ROCKET SEEDS®

FIELD FACTS

ROCKET SEEDS® NUTRITIONAL SEED-APPLIED PRODUCTS IN CORN: PMZ DRY

KEY FINDINGS:

ROCKET SEEDS PMZ DRY

INCREASES AVERAGE CORN YIELD BY

+3.9 BU/AC

VS. THE GSP ALONE

OVERVIEW:

Rocket Seeds PMZ Dry (2-12-0; 2% Mn, 9% Zn) contains a unique blend of micronutrients to help a crop maximize early season growth and nutrient uptake. PMZ Dry also contains a flowability and lubricating agent, which allows it to be a great substitute for talc or graphite in a seeding operation.

OBJECTIVE:

In order to demonstrate the potential benefits for Rocket Seeds PMZ Dry planter box seed treatment in corn production, Compass Minerals conducted rigorous laboratory testing to assess flowability and singulation, as well as growth chamber studies to assess biomass accumulation and nutrient uptake, at the Compass Minerals Innovation Center in Stilwell, Kansas.

Once the product concept was fully proven in the lab, it was time to take it to the field and implement large, replicated strip trials with a third-party research cooperator under real-life conditions. These studies demonstrate both agronomic and operational efficiencies of applying PMZ Dry to commercially treated corn seed, and the results are presented in this Field Facts.

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FLOWABILITY/ SINGULATION TRIAL:

In order to demonstrate the effect of PMZ Dry on seed drying, lubrication and flowability, Compass Minerals conducted two laboratory experiments in which treated seeds were tested under dry and wet/humid conditions. One trial measured flow and the other measured singulation in a lab scale vacuum planter at 5 MPH.

FLOW RESULTS

Results showed that seed flow was similar under dry conditions. However, under simulated high humidity, the seed that was not treated with PMZ Dry was sticking and did not flow. This confirms that PMZ Dry is effective at drying seeds and improving flow (Figure 1).

SINGULATION RESULTS

Singulation is the ability of the planter to plant one seed at a time, saving the farmer money from wasted doubles and improving planting population affected by skips. Results from these studies show that PMZ Dry treated corn seed maintained singulation compared to untreated corn under dry conditions—and improved singulation by over 3% under wet conditions (Figure 2).

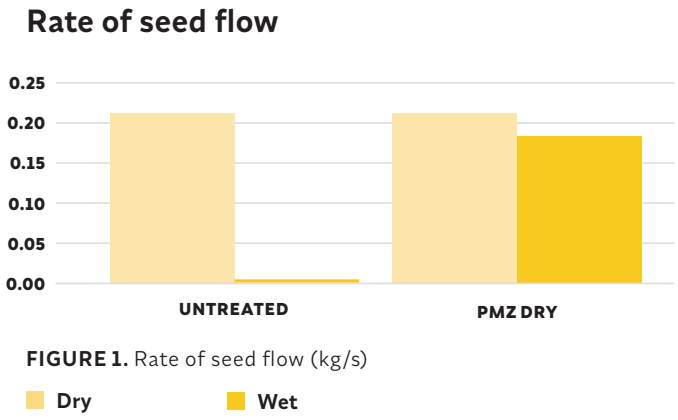

FIGURE 1. Rate of seed flow (kg/s)

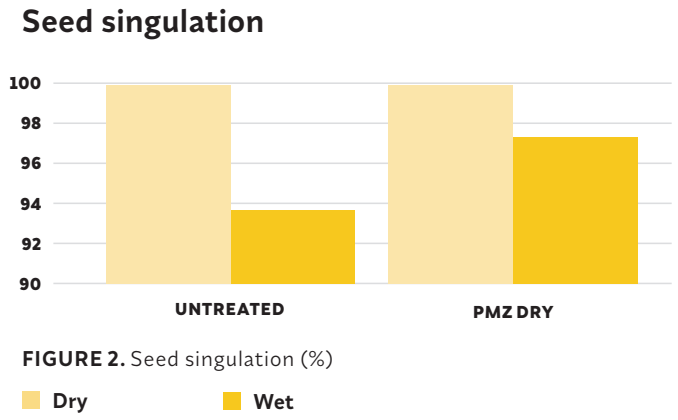

FIGURE 2. Seed singulation (%)

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GROWTH CHAMBER TRIAL:

Corn seeds were treated with PMZ Dry and placed in a growth chamber to grow for three weeks, at which point the plants were harvested in order to quantify root area, biomass and elemental uptake. This experiment was conducted with eight replicates.

