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What Will It Take for Biologics to Achieve Greater Impact on Production Agriculture?

Paul Walgenbach, Ph.D., BCE, CCA, PCA
Technical Services
Bayer CropScience

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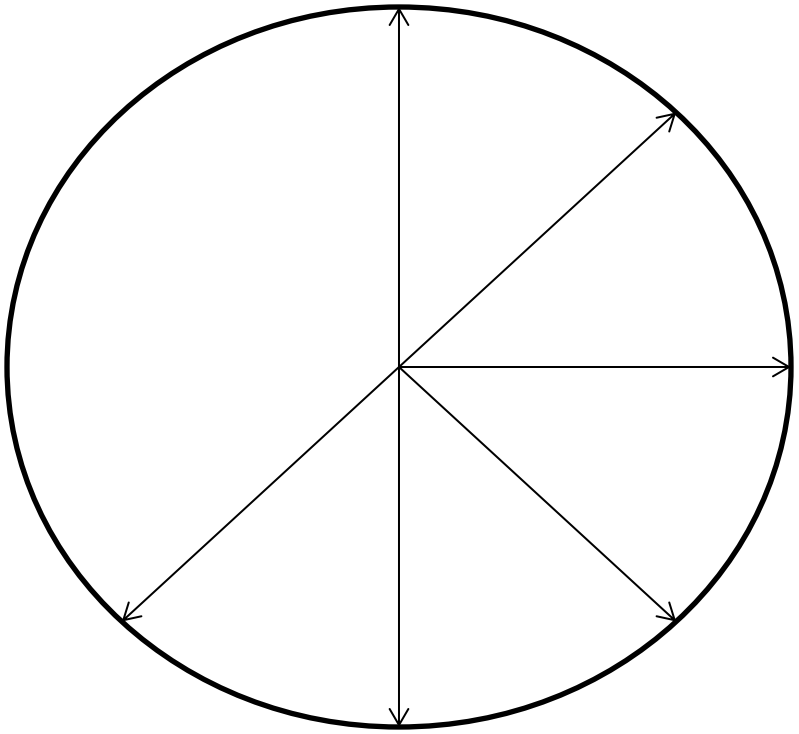
OR

How do we move the needle?



Drivers & Barriers for Biologicals

Main drivers to the use of biological products	**Main barriers** to the use of biological products
Product performance	**Lack of information & promotion**
Cost effectiveness	**Lack of efficacy**
Management of residues	**The cost of using biologicals**
Management of resistances	**Lack of reliable proofs of efficacy**
Long lasting control	**Slow action**
Re-entry interval	**Lack of availability**
Speed of action	**Lack of experience among farmers**
Pre-harvest interval	**Sensitivity to weather conditions**
Safety for the environment	**Tank mix compatibility issues**

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Some definitions

Biologics: Certain types of crop protection products derived from plants, bacteria, fungi and certain minerals. BCS

Organic: Organic agriculture produces products using methods that preserve the environment and avoid most synthetic materials, such as pesticides and antibiotics. USDA

Integrated solutions: Combining chemical crop protection products with biologicals control. BCS

Crop Efficiency: Long-term enhancement of yield potential with optimum management of resources and plant genetics. PJW

Sustainability: The quality of maintaining a long-term, thriving business without causing harm to man the environment. PJW

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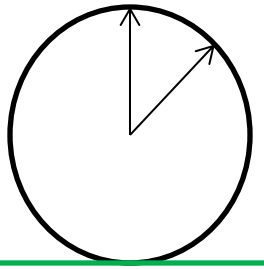
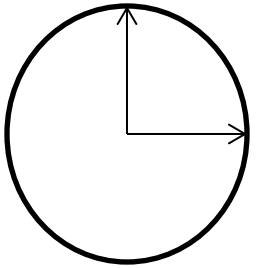
The Biologics' Primary Applications

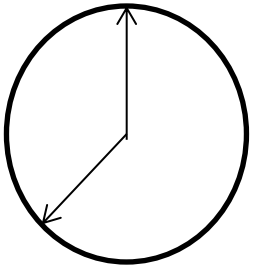
Organics



Integrated Solutions (IS)



