Final Report for 2024 National Peanut Board funding to the Texas Peanut Producers Board.

1) Subject area: Molecular Genetics & Breeding

a. Project Title: Breeding to Increase Peanut Yields and Production Efficiency in Texas by Developing Breeding Lines with Improved Drought, Heat Tolerance, and Multiple Disease Resistance

b. Funding Year: 2024

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f. Total Funds Requested: $185,090

g. Locations: Lubbock, Gaines, Yoakum, Terry, Collingsworth, Comanche, Erath, Wilbarger, DeWitt, and Frio County, Texas and Clovis, New Mexico

h. Continuing Project ID 329: 2011 to Present: Several varieties have been released that contain traits that improve farmers' overall productivity, with others beginning to emerge. In addition, marker development for these traits and the incorporation of new technologies continue to streamline the breeding process.

Multiple Trait Runner-type Trials

The TAMU Peanut project had replicated yield trials located in South Texas, (Pearsall, Dilley, Yoakum, and Derby), in Central Texas (Stephenville and Gustine), in West Texas, (Brownfield, Seminole, and Denver City), the High Plains (Wellington), and in the Rolling Plains (Vernon). We conducted seven small-plot Advanced Line Trial (ALT) tests and one large-plot Combine Trial across Texas in 2024, as well as two replicated screening nurseries for Sclerotinia and Leafspot resistance. We submitted release documents for a drought-tolerant runner cultivar, two high-oleic Virginias, two high-oil lines, one hybrid Spanish, and one high-yielding Runner to the Texas Plant and Seed Board. All these lines represent a large investment across the industry, and with our shelling plant being back online, we anticipate seed being available in 2026. This season, these lines are in various stages of increase, and we actively recruited cooperators at the farm and sheller level to conduct demonstration plots around the state to begin building momentum.

In our breeding plots across the state, we included all of these lines for evaluation and others under different production scenarios. In our small plot ALTs, nine new release candidates were included from the previous year's results, and an additional nine were included for the third year. In all, 14 breeding lines were included. Six commercial checks including Georgia 16HO, AG18, Georgia 09B, Murray, NemaTAM II, and CB-7, a new leafspot resistant runner released from the USDA-ARS in Georgia. CB-7 represents the first cultivar totally resistant to leafspot with no

Table 1. Combined Analysis of all Advanced Line Runner Tests across Texas in 2024.

	Pods/Ac. Lbs.		Val/Ac. $		TSMK %		Seed Wt g/100		Seed/Lbs		SS%	
Cultivar												
TxL100212-03-03	6251	A	1129.72	A	72.2	ABCDE	70.7	BC	643	IJ	4.8	GH
TP200614-1-1-1	5986	AB	1110.57	AB	73.9	A	62.0	GHI	734	CDE	5.2	EFGH
TP210656-2-1	5929	ABC	1082.75	AB	73.3	AB	58.8	JK	777	AB	5.2	EFGH
TP200625-3-2	5836	ABCD	1040.60	ABCD	70.9	CDEFGH	62.5	FGHI	730	DEF	6.6	ABCDE
Georgia 09B	5800	ABCDE	1052.60	ABC	72.2	ABCDE	63.8	EFGH	713	DEFG	7.5	AB
Georgia 16HO	5784	ABCDE	1057.27	ABC	73.3	AB	69.2	CD	658	HI	7.3	ABC
TP200607-1-16	5698	ABCDE	1012.74	BCDE	70.3	EFGH	64.6	EFG	704	EFG	6.7	ABCDE
Tx144370	5691	ABCDE	1030.07	ABCDE	71.9	BCDEFG	64.7	EFG	703	EFG	6.4	BCDEFG
TP200615-2-1-1	5667	ABCDE	1043.74	ABC	73.5	AB	82.7	A	553	K	5.8	CDEFG
NemaTAM II	5662	ABCDE	1002.95	BCDE	70.4	DEFGH	70.4	BC	648	IJ	7.7	AB
TP210657-1-1-3	5630	BCDE	1023.18	ABCDE	72.3	ABCD	61.0	HIJ	744	BCD	7.3	ABC
TP210624-4-1	5629	BCDE	1030.60	ABCDE	72.5	ABC	65.7	EF	692	GH	6.6	ABCDE
TP220673-4-1	5454	BCDEF	964.17	CDEF	70.0	GH	66.7	DE	685	GH	7.2	ABCD
AG18	5351	CDEF	962.43	CDEF	70.7	CDEFGH	61.4	HIJ	744	BCD	4.0	H
TP210612-3-1-1	5343	CDEF	962.57	CDEF	71.9	BCDEFG	73.2	B	622	J	4.9	FGH
TP210624-2-1	5332	CDEFG	962.93	CDEF	72.1	ABCDEF	64.1	EFGH	711	DEFG	5.7	DEFG
Tx137967	5282	DEFG	928.17	DEF	69.6	H	65.4	EF	696	FG	7.8	AB
31-08-05-03	5215	EFG	924.59	EF	70.2	FGH	64.1	EFGH	714	DEFG	6.5	ABCDEF
TP230736-3-15	4903	FG	865.96	F	69.4	H	59.5	IJ	767	BC	7.3	ABCD
CB-7	4737	G	867.00	F	72.6	ABC	56.0	K	811	A	8.1	A
Mean	5507		992.17		71.7		65.3		703		6.0	
CV	18.9		20.5		5.0		11.2		10.7		49.8	
Entry F	0.0003		<.0001		<.0001		<.0001		<.0001		<.0001	

fungicide sprays recommended in Southern Georgia, and it was reported to have possible drought tolerance in Georgia.

For 2024, the entire state of Texas continued to be very dry. While some areas of the state received "normal" rainfall, there was a significant dry period in August across the state that was characterized by high temperatures and no rainfall. During this period, the temperature extremes caused issues with growers' ability to apply sufficient irrigation to overcome the high evapotranspiration rates and do this consistently across the season. Both individual tests as well as combined analyses were statistically revealing and are presented for discussion purposes. The combined analysis is presented in **Table 1**, while additional combined analysis traits and individual location summaries for each ALT test are available in supplemental charts **S1-S7**. Overall, the average yield in our statewide ALT test was 5600 lbs/ac. and a TSMK% of 71.7%. Across all locations, the new drought-tolerant release candidate, TxL100212-03-03, yielded the best in our combined analysis with an average yield of 6251 lbs/ac. The grade was equal to Georgia 09B at 72.2%. The seed size was similar to NemaTAM II and Georgia 16HO at 70.7 g/100 sd., placing it in the large-seeded runner category. There were large differences in performance by location that could be partially explained by differences in irrigation. Typically, drought-tolerant lines that perform well under drought conditions do not perform as well under high irrigation rates. In the case of TxL100212-03-03, it has a very high yield potential under full irrigation and an average yield potential under drought stress.

We also conducted seven other replicated runner trials to combine elite traits into new breeding lines. Three focused on yield and grade with materials explicitly bred for these traits. The other three were bred for a combination of multiple disease-resistance traits. Lines that performed well in 2023 advanced to Test 1 or 2 of either the high yield and grade trials or the multiple disease

Table 2. Yield Test #1 in South Texas for 2024.

	Pods/Ac. Lbs.		Val/Ac. $		TSMK %		Seed Wt g/100		Seed/Lbs		SS%	
Cultivar												
Georgia O9B	7830	A	1472.50	A	76.0	A	67.0	EFG	677	DEF	5.0	ABCD
Tx144370	7240	AB	1357.90	AB	75.8	A	63.0	HI	721	ABC	2.7	EF
TxL100212-03-03	6893	BC	1245.10	BC	73.6	ABCDE	71.1	BCD	638	GHI	5.9	AB
TP210624-3-4	6774	BCD	1233.80	BC	73.1	CDE	67.6	DEF	671	EFG	2.7	EF
TP220671-3-1	6735	BCD	1211.80	BCD	73.0	CDE	73.5	B	617	I	3.1	DEF
TP220670-3-1	6699	BCD	1194.50	CDE	72.5	CDE	78.9	A	575	J	3.7	CDEF
TP220671-5-1	6689	BCDE	1202.00	CDE	72.8	CDE	69.1	CDE	657	FGH	6.0	AB
TP220667-3-1	6626	BCDE	1206.00	BCDE	73.7	ABCDE	61.0	I	746	AB	6.3	A
NemaTAM II	6572	BCDE	1183.80	CDE	72.5	CDE	72.0	BC	630	HI	5.0	ABCD
Georgia 16HO	6414	BCDEF	1199.60	CDE	75.6	AB	68.7	CDEF	660	EFGH	4.2	BCDEF
TP230627-5-1	6289	CDEFG	1128.30	CDEF	71.9	CDE	63.4	GHI	716	BCD	4.3	ABCDEF
TP220671-4-1	6222	CDEFGH	1122.20	CDEF	72.6	CDE	71.8	BC	633	GHI	4.7	ABCDE
TP210651-2-1	6018	DEFGH	1111.50	CDEFG	74.3	ABCD	59.8	I	758	A	3.6	CDEF
TP220671-6-1	5948	DEFGH	1098.90	CDEFG	74.2	ABCDE	62.4	HI	728	ABC	5.5	ABC
TP230626-2-1	5850	EFGH	1053.90	EFG	72.6	CDE	60.6	I	749	AB	3.0	DEF
AG18	5845	EFGH	1077.80	DEFG	74.1	ABCDE	60.0	I	756	A	2.6	F
TP210627-4-1	5703	FGH	1054.20	EFG	74.3	ABC	60.2	I	754	AB	3.1	DEF
TP220671-2-1	5485	GH	986.70	FG	71.8	E	60.9	I	746	AB	3.2	DEF
TP210624-3-1	5384	H	967.20	G	73.3	BCDE	65.3	FGH	696	CDE	4.7	ABCDE
TP230624-2-1	4390	I	777.20	H	71.9	DE	70.4	BCDE	645	FGHI	4.2	BCDEF
Mean	6280		1144.24		73.5		66.3		689		4.2	
CV	13.8		14.5		2.4		8.6		8.4		36.9	
Entry "F"	<.0001		<.0001		0.017		<.0001		<.0001		0.005	

resistance trials in 2024. Low-performing lines were dropped out of the program and stored as germplasm samples. All these tests had lines that were significant and are presented in summary tables 2-6. One of the tests representing our elite leafspot materials is presented and discussed in the leafspot section. In some cases, variability between replications was higher than we preferred, which, again, we attributed to environmental effects during the season. Yield Trial #1 was planted in South Texas and revealed Georgia 09B as the top performer of the trial for yield with a total of 7,830 lbs/ac (**Table 2**), which was statistically better than NemaTAM II at 6,572 lbs/ac. The top grading TAMU entry in the test was Tx144370, also known as Murray, which was statistically equal to Georgia 09B in yield and grade at 7240 lbs/ac. and a grade of 75.8%.

A second yield trial was planted in South Texas (**Table 3**) and contained both previously tested and first-time breeding lines. In this trial, minimum tillage was practiced with ample irrigation. In this scenario, TxL10021-03-03 again performed at the top of the test, beating the average by 1360 lbs/ac. and 4.6% TSMK.

Table 3. Yield Test #2 in South Texas for 2024.

	Pods/Ac. Lbs.		Val/Ac. $		TSMK %		Seed Wt g/100		Seed/Lbs		SS%	
Cultivar												
TxL100212-03-03 C	7173	A	1271.00	A	71.0	A	67.1	ABCD	677	FGH	5.7	BCD
TxL100212-03-03	7102	AB	1246.30	A	69.5	ABC	67.6	ABC	671	FGH	4.9	BCDE
TP240746-2-10	7066	ABC	1149.80	AB	63.9	HI	60.3	EFG	753	BCDE	6.3	BC
TP240746-1-9	6884	ABCD	1164.20	AB	66.8	CDEFGH	68.4	ABC	663	GH	6.4	BC
TP240746-1-16	6842	ABCD	1117.60	ABC	65.3	EFGH	67.5	ABC	673	FGH	3.1	CDE
TP230657-1-1	6159	ABCDE	1077.60	ABCD	69.4	ABC	64.2	BCDE	707	DEFGH	3.0	DE
Georgia O9B	6136	BCDEF	1044.90	BCDE	68.6	ABCDE	65.8	ABCD	693	EFGH	5.3	BCD
TP240746-1-5	6116	BCDEF	1007.90	BCDEF	64.3	GHI	57.6	FG	792	BC	3.2	CDE
TP210656-2-1	6039	CDEF	1075.30	ABCD	70.4	AB	56.2	G	809	B	2.9	DE
TP230625-3-1	5913	DEFG	1003.50	BCDEF	67.5	BCDEFG	70.1	A	648	H	4.7	BCDE
Tx144370	5610	EFG	995.30	BCDEF	71.0	A	59.4	EFG	764	BCD	3.9	BCDE
TP240746-1-11	5586	EFG	929.60	CDEFG	65.1	FGH	60.3	EFG	752	BCDE	3.3	CDE
NemaTAM II	5582	EFG	942.50	CDEFG	66.5	CDEFGH	69.0	AB	658	GH	6.7	B
TP210651-1-2	5452	EFG	917.80	DEFG	66.8	CDEFGH	58.3	FG	780	BC	4.7	BCDE
TP210624-3-3	5284	EFG	869.00	EFG	64.2	GHI	63.8	CDE	713	DEFG	4.5	BCDE
Georgia 16HO	5129	FG	884.40	DEFG	69.0	ABCD	64.4	BCDE	704	DEFGH	11.0	A
TP230662-2-1	5002	G	781.40	G	61.3	I	57.2	FG	797	B	4.6	BCDE
AG18	4942	G	843.50	FG	65.6	DEFGH	56.5	G	804	B	1.9	E
TP210611-1-3-1	4933	G	844.30	FG	67.8	ABCDEF	62.3	DEF	728	CDEF	2.4	DE
TP230650-3-1	3303	H	446.40	H	55.7	J	51.1	H	891	A	3.5	BCDE
Mean	5813		980.62		66.5		62.4		734		4.6	
CV	18.4		21.2		5.9		9.2		9.7		56.3	
Entry "F"	<.0001		<.0001		<.0001		<.0001		<.0001		0	

Finally, the third yield trial was conducted in West Texas. New breeding lines performed in the top statistical category for yield, which is very exciting for the program because these materials represent the first round of what has been through an entire round of selection in our program. In this trial, first-year breeding lines were the top 3 entries in the test, producing at least 400 lbs/ac. more than the test average at 4029 lbs/ac. TP240627-6-1 was the top-yielding line in the test at 5127 lbs/ac. and had a grade of 70.6% TSMK (**Table 4**).

In addition to conducting improved yield and grade trials, we continued testing several new populations that were created to combine leafspot, sclerotinia, and nematode resistance. These have traditionally been called Multiple Disease Resistance Tests with the focus of any one test changing from year to year such as leafspot or sclerotinia, depending on the parents of the cross and everything being funneled into increasingly lower numbered tests. Multiple Disease Resistance Trial #1 (**Table 5**) contains the materials closest to release. It was grown in South Texas and contains lines from several years of crossing programs and represents the lines that have been tested for multiple seasons. One particularly promising line is TP220670-13RN. It yielded 6503 lbs/ac., graded 74.4% TSMK, had a seed weight of 65.2 g/100 sd., and is nematode resistant.

Table 4. Yield Test #3 in West Texas for 2024.

	Pods/Ac. Lbs.		Val/Ac. $		TSMK %		Seed Wt g/100		Seed/Lbs		SS%	
Cultivar												
TP240627-6-1	5127	A	896.78	A	70.6	DEFG	71.6	AB	635	GH	9.9	DEFGH
TP240746-2-16	4770	AB	838.61	AB	69.9	FG	64.6	DEFGH	703	ABCDE	15.3	ABC
TP240746-2-7	4432	ABC	777.90	ABC	69.7	G	66.5	CDEF	682	BCDEF	15.0	ABC
TP240746-1-10	4282	BC	765.21	ABC	72.1	BCDEFG	63.8	EFGH	711	ABC	10.8	DEFG
TP240746-1-2	4241	BC	703.85	BCD	66.0	H	64.3	DEFGH	705	ABCDE	11.8	CDE
TP240720-4-4	4195	BC	732.70	ABCD	70.3	EFG	63.2	FGH	719	AB	13.2	ABCD
AG18	4052	BCD	737.28	ABCD	73.0	ABCD	61.2	H	742	A	6.3	H
TP240746-1-6	4026	BCD	710.17	BCD	70.5	DEFG	69.3	ABC	655	FGH	13.0	BCD
TP240749-2-8	4023	BCD	728.43	ABCD	72.7	ABCDE	68.1	BCD	666	EFG	9.5	DEFGH
TP240749-3-7	3994	BCD	739.06	ABCD	74.6	A	65.4	CDEFG	694	BCDEF	10.0	DEFGH
TP240742-2-10	3916	CD	697.76	BCD	71.3	DEFG	61.6	GH	737	A	16.8	A
Georgia 16HO	3874	CD	697.34	BCD	72.8	ABCD	67.7	BCDE	670	CDEFG	11.6	CDEF
TP240751-4-1	3870	CD	699.19	BCD	72.3	ABCDEF	65.9	CDEF	691	BCDEF	9.9	DEFGH
Tx100212-03-03	3853	CD	707.01	BCD	73.9	ABC	68.7	BC	661	FGH	8.8	EFGH
Georgia O9B	3836	CD	711.47	BCD	74.3	AB	64.0	EFGH	708	ABCD	12.9	BCD
Tx144370	3797	CD	699.31	BCD	74.3	AB	67.8	BCDE	670	DEFG	15.1	ABC
TP240749-3-5	3700	CD	657.93	CD	71.6	CDEFG	66.3	CDEF	685	BCDEF	7.3	GH
NemaTAM II	3674	CD	661.44	CD	73.0	ABCD	72.8	A	624	H	15.9	AB
TP240745-1-4	3668	CD	653.06	CD	70.5	DEFG	71.1	AB	638	GH	7.9	GH
TP240745-2-9	3255	D	586.74	D	72.6	ABCDE	72.8	A	623	H	7.9	FGH
Mean	4029		717.07		71.8		66.8		681		11.4	
CV	15.5		15.2		3.3		5.9		5.9		31.3	
Entry "F"	0.037		ns		<.0001		<.0001		<.0001		<.0001	

Multiple Disease Resistance Test #2 was also grown in South Texas (**Table 6**). Although the location did not have any obvious issues, the variability was very high, and the trial did not reveal any signification differences for yield or grade. This might be attributed to an early-season herbicide application that killed or stunted some of the plants, although visibly it was not seen at harvest. Overall, the yields were high, but the grades were low, with a test average of 5867 lbs/ac., and an average grade of 68% TSMK. Most of the lines were in their second or third year of testing and will be evaluated to see where their overall performance warrants keeping them in the program.

As we begin planning our 2025 planting, we will advance many crosses that also have parental materials from our drought tolerance program. This will represent a major advancement in the

statewide testing program due to the fact that we have added sites under dryland and limited irrigation. These will be presented in the 2025 report.

Table 5. Multiple Disease Resistance Test #1 in South Texas for 2024.

	Pods/Ac. Lbs.		Val/Ac. $		TSMK %		Seed Wt g/100		Seed/Lbs		SS%	
Cultivar												
TP210614-1-2-1	6726	A	1241.30	A	73.3	CDEF	58.5	I	776	A	5.2	CDE
TP220670-12RN	6503	AB	1157.90	ABC	71.3	GHIJ	77.3	A	587	H	7.5	AB
TP200610-3-6	6491	ABC	1211.60	AB	74.6	ABCD	68.8	CDE	659	EF	2.7	GHIJ
Tx144370	6361	ABCD	1150.10	BCD	71.4	FGHIJ	64.0	F	710	D	4.1	CDEFGHI
TP210625-3-4	6260	ABCDE	1101.00	CDEF	69.9	IJK	68.3	DE	666	EF	4.7	CDEFGH
Georgia 16HO	6134	BCDEF	1135.20	BCDE	74.7	ABC	69.7	CD	651	FG	5.4	BCD
TP210625-3-1	6128	BCDEF	1077.30	CDEFG	69.8	JK	73.5	B	617	GH	4.8	CDEFG
TP200610-4-4	6050	BCDEF	1117.80	CDEF	73.5	BCDE	63.2	FGH	719	D	5.1	CDEF
NemaTAM II	6046	BCDEF	1073.70	CDEFG	70.0	HIJK	69.8	CD	651	FG	6.0	BC
TP220670-13RN	6019	CDEF	1120.80	CDEF	74.4	ABCD	65.2	EF	696	DE	6.1	BC
TP200610-2-4	6011	CDEF	1139.00	BCDE	76.2	A	59.8	GHI	759	ABC	3.7	DEFGHI
TP210628-1-1	5937	DEFG	1038.30	FG	68.5	K	68.2	DE	665	EF	4.9	CDEFG
TP200610-2-10	5919	DEFG	1112.90	CDEF	75.3	AB	59.6	HI	762	AB	3.1	EFGHIJ
AG18	5901	DEFG	1068.20	DEFG	72.3	EFG	62.6	FGH	725	BCD	1.3	J
Georgia 09B	5873	EFG	1059.10	EFG	71.7	EFGHI	63.3	FG	717	D	9.6	A
TP210615-2-2-1	5821	EFG	1056.90	EFG	72.7	DEFG	63.4	FG	717	D	2.5	HIJ
TP200610-4-9	5798	EFG	1062.80	DEFG	72.4	EFG	62.9	FGH	723	CD	4.9	CDEFG
TP220670-11RN	5798	EFG	1052.60	EFG	71.9	EFGH	72.1	BC	630	FG	4.4	CDEFGH
TP210621-2-1-5	5704	FG	1001.50	G	69.5	JK	69.6	CD	652	FG	1.9	IJ
Georgia 14N	5504	G	1041.30	FG	75.6	A	62.2	FGH	729	BCD	2.9	FGHIJ
Mean	6049		1100.97		72.4		66.1		691		4.5	
CV	7.5		8.0		3.3		8.0		7.8		49.6	
Entry "F"	0.003		0.0019		<.0001		<.0001		<.0001		<.0001	

Table 6. Multiple Disease Resistance Test #2 in South Texas for 2024.

	Pods/Ac. Lbs.		Val/Ac. $		TSMK %		Seed Wt g/100		Seed/Lbs		SS%	
Cultivar												
Tx144370	6795	A	1163.50	A	68.7	ABCD	62.8	CDEF	722.7	CDEF	4	EFG
TP240752-2-1	6566	AB	1128.80	AB	69.7	ABC	75.2	A	605.1	G	8	ABC
TP240753-2-3	6557	AB	1083.50	ABC	69.7	ABC	67.4	BCDE	675.9	DEFG	6	CDE
TP210626-2-1	6541	AB	1157.00	A	70.6	AB	67.5	BCDE	675.4	DEFG	3	FG
TP210614-2-1	6437	AB	1155.30	A	70.0	ABC	55.1	GH	824.9	AB	5	DEFG
TP240754-1-5	6386	AB	1125.10	AB	68.8	ABCD	54.7	GH	831.6	AB	9	A
Georgia 16HO	6208	ABC	1103.10	ABC	71.0	A	74.1	AB	614.4	G	9	AB
TP220670-15RN	6136	ABCD	1072.10	ABC	68.7	ABCD	69.2	ABCD	656.7	FG	6	BCDE
TP220673-3-1	6028	ABCD	1066.90	ABC	69.9	ABC	58.9	FGH	776.7	ABC	3	G
TP210614-2-1-5	5920	ABCDE	1065.00	ABC	69.9	ABC	53.5	H	852.4	A	5	DEFG
Georgia 09B	5818	ABCDE	1019.70	ABCD	69.5	ABC	60.6	EFG	751.8	BCDE	6	CDE
Georgia 14 N	5702	ABCDE	1006.00	ABCD	69.7	ABC	57.5	FGH	789.9	ABC	4	EFG
NemaTAM II	5546	BCDE	934.20	ABCD	66.6	ABCD	62.3	DEF	728.6	CDEF	6	CDEF
TP220670-6RN	5510	BCDE	884.70	BCD	64.2	D	68.6	ABCD	661.5	FG	5	DEFG
TP220670-11RN	5494	BCDE	947.90	ABCD	67.6	ABCD	69.8	ABC	651.0	FG	5	DEFG
AG18	5467	BCDE	933.20	ABCD	66.0	BCD	57.8	FGH	789.6	ABC	4	EFG
TP220673-6-1	5421	BCDE	920.30	ABCD	66.1	ABCD	60.2	FGH	754.2	BCD	4	EFG
TP220673-5-1	5110	CDE	869.70	CD	65.7	CD	57.1	FGH	797.5	ABC	3	G
TP240724-1-3	4941	DE	806.50	D	65.2	CD	55.0	GH	825.9	AB	7	ABCD
TP220673-2-1	4754	E	798.10	D	66.0	BCD	68.0	BCD	668.8	EFG	4	EFG
Mean	5867		1012.04		68.2		62.8		732.7		5	
CV	14.3		16.8		4.6		11.9		11.8		43.7	
Entry "F"	ns		ns		ns		<.0001		<.0001		0.000	

Cooperative Testing

Cooperative testing is a key component that our program is looking to expand. As release candidates are identified, they need to be tested in additional environments and under different management practices. In 2024, the university breeders of the Southwest began cooperating in a testing series called the Southwest Uniform Peanut Performance Test (SWUPPT). This series is meant to replace the Uniform Peanut Performance Test which used to be conducted across the peanut belt.

