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Title: Nematode Resistance in Peanut with High O/L Ratio and Resistance to Sclerotinia Blight and Tomato Spotted Wilt Virus

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Statement of Problem:

The peanut industry has placed great emphasis on having a peanut with an altered ratio of fatty acids such that shelf life of derived products is increased. As result, most peanut cultivars being developed for Texas growers now have the high Oleic to Linoleic fatty acid ratio trait. Plant diseases represent a serious obstacle to achieving the genetic yield potential of peanut. Among the most important diseases affecting peanut in Texas are the Tomato Spotted Wilt Virus, root-knot nematodes, and Sclerotinia blight. Disease management by use of host resistance is preferred because growing a resistant cultivar can reduce or completely eliminate the need for costly fungicides or nematicides. Further, host resistance can provide greater disease control than can be achieved by use of pesticides. Fortunately, resistance to each of these diseases is available in various peanut cultivars or breeding lines. However, no one peanut cultivar has resistance to all of these diseases. Our efforts for the past several years have been directed toward development of peanut cultivars that possess all of these important traits.

Results:

Here we report the development of multiple disease resistant peanut lines. Further, these resistance traits have been introgressed into peanut genotypes that also have ratios of oleic to linoleic fatty acids (O/L) of greater than 10. The resistance to root-knot nematodes suppresses nematode reproduction by more than 90% and was developed by introgression of the resistance from wild *Arachis* spp. into *A. hypogaea.* Moderate resistance to the TSWV and Sclerotinia blight was derived from the cultivar Tamrun 96. The high O/L ratio trait was derived from SunOleic 95R. Several lines with yield potential equal to that of the popular cultivar Tamrun OL07 and superior to Florunner have been identified. We expect to release on of these lines as a multiple disease resistant cultivar that also has the high O/L trait later in 2010 or early 2011.

Table 1. Comparison of the yield potential of three breeding lines to cultivars of known performance in a 2009 test.

Entry	$/Ac	Pods/Ac lbs.		TSMK %		Seed g/100	
PR-2	796.89 a	4626.8	a	69.5	a	60.5	a
TP467-1-7	773.08 ab	4603.6	a	66.8	ab	50.8	c
NemaTAM	716.97 ab	4244.5	ab	66.8	ab	48.9	cd
Tx901639-3	705.61 ab	4261.2	ab	65.2	b	47.1	c-e
TamrunOL07	691.31 ab	4002.3	ab	69.1	a	59.0	ab
Florunner	625.07 b	3686.7	bc	67.0	ab	46.6	de
Langley	447.5 c	2849.7	c	60.3	c	44.4	e

CV(%)	15.7	14.7	3.7	5.7
"F"	0.0086	0.0323	<.0001	<.0001

Table 2. Yield comparison of advanced generation lines in a field infested with *Sclerotinia minor*

Entry	$/Ac		Pods/Ac (lb)		TSMK (%)		Sclerotinia (0-10)	
PR-2	690.41	a	4286.0	a	64.4	a	5.7	b
Tamrun OL07	656.24	ab	4035.0	a	64.4	a	5.0	b
Tx901639-3	601.14	a-c	3844.3	ab	61.5	a	5.0	b
Florunner	499.58	bc	3357.7	a-c	58.1	a	6.7	b
TP467-1-7	427.05	cd	2875.7	b-d	57.4	a	5.0	b
NemaTAM	414.17	cd	2608.6	cd	63.0	A	6.0	ab
Langley	275.65	d	1831.3	d	58.8	A	8.0	a
CV(%)	22.01		19.6		7.8		17.7	
"F"	0.0011		0.0008		0.3058		<0.004	

Other activities –

Approximately 500 samples were tested for M. Baring and C. Simpson using gas chromatography to either confirm high O/L status of advanced generation lines or to select individuals with high O/l from segregating populations

Similary, we used a combination of marker-assisted selection and greenhouse tests to confirm the nematode resistance in 10 advanced generation lines for C. Simpson. We are currently working with M. Baring to select nematode-resistant individuals, and especially those which are homozygous for the resistance gene, from a population of nearly 800 F2 individuals that are segregating for this trait using molecular markers linked to the resistance trait.