National Peanut Board Annual Report for 2008

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.

Progress to date:

Fifteen breeding lines with multiple disease resistance and the high O/L trait have been tested for yield multiple for 3 to 4 years at multiple locations. Three of these lines (TP 458-4-9, TP465-4-3, and TP467-1) that looked very promising after the 2007 yield tests did not perform up to our expectations in the four yield tests conducted in 2008 (Tables 1-4). Thus we are delaying our decision on a possible release until we have more confidence that the any selections from these lines will meet the expectations of the Texas peanut producers relative to yield and various quality traits.

In addition to the lines that have been in yield tests for 3-4 years, we have another group of breeding lines that have only been tested for 1 -2 years (Fig. 1) . Although several of these breeding lines have good yield, none were superior to Tamrun OL07 in the 2008 tests. These lines will be tested for one to two more years

Overall in this effort, we have several high quality breeding lines with excellent yield potential combined with resistance to nematodes, Tomato Spotted Wilt Virus, and Sclerotinia blight, plus having the high O/L trait. Unfortunately we have yet to identify a line that is clearly superior to the others and ready for release as a new cultivar. We anticipate being able to make this decision in the very near future.

Lastly, we are looking to bring a higher level of resistance to the Tomato Spotted Wilt Virus into the Texas peanut germplasm. Because this trait is now in a high yielding peanut line, we hope that when crossed with our best yielding lines with high O/L and multiple disease resistance, that we can 'fast tract' this effort and avoid an extensive backcross program that increases greatly the time required to develop a new peanut cultivar.

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In addition to this ongoing effort. We are initiating two new projects. In the first, because of the recent discovery of the northern root-knot nematode (Meloidogyne hapla) attacking peanut and pepper in New Mexico immediately adjacent to Texas peanut production fields, we will begin looking at our germplasm collection, especially the interspecific hybrid TxAg-6 for resistance to this new root-knot nematode species. Our intent is to identify resistance to this nematode and initiate a breeding effort such that advanced generation breeding lines are ready for use should this nematode become a threat to the Texas peanut industry.

Lastly, we are looking to bring a higher level of resistance to the Tomato Spotted Wilt Virus into the Texas peanut germplasm. Because this trait is now in a high yielding peanut line, we hope that when crossed with our best yielding lines with high O/L and multiple disease resistance, that we can 'fast tract' this effort and avoid an extensive backcross program that increases greatly the time required to develop a new peanut cultivar.

