Formulation Technology Innovation and Improvements

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Seedcare™
Beyond Seed Protection

AGENDA

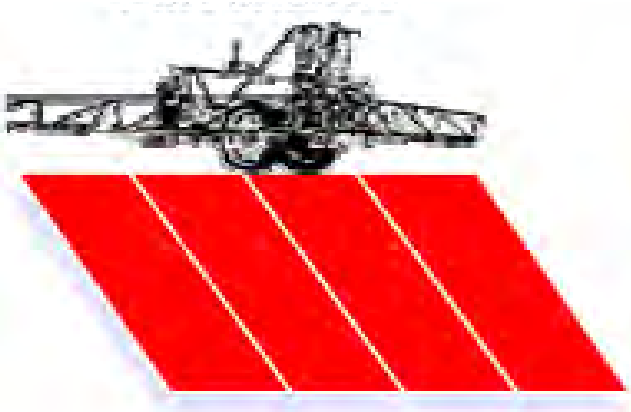
1. History of Seed Treatment Development
2. The quality of treated seeds
3. Formulation assessment methods
4. Simulation of dust emission from planters during formulation development
5. Summary and conclusions

History

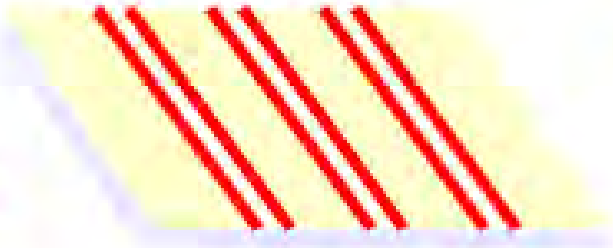
- Pests are always adapting to new environments and growing conditions change constantly.
- Before seed treatments were available, growers were soaking their seeds in chlorine or manure in large amounts. Sometimes growers would turn to arsenic- and mercury-based compounds due to a lack of options.
- Seed treatments represent extremely efficient and targeted delivery systems for pesticides; only a small amount of a pesticide is applied to the seed before planting, which allows for reduced applications and exposure potential.

Seed Treatment - Dose Reduction per Area (Bayer CropScience)

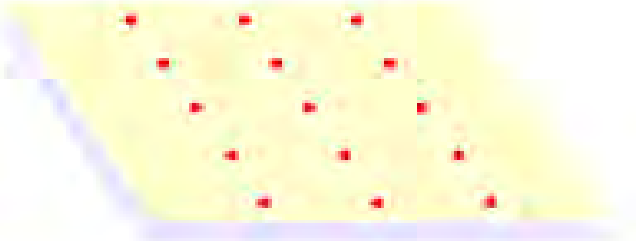
Spray Application



Furrow Application
(e.g. granulates)



Seed Treatment



Treated Area (m^2/ha)

