Evaluation of Organic Soybean Rust Treatments for Organic Production —Neely-Kinyon Trial, 2006

Kathleen Delate, associate professor
Andrea McKern, research assistant
Departments of Horticulture and Agronomy
Bob Burcham, ag specialist

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.

Dry conditions across the Midwest in 2006 kept soybean rust out of Iowa, but soybean rust was found as far north as Indiana, and has been shown to overwinter in Florida. Iowa State University has been awarded a grant from USDA to investigate "Strategies for Management of Asian Soybean Rust in Organic Systems," which includes treatments allowable under certified organic conditions. Trials were established in 2005 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, Pioneer 9305 soybeans were planted at the Neely-Kinyon Farm on May 19, 2006, 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 AgriCoat Natural IV ™ (AgriCoat LLC, Soledad, CA) at 12 oz/acre. All treatments were compared with a control. Treatments were applied on July 14, 2006, at the R-1 stage. Leaves were inspected for disease on July 13, 26, August 11, 29, and September 13, by randomly selecting one leaf from the top, middle, and bottom sections of four plants per plot. Plots were maintained with one rotary hoeing on June 1, one cultivation on June 22, and walking on August 3, 2006. Soybeans were harvested on October 31. 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 2006. The treatments had no significant effects on yield, soybean diseases, or grain quality (Table 1). Other diseases observed in 2007 include Frog Eye Leaf Spot, Cercospora Leaf Blight, Bacterial Pustule, Bacterial Blight, Brown Spot, and Downy Mildew. The most prevalent diseases were Frog Eye Leaf Spot and Downy Mildew (Fig. 1). The highest number of infected leaves from Frog Eye Leaf Spot and Downy Mildew occurred on August 29 and August 11, respectively. We will continue to test products in 2007, monitor treatment effects on other soybean diseases, in the event of no rust appearing.

References

http://www.plantpath.iastate.edu/soybeanrust/
http:// sbrusa.net.
http://extension.agron.iastate.edu/organicag/
http://www.ipm.iastate.edu/ipm/icm/2002/11-18-2002/soybeanrust.html

Acknowledgments

We would like to thank the Leopold Center for Sustainable Agriculture for their support of the Neely-Kinyon projects. We thank the Wallace Foundation for their input and support. Thanks also go to Greg Lilly, David Rosmann, Magda Marin Beltran, Kristin Brown, Daniel Rosmann, Mark Rosmann, Rita Tisinger, Christina Erickson, and Francisco Viteri for their help. We also thank Eric Gross of Pioneer Hi-Bred International, TerraMax, Inc., Cottage Grove, MN, AgraQuest, Inc., Davis, CA, and AgriCoat LLC, Soledad, 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, 2006.

Treatment	Yield (bu/acre)	Protein (%)	Oil (%)	Fiber (%)	Carbohydrates (%)	Moisture (%)
Control	43.88	37.64	17.83	4.70	21.84	10.93
Sonata®	46.09	37.39	17.96	4.70	21.95	10.84
AgriCoat Natural IV ™	49.78	37.43	17.80	4.70	22.08	10.90
MicroAF™	44.25	37.70	17.63	4.70	21.98	10.83
LSD 0.05	NS	NS	NS	NS	NS	NS

Table 2. Yield and grain quality in soybean rust treatment trial, Neely-Kinyon, 2006.

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	5.43	22.6	1.3	0.4	1.3	0.9	12.2
Sonata®	3.84	18.3	2.6	1.7	2.2	0.0	12.7
AgriCoat Natural IV ™	5.58	21.7	3.4	1.7	1.7	0.0	15.3
MicroAF™	4.48	19.2	2.1	0.9	1.3	0.0	14.1
LSD 0.05	NS	NS	NS	NS	NS	NS	NS

Figure 1. Soybean disease occurrence in soybean rust treatment trial, Neely-Kinyon, 2006.