Crop Efficiency



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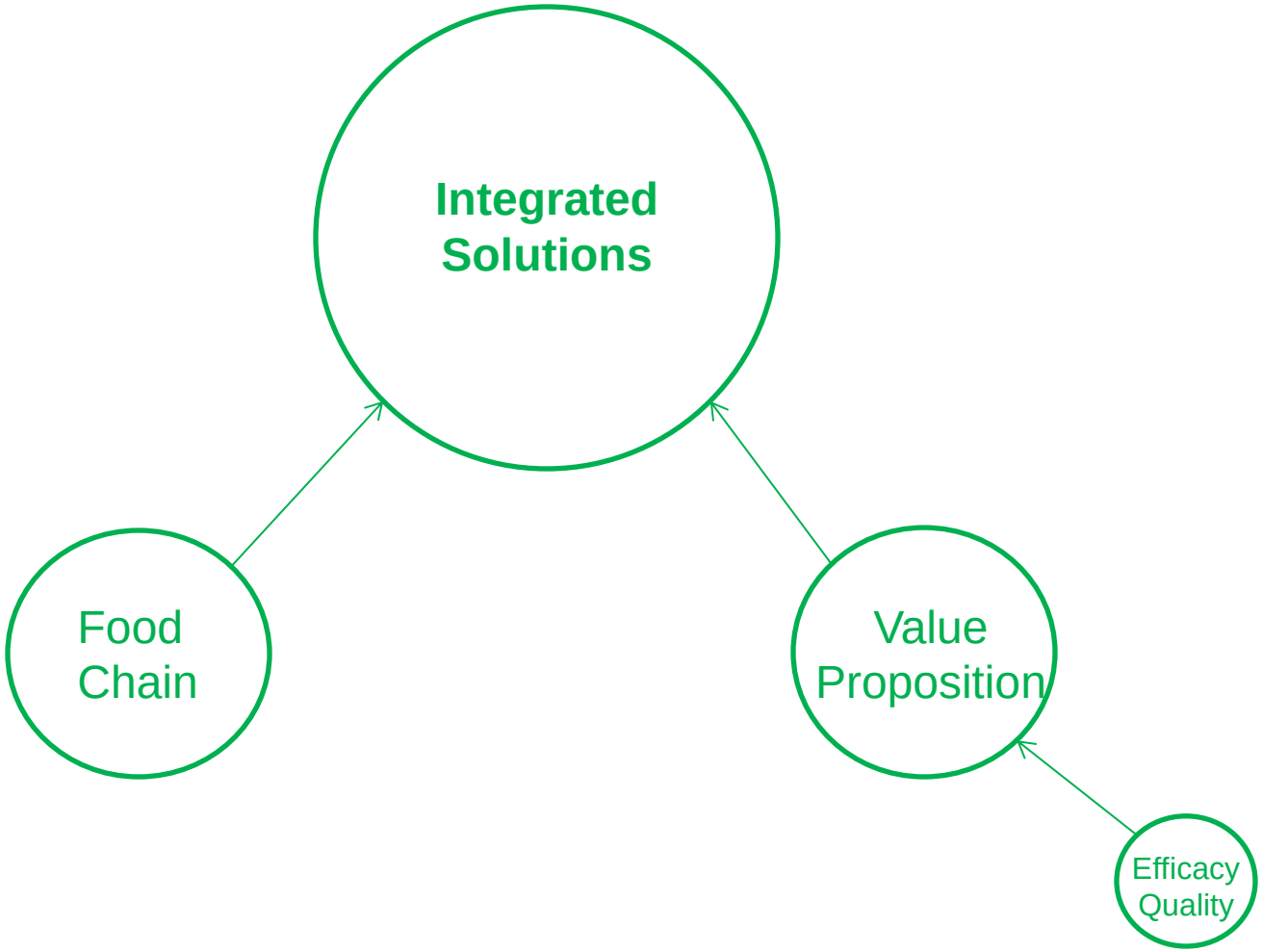
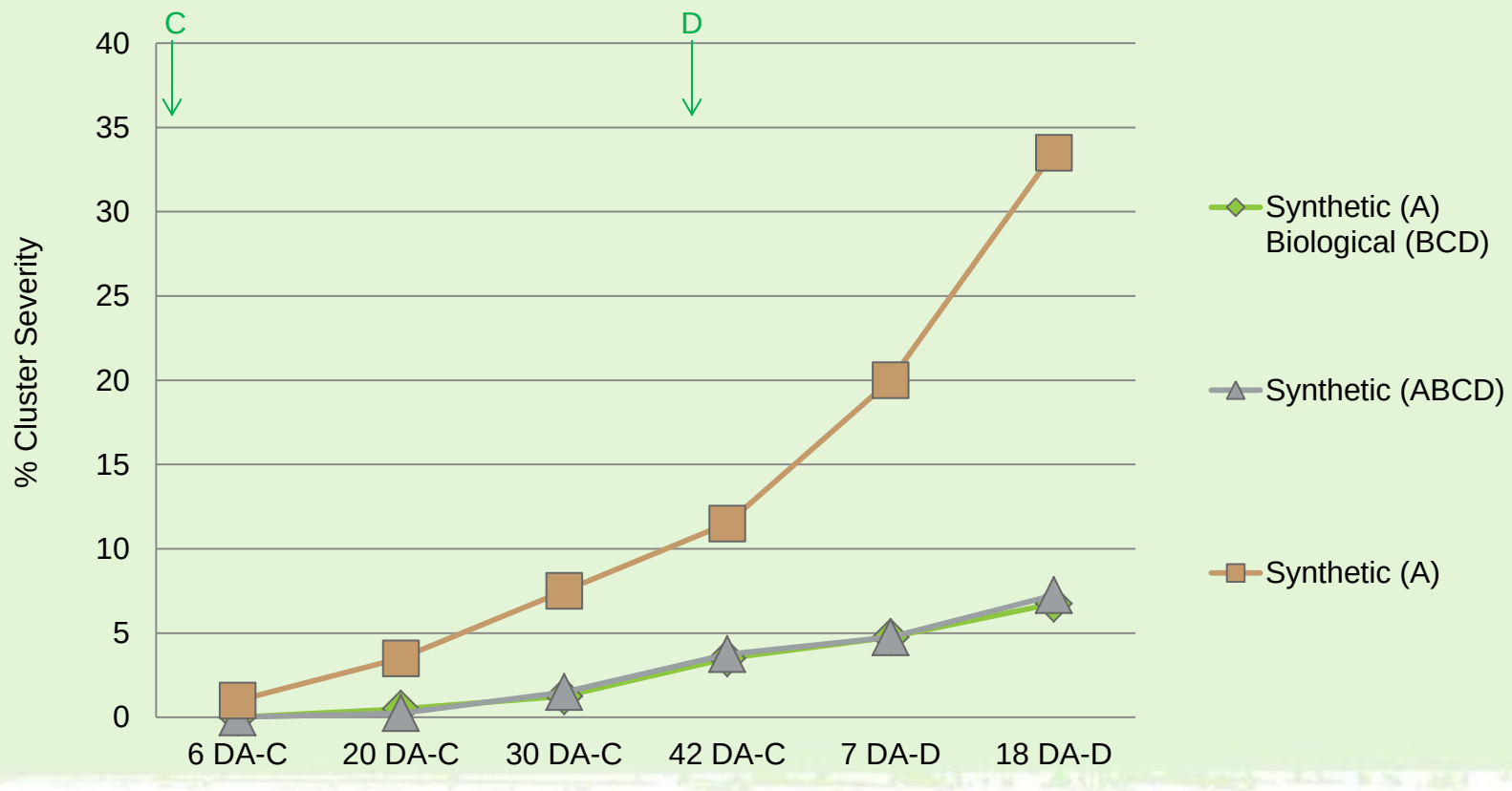
The Grower Perspective