10.000 → 500 → 58

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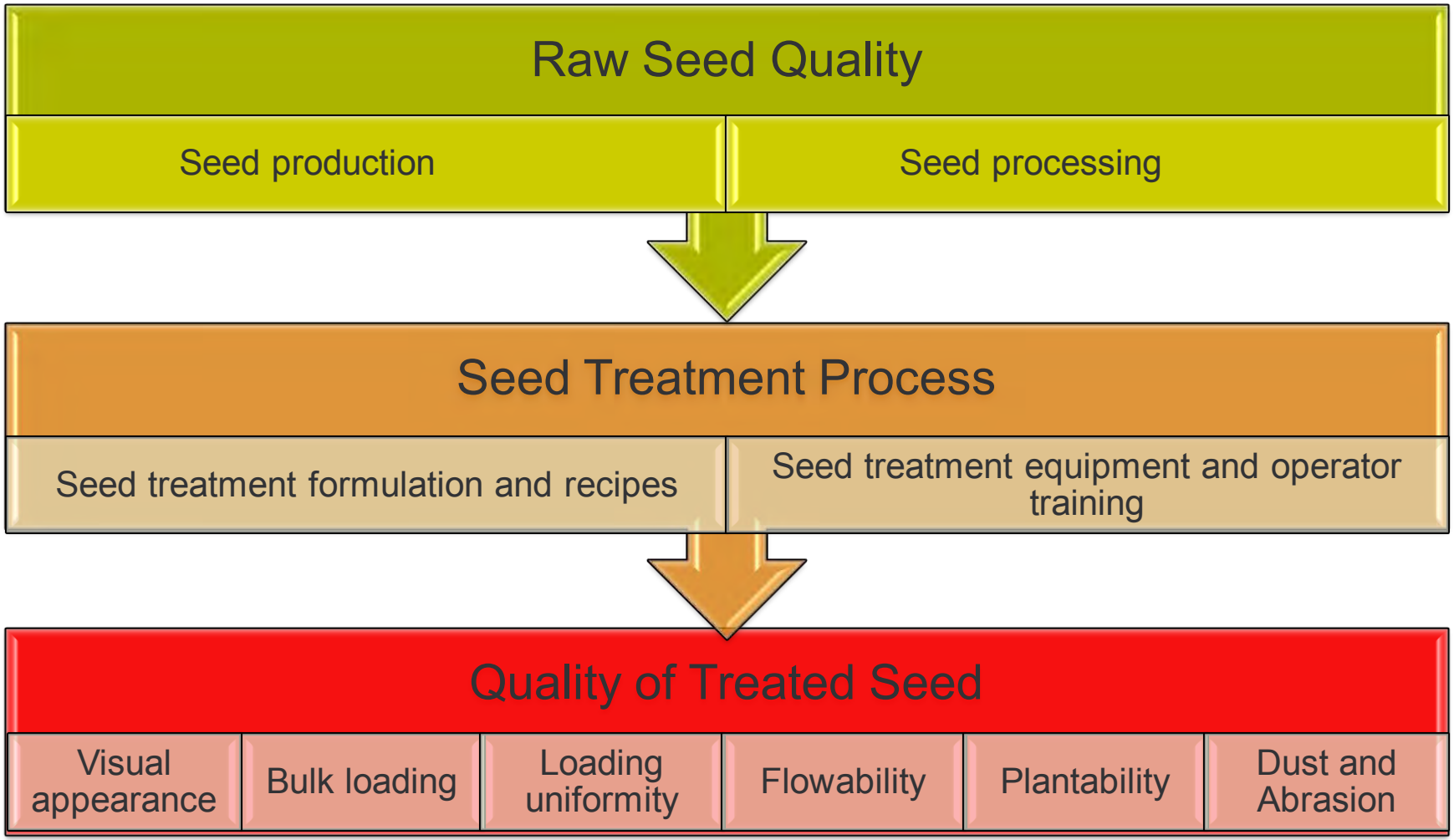
Quality of Treated Seeds

Seed treatment quality

.....is the result of a multi-step process



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Quality and safety of treated seed

…is a shared responsibility along the supply chain

1 Seed processing

2 Product formulation

3 Recipes & application

4 Supply chain & on farm

5 Planting

…is continuously on the agenda of improvement of seed applied technologies

Stepwise Improvements

- Improvement of formulations and recipes
- Implementation of approved recipes
- Implementation of stewardship programs
- Initiating research on novel polymers
- Research in improvements of application technologies

- Continued improvement and education of seed handling from harvest to planting
- Continued research and development on novel polymers
- Research in improvements of application technologies

- New delivery systems for Seed Applied Technologies
- Continued research and collaboration with industry partners –equipment manufactures, seed trade, and polymer technology providers

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Formulation Assessment Methods

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Standard quality assessment tests/tools employed by Syngenta Seed Care

Funnel: Flowability

HEUBACH: Dust Assessment

CornCounter: Plantability

HPLC: Seed Loading

QUEST Pro: Seed-to-Seed Distribution

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Formulation assessment in the laboratory

Heubach test

Apparatus with pump, drum and filter case

Control panel

Dust Assessment

- according to SOP of ESTA

Standardized filter case and filter

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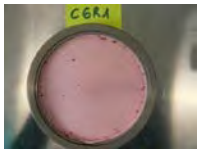
Dust assessment on simulated planter level

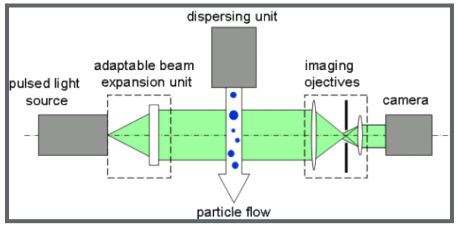
Digitel Technology

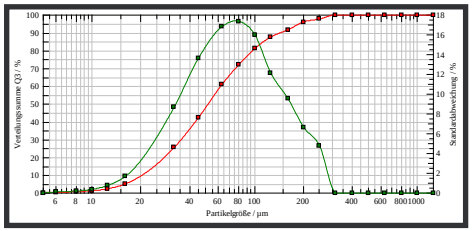


Principle

- Collection of dust at exit of planting unit on filter
- Assessment of total dust-off on filter
- Calculation of dust-off per seed unit or acre/ha

