MICHIGAN SOYBEAN ON-FARM RESEARCH

IN-SEASON MANAGEMENT GUIDE

Summer 2021

MICHIGAN SOYBEAN COMMITTEE

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The information in this publication is the result of checkoff investments in soybean research. We hope you find this information valuable and wish you a successful 2021 soybean crop.

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FROM OUR RESEARCH DIRECTOR

The Michigan Soybean Committee (MSC) makes a significant and intentional investment in soybean production research each year. Our research is split into three categories:

- **Competitive Research:** MSU researchers and industry professionals
- **On-Farm Research:** field scale farm-based trials
- **North Central Soybean Research Program (NCSRP):** 13 states contribute to address widespread issues investigated by teams of University researchers

Farmer and industry needs are carefully evaluated and considered by the MSC board when they choose the most critical topics to fund within competitive research, while the on-farm research topics are chosen with extensive grower input. NCSRP project selection is made by farmer directors from each of the 13 member states, with support from state checkoff staff.

You can be confident a thorough system is used to determine the best ways to utilize your checkoff investment, and project progress is carefully tracked to ensure the valuable results are shared with you.

Mark Seamon

FROM OUR RESEARCH COMMITTEE

As governor-appointed board members serving on behalf of all Michigan soybean farmers, we don't take lightly the responsibility of investing your checkoff dollars wisely.

MSC invests a significant amount of funding in production research each year. As a board, we are committed to investing time and checkoff dollars to solve the most important challenges facing our farms. We value the input of our fellow soybean farmers and work diligently to invest in research that is applicable to you and your farm.

Dennis Gardner

FUNGICIDE USE FOR WHITE MOLD MANAGEMENT IN SOYBEANS

MIKE STATON
MSU EXTENSION SOYBEAN EDUCATOR

DR. MARTY CHILVERS
MSU FIELD CROP PATHOLOGIST

White mold disease development is challenging to predict as it is highly dependent on a susceptible host, presence of the pathogen and favorable environmental conditions. While foliar fungicides are one of the tactics for managing white mold, they should be used in combination with other white mold management practices such as, partially resistant varieties, wide rows, reduced planting rates, irrigation water management and appropriate tillage methods. Also, producers should consider the following factors before purchasing and applying a fungicide to manage white mold in soybeans.

Severe white mold infection

History of white mold?
White mold sclerotia can survive for five to seven years when buried more than two inches deep in the soil.

How dense is the soybean canopy?
Narrow rows, high planting populations, early planting dates and high fertility levels lead to a dense soybean canopy which promotes white mold development.

Can you apply the fungicide at the optimum time?
Application must be made between R1 and R3 growth stages to protect flowers from infection. A second fungicide application made approximately 10 days after the first application may improve control if the weather is predicted to remain cool and wet or humid. Sporecaster was created to suggest if a fungicide should be applied and when to make the application.

Has the topsoil remained cool and continuously moist for 7 to 10 days prior to the R1 growth stage?
These conditions induce sclerotia germination, apothecia formation and spore dispersal.

Is the air temperature predicted to be cool and the foliage to remain continuously moist for at least 40 hours at the beginning of the R1 growth stage?
These conditions favor infection.

Is the fungicide effective in managing white mold?
The following fungicides have been rated as providing good to very good management of white mold:

- Aproach 2.08SC (G-VG, based on two applications – R1 and R3)
- Endura 0.7DF (VG)
- Lektivar 40SC (G)
- Omega 500DF (G)
- Propulse 3.34SC (G)

Is your sprayer equipped and operated to maximize droplet penetration and plant coverage?

- Apply 15 to 20 gallons of water per acre
- Adjust nozzle pressure to around 40 psi
- Maintain ground speed at 10 mph or less
- Utilize nozzles that produce a single flat fan spray pattern directed straight down into the canopy.
- Select nozzles that generate fine to medium droplets.
- Use the mid-point in the crop canopy as your target and adjust the boom height from this point.

Have realistic expectations. Fungicides have provided control ranging from 10 to 80 percent in research trials.

MICHIGAN SOYBEAN ON-FARM FOLIAR FERTILIZER TRIALS

2009 - 2020 RESEARCH SUMMARY

MIKE STATON, MSU EXTENSION SOYBEAN EDUCATOR

There continues to be interest in applying foliar fertilizers to soybeans. This article summarizes the results from 134 on-farm soybean foliar fertilizer trials conducted by the Michigan Soybean On-Farm Research Program over the past 10 years.

In the on-farm trials, eleven foliar fertilizers (3-16-16, 3-18-18, 2-14-14-2, 26-0-0, three boron products, manganese sulfate monohydrate, 0-0-25-17, 0-0-19-13 and 10-8-18-2) were compared to an unfertilized control between 2009 and 2020. In 2016 and 2017, field-specific prescription foliar fertilizer mixtures were compared to an unfertilized control. Cooperating producers were encouraged to equip and operate their sprayers to maximize canopy penetration and leaf coverage.

