Humic Products Effects on Central Iowa Corn and Soybean Production

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Dr. Dan C. Olk, Research Soil Scientist, USDA-ARS, National Laboratory for Agriculture and the Environment
Dana Dinnes, Agronomist, USDA-ARS, National Laboratory for Agriculture and the Environment
Ben Knutson, Farm Manager, USDA-ARS, National Laboratory for Agriculture and the Environment

Objective

To examine the long-term grain yield effects of a humic product application on corn and soybean in rotation.

Introduction

Long-term field research results of humic products applications are few in the world. Therefore, our goal was to establish a long-term humic product experiment using a conventional corn-soybean rotation. Our objectives have been to measure the effects of the long-term humic product application on corn and soybean growth, grain yield and soil physical properties. Here we present the effects on crop yield.

Materials and Methods

Our experiment at the Boyd 11 field near the AERC farm. The soil types the plot area are Nicollet, Coland-Spillville complex and Clarion. The row spacing is 30 inches and the corn was planted at 34,000 seeds/a. The experiment was initiated in 2014, but the rates of application were changed at the vendor's recommendation in 2015. The herbicide and fertility management were done as normal practices for corn-soybean management. The humic product was broadcast spray applied at the V4 growth stage for both corn and soybean. Crop grain yields were measured from a combine equipped with a yield monitor with a global positioning system. Soybeans were planted at 175,000 seeds/a; corn at 34,000 seeds/a.

Results and Discussion

Table 1 presents the corn yield results in the even years for 2016-2022. Table 2 presents the soybean yield results in the odd years for 2015-2023.

Corn yields show a bit of a mix of positive and negative yield effects with 2018 standing out for yield loss. The weather pattern in 2018 was very wet, and we have documented elsewhere that very wet soil conditions can lead to yield losses with humic application. We suspect that the biostimulatory effect of the humic products caused the corn to grow more aggressively than it should have in those conditions, which benefitted biomass production, but at the cost of grain production. In other years, particularly in 2015 with the 128 oz/a humic rate, the corn yield was significantly greater than that of the control. In every soybean year at both humic rates there were yield gains with the applications of the two rates. Often, those yield gains were statistically significant.

Conclusions

Yield results from this long-term experiment of humic product application have allowed us to examine the performance over years of varied weather patterns that have given us the

ability to better understand the drivers of variable yield results. Similar to nitrogen fertilizer application, humic product application does not give the same yield effect in each year in every location. It is for this reason that variable rate nutrient application has arisen, and there is now evidence that there would be a similar benefit to site-specific rate application for humic products. Generating reliable humic product application maps – avoiding typically wet soils in low-lying areas – could increase the efficiency of product use and maximize the yield benefits of humic products applications.

Table 1. 2016-2022 corn grain yields from a control and two rates of humic product application.

Mean Corn Grain Yield (Bu/a)			
Year	**Yield Bu/a**	**% Diff (Humic-Control)**	**P Value (Humic v. Control)**
2016			
Control	220.5	.	.
64 oz/a Humic	222.7	1.0	0.36
128 oz/a Humic	229.3	4.0	**0.007**
2018			
Control	176.3	.	.
64 oz/a Humic	176.0	-0.2	0.97
128 oz/a Humic	163.5	-7.3	0.13
2020			
Control	189.0	.	.
64 oz/a Humic	185.5	-1.9	0.36
128 oz/a Humic	185.8	-1.7	0.40
2022			
Control	183.7	.	.
64 oz/a Humic	187.8	2.2	0.55
128 oz/a Humic	193.1	5.1	0.20

Table 2. 2015-2023 soybean grain yields from a control and two rates of humic product application.

Mean Soybean Grain Yield (Bu/a)			
Year	**Yield Bu/a**	**% Diff (Humic-Control)**	**P Value (Humic v. Control)**
2015			
Control	47.6	**.**	**.**
64 oz/a Humic	48.2	1.3	0.74
128 oz/a Humic	50.9	6.8	**0.10**
2017			
Control	51.8	.	.
64 oz/a Humic	55.8	7.7	**<0.001**
128 oz/a Humic	57.8	11.4	**<0.001**
2019			
Control	52.0	.	.
64 oz/a Humic	59.4	14.1	**0.01**
128 oz/a Humic	58.7	12.9	**0.02**
2021			
Control	51.6	.	.
64 oz/a Humic	54.7	6.1	**0.10**
128 oz/a Humic	54.1	4.8	0.17
2023			
Control	61.0	.	.
64 oz/a Humic	63.0	3.3	**0.09**
128 oz/a Humic	61.1	0.2	0.93