Exceed the seed™ an AgriThority® Initiative

Stimulate the Seed

Seed Treatment Technologies, A World of Opportunity

Richard Shaw

AgriThority® Science without Borders

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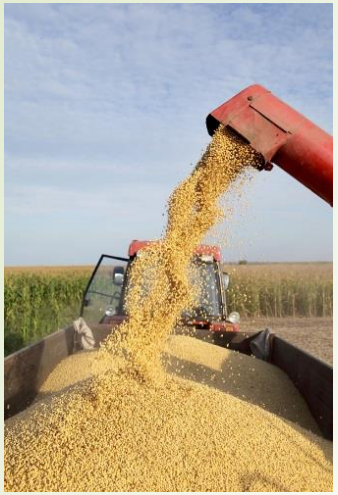
Seed Treatment Technologies
A World of Opportunities

Richard Shaw
Mgr. Operations & Logistics



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How Did We Get Here

Seed treatment technology rapidly advancing

New chemistries and technologies in development

- We have continuously discovered key missing pieces of the puzzle.
  - New products and new categories of products
    - Crop Safety
    - Efficacy
  - New application technologies
  - Greater environmental consciousness
  - Economics has played no small part
    - Higher value seed
    - Improved germplasm
    - Valuable traits technologies
    - High cost of active ingredients

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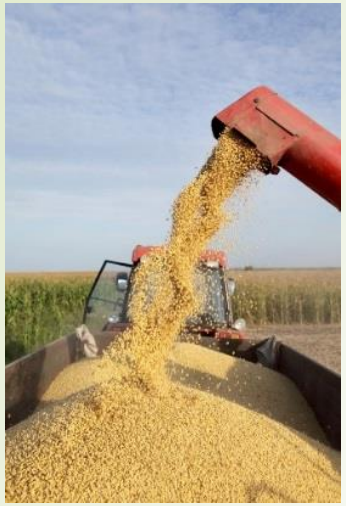
How Did We Get Here

- 1960s: High rates broadcast incorporated treatments were first objective
- 1970s: Learned that banded treatments could deliver same results.
- 1970-1990s Recognized that further reduced rates could be used by in-furrow application
- 1990s – 2010 and beyond Seed treatments began to challenge in-furrow treatments
  - Effective products
  - Convenience issues created serious challenges for in-furrow treatments
  - Agronomic practices
  - Crop safety



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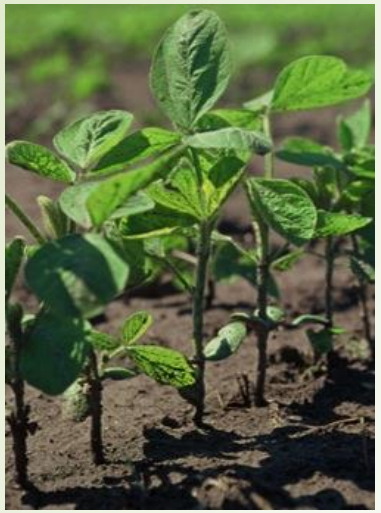
New focus on precision target response

Most significant statement about seed treatments made today

- *Yield starts at germination* (White, C. Winnfield)
- *You only get one chance to optimize plant population* (White, C. Winnfield)
- You only get one chance to establish a seedling root system as a foundation for season long efficiency in uptake of water, nutrients, (plant protectants)
- Best opportunity to increase yields through protection from soil borne diseases and insects is the first 30 days after planting.



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Observations on Natural Products

- Biological pesticides
- Other Natural Products
  - Chitosans
  - Organic Acids
  - Proteins
    - LCOs
  - Seaweed extracts
- Products that solve problems beyond vigor, stand, disease and insects
  - Inferred Systemic Resistance
  - Systemic Acquired Resistance
  - Biostimulants
  - PGRs

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Observations on Natural Products

- **At least a 40 year history of microbial products inducing desirable crop responses with limited commercial success on broad-acre crops.**
- **What has changed?**
  - Improved Production, formulation and quality control capabilities
    - More active, more consistent, less expensive products
  - Greatly increased isolation and identification of active organisms and extracts
  - Advances in biochemistry, microbiology, plant physiology, integrated pest and crop management as well as agronomy, entomology and plant pathology can explain and/or predict how to use these products, as well as when and why they work

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Key Considerations for Natural Products

- **Intellectual property**
- **Regulatory requirements will be critical**
  - Credibility
  - Proactive PR defense strategy for future reference
- **Testing and development**
  - *Challenge will be differentiating products backed by strong science with replicated efficacy data packages from "snake Oils"* (Himmel, P MBI)
  - We have never been able to extrapolate from test tube to consistent commercially viable performance.
  - We cannot extrapolate from petri dish or culture to field performance

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AgriThority's Role

An Integrated Science Consultancy

- AgriThority brings nearly 200 years of combined seed treatment experience to your project through our Global team

- From discovery to delivery, we cover your needs with expertise and proven value
- Bridge gaps in product & field development
- Provide credible, third-party data that delivers results
- Deliver market access around the world

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Thank you

Where can we guide you?