

Research Report (FY 2007-2008) to
Georgia Peanut Commission

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

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PROGRESS REPORT:

- S Released Tifguard, the first peanut cultivar with a high level of resistance to both the peanut root-knot nematode (PRN) and tomato spotted wilt virus (TSWV) (See Table Below).
- S Continued breeding program to combine resistance to the PRN with high yield and grade, resistance to other pathogens such as leaf spot and white mold, and high oleic acid content. This included continued hybridization and generation advance for breeding populations involving 43 cross combinations. Material is first advanced to the F₄ 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 and other characteristics. We have several late generation breeding lines that we will be evaluating over the next two years for possible release.
- S During the past year we continued working with Drs. P. Ozias-Akins and Y. Chu to develop and refine procedures for marker assisted selection. These procedures will speed the process of developing future resistant varieties.

Table 4. Mean yield and final intensity of tomato spotted wilt of selected peanut genotypes when grown without nematicides at locations heavily infested with *Meloidogyne arenaria*.

Genotype	Yield (lb/ac)			Root Gall Index			TSWV
	Gibbs	Bowen	Mean	Gibbs	Bowen	Mean	Gibbs %
Tifguard	5232	2724	4158	0.1	0.0	0.0	3.8
C724-19-25	4276	1471	3074	7.1	6.8	7.0	11.3
TifGP-1	3583	1637	2749	4.4	4.3	4.3	5.0
NR0812	3139	1315	2531	1.0	1.7	1.3	16.7
NR0817	3054	1255	2284	2.9	1.0	1.9	10.8
GaG	2974	963	2304	6.1	5.2	5.6	20.0
NemaTAM	1976	1162	1627	0.3	0.7	1.4	30.8
LSD (0.05)	633	256	475	2.5	2.3	1.9	4.5

Root Gall Index is 0 to 10 scale.

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Publications from this Research Focus:

- Anderson, W. F., C. C. Holbrook, and P. Timper. 2006. Registration of root-knot nematode resistant peanut germplasm lines NR 0812 and NR 0817. *Crop Sci.* 46:481-482.
- Chu, Y., C. C. Holbrook, P. Timper, and P. Ozias-Akins. 2007. Development of a PCR-based molecular marker to select for nematode resistance in peanut. *Crop. Sci.* 47:841-847.
- 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 A. K. Culbreath. 2008. Registration of peanut germplasm, TifGP-1 with resistance to the root-knot nematode and tomato spotted wilt virus. *J. of Plant Registrations* 2:57.
- Holbrook, C. C., P. Timper, A. K. Culbreath, and C. K. Kvien. 2008. Registration of >Tifguard= peanut. *J. of Plant Registrations.* (In Review).
- Holbrook, C. C., P. Timper, W. Dong, C. K. Kvien, and A. K. Culbreath. 2008. Development of near-isogenic peanut lines with and without resistance to the peanut root-knot nematode. *Crop. Sci.* 48:194-198.
- 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.