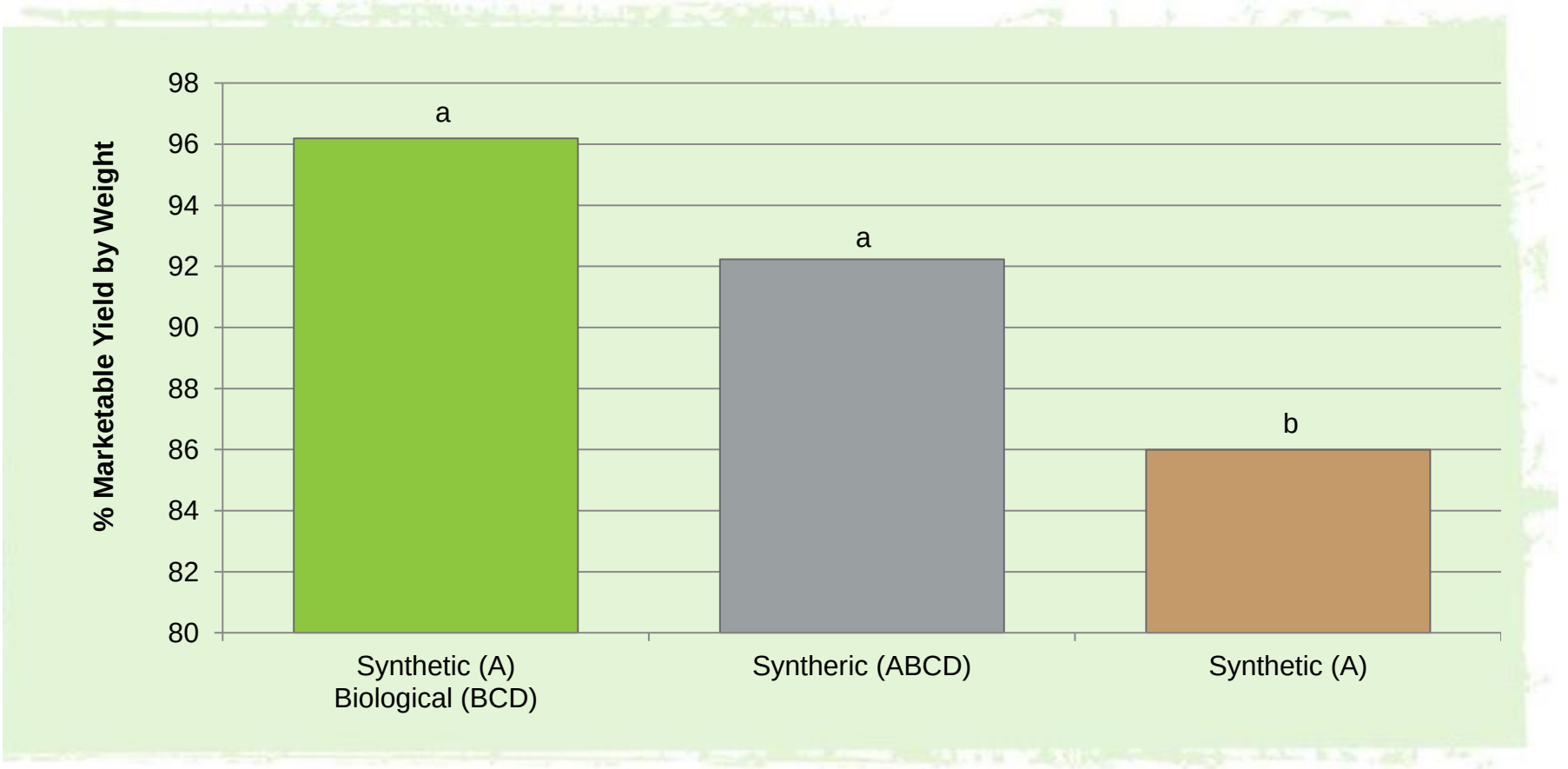


Botrytis on Chardonnay Grapes



Private Researcher. Greenfield, CA 2012. A = Bloom, B = PreClose, C = Verasion, D = PreHarvest.

Botrytis on Chardonnay Grapes



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Employing first generation products into Integrated Solutions

- Recognize that, in the broad sense, today's biologicals are not as efficacious in 1:1 matches with synthetic chemistry. The don't have to be.
  - They need to add value to the existing, synthetic based programs
  - They do this by addressing major drivers and over-coming major barriers
- We wish to replace certain older, problematic chemistries and add to the portfolio of IPM options to meet the demands of the food chain
- Employ biologicals that, based on research, best meet grower needs [as demanded by the food chain]

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Approaches to consider in developing Integrated Solutions – Challenge to Industry

