Biological Seed Coatings Influence on Soil and Plant Health in Central Iowa

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Introduction

Seed treatments have been applied since the 17th century, and since the 1990s have been revamped and exponentially increasing in use. Biological seed treatments have gained the most spotlight due to their connection with soil health, mainly in terms of potential beneficial relationships within soil biota and increasing soil health in general. BASF has developed a biological seed treatment called Poncho® Votivo® 2.0 (PV2.0), which is marketed to improve yields by improving soil health, making nutrients more plant available. Other potential benefits include protecting roots from harmful nematodes and stimulating root growth at earlier stages to increase plant vigor.

The goal was to evaluate the effectiveness of both chemical and biological seed treatments across four site years (two sites and two years) and four common maize (Zea mays L.) hybrids. The major research questions are: 1) How do chemical and biological seed treatments impact maize growth and quality? 2) Do hybrid and environment influence the effectiveness of seed treatments? To answer these questions, plant growth (height, density), vigor (NDVI), grain yield, and grain quality across these four site years was measured.

Materials and Methods

This experiment is located in central and northwest Iowa in a randomized block design. Only the central Iowa location is presented here. The corn seeds used have five predefined concentrations and combinations of the PV 2.0 product, a non-coated seed with base fungicide treatment and a complete control seed with no treatments (Table 1). In addition to the treatments, there are two different hybrids per location. In central Iowa, the following hybrids were used—KSC6812 SS RIB (hybrid W) and 6274SX (hybrid X). This planting followed soybean and was planted in 30-in. rows with a seeding rate of 35,000 seeds/acre. Furthermore, 150 lb of N/acre was applied pre-planting. The 2020 growing season consisted of drought and a derecho affecting data.

Results and Discussion

The yield for hybrid W ranged from 166 to 228 bushels/acre with an average yield of 201 bushels/acre. For hybrid X, yield ranged from 157 to 231 bushels/acre with an average yield of 190 bushels/acre (Figure 1).

A mixed ANOVA for this site-year was used. There was no treatment effect but a significant hybrid ($P = 0.002$) and hybrid by treatment interaction ($P = 0.060$). For hybrid W, the base seed treatment was greater than the untreated seed, however, the P5, P5V, and P5V2 were not significantly different than the untreated control. For hybrid X, the base seed treatment was significantly lower than the untreated control, while the P5 treatment was greater. The P5V and P5V2 were similar to the untreated control.

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Table 1. Seed treatment descriptions; the following abbreviations were used throughout the report.

Category	Abbreviation	Treatments
Control	Untreated	Untreated Seed
	Base	Base Fungicide (BF)
Chemical	P5	BF + Poncho at .5mg/seed
Biological	P5V	BF + Poncho at .5 mg/seed + Votivo
	P5V2	BF + Poncho at .5mg/seed + Votivo + 2.0

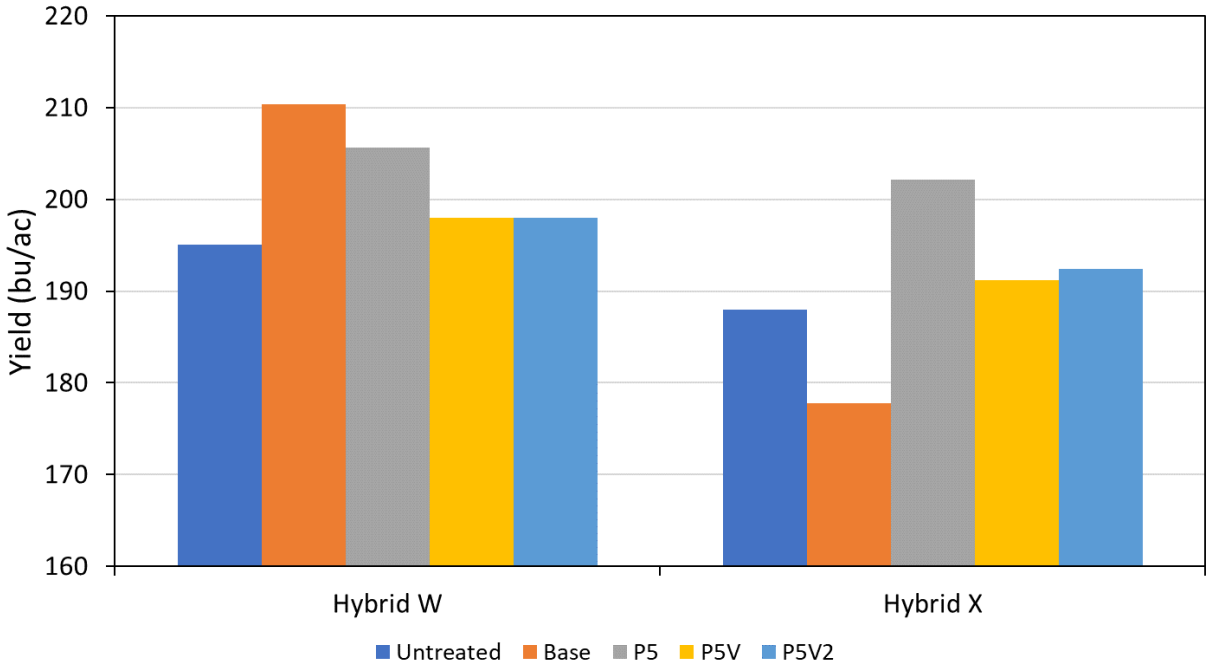

Figure 1. Corn grain yield response with chemical and biological seed treatments compared with no seed treatment (untreated) and base fungicide (base) seed treatment controls, Boone, IA, 2020.