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Major QTL in soybean suppresses southern root-knot nematode populations under field conditions

December 10, 2025

Development of galls in soybean roots caused by southern root-knot nematode. Photo courtesy of Caio Canella Vieira, University of Arkansas.

The southern root-knot nematode (SRKN) is a major threat to soybean production across the southern United States. Resistant alleles on soybean chromosome 10 have been shown to protect yield under nematode pressure, but the genetic region's (quantitative trait locus; QTL) effect on nematode populations remains unclear. To address this, researchers evaluated nematode populations in naturally infested fields after growing soybean breeding lines over two seasons that are SRKN resistant and susceptible.

The southern root-knot nematode (SRKN) is a major threat to soybean production across the southern United States, reducing yield and increasing production costs. Because chemical controls are largely ineffective and most rotational crops are SRKN hosts, growers rely on planting genetically resistant soybean varieties as the most reliable management strategy.

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Resistant lines consistently showed lower nematode densities, confirming that genetic resistance not only protects yield, but also limits nematode buildup in the soil. However, repeated off-target dicamba herbicide exposure increased nematode counts across all lines. Interestingly, soybean lines with greater dicamba tolerance tended to maintain lower nematode densities, regardless of their resistance status.

These findings show that genetic resistance can help break the nematode cycle. Suppressing nematode field populations can facilitate other sustainable management practices of SRKN, such as rotation with susceptible crops. Variation in nematode suppression among resistant lines also suggests that additional QTLs may contribute to stronger, more durable resistance in future soybean varieties.

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Vieira, C. C., Ferrari do Nascimento, E., Acuna, A., Usovsky, M., Pominville, A., Faske, T., Li, Z., Mitchum, M. G., Nguyen, H. T., & Shannon, G. (2025). Soybean resistance to southern root-knot nematode reduces nematode population density under field conditions. *Crop Science*, *65*, e70183. https://doi.org/10.1002/csc2.70183

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