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Lines developed from new genetic source PI 567516C provide broader resistance to *Heterodera glycines* and potential for sustainable soybean production

*Lisa Fritz**, Crop Genetics Research Unit, USDA-ARS, Tennessee, USA

Barbara Michaud, Crop Genetics Research Unit, USDA-ARS, Tennessee, USA

Jason Deffenbaugh, Crop Genetics Research Unit, USDA-ARS, Tennessee, USA

Alemu Mengistu, Department of Plant Pathology, USDA-ARS, Tennessee, USA

Worldwide, soybean [*Glycine max* (L.) Merr] is the most used legume crop, providing 71% of protein meal, as well as food oil, and a renewable source of fuel. In the United States alone, the annual production value exceeds \$35 billion. Soybean cyst nematode (SCN, *Heterodera glycines* Ichinohe) is the most economically damaging pathogen of soybean, causing more than \$1 billion in annual losses in the US. Currently grown cultivars trace their nematode resistance primarily to soybean 'Peking' and/or Plant Introduction (PI) 88788, but nematodes are adapting to this limited genetic base of host plant resistance. Introgression of SCN resistance from a new source, PI 567516C, is highly desirable to provide broader resistance, and for sustainable soybean production.

We crossed parental line JTN-5503, with resistance from 'Hartwig', to an experimental line derived from a cross of 'Hutcheson' and PI 567516C. Early generation testing for SCN resistance was made in F₃ using Simple Sequence Repeats tagged to PI 567516C and 'Hartwig' resistance alleles. Selections were mass advanced, and F₆ seed was screened for SCN resistance in the greenhouse using curated nematode populations. A line was found resistant to HG Types 2.5.7, 1.2.5.7, 0, and 1.3.5.6.7. From this composited population, three lines were selected and designated: JTN-5316, JTN-5416, and JTN-5516. In 2016, the three lines entered into the Preliminary MG V Test of the USDA Uniform Soybean Tests, Southern States; each had an average yield above 3026 kilograms per hectare. In addition to the broad SCN resistance, confirmed twice in the greenhouse, preliminary disease screening show the three lines have resistance or moderate resistance to: reniform nematode (*Rotylenchulus reniformis* Linf. & Oliv.) , Frogeye leaf spot (caused by *Cercospora sojina* K. Hara), charcoal rot [caused by *Macrophomina phaseolina* (Tassi) Goid], and southern stem canker [caused by *Diaporthe phaseolorum* var. *meridionalis* (Cooke & Ellis)].