For 2024, the SWUPPT was grown at five locations: Fort Cobb, OK, Lingo, NM, Stephenville, TX, Vernon, TX, and Lubbock, TX. Each location featured four replications, two digging dates, and included all four market types. There were five checks: Schubert (sp), Comrade (vr), New Mexico Val C (va), Lariat (ru), and Georgia 09B (ru). Overall, the series was very successful, with 4 out of the 5 trials being harvested and data collected. Each location was analyzed as a whole and by market type. Although a combined analysis showed statistical differences, it was not as useful as anticipated due to missing data. The average across four locations showed an average yield of 4092 lbs./ac. and an average grade of 71.1% TSMK. At the fifth location, a well failure caused the trial to be eliminated. Shelling data was also collected at two locations where large samples were sent to the USDA shelling lab in Dawson, GA, where a small sheller that mimics larger commercial shellers was used for a full analysis of each of the varieties. A full breakdown of the yield, grade, and shelling results can be found at the varietytesting.tamu.edu website and in the appendix of this document (**S18-36**).

The breeding program had combine plot variety trials in Collingsworth Co. Texas (**Table 7**) and in cooperation with the Arkansas and Missouri Extension Service, which had six other locations in Arkansas and Missouri. We continue to collaborate with Dr. Travis Faske, the Arkansas Extension Pathologist, who evaluates our materials for yield and disease, where Murray performed very well for yield and grade (**Table 8**). In 2024, we also collaborated with Dr. Justin Calhoun of the Missouri Extension Service to evaluate our materials in a newer production area. Dr. Calhoun reported the release candidate TP200625-3-2 and NemaTAM II performed well in several trials.

Table 7. Collingsworth County Advanced Line Combine Trial for 2024.

	Pods/Ac. Lbs.		Val/Ac. $		TSMK %	
Cultivar						
TP200625-3-2	2858	A	73.35	A	74.7	A
GA09B	2675	AB	73.61	A	74.7	A
TP210624-4-1	2657	AB	74.88	A	76.5	A
GA 16HO	2291	ABC	71.32	A	72.7	A
Txl44370	2283	ABC	70.45	A	71.9	A
Nema TAMII	2161	ABC	72.65	A	74.3	A
TP230736-3-15	2126	ABC	72.48	A	73.8	A
TP220673-4-1	2065	ABC	74.55	A	75.6	A
TP200607-1-16	1777	BC	75.38	A	76.7	A
TP210656-2-1	1490	C	74.61	A	75.8	A
Mean	2238		74.73		73.4	
CV	28.0		4.1		4.1	
Entry F	ns		ns		ns	

It is important to conduct variety testing under different conditions to determine seed robustness. This additional information allows breeders to discern which varieties to recommend for release and identify traits to prioritize when breeding for cultivar improvement in different regions of the country. Additional data on Arkansas field trials can be found at Field performance of Nineteen Runner-Type Peanut Cultivars/Genotypes in Mississippi County, Arkansas, 2024.

Table 8. Arkansas Combine Variety Trial in Mississippi County for 2024

Cultivar	Oleic Acid	Stand Coun	TSMK%	Yield
FloRun T-61	high	40.8 a-e	75	8,309 a
FloRun 52N	standard	43.5 a-d	75	8,296 a
GA O9B (ACI)	high	33.0 de	77	7,819 ab
GA 06G	standard	42.0 a-e	76	7,679 ab
Murray	high	48.5 ab	73	7,458 abc
GA 21GR	standard	30.0 e	78	7,120 abc
TXL100212-03-03	standard	45.3 abc	75	6,890 abc
NemaTamII	high	47.8 ab	72	6,868 abc
IPG 913	standard	37.0 b-e	78	6,707 abc
GA 16HO (ACI)	high	48.5 ab	77	6,557 abc
IPG 517	high	50.5 a	73	6,503 abc
IPG 3628	high	40.5 a-e	72	6,470 abc
Arnie	standard	40.3 a-e	74	6,422 abc
R106-9L	high	47.8 ab	75	5,984 abc
GA 20VHO	high	33.8 cde	76	5,984 abc
R109-1L	high	48.5 ab	75	5,883 abc
IPG 20-3-1102	high	40.3 a-e	70	5,744 bc
AG18	high	42.5 a-dd	72	5,118 c
IPG 21-SP-0229	high	40.0 a-e	75	5,080 c

Stand count is total number of plants per 10 row ft.

[b]Grade (total SMK) was based on USDA standard for peanut and conducted by USDA graders at Birdsong Peanut in Portia, AR.

[c] Moisture at harvest averaged 6 percent moisture across cultivars.

[d]Data are averages of four replications. Averages followed by a different letter within each column are significantly different at $\alpha = 0.05$ according

In closing for this section, five Texas A&M AgriLife Extension Variety trials were conducted in Texas, one in the South Plains, one in the High Plains, one in the Rolling Plains, one in Central Texas, and one in South Texas. Three were large plot combine trials that mimicked true production scenarios with respect to harvest equipment. The other two provided better grade data for different varieties due to seed purity with research harvest materials. In our program, large plot trials are used as a final look before release to evaluate how candidate breeding lines perform, and the more locations we do this at, the more accurate readings we get on large-scale harvests. Drs. Travis Faske and Justin Calhoun graciously agreed to evaluate our materials in their environments. In addition to this, we participate in Dr. Emi Kimura's Statewide variety trials each year with our most advanced lines (varietytesting.tamu.edu).

Multiple Trait Spanish-type Yield Trials

We formalized our testing procedures for our Spanish breeding materials in 2024. Spanish Test #1 was grown at three Texas locations: Denver City, Vernon, and Seminole. This allows us to evaluate our most advanced materials across the predominant Spanish growing region. We feed new breeding lines in these trials in the same manner as the Advanced line tests. Typically, we will have a Spanish Test #2 and possibly a hybrid Spanish Test that will be grown at one location and evaluated for selection to move forward into the Spanish #1. 2024 had a large number of new breeding lines enter for first-time testing. Breeding lines represent true Spanish growth and newer hybrid Spanish growth types. Growing conditions were difficult, and the test results reflected these conditions. In 2024, we had five commercial checks and two historic varieties for disease evaluation. The higher number of checks was to accommodate the production practices involving hybrid Spanish, organic, and true Spanish production.

A combined analysis of the Spanish Test #1 (**Table 9**) is presented with the individual test results available in the appendix. TP 220708-3-3 and TP210656-2-1 were the numerically highest yielding lines in the analysis, although they were not statistically significant, at 4653 lbs./ac and 4546 lbs/ac. respectively. TP210656-2-1 also had the highest TSMK% at 74.4%. It is a hybrid Spanish candidate release that yielded and graded in the top statistical grouping of the test at 4566 lbs/ac and a TSMK% of 66.6%. Seed size for this breeding line was 55.9 g/100sd, placing it in the Spanish seed category.

Table 9. Combined Analysis of Spanish Test #1 at three locations in 2024.

	Pods/Ac. lbs.		Val/Ac. $		TSMK %		Seed Wt g/100		Seeds/lb		SS%	
Cultivar												
AT9899	4871	A	824.18	A	65.1	A	42.4	BCDE	1072	DEFGH	5.1	FGH
TP210656-2-1	4566	A	785.30	A	66.6	A	48.9	AB	929	HI	4.6	FGH
Schubert	3296	B	524.30	B	62.3	ABC	52.0	A	873	I	3.6	H
TP210655-1-1	3205	BC	506.73	B	58.1	BCDE	33.7	GH	1351	ABC	8.9	BCD
TP210652-2-3	3049	BCD	523.30	B	65.1	A	33.1	GH	1384	AB	10.1	BC
TP210640-2-1	2953	BCD	491.73	B	62.8	ABC	44.3	BCD	1025	FGHI	4.0	GH
Olin	2809	BCDE	472.92	BC	64.4	A	45.4	ABC	1015	GHI	5.8	EFGH
TP210653-2-2	2686	BCDE	448.96	BC	63.5	AB	44.4	BCD	1055	EFGH	11.6	AB
#00	2632	BCDE	394.60	BCD	51.8	F	41.0	CDEF	1107	DEFG	3.7	H
TP210641-4-1	2567	BCDEF	421.57	BCD	61.5	ABCD	35.7	FGH	1280	BC	13.3	A
Tamspan 90	2565	BCDEF	436.90	BC	65.6	A	44.6	BCD	1023	FGHI	4.2	GH
TP210641-5-1	2530	BCDEF	433.72	BC	67.1	A	45.8	ABC	997	GHI	6.9	DEFG
TP210639-4-1	2512	BCDEF	382.58	BCDE	57.5	BCDEF	41.5	CDEF	1095	DEFGH	5.8	EFGH
TP210641-1-1	2375	CDEFG	377.56	BCDEF	56.9	CDEF	30.7	H	1477	A	8.6	CDE
TP210655-3-2	2242	DEFGH	369.15	BCDEFG	63.7	AB	37.9	DEFG	1200	CDE	6.3	DEFGH
TP220683-1	2026	EFGHI	322.33	CDEFG	57.6	BCDEF	36.5	EFGH	1243	BCD	7.2	CDEF
TP220683-2	1741	FGHI	261.22	DEFG	56.9	CDEF	43.9	BCD	1041	EFGHI	5.6	FGH
TP220683-4NR	1596	GHI	228.66	EFG	51.9	EF	43.4	BCD	1055	EFGH	4.0	GH
TP220683-2RN	1455	HI	212.73	G	56.0	DEF	45.4	ABC	1005	GHI	3.4	H
TP220683-2-3	1228	I	216.40	FG	66.3	A	38.3	DEFG	1190	CDEF	7.4	CDEF
Mean	2645		431.74		61.0		41.4		1121		6.5	
CV	38.1		41.9		9.3		15.4		15.8		50.1	
Entry F	<.0001		<.0001		0.0003		0.0001		<.0001		<.0001	

The Hybrid Spanish Test (**Table 10**) was located on Gaines/Yoakum Co. line and was in the same field as one of the Spanish Test #1. “Hybrid Spanish” lines are lines that are runner in appearance but have small, Spanish-size seeds. The advantage is the higher yields of runners but the maturity of a Spanish. The top-yielding line in the test was the runner check Georgia 14N. However, the newly released cultivar TP210656-2-1 had a yield of 4616 lbs/ac., which was statistically equal to the check at 4994 lbs/ac. The size of the breeding lines varied with TP 23713-2-1 being the smallest seeded line in the test at 46.5 g/100 seed, which was statistically equal to the runner variety 9899 at 52.8 g/100 seed. In contrast, the largest-sized line in the test was TP 21656-2-1 at 61.5 g/100, which was not the case in the previous year. As mentioned, the best performing of the lines from both tests will be carried forward into 2024 with continued testing and new lines being added. For the sake of brevity, we have omitted the detailed presentation of each location, including the Spanish lines in the SWUPPT, but this information is readily accessible in the appendix (**S18-36**).

Table 10. Hybrid Spanish Test in West Texas for 2024.

	Pods/Ac. Lbs.		Val/Ac. $		TSMK %		Seed Wt g/100		Seed/Lbs		SS%	
Cultivar												
Georgia 14N	4994	A	938.07	A	74.8	AB	64.3	A	705	J	5.8	FGH
TP240738-2-8	4897	AB	874.68	AB	69.7	CDEF	55.2	EFG	822	EFGH	10.0	BCDEF
AT9899	4737	ABC	842.80	ABC	70.7	BCDE	52.8	FGH	861	CDEF	13.1	ABC
TP210656-2-1	4616	ABCD	815.65	ABCD	71.4	ABCD	61.3	ABC	741	IJ	4.9	GH
TP240748-3-3	4610	ABCD	803.15	ABCDE	67.0	EFG	47.5	J	957	AB	8.0	DEFGH
TP240748-2-7	4359	ABCD	738.74	ABCDEF	66.1	FG	56.9	CDEF	798	EFGHI	13.4	AB
Span 17	4299	ABCDE	779.90	ABCDE	73.0	ABC	60.3	ABCD	754	HIJ	9.3	BCDEFG
TP220708-3-3	4268	ABCDE	745.43	ABCDEF	68.1	DEFG	55.8	DEF	815	EFGH	7.9	DEFGH
TP220708-3-2	4219	ABCDEF	746.79	ABCDEF	69.7	CDEF	62.0	AB	733	IJ	8.9	CDEFG
TP240748-3-4	4089	ABCDEF	698.93	BCDEFG	66.3	FG	54.9	EFG	827	DEFG	12.2	BCD
TP220708-5A-1	3836	BCDEFG	682.45	BCDEFG	69.8	CDEF	62.3	AB	729	IJ	7.8	DEFGH
TP240738-2-9	3774	CDEFG	647.83	CDEFG	67.5	DEFG	49.7	HIJ	912	ABC	17.2	A
TP240738-3-3	3745	CDEFG	653.84	CDEFG	68.9	CDEFG	55.7	DEF	816	EFGH	10.6	BCDE
TP230708-2-1	3713	CDEFG	650.61	CDEFG	69.8	CDEF	58.0	BCDE	792	FGHI	8.8	CDEFG
TP230713-3-1	3704	CDEFG	613.94	DEFG	65.5	G	48.4	HIJ	937	AB	9.5	BCDEF
TP230708-1-1	3586	DEFG	602.82	EFG	67.2	EFG	59.6	ABCDE	761	GHIJ	7.1	EFGH
TP230713-2-1	3229	EFG	556.90	FG	66.9	EFG	46.5	J	977	A	8.1	DEFGH
TP240738-1-5	3126	FG	548.91	FG	69.0	CDEFG	50.8	GHIJ	894	BCD	12.7	ABC
TP240738-1-6	2993	G	565.28	FG	75.5	A	52.4	FGHI	866	CDE	11.6	BCD
TP230713-4-1	2941	G	500.42	G	64.9	G	48.0	IJ	946	AB	3.8	H
Mean	3987		700.36		69.1		55.1		832		9.5	
CV	20.8		22.3		5.1		10.7		10.7		40.3	
Entry "F"	0.0048		0.0029		0.0001		<.0001		<.0001		<.0001	

Multiple Trait Virginia Trials

We continued testing materials at one location in West Texas. This material has been narrowed from a wide range of parental materials to only 16 entries in 2024. The candidate lines mentioned above were used as parents for some lines and others have large-seeded runner parents. Others had exotic germplasm from our cultivated germplasm collection. In the Virginia Test #1 (**Table 11**) TP220694-1-1 yielded 5519 lbs/ac numerically and statistically better than the commercial check Bailey with a yield of 4197 lbs/ac. It had a seed size larger than Bailey at 86.2 g/100sd. and 79.8 g/100sd. respectively.

Drought Tolerant Runner and Spanish-type Development

Using Wild and Exotic Germplasm for Introgression of Drought Tolerance.

This project continues as part of the long-term drought project. It was first funded internally but has been absorbed into our overall drought program. The initial phase of this project identified 14 candidate genes associated with drought tolerance. We received additional funding from the Peanut Research Foundation to validate the presence of the candidate genes in the original drought-tolerant species and to expand the study to include other related species. Sequencing is complete, and an in-depth differential gene expression (DGE) study was performed. However, personnel changes have led to a delay in the manuscript as we find a new student to work on the project. In the Spring of 2025, Dr. Madhusudnan Janga agreed to perform the DGE analysis. Transcriptomics is a powerful tool that can not only tell if a gene is present but how strongly it is expressed. Once the genes are validated for expression, level marker development can be conducted and used to aid in the introgression of genes into our elite material.

Crossing and chromosome doubling continue as part of the wild species introgression pathway and are under development. Once completed, this will allow identified genes to be moved into the cultivated peanut. At this point, we have made the initial cross and confirmed hybridization. The next step in pathway development is to double the chromosome number. This is proving to be very challenging, but we are exploring alternate pathways using other species and or accessions to move the genes. One related complex hybrid has already been doubled and has cultivated materials that are being backcrossed into more advanced materials. Tamrun OL11 is the recurrent parent in this crossing program, however, several more backcrosses are needed to make the lines commercially viable. We also expanded this backcrossing program to include the candidate line Tx144370 (Murray).

Table 11. Virginia Test #1 in West Texas in 2024.

	Pods/Ac. lbs.		Val/Ac. $		TSMK %		Seed Wt g/100		Seed/Lb		SS%	
Cultivar												
TP220694-5	5595	A	129.12	A	68.2	BCD	87.8	ABCD	517	GHI	4.8	ABC
TP220694-2	5503	AB	113.51	AB	66.5	CDE	93.6	A	487	I	2.6	CD
TP220694-3	5068	ABC	112.90	AB	67.0	CDE	90.9	AB	501	HI	3.1	BCD
TP220696-1	4883	ABCD	98.37	BCD	68.9	BC	81.8	DEFGH	555	DEFG	3.3	BCD
TP220694-1	4839	BCD	106.54	ABC	65.8	DE	89.4	ABC	509	GHI	3.3	BCD
Bailey	4815	BCD	85.40	CDEFG	66.8	CDE	82.9	CDEFG	547	DEFGH	2.9	CD
TP220696-2	4787	BCD	85.94	CDEF	66.5	CDE	79.6	EFGHI	572	BCDEF	5.3	AB
TP220688-6	4624	CD	74.97	DEFGH	74.1	A	74.3	IJ	613	AB	3.5	BCD
TP220691-8	4509	CDE	98.26	BCD	68.9	BC	88.8	ABCD	513	GHI	3.7	BCD
TxL09105-07	4450	CDE	94.84	BCDE	68.6	BC	85.6	BCDE	531	FGHI	2.9	BCD
TP220691-1	4325	CDEF	88.95	CDE	67.8	BCDE	77.8	GHI	583	BCD	3.1	BCD
TP220688-8	4308	DEF	94.37	BCDE	65.8	DE	83.4	CDEFG	544	DEFGH	2.4	D
TP220686-10	4293	DEF	81.38	DEFG	67.0	CDE	85.3	BCDEF	535	EFGH	3.6	BCD
TP220688-1	4250	DEF	74.12	EFGH	66.9	CDE	78.0	FGHI	582	BCDE	3.7	BCD
TP220692-1	3829	EFG	63.45	FGHI	67.2	CDE	76.8	GHI	592	BCD	4.8	ABC
TP220689-1	3829	EFG	84.43	CDEFG	70.2	B	83.0	CDEFG	547	DEFGH	4.0	ABCD
TP220692-3	3635	FG	47.70	I	65.1	E	74.5	HIJ	609	ABC	3.5	BCD
TP220691-2	3620	FG	63.60	FGHI	68.2	BCD	80.2	EFGHI	565	CDEF	3.5	BCD
TxL09106-15	3468	G	61.84	GHI	70.1	B	85.5	BCDEF	531	FGHI	6.2	A
TP220686-9	3181	G	56.94	HI	70.0	B	69.3	J	655	A	1.7	D
Mean	4390		85.83		68.0		82.4		554		3.6	
CV	17.4		27.7		3.4		8.7		8.7		43.3	
Entry F	<.0001		<.0001		0.0003		0.0001		<.0001		NS	

A more recent development began in the fall of 2024. Dr. Nithya Subramaniam is conducting a dose response study to begin a mutation breeding program using ethyl methanesulfonate (EMS). This mutagen induces mutations in plants that can then be screened for traits such as oil content, early maturity, and drought tolerance. We anticipate evaluating several thousand seeds in 2025.

One final area of interest is our ongoing germplasm maintenance program. We continue to coordinate with the *Arachis* collection curator, Dr. Shyam Tallury, to assist in germplasm increase and reintroduction into the national collection. This allows us to serve as a vital additional repository for this valuable wild germplasm.

Developing Populations That Combine Drought Tolerance and High Oil Content

In 2022, Texas A&M AgriLife was funded by the Chevron Corporation to develop high-oil peanuts for low-input sustainable peanut production for use in renewable diesel and aviation fuel. In 2024, we were funded by the USDA-NIFA and the National Peanut Board to evaluate the economic feasibility of developing a low-input sustainable peanut market for cooking oil or renewable fuel. Initial estimates for both projects are very promising, and we have been making crosses to both improve oil content and combine it with drought tolerance. We established what the yield potential is of the existing high oil line that we developed in earlier projects. Two candidate lines were tested under dryland, full, and limited irrigation. Oil content was checked under all three scenarios to establish how the lines performed. We were able to test it under no supplemental irrigation up to 24+ inches of irrigation in 2024. We conducted a complete dryland study in Comanche Co. in 2024. The high oleic, high-oil content line performed very well with the highest yield average in the test and the highest oil content. Interestingly, Georgia 09B and CB-7 also performed very well with all lines performing very close in yield, grade, and oil content. Another interesting finding is that overall oil content was higher in most cases than the assumed 48% and is highly dependent on environmental conditions. This particular test was left in the field for 227 days to reach maturity, but the overall oil content was lower than expected. Conversely, fully irrigated sites harvested in 143 days had an average oil content of over 60% for the test. Further investigation is needed, but significant differences were found in the content of the high oil lines. In some cases, the oil content made up for the yield drag that lines possess, and in other cases, the yield potential of low-oil content lines made up the difference. Ideally, high-oil content peanuts will be grown under low-input situations where full irrigation is not possible. This opens a door for research into best management practices in these situations to maximize oil content as well as highlighting the need for crossing that will combine yield potential under low irrigation with maximum oil content.

Table 12. Organic Spanish Test #1 Test in West Texas for 2024.

	Pods/Ac. Lbs.		Val/Ac. $		TSMK %		Seed Wt g/100		Seed/Lbs		SS%	
Cultivar												
AT9899	4746	A	857.68	A	73.6	BCDEF	49.9	I	908	D	10.8	CDEF
TP210656-2-1	4733	A	886.42	A	77.4	A	63.6	CD	714	HI	16.0	AB
TP230721-40-4	4681	A	855.39	AB	74.5	BCD	49.1	IJ	925	D	18.7	A
OLin	4519	AB	809.55	ABC	73.3	CDEF	49.2	IJ	925	D	13.5	BCD
TP220708-3-3	4458	ABC	807.59	ABC	73.9	BCDE	56.1	GH	809	EF	15.0	ABC
Schubert	4409	ABC	667.98	ABCD	68.5	H	54.5	H	832	E	8.3	EF
TP210641-5-1	4368	ABC	705.28	ABCD	70.8	G	61.3	DEF	741	GHI	16.2	AB
Span 17	4287	ABC	783.66	ABCD	75.2	BC	59.4	EFG	765	FGH	15.2	ABC
TP230710-1-1	4254	ABC	757.50	ABCD	73.3	BCDEF	70.1	AB	649	J	12.3	BCDE
TP210652-2-3	4191	ABC	757.49	ABCD	73.5	BCDEF	39.6	M	1149	A	18.4	A
TP230721-40-1	4107	ABC	749.00	ABCD	75.5	AB	62.0	DE	732	GHI	9.3	DEF
Tamspan 90	4065	ABC	726.81	ABCD	72.9	DEFG	48.3	IJ	940	CD	11.1	CDEF
Tamnut 74	3894	ABC	682.45	ABCD	71.7	FG	44.6	KL	1017	B	15.2	ABC
TP230721-42-19	3721	ABC	610.39	ABCD	73.2	CDEF	58.0	FGH	782	EFG	15.1	ABC
TP230710-2-3	3693	ABC	674.45	ABCD	74.7	BCD	72.5	A	626	J	7.9	EF
TP230710-2-5	3669	ABC	657.86	ABCD	72.7	DEFG	66.9	BC	678	IJ	7.4	F
TP230721-40-11	3582	ABC	654.00	ABCD	74.5	BCD	71.7	A	633	J	11.7	BCDEF
TP210640-2-1	3481	ABC	521.31	D	71.5	FG	47.9	IJK	951	CD	10.2	DEF
TP210653-2-2	3293	BC	580.06	BCD	71.7	FG	45.8	JK	991	BC	15.8	AB
TP210655-3-2	3141	C	553.84	CD	72.0	EFG	41.3	LM	1102	A	18.8	A
Mean	4065		714.94		73.2		55.6		843		13.3	
CV	20.2		23.8		3.2		18.2		18.5		34.7	
Entry "F"	ns		ns		<.0001		<.0001		<.0001		<.0001	

Organic Breeding

Our organic breeding program was started in 2019. We annually evaluate our current elite breeding lines in certified organic fields in Terry Co. and Wilbarger Co. and cooperate with the State organic specialist, Mr. Bob Whitney, to test biological products at our Erath Co. location. In 2024, the top-yielding line for the Organic Spanish Test #1 was 9899, followed closely by TP210656-2-1 with a yield of 4746 lbs/ac. and 4733 lbs/ac., respectively. TP210656-2-1, a new release, was also in the top statistical group for a grade of 77.4% TSMK (**Table 12**). We are very excited about TP210656-2-1 as a potential variety for the new hybrid Spanish market for both conventional and organic production.

