

Improving Flood and Drought Tolerance for Soybeans in the North Central Region

Funding: \$300,000

Principal Investigator

Henry Nguyen, University of Missouri

Co-Principal Investigators

Grover Shannon, University of Missouri

William Schapaugh, Kansas State University

Asheesh Singh, Iowa State University

Aaron Lorenz, University of Minnesota

Carrie Miranda, North Dakota State University

Overview of Project Objectives

Flooding for periods lasting as short as two days has been shown to reduce soybean yields by as much as 27% during the early vegetative or early reproductive growth stages. In recent years, flooding events were observed more frequently and on a larger scale than in previous decades in the Midwest. The best strategy to protect soybean production and farmers' investments is the release of new flood-tolerant soybean varieties into management systems. Soybean researchers in the South have identified flood-tolerant soybean genotypes. Through the partnership of researchers at the University of Missouri, the University of Minnesota, and Iowa State University, this project is dedicated to solving this problem by taking advantage of the most active and successful Southern breeding pipelines and genetics for the development and release of flood-tolerant varieties for the northern growing regions.

Drought has also become a significant problem that can affect farmers anywhere in the US. Drought stress can reduce yield and the underlying physiological processes such as nitrogen fixation. Slow wilting is a reliable drought tolerance trait identified so far in the soybean breeding community. Soybean breeders have been developing drought-resilient germplasm and varieties. However, like flood tolerance, most of the breeding work has been conducted in late maturity groups. These drought tolerance traits need to be incorporated into the early MGs (0 to early IV) suitable for the North Central region. The team aims to characterize soybean germplasm for early season flood tolerance and to develop new soybean varieties with drought and flood tolerance in maturity groups 0 to IV.

Key Results

Soybeans lines have been screened for flood tolerance and selected for the highest tolerance. Genetic studies are being performed to identify DNA markers for accelerated breeding purposes. Soybeans have been backcrossed to create populations for flood tolerance and others were backcrossed for slow wilting genes associated with drought tolerance. Researchers have also crossed the flood tolerant parents with drought tolerant parents with 18 successful cross pollinations. Other initial crosses with early maturity group germplasm have been initiated.

Benefit to Farmers

The technology developed from this project, including germplasm, genes, markers, screen methods, and management strategies, will help the research community, private and public breeders, and producers in dealing with temporal flooding and drought stress. The goal is to improve the yield advantage of 10 to 20 bu/acre under flooding and drought stress in the new lines without compromising yield potential under normal non-stress conditions. These protected bushels will directly transfer into farmer profits.

Links

[Improving Flood and Drought Tolerance for Soybeans in North Central Region](#)

USB National Soybean Checkoff Research Database