

Genetics of Root-Knot Nematode Resistance

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- Dr. Shepard, USDA-ARS breeder, developed a highly-resistant line, 'Auburn 623 RNR', from a cross of two moderately resistant lines, 'Clevewilt 6-8', and Mexican Wild (TX 2516 aka Wild Mexican - Jack Jones).
- Transgressive segregation implies (at least) a two-gene system.

Shepard. 1974. Crop Sci. 14: 872-875.

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- Drs. Hyer & Jorgenson, USDA-ARS breeders at Shafter, California developed a root-knot nematode resistant line, 'NemX'.
- Dr. Robinson, USDA-ARS, College Station, TX ascribed the source of root-knot nematode resistance to 'N6072'.

Hyer et al. 1979. *Crop Sci.* 19:898-901.

Robinson et al. in Kirkpatrick & Rothrock eds.
Compendium of Cotton Diseases. APS Press.

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Population	Genes/QTL	Markers	Researcher
NemX x SJ-2	rkn-1 – ch. 11 (recessive)	CIR-316 BNL 1066	Roberts Roberts
M 125 x S-6	<i>Mi</i> -A03 – ch. 11 (dominant)	CIR-316 CIR-069	Chee Chee
M 240 x STV 213	QTL – ch. 11	CIR-316 BNL 1231	Jenkins Jenkins
M 240 x STV 213	QTL ch 14	BNL 3545 BNL 3661 BNL 3664	Jenkins Jenkins Jenkins

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- Dr. Starr showed that five primitive race stocks from Mexico had good to excellent heritable root-knot nematode resistance.
- Markers associated with the resistance in other lines were not associated in the newly evaluated lines.

Starr et al. 2010. J. of Nematology 42:352-358.

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Summary

- Root-Knot Resistance is confirmed to be at least a two-gene system involving chromosomes 11 & 14.
- Inheritance of resistance involving one or more of the same markers may be expressed differently in different populations.
- A major gene is located within a resistance-gene, rich region on chromosome 11.

Post-Infection Development of Root-Knot Nematode in Cotton

- Juvenile penetrates root, becomes sedentary and initiates giant cell.
- Sexual differentiation occurs; rapid growth of giant cells (root galls)
- Females conspicuous; Egg laying begins ~ 16 days post penetration.
- Life cycle is 28-30 days

Tang et al. 1994. Mississippi St. Univ. Tech. Bull. 195.