PICTOS Technology





Principle

- Particle count with high-speed camera
- Size range from 10 microns to 2000 microns
- Classification into distinct ranges
- Particle number, size and shape information
- Total mass of dust captured

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Simulation of dust emission from planters during formulation development

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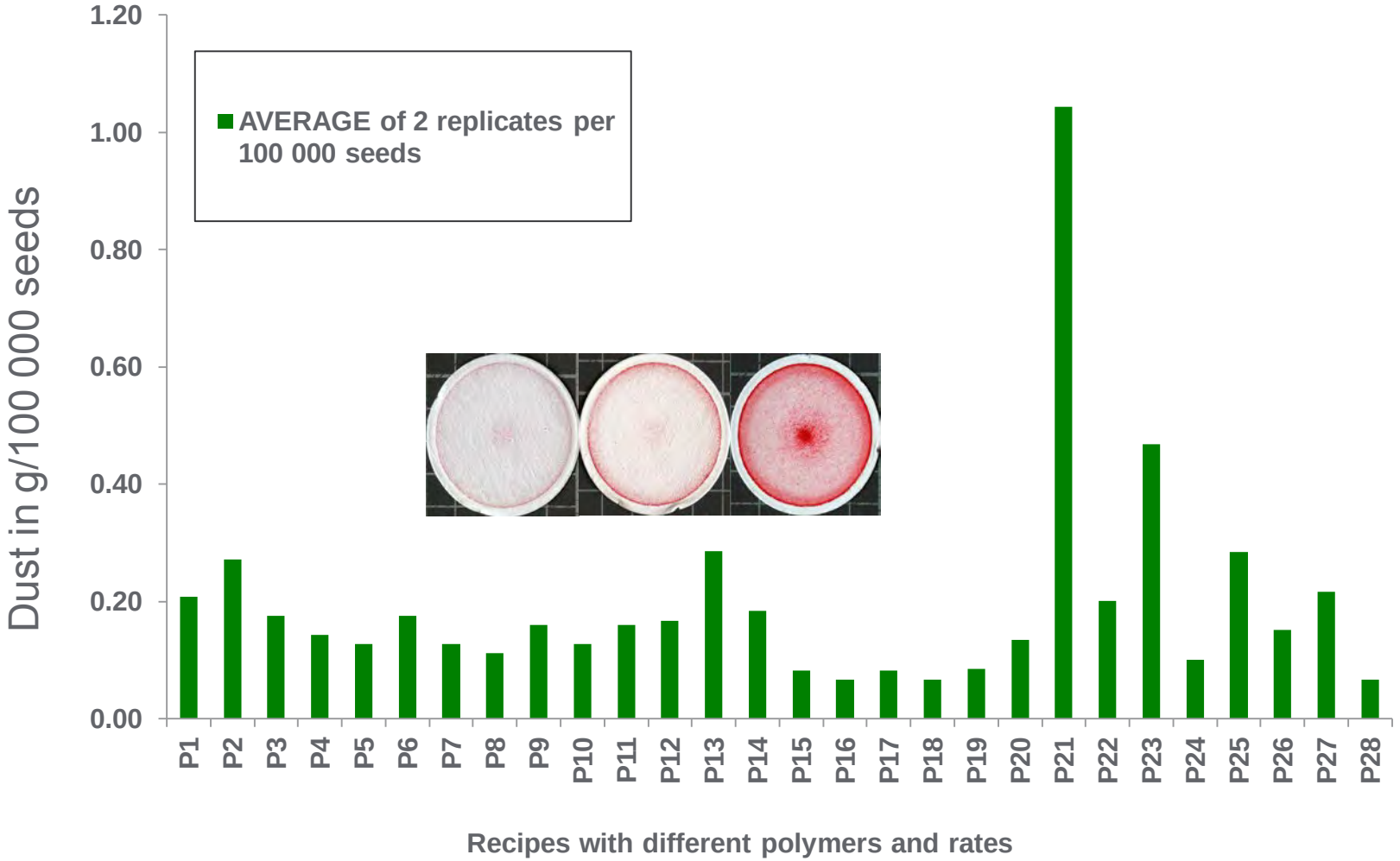
Polymers and recipes (products + polymers) screening