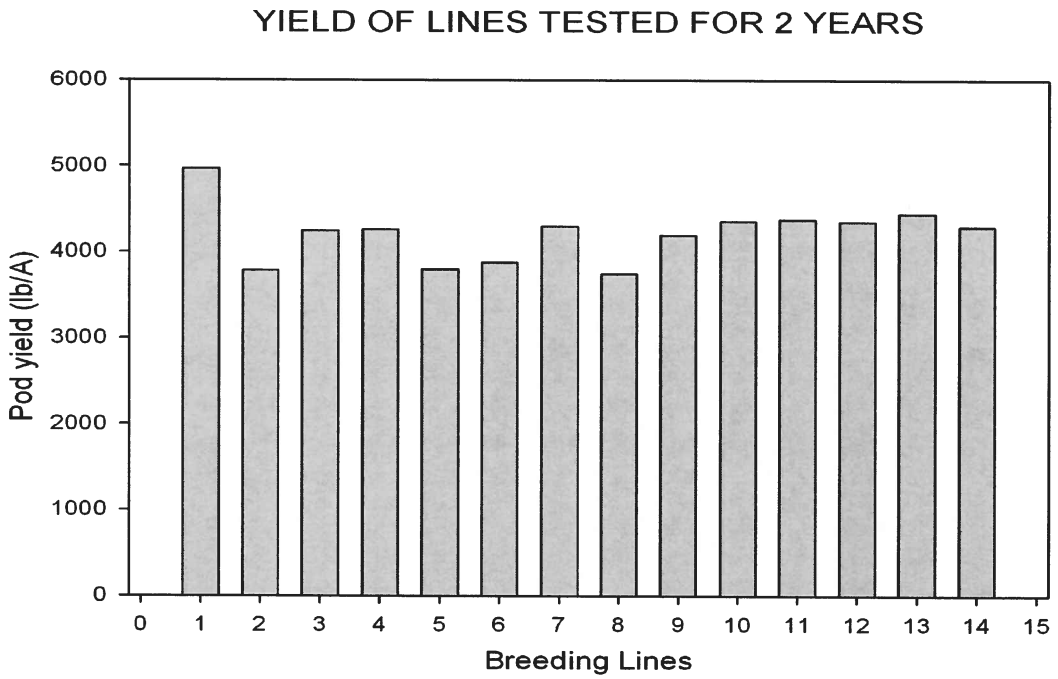

Fig. 1. Comparison of yield of selected breeding lines with Tamrun OL07 (line number 1) . The breeding lines in this figure have been tested for yield potential for only one or two years.

Cultivar	Value/Ac $		Pods/Ac lbs.		TK		TSMK		DK		OK		Seed Wt g/100	
					----------%----------									
TamrunOL02	1162.8	a	6855.7	a	73.4	b-f	68.01	a-e	0.1	c	5.31	e-g	55.2	c-e
TamrunOL07	1142	ab	6665.5	ab	74.8	a-d	68.38	a-c	0.1	bc	6.27	d-f	60.1	b
Florunner	1102.4	ab	6318.1	a-e	77.2	a	69.77	ab	0.7	ab	6.77	d-f	50.0	f-h
TP456-3-9	1092.2	a-c	6584	a-c	73.0	c-f	65.99	b-f	0.1	c	6.94	c-f	53.2	c-f
TP467-1-7	1087.3	a-c	6429.8	a-d	73.9	b-f	67.31	b-f	0.2	a-c	6.39	d-f	54.2	c-f
PR-2	1080.3	a-d	6293.2	a-e	74.8	a-d	69.08	a-c	0.8	a	4.93	fg	64.9	a
TP456-1-6	1062.2	a-d	6582.3	a-c	73.2	c-f	63.76	gf	0.5	a-c	8.89	a-c	50.7	f-h
TP465-4-6	1020.4	a-e	5772.7	d-i	75.6	a-c	71.4	a	0.6	a-c	3.6	g	56.6	b-d
TP466-2-6	1020.2	a-e	6004.8	b-g	75.0	a-d	67.18	b-f	0.2	bc	7.65	b-d	51.3	e-g
PR-12	1013.5	a-e	5935.3	c-h	74.9	a-d	67.78	a-e	0.3	a-c	6.85	c-f	56.6	b-d
PR-10	992.8	a-e	6149.9	b-f	71.7	f	64.18	e-g	0.3	a-c	7.21	b-e	52.3	d-f
TP455-4-3	962.2	a-e	6120.3	b-f	72.0	ef	61.63	g	0.4	a-c	9.93	a	52.1	fe
TP454-2-3	953.6	a-e	5577.1	f-i	75.5	a-c	68.08	a-d	0.2	a-c	7.16	c-e	44.8	i
NemaTAM	942.4	b-e	5510.8	f-i	75.9	ab	67.73	a-e	0.4	a-c	7.76	b-d	47.1	g-i
TP465-4-3	929.7	b-e	5653.4	e-i	72.7	d-f	65.55	c-e	0.7	ab	6.47	d-f	53.6	c-f
TP468-2-7	877.2	c-e	5099.2	i	75.4	a-c	68.47	a-c	0.2	bc	6.72	d-f	50.0	f-h
PR-6	876.7	c-e	5373.7	g-i	73.7	b-f	64.2	e-g	0.3	a-c	9.21	ab	47.3	g-i
TP458-4-9	868.1	de	5285.6	hi	74.7	a-d	64.33	d-g	0.4	a-c	10.02	a	46.6	hi
TP466-1-7	810.6	e	6375.5	a-d	74.9	a-d	69.38	a-c	0.5	a-c	4.99	fg	57.2	bc

Table 1. Yield and performance data for several breeding lines and peanut cultivars. These breeding lines have been tested for yield potential for three or four years. Erath county test location 1.