Table 13. Organic Spanish Test #2 on the Rolling Plains for 2024

	Pods/Ac. Lbs.		TSMK %	
Cultivar				
TP220708-3-3	5265	A	63.7	AB
TP210640-2-1	4919	A	64.1	AB
TP230721-40-1	4723	A	71.8	A
Tamspan 90	4471	AB	68.7	AB
TP210653-2-2	4463	AB	68.3	AB
Schubert	4380	AB	64.6	AB
AT9899	4371	AB	70.7	A
Tamnut 74	4220	AB	70.1	A
TP210655-3-2	3909	AB	70.6	A
TP210652-2-3	3839	AB	68.7	AB
TP230710-2-5	3824	AB	70.4	A
TP230721-40-4	3808	AB	66.6	AB
Olin	3791	AB	71.3	A
TP210656-2-1	3544	AB	72.5	A
TP230721-42-19	3397	AB	66.5	AB
TP210641-5-1	3167	AB	59.9	B
TP230721-40-11	3072	AB	65.5	AB
TP230710-2-3	2833	AB	68.7	AB
TP230710-1-1	2527	AB	69.0	A
Span 17	1821	B	67.3	AB
Mean	3817		68.0	
CV	43.3		8.1	
Entry "F"	ns		ns	

A second Organic Test (**Table 13**) with the same lines were tested for yield and grade on organic plots at the Texas A&M AgriLife Research Center in Vernon, TX. Irrigation was conducted during an extreme period of drought stress. The yield varied from 1,821 lbs/ac to 5265 lbs/ac, with an average of 3817 lbs/ac. Grades varied from 59.9.% to 71.8%, with an average of 68.0%.

Leafspot Screening and Sclerotinia Screening

Leafspot Resistance

Disease screening is an important part of the multiple disease resistance program. The year-to-year screening gives a good picture of the overall resistance package that is present in breeding lines. Every year, the variability is high in screening nurseries, so it is essential to evaluate lines for several years to get a comprehensive picture of their resistance. The 2024 season was much more conducive to disease than the previous year. To establish the yield potential of the lines, we also conducted a yield trial in South Texas. The test averaged 5734 lbs./ac. with the top lines in the test being Georgia 09B and TP230736-3-19. Although not significantly different, Georgia 09B was the top-yielding at 6546 lbs/ac. and TP230736-3-19 close behind at 6426 lbs./ac. However, TP023736-3-19 graded 76.5%, while Georgia 09B was 75.4% (**Table 14)**.

Table 14. Leafspot Resistance Line Test for Yield in 2024.

	Pods/Ac. Lbs.		Val/Ac. $		TSMK %		Seed Wt g/100		Seed/Lbs		SS%	
Cultivar												
Georgia O9B	6546	A	1222.30	A	75.4	AB	66.9	CDEF	679	BCDE	6.0	ABC
TP230736-3-19	6426	A	1210.70	A	76.5	A	79.0	ABC	585	EF	4.5	ABCDEF
NemaTAM II	6366	AB	1155.60	AB	73.7	BCDE	76.3	ABCD	600	DEF	4.8	ABCDEF
TP230736-6-2	6163	ABC	1147.80	ABC	75.3	AB	82.5	A	553	F	6.2	AB
TP230736-3-3	6149	ABC	1132.40	ABC	74.6	ABCD	76.9	ABCD	599	DEF	3.3	EF
TP230736-2-14	6104	ABC	1103.00	ABC	72.5	E	70.3	ABCDEF	650	CDEF	6.5	A
TP230723-1-15	6094	ABC	1127.40	ABC	74.8	ABC	72.1	ABCDE	630	CDEF	2.7	F
TP240743-1-5	5961	ABC	1052.70	ABCD	70.4	F	64.7	DEFG	718	BC	4.1	BCDEF
Georgia 16HO	5960	ABC	1114.00	ABC	75.4	AB	79.7	AB	574	F	3.6	DEF
Tx100212-03-03	5897	ABC	1091.60	ABCD	75.3	AB	70.4	ABCDEF	649	CDEF	3.8	CDEF
TP230736-3-15	5758	ABCD	1068.10	ABCD	75.0	ABC	65.7	DEFG	692	BCD	3.4	EF
TP230736-2-23	5744	ABCD	1040.10	ABCD	73.5	BCDE	75.9	ABCD	605	DEF	3.6	DEF
TP230736-6-10	5707	ABCD	1028.80	ABCD	72.7	DE	74.2	ABCDE	617	CDEF	4.3	ABCDEF
TP230723-1-31	5606	ABCD	1011.00	ABCDE	73.1	CDE	69.7	BCDEF	652	CDEF	5.6	ABCDE
Tx144370	5462	ABCDE	1006.40	ABCDE	74.6	ABCD	70.1	ABCDEF	650	CDEF	3.1	F
TP240743-4-3	5379	ABCDE	986.40	BCDE	73.6	BCDE	62.9	EFG	721	BC	2.9	F
TP230736-4-16	5245	BCDE	955.40	BCDE	73.6	BCDE	59.5	FG	764	AB	5.8	ABCD
TP230723-1-14	5100	CDE	930.00	CDE	73.1	CDE	82.6	A	551	F	3.5	DEF
CB7	4652	DE	872.90	DE	74.6	ABCD	54.3	G	837	A	5.0	ABCDEF
TP240743-1-1	4363	E	796.20	E	73.5	BCDE	66.3	DEFG	689	BCDE	2.9	F
Mean	5734		1052.64		74.1		71.0		651		4.3	
CV	14.3		14.7		2.2		13.8		13.6		38.3	
Entry "F"	0.04		0.0345		1E-04		0.002		0.00		0.019	

In addition to a test for yield we also annually conduct a leafspot screening at the research center in Yoakum, TX. Yoakum is in between Houston and San Antonio, and the center has been conducting peanut research for over 50 years. Leafspot pressure is typically very high due to its close proximity to the coast. In 2024, leafspot pressure was very good, and James Grichar was able to take visual ratings at the end of October. The ratings ranged from 5-8 with an average of 7 on the Florida 1-10 scale. The new leafspot-resistant cultivar from the USDA-ARS averaged 6 Interestingly, the two release candidates TP200625-3-2 and TP210656-2-1 also averaged 6 in the ratings (**Table 15**). One of the more exciting findings of 2024 was the results of the Multiple Disease Resistance Leafspot Trial. These ratings showed strong resistance with several lines exhibiting higher resistance than CB-7 (**Table 16**). The Advanced Line Trial and Leafspot Trial were also evaluated for Sclerotinia resistance. The 2024 season produced excellent disease pressure in Central Texas. Overall, in the Advanced Line Trial TP210657-1-1-3 and TP230736-3-15 had Sclerotinia rating in the lowest statistical grouping (**Table 17**) as did TP240743-4-3 in the MDR Leafspot Resistance Test #1 (**Table 18**) as well as performing well in the Leafspot Screening. These represent true candidates for multiple disease resistance cultivar releases.

Current and Future Releases

The 2024 season was very productive. The Cason group released four cultivars, two of which were high-oil cultivars, 31-08-05-03 and Tx137967. Both these lines represent high-oil lines on the market and are estimated to be between 10-12% higher than conventional varieties. These cultivars are the first lines to be included in Texas A&M's trademarked OilMax$_{TM}$ series and the

Breeding Program will continue to produce cultivars with the trademarked high-oil trait that will be branded with the OilMax logo.

Table 15. Advanced Line Test Leafspot Resistance in South Texas for 2024.

	Rating	
Cultivar	(0-10 scale)	
TP210624-2-1	8	A
TP220673-4-1	8	A
TxL100212-03-03	8	AB
Tx144370	8	AB
31-08-05-03	8	ABC
AG18	8	ABC
NemaTAM II	8	ABC
TP210612-3-1-1	7	ABCD
Tx137967	7	ABCD
TP200614-1-1-1	7	ABCD
TP210624-4-1	7	ABCD
Georgia 09B	7	ABCDE
Georgia 16HO	7	ABCDE
TP200625-3-2	6	BCDE
TP210657-1-1-3	6	BCDE
TP210656-2-1	6	CDE
CB-7	6	DE
TP200615-2-1-1	6	DE
TP230736-3-15	6	DE
TP200607-1-16	5	E
Mean	7	
CV	19.8	
Entry F	0.025	

Table 16. MDR Leafspot Resistance Test #1 in South Texas for 2024.

	Rating	
Cultivar	(0-10 scale)	
Tx100212-03-03	9	A
CB7	8	AB
TP230736-6-10	8	ABC
Georgia O9B	8	ABCD
NemaTAM II	7	ABCD
Tx144370	7	BCDE
Georgia 16HO	6	CDEF
TP230736-3-15	6	CDEF
TP230736-6-2	6	CDEF
TP230723-1-15	6	DEFG
TP230723-1-31	6	DEFG
TP230736-2-23	5	EFGH
TP230736-3-3	4	FGH
TP230736-3-19	4	FGH
TP230736-4-16	4	FGH
TP230723-1-14	4	FGH
TP240743-1-1	4	FGH
TP240743-1-5	4	GH
TP240743-4-3	4	GH
TP230736-2-14	3	H
Mean	6	
CV	36.6	
Entry F	<.0001	

Additionally, TP200625-3-2 is a high yield and grade medium-seeded runner cultivar that performs well in all growing regions of Texas. Finally, TP210656-2-1 is our first release into the hybrid Spanish market. It has a seed size and shape similar to Schubert but a low canopy growth like Georgia 09B. Both lines have yielded well for 3 years in statewide testing and are currently being increased at Texas A&M Foundation Seed Service.

Table 17. Advanced Line Test Sclerotinia Resistance in Central Texas for 2024.

	Rating	
Cultivar	(hits/plot)	
TP200625-3-2	68	A
Georgia 09B	56	AB
CB-7	54	ABC
TP200615-2-1-1	46	ABCD
TP210624-4-1	36	BCDE
TP200614-1-1-1	29	BCDEF
Georgia 16HO	29	BCDEF
TP200607-1-16	28	BCDEF
TP210656-2-1	25	CDEF
Langley	25	CDEF
TP230736-3-15	20	DEF
Tx137967	20	DEF
NemaTAM II	19	DEF
TxL100212-03-03	19	DEF
TP210624-2-1	16	DEF
TP220673-4-1	16	DEF
31-08-05-03	16	DEF
Tx144370	13	EF
TP210657-1-1-3	11	EF
TP210612-3-1-1	4	F
AG18	2	F
Tx901639-3	2	F
Mean	25	
CV	92.4	
Entry F	0.0003	

Table 18. MDR LS Sclerotinia Resistance in Central Texas for 2024.

	Rating	
Cultivar	(hits/plot)	
TP230736-2-23	63	A
TP230723-1-14	61	AB
Langley	60	AB
TP230736-3-3	59	AB
TP230736-3-19	58	AB
TP230736-4-16	53	ABC
TP230736-3-15	50	ABC
TP230736-2-14	49	ABC
TP230723-1-31	44	ABC
NemaTAM II	43	BC
CB7	42	BC
TP230736-6-2	42	BC
Georgia O9B	42	BC
Tx144370	37	CD
TP230723-1-15	36	CD
TP230736-6-10	36	CD
TP240743-1-5	35	CD
Tx100212-03-03	35	CD
Georgia 16HO	33	CD
TP240743-4-3	20	DE
TP240743-1-1	12	E
Tx901639-3	3	E
Mean	41	
CV	45.0	
Entry F	<.0001	

Closing Comments

Numerous exciting initiatives are currently in progress. Texas A&M AgriLife Research spearheads a significant endeavor aimed at devising climate-smart agricultural practices. Initial focus is on engaging peanut growers to trial these methods and confirm their efficacy. We are also starting an NRCS testing series that is called Testing Ag Performance Systems (TAPS) that recruits farmers to participate in a competition to encourage sustainable farming practices. Meanwhile, ongoing work centered around flavor analysis using NIR, gene editing, marker discovery, mutation breeding, germplasm enhancement, algorithm development, and aflatoxin issues in a field setting and in storage ensures our program remains at the forefront of research and variety advancement. We are making strides in high-throughput phenotyping utilizing Unmanned Aerial Systems (UAS) and handheld Raman spectroscopy, alongside efforts to develop novel populations geared towards drought resistance, enhanced yield, leafspot

resistance, and organic production. Moreover, we've embarked on new ventures addressing peanut nutrition and health, robotics integration in agriculture, and the creation of a high-throughput grading platform. Notably, we've initiated a groundbreaking project in collaboration with Chevron Corporation, focused on high-oil-content peanuts. We have also been funded by the NIFA and the NPB to develop high-oil peanuts that can be used for both cooking oil and renewable fuel. The unfolding of these endeavors hold transformative potential for peanut production in Texas, as well as the broader landscape of Texas agriculture.

Genomic and Phenomic Tool development

High Oleic Virginia Releases

Data from the Virginia Advanced Line Tests from previous years were pooled and analyzed across four locations and four years (**Table 19)**. The breeding line TxL090105-07 (5583 lb/ac) yielded similarly to Bailey (5592 lb/ac) and was superior to NC-7 (5205 lb/ac) and Champs (5117 lb/ac). Yield of TxL090106-15 (5340 lb/ac) was intermediate numerically among check cultivars and TxL090105-07 and not different statistically from any of them.

Table 19. Means for yield and grade over years and locations in the Virginia Advanced Line test. Data are excerpted from the larger analysis; only the two releases and the three check cultivars are shown.

Entry	Value ($/ac)	Pod Yield (lb/ac)	Shellout (%TSMK)	Seed Wgt (100 SMK)
Bailey	1066 a	5592 a	72.3 ns	93.9 c
TxL090105-07	1065 a	5583 a	73.0	92.9 c
TxL090106-15	1012 a-d	5340 ab	72.8	98.1 b
NC-7	989 b-d	5205 b	72.8	105.3 a
Champs	954 d	5117 b	71.8	98.6 b
p	0.004	0.02	0.305	0.001
Mean	1018	5389	72.6	97.0
LSD	67.1	344.3	—	2.8
CV	12.2%	11.8%	3.9%	5.2%

Hundred seed weights of both TxL090105-07 (92.9 g/100 SMK) and TxL090106-15 (98.1 g) were lower than NC-7 (105.3g); however, seed weight of TxL090106-15 was similar to Champs (98.6 g) and higher than Bailey (93.9g). Hundred seed weight of TxL090105-07 was similar to Bailey, and less than Champs and TxL090106-15. Shellout ranged from 71.8% to 73.0% TSMK among the entries in **Table 19**, but no significant differences were found among any of the accessions in the test.

Both Virginia lines were selected for high-oleic oil. Percent oleic acid was 73.6% in TxL090105-07 and 73.4% in TxL090106-15 **(Table 20)**. Oil percentage in the two releases was 44.3% and 44.4%, respectively. Flavor analysis was performed on TxL090105-07, and no fruity-fermented flavor was detected.

Table 20. Chemical and sensory analysis of releases.

Entry	% Oleic	% Linoleic	O/L ratio	% Oil	% Moisture	% Sugar	RP	FF
TxL090105-07	73.56	10.08	12.02	44.3	5.3	5.3	4.7	0
TxL090106-15	73.42	10.32	11.27	44.4	4.9	5	---	---

We are currently writing up release documents and expect to submit both entries to the Texas Plant Release Committee this year. We are planting appx. 3/4 ac of TxL090105-07 and 3/8 ac of TxL090106-15 in 2025 for increase.

Release of a First-Generation High-Oleic Drought-Tolerant Runner Variety

Trials under water deficit were performed from 2015 to 2018, and again from 2021 to 2024. Under these conditions (25% ET replacement from appx. 40 to 100 days after planting, about equal to dryland cultivation during the summer), TxL100212-03-03 was found to repeatedly outyield check varieties from 10% to >50% at the USDA-ARS and AgriLife locations in Lubbock **(Table 23)**. Typical mean yields for tests were on the order of ca. 1000 to 1500 lb/ac. Over three years, TxL100212-03-03 numerically outyielded all check cultivars in the test, including Georgia-09B by 30% over the years. For grade, TxL100212-03-03 was statistically superior to ICGS-76 and Flavorunner 458 in 2022 (data not shown), but differences were not statistically significant in 2021 or 2023. Mean shellout for TxL100212-03-03 (64.1%) was greater over the years than for Georgia-09B (60.7%); however, the rankings of these two accessions varied by year and location, so differences in grade were not consistent. Hundred seed weight was greater for TxL100212-03-03 than Georgia-09B in 2021 and 2022, but no significant difference was observed in 2023. Overall means were 57.7 and 48.8 g/100 SMK, respectively.

Table 21. Field Performance under Water Deficit Stress.

Accession	Pod Yield 2021 (lb/ ac)		Pod Yield 2022 (lb/ac)		Pod Yield 2023 (lb/ ac)		Pod Yield Mean (lb/ ac)	Mean Shellout (% TSMK)	Seed Weight (g/ 100 SMK)
TxL100212-03-03	1321	a-d	1370	b-f	1462	ns	1384	64.12	57.72
TamrunOL18L	1154	a-g	1265	c-f	1051		1157	57.64	51.31
ICGS-76	899	b-i	1136	d-f	1286		1107	53.43	50.46
Georgia09B	1065	a-h	1260	c-f	879		1068	60.70	48.85
TamrunOL02	751	f-i	1294	c-f	978		1008	57.15	49.85
FlvRun458	882	c-i	1057	ef			969	54.05	50.24
p	0.071		0.021		0.132				
Mean	958		1333		1489				
LSD	523		492		---				
CV	33.4%		22.3%		43.9%				

Trials under fully irrigated conditions in several sets of tests demonstrated that TxL1002012-03-03 repeatedly performed at the top of the test for yield, with yields ranging from 4000 to 6000 lb/ac. In trials run from 2021 to 2023 (**Table 22**), there were no significant differences observed for yield under irrigated conditions. However, TxL100212-03-03 was at the top of the test for yield in all three years, with a mean yield of 5106 lb/ac, compared to 4795 lb/ac for Georgia-09B, for an increase of 6.5% relative to Georgia-09B. Grade was similar to check varieties, except a little lower than Georgia 14N.

Table 22. Field performance under Irrigated Conditions.

Accession	Pod Yield 2021 (lb/ ac)	Pod Yield 2022 (lb/ ac)	Pod Yield 2023 (lb/ ac)	Pod Yield Mean (lb/ac)	Value Mean ($/ac)	Shellout Mean (% TSMK)	Seed Weight Mean (g/ 100 SMK)
TxL100212-03-03	5162 ns	5732 ns	4423 ns	5106	893	73.1	66.5
Georgia 16HO	4895	5436	4257	4863	867	73.4	65.7
Georgia 09B	4865	5446	4075	4795	843	73.2	61.0
AG18	4862	5192	4074	4709	838	71.7	58.8
NemaTAM II	4762	5645	3695	4701	840	71.1	68.0
Georgia 14N	5043	5054	3528	4542	849	74.8	57.1
p	ns	ns	ns				
Mean	5337	5058	4028				
LSD	ns	ns	---				
CV	23.5%	25.6%	34.5%				

We are currently writing up release documents for this release, including statistical analysis of means over years and expect to submit the documents to the Texas Plant Release Committee this year. A total of 3 acres (Is this correct? 2 acres near Lubbock + 1 acre at Vernon) are being planted for increase in 2025.

Drought-Tolerant Nematode Resistant Runner Test, 2024.

Breeding lines have been selected with three markers for drought tolerance, one for nematode resistance, and one for the high oleic trait. Selections from previous years were grown under water deficit irrigation (conditions as above) at two locations. Data on selections are shown below (**Table 23**). Again, several breeding lines did numerically better than check varieties for yield, although differences were not statistically significant this year. Grades and seed weights were similar to the check varieties.

Table 23. Field performance of nematode-resistant breeding lines under water deficit in 2024.

Genotype	Pod Yield (lb/ ac)	Shellout (%TSMK)	Seed Weight (g/100SMK)
TxL131901-349	2561 a	55.0 a-d	64.5 a-d
TxL144301-119	2254 ab	45.3 d-f	69.0 a
TxL144301-131	2178 ab	50.2 a-f	73.0 a
TxL144301-100	2114 a-c	46.3 b-f	70.8 a
TxL144301-016	2040 a-c	57.8 ab	69.9 a
TxL131901-030	1989 a-c	50.6 a-f	68.4 a
TxL144301-192	1975 a-c	48.7 a-f	67.8 a
TxL131901-225	1954 a-c	51.9 a-f	65.6 a-c
TxL144301-003	1953 a-c	52.2 a-f	68.2 a
TamrunOL18L	1945 a-c	54.9 a-d	68.7 a
...			
FlvRun458	1534 b-d	54.4 a-d	63.0 a-d
COC270	1525 b-d	56.3 a-d	62.5 a-e
Georgia-09B	1524 b-d	54.7 a-d	67.5 a
TxL144301-044	1395 b-d	53.3 a-f	68.3 a
...			
TxL131901-171	813 d	57.5 a-c	60.3 a-e
p	0.665	0.153	0.121
Mean	1757	51.34	64.6365
LSD	1001	11.74	13.165
CV	34.89%	9.89%	8.81%

Means over 4 years and 2 locations under water deficit generally are in agreement with 2024 results: several breeding lines consistently have performed better than check varieties under water deficit (**Table 24**). Several breeding lines yielded from 1% to 22% better than Georgia-09B under water deficit stress (we will be working on statistical analysis of means across years this summer). Tamrun OL18L also did well; however, it is not resistant to root-knot nematodes. Confirmation of nematode resistance is being performed by Dr. Terry Wheeler in the greenhouse. At least one of these selections appears to be segregating for nematode resistance, and reselections will be made using DNA markers.

Table 24. Field Performance of the Population Developed to Combine Drought Tolerance and Nematode Resistance in a High Oleic Runner. Values shaded in blue are in the top 5 entries in the test for that trait. Values shaded in green are ranked 6th to 10th.

Accession	Pod Yield (lb/ac)	Shellout (% TSMK)	Seed Wgt (100 SMK)	Yield Adv vs Georgia-09B	Increase?
TamrunOL18L	1771	50.5	54.6	25.6%	
TxL144301-131	1730	45.5	53.4	22.7%	yes
TxL144301-119	1614	38.5	51.3	14.5%	
TxL144301-016	1605	42.2	46.3	13.8%	
TxL144301-001	1595	47.6	47.7	13.1%	yes
TxL144301-044	1514	47.7	49.4	7.4%	yes
TxL144301-100	1464	39.7	52.3	3.9%	
TxL144301-025	1454	39.5	46.5	3.1%	
TxL144301-103	1434	52.3	51.9	1.7%	yes
TxL144301-171	1420	41.0	46.1	0.8%	
TxL144301-112	1416	43.5	47.6	0.4%	
TxL144301-003	1412	43.8	47.5	0.2%	
Georgia09B	1410	48.2	47.6	0.0%	
...					
TxL144301-170	1379	51.9	55.5	-2.2%	yes
...					
Tx071304	1230	42.1	46.8	-12.7%	
FlvRun458	1175	43.0	45.0	-16.7%	
COC270	1123	32.7	40.5	-20.3%	
...					
Overall Mean	1353	43.2	47.7		

Five of these breeding lines are being increased on 1/10 acre plots each in 2025 and are being planted in South Texas under irrigated conditions. If any do relatively well also under irrigated conditions, we will plan to release one as a new variety in the next year or two as a second-generation drought-tolerant runner.

