ARE SOYBEAN LEAF DISEASES CAUSING ECONOMIC YIELD LOSS IN WISCONSIN?

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Introduction

The impact of foliar soybean diseases and the use of fungicides for both disease control and plant health benefits has become a focal point in soybean production since the discovery of soybean rust in the United States. As a result, the University of Wisconsin has initiated a two year research project focusing on foliar fungicide use in small research plots and large on-farm field plots.

On-Farm Field Trial Results

Nine trials were conducted in 2005 and six trials in 2006 using Headline applied at 6 oz./a during late R2 or R3 growth stage (2005) and R3 stage (2006). During the 2005 and 2006 growing seasons, a statistically significant yield advantage (P=0.05) of 1.4 and 2.8 bu/a, respectively, was observed in the Headline treated plots when yield data was combined across all locations for each year. Using current pricing scenarios (Table 1), we have calculated 3.4 bu/a as a baseline needed for an economic response to the application of a fungicide, ($7.50/a application fee and $6.00/bu soybean). Therefore, these yield advantages are not considered to be an economic benefit to the grower.

Table 1. Estimated yield gain needed to cover the cost of Headline ($270/gallon at 6 fl oz/a) at various soybean prices and application costs

	Application costs ($/a)		
Soybean price/bu	7.00	7.50	8.00
	---------- bu/a ----------		
$5.75	3.4	3.5	3.6
$6.00	3.3	3.4	3.5
$6.25	3.1	3.2	3.3

Of the nine individual field trials conducted in 2005, there was no statistical yield difference between treated and untreated plots within individual fields. In 2006, there was a statistically significant and economic yield advantage of 6.3 bu/a and 5.1 bu/a for each of two soybean varieties (maturity groups 1.5 and 0.8, respectively) at the Marshfield Agricultural Research Station and a 5.7 bu/a advantage using Headline in a Green County experiment. A statistical yield advantage was not observed for the four plots in Columbia, Dane, Green, and Walworth counties during 2006.

During the 2006 growing season, Bill Halfman and Steve Huntzicker, UWEX Monroe and La Crosse counties, respectively, initiated five on-farm plots using Quadris fungicide (6.0 fl oz/a) applied at growth stage R3. Pooled yield results from all locations did not indicate a statistical

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yield advantage to using Quadris. Yield results from individual fields indicated that only one of the five fields had a significant, but non-economic yield benefit of 2.0 bu/a.

Small Plot Research Results

Small plot research trials were also conducted in 2005 and 2006 using various application timings (R2, R3, R2+R3) of Headline + Folicur, Quilt, Laredo, and Punch. These products were chosen to represent different combinations of active ingredients and fungicide classes. Punch and Quilt are not registered for use on soybeans. Headline + Folicur and Laredo are approved for soybean rust only through the section 18 process and are not legal to use for other soybean disease or for plant health purposes. Results of this 2-year study at three locations (Arlington, Lancaster and West Madison Research Stations) indicate that fungicide treatments did not consistently increase soybean yields. Only one treatment, Punch applied at R3, increased yield enough to be statistically significant and economically feasible at the West Madison Station during the 2006 season.

Discussion

We have not identified a single key factor that would predict whether a fungicide application would result in an economic return. There is a trend for greater yield increases if fungicides are applied at the R3 growth stage when compared to applications at earlier growth stages. Weather conditions are a significant factor that contribute to disease development and thus, the yield response of soybean to fungicides. Soybean variety is another variable suspected to influence the response of soybean to fungicides. Results from Wisconsin and other Midwestern states suggest similar results. Funding for soybean fungicide research has been provided by the Wisconsin Soybean Marketing Board and participating companies.

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