GROWTH CHAMBER RESULTS

Corn plants treated with PMZ Dry had more than twice the root area as the untreated control as quantified by WinRHIZO™ image analysis system (Figure 3).

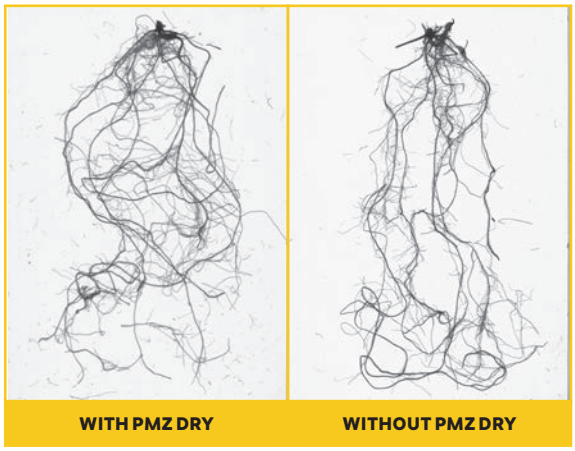

FIGURE 3. Root scan of corn plants with and without PMZ Dry at V3 (62 vs. 135 cm^2, WinRHIZO)

Both above-ground biomass and root biomass was nearly doubled with application of PMZ Dry relative to the untreated control (Figure 4).

Tissue and root biomass

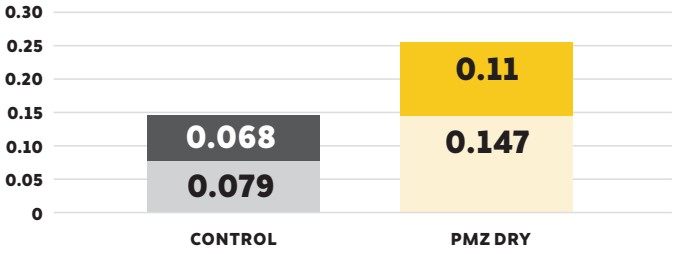

FIGURE 4. Tissue and root biomass (g/plant) at V3. P<0.01

Tissue
Root

Application of PMZ Dry to corn seed resulted in increased micronutrient uptake, with approximately twice as much boron, manganese, iron and copper content in harvested tissue relative to the untreated control (Figure 5).

Micronutrient uptake

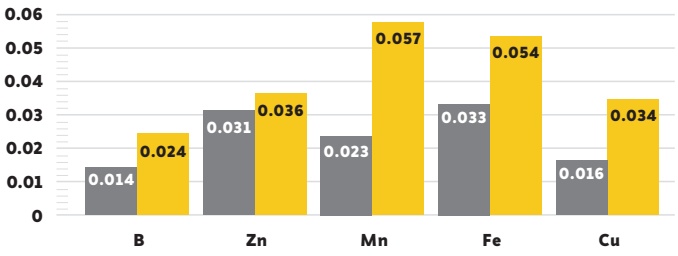

FIGURE 5. Micronutrient uptake (mg)

Control
PMZ Dry

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FIELD TRIAL DETAILS:

Location(s): Western Corn Belt - Kansas, Iowa, Minnesota, Nebraska, Missouri, South Dakota

Trial Design: Large Strip Trial, Randomized Complete Block Design w/ Three Replicates

Crop: 'R1309VT2P' Corn

Soil Profile:

SD:	pH = 5.1	CEC = 21.4	OM = 3.6%
IA:	pH = 5.9	CEC = 21.3	OM = 3.6%
KS:	pH = 7.0	CEC = 11.0	OM = 2.1%
MN:	pH = 6.6	CEC = 8.5	OM = 1.9%
MO:	pH = 7.2	CEC = 16.8	OM = 3.8%
NE:	pH = 6.7	CEC = 15.0	OM = 3.1%

Stats: General Linear Model,
Least Squares Means Student's t (P≤0.10)

Treatments:

1. **Grower Standard Practice (GSP) incl. Commercial Base Seed Treatment (Acceleron™ Basic)**
2. **GSP incl. Acceleron Basic + Rocket Seeds® PMZ Dry**

RESULTS FROM THE FIELD:

Although not part of the replicated trials, on-farm, side-by-side evaluations in Wisconsin, also showed increased root mass throughout the season compared to an untreated check. (Figure 6).