Foliar Fertilizer: 3-16-16
Number of Locations: 27
Trial Years: 2009 and 2010
First Application Rate & Growth Stage: 1 gal/ac with 1 qt/ac of sugar at R1
Second Application Rate & Growth Stage: 0.5 gal.ac with 1 qt/ac of sugar and a controlled-release nitrogen fertilizer at R3
Results: Increased yield and income at two of 27 sites, decreased yield at one site. Less profitable than the unfertilized control.

Foliar Fertilizer: 3-18-18
Number of Locations: 24
Trial Years: 2009 and 2010
First Application Rate & Growth Stage: 1 gal/ac at R1
Second Application Rate & Growth Stage: 2 gal/ac at R3
Results: Increased yield and income at two of 24 sites. Less profitable than the unfertilized control when all locations were combined.

Foliar Fertilizer: 2-14-14
Number of Locations: 2
Trial Year: 2011
Application Rate & Growth Stage: 2.25 gal/ac with sugar at V3 to V4
Results: No significant difference in yield at either location.

Foliar Fertilizer: Trial One - manganese sulfate monohydrate vs. EDTA chelate manganese fertilizer; Trial Two - Manganese sulfate monohydrate applied to soybeans without visible deficiency symptoms
Number of Locations: 2 for each trial
Trial Years: 2013
Soils: Trial One - Muck soils; Trial Two - Lakebed soils with pH of 7.4
Results: Trial One - Manganese sulfate monohydrate increased yield by 1.9 bu/ac and income by $23/acre over EDTA chelate. Trial Two - Applications made in the absence of visible manganese deficiency symptoms did not increase yields.

Foliar Fertilizer: 26-0-0 with trace micronutrients
Number of Locations: 18
Trial Years: 2011 and 2012
Application Rate & Growth Stage: 1 gal/ac between R2 and R4
Results: Increased yield and income at three sites. Yield increase of 0.6 bu/ac over the untreated control when all sites were combined – not enough to cover product and application costs.

Foliar Fertilizer: Liquid boron formulation
Number of Locations: 9
Trial Years: 2011-2013
Soil: Coarse-textured with low organic matter levels
Application Rate & Growth Stage: 0.25 lb/ac of actual boron at R1
Results: No yield increase compared to the unfertilized control.

Foliar Fertilizer: Potassium thiosulfate (0-0-25-17)
Number of Locations: 4
Trial Years: 2014
Application Rate & Growth Stage: 1 gal/ac at R1
Results: No yield response at any locations. Soil test potassium levels were high to very high at all trial locations.

Foliar Fertilizer: Field-specific prescription foliar mixes (based on composite soil samples from trial areas)
Number of Locations: 20
Trial Years: 2016 and 2017
Application Rate & Growth Stage: V4 when row spacing was 15 in. or less and R1 when row spacing was wider than 15 in.
Results: Increased yields at three of the 20 sites, however yield increases were only large enough to be profitable at one site.

Foliar Fertilizer: 0-0-19-13 with a proprietary adjuvant
Number of Locations: 16
Trial Years: 2018 and 2019
Application Rate & Growth Stage: Fertilizer at 1 qt/ac and adjuvant at 6.4 oz/ac at R1
Results: Increased yield and was profitable at one site.

Foliar Fertilizer: 10-8-18-2 plus trace micronutrients
Number of Locations: 10
Trial Years: 2020
First Application Rate & Growth Stage: tank-mixed with post-emergence herbicides at 1 qt/ac
Results: Increased yield and income at one location and when all 10 sites were combined.

The foliar fertilizer application was less profitable than the unfertilized control in 121 of the 134 trials conducted in Michigan since 2009. Due to the low probability (10 percent) of realizing a positive economic return, applying foliar fertilizers to soybeans is not recommended by Michigan State University Extension unless visible manganese deficiency symptoms are present. Foliar fertilizer applications are more likely to produce an economic return when nutrient levels in the soil are low, root uptake is reduced due to restricted root growth, or the fertilizer is tank-mixed with postemergence herbicides.

FUNGICIDES FOR SOYBEAN LEAF DISEASE CONTROL

ON-FARM TRIAL RESULTS 2012 - 2019

MIKE STATON, MSU EXTENSION SOYBEAN EDUCATOR

The Michigan Soybean On-Farm Research Program has conducted numerous projects evaluating the yield and profitability impacts of foliar fungicides. In some cases, a single product application was made while in other cases, the foliar fungicide was tank mixed with an insecticide. These applications are intended to reduce leaf diseases such as Septoria Brown Spot and Frog Eye Leafspot and not control white mold infections.

