

In 2017, soybeans were planted on **83 million acres** in the U.S. and valued at **\$41 billion.** 

# MANAGING SOYBEAN DISEASES

Soybeans are an affordable, protein-rich legume with a wide variety of uses.

The U.S. is the world's leading soybean producer and exporter, but in recent years, yields have been stagnant in several areas. This is largely due to the frequency and spread of soybean diseases.



Some diseases, like frogeye leaf spot, are more .. prevalent now due to warmer, wetter climate trends and increased use of no-till planting.

Some diseases, like soybean rust, spread in different patterns each year and are difficult to predict. Some farmers may use chemical control unnecessarily, which can pose human and environmental health risks and promote development of fungicide-resistant pathogens.

# RESEARCHERS ARE TAKING ACTION

A team of land-grant university scientists and Extension educators is monitoring soybean diseases, testing control strategies, and sharing information and tools with farmers, breeders, and agricultural companies across the U.S.



With members in multiple states, the group can share resources and data, compare disease status in different areas, and spread solutions widely.

Research and Extension efforts **INCREASED SOYBEAN YIELDS** and **ENHANCED THE SUSTAINABILITY** of soybean production.

Outreach provided unbiased, science-based information and ... tools to the agricultural community, **RAISED AWARENESS** of issues, and **INCREASED USE** of effective solutions.

New knowledge and tools helped detect and monitor diseases and **PREVENTED SERIOUS DAMAGE**.

Research findings and alternative products led to more *judicious* use of chemical pesticides, **REDUCED COSTS FOR FARMERS**, and **DECREASED HUMAN AND ENVIRONMENTAL HEALTH RISKS**.

Cost-effective control options **MINIMIZED LOSSES FOR FARMERS** and **KEPT PRICES LOW FOR CONSUMERS**.

Fungicide efficacy tables created by group members reach about 100,000 users across 18 states each year.

Research has saved farmers millions of dollars by reducing management . costs and minimizing yield loss. For example, Tennessee farmers estimated saving \$7 million in 2017 alone.

# **RESEARCH HIGHLIGHTS**



#### UNDERSTANDING DISEASES

Working together, researchers determined long-term

soybean disease trends. For example, researchers looking at corn-soybean fields in Kansas over the last 40 years found that applying higher rates of phosphorus during corn years lessened the severity of sudden death syndrome in subsequent soybean crops. Findings like this guide research efforts and management strategies.

Researchers collaborated to study the biology and distribution of emerging soybean diseases. For example, scientists in Alabama, Louisiana, and Mississippi teamed up to identify and understand the fungus causing taproot decline. In Illinois, researchers examined red crown rot. Team members also looked into new species of fungi causing Cercospora leaf blight. Other studies determined that soybean vein necrosis virus is spread mostly by soybean thrips, which are more abundant in dry weather.

Project members also looked at how specific farming practices affect soybean diseases. Many states examined cover crops. For example, a Kansas study found that a pre-season mustard cover crop reduces charcoal rot severity. Michigan and Wisconsin researchers demonstrated that row spacing can dramatically reduce white mold. Studies in Delaware and Maryland showed that double-cropped soybeans (soybeans harvested the same year as a prior crop on the same land) may be affected more severely by soybean vein necrosis.



### MONITORING DISEASES

Many researchers designed better ways to monitor or determine the risk for

soybean diseases. For example, researchers in Iowa and Kentucky showed how Twitter can be used to track soybean diseases. Wisconsin scientists developed the <u>Sporecaster</u> app to help farmers predict white mold severity and determine when to apply fungicide. The app has over 6,000 users as of 2020.

Scientists worked together to alert farmers in all states about the likely spread of soybean diseases, especially soybean rust.



## SOYBEAN RESISTANCE

Researchers identified soybean genes that play a role in resistance to

various pathogens and worked with breeders to develop new diseaseresistant soybean varieties.

Researchers in Illinois, Iowa, Minnesota, and Ohio improved the durability of soybean resistance.



### CHEMICAL CONTROL

Project members in all states tested seed treatments and foliar fungicides

and trained farmers how to properly select and use them.

# TALK TODES

#### EDUCATION & TRAINING

All project members contributed to the <u>IPM PIPE</u>, or Integrated Pest

Management Pest Information Platform for Extension and Education, which shows the spread of soybean diseases in real time and helps farmers make decisions, including timely, judicious applications of fungicides.

Project members also provided materials for the <u>Crop Protection</u> <u>Network</u> website. The network's soybean publications have been downloaded over 120,000 times since 2015.

North Dakota State University leads the <u>Soybean Cyst Nematode</u> <u>Coalition</u>, which has encouraged farmers to change the way they manage the disease.

Each growing season, researchers and Extension specialists responded to hundreds of inquiries, many of which resulted in field visits or laboratory diagnostics. Correct disease diagnoses help crop consultants and farmers choose the right soybean seed. Planting the right seed can increase soybean yields by about 20 bushels per acre.

Project members trained thousands of clients across multiple states in disease management strategies. For example, 98% of participants at Indiana Extension workshops improved their knowledge of soybean disease management, and outreach in Kentucky and Missouri increased awareness of how to manage fungicide resistance in soybeans.

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