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Evaluation of the Performance of a Soy Protein Seed Lubricant in Corn and Soybeans

University of Maryland evaluated the performance of a new seed lubricant product called DUST (Low Mu Tech, Calamus, IA, www.lowmutech.com) on corn and soybeans against two common seed lubricants, graphite and Fluency (Bayer Crop Science, USA) in 2019. Seed lubricants are materials mixed in with seed in the boxes of planters to ease the flow of seed through the planter and decrease wear in these mechanisms, especially in planters utilizing finger pickup units. DUST is a soy protein lubricant which is a cleaner alternative to commonly available seed lubricants. Graphite, for example, can leave a dark-colored residue on planter box surface, user clothing, and hands. The manufacturers of DUST also reported the product contributes to early plant vigor.

We used a completely randomized design with five replicates and an untreated control treatment (UTC) to evaluate the effects of DUST, graphite, and Fluency on plant emergence, early season vigor, and grain yield in corn and soybeans at Wye Research and Education Center in Queenstown, MD. Tables 1 and 2 detail the agronomic management of corn and soybeans. Stand counts were reported as number of 1,000 plants per acre, with plants counted in a 30-foot length of one corn row and plants counted in an area the size of 1/1000 of an acre in soybean plots. We assessed early season vigor at 7, 14, and 21 days after planting (DAP) through collection of normalized difference vegetation index (NDVI) readings using a handheld Greenseeker sensor. The sensor was held approximately 1 meter from the surface of the ground as the operator walked down the length of one corn or soybean row per plot. Readings were collected constantly as the operator walked at a similar speed and are reported as an average of those readings.

Corn was harvested when moisture approached 15% and yields are reported in bushels per acre corrected to 15% moisture. Soybeans were harvested when moisture approached 13% and yields are reported in bushels per acre corrected to 13% moisture. Seed lubricant products were purchased for the evaluation and costs of use are calculated based on unit cost of product and amount of product used on a per-acre basis.

We analyzed differences among seed lubricant treatments for plant population, early season vigor, and crop yield. We used a mixed model analysis of variance with replication as a random variable using SAS 9.4 software. Coefficients of variation (CV%) are reported as a measure of variability at a test site and values less than 10% indicate enough precision existed to determine a significant difference.

Comparable Results, More Expensive per Acre

Corn did not emerge until 10 DAP so we did not collect 7 DAP measurements (Table 1). We reported no

differences in emergence or yield among the treatments for either corn or soybeans (Tables 3 and 4), indicating all seed lubricants performed equally well to each other and un-amended seed. Additionally, we found no effect of seed lubricant on early season vigor observed in either corn or soybeans in 2019.

Although the DUST lubricant had the lowest unit cost (Table 5), a greater amount of the product is recommended for use. As a result, DUST is the most expensive product on a per-acre basis. Based on the data we collected in 2019, the DUST soy protein seed lubricant is comparable to other seed lubricants commonly used in Maryland for corn and soybean production.

Table 1. *Agronomic management for corn in Low Mu Tech trial*

Planted	10 May 2019
Plot details	four 30" rows
Hybrid	P0843AM
Target population	30,000 plants ac^{-1}
Fertility	46 gal of 30% UAN
Herbicides	**PRE:** Scanner @ 2 pt/ac Acuron @ 2.5 qt/ac Atrazine 4L @ 1 qt /ac
Harvest	10 September 2019

Table 2. *Agronomic management for soybeans in Low Mu Tech trial*

Planted	7 June 2019
Plot details	seven 15" rows
Hybrid	Asgrow AG39X7
Target population	160,000 plants ac^{-1}
Herbicides	**PRE:** Liberty 280 SL @ 32 oz/ac Medal II @ 1.5 pt/ac Authority First DF @ 6 oz/ac Actamaster SC @ 3 lb/ac **POST:** Gly Star Plus @ 1 qt/ac
Harvest	6 November 2019

Table 3. *Corn population and NDVI readings at 14 and 21 days after planting (DAP) and corn yield, corrected to 15% moisture, by seed lubricant treatment*

	14 DAP	21 DAP	14 DAP	21 DAP	Corn yield
	Plants ac^{-1}		NDVI		Bu ac^{-1}
DUST	28691	27646	0.31	0.39	177.7
Fluency	28227	27414	0.36	0.41	162.8
Graphite	27065	27414	0.38	0.39	168.8
UTC	28459	27878	0.34	0.33	172.5
Probability >F	0.4127	0.9423	0.2279	0.2492	0.4279
CV, %	5.8	4.9	18.0	19.4	10.7

Table 4. *Soybean stand and NDVI readings at 7, 14, and 21 days after planting (DAP) and soybean yield, corrected to 13% moisture, by seed lubricant treatment*

	7 DAP	14 DAP	21 DAP	7 DAP	14 DAP	21 DAP	Yield
	1000 plants ac^{-1}			NDVI			Bu ac^{-1}
DUST	16.4	16.8	19.4	0.26	0.53	0.39	78.0
Fluency	16.6	18.4	18.8	0.28	0.55	0.44	73.9
Graphite	15.2	18.2	17.6	0.27	0.51	0.42	76.6
UTC	14.2	19.8	17.8	0.25	0.51	0.39	76.1
Probability >F	0.6751	0.5442	0.7977	0.5641	0.8029	0.4188	0.6246
CV, %	21.4	18.3	16.8	10.6	17.7	14.4	6.4

Table 5. *Cost of use for seed lubricant products evaluated in this study**

		Corn		Soybeans	
	Cost, $lb^{-1}	**lb used ac^{-1}**	**$ ac^{-1}**	**lb used ac^{-1}**	**$ ac^{-1}**
Fluency	$5.05	0.0058	$0.03	0.0144	$0.07
Graphite	$13.30	0.0087	$0.11	0.0312	$0.41
DUST	$4.41	0.0937	$0.41	0.143	$0.63

**Mass per acre was calculated based on rate recommendation for each product at the target population for the crop (i.e. 30,000 plants per ac for corn and 160,000 plants per ac for soybeans).*

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