- Use of IPM principles
- In harmony
- Trust
- Certification

**Conventional**
- Yield focus
- Redefinition of IPM
- Constant correction
- Silver bullets
- Resistance

Movement forced

Policy changes
- External influences

Unsustainable in current form
Future Crop protection led by Organic Agriculture

• Founded on prevention and monitoring
• Intervention only when needed
• New tools all nature-based solutions
• Biopesticides, biostimulants, biofertilisers
• Resilient soils and resilient plants (microorganisms, seed treatments)
• Automation, ICT tools and intelligent equipment minimise use of products and exposure
• Holistic natural scientific approach
• Interventions upon a licensed PCA written recommendation
Threats to Organic use of Biocontrol

• Flow of information
  • General principles
  • Local tailoring to be fit for purpose

• Lack of Harmonisation of regulations
  • Global and Regional harmonisation required
  • Cross sector harmonisation
  • Agricultural input harmonisation
  • Smart integration of regulations eg 1107/2009 & 834/2007
Responsibilities of Biocontrol industry

- Ensure product quality and performance
- Disseminate information
- Engage with the entire food chain
- Satisfy farmer needs
Role of Biocontrol Products

Modern Agriculture
- Satisfy food security issues
- Reduced impact on the environment
- Reduced risk for human health

Biocontrol Products
- Increasing role in modern agriculture
- Regulation should not preclude these products from being available to growers
- Regulation should be proportionate to the risks posed
- Take into account a history of safe use and target assessment on needs
- Are needed to allow IPM to be implemented
- Are needed to prevent development of resistance
- Satisfy increasing societal scrutiny of inputs
What significant issues exist in moving towards biocontrol based IPM?

- Holistic versus incident based control
- Moving to a range of biological inputs
- Aiming for little or no impact on human health or environment
- Understanding and maintaining healthy soils & plants
- Niche uses and highly specific localised solutions

IBMA
International Biocontrol Manufacturers Association
Concluding remarks

Growth of bioprotection market as part of a range of biological inputs of use for organic agriculture:

• Microbials
  - Bacteria, for disease control, for nematode control
  - Antagonistic fungi, for disease control
  - Entomopathogenic fungi: slow growth
  - Baculoviruses: increased use in orchards and vegetables

• Macrobials
  - EPNs: orchard, vegetables, amenity areas
  - Improved application techniques

• Semiochemicals & Natural Products
  - More specific niche solutions
  - Fermented products including naturally produced metabolites
  - Mixtures

• Annual growth will continue with 15-20%
• Bioprotection will become a major part of crop protection means: > 50% in 2030
Production of food has to be as a part of the ecosystem and the environment through using green tools first.

Healthy soils and plants give us the food we want our children to eat and an environment in which we are happy and proud for them to live in.
Many thanks!