Outwitting pesky parasites

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Across the southern United States, an invisible, yet deadly parasite known as the root-knot nematode is crippling soybean crops. While plant breeders are racing to develop cultivars resistant to the root-knot nematode, they are being slowed down by current time-consuming and expensive methods of screening for resistant plants. Now, researchers believe they have found a shortcut for screening resistant soybean crops.

Researchers at the University of Georgia report the discovery of several molecular markers that will help soybean breeders to accurately screen for root-knot resistant plants at a fraction of the time and cost of current screening techniques in the July issue of *The Plant Genome*.

While previous studies of soybean crops helped researchers to locate genes associated with root-knot nematode resistance, University of Georgia scientists recently identified single nucleotide polymorphisms (SNPs), slight variations in the DNA, nearby genetic regions that code root-knot nematode resistance. After linking the identified SNPs to root-knot nematode resistance, scientists developed a marker assisted screening test that used SNPs to determine whether or not plants were resistant to root-knot nematode.

“The basic objective of any breeding scheme is to identify elite individuals that can pass on their desirable characteristics,” explained Bo-Keun Ha, lead author of study. While Ha says most conventional breeders rely on phenotypic evaluations of plants to select the plant with most desirable traits, this process takes time and money. For example, if a breeder wants to select plants with resistance to root-knot nematode

based upon a phenotypic evaluation alone, he or she must grow a large population of plants, inoculate plants with nematode eggs, wait until the growth of the nematode and evaluate the damage before selecting the most resistant plants.

Instead of relying on the time-consuming phenotypic screening to determine whether or not the root-knot resistance genes are present in soybean crops, “marker assisted selection can inform breeders about the presence of the resistance gene in individual plants,” said Ha. Also, because marker assisted selection involves the screening of a few markers across thousands of plants Ha pointed out that the marker assisted selection is rather inexpensive and time efficient.

“Our results found SNPs linked to two root-knot nematode resistance genes and developed the resources for a relatively high throughput method of selection for the two genes,” said Ha. “The SNP assays that we have reported will empower soybean breeders to efficiently incorporate root-knot resistance genes into new productive cultivars.”

Source: Crop Science Society of America