

# Evaluation of treatments to maximize yield in Ohio soybeans

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## Objective

To evaluate increase yield of soybeans across different inputs and to evaluate genetics as one of the variables in input selection.

## Background

|                |                      |                |  |
|----------------|----------------------|----------------|--|
| Crop Year:     | 2011                 | Tillage:       | No till  |
| Location:      | South Charleston, OH | Soil test:     | pH 6.9, LTI 7.0, P 68 ppm, K 139 ppm, CEC 13.3 |
| County:        | Clark                | Planting date: | 9 June 2011                                    |
| Soil type:     | Crosby silt loam     | Seeding rate:  | 170,000 seeds/A                                |
| Drainage:      | Pattern tiled        | Harvest date:  | 29 Oct 2011                                    |
| Previous crop: | Corn                 |                |  |

## Methods

This study was designed as a randomized complete block with four replications. The trial was conducted at the OARDC Western Agricultural Research Station in 45 by 8.75 feet plots for each treatment. Seven 15-inch rows were planted for each treatment with a Kinze double frame no-till planter. Five rows were harvested for yield from the center of each treatment. Herbicides used in the plot area included a burndown of glyphosate, 2,4-D, Canopy and Valor seven days before planting followed by an application of glyphosate post.

Variables evaluated:

1. Genetics – 4 varieties
  - Wellman W4134, W4032 and Pioneer 93Y82, 93Y91
2. Inoculant seed treatment – Vault HP (2.0 fl oz/CWT)
3. Foliar insecticide with fungicide
  - Warrior (3.2 oz/A) with Headline (6.4 oz/A)
4. Foliar fertilizer – SoyScience; analysis 4-0-18 ,B 0.5%, Mn 2.5% (2 qt/A)
5. A kitchen sink treatment – Vault seed treatment followed by Warrior, Headline, and SoyScience as above, plus a growth enhancer BioForge (1 pt/A)

The soybean varieties were chosen based on their abilities – requested from each company was a “high yielding” variety with good potential but lacking key disease protection vs. a “stable yielding” variety with excellent disease protection. The Wellman seed came with seed treatments that included imidacloprid and a microbial additive. The Pioneer varieties included no seed treatments before the trial additions.

The Vault HP seed treatment was applied May 19<sup>th</sup> with a small laboratory size seed treater.

The foliar applications of insecticide and fungicide, foliar fertilizer and/or BioForge were applied by self-propelled applicator on August 18 at 4 mph, in 20 gpa volume with 8002FF tips. Notes were not taken on individual plots, but little to no insect or disease pressure was seen across the trial.

A small plot Massey Ferguson model MF8xp combine was used to harvest the center five rows of each seven row plot and weighed in a digital scale mounted on the machine for on-the-go harvest and plot weighing. Yield was calculated in bushels/acre at 13% moisture content.

Yields were analyzed using PROC MIXED in SAS 9.2. The model included treatment and variety by treatment statements. Random effects were replicates and variety by replicates.

## Results

Table 1. Least Square Means of soybean yield response to treatments. (bu/A)

|                    | <u>With</u>       | <u>Without (untreated)</u> |
|--------------------|-------------------|----------------------------|
| Rhiz. seed inoc.   | 57.7 <sup>a</sup> | 61.0                       |
| Fol. insect & fung | 61.9 <sup>b</sup> | 56.8                       |
| Foliar fert        | 59.0              | 59.7                       |
| Kitchen sink       | 59.6              | 59.1                       |

a Treatment difference P = 0.04, b treatment difference P = 0.002

Table 2. Least Square Means of soybean yield response by variety to inputs of inoculant, insecticide, fungicide, foliar fertilizer and growth enhancer. (bu/A)

| <i>Trt</i>         | <i>variety</i>     |                   |                   |                    |
|--------------------|--------------------|-------------------|-------------------|--------------------|
|                    | <u>W4134</u>       | <u>W4032</u>      | <u>P93Y82</u>     | <u>P93Y91</u>      |
| Untreated          | 58.3 <sup>ab</sup> | 53.8 <sup>a</sup> | 66.1 <sup>b</sup> | 59.2 <sup>ab</sup> |
| Rhiz. seed inoc.   | 53.5 <sup>c</sup>  | 49.0 <sup>c</sup> | 68.0 <sup>d</sup> | 60.5 <sup>cd</sup> |
| Fol. insect & fung | 61.2 <sup>ef</sup> | 55.5 <sup>e</sup> | 69.9 <sup>f</sup> | 61.0 <sup>ef</sup> |
| Foliar fert        | 58.2 <sup>gh</sup> | 52.4 <sup>g</sup> | 66.9 <sup>h</sup> | 58.4 <sup>gh</sup> |
| Kitchen sink       | 57.4 <sup>ij</sup> | 52.7 <sup>i</sup> | 67.5 <sup>j</sup> | 60.8 <sup>ij</sup> |

Within row comparisons only. Different Superscripts in the same row are significantly different. P=0.02

## Summary

The rhizobia seed inoculant treatment reduced yield, due largely to the two Wellman varieties. Because the Wellman varieties were already treated, the additional run through the trial seed treater may have injured the seedcoat. The foliar insecticide plus fungicide treatment increased yield, without the appearance of significant insect or disease infestation. The other treatments did not increase yield above the untreated check.

There was variation in yield across the four varieties; the Wellman W4032 was the least responsive to inputs and Pioneer P93Y82 the most responsive. Variety selection should be a key component in pursuing maximum yield from additional inputs.

## **Acknowledgement**

The author expresses appreciation to a number of participants in the discussion and implementation of the trial: Steve Hodge, Kevin Forrest Pioneer, Jim Pullins of Becker-Underwood, Jim Beuerlein, Tri-Ag Products, the Western Agricultural Research Station, and to the Ohio Soybean Council for financial support.

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