FIGURE 6. Root digs from farmer side-by-side evaluations in Wisconsin. Treated on the left, untreated on the right.

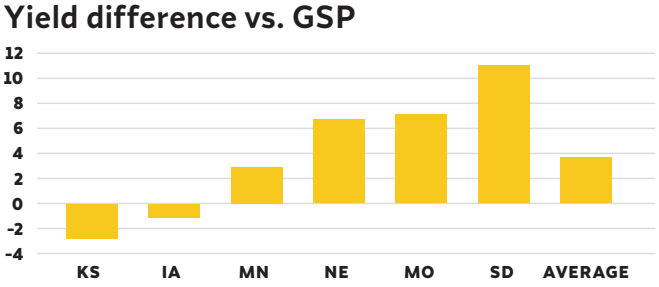

FIGURE 7. Yield difference between the GSP and PMZ Dry across six locations (bu/ac). P>0.20 for all locations except for NE, SD and the average.

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RESULTS FROM THE FIELD:

YORK, NEBRASKA

Addition of PMZ Dry to the GSP (which included Acceleron™ Basic) significantly increased yield by 6.4 bu/ac relative to the GSP in large strip trials conducted near York, NE (Figure 8).

RESULT: +6.4 bu/ac

CENTREVILLE, SD

In South Dakota, addition of PMZ Dry to the GSP significantly increased yield by 10.9 bu/ac relative to the GSP (Figure 9).

RESULT: +10.9 bu/ac

Corn yield (York, NE)

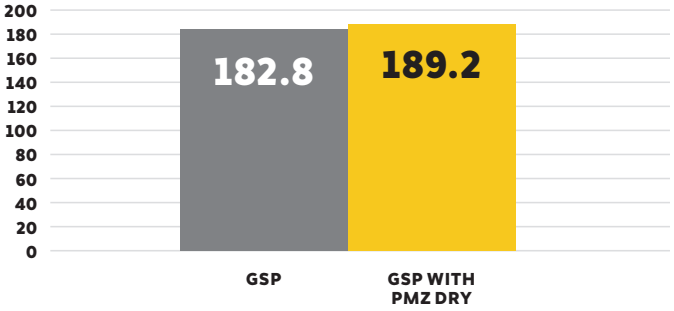

FIGURE 8. Corn yield (bu/ac). P=0.1252, CV=12.6%

Corn yield (Centreville, SD)

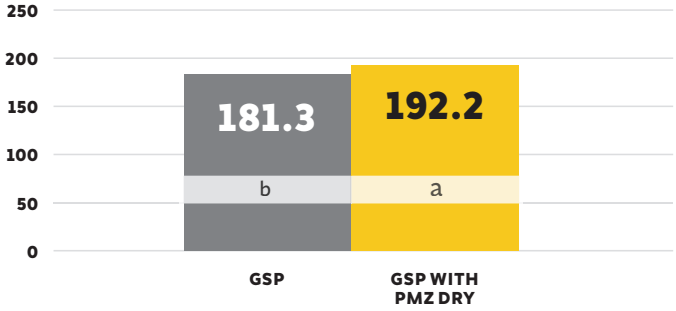

FIGURE 9. Corn yield (bu/ac). P=0.0538, CV=1.6%

SUMMARY:

Rigorous controlled environment studies demonstrate the potential of Rocket Seeds® PMZ Dry to increase root growth and nutrient uptake in corn seedlings. **Further, field testing under real-life conditions with large, replicated strip trials has confirmed that the benefits observed in the lab translate to real value for growers, with statistically significant yield increases exceeding 10 bushels per acre in some cases.**

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