Cultivar	Value/Ac		Pods/Ac		TK		TSMK		DK		OK		Seed Wt	
	$		lbs.		---								g/100	
TP456-3-9	804.9	a	4859.1	a	75.8	c-f	67.1	a-c	2.88	e-h	5.9	fe	52.7	e-g
PR-2	799.0	a	4779.5	ab	77.1	bc	69.7	ab	3.55	d-h	3.8	g	66.0	a
TP455-4-3	788.9	a	4927.4	a	75.3	c-f	65.1	cd	2.5	gh	7.7	b-e	52.2	e-g
TamrunOL02	779.0	a	4939	a	76.8	b-e	66.8	bc	3.62	d-h	6.3	c-f	56.3	c-e
TP456-1-6	746.4	ab	4504.9	ab	75.7	c-f	66.1	bc	1.78	h	7.8	b-d	50.1	f-h
TamrunOL07	739.1	ab	4480	a-c	75.6	c-f	66.9	bc	3.04	d-h	5.7	fg	62.2	ab
TP466-1-7	679.1	a-c	4195.7	b-e	76.5	b-f	66.0	bc	3.82	c-h	6.7	c-f	53.6	d-f
TP467-1-7	634.0	b-d	3871.1	c-f	76.1	b-f	66.7	bc	3.25	d-h	6.1	d-f	52.5	e-g
PR-10	592.5	c-e	3723.6	d-f	76.1	b-f	65.9	bc	3.97	b-h	6.3	d-f	57.5	cd
TP468-2-7	582.2	c-e	3655.3	e-g	77.0	b-d	66.2	bc	4.52	b-g	6.2	d-f	48.5	gh
TP458-4-9	564.9	c-f	3497.2	f-i	76.1	b-f	64.9	cd	2.93	e-h	8.2	a-c	47.4	h
TP466-2-6	531.2	d-f	3564.7	f-h	75.6	c-f	63.5	c-e	5.18	b-e	6.9	c-f	52.3	e-g
PR-12	521.5	d-f	3307	f-j	75.1	d-g	63.5	c-e	3.7	c-h	7.9	b-d	58.6	bc
TP454-2-3	495.9	f-g	3334.2	f-j	76.7	b-e	63.8	c-e	5.09	b-f	7.8	b-d	47.2	h
NemaTAM	451.2	fg	2944.2	ij	77.8	ab	64.7	c-e	5.13	b-f	7.9	b-d	49.6	f-h
PR-6	445.2	fg	3416.2	f-i	73.3	g	57.4	f	5.95	a-c	9.9	a	46.3	h
TP465-4-3	444.8	fg	3009	h-j	75.0	d-g	62.9	c-e	5.31	b-d	6.8	c-f	53.7	d-f
TP465-4-6	377.3	g	3039.3	g-j	74.6	fg	60.8	d-f	7.97	a	5.8	fe	51.9	fg
Florunner	375.2	g	2781.7	j	75.6	c-f	60.6	ef	6.15	ab	8.9	ab	49.7	f-h

Table 2. Yield and performance data for several breeding lines and peanut cultivars. These breeding lines have been tested for yield potential for three or four years. Commanche county test location 1.

TP467-1-7	687.1	a	3843.1	a	76.5	bc	75.0	bc	1.0	ab	3.1	a-c	69.4	b-e
TP456-1-6	680	a	3834.2	a	75.3	c	73.7	bc	0.8	ab	2.6	a-e	64.8	d-g
PR-2	664.8	ab	3604.8	ab	77.2	bc	75.0	bc	0.3	ab	1.9	d-f	74.0	ab
TP466-1-7	664.6	ab	3651	ab	76.8	bc	74.3	bc	0.6	ab	2.2	b-f	72.7	ab
TP454-2-3	642.6	ab	3576.4	ab	77.5	a-c	73.5	bc	1.2	a	3.2	ab	58.0	h
TP458-4-9	620.9	ab	3466.7	ab	76.0	bc	74.2	bc	0.2	b	3.4	a	57.4	h
TP465-4-3	618.3	ab	3400.9	ab	77.4	bc	74.6	bc	1.0	ab	2.2	b-f	67.9	b-f
NEMATAM	611.6	ab	3265.1	ab	78.7	ab	76.0	ab	0.5	ab	2.2	b-f	64.0	e-h
TP455-4-3	607.8	ab	3364.1	ab	76.2	bc	71.9	c	0.5	ab	2.2	b-f	60.9	gh
TP468-2-7	598.1	ab	3227.8	ab	78.0	a-c			0.5	ab	2.5	a-e	63.6	e-h
TAMRUNOL02	591.3	ab	3191.6	ab	77.3	bc	75.4	a-c	0.1	b	1.9	d-f	72.7	ab
TAMRUNOL07	575.1	ab	3153.7	ab	77.7	a-c	74.0	bc	0.7	ab	3.1	a-d	78.9	a
TP465-4-6	574.1	ab	3130.6	ab	77.2	bc	73.9	bc	0.7	ab	2.0	c-f	70.7	b-d
TP466-2-6	574.1	ab	3147.8	ab	76.8	bc	72.4	c	0.4	ab	2.1	b-f	65.8	c-g
TP456-3-9	560.7	ab	3106.9	ab	76.3	bc	72.4	c	0.8	ab	1.7	ef	67.4	b-g
PR-10	540.6	ab	2977	ab	76.7	bc	74.1	bc	0.5	ab	2.1	b-f	71.4	b-d
PR-6	521.8	ab	2849	ab	77.6	a-c	74.6	bc	0.5	ab	2.5	a-e	65.5	c-g
FLORUNNER	494.1	ab	2731.6	ab	76.9	bc	72.9	bc	0.5	ab	3.5	a	62.2	f-h
PR-12	449.7	b	2557.3	ab	75.5	c	72.2	c	0.9	ab	2.4	a-e	67.8	b-f