Heubach Assessment



Polymers play a key role in dust reduction and recipe development

Example: P21 was rejected due to outright unacceptable dust levels

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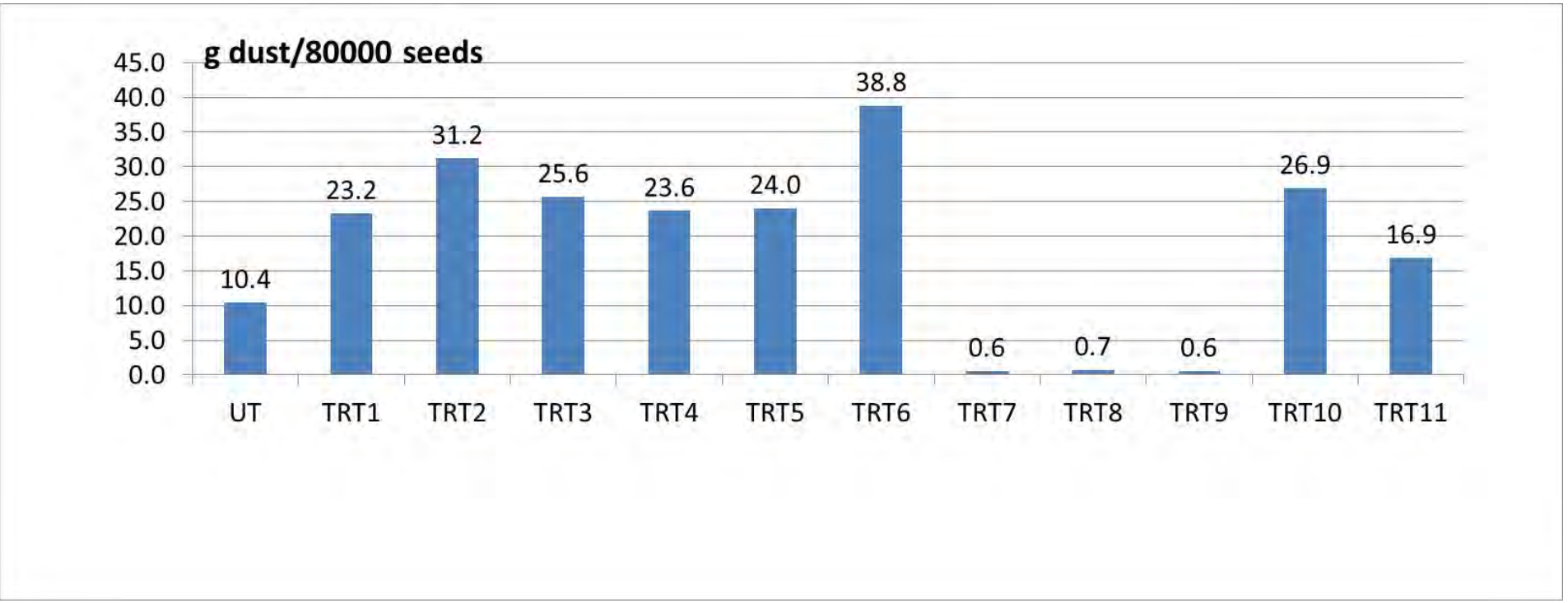
Recipe screening based on novel polymers

PICTOS assessment



Selection of the appropriate polymer is critical; weak polymers do not stick to the seed (TRT 1- 6; 10 - 11); strong polymers reduce the dust-off impressively while maintaining germination