Possible Third-Generation Drought-Tolerant, High Oleic Runner

The TxL100212-03-03 breeding line was identified as having superior yield under both water deficit and fully-irrigated conditions, and for this reason was put into advanced yield trials early.

However, there were some additional breeding lines that have been selected, with yields under water deficit that appear to be better than TxL100212-03-03. Yields over 4 years and 2 locations are shown in **Table 25.** However, in limited testing, these lines did not perform as well as TxL100212-03-03 under irrigated conditions. After several additional years of testing under

water deficit, these lines appear good enough to put into irrigated trials again- yields of the best lines are 10% to 36% higher than TxL100212-03-03 under water deficit. One (TxL100225-03-08) has yield better than Georgia-09B and grade similar to the check variety. Others have yielded better than Georgia-09B but grade 2 or 3 points lower.

We have selected five lines (marked as Increase: yes) to put into irrigated trials throughout the state, beginning in South Texas in 2025. In addition, we are increasing each of these lines on 1/10 acre plots in 2025 to have sufficient seed for future increases or testing under the auspices of seed companies.

Table 25. Mean field performance under water deficit over 4 years. Values shaded in blue are in the top 5 entries in the test for that trait. Values shaded in green are ranked 6th to 10th.

Genotype	PodYield	Shellout (%TSMK)	Seed Wgt (100 SMK)	Yld Adv Rel to Ga09B	Increase?
TxL100225-03-08	1834	63.8	55.1	59%	yes
TxL100212-07-01	1651	57.4	51.5	43%	yes
TxL100225-03-05	1646	61.2	54.1	43%	yes
TxL100212-05-10	1547	59.0	56.1	34%	yes
TxL100225-05-07	1475	59.6	53.7	28%	
...					
TxL100212-03-03	1345	67.2	62.5	17%	
...					
ICGS-76	1298	53.5	49.3	13%	
FlvRun458	1239	49.8	45.7	8%	
...	1222	57.9	53.2	6%	
TxL100212-07-04	1201	64.4	55.8	4%	yes
...	1198	66.7	57.3	4%	
Georgia09B	1152	63.1	49.5	0%	
...					
TamrunOL18L	1096	57.6	52.9		
...					
TamrunOL02	979	57.2	50.5		
...					
TxL100212-03-11	850	61.9	50.8		
Mean	1309	57.1	52.7		

High-Oleic Drought-Tolerant Spanish Peanut.

The goal of this work is to develop a high-yielding, high-oleic Spanish peanut that is tolerant to drought and has low potential for developing aflatoxin contamination. Although aflatoxin contamination is relatively low under irrigation, declining water availability presents the risk that this problem could increase in the future.

One of the parents is 55-437, which is partially drought-tolerant and resistant to aflatoxin contamination in West Africa. This has been crossed by Schubert and a Schubert sister line. The best lines from a larger population evaluated over 3 years were planted in 2024 at two locations and grown under water deficit. Approximately half of the accessions yielded numerically better than Schubert (those yielding less are not shown) (**Table 26**). Many lines graded 1 or 2 points below Schubert.

Table 26. Agronomic data from the Spanish Drought Test in 2024.

Genotype	Pod Yield (lb/ac)		Shellout (%TSMK)		Seed Weight (g/100SMK)	
14GAF1334	1640	a	53.5	ij	42.1	h-l
14GAF1344	1439	ab	62.0	b-f	44.0	e-l
14GAF1340	1361	a-c	61.5	b-g	48.1	b-j
14GAF1301	1214	a-d	58.5	d-h	49.4	b-g
14GAF1314	1139	a-e	61.5	b-g	51.8	a-d
14GAF1407	1081	a-f	62.0	b-f	50.3	a-f
14GAF1364	1029	b-g	59.0	c-h	46.1	c-l
14GAF1303	1017	b-g	60.0	b-h	41.8	h-l
14GAF1335	1012	b-g	61.5	b-g	48.9	b-h
14GAF1405	998	b-g	59.0	c-h	41.9	h-l
14GAF1464	977	b-g	60.0	b-h	50.4	a-f
14GAF1305	926	b-g	52.5	j	57.3	a
55-437	917	b-g	58.0	e-i	41.6	i-l
14GAF1353	908	b-g	62.5	b-e	44.3	e-l
TxL054520-27	888	b-g	60.0	b-h	46.2	c-k
14GAF1412	875	b-g	.		40.6	kl
14GAF1366	873	b-g	62.0	b-f	41.7	h-l
14GAF1385	871	b-g	63.0	b-d	52.7	a-c
14GAF1315	863	b-g	61.5	b-g	48.7	b-i
14GAF1343	862	c-g	59.0	c-h	44.9	d-l
14GAF1373	849	c-g	64.0	b	44.6	d-l
14GAF1346	845	c-g	62.0	b-f	46.6	c-k
14GAF1413	811	c-g	58.5	d-h	45.0	d-l
Schubert	776	d-g	63.5	bc	42.0	h-l
p	0.123		<0.001		0.001	
Mean	176		61.9		45.9	
LSD	105		4.8		7.3	
CV	29.36%		3.81%		7.76%	

Pooling data over 4 years, the top 10 lines yielded 17% to 31% more than Schubert (**Table 27**). Four of the top 10 yielding lines graded as well as or better than Schubert. Several lines graded 3 to 5 points higher than Schubert, but the lines that graded the best were not in the top third of the test for yield. This trend of lower grades in the top-yielding entries was also seen in one of the runner populations developed for tolerance to water deficit.

A second goal is to screen the population for resistance to aflatoxin contamination, using both an *in vitro* seed colonization assay and a metabolomics assay for seed coat compounds that we have identified as causing resistance to colonization and aflatoxin production (see below).

Table 27. Means field performance of the Spanish population under water deficit stress over 4 years of evaluation. Values shaded in blue are in the top 5 entries for that trait, green shading- 6th to 10th, yellow- 11th to 15th, and orange- 16th to 20th.

Genotype	Mean Pod Yield (lb/ ac)	Mean Shellout (% TSMK)	Seed Size (g/100 SMK)
14GAF1305	1588	49.8	43.4
14GAF1412	1538	59.1	41.6
14GAF1334	1529	56.7	40.0
14GAF1344	1526	62.7	42.5
14GAF1367	1502	60.9	47.4
14GAF1340	1474	58.8	44.0
14GAF1343	1469	54.1	40.3
14GAF1301	1437	55.9	48.7
14GAF1314	1436	60.3	49.3
14GAF1339	1419	60.3	38.0
14GAF1418	1397	58.3	41.5
14GAF1364	1385	59.2	44.7
14GAF1380	1359	62.2	39.3
14GAF1353	1356	60.9	38.4
14GAF1332	1353	55.6	45.6
14GAF1335	1339	61.1	48.4
14GAF1373	1334	65.7	41.4
14GAF1407	1329	60.3	47.4
TxL054520-27	1321	63.6	45.5
14GAF1464	1315	54.9	47.4
...			
14GAF1302	1275	64.0	39.3
...			
14GAF1363	1242	62.9	42.8
14GAF1346	1233	62.8	40.9
14GAF1366	1229	64.8	41.7
...			
55-437	1217	58.0	41.6
...			
Schubert	1212	60.4	43.5
...			
14GAF1315	1184	63.8	45.9
...			
14GAF1401	1131	60.9	40.3
14GAF1385	1125	66.6	48.2
...			
14GAF1459	959	56.5	42.5
Mean	1271	59.0	42.1

Seed Coat Compounds that Inhibit Colonization by *A. flavus* and Aflatoxin Production.

In collaboration with Dr. Venu Mendu's program at Texas Tech and with partial USAID (Feed the Future) support, we grew Spanish peanuts under water deficit and identified new sources of moderate resistance to colonization by *A. flavus*. Schubert and TMV-2 were susceptible, but 55-437, some plant introductions, and two TxAG-6 backcross (BC3) lines used as donors of resistance to early leaf spots possessed a moderate degree of resistance (**Figure 1**).

Figure 1. Colonization by *A. flavus* on four genotypes grown under well-watered conditions. Left to right: 55-437, TMV-2, BC3-60-02-03-02 and BC3-43-09-02-03. Note that there is relatively little growth of *A. flavus* on BC3-60-02-03-02.

Seed coats were peeled, compounds extracted from the soluble fraction, and small molecules present were identified by HPLC/MS/MS (high performance liquid chromatography, mass spectroscopy), from the soluble fractions of resistant and susceptible genotypes grown in the field under irrigated and terminal drought conditions – the latter meant no irrigation from the early pod fill stage through to maturity. This metabolomic analysis identified 47 compounds present in higher amounts in the partially-resistant materials. Of these, 10 were selected for further analysis (based on cost and availability in sufficient quantities for additional testing).

Testing was performed by adding compounds to petri dishes and measuring the reduced growth rate of the *A. flavus* fungus in plates where the different chemicals were added and compared to fungal growth on the control plates. After this, fungal mycelia were isolated, extracted for aflatoxins, and concentrations tested using immuno test strips (somewhat similar to the types used for covid testing, except able to measure the amount of aflatoxin present). The table below (**Table 28**) shows that three of the compounds (*p*-coumaric acid, ferulic acid, and 2,5-dihydroxybenzaldehyde) resulted in decreases from 90% to 99% in the levels of aflatoxin present in the cultures compared to the negative control.

Results were presented at the APRES meeting last July, and the graduate student (Leslie Commey) won the award for the best poster at the Joe Sugg PhD poster competition.

Based on these results, and due to the high cost of the analyses, we purchased a used HPLC/MS/MS under other funding to perform additional analyses, to begin screening breeding lines such as the drought-tolerant Spanish population, and to develop a high-throughput method of analysis that would be faster and cheaper than HPLC/MS/MS.

USAID funding provided a significant addition to peanut board funding for the Spanish drought and aflatoxin work. Unfortunately, with the recent elimination of USAID, we have lost funding for a postdoc working on the project [the one who identified the seed coat compounds in the first place], and will have to drop some of this work. We have also lost half the funding for a graduate student who began working on the Spanish drought project in September.

Table 28. Estimation of aflatoxin contamination of the ten metabolites after radial growth bioassay.

Metabolites	Molecular formula	Aflatoxin (ppb)	% Reduction
3,5-Dihydroxybenzoic acid	C7 H6 O4	143 ± 7	86%
Ferulic acid	C10 H10 O4	30 ± 7	97%
Eriodyctiol	C15 H12 O6	128 ± 10	87%
Formononetin	C16 H12 O4	219 ± 8	78%
p-coumaric acid	C9 H8 O3	97 ± 8	90%
Daphnetin	C9 H6 O4	302± 6	70%
2,5-Dihydroxybenzaldehyde	C7 H6 O3	3.1± 0.5	>99%
Xanthohumol	C21 H22 O5	325.4± 6	68%
Genistein	C15 H10 O5	210 ± 5	79%
Naringenin	C15 H12 O5	218 ± 4	78%
Nystatin	C47H75NO17	4.7 ± 0.6	>99%
Negative Control		994 ± 3	
Control (PDA media no inoculation) check		2.3 ± 0.6	

Spanish Leafspot Early Leafspot Resistance Testing

Two populations have been developed and tested for resistance to leafspot. These are Schubert (high oleic Spanish) x BC3-60-02-03-02 and NKatieSARI x Schubert. We have shown previously that BC3-60-02-03-02 is a runner line with resistance to early and late leafspot. It was developed from TxAG-6 (wild species hybrid developed by Dr. Simpson, which is a donor for nematode resistance), and NKatieSARI is a leafspot-resistant Virginia bunch line from Ghana that has good resistance, and a growth habit not too different from Spanish peanut, but is late maturing. The goal is to introduce leaf spot resistance into Schubert but keep the high oleic oil and earlier maturity than the resistant donors. The progeny of two crosses was evaluated, with the first being Schubert x BC3-60-02-03-02.

We only had enough seed for planting a few of the selections made in 2021, due to major losses from caterpillars in 2022 and deer grazing in 2023. However, for the BC3 x Schubert test (**Table 29**), we did see that all of the selections except two (one was a susceptible line intentionally retained as a susceptible check) had leaf spot scores numerically lower than Schubert at the early (ELS_1, October) and late (ELS_2, at harvest) ratings. Schubert had about 35% to 45% defoliation at these two rating dates. For TxL190128-06-02, there was no measurable defoliation at the early rating date, but about 25% at harvest.

Currently, we have identified two DNA markers for resistance in this population (see below). Also, BC3-60-02-03-02 has shown some resistance to aflatoxin contamination, so this is a second Spanish population that could have some resistance to aflatoxin contamination, although, we have never screened the population for this because it is a recent discovery.

Table 29. Leafspot scores for the BC3 x Schubert population at Yoakum, TX. A score of "1" means no disease, "10" means that all plants in the plot were dead.

Genotype	ELS_1		ELS_2		ELS_avg	
Bailey II	3.25	b	4.00	b	3.63	b
TxL190128-06-02	3.33	b	5.00	ab	4.17	ab
BC3-60-02-03-02	4.25	ab	5.25	ab	4.75	ab
TxL190122-08-01	4.83	ab	5.67	ab	5.25	ab
TxL190110-02-01	5.25	ab	5.75	ab	5.50	ab
TxL190118-08-01	5.00	ab	6.00	ab	5.50	ab
TxL190122-11-01	5.13	ab	6.25	ab	5.69	ab
TxL190119-07-01	4.67	ab	6.50	ab	5.58	ab
TxL190133-05-01	6.13	a	6.75	a	6.44	a
Schubert	6.00	a	6.75	a	6.38	a
TxL190110-11-03	5.88	a	6.75	a	6.31	a
p	0.001		0.015		0.003	
Mean	4.93		5.89		5.41	
CV	17.83		16.97		16.56	

We also made selections for resistance from the NKatieSARI x Schubert population (**Table 30**). Several breeding lines in this population had lower leaf spot ratings than lines in the BC3 x Schubert population. Five had no noticeable defoliation (score of 1 to 3) to 10% defoliation (score of 4) at harvest, while Schubert had over 50% defoliation.

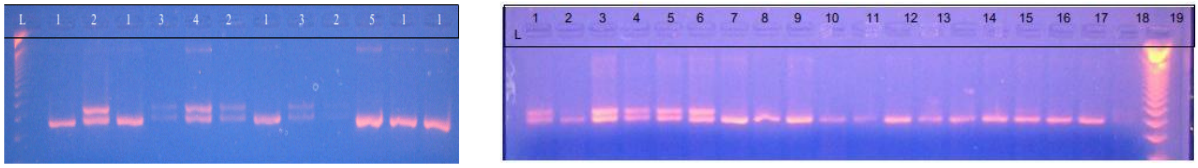

Figure 2. Left panel: 1- Schubert, 2- BC3-60-02-03-02, 3- BC3-43-09-03-02, and 4- Bailey. Right panel: each lane is a different progeny line from the cross between BC3-60-02-03-02 and Schubert.

Table 30. Leaf spot ratings from the NKatieSARI x Schubert population.

Genotype	ELS_1		ELS_2		ELS_avg	
TxL151198-02	3.25	d	3.50	e	3.38	e
TxL151161-02	3.63	cd	3.75	e	3.69	de
TxL151151-04	3.75	b-d	4.00	de	3.88	c-e
TxL151187-01	3.50	cd	4.13	de	3.81	de
TxL151159-02	4.13	b-d	4.25	c-e	4.19	c-e
TxL151171-01	3.63	cd	4.63	c-e	4.13	c-e
TxL151207-01	3.75	cd	4.63	c-e	4.19	c-e
TxL151161-03	4.38	b-d	4.75	b-e	4.56	c-e
TxL151153-03	4.33	b-d	5.00	b-e	4.67	b-e
TxL151147-01	4.50	b-d	5.75	b-e	5.13	b-d
TxL151156-01	4.25	b-d	6.13	b-d	5.19	b-d
TxL151137-02	4.75	bc	6.50	abc	5.63	bc
Schubert	5.75	b	7.50	ab	6.63	ab
TxL151153-07	8.25	a	8.50	a	8.38	a
p	<0.001		<0.001		<0.001	
Mean	4.39		5.18		4.78	
CV (%)	12.24		16.17		12.54	

The number of seeds from these populations is small. In addition to repeating testing, we will increase seed so that we can repeat testing on some other accessions that did well in 2021 and perform disease-free yield testing on breeding lines with good resistance scores.

BC3 x Schubert marker data

As part of a project to develop a leafspot-resistant, high-oleic Spanish variety, we have been developing markers to help with selection for resistance. Two of these are shown below.

The first is an SSR (simple-sequence repeat, or microsatellite) marker. There are two forms, one linked to the allele for susceptibility to early leafspot, and the other linked to resistance. In **Figure 2**, lanes in the left panel with one band are susceptible to early leaf spot, and lanes with two bands have partial resistance. The two backcross lines and Bailey all inherited resistance from the wild species *A. cardenasii*. The two BC3 lines had TxAG-6 as a parent. In the right panel are different breeding lines from the cross between the resistant runner BC3-60-02-03-02 and the susceptible high-oleic Spanish variety Schubert. As can be seen, some of the breeding lines have the marker for resistance, and some do not.

We have been developing newer types of markers, called KASP (Kompetitive Allele-Specific Primer) markers. In **Figure 3**, it can be seen that the breeding lines are segregating for this resistant marker and that the susceptible Schubert and resistant BC3 parents have different scores. As resistance to leaf spots is controlled by several genes, we need different markers for each gene.

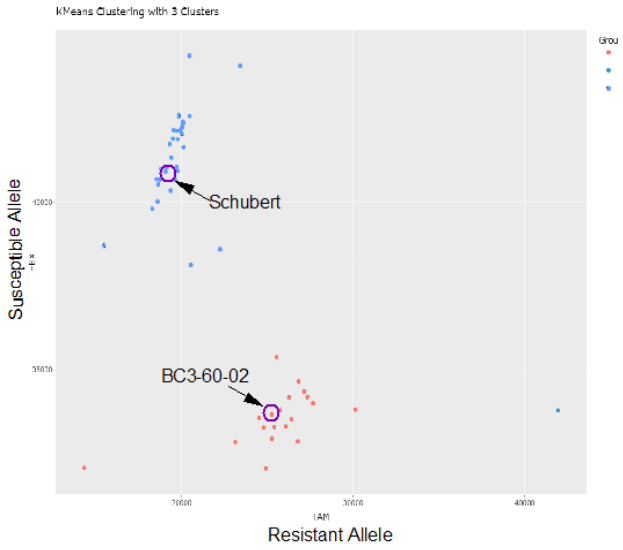

Figure 3. KASP marker for resistance to early leaf spot.

Improved Marker Maps for Selection.

We improved a genetic map of peanut from the TxAG-6 x Florunner population developed by Dr. Simpson and used for introgression of resistance to nematodes and leafspot. The backcross lines may also be useful for resistance to aflatoxin contamination because certain seeds have shown resistance to colonization by *A. flavus*.

A previous graduate student (Theophilus Tengey) had developed a map of this backcross population, but it was missing two linkage groups (chromosomes). He updated the map and filled in markers on the missing chromosomes. The map (**Figure 4**) has been expanded from 150 to 229 markers, with a total map length of 4404 cM. All linkage groups in the Tifrunner whole genome sequence reference map are represented, but 20 linkage groups are expected. However, there are 34 linkage groups, although there is evidence that several should be joined as part of the same chromosome. Taking this into account, there would be 23 linkage groups. This will require some refining yet.

The advantage is that these are KASP markers, which can be used in the lab easily, allowing for markers to be used for screening peanut plants quickly and inexpensively.

As part of a different project (funded by NIFA, see below), we expect to use a higher-density map made using a SNP chip to develop more KASP markers for breeding. We will also be re-analyzing leafspot data to develop additional markers for resistance to leafspot, and compare them to *A. flavus* colonization and aflatoxin contamination data to identify DNA markers for resistance to this fungus.

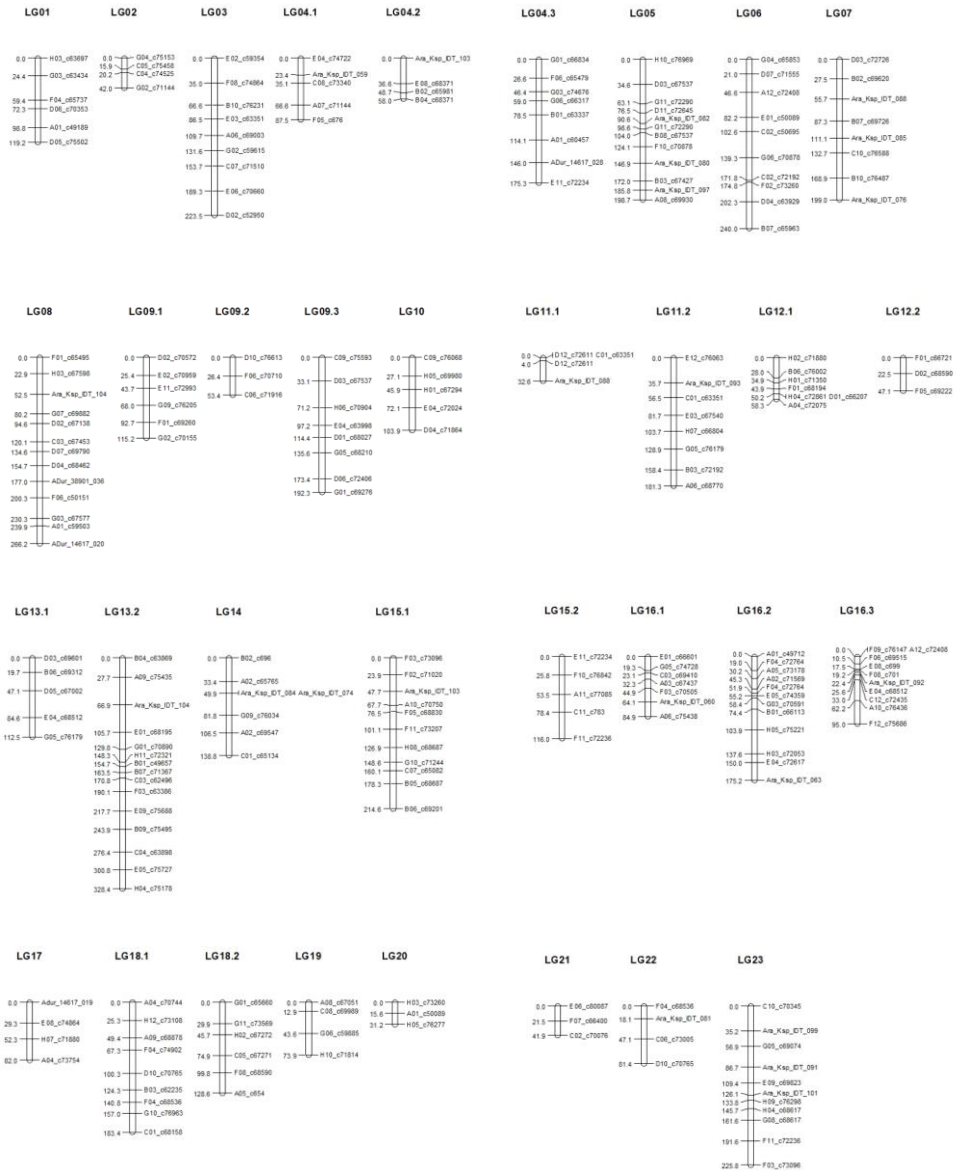

Figure 4. KASP marker map of the BC1 generation of the Florunner x TxAG-6 population.

High-resolution marker map.

We made an initial attempt to map markers obtained from the peanut community Axiom Arachis_Array2 SNP chip. For this, we sent DNA from the same Florunner x TxAG-6 population to Affymetrix for genotyping. From this, they identified 9,589 polymorphic, high-resolution markers. We found ca. 6,200 to pass quality control and used 1,200 for an initial analysis. The draft map that we developed (**Figure 5)** has a higher density than the KASP marker map.

