Foliar Fungicides on Soybeans
2006 Report

Purpose:

With the introduction of Asian soybean rust (a new invasive disease) into the US in the fall of 2004 and its subsequent establishment in the southern US and Mexico, the risk to Ontario soybean production has increased. As the disease continues to establish in North America, spread into Ontario and the Midwest US corn belt will become more likely. In 2006 rust was detected as far north as Indiana and Illinois. For the foreseeable future, the primary management option for North American producers will be fungicides since other alternatives such as resistant varieties are not presently available. In Ontario various fungicides have received registration against soybean rust and these have been shown to be very effective in US trials against soybean rust.

A number of North American trials have shown a significant yield boost with the use of a fungicide, even in the absence of rust. This yield boost may be a function of controlling bean diseases that have previously been ignored, or may result from plant enhancements resulting from the application of the fungicide. Scientists now believe that these plant enhancements in the absence of disease are associated with a reduction in plant respiration, a reduction in the plant hormone ethylene, a change in nitrogen processing and a number of changes in the anti-disease, anti-stress systems in the plant. The main question for soybean growers is whether yield benefits are large enough to warrant spraying in the absence of major disease outbreaks. In 2006 trials were conducted to assess the possible yield benefits of foliar fungicides on soybeans in Ontario.

Methods:

On-farm strip trials were set up by OMAFRA and various agribusinesses across Ontario and data was collected from 31 sites in Ontario. Trials were set up across a wide variety of soil types, environmental conditions and geography.

With the exception of fungicide applications, fields were treated as a whole when applying herbicides, fertilizers, insecticides, and tillage practices. Whenever possible, crop inputs were applied perpendicular to the direction of the fungicide treatments. This ensured that mistakes or misses in field operations occurred across all trial treatments.

The majority of trials were sprayed with the fungicide at the R2 soybean plant growth stage (full bloom) which has been promoted in plant health literature.

Leaf samples were taken from 11 sites and sent to the University of Guelph Pest Diagnostic Clinic for disease detection and identification.

Results:

Figure #1: Soybean Yield Response to Foliar Fungicides in Ontario. (2006)

Summary:

The cost for strobilurins (Headline and Quadris) is approximately $16.00 per acre, excluding application costs. Assuming an application cost of about $8.00 per acre and a tramping loss of 1.0 bu/ac, a 4.4 bu/ac yield increase would be required to break even ($16.00 product + $8.00 application + $7.00 tramping loss). This assumes a tramping loss of 1 bu/ac and a selling price of $7.00/bu. Late season spraying tramping losses have been reported from as low as 1% to as high as 4% depending on the width of the boom, etc.

Of the 31 trials in this study, 21 trials (68%) showed a yield gain but only 8 of these yield gains were high enough for a positive economic return. In other words 26% of the trials increased profits while 76% of the trials showed an economic loss. An average yield gain of only 0.8 bu/ac was realized across these 31 strip trials. In 2005 an average yield response of 3.6 bu/ac was realized in similar trials conducted in Ontario.

The 2006 growing season was relatively wet with above average Crop Heat Units. These excellent growing conditions increased average yields across the province by 5-10 bu/ac. These extraordinary yields may have influenced the results. When growing conditions are excellent yield response to crop inputs are often masked. This may explain the lower yield benefits to spraying in 2006 compared to 2005.

The variability or inconsistency in these results are very similar to other foliar fungicide strip trials conducted in the US. For instance, in a 2005 University of Minnesota study, a positive economic return to fungicide application occurred on roughly 1/3 of the trials. http://www.extension.umn.edu/cropenews/2005/05MNCN59.htm

Considerable work is underway across North America to understand when and where positive economic returns can be found with the use of foliar fungicides on soybeans. Yield response may be associated with the amount of stress a plant is under but even this theory has yet to be proven. Economic yield results have been inconsistent when applying foliar fungicides.

Next Steps:

Similar studies should be conducted including fungicide/insecticide tank mixes to assess the economic value of using these products on soybeans.

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