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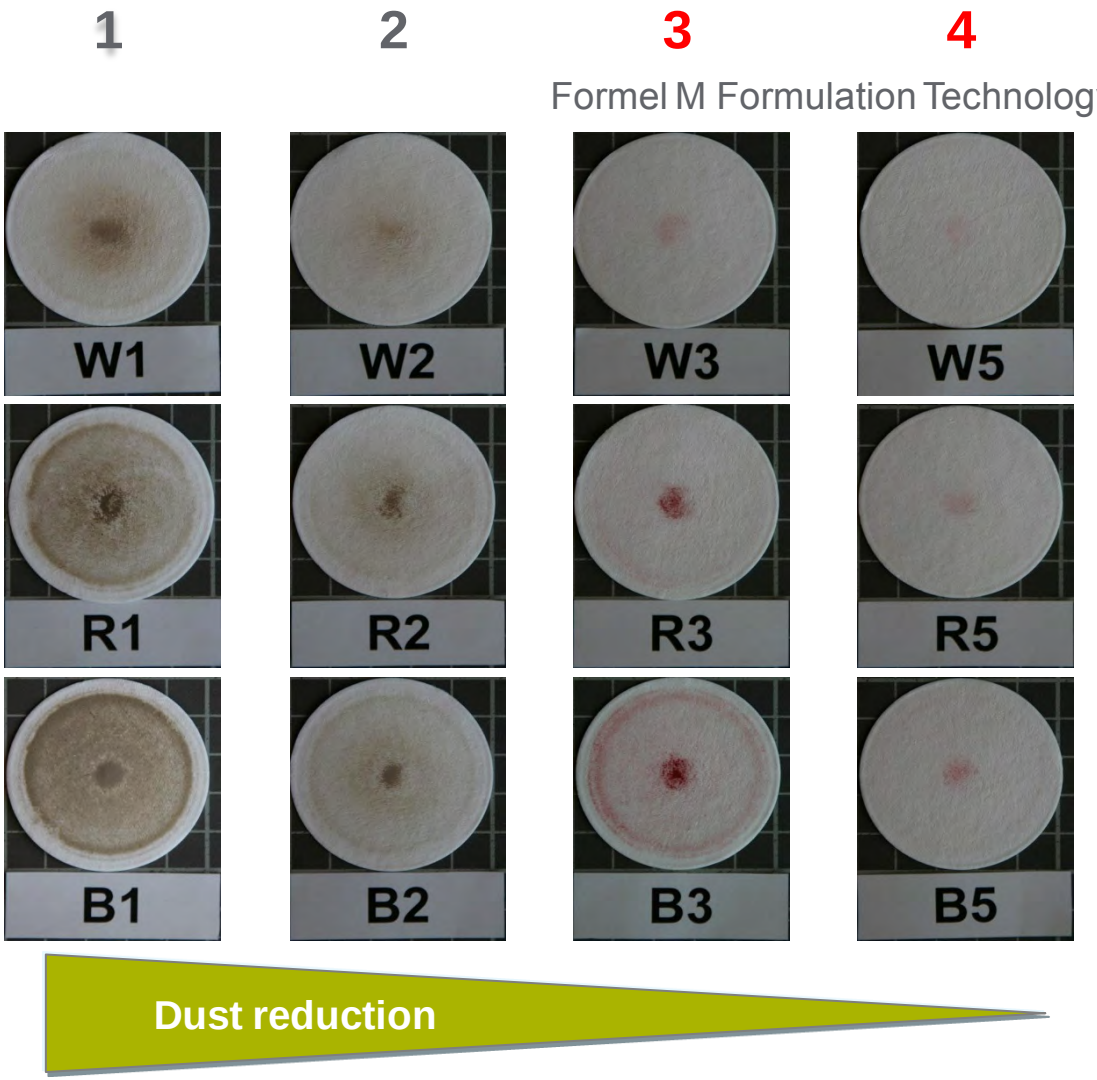
Influence of dedusting raw seed and formulation technology on treated seed quality (2)



1. Non-dedusted and untreated
2. Dedusted and untreated
3. Non-dedusted and treated
4. Dedusted and treated

Treatment (3 and 4)