Table 3. Yield and performance data for several breeding lines and peanut cultivars. These breeding lines have been tested for yield potential for three or four years. South Texas test location.

Cultivar	Value/Ac		Pods/Ac		TK		TSMK		DK		OK		Seed Wt	
	$		lbs.		----------								g/100	
TamrunOL07	882	a	4952	a	77.1	de	71.4	c-f	0.2	b-d	5.5	cd	56.3	b
TP456-3-9	860	ab	4826	a-c	76.6	d-g	71.7	c-f	0.3	b-d	4.6	d	51.2	c-g
TP456-1-6	844	ab	4927	ab	76.1	e-g	67.9	gh	0.2	cd	8.0	ab	46.3	h-j
PR-2	825	a-c	4530	a-d	77.4	de	73.8	a-c	0.6	a-d	3.0	e	61.0	a
TP455-4-3	803	a-d	4807	a-c	75.1	g	66.0	h	0.4	a-d	8.8	a	47.5	f-j
TamrunOL02	772	a-e	4375	a-f	76.7	d-f	70.8	ef	0.6	a-d	5.3	cd	51.8	c-f
TP468-2-7	771	a-e	4276	b-g	77.3	de	72.7	a-e	0.3	b-d	4.3	de	48.6	e-i
TP465-4-6	754	b-e	4227	c-g	77.3	de	72.2	b-f	0.9	a	4.2	de	50.8	c-g
TP458-4-9	712	c-e	4241	c-g	76.4	e-g	66.2	h	0.7	a-c	9.5	a	45.2	ij
PR-12	706	c-e	4032	d-g	75.6	fg	70.6	e-g	0.5	a-d	4.5	de	54.3	bc
NemaTAM	706	c-e	3810	e-g	79.2	ab	74.7	ab	0.4	a-d	4.1	de	50.5	c-h
TP467-1-7	690	de	3844	e-g	77.5	c-e	72.4	b-e	0.6	a-d	4.6	de	52.5	b-e
PR-6	677	e	3838	e-g	77.4	de	70.3	e-g	0.4	b-d	6.8	bc	47.1	g-j
TP466-1-7	672	e	3764	fg	77.1	de	72.1	b-f	0.5	a-d	4.6	de	53.6	b-c
Florunner	672	e	3655	g	79.4	a	74.0	a-c	0.5	a-d	4.9	d	50.1	c-h
TP465-4-3	669	e	3791	fg	76.8	d-f	71.1	d-f	0.8	ab	4.9	d	49.5	d-i
TP454-2-3	669	e	3641	g	79.0	a-c	73.8	a-c	0.6	a-d	4.6	d	43.9	j
PR-10	666	e	3847	e-g	75.2	g	69.6	gh	0.7	a-c	4.9	d	54.4	bc
TP466-2-6	665	e	3646	g	77.9	b-d	73.6	a-d	0.4	a-d	3.9	de	52.5	b-e

Table 4. Yield and performance data for several breeding lines and peanut cultivars. These breeding lines have been tested for yield potential for three or four years. Erath county test location infested with Sclerotinia blight.