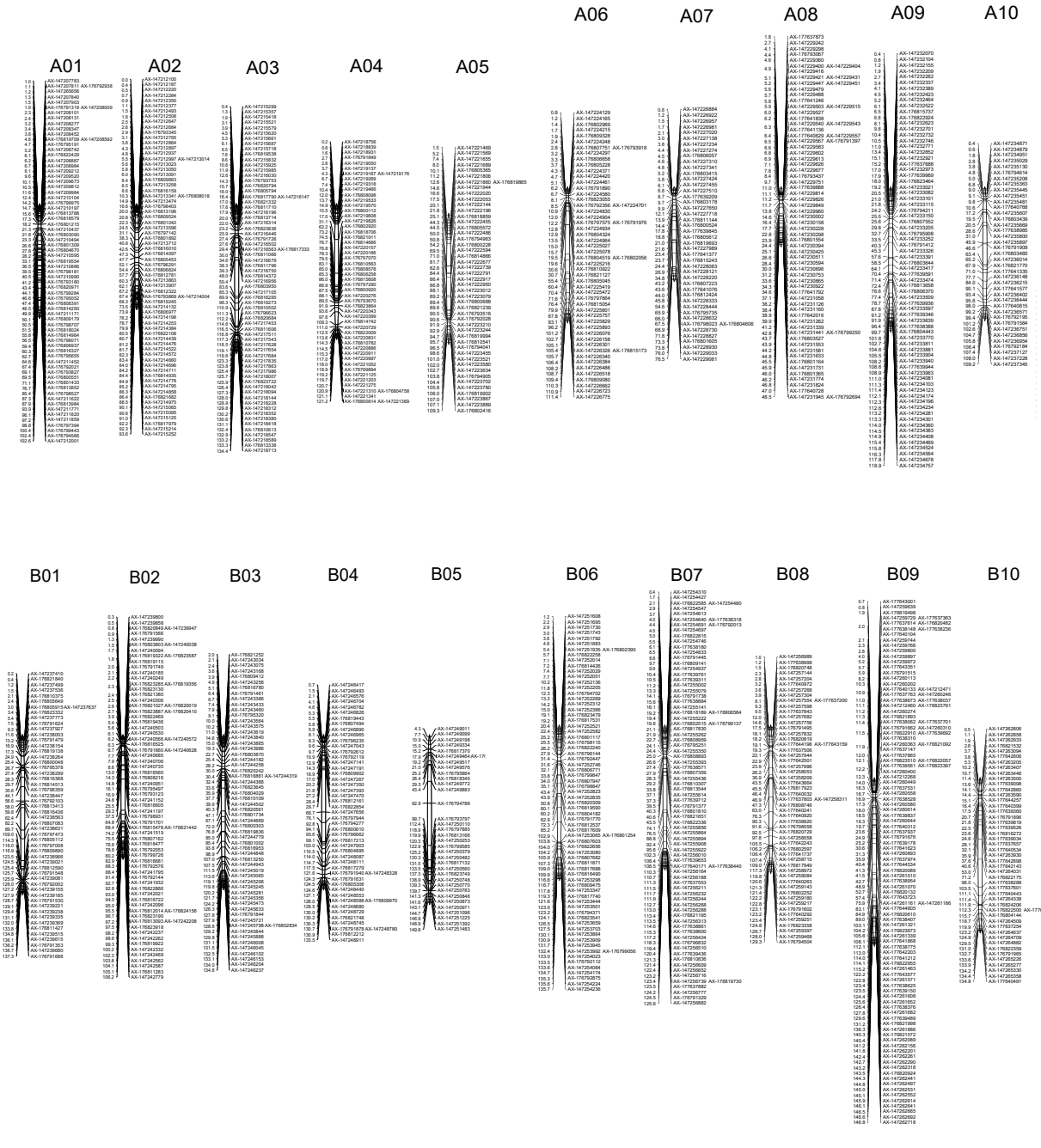

Figure 5. SNP marker map of the BC_1 population. Map was made using ca. 1,200 of the 9,589 polymorphic high-resolution markers obtained from genotyping on the *Arachis* Axiom_Array2 SNP chip.

The complete set of BC3 lines are also being genotyped on the SNP chip as part of the NIFA project. This will be used to help us identify additional markers for resistance to root-knot nematodes, early leafspot, and aflatoxin contamination. These markers are too expensive to use routinely in a breeding program, but the map and the QTL (quantitative trait locus) data will be useful in developing more KASP markers that can improve our breeding program efficiency.

UAV imaging for drought tolerance.

We are beginning to use UAV (Unmanned Aerial Vehicle drone) imaging to predict performance under water deficit stress. Expected benefits are (a) the ability to take repeated images of the field weekly throughout the growing season. Taking ground-based data is very labor-intensive and can be done at best two or three times during the growing season, and only for a few of the tests, (b) the ability to take different measures of plant responses, allowing for selecting accessions with different favorable responses to water deficit, (c) once methods are good enough, they may allow for making selections before harvest or based on photos obtained at harvest. This could allow for planting more materials, but harvest only those that yield the best, making a more efficient use of resources, especially as labor is becoming increasingly scarce and expensive.

We have been working with personnel at the USDA-ARS in Lubbock for UAV analysis. We took ground-based measurements (SPAD chlorophyll, canopy temperature, flowering, leaf folding, wilting) again in 2024 on two populations (including the drought-tolerant, nematode-resistant population in #2 above) under drought stress the same day as USDA personnel took aerial images. We also took images at the USDA and at AgriLife using a set of drone cameras (RGB- red/green/blue, and OCN- orange/cyan/infrared) on a 30 ft pole mounted on a tractor.

We are relying on USDA-ARS personnel to stitch images together and compare them to field and yield data. Each organization will be using two very different models for relating image data to yield. **Figure 6** shows two examples of the differences in stand, leaf color, plot dimensions (height, width, and area covered) that we are capturing. The OCN camera is expected to pick up canopy temperature in the infrared band.

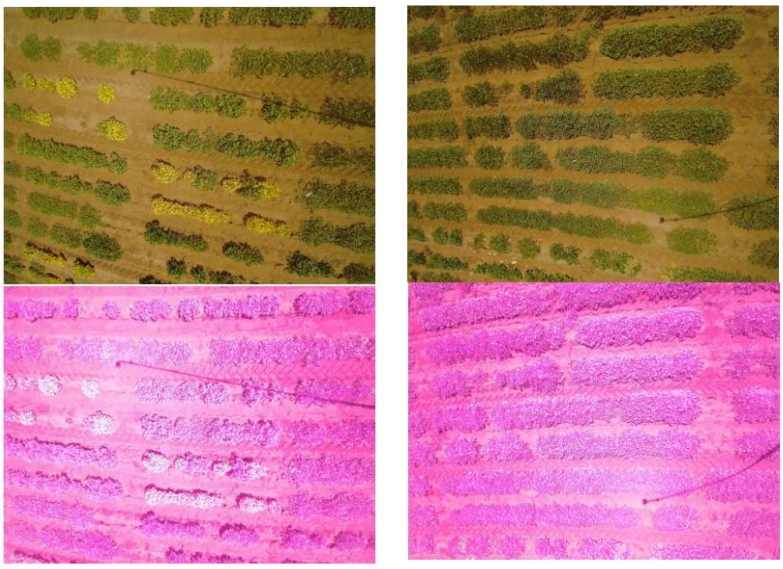

Figure 6. Pole camera images of field plots. The images on the left were taken of the same plot with RGB (top) and OCN (bottom) cameras. Yellow leaves in some plots and skips in the field are visible. Images on the right were from a different plot. A mixture of plant types (runners at top, Spanish at center right) are visible.

High Throughput Phenotyping

Unmanned Aircraft System (UAS) and sensors are an emerging remote sensing technology that provides imagery datasets with exceptional spatiotemporal resolutions. UAS can collect images quickly and repeatedly under appropriate weather conditions for agricultural applications. UAS-based imagery data also provides advanced phenotypic data using image processing and computer science algorithms, which is very useful and practical for extracting crop traits. The ongoing UAS program continues to develop. The units of UAS platforms and sensors that were obtained in the late summer of 2022 were used in 2023. Similar to previous years, UAS data was collected, and a UAS-based High-Throughput Phenotyping system was adopted to extract various crop parameters such as canopy cover, plant height, vegetation indices, etc. Additionally, this year, we measured the length of plots from the obtained UAS data. To better understand the collected UAS data and their association with yield, we closely analyzed and are presenting the data collected from the field trial conducted at the AgriLife center's location.

UAS Data Collection

Texas A&M AgriLife Research at Stephenville conducted UAS data collection using DJI Phantom 4 Pro to acquire RGB and multispectral images. The UAS data collection protocol developed by Texas A&M AgriLife Corpus Christi was followed to collect high quality UAS data. This protocol included UAS flights at 25-meter altitude with 80% overlaps, depending on the sensors used and proper installation of Ground Control Points (GCPs). The protocol is designed to create a digital representation of the field to facilitate the phenotyping measurements from the digital replica of the field instead of manual measurements. The protocol ensures high quality of the data collected and, subsequently, the measurement quality.

UAS Data Processing:

The UAS image processing pipeline developed by our team is divided into three levels and presented in **Figure 7**. The workflow starts with the collection of raw overlapping images (Level 0 data product from different sensors and platforms). Level 0 overlapping images are used to triangulate points in the field in the 3D space (point cloud). The process is commonly known as structure from motion (SfM), where it improves the camera locations and orientations during the data collection and reconstructs the 3D point cloud. Part of the triangulation process is to include the GCPs to map the point cloud and the subsequent products to Earth's surface coordinate system. GCPs help to obtain temporal measurements such as height and volume changes in the canopy over the season. GCPs are also used to verify the quality of the measurements; for instance, the level of accuracy is within 2-3 cm error of test GCPs. Level 1 geospatial data products, such as Digital Surface Model (DSM) and orthomosaic image data. Level 2 data products are generated from the Level 1 data products and represent relevant biological crop features, canopy height, canopy cover, various vegetation indices, such as Normalized Difference Vegetation Index (NDVI), Soil Adjusted Vegetation Index (SAVI), and Excessive Greenness Index (ExG). Plot boundaries are also developed during the Level 2 phase to break down the field maps and obtain plot-level measurements. All raw data collected from UAS was processed to generate an orthomosaic and DSM. We adopted the Agisoft Metashape software (Agisoft LLC, St. Petersburg, Russia), which is one of the famous commercial software to stitch

UAS raw images using SfM GCPs' GPS coordinates weas also input in the image stitching process for removing distortion and precise geo-referencing.

Once the orthomosaic is generated, canopy features such as height, cover, and vegetation indices are obtained. Canopy height (CH) is generated by using two digital elevation models. The first flight is the ground before germination, commonly named digital terrain model (DTM) or the soil. The second map is a subsequent elevation model in the season where plants germinate, and it is known as digital surface model (DSM). The canopy height model (CHM) is the result of subtracting DTM from DSM which results in the height of the field's canopy. A classification algorithm will be used to obtain canopy cover (CC) from orthomosaic images. The classification algorithm uses red, green, and blue spectral bands of orthomosaic images and Red Green Blue Vegetation Index (RGBVI) to generate a binary classification that separates canopy areas from non-canopy areas on the image. A plot boundary file with plot/grids will be created and overlaid on the CHM to obtain height measurements and to calculate percentage of green pixels (CC) within each grid/boundary. Canopy volume (CV) provides an estimate of plant biomass as a combination of canopy size and height. CV for individual grids is calculated as the sum of pixels classified as canopy multiplied by the individual pixel height. We also calculated multi-spectral and RGB-based vegetation indices to assess canopy efficiency and canopy health (**Figure 8**).

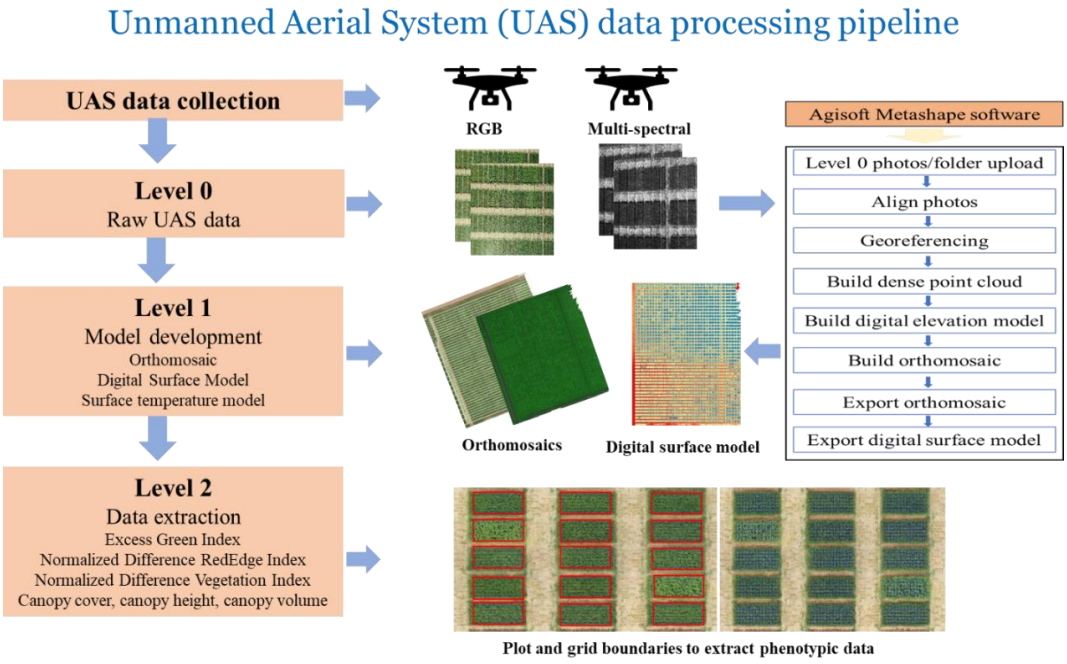

Figure 7. Overall, UAS data processing pipeline used to process raw images and obtain phenotypic information.

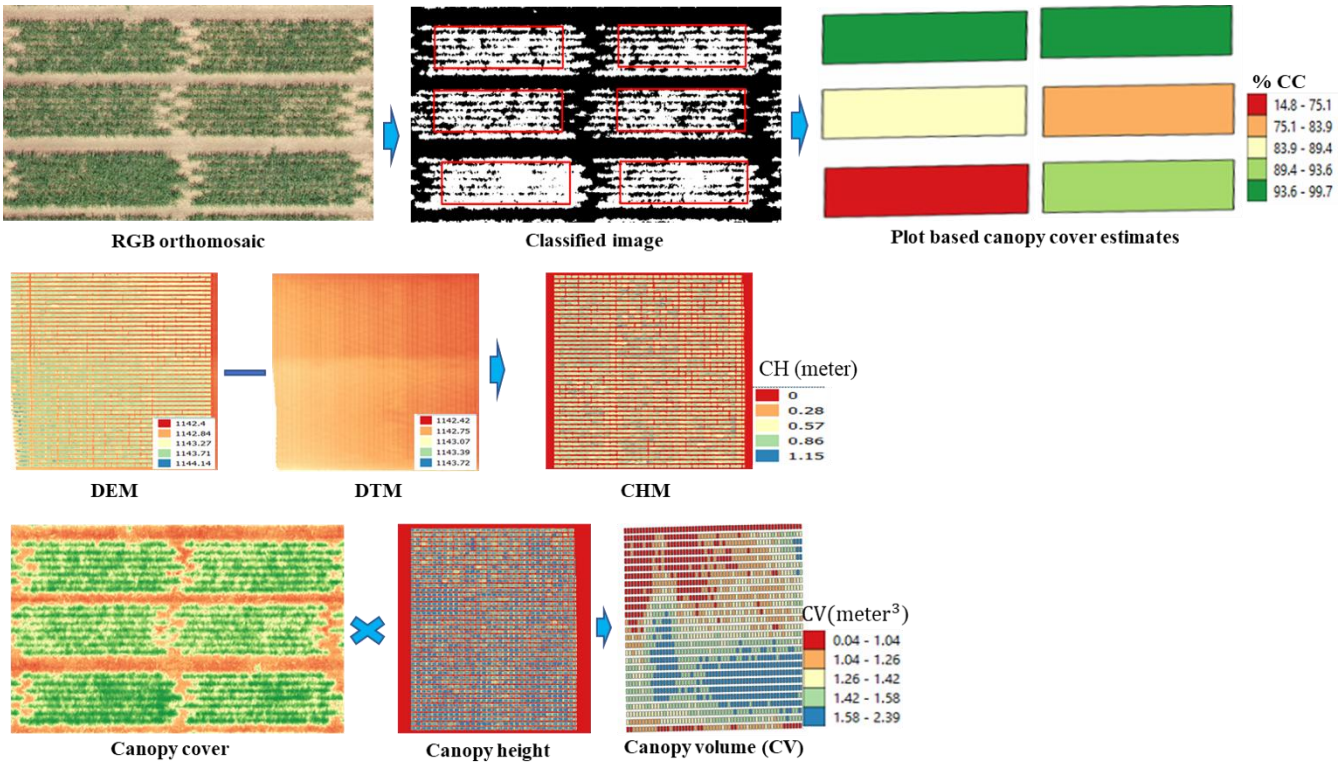

Figure 8. Estimating canopy cover (CC), canopy height (CH), and canopy volume (CV) from Unmanned Aerial Systems (UAS)-based orthomosaic and digital surface models (DSMs)

Data extraction and analysis

The data was extracted by creating plot boundaries (**Figure 9**) for all of these plot rows. Length of the rows for each plot row was calculate as well.

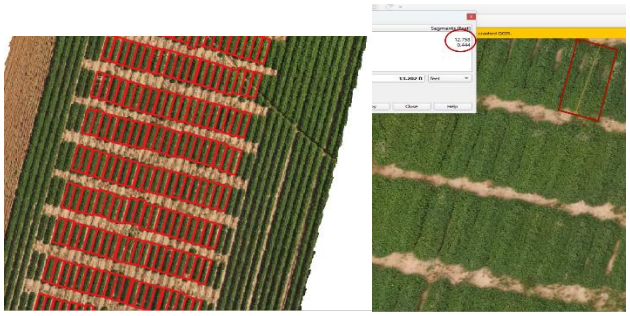

Figure 9. Plot boundaries and row length calculations

Canopy cover (CC), canopy height (CH), canopy volume (CV), Normalized Difference Vegetation Index (NDVI), and Normalized Difference Red Edge (NDRE) features were extracted from the UAS imagery. **Figure 10** shows the box plot graphs for these measurements for all the plots. CC, which is measured in percentage, ranged from 0 to 60%. During the peak growth phase, the maximum CH reached >45 cm in some plots, but on average it was 30 to 36 cm. CV, which provides a three-dimensional measurement of the canopy 1-1.25-meter cube per plot. NDVI, which normally ranges from -1 to +1, was around 0.15 to 0.6 during the growth period in this study. The value of NDRE, which ranges from -1 to +1, was around 0.6 to 0.8 in this study. The structural features, CC, CV, CH, followed a sigmoidal growth pattern resulting in

slow growth early in the season, followed by a linear phase, and a steady phase until it starts to senesce.

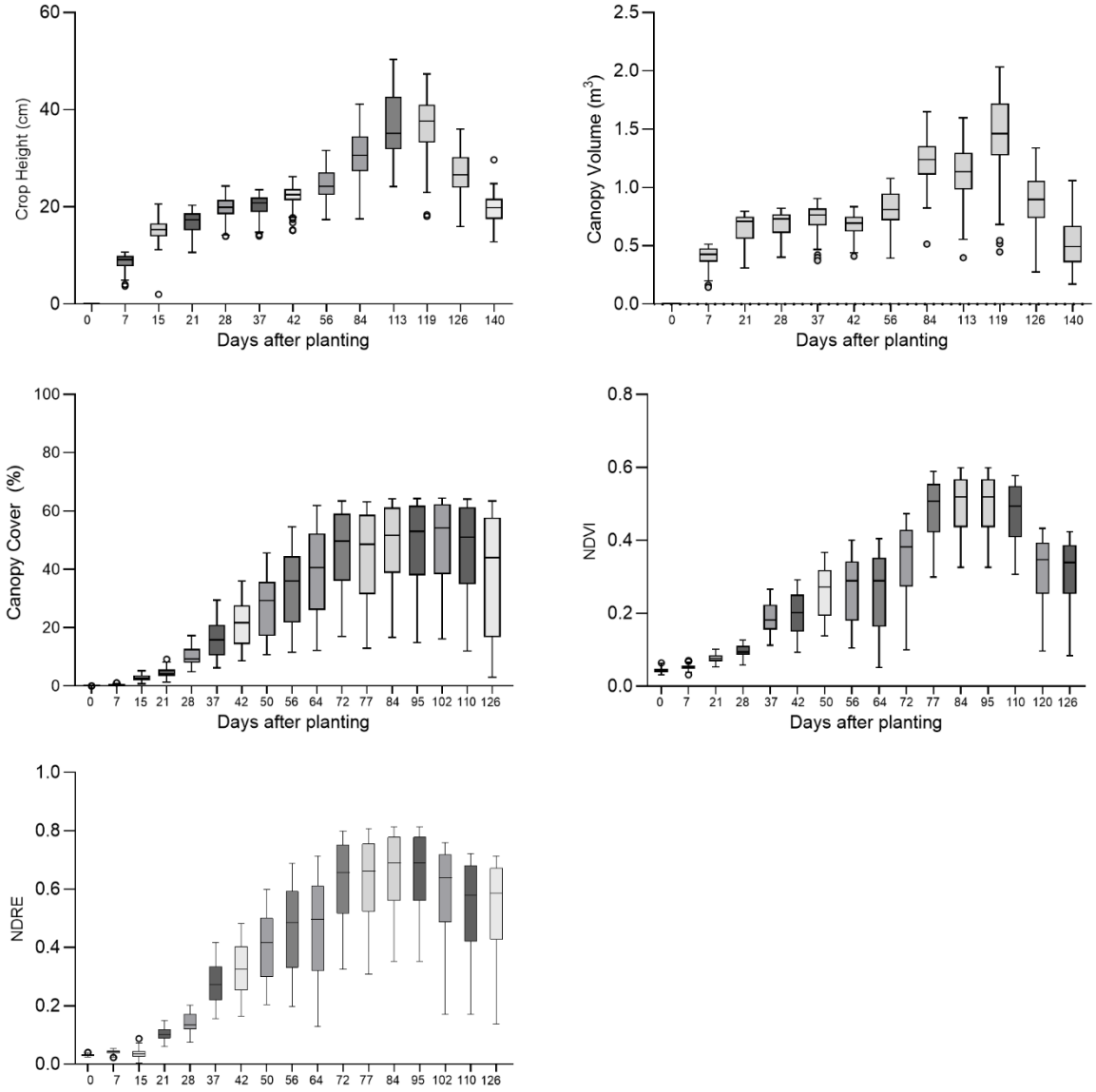

Figure 10: Box plot for all the features obtained from Unmanned Aerial Systems (UAS)

Correlation of UAS-based features with yield

We assessed the relationship between the UAS-based features and peanut yield using Pearson's correlation coefficient (**Figure 11**). As shown in the figure, a strong correlation between the UAS-based features and yield was found starting 55 Days After Planting (DAP) ($r>0.6$) and becomes consistent for the rest of the season. Additionally, among all the features, CV had better

correlation with yield starting 40 DAPs. These results are encouraging to develop more non-linear machine learning models for better yield estimations.

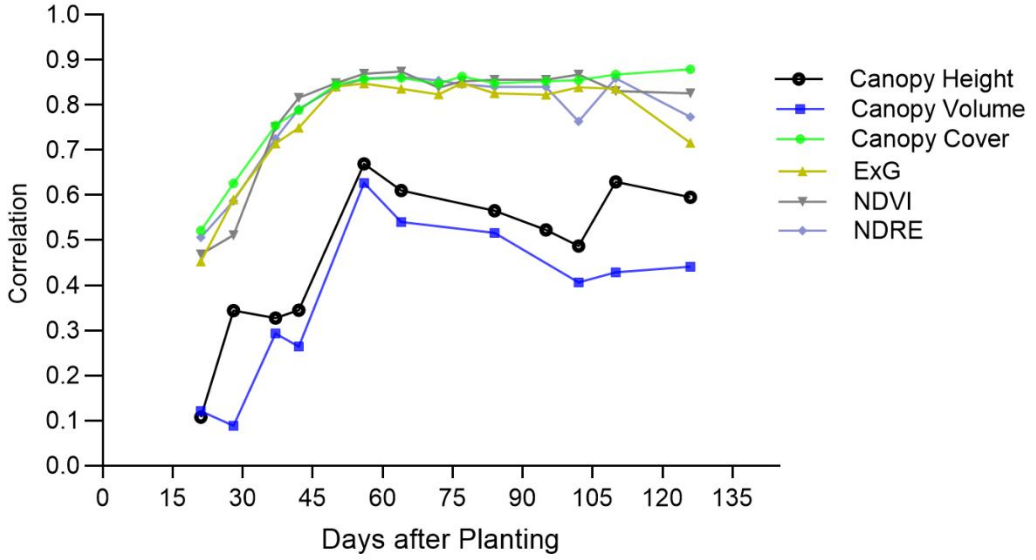

Figure 11. Correlation between yield and UAS best variables.

