

Research Report (FY 2005-2006) to  
Georgia Peanut Commission

**TITLE:      **Developing Cultivars with Resistance to the Peanut Root-knot Nematode****

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**PROGRESS REPORT:**

- During the past year we continued to refine a greenhouse screening technique that allows us to access material for resistance in half the time that it used to take. We are also working with Drs. P. Ozias-Akins and Y. Chu to develop marker assisted selection. These developments will speed the process of developing resistant varieties.
- Continued breeding program to combine resistance to the peanut root-knot nematode (PRN) with acceptable yield and grade. This included continued hybridization and generation advance for breeding populations involving 53 cross combinations. Material is first advanced to the F<sub>4</sub> generation when individual plants are harvested. This material is then evaluated in the greenhouse for resistance. Material showing resistance is then evaluated in the field for yield. We have several late generation breeding lines that we will be evaluating over the next two years for possible release.
- For the past three years we have been intensively evaluating several hundred progenies from two crosses. The objective of this work is to combine genes for nematode resistance from the wild species into an agronomically acceptable variety. Over 20 of these lines have a high level of resistance to the PRN. Several of these lines also have a very high level of resistance to TSWV. Two of these lines are being considered for possible release as varieties.

**2005 Yield Trial of Breeding Line - Test 12 TSWV**

<u>Entry</u>	<u>Yield</u> <u>Lb/Ac</u>	<u>Nematode</u>	<u>Pct</u> <u>TSWV</u>
C724-19-25	4204	Susc	22
C724-19-15	4047	Res	16
C99R	3312	Susc	36
Ga Green	2014	Susc	46
NemaTAM	748	Res	62
LSD 0.05	775		13

**2005 - Test 12 MAX**

<u>Entry</u>	<u>Yield</u> <u>Lb/Ac</u>	<u>Nematode</u>	<u>Pct</u> <u>TSWV</u>
C724-19-15	3507	Res	4
C724-19-25	3425	Susc	8
C99R	2718	Susc	11
Ga Green	1624	Susc	14
NemaTAM	372	Res	25
LSD 0.05	651		5

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**Publications from this Research Focus:**

- Holbrook, C. C. and J. P. Noe. 1990. Resistance to *Meloidogyne arenaria* in *Arachis* spp and the implications on development of resistant peanut cultivars. *Peanut Sci.* 17:35-38.
- Holbrook, C. C. and J. P. Noe. 1992. Resistance to the peanut root-knot nematode (*Meloidogyne arenaria*) in *Arachis hypogaea*. *Peanut Sci.* 19:35-37.
- Holbrook, C. C., J. P. Noe, M. G. Stephenson, and W. F. Anderson. 1996. Identification and evaluation of additional sources of resistance to the peanut root-knot nematode. *Peanut Sci.* 23:91-94.
- Holbrook, C. C., J. P. Noe, D. W. Gorbet, and M. G. Stephenson. 1998. Evaluation of peanut breeding lines with resistance to the peanut root-knot nematode. *Crop Sci.* 38:260-262.
- Holbrook, C. C., M. G. Stephenson, and A. W. Johnson. 2000. Level and geographical distribution of resistance to *Meloidogyne arenaria* in the U.S. peanut germplasm collection. *Crop Sci.*40:1168-1171.
- Holbrook, C. C., P. Timper, and A. K. Culbreath. 2003. Resistance to tomato spotted wilt virus and root-knot nematode in peanut interspecific breeding lines. *Crop Sci.* 43:1109-1113.
- Holbrook, C. C., P. Timper, and H. Xue. 2000. Evaluation of the core collection approach for identifying resistance to *Meloidogyne arenaria* in peanut. *Crop Sci.*40:1172-1175.
- Noe, J. P., C. C. Holbrook, and N. A. Minton. 1992. Field evaluation of susceptibility to *Meloidogyne arenaria* in *Arachis hypogaea* plant introductions. Supplement to the *J. Nematol.* 24:712-716.
- Timper, P. C. C. Holbrook, and W. F. Anderson. 2004. Reproduction of *Meloidogyne* spp. on resistant peanut genotypes from three breeding programs. *J. of Nematology* 35:417-421.
- Timper, P., C. C. Holbrook, and H. Q. Xue. 2000. Expression of nematode resistance in plant introductions of *Arachis hypogaea*. *Peanut Sci.* 27:78-82.
- Timper, P., D. M. Wilson, C. C. Holbrook, and B. W. Maw. 2004. Relationship between *Meloidogyne arenaria* and aflatoxin contamination in peanut. *J. of Nematology* 36:167-170.

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