Formel M technology for cereals

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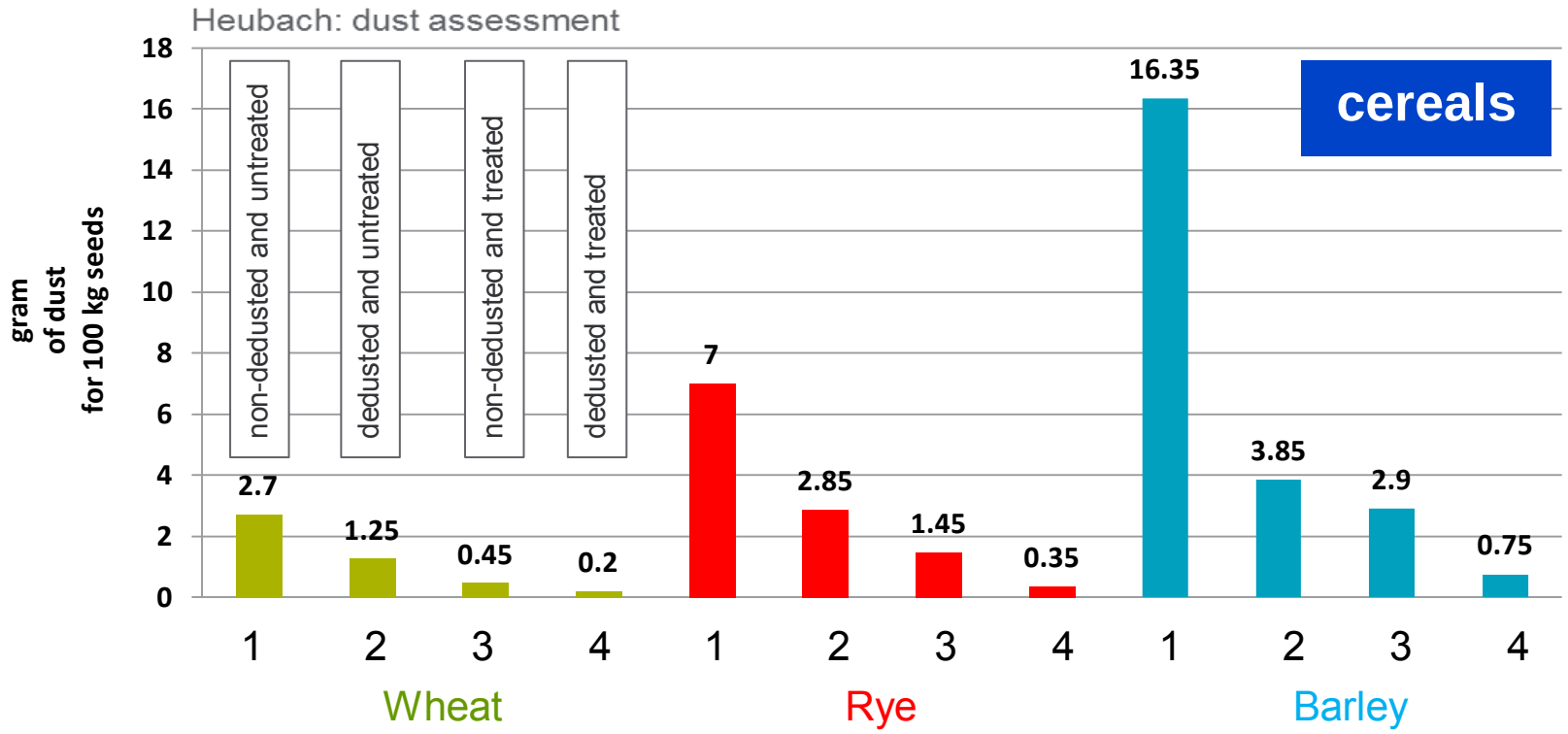
Influence of dedusting raw seed and formulation technology on treated seed quality



Dedusting: spouted bed cleaning assessment technology

Application: Rotostat

Formel M: dust reducing formulation

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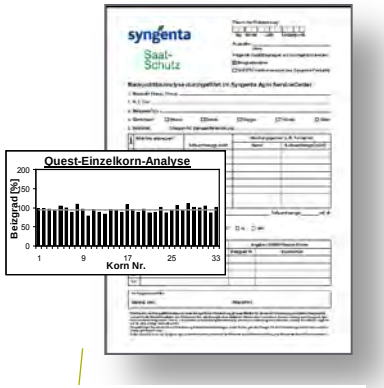
Summary and conclusions

- The quality of treated seed is a multifactorial result
- Seed cleaning is a first crucial step in ensuring quality seed treatment
- Great improvements have been made on polymers and recipes (products + polymers)
- Polymers and recipes are critical in managing potential dust-off and abrasion
- Effective quality management and stewardship along supply chain is a must
- Research and development on-going into novel polymers and application processes