Prophylactic foliar fungicide applications have produced modest yield increases in Michigan on-farm research trials.

Fungicide applied: Stratego YLD
Number of trials: 9
Trial Years: 2012 and 2013
Yield effect: Increased yields by 1.4 bushels per acre

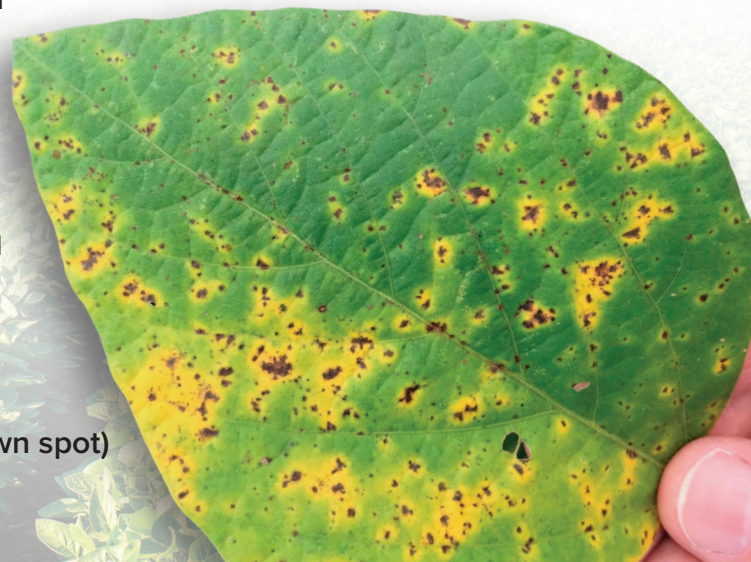
Fungicide applied: Priaxor
Number of trials: 22
Trial Years: 2014 and 2015
Yield effect: Increased yields by 2.1 bushels per acre

Fungicide applied: Miravis Neo
Number of trials: 14
Trial Years: 2020
Yield effect: Increased yields by 2.0 bushels per acre

These yield increases are not sufficient to cover product and application costs given the projected market prices.

Due to reports of enhanced performance when fungicides are tank-mixed with insecticides, along with the prevalence of this practice, on-farm cooperators compared the foliar fungicide and insecticide tank-mixture they were planning to apply to an untreated control. The foliar applications including a fungicide and an insecticide were profitable in only two of 15 on-farm trials conducted in Michigan between 2017 and 2019.

In summary, prophylactic applications of a foliar fungicide or a fungicide/insecticide tank-mixture are rarely profitable. These applications can also suppress diseases and beneficial insects that help control insect pests.



Septoria leaf spot (brown spot)

North Central Soybean Research Program
Research Facts

Current fiscal year checkoff investment in production research

$3-4 million

TOP RESEARCH FUNDING AREAS

Most NCSRP checkoff funding goes to large, multifaceted, multidiscipline, multistate research, teaching and outreach programs that encompass several objectives and projects. The goal is to build holistic regional or national discovery, development and outreach on high priority areas that impact soybean production to ensure profitability, quality and sustainability.

RECENT INNOVATIVE RESEARCH PROJECTS

- Developing, leveraging, integrating and implementing diverse disciplines, technologies and tools for accelerating breeding to increase genetic gain, yield potential and quality
- Conducting basic and applied research, teaching and outreach to understand biology, life cycles and plant interactions for integrated management solutions for these yield robbers:
  - Insects (soybean aphid, stink bugs, spider mites, loopers/worms, beetles, stem borers)
  - Seedling, soilborne disease-causing pathogens (Phytophthora, Fusarium, Rhizoctonia)
  - Basic and applied studies for integrated soybean cyst nematode management
  - Basic and applied studies for integrated management of foliar diseases (sudden death syndrome, white mold, iron deficiency chlorosis, brown stem rot)
  - Multistate agronomic and cropping systems on-farm research for improved profitability and production management
  - Biotech programs to develop tools and technologies that lead to faster, more precise, more economical improvements (CRISPR, mutation/ mutant germplasm resources)
  - Basic and applied studies for short- and long-term integrated weed management

Dedicated States

NCSRP SUCCESS STORIES ARE A RESULT OF CHECKOFF DOLLARS INVESTED IN RESEARCH

The North Central Soybean Research Program invests checkoff dollars from producers in Iowa, Illinois, Indiana, North Dakota, South Dakota, Nebraska, Kansas, Minnesota, Missouri, Michigan, Ohio and Pennsylvania in research that benefits the region.

NCSRP

SOYBEAN RESEARCH & INFORMATION NETWORK

SOYBEANRESEARCHINFO.COM

Funded by the soybean checkoff

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