

DISSECTING GENETIC YIELD-RELATED TRAITS FOR SOYBEAN BREEDING



Farmer Blog



By Barb Baylor Anderson

Increases in soybean yield through breeding during the past few decades have been slower than farmers expected, primarily because of an overall low level of genetic diversity in soybeans and a narrow genetic base of ancestral soybean lines used in soybean breeding programs.

Jianxin Ma, Purdue University agronomy professor, is hoping to change that trajectory. He is in his third year of serving as principal investigator for a research project to dissect genetic yield-related traits for soybean breeding that is funded by the Indiana Soybean Alliance.

“Wild soybean has more abundant genetic diversity and contains useful yield genes that have not yet been used in a commercial soybean breeding program,” says Ma. “But it is difficult to use these genes in breeding unless the favorable traits and undesirable wild traits are first identified.”

Ma and his team previously developed two large recombinant inbred lines to identify the genes or genomic regions associated with domestication traits and yield components. To date, they have found lines with favorable yield component traits that include pod numbers per node, node numbers per plant and seed sizes as well as more favorable plant architecture traits associated with branching angles and leave shapes. Promising lines have been further crossed with elite varieties to produce new populations for more effective gene discovery and trait introgression.

“We hope to develop molecular markers for implementing marker-assisted selection for yield-related traits in breeding programs,” says Ma. “These activities are complementary to a project funded by the North Central Soybean Research Program (NCSRP) where we have pinpointed genomic regions associated with high yield and selected high-yielding

experimental lines that can be used to further improve elite soybean varieties of benefit to farmers in the near future.”

Ma says findings from this project will provide both pre-breeding lines with enhanced yield component traits and the knowledge needed for effective selection of desirable yield component traits in soybean breeding. Researchers plan next to locate and validate candidate genes associated with yield components traits and design molecular markers for precise selection of those traits in breeding. Commercial variety availability remains a few years away.



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