UAV-based disease resistance screening

We obtained the aerial images of peanut fields with cultivars of different levels of diseases resistance to obtain vegetative indices (NDVI and NDRE). We are analyzing the data obtained to establish with field collected diseases severity (hits/plot) in the field.

Data preparation for Machine Learning Model

One of the major problems with using multi-temporal data obtained from UAS is the inconsistency in data collection across environments. To address this issue, we need to define and develop an input framework for training, testing, and using ML models for yield predictions. We used Radial Basis function (RBF), a neural network model (**Figure 12**) to interpolate the data for developing the input vector for training a yield prediction model.

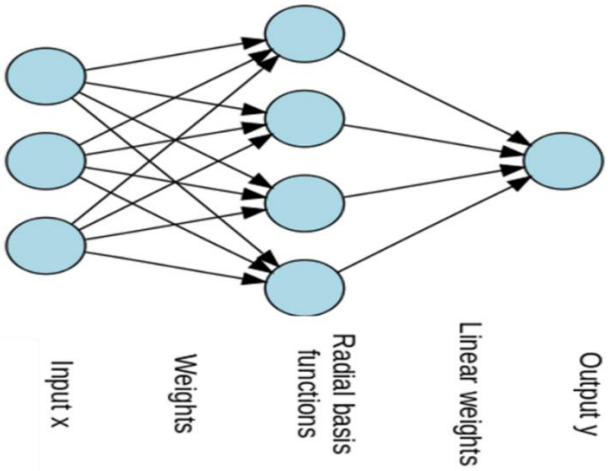

Figure 12. Radial Basis Function (RBF) Neural Network Framework

In 2023, we were able to transfer irregular multi-temporal data for UAS-based features to a continuous dataset from 0 DAP to 140 DAP (**Figure 13**). This dataset will be the input for the machine learning based yield prediction model. We are developing this framework with the data obtained in the year 2024.

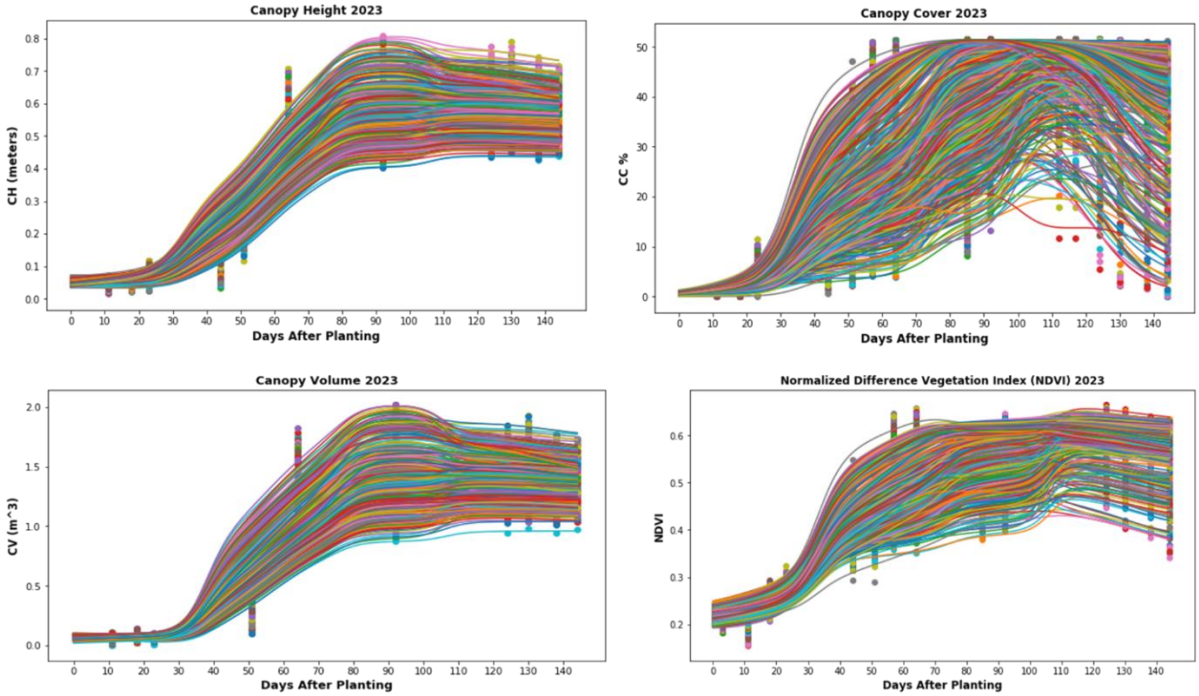

Figure 13. UAS-based features after performing radial basis function interpolation

The UAS program is set to make great strides in 2025 with the addition of a full-time postdoc and a pipeline that will allow quick turnaround on data analysis. We hope that once validated, we can fly every location at key times during the growing season to determine plant height, canopy volume, and greenness correlated to yield and maturity. This will decrease the labor required to collect critical data for yield calculations, disease resistance, and release.

Supplemental Data

Advanced Line Test Tables (S1-S7)

S1. Combined analysis of Advanced Line Tests from five locations in 2024.

	Pods/Ac. Lbs.		Val/Ac. $		TK%		TSMK %		ELK%		Med%		SMK%		SS%		DK%		OK%		Seed Wt g/100		Seed/Lbs	
Cultivar																								
TxL100212-03-03	6251	A	1129.72	A	74.8	ABC DEF	72.2	ABC DE	36.0	B	28.9	FGH	3.2	DEF	4.8	GH	0.1	A	2.3	E	70.7	BC	643	IJ
TP200614-1-1-1	5986	AB	1110.57	AB	77.0	A	73.9	A	28.4	CDE FG	37.1	BCD	3.5	CDEF	5.2	EFGH	0.1	A	2.9	BCD E	62.0	GHI	734	CDE
TP210656-2-1	5929	ABC	1082.75	AB	76.5	AB	73.3	AB	28.0	CDE FG	36.0	BCD	4.2	BCDE	5.2	EFGH	0.3	A	2.7	CDE	58.8	JK	777	AB
TP200625-3-2	5836	ABC D	1040.60	ABC D	74.0	CDEF	70.9	CDE FGH	25.3	EFG H	35.6	CD	3.9	BCDE F	6.6	ABCD E	0.1	A	3.0	BCD E	62.5	FGHI	730	DEF
Georgia 09B	5800	ABC DE	1052.60	ABC	75.1	ABC DEF	72.2	ABC DE	32.8	BCD	28.7	GH	3.5	CDEF	7.5	AB	0.2	A	2.7	CDE	63.8	EFGH	713	DEFG
Georgia 16HO	5784	ABC DE	1057.27	ABC	75.6	ABC D	73.3	AB	33.2	BC	29.5	EFGH	3.7	BCDE F	7.3	ABC	0.1	A	2.2	E	69.2	CD	658	HI
TP200607-1-16	5698	ABC DE	1012.74	BCD E	73.9	CDEF	70.3	EFG H	24.7	FGH	34.6	DEF	4.7	BCD	6.7	ABCD E	0.2	A	3.4	ABC	64.6	EFG	704	EFG
Tx144370	5691	ABC DE	1030.07	ABC DE	74.8	ABC DEF	71.9	BCD EFG	21.2	HIJ	40.9	ABC	3.6	BCDE F	6.4	BCDE FG	0.1	A	2.8	BCD E	64.7	EFG	703	EFG
TP200615-2-1-1	5667	ABC DE	1043.74	ABC	76.1	ABC	73.5	AB	49.3	A	16.3	I	2.4	F	5.8	CDEF G	0.1	A	2.5	DE	82.7	A	553	K
NemaTAM II	5662	ABC DE	1002.95	BCD E	73.8	CDEF	70.4	DEF GH	31.1	BCD E	28.7	GH	2.9	EF	7.7	AB	0.2	A	3.2	ABC D	70.4	BC	648	IJ
TP210657-1-1-3	5630	BCD E	1023.18	ABC DE	75.3	ABC DE	72.3	ABC D	16.7	J	43.0	A	5.1	BC	7.3	ABC	0.1	A	2.9	BCD E	61.0	HIJ	744	BCD
TP210624-4-1	5629	BCD E	1030.60	ABC DE	75.9	ABC	72.5	ABC	24.8	FGH	36.4	BCD	5.2	B	6.6	ABCD E	0.1	A	3.3	ABC	65.7	EF	692	GH
TP220673-4-1	5454	BCD EF	964.17	CDE F	73.4	DEF	70.0	GH	24.9	FGH	34.2	DEFG	4.0	BCDE F	7.2	ABCD	0.0	A	3.3	ABC D	66.7	DE	685	GH
AG18	5351	CDEF	962.43	CDE F	74.5	BCD EF	70.7	CDE FGH	18.1	IJ	41.6	AB	7.3	A	4.0	H	0.1	A	3.5	AB	61.4	HIJ	744	BCD
TP210612-3-1-1	5343	CDEF	962.57	CDE F	74.6	ABC DEF	71.9	BCD EFG	35.1	B	28.8	FGH	3.1	DEF	4.9	FGH	0.1	A	2.7	CDE	73.2	B	622	J
TP210624-2-1	5332	CDEF G	962.93	CDE F	75.0	ABC DEF	72.1	ABC DEF	27.0	DEF GH	35.5	CD	4.2	BCDE	5.7	DEFG	0.1	A	2.9	BCD E	64.1	EFGH	711	DEFG
Tx137967	5282	DEFG	928.17	DEF	73.0	EF	69.6	H	21.7	HIJ	35.3	CDE	4.9	BC	7.8	AB	0.1	A	3.2	ABC D	65.4	EF	696	FG
31-08-05-03	5215	EFG	924.59	EF	74.3	BCD EF	70.2	FGH	23.7	GHI	36.0	BCD	4.2	BCDE	6.5	ABCD EF	0.3	A	3.7	A	64.1	EFGH	714	DEFG
TP230736-3-15	4903	FG	865.96	F	72.9	F	69.4	H	30.7	BCD EF	27.5	H	4.3	BCDE	7.3	ABCD	0.2	A	3.3	ABC	59.5	IJ	767	BC
CB-7	4737	G	867.00	F	75.9	ABC	72.6	ABC	21.1	HIJ	38.8	ABCD	4.3	BCDE	8.1	A	0.2	A	3.3	ABC	56.0	K	811	A
Mean	5507		992.17		74.8		71.7		27.8		33.7		4.1		6.0		0.2		3.0		65.3		703	
CV	18.9		20.5		3.5		5.0		35.6		24.2		45.1		49.8		210.2		46.5		11.2		10.7	
Entry F	0.0003		<.0001		ns		<.0001		<.0001		0.0002		0.004		<.0001		ns		0.008		<.0001		<.0001	

S2. Advanced Line Test in Yoakum County in 2024.

	Pods/Ac. Lbs.		Val/Ac. $		TK%		TSMK %		ELK%		Med.%		SMK%		SS%		DK%		OK%		Seed Wt g/100		Seed/Lbs	
Cultivar																								
TP210656-2-1	5758	A	994.94	A	75.1	ABCD	68.2	DE	25.8	GHI	32.2	ABCD	4.7	ABCDE	5.5	DE	1.1	A	5.8	A	56.8	FG	807	AB
TP210612-3-1-1	5444	AB	995.23	A	75.9	AB	72.9	AB	38.5	BCD	25.9	CDEF	1.5	H	6.8	ABCDE	0.0	C	3.0	EFG	77.4	A	586	G
TP200614-1-1-1	5187	ABC	953.23	AB	76.6	A	72.4	AB	32.5	CDEFG	30.2	ABCDE	3.5	CDEFG	6.3	BCDE	0.1	C	4.1	BCDEF	59.6	EFG	767	ABC
TP200625-3-2	5039	ABC	888.43	AB	73.3	CDE	70.1	BCD	25.3	GHI	32.0	ABCD	3.7	BCDEFG	9.0	ABCDE	0.1	C	3.1	DEFG	64.4	CDEF	705	CDE
NemaTAM II	5031	ABC	902.16	AB	74.4	ABCD	71.5	ABC	39.7	BC	19.5	FG	2.0	GH	10.3	AB	0.1	C	2.9	EFG	75.9	AB	599	FG
TP220673-4-1	4990	ABC	879.36	ABC	73.3	CDE	69.3	CDE	27.6	FGHI	28.6	ABCDEF	3.3	DEFGH	9.8	ABC	0.0	C	4.0	BCDEF	65.5	CDE	694	CDEF
TxL100212-03-03	4936	ABC	898.53	AB	75.6	AB	72.0	ABC	40.6	AB	23.5	DEF	2.0	GH	5.9	CDE	0.0	C	3.6	CDEFG	72.2	ABC	629	EFG
TP200607-1-16	4838	ABCD	828.12	ABC	71.7	EF	66.3	EF	23.2	HI	28.1	BCDEF	4.2	ABCDEF	10.8	A	0.1	C	5.4	AB	62.1	DEFG	732	BCD
31-08-05-03	4775	BCD	835.12	ABC	75.2	ABCD	70.6	ABCD	28.5	FGH	30.2	ABCDE	4.0	BCDEF	7.8	ABCDE	0.7	AB	3.9	BCDEFG	66.3	CDE	700	CDE
TP200615-2-1-1	4700	BCD	843.67	ABC	75.3	ABC	70.5	ABCD	48.2	A	12.4	G	2.5	FGH	7.3	ABCDE	0.1	C	4.7	ABC	80.8	A	567	G
Tx137967	4687	BCDE	815.18	BCD	72.9	DE	68.2	DE	25.3	GHI	29.1	ABCDE	4.6	ABCDE	9.2	ABCDE	0.1	C	4.6	ABCD	62.2	DEFG	733	BCD
Georgia 09B	4675	BCDE	836.03	ABC	74.2	BCD	70.8	ABCD	34.2	BCDEF	25.5	CDEF	3.4	CDEFGH	7.7	ABCDE	0.0	C	3.4	CDEFG	61.5	DEFG	738	BCD
Georgia 16HO	4673	BCDE	838.63	ABC	74.4	ABCD	71.1	ABCD	37.1	BCDE	22.1	EF	3.6	CDEFG	8.3	ABCDE	0.0	C	3.3	CDEFG	68.8	BCD	660	DEFG
TP210624-4-1	4438	CDEF	808.60	BCDE	75.9	AB	71.5	ABC	31.4	DEFG	29.5	ABCDE	4.4	ABCDEF	6.3	BCDE	0.2	BC	4.2	BCDE	66.0	CDE	687	CDEF
AG18	3905	DEFG	706.14	CDEF	75.7	AB	70.7	ABCD	22.8	HI	36.6	AB	6.0	A	5.2	E	0.1	C	4.9	ABC	59.8	EFG	765	ABC
TP230736-3-15	3733	EFG	621.01	F	69.5	F	64.8	F	26.4	FGHI	26.4	CDEF	5.5	AB	6.5	BCDE	0.0	C	4.7	ABC	56.7	FG	802	AB
TP210657-1-1-3	3591	FG	652.66	DEF	75.7	AB	73.1	AB	20.6	I	37.7	A	5.3	ABC	9.5	ABCD	0.2	BC	2.5	G	61.0	DEFG	745	BCD
Tx144370	3566	FG	636.36	EF	74.5	ABCD	70.9	ABCD	27.4	FGHI	31.6	ABCD	2.9	EFGH	9.1	ABCDE	0.1	C	3.5	CDEFG	62.7	DEF	724	BCD
CB-7	3438	G	617.80	F	74.8	ABCD	70.7	ABCD	25.0	GHI	34.7	ABC	5.1	ABCD	5.8	CDE	0.0	C	4.2	BCDEF	53.9	G	846	A
TP210624-2-1	3268	G	601.09	F	76.1	AB	73.4	A	29.4	EFGH	33.6	ABC	4.6	ABCDE	5.8	CDE	0.0	C	2.7	FG	58.9	EFG	771	ABC
Mean	4533		807.61		75		70.5		30		28		4		7.7		0.2		3.9		64.6		713	
CV	19.0		19.0		2.7		3.8		28.3		26.4		40.9		36.3		258.6		29.6		12.8		12.3	
Entry F	<.0001		<.0001		<.0001		<.0001		<.0001		5E-04		0.0008		0.139		0.027		0.002		<.0001		<.0001	

S3. Advanced Line Test in Terry County in 2024.

	Pods/Ac. Lbs.		Val/Ac. $		TK%		TSMK %		ELK%		Med.%		SMK%		SS%		DK%		OK%		Seed Wt g/100		Seed/Lbs	
Cultivar																								
TP200615-2-1-1	5652	A	1063.30	A	77.3	A	76.4	A	47.9	A	39.9	ABCD	1.7	H	9.7	ABCD	0.0	A	0.9	F	81.9	A	555	I
TP200625-3-2	5544	A	990.50	AB	73.9	BCDEFG	71.7	CDEFG	16.1	I	30.9	GH	5.4	BCDEF	10.3	ABC	0.1	A	2.2	CDE	62.8	DEFG	724	DEF
TP210656-2-1	5172	AB	960.90	AB	76.8	AB	75.6	AB	25.6	C	40.9	ABC	5.8	ABCD	9.8	ABCD	0.0	A	1.1	EF	58.0	GHI	783	ABCD
TP200607-1-16	5126	ABC	912.10	BC	73.8	CDEFG	70.9	EFG	19.2	FGH	35.1	EFG	5.7	ABCDE	10.8	ABC	0.1	A	2.8	BCD	62.3	DEFG	728	CDEF
AG18	4870	BCD	879.60	BCD	74.6	ABCDEFG	72.4	CDEF	16.4	HI	43.1	A	6.6	AB	6.3	DE	0.1	A	2.1	CDEF	60.0	FGHI	756	BCDE
Georgia 09B	4817	BCDE	891.70	BCD	76.4	ABC	74.5	ABC	23.3	CD	37.9	BCDE	4.8	DEFG	8.6	ABCD	0.1	A	1.8	CDEF	63.8	DEF	711	EFG
TP210657-1-1-3	4702	BCDE	846.30	CDE	74.2	BCDEFG	72.6	BCDE	15.6	I	41.6	AB	5.6	ABCDE	10.5	ABC	0.0	A	1.6	EF	61.3	EFGH	740	BCDEF
31-08-05-03	4617	BCDEF	840.30	CDE	75.2	ABCDEF	72.9	BCDE	20.6	DEFG	36.6	CDEF	4.5	DEFG	11.2	AB	0.0	A	2.3	CDE	62.8	DEFG	723	DEF
TP200614-1-1-1	4607	BCDEF	848.00	CDE	76.0	ABCD	74.1	ABCD	23.3	CD	37.8	BCDE	4.6	DEFG	8.4	ABCD	0.1	A	1.8	CDEF	61.6	EFGH	737	CDEF
TP220673-4-1	4553	CDEFG	788.80	DEF	71.9	GH	68.9	G	14.6	I	27.6	H	5.4	BCDEF	7.3	CDE	0.0	A	2.9	BC	58.4	GHI	789	ABC
Tx144370	4494	DEFG	807.00	CDEF	74.2	BCDEFG	72.4	CDEF	19.0	GH	33.3	FG	4.7	DEFG	11.8	A	0.1	A	1.7	DEF	65.5	BCDE	694	EFGH
TP210624-4-1	4493	DEFG	818.40	CDEF	75.3	ABCDEF	73.0	BCDE	23.2	CD	34.4	EFG	6.5	ABC	8.1	BCDE	0.0	A	2.3	CDE	64.5	CDEF	706	EFGH
Georgia 16HO	4449	DEFG	801.80	CDEF	74.3	BCDEFG	72.9	BCDE	22.3	DE	35.6	DEF	5.1	CDEF	9.8	ABCD	0.0	A	1.5	EF	65.6	BCDE	692	EFGH
Tx137967	4417	DEFG	784.50	DEF	73.5	DEFG	71.3	DEFG	19.9	EFG	36.9	CDEF	4.7	DEFG	11.1	AB	0.1	A	2.1	CDEF	67.1	BCD	677	FGH
TP230736-3-15	4235	EFGH	709.50	FG	69.6	H	65.8	H	20.4	DEFG	35.5	DEF	7.0	A	10.8	ABC	0.0	A	3.8	AB	54.7	I	830	A
TP210624-2-1	4085	FGHI	743.40	EFG	75.3	ABCDEF	73.1	BCDE	22.0	DEF	35.3	EFG	5.8	ABCD	9.3	ABCD	0.0	A	2.1	CDEF	63.3	DEFG	717	EFG
TP210612-3-1-1	4070	FGHI	748.00	EFG	76.0	ABCD	74.0	ABCD	31.3	B	36.0	DEF	4.2	FG	7.6	BCDE	0.1	A	1.8	CDEF	70.7	B	642	H
TxL100212-03-03	4001	GHI	711.40	FG	73.1	EFG	71.4	DEFG	29.8	B	17.1	I	3.6	G	4.8	E	0.0	A	1.6	DEF	69.6	BC	652	GH
NemaTAM II	3710	HI	650.10	G	72.7	FG	69.6	FG	22.5	DE	33.2	FG	4.4	EFG	9.6	ABCD	0.1	A	3.0	ABC	70.8	B	643	H
CB-7	3539	I	644.60	G	75.8	ABCDE	71.6	CDEFG	19.9	EFG	35.5	DEF	5.3	BCDEF	10.9	ABC	0.0	A	4.2	A	56.4	HI	806	AB
Mean	4558		822.01		74		72.3		22.6		35.2		5.1		9.3		0.0		2.2		64.0		715	
CV	13.5		14.7		3.1		3.8		33.8		17.0		30.4		27.5		224.4		50.0		10.2		9.9	
Entry "F"	<.0001		<.0001		0.0009		<.0001		<.0001		<.0001		<.0001		0.0272		ns		0.0022		<.0001		<.0001	

S4. Advanced Line Test in Comanche County in 2024.