Syngenta activities for Best Management Practices in Seedcare



Seed to seed distribution

Heubach dust analysis

Reports & documentation

Seed loading analysis

Mixtures &

Recipe development

Seed treatment Quality

Seed quality/safety

Technical Service

Training

Workers exposure

Facility check

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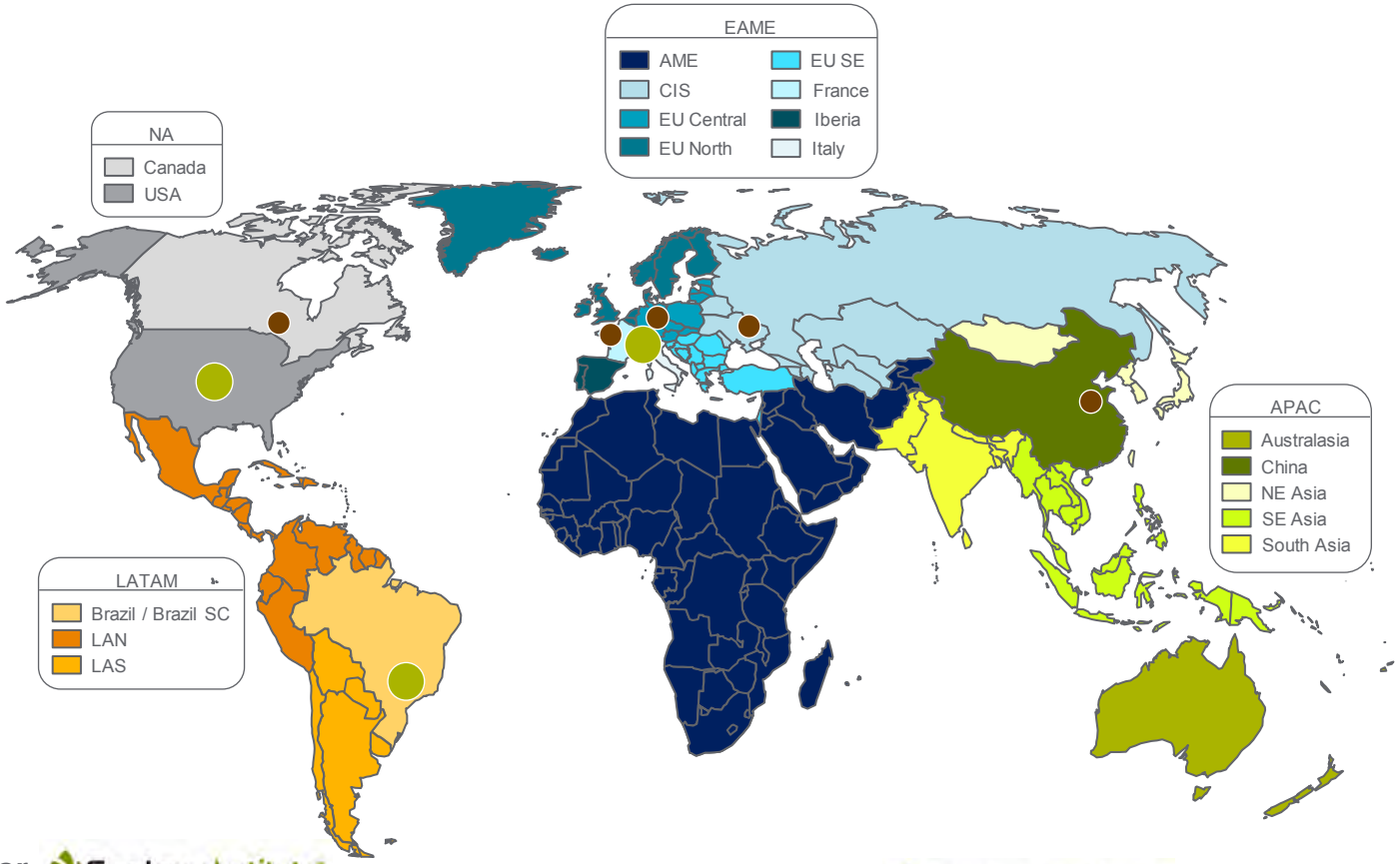
Global Network of Seed Care Institutes and Territories



Major Seedcare Institute

Local Seedcare Institute

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Critical Steps

Quality and safety of treated seed

…is a shared responsibility along the supply chain

1 Seed processing

2 Product formulation

3 Recipes & application

4 Supply chain & on farm

5 Planting

Best practices for commercial seed treatment

BMP for handling/planting

Other Technologies

Seed cleaning

Formulations & Polymers

Optimized recipes

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