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Seed Treatment Technology From Chemicals to Biopesticides: An Overview

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Historical Trend In Seed Treatment Technology

Prior to 1992	After 1998
• Old chemistry	Highly active, low-rate chemistry
• Imprecise application methods	Better seed treatment formulations
• High loading rates	More consistent performance
• Exposure concerns	More precise application equipment
• Poor handling formulations	Introduction of seed coating

http://www.croplifeamerica.org/seedtreatment

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General Seed Treatment Formulations
(A Broad Definition)

- Fungicides
- Insecticides
- Nematicides
- Bio-Pesticides
- Safeners
- Micronutrients
- Growth Regulators
- Disinfectants
- Inoculants
- Elicitors
- Biological Nutrient Enhancers
- Colorants
- Polymers

Ref. K. K. Mehta, AgBio World Congress, Informa Life Science, Dec. 2, 2014, Berlin

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Seed Treatment Formulation Trends No. of Actives (2003-2012)

Formulation Type	2003	2012
• Flowable Suspensions (FS)	37	43
• Dry Powders (WP or DS)	37	24
• Water Slurry Powders (WS)	21	16
• Liquid Solutions (LS)	22	13
• Emulsions (water-based - ES)	3	3

Ref. K. K. Mehta, AgBio World Congress, Informa Life Science, Dec. 2, 2014, Berlin

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The Spray Area Comparison (An IPM Strategy)

Sprays VS. **In Furrow** VS. **Seeds**

Area: 10,000 m^2/ha

http://www.myelomablogs.org/

Area: 500 m^2/ha

http://www.fao.org/

(photo from Certified Alfalfa Seed Council, USA)

Area: 58 m^2/ha

http://report.agropages.com/ReportDetail-1028.htm

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The Treated Seeds

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Seed Treatment Biologics
(Current Status)

- Biological seed treatments are from renewable resources containing naturally occurring active ingredients. Their effectiveness in protecting the seeds and enhancing plant growth is still being extensively studied. (A paradigm shift for all!)
- Typically, biologics are applied in conjunction with a chemical treatment. The chemical provides early season protection and the biological product offers later season protection after the organism has colonized the plant roots.
- Biological seed treatments claim to further reduce potential negative impacts on the environment along with pest resistance development.

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Seed Treatment Biologics
(Continued)

- Biological seed treatments are expected to be one of the fastest growing seed treatment sectors in the near future.
- Several biological products – native or exotic microbial species that mitigate the effects of insects or diseases – are emerging as stand-alone products or in combination with chemicals.
- Most of these products claim to stimulate the natural defenses of the germinating seed to which they are applied. One example is a product comprised of Bacillus *subtilis* and Rhizobial inoculum, and sold as a bio-fungicide (e.g., BASF HiStick N/T).

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New Combo Seed Treatment
(Both Chemical and Biological)

- As exemplified by Poncho/VOTiVO from Bayer CropScience.
- This seed treatment product for corn and soybean is a unique, modern, innovative combination of a seed-applied chemical (Clothianidin) and a biological (Bacillus *firmus*) insecticide for nematode protection on the seed.

Criteria of Seed Treatment Formulations

- Uniform coverage
- Loading
- Adhesion (Dust-off)
- Appearance
- Seed Safety
- Operator Safety
- Environment Safety
- Seed Plantability (Drillability)

Additives to Reduce Dust and Increase Plantability

- Mostly polymers to keep treated seed film coat where it belongs.
- Reduce fungicide and insecticide Dust-Off
- For example, reduction of seed-applied actives in the dust by 70 to 88 percent.
- Lowers worker exposure to off dust.
- Helps to improve the seed flow and handling.

Seed Treatment Formulation with Dust Control Technology

- Add binder, flowing agent or wax to the formulation

  *Example: On cotton seed, Flo Rite 5330 Polymer (*BASF*)* would cut dust off of seed-applied Poncho Votivo by 88 percent*.

- Improved Seed Treatment Flow through planter
- Can help eliminate need for talc during seed treatment.

* Ref. BASF literature, Flo Rite 5330

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Seed Treatment Tecnology: The Future Trend

- Move from WP, FS formulations to WDG, for safety, stability considerations.
- Move from single active to multiple actives for efficacy and market needs.
- Move from pure chemicals to chemical and biological combos for yield potential , and environmental concerns.
- Utilize nano technology and encapsulations.

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Where can we guide you?

THANK YOU

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