	Pods/Ac. Lbs.		Val/Ac. $		TK%		TSMK %		ELK%		Med.%		SMK%		SS%		DK%		OK%		Seed Wt g/100		Seed/Lbs	
Cultivar																								
TxL100212-03-03	6346	A	1136.00	A	74.3	FG	70.8	CDEFG	36.4	CD	28.1	FG	2.1	E	4.2	DEF	0.1	AB	3.5	AB	74.9	B	606	E
NemaTAM II	5799	AB	1024.80	ABC	73.7	G	69.4	FG	36.7	CD	25.3	GH	2.4	CDE	5.0	BCDE	0.1	AB	4.2	AB	75.1	B	604	E
TP210624-4-1	5654	ABC	1048.80	AB	77.4	AB	73.4	AB	32.5	DEFGH	34.1	BCD	3.5	BCDE	3.3	EF	0.1	AB	3.9	AB	69.9	C	649	CD
Georgia 09B	5463	BC	991.70	BCD	75.4	CDEFG	71.8	BCDEF	38.8	BC	23.1	HI	2.8	CDE	7.2	BC	0.1	B	3.5	AB	66.6	CD	684	BC
Georgia 16HO	5433	BC	1018.80	ABC	77.8	A	74.5	A	35.4	CDE	29.4	EFG	2.1	E	7.6	B	0.1	AB	3.3	B	74.4	B	611	DE
Tx144370	5302	BCD	953.80	BCDEF	75.4	CDEFG	70.9	CDEFG	27.0	IJK	36.7	BC	3.5	BCDE	3.7	EF	0.3	A	4.2	AB	66.3	CD	686	BC
TP210656-2-1	5291	BCD	961.70	BCDE	76.0	ABCDEF	71.9	BCDEF	29.2	GHIJ	33.9	BCDE	4.7	AB	4.1	DEF	0.1	AB	4.1	AB	63.0	D	721	B
TP200625-3-2	5288	BCD	949.00	BCDEF	74.9	EFG	70.2	DEFG	24.9	JKL	37.8	AB	2.5	CDE	4.9	CDEF	0.0	B	4.7	A	66.3	CD	684	BC
TP200614-1-1-1	5277	BCD	969.60	BCDE	77.0	ABCD	72.5	ABCD	34.1	CDEF	33.7	BCDE	2.0	E	2.7	EF	0.2	AB	4.3	AB	63.9	D	710	B
TP210624-2-1	5259	BCD	955.60	BCDE	75.7	BCDEF	71.5	BCDEF	31.2	EFGHI	32.3	CDEF	3.4	BCDE	4.6	DEF	0.1	AB	4.1	AB	66.5	CD	684	BC
AG18	5240	BCD	975.50	BCDE	77.2	ABC	73.6	AB	29.4	GHIJ	38.0	AB	3.8	BCD	2.5	F	0.0	B	3.6	AB	69.6	C	652	C
Tx137967	5181	BCD	932.10	BCDEFG	74.9	EFG	70.8	CDEFG	25.4	JK	33.4	BCDE	5.4	A	6.6	BCD	0.0	B	4.0	AB	69.1	C	657	C
TP210657-1-1-3	5128	BCD	924.50	BCDEFG	75.2	DEFG	70.7	CDEFG	20.6	L	41.7	A	4.6	AB	3.9	EF	0.1	AB	4.4	AB	63.7	D	712	B
31-08-05-03	5102	BCD	921.80	BCDEFG	75.4	CDEFG	70.8	CDEFG	30.5	FGHI	34.3	BCD	2.3	DE	3.7	EF	0.0	B	4.6	AB	68.9	C	659	C
TP200607-1-16	5031	CDE	903.20	CDEFG	74.9	EFG	70.2	DEFG	28.4	HIJ	35.1	BCD	3.9	BC	2.9	EF	0.0	B	4.7	A	68.4	C	663	C
TP200615-2-1-1	4941	CDE	909.00	CDEFG	76.5	ABCDE	72.6	ABCD	49.6	A	16.9	J	2.7	CDE	3.4	EF	0.0	B	3.9	AB	86.1	A	528	F
TP210612-3-1-1	4923	CDE	877.00	DEFG	74.3	FG	69.8	EFG	43.0	B	20.1	IJ	2.8	CDE	4.0	EF	0.1	AB	4.4	AB	76.8	B	591	E
TP230736-3-15	4644	DE	847.90	EFG	76.0	ABCDEF	72.0	BCDE	33.8	DEFG	30.6	DEF	2.9	CDE	4.7	CDEF	0.0	B	4.0	AB	63.6	D	714	B
TP220673-4-1	4620	DE	816.20	FG	73.7	G	69.0	G	27.5	IJK	32.2	CDEF	4.7	AB	4.5	DEF	0.0	B	4.7	A	69.5	C	653	C
CB-7	4338	E	800.20	G	76.8	ABCDE	72.9	ABC	23.6	KL	34.8	BCD	3.7	BCD	10.8	A	0.0	B	3.9	AB	57.2	E	793	A
Mean	6256		1135.03		76		71.5		32		32		3		4.7		0		4		69.0		663	
CV	10.9		11.1		2.0		2.6		22.6		20.7		37.8		49.4		253.9		20.1		9.4		9.0	
Entry F	0.003		0.0043		0.0009		0.0029		<.0001		<.0001		0.0006		<.0001		0.7101		0.5340		<.0001		<.0001	

S5. Advanced Line Test in Frio County (Derby) in 2024.

	Pods/Ac. Lbs.		Val/Ac. $		TK%		TSMK %		ELK%		Med.%		SMK%		SS%		DK%		OK%		Seed Wt g/100		Seed/Lbs	
Cultivar																								
TxL100212-03-03	7355	A	1336.60	A	74.9	EFGH	73.4	BCDEFG	31.1	DE	35.7	EF	3.4	DEFGH	3.2	DEFGHI	0.0	B	1.5	G	70.5	C	644	J
TP210657-1-1-3	6959	AB	1287.70	AB	76.7	ABCD	73.6	ABCDEF	14.6	LM	49.5	AB	5.4	AB	4.2	BCDEFGH	0.1	AB	3.0	ABC	60.3	IJK	752	CD
TP200614-1-1-1	6452	BC	1213.80	ABC	77.9	A	75.2	AB	28.0	EFGH	41.3	D	2.6	GHI	3.4	CDEFGHI	0.1	AB	2.5	BCDE	63.2	GH	718	FG
Tx144370	6383	BCD	1155.80	BCD	75.3	DEFGH	71.6	GH	13.9	M	50.6	A	4.3	BCDEF	2.9	EFGHI	0.1	AB	3.7	A	61.5	HIJ	738	DE
TP210624-4-1	6330	BCD	1165.70	BCD	76.7	ABCD	73.6	ABCDEF	25.5	GH	39.3	DE	4.3	BCDEF	4.6	ABCDEFG	0.3	A	2.8	BC	65.3	E	695	I
Georgia 16HO	6314	BCD	1162.50	BCD	75.9	BCDEFG	74.1	ABCD	37.0	C	30.3	G	2.9	FGHI	4.1	CDEFGH	0.0	B	1.8	EFG	69.9	CD	650	J
TP210624-2-1	6301	BCDE	1124.20	CD	74.3	GH	71.2	H	24.5	GHI	41.0	D	3.4	EFGH	2.4	GHI	0.2	AB	3.0	ABC	69.5	CD	652	J
TP200625-3-2	6273	BCDE	1142.50	BCD	75.3	DEFGH	72.7	DEFGH	27.0	EFGH	39.7	DE	2.5	HI	3.6	CDEFGHI	0.0	B	2.6	BCDE	53.4	M	850	A
AG18	6203	BCDE	1116.20	CD	74.4	FGH	71.7	FGH	13.5	M	50.5	A	6.1	A	1.6	I	0.0	B	2.7	BC	61.7	GHI	736	DEF
NemaTAM II	6111	CDE	1098.60	CD	75.1	DEFGH	71.6	GH	29.1	DEFG	34.5	FG	2.6	GHI	5.4	ABCD	0.2	AB	3.3	AB	63.0	GH	721	EFG
TP210612-3-1-1	6082	CDE	1119.70	CD	76.1	BCDEF	73.8	ABCDE	43.6	B	25.7	H	2.3	HI	2.2	HI	0.0	B	2.3	CDEF	75.0	B	605	K
TP210656-2-1	5991	CDE	1119.60	CD	77.6	AB	75.3	AB	24.8	GHI	43.5	CD	3.1	EFGHI	3.9	CDEFGH	0.1	AB	2.2	CDEFG	59.7	JKL	760	C
TP200615-2-1-1	5971	CDE	1117.60	CD	77.1	ABC	75.5	A	52.4	A	18.9	I	1.7	I	2.5	FGHI	0.0	B	1.6	FG	82.4	A	550	L
Georgia 09B	5963	CDE	1095.30	CD	75.9	BCDEFG	73.6	ABCDEF	30.4	DEF	33.9	FG	2.6	GHI	6.7	A	0.1	AB	2.3	CDEFG	62.5	GH	726	EFG
TP200607-1-16	5948	CDE	1087.20	CD	75.6	CDEFGH	72.9	CDEFGH	23.8	HIJ	40.9	D	3.5	CDEFGH	4.7	ABCDEF	0.1	AB	2.6	BCD	63.3	FG	716	GH
31-08-05-03	5906	CDE	1066.80	CD	74.9	EFGH	71.9	EFGH	20.4	IJK	42.1	CD	5.0	ABC	4.3	BCDEFGH	0.0	B	3.0	ABC	63.0	GH	720	EFG
TP220673-4-1	5906	CDE	1058.10	CD	74.1	H	71.8	EFGH	26.1	FGH	36.1	EF	4.1	BCDEFG	5.5	ABC	0.1	AB	2.3	CDEF	68.4	D	664	J
Tx137967	5735	CDE	1030.50	D	74.6	FGH	71.4	H	19.2	JKL	42.4	CD	4.9	ABCD	4.9	ABCDE	0.1	AB	3.2	AB	65.1	EF	697	HI
CB-7	5623	DE	1053.70	D	77.5	AB	74.8	ABC	18.2	KLM	45.8	BC	4.5	BCDE	6.4	AB	0.1	AB	2.7	BCD	57.9	L	783	B
TP230736-3-15	5491	E	1016.90	D	76.5	ABCDE	74.6	ABCD	32.8	CD	33.0	FG	3.1	EFGHI	5.6	ABC	0.1	AB	1.9	DEFG	59.0	KL	769	BC
Mean	6165		1128.45		75.8		73.2		26.8		38.7		3.6		4.1		0.1		2.5		64.7		707	
CV	10.7		11.3		2.1		2.6		37.3		21.7		40.8		53.8		220.2		30.4		10.0		9.4	
Entry F	0.011		0.0245		<.0001		<.0001		<.0001		<.0001		<.0001		0.0002		ns		<.0001		<.0001		<.0001	

S6 Advanced Line Test in Frio County (Pearsall) in 2024.

	Pods/Ac. Lbs.		Val/Ac. $		TK%		TSMK%		ELK%		Med.%		SMK%		SS%		DK%		OK%		Seed Wt g/100		Seed/Lbs	
ı	7443	A	1391.00	A	77.4	CD	75.8	BCDE	25.0	FG	45	AB	2.1	G	3.5	CDEF	0.2	AB	1.4	BCDE	68.4	BCD	664	CDE
)9B	7174	AB	1337.00	AB	76.9	CDE	75.6	BCDEF	47.2	B	20	J	2.5	DEFG	5.4	ABC	0.1	AB	1.2	BCDEF	67.1	BCDEF	677	CDE
7-1-1-3	6617	ABC	1235.00	ABCD	77.0	CDE	75.3	BCDEFG	17.7	H	49	A	3.6	BCDEF	5.2	ABCD	0.0	AB	1.6	BCDE	61.3	EFG	740	B
1-1-1-1	6607	ABC	1274.30	ABC	79.3	A	78.4	A	32.9	DE	39	CDE	2.1	FG	4.7	CDE	0.0	B	0.9	DEF	65.1	CDEF	700	BCD
7-1-16	6556	ABC	1236.70	ABCD	77.7	C	76.3	BC	35.3	CDE	36	DEF	2.3	EFG	3.1	EF	0.0	B	1.4	BCDE	68.1	BCD	668	CDE
M II	6453	BCD	1193.60	BCDE	76.7	CDEF	74.7	CDEFGH	36.1	CD	31	FGH	2.9	CDEFG	4.9	BCDE	0.3	A	1.7	ABCDE	72.2	B	629	E
2-03-03	6412	BCD	1186.50	BCDE	76.0	DEFG	75.5	BCDEF	46.0	B	24	IJ	1.7	G	3.2	DEF	0.1	AB	0.4	F	71.4	BC	637	E
5-2-1	6338	BCD	1214.10	ABCD	79.1	AB	78.3	A	37.0	CD	36	DE	3.1	BCDEFG	2.2	F	0.0	B	0.8	EF	62.7	DEF	725	BC
6HO	6263	BCDE	1172.50	BCDEF	77.0	CDE	75.9	BCD	38.7	C	29	HI	2.9	BCDEFG	5.4	ABCD	0.0	B	1.1	BCDEF	68.7	BCD	663	DE
1-2-1	6113	CDE	1144.70	CDEF	77.6	C	75.8	BCDE	33.2	DE	34	DEFG	2.7	CDEFG	5.7	ABC	0.2	AB	1.6	BCDE	67.2	BCDEF	677	CDE
5-3-15	6056	CDEF	1130.90	CDEF	76.9	CDE	75.7	BCDEF	47.6	B	22	J	1.9	G	4.4	CDEF	0.1	AB	1.2	BCDEF	67.3	BCDEF	676	CDE
	6017	CDEF	1096.30	DEFG	75.5	FG	73.6	GH	17.2	H	47	A	5.3	A	3.9	CDEF	0.2	AB	1.7	ABCDE	61.1	FG	743	B
5-3-2	5919	CDEFG	1090.50	DEFG	76.1	DEF	74.1	EFGH	36.6	CD	30	GH	3.8	ABCD	3.9	CDEF	0.1	AB	2.0	AB	67.1	BCDEF	676	CDE
3-4-1	5916	CDEFG	1073.20	DEFG	74.7	G	73.4	H	34.0	CDE	29	GHI	2.5	DEFG	7.4	A	0.0	B	1.3	BCDEF	71.8	B	632	E
5-2-1-1	5802	CDEFG	1095.10	DEFG	77.8	BC	76.6	AB	59.3	A	12	K	1.7	G	3.6	CDEF	0.2	AB	1.0	CDEF	93.2	A	487	F
1-4-1	5705	CDEFG	1071.50	DEFG	77.5	C	75.6	BCDEF	22.4	GH	42	BC	4.2	ABC	7.0	AB	0.1	AB	1.9	ABC	67.5	BCDE	673	CDE
03	5574	DEFG	1023.90	EFG	76.1	DEF	73.4	H	30.4	EF	36	DEF	3.7	BCDE	3.7	CDEF	0.1	AB	2.6	A	66.7	BCDEF	683	BCDE
	5381	EFG	1002.80	FG	77.6	C	75.5	BCDEF	22.7	GH	44	ABC	3.6	BCDEF	5.5	ABC	0.3	A	1.8	ABCD	55.8	G	813	A
'	5144	FG	943.70	G	75.7	EFG	73.9	FGH	24.7	G	39	CD	4.4	AB	5.4	ABC	0.0	B	1.9	ABC	67.1	BCDEF	679	CDE
2-3-1-1	5029	G	922.50	G	75.8	EFG	74.4	DEFGH	34.9	CDE	34	EFGH	2.8	CDEFG	2.9	EF	0.3	A	1.2	BCDEF	72.0	B	632	E
	6126		1141.79		76.9		75.4		34.0		34		3.0		4.6		0.1		1.4		68.1		674	
	12.4		13.1		1.7		2.2		32.2		28.7		40.3		37.6		152.1		46.2		11.3		10.1	
	0.0004		0.0002		<.0001		<.0001		<.0001		<.0001		0.0007		0.0011		ns		0.0126		<.0001		<.0001	

S7. Advanced Line Test in Frio County (Dilley) in 2024.

	Pods/Ac. Lbs.		Val/Ac. $		TK%		TSMK %		ELK%		Med%		SMK%		SS%		DK%		OK%		Seed Wt g/100		Seed/Lbs	
Cultivar																								
TxL100212-03-03	6749	A	1177.00	A	73.2	ABC	69.7	AB	31.2	B	28.5	HI	5.1	BCDEF	4.9	BCDEFG	0.4	BC	3.0	DEFG	64.3	BCDE	706	GHI
TP200614-1-1-1	6443	AB	1154.10	AB	75.4	A	71.4	A	21.6	CDEF	41.3	ABCD	5.7	BCDEF	2.8	EFG	0.5	ABC	3.5	CDEF	58.3	FGH	778	CDEF
Georgia 16HO	6058	ABC	1058.00	ABC	73.2	ABC	70.4	AB	26.2	BC	32.8	EFGH	4.7	CDEF	6.7	ABC	0.5	ABC	2.3	G	67.2	B	678	IJ
TP200625-3-2	5879	BCD	983.30	CDE	70.0	CDE	66.1	BCDEF	21.6	CDEF	33.1	EFGH	6.2	BCD	5.2	BCDEF	0.3	C	3.6	CDE	60.8	DEFG	746	DEFGHI
TP210656-2-1	5850	BCD	1024.00	ABCD	73.3	ABC	70.6	AB	19.6	EFG	41.8	ABC	6.8	BC	2.4	FG	0.3	BC	2.4	FG	52.1	IJ	880	AB
TP210624-2-1	5772	BCD	1001.00	BCDE	72.1	ABCDE	68.4	ABC	22.2	CDEF	36.2	CDEF	5.8	BCDEF	4.2	CDEFG	0.0	C	3.7	CDE	59.5	EFGH	763	CDEFGH
TP200615-2-1-1	5641	BCDE	987.60	CDE	72.5	ABCD	69.5	ABC	42.8	A	18.2	J	3.4	F	5.0	BCDEFG	0.1	C	2.9	EFG	73.7	A	617	J
Tx144370	5549	CDEF	973.70	CDE	72.6	ABC	70.2	AB	15.0	GHI	44.5	A	5.3	BCDEF	5.3	ABCDEF	0.1	C	2.4	FG	63.9	BCDE	710	FGHI
TP210624-4-1	5508	CDEF	958.50	CDE	73.1	ABC	68.5	ABC	18.7	FG	36.3	CDEF	6.1	BCD	7.4	AB	0.3	C	4.3	BC	61.3	CDEFG	741	DEFGHI
TP200607-1-16	5477	CDEF	893.10	DEFG	70.1	CDE	64.9	CDEF	18.3	FG	36.1	CDEF	5.8	BCDE	4.6	BCDEFG	1.1	A	4.0	BCDE	63.0	BCDEF	720	EFGHI
TP220673-4-1	5436	CDEFG	928.10	CDEF	71.0	BCDE	67.3	ABCD	20.4	DEF	35.6	DEFG	5.4	BCDEF	5.9	ABCDE	0.0	C	3.8	CDE	65.9	BCD	689	I
TP210657-1-1-3	5394	CDEFG	934.60	CDEF	73.0	ABC	68.5	ABC	10.4	IJ	44.1	AB	7.5	B	6.5	ABC	0.3	BC	4.2	BCD	59.1	EFGH	769	CDEFG
NemaTAM II	5376	CDEFG	904.10	CDEF	71.3	BCDE	66.7	ABCDE	24.3	CDE	31.8	FGH	3.5	EF	7.0	ABC	0.5	ABC	4.2	BCD	65.2	BCD	697	HI
Georgia 09B	5256	CDEFGH	891.40	DEFG	71.8	ABCDE	67.0	ABCDE	19.0	FG	35.3	EFG	5.9	BCDE	6.8	ABC	0.7	ABC	4.1	BCDE	62.2	BCDEF	730	EFGHI
TP210612-3-1-1	5206	DEFGH	872.50	DEFGH	70.9	CDE	67.2	ABCD	30.4	B	29.3	HI	4.3	DEF	3.1	DEFG	0.6	ABC	3.1	DEFG	66.7	BC	680	IJ
Tx137967	4937	EFGHI	772.30	FGHI	65.5	FG	61.7	FG	18.4	FG	29.8	GHI	6.8	BC	6.7	ABC	0.2	C	3.6	CDE	62.6	BCDEF	725	EFGHI
CB-7	4771	FGHIJ	845.50	EFGH	74.6	AB	70.9	A	17.5	FGH	42.5	AB	4.9	CDEF	6.0	ABCD	0.7	ABC	3.1	DEFG	54.8	HI	827	BC
Schubert	4623	GHIJ	711.00	HI	64.8	G	59.7	G	10.2	IJ	34.2	EFGH	12.1	A	3.3	DEFG	0.1	C	5.0	AB	49.3	J	923	A
AGI8	4497	HIJ	731.20	GHI	68.5	EF	62.3	EFG	9.2	J	38.4	BCDE	12.8	A	1.9	G	0.3	C	5.9	A	56.3	GHI	808	CD
TP230736-3-15	4171	IJ	670.40	I	68.9	DEF	63.6	DEFG	25.1	CD	25.0	I	5.2	BCDEF	8.4	A	1.1	AB	4.2	BCD	56.5	GHI	804	CD
31-08-05-03	3965	J	616.90	I	68.5	EF	61.6	FG	12.9	HIJ	36.4	CDEF	7.0	BC	5.3	ABCDEF	1.1	AB	5.9	A	57.7	FGH	791	CDE
Mean	5360		908.96		71.2		67.0		20.7		34.8		6.2		5.2		0.4		3.8		61.0		752	
CV	14.9		18.3		4.6		6.2		39.3		20.1		41.4		44.9		113.8		33.4		10.0		10.4	
Entry "F"	<.0001		<.0001		<.0001		<.0001		<.0001		1		1		0.006		ns		<.0001		<.0001		<.0001	

Spanish Tests (S8-S10)

S8. Spanish Test #1 in Yoakum County in 2024.

	Pods/Ac. Lbs.		Val/Ac. $		TK%		TSMK %		Med.%		SMK%		SS%		DK%		OK%		Seed Wt g/100		Seed/Lbs	
Cultivar																						
TP210656-2-1	5353	A	974.73	A	77.1	A	73.3	ABC	60.1	A	4.5	HIJ	8.7	FGHIJ	0.6	A	3.3	DEFGHIJ	61.3	BC	741	HI
TP230710-2-5	5262	AB	906.01	AB	72.4	DEFG	66.7	GHI	54.3	BCD	7.4	EFGH	5.1	JK	0.0	C	5.6	A	63.7	B	713	IJ
TP230721-40-4	4970	ABC	903.51	ABC	76.1	AB	71.6	ABCDE	53.7	BCD	6.6	FGHI	11.3	BCDEF	0.0	C	4.5	ABCDEF	51.4	FGH	884	DEF
TP230721-42-19	4379	ABCD	785.01	ABCDE	74.8	ABCDE	72.6	ABCD	56.6	ABC	3.5	J	12.4	BCDE	0.1	C	2.2	IJ	59.8	BCD	759	GHI
TP230721-40-1	4378	ABCD	805.24	ABCD	76.5	AB	74.0	A	60.9	A	5.7	GHIJ	7.3	GHIJK	0.0	C	2.5	HIJ	59.2	CD	767	GHI
TP210652-2-3	4239	ABCD	761.66	ABCDE	75.1	ABCD	70.9	ABCDEF	35.8	J	18.7	A	16.4	A	0.0	C	4.2	ABCDEF	37.7	M	1203	A
TP220708-3-3	4226	ABCD	733.22	BCDE	72.7	CDEFG	67.5	FGHI	47.9	FGH	8.3	DEFG	11.4	BCDEF	0.1	C	5.1	AB	55.6	DEF	815	FG
TP230721-40-11	4103	BCDE	746.21	BCDE	75.8	AB	73.8	AB	59.7	A	3.9	IJ	10.2	DEFGHI	0.2	BC	1.8	J	69.9	A	649	J
Span 17	4064	BCDE	737.62	BCDE	75.5	ABC	72.4	ABCD	53.1	CDE	7.7	EFG	11.6	BCDEF	0.1	C	3.0	FGHIJ	57.8	CDE	787	GH
TP210655-3-2	3909	CDE	679.84	CDEF	72.9	CDEFG	68.0	EFGHI	42.4	I	14.9	B	10.7	DEFGH	0.0	C	4.9	ABC	40.0	LM	1136	A
AT9899	3897	CDE	688.70	BCDEF	73.8	BCDEF	70.0	BCDEFG	52.9	CDEF	9.9	CDE	7.1	HIJK	0.0	C	3.8	BCDEFGI	51.2	GHI	888	DE
TP230710-1-1	3816	CDE	675.03	DEF	74.6	ABCDE	71.0	ABCDEF	52.7	CDEF	3.9	IJ	14.4	ABC	0.3	AB	3.3	EFGHIJ	69.3	A	657	J
TP230710-2-3	3811	CDE	654.97	DEF	72.2	EFG	67.5	FGHI	58.8	AB	3.9	IJ	4.7	K	0.1	BC	4.6	ABCDE	68.9	A	659	J
Tamspan 90	3783	CDE	658.52	DEF	72.9	CDEFG	67.8	EFGHI	50.0	DEFG	7.7	EFG	10.2	DEFGHI	0.0	C	5.0	ABC	50.1	HIJ	912	CD
TP210640-2-1	3679	DEF	647.24	DEFG	73.8	BCDEF	69.0	DEFGH	44.5	HI	15.0	B	9.4	EFGHI	0.1	C	4.8	ABCD	47.0	IJK	967	BC
OLin	3448	DEF	592.63	DEFG	71.4	FG	65.8	HI	45.1	GHI	9.9	CDE	10.8	CDEFG	0.0	C	5.6	A	45.9	JK	993	B
Tamnut 74	3365	DEF	589.53	DEFG	73.0	CDEFG	69.7	CDEFG	48.2	EFGH	8.2	DEFG	13.3	ABCD	0.0	C	3.3	EFGHIJ	44.3	KL	1024	B
Schubert	3323	DEF	563.48	EFG	70.6	G	67.6	FGHI	51.7	CDEF	9.2	CDEF	6.7	IJK	0.0	C	3.0	GHIJ	54.8	EFG	829	EFG
TP210653-2-2	2935	EF	505.49	FG	71.8	FG	68.1	EFGHI	42.2	I	11.1	CD	14.8	AB	0.1	BC	3.5	CDEFGH	44.7	K	1017	B
TP210641-5-1	2555	F	426.78	G	70.4	G	65.0	I	44.6	HI	11.5	C	8.9	EFGHI	0.0	C	5.3	A	56.1	DE	810	GH
Mean	3975		701.77		73.7		69.6		50.8		8.6		10.3		0.1		4.0		54.4		860	
CV	24.6		26.1		3.2		4.7		14.2		51.3		35.7		219.9		34.0		17.7		18.5	
Entery F	0.005		0.002		0.0001		1E-04		<.0001		<.0001		<.0001		0.006		<.0001		<.0001		<.0001	

S9. Spanish Test #1 in Gaines County in 2024.

