

Evaluation of Organic Soybean Rust Treatments for Organic Production —Neely-Kinyon Trial, 2008

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Introduction

Asian soybean rust, which arrived in the U.S. in 2004, has the potential to be the single most important impediment to economical organic production in the U.S., with the economic impact of ASR in organic systems ranging from \$30 to \$120 million in yield loss, upon its arrival in organic soybean areas. The fungus (*Phakopsora pachyrhiz*) survives year-round in warm areas, such as the southern United States. During a growing season, the pathogen is disseminated by northward seasonal wind.

Weather conditions in 2008 kept soybean rust out of Iowa, but soybean rust was found as far north as Illinois, and has been shown to overwinter in Florida. Iowa State University was awarded a grant from USDA in 2005 to investigate “Strategies for Management of Asian Soybean Rust in Organic Systems,” which includes treatments allowable under certified organic conditions. Trials were established from 2005 to 2007 in an area of Florida where rust is present to examine the effect of these treatments. Concurrently, trials have been established in Iowa, Pennsylvania and Michigan to examine yield effects of these treatments under non-rust conditions.

Materials and Methods

In the soybean rust treatment trial, Blue River 34A7 soybeans were planted at the Neely-Kinyon Farm on May 20, 2008, and re-planted on June 25, due to floods, at 200,000 seeds/acre. Plots measuring 10 x 20 ft. were laid out in a completely randomized design. There were four replications of the following treatments:

MicroAF™ (TerraMax, Inc., Cottage Grove, MN) at 1 gallon/acre, Sonata® (AgraQuest, Inc., Davis, CA) at 1 gallon/acre, and Heads-Up™ (Heads Up Plant Protectants, Inc., Kamsack, Saskatchewan, Canada) at 1g/360lb of seed. All treatments were compared with a control. Treatments were applied on July 14, 2008, at the R-1 stage, and every two weeks between July 14 and September 1 except for the Heads Up™ which was mixed with seed before planting. Leaves were inspected for disease on June 30 and July 14, and on alternate weeks to treatment spraying on July 21, and on August 4, 18 and September 8, by randomly selecting one leaf from the top, middle, and bottom sections of four plants per plot. Plots were maintained with rotary hoeings on June 30 and July 7, cultivation on July 15 and 22, and July 30, and walking on August 1 and 14, 2008. Soybeans were harvested on November 19. The percentage of stained soybeans was determined by counting the number of stained soybeans in a 200-gram sample that was randomly collected from the harvest of each plot.

Results and Discussion

Soybean rust was not observed in the trial plots in 2008. The treatments had no significant effects on yield, soybean diseases, or grain quality (Table 1). Yields averaged 34.5 bu/acre, down considerably from previous years due to flooding and re-planting issues. Protein averaged 33.5% across all treatments. Disease pressure was extremely low in 2008, despite flooded conditions in the early part of the growing season. The main diseases observed in 2008 included Bacterial Blight, Brown Spot, and Downy Mildew, but all were considered at low levels. Soybean staining averaged 18% in 2008, higher than 2007 rates, with no significant difference among treatments (Table 2). We will continue to test products in 2009, and monitor

treatment effects on other soybean diseases, in the event of no rust appearing. The most effective, organic-compliant product for mitigation of Asian soybean rust in the Florida trials was Champion® Wetable Powder (Nufarm, Burr Ridge, Illinois) containing 77% copper hydroxide.

References

<http://www.plantpath.iastate.edu/soybeanrust/>
<http://sbrusa.net>.
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Acknowledgments

We would like to thank the Leopold Center for Sustainable Agriculture for their support of the Neely-Kinyon projects. Thanks also go to Francisco Rosas, Bernardo Thompson, and Chloe Poitral for their help. We also thank Blue River Hybrids, TerraMax, Inc., Cottage Grove, MN, and AgraQuest, Inc., Davis, CA, and Charles Hurburgh and Glen Rippke of the ISU Grain Quality Lab for grain analysis.

Table 1. Yield and grain quality in soybean rust treatment trial, Neely-Kinyon, 2008.

Treatment	Yield (bu/acre)	Protein (%)	Oil (%)	Carbohydrates (%)
Control	34.26	33.80	18.30	24.93
Sonata®	35.10	33.83	18.26	24.93
Heads Up™	35.16	33.35	18.25	25.40
MicroAF™	32.48	33.20	18.03	25.75
LSD 0.05	NS	NS	NS	NS

Table 2. Disease pressure and stained soybeans in soybean rust treatment trial, Neely-Kinyon, 2008.

Treatment	Disease presence average over the growing season (%)						
	Stained soybeans (%)	Frogeye leaf spot	Cercospora leaf blight	Bacterial pustule	Bacterial blight	Brown spot	Downy mildew
Control	20.35	0.00	0.80	0.00	0.00	0.80	0.80
Sonata®	16.35	0.00	0.00	0.00	0.08	0.00	1.50
Heads Up™	17.25	0.00	0.00	0.00	0.08	0.80	1.50
MicroAF™	21.00	0.00	0.00	0.00	0.08	0.00	0.00
LSD 0.05	NS	NS	NS	NS	NS	NS	NS