Science Societies

Putting genetic resistance to southern root-knot nematode into action

May 30, 2021

Caio Canella Vieira, Ph.D. student at the University of Missouri, collecting soil samples from a soybean plot in a field with high southern root-knot nematode pressure. A total of eight samples were collected in each plot, totaling near 4,000 samples over two years.

Photo by Dongho Lee.

Southern root-knot nematode is one of the most yield-suppressing pathogens in soybean around the world, accounting for nearly 20% of yield losses in the southern U.S. Because most flowering plants are hosts to this nematode, cultural management such as crop rotation has little effect in reducing root-knot pressure.

The use of genetic resistance is the most efficient and economical means to manage this nematode, with the primary source of resistance from a quantitative trait loci (QTL) mapped to chromosome 10. New research in Crop Science reports on a multidisciplinary large-scale study combining genetics, soil biology, and agronomy to assess the effect of the resistance allele in field conditions with variable levels of nematode pressure.

Under nematode pressure, resistant cultivars yielded, on average, 21.2% (10–15 bu/ac) higher than the susceptible cultivars, whereas no significant yield drag was observed in the absence of nematode pressure. The presence of the major resistance allele reduced yield losses by approximately sixfold compared with the susceptible group without the resistance allele, which provided significant yield protection under high nematode pressure. With the assistance of molecular markers, incorporating the resistance allele should be a simple process with extensive benefits to the soybean value chain.

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Vieira, C.C., Chen, P., Usovsky, M., Vuong, T., Howland, A.D., Nguyen, H.T., … & Shannon, G. (2021). A major quantitative trait locus resistant to southern root-knot nematode sustains soybean yield under nematode pressure. *Crop Science*. **https://doi.org/10.1002/csc2.20443**

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