- Know your customers and define their needs for biologics to meet consumer demands
- Develop targeted plans and test them over time and space.
  - We must supply credible information
- Under-sell and over-deliver
  - It's about setting expectations
- Look for short-term wins
  - These are confidence builders and pave the way for future success
- Work with, not at odds, with the academic community to advance biologicals and IS
- Summary: Employ your efforts to have Integrated Solutions become common practice

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Approaches to consider in developing Integrated Solutions – Challenge to Academia

- Even if biologicals don't match synthetics they still play a role in meeting the demands of the food chain.
  - Refer to the Drivers
- Your growers feel the pressure of meeting those demands and need solutions. So….
- Consider Integrated Solutions as a legitimate part of applied research in meeting production challenges of growers
- Employ your considerable research capabilities and influence to advance IS as a sub-discipline of IPM

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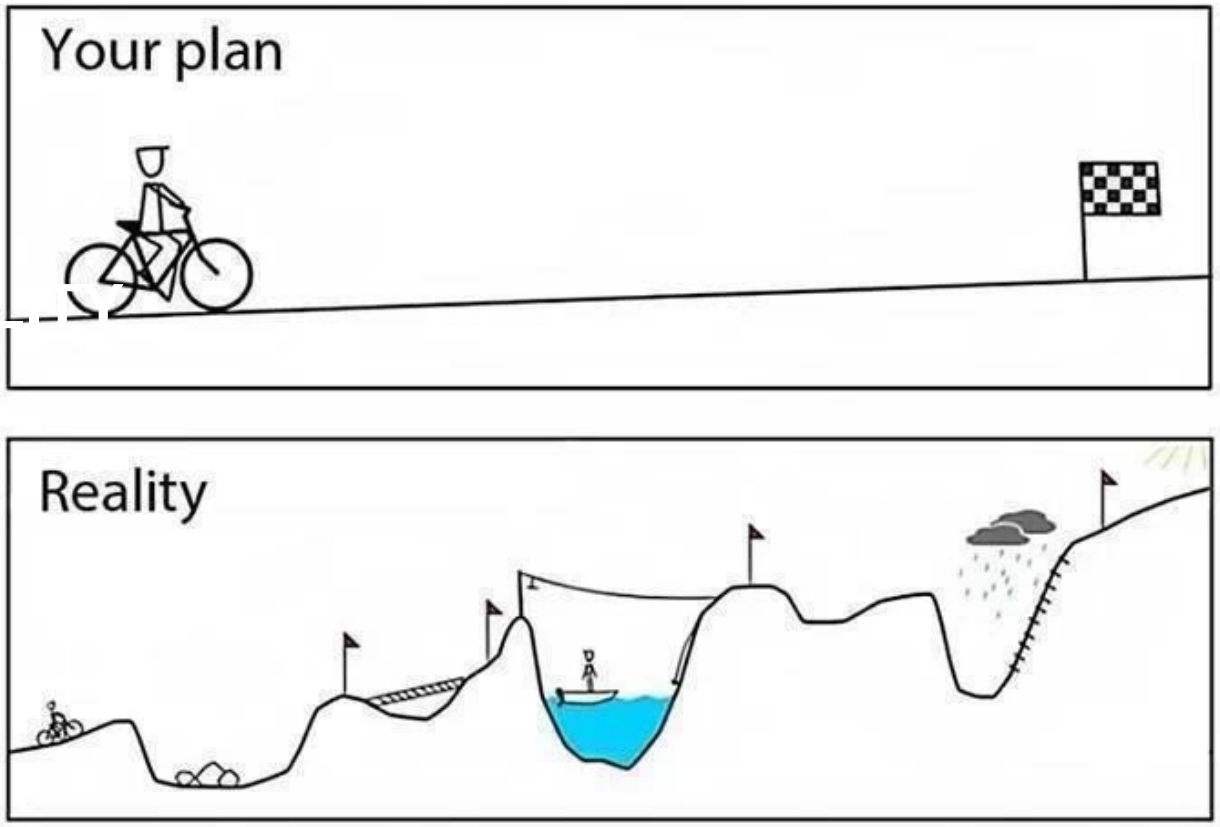
INTEGRATED SOLUTIONS:

A way to achieve greater use of biologicals in production agriculture. Make them common practice.



We are on the way, but the road is not smooth