	Pods/Ac. Lbs.		Val/Ac. $		TK%		TSMK %		Med.%		SMK%		SS%		DK%		OK%		Seed Wt g/100		Seed/Lbs	
Cultivar																						
AT9899	4746.1	A	857.68	A	75.3	BCDEF	73.6	BCDEF	48.4	GH	14.4	B	10.8	CDEF	0.2	C	1.4	ABC	49.9	I	908	D
TP210656-2-1	4732.5	A	886.42	A	78.6	A	77.4	A	59.5	ABCD	1.9	G	16.0	AB	0.6	C	0.7	CD	63.6	CD	714	HI
TP230721-40-4	4680.6	A	855.39	AB	76.2	BCD	74.5	BCD	49.1	GH	6.7	CDE	18.7	A	0.4	C	1.4	ABC	49.1	IJ	925	D
OLin	4519.3	AB	809.55	ABC	74.6	DEFG	73.3	CDEF	53.4	EFG	6.5	CDE	13.5	BCD	0.3	C	1.1	ABCD	49.2	IJ	925	D
TP220708-3-3	4457.5	ABC	807.59	ABC	76.2	BCD	73.9	BCDE	53.7	DEFG	5.2	DEF	15.0	ABC	0.7	BC	1.6	AB	56.1	GH	809	EF
Schubert	4409.2	ABC	667.98	ABCD	71.4	H	68.5	H	50.5	FGH	9.6	C	8.3	EF	1.6	ABC	1.3	ABCD	54.5	H	832	E
TP210641-5-1	4367.8	ABC	705.28	ABCD	73.9	FG	70.8	G	49.2	GH	5.4	DEF	16.2	AB	1.4	ABC	1.8	A	61.3	DEF	741	GHI
Span 17	4287.1	ABC	783.66	ABCD	76.8	B	75.2	BC	53.1	EFG	6.9	CDE	15.2	ABC	0.5	C	1.1	ABCD	59.4	EFG	765	FGH
TP230710-1-1	4253.9	ABC	757.50	ABCD	74.9	CDEFG	73.3	BCDEF	56.8	BCDE	4.2	EFG	12.3	BCDE	0.6	BC	0.9	BCD	70.1	AB	649	J
TP210652-2-3	4191	ABC	757.49	ABCD	75.3	BCDEF	73.5	BCDEF	30.5	J	24.6	A	18.4	A	0.3	C	1.5	AB	39.6	M	1149	A
TP230721-40-1	4107	ABC	749.00	ABCD	76.9	B	75.5	AB	63.2	A	2.9	FG	9.3	DEF	0.9	BC	0.6	D	62.0	DE	732	GHI
Tamspan 90	4065.2	ABC	726.81	ABCD	74.8	CDEFG	72.9	DEFG	53.5	EFG	8.2	CD	11.1	CDEF	0.5	C	1.4	ABC	48.3	IJ	940	CD
Tamnut 74	3894.1	ABC	682.45	ABCD	74.2	EFG	71.7	FG	48.8	GH	7.8	CD	15.2	ABC	1.0	BC	1.5	AB	44.6	KL	1017	B
TP230721-42-19	3721.1	ABC	610.39	ABCD	76.3	BC	73.2	CDEF	55.0	CDEF	3.0	FG	15.1	ABC	2.1	AB	1.0	ABCD	58.0	FGH	782	EFG
TP230710-2-3	3692.9	ABC	674.45	ABCD	75.9	BCD	74.7	BCD	64.0	A	2.9	FG	7.9	EF	0.2	C	1.0	ABCD	72.5	A	626	J
TP230710-2-5	3669.1	ABC	657.86	ABCD	75.1	CDEF	72.7	DEFG	61.3	AB	4.0	EFG	7.4	F	1.0	BC	1.3	ABCD	66.9	BC	678	IJ
TP230721-40-11	3581.9	ABC	654.00	ABCD	76.2	BCD	74.5	BCD	60.5	ABC	2.3	FG	11.7	BCDEF	0.5	C	1.2	ABCD	71.7	A	633	J
TP210640-2-1	3481	ABC	521.31	D	75.8	BCDE	71.5	FG	46.4	H	14.8	B	10.2	DEF	2.7	A	1.6	AB	47.9	IJK	951	CD
TP210653-2-2	3292.5	BC	580.06	BCD	73.4	G	71.7	FG	48.1	GH	7.9	CD	15.8	AB	0.2	C	1.5	ABC	45.8	JK	991	BC
TP210655-3-2	3141.2	C	553.84	CD	74.0	FG	72.0	EFG	37.9	I	15.3	B	18.8	A	0.4	C	1.6	AB	41.3	LM	1102	A
Mean	4064.5		714.94		75.3		73.2		52.1		7.7		13.3		0.8		1.3		55.6		843	
CV	20.2		23.8		2.3		3.2		16.8		75.1		34.7		124.8		40.0		18.2		18.5	
Entry "F"	ns		ns		<.0001		<.0001		<.0001		<.0001		<.0001		ns		ns		<.0001		<.0001	

S10. Spanish Test #1 in Wilbarger County in 2024.

	Pods/Ac. Lbs.		TSMK %	
Cultivar				
TP220708-3-3	5265	A	63.7	AB
TP210640-2-1	4919	A	64.1	AB
TP230721-40-1	4723	A	71.8	A
Tamspan 90	4471	AB	68.7	AB
TP210653-2-2	4463	AB	68.3	AB
Schubert	4380	AB	64.6	AB
AT9899	4371	AB	70.7	A
Tamnut 74	4220	AB	70.1	A
TP210655-3-2	3909	AB	70.6	A
TP210652-2-3	3839	AB	68.7	AB
TP230710-2-5	3824	AB	70.4	A
TP230721-40-4	3808	AB	66.6	AB
Olin	3791	AB	71.3	A
TP210656-2-1	3544	AB	72.5	A
TP230721-42-19	3397	AB	66.5	AB
TP210641-5-1	3167	AB	59.9	B
TP230721-40-11	3072	AB	65.5	AB
TP230710-2-3	2833	AB	68.7	AB
TP230710-1-1	2527	AB	69.0	A
Span 17	1821	B	67.3	AB
Mean	3817		68.0	
CV	43.3		8.1	
Entry "F"	ns		ns	

Sclerotinia Screening Tests S11-S13

S11. Yield Test #1 Sclerotinia Screening in 2024.

	Rating	
Cultivar	(hits/plot)	
TP220671-2-1	61	A
TP220671-4-1	59	AB
TP210651-2-1	59	AB
Langley	59	AB
TP220671-5-1	57	ABC
TxL100212-03-03	57	ABC
TP220671-3-1	43	ABCD
TP230624-2-1	43	ABCD
Tx144370	42	ABCDE
TP230627-5-1	37	BCDE
Georgia O9B	35	CDE
TP210627-4-1	32	DE
TP210624-3-1	31	DE
TP220671-6-1	31	DE
NemaTAM II	28	DEF
TP220667-3-1	28	DEF
TP230626-2-1	20	EFG
Georgia 16HO	19	EFG
AG18	6	FG
TP210624-3-4	4	G
Tx901639-3	2	G
Mean	36	
CV	60.4	
Entry F	<.0001	

S12. Yield Test #2 Sclerotinia Screening in 2024.

	Rating	
Cultivar	(hits/plot)	
Langley	52	A
TP210656-2-1	52	A
TP240746-2-1	51	AB
Tx144370	51	AB
TP240746-1-9	50	AB
Georgia O9B	46	ABC
TP230650-3-1	45	ABC
TP240746-1-1	44	ABC
TxL100212-0	41	ABCD
Georgia 16H	40	ABCD
TP210611-1-3	40	ABCD
TP240746-1-1	40	ABCD
TP230625-3-1	38	ABCD
TxL100212-0	38	ABCD
NemaTAM I	34	ABCD
TP240746-1-5	33	BCD
TP230657-1-1	30	CD
TP210624-3-3	28	CD
AG18	24	DE
TP230662-2-1	8	EF
Tx901639-3	3	F
Mean	38	
CV	42.9	
Entry F	<.0001	

S13. Yield Test #3 Sclerotinia Screening in 2024.

	Rating	
Cultivar	(hits/plot)	
Langely	63	A
TP240746-2-16	58	AB
Georgia O9B	55	ABC
TP240627-6-1	55	ABC
TP240751-4-1	50	ABCD
TP240746-1-10	49	ABCD
Tx100212-03-03	47	ABCD
TP240720-4-4	47	ABCD
TP240749-2-8	44	BCD
TP240746-1-2	43	BCD
TP240745-1-4	43	BCD
TP240746-1-6	42	BCD
TP240745-2-9	42	BCD
Tx144370	39	CDE
TP240749-3-5	39	CDEF
NemaTAM II	38	CDEF
Georgia 16HO	36	DEF
TP240746-2-7	34	DEF
TP240749-3-7	23	EFG
TP240742-2-10	21	FG
AG18	9	G
Tx901639-3	6	G
Mean	40	
CV	42.3	
Entry F	<.0001	

Multiple Disease Resistance Test (S14-S15)

S14. Multiple Disease Resistance Test #1 Sclerotinia Screening in 2024.

Cultivar	(hits/plot)	
TP200610-4-4	54	A
Georgia O9B	50	AB
TP220670-11RN	50	AB
TP220670-12RN	49	AB
TP200610-2-4	48	AB
TP210628-1-1	47	ABC
TP210614-1-2-1	46	ABC
Georgia 16HO	44	ABC
TP200610-2-10	42	ABC
TP210615-2-2-1	42	ABC
TP210625-3-1	42	ABC
Tx144370	41	ABC
Langley	38	ABC
TP200610-4-9	37	ABC
TP210625-3-4	34	ABC
TP200610-3-6	33	ABC
TP210621-2-1-5	30	ABC
Georgia 14N	27	BC
AG18	26	BC
TP220670-13RN	23	C
Mean	40	
CV	37.5	
Entry F	0.4862	

S15. Multiple Disease Resistance Test #2 Sclerotinia Screening in 2024.

	Ratings	
Cultivar	(hits/plot)	
Langley	67	A
TP220673-6-	57	AB
TP240724-1-3	53	AB
Tx144370	53	AB
TP220673-3-	49	ABC
TP220673-5-	45	BCD
Georgia 16H(	45	BCD
TP240754-1-5	44	BCD
TP220673-2-	44	BCD
TP220670-15	43	BCD
TP240753-2-3	43	BCD
TP210614-2-	42	BCD
NemaTAM I	42	BCD
Georgia O9B	42	BCD
TP220670-11	42	BCD
TP210626-2-	40	BCDE
TP220670-6R	32	CDEF
Georgia 14 N	30	DEF
TP240752-2-	22	EF
AG18	18	FG
TP210614-2-	18	FG
Tx901639-3	3	G
Mean	40	
CV	42.8	
Entry F	<.0001	

Spanish Sclerotinia Screening Test (S16-S17)

S16. Spanish Test #1 Sclerotinia Screening in 2024.

	Ratings	
Cultivar	(hits/plot)	
Tamnut 74	46	A
AT9899	46	A
TP220708-3-3	45	A
TP210640-2-1	45	AB
TP230710-2-5	43	ABC
TP210641-5-1	42	ABCD
TP230710-1-1	39	ABCD
TP210655-3-2	37	ABCD
TP230721-42-19	37	ABCD
TP210652-2-3	37	ABCD
Tamspan 90	30	ABCD
TP230721-40-1	27	ABCD
TP210656-2-1	26	ABCD
Span 17	25	ABCD
TP210653-2-2	25	ABCD
Tx901639-3	22	BCD
OLin	22	CD
TP230721-40-11	22	CD
Schubert	21	CD
TP230721-40-4	20	D
TP230710-2-3	20	D
Langley	20	D
Mean	32	
CV	57.0	
Entry F	0.1163	

S17. Hybrid Spanish Test Sclerotinia Screening in 2024.

	Ratings	
Cultivar	(hits/plot)	
Langley	70	A
TP220708-3-2	54	AB
TP230708-2-1	46	ABC
TP240738-2-8	46	ABC
TP240748-3-4	44	ABCD
TP240748-3-3	41	BCD
TP240738-3-3	41	BCD
TP220708-3-3	41	BCD
TP230708-1-1	40	BCD
TP240738-2-9	36	BCDE
TP210656-2-1	30	BCDE
AT9899	30	BCDE
TP230713-4-1	29	BCDE
TP240738-1-5	29	BCDE
TP230713-3-1	27	BCDE
Span 17	24	BCDE
Georgia 14N	24	CDE
TP230713-2-1	22	CDE
TP240738-1-6	18	CDE
TP220708-5A-1	15	DE
TP240748-2-7	15	DE
Tx901639-3	5	E
Mean	34	
CV	62.0	
Entry F	0.0249	

S18. Southwest Uniform Peanut Performance Test Stephenville, TX analysis for all lines in 2024.

	Pods/Ac. Lbs.		TSMK %		TK %		ELK%		Med.%		No.1%		DK%		OK%		100 sd wt.	
Cultivar																		
ARSOK R109-1L	4706	A	66.7	BCDEF	72.1	ABCDE	15.1	DEF	38.7	CD	7.0	FGH	0.7	CDE	4.7	ABC	62.6	CD
Tx144370	4106	AB	65.6	CDEF	72.1	ABCDE	11.0	F	39.2	C	10.4	EF	0.5	CDE	5.9	A	55.8	DEF
Georgia-09B (ck)	4005	AB	66.2	BCDEF	71.1	CDE	18.3	CDE	33.2	DE	7.7	FGH	0.8	CD	4.1	BCDE	57.2	DE
TP220694-5-1	3626	BC	64.2	EF	67.4	GH	28.4	B	24.9	F	6.4	FGH	0.7	CDE	2.6	EFG	68.8	BC
TP200625-3-2	3534	BC	64.4	EF	70.7	CDEFG	13.8	EF	36.6	CDE	7.3	FGH	1.0	BC	5.3	AB	58.1	DE
ARSOK S58-B[R]	3527	BC	72.8	A	74.6	AB	20.8	C	40.8	ABC	5.2	GH	0.0	E	1.7	G	54.1	EFG
TP210656-2-1	3368	BC	70.4	AB	74.5	AB	18.8	CD	36.5	CDE	9.3	EFG	0.2	DE	3.9	BCDE	54.3	EFG
TP220688-6-1	3319	BC	65.3	CDEF	69.5	DEFGH	11.1	F	40.5	ABC	8.8	EFGH	0.4	CDE	3.9	BCDE	63.0	CD
ARSOK V99	3132	C	63.3	F	67.2	H	26.5	B	22.6	F	9.3	EFG	0.7	CDE	3.1	DEFG	71.1	B
Comrade (ck)	3073	C	65.3	CDEF	67.7	FGH	34.8	A	21.1	F	4.8	H	0.6	CDE	1.9	FG	87.4	A
Span17 (ck)	2929	CD	69.3	ABC	73.8	ABC	3.1	GH	46.5	A	13.0	DE	0.2	DE	4.2	BCD	49.2	FGH
Schubert (ck)	2194	DE	67.6	BCDE	70.7	CDEFG	3.3	GH	39.3	C	21.0	B	0.3	CDE	2.8	DEFG	43.6	H
Valencia C (ck)	2188	DE	63.3	F	69.8	DEFGH	2.3	GH	40.2	BC	18.9	BC	2.3	A	4.2	BCD	42.0	H
NM MO-2	2039	E	66.9	BCDEF	71.0	BCDEF	5.8	G	35.6	CDE	22.4	B	0.9	BCD	3.2	CDEFG	43.8	H
NM MO-3	1795	E	70.0	AB	74.7	A	0.6	H	34.9	CDE	28.7	A	1.6	AB	3.1	DEFG	32.7	I
ARSOK S104-2E	1711	E	69.2	ABCD	72.7	ABCD	2.7	GH	45.6	AB	15.6	CD	0.5	CDE	3.1	DEFG	47.8	GH
NM MO-1	1619	E	65.4	CDEF	69.3	EFGH	2.9	GH	39.0	CD	20.7	B	0.7	CDE	3.2	CDEF	43.4	H
NM MO-4	1433	E	65.1	DEF	70.1	DEFGH	2.7	GH	32.5	E	27.5	A	1.0	BC	4.0	BCDE	41.9	H
Mean	2918		66.7		71.1		12.4		36.0		13.4		0.7		3.6		54.4	
CV	35.5		5.9		4.4		85.7		21.9		61.0		96.8		39.0		25.2	
Entry F	<.0001		0.0005		<.0001		<.0001		<.0001		<.0001		<.0001		<.0001		<.0001	

S19. Southwest Uniform Peanut Performance Test Stephenville, TX analysis for runner lines in 2024.

	Pods/Ac. Lbs.		TSMK %		TK %		ELK%		Med.%		No.1%		DK%		OK%		100 sd wt.	
Cultivar																		
ARSOK R109-1L	4706	A	66.7	A	72.1	A	15.1	AB	38.7	A	7.0	B	0.7	A	4.7	A	62.6	A
Tx144370	4106	B	65.6	A	72.1	A	11.0	B	39.2	A	10.4	A	0.5	A	5.9	A	55.8	B
Georgia-09B (ck)	4006	BC	66.2	A	71.1	A	18.3	A	33.2	B	7.7	B	0.8	A	4.1	A	57.2	B
TP200625-3-2	3534	C	64.4	A	70.7	A	13.9	AB	36.6	AB	7.3	B	1.0	A	5.3	A	58.1	AB
Mean	4088		65.7		71.5		14.5		36.9		8.1		0.8		5.0		58.4	
CV	12.8		3.0		2.0		28.1		8.9		22.6		64.9		25.8		6.6	
Entry F	0.0041		ns		ns		ns		0.02		0.01		ns		ns		ns	

S20. Southwest Uniform Peanut Performance Test Stephenville, TX analysis for Virginia lines in 2024.

	Pods/Ac. Lbs.		FP		TSMK%		TK%		ELK%		Med%		No.1%		DK%		OK%		100 sd wt.	
Cultivar																				
TP220694-5-1	3626	A	67.2	A	64.2	A	67.4	A	28.4	AB	24.9	B	6.4	AB	0.7	A	2.6	AB	68.8	B
TP220688-6-1	3319	A	16.9	B	65.3	A	69.5	A	11.1	C	40.5	A	8.8	A	0.4	A	3.9	A	63.0	B
ARSOK V99	3132	A	59.0	A	63.3	A	67.2	A	26.5	B	22.6	B	9.3	A	0.7	A	3.1	AB	71.1	B
Comrade (ck)	3074	A	88.6	A	65.3	A	67.7	A	34.8	A	21.1	B	4.8	B	0.6	A	1.9	B	87.4	A
Mean	4088		65.7		71.5		14.5		36.9		8.1		0.8		5.0		58.4		72.6	
CV	12.8		3.0		2.0		28.1		8.9		22.6		64.9		25.8		6.6		14.6	
Entry F	0.0041		ns		ns		ns		0.0238		0.0125		ns		ns		ns		0.0003	

S21. Southwest Uniform Peanut Performance Test Stephenville, TX analysis for Spanish and Valencia lines in 2024.

	Pods/Ac. Lbs.		TSMK %		TK %		ELK%		Med.%		No.1%		DK%		OK%		100 sd wt.	
Cultivar																		
ARSOK S58-B[R]	3526	A	72.8	A	74.6	A	20.8	A	40.8	ABC	5.2	G	0.0	D	1.7	B	54.1	A
TP210656-2-1	3367	A	70.4	AB	74.5	A	18.8	A	36.5	CD	9.3	FG	0.2	D	3.9	A	54.3	A
Span17 (ck)	2927	AB	69.3	ABCD	73.8	AB	3.1	BC	46.5	A	13.0	EF	0.2	D	4.2	A	49.2	B
Schubert (ck)	2192	BC	67.6	BCDE	70.7	BCD	3.3	BC	39.3	BCD	21.0	C	0.3	CD	2.8	AB	43.6	D
Valencia C (ck)	2186	BC	63.3	E	69.8	CD	2.3	BC	40.2	ABC	18.9	CD	2.3	A	4.2	A	42.0	D
NM MO-2	2054	BC	66.9	BCDE	71.1	BCD	5.8	B	35.6	CD	22.4	BC	0.9	BCD	3.2	AB	44.0	CD
NM MO-3	1794	C	70.0	ABC	74.7	A	0.6	C	34.9	CD	28.7	A	1.6	AB	3.1	AB	42.7	D
ARSOK S104-2E	1709	C	69.2	ABCD	72.7	ABC	2.7	BC	45.6	AB	15.5	DE	0.5	CD	3.1	AB	47.8	BC
NM MO-1	1617	C	65.4	CDE	69.3	D	2.9	BC	39.0	BCD	20.6	CD	0.7	CD	3.2	AB	43.4	D
NM MO-4	1431	C	65.1	DE	70.2	CD	2.7	BC	32.5	D	27.5	AB	1.0	BC	4.0	A	41.9	D
Mean	2286		68.0		72.2		6.3		39.2		18.1		0.8		3.4		46.3	
CV	39.9		5.9		4.2		117.0		15.5		45.8		110.5		35.3		11.2	
Entry F	0.0002		0.0121		0.0038		<.0001		0.0083		<.0001		<.0001		ns		<.0001	

S22. Southwest Uniform Peanut Performance Test Fort Cobb, OK analysis for all lines in 2024.

	Pods/Ac. Lbs.		TSMK %		TK %		ELK%		Med.%		No.1%		DK%		OK%		100 sd wt.	
Cultivar																		
TP200625-3-2	6187	A	69.8	GHIJ	73.8	FGH	61.5	FG	39.0	BCDE	3.3	EFG	2.0	AB	3.5	AB	67.8	GH
Lariat (ck)	6168	AB	76.3	A	79.3	A	63.8	DEF	33.8	EF	2.5	EFGH	1.0	CDE	3.5	AB	76.0	AB
Comrade (ck)	6037	ABC	72.8	CDE	74.3	EFG	83.8	B	13.8	H	2.0	GH	1.0	CDE	1.5	EF	74.3	ABCD
TP210656-2-1	5882	ABC	75.3	AB	77.5	ABC	90.8	A	7.8	I	2.0	GH	1.0	CDE	1.8	DEF	77.0	AB
Tx144370	5811	ABCD	72.3	DEF	75.5	DEF	56.5	GHI	41.0	BCD	2.3	FGH	2.0	AB	3.3	ABC	69.0	FGH
Span17 (ck)	5757	ABCD	75.8	A	77.8	AB	73.8	C	24.0	G	2.0	GH	0.5	E	1.5	EF	77.3	A
TP220694-5-1	5735	ABCD	71.3	EFGH	73.5	GHI	83.3	B	13.3	H	3.5	EFG	1.8	ABC	2.0	CDEF	73.5	BCDE
TXL 100212-03-03	5649	ABCD	71.5	EFGH	75.5	DEF	63.0	EFG	33.3	F	3.3	EFG	2.0	AB	4.0	A	70.5	EFG
ARSOK V99	5554	BCD	74.8	ABC	75.8	CDE	88.3	AB	10.5	HI	1.3	H	0.8	DE	0.8	F	75.8	AB
Georgia-09B (ck)	5515	CDE	73.0	BCDE	76.3	BCD	70.0	CD	27.0	G	3.0	EFGH	1.8	ABC	3.3	ABC	70.0	EFGH
ARSOK R109-1L	5437	CDE	74.5	ABCD	77.3	BCD	60.3	FGH	36.0	DEF	4.0	DEF	1.0	CDE	2.8	ABCDE	76.3	AB
ARSOK R106-9L	5194	DEF	71.8	EFG	75.8	CDE	50.3	IJ	44.0	AB	5.8	CD	2.0	AB	3.5	AB	66.8	H
ARSOK S58-B[R]	4909	EF	73.3	BCDE	75.8	CDE	82.8	B	10.0	HI	2.3	FGH	1.3	BCDE	2.8	ABCDE	75.3	ABC
ARSOK S104-2E	4633	FG	70.0	FGHI	72.5	GHIJ	68.8	CDE	27.3	G	4.3	DE	0.8	DE	2.8	ABCDE	71.8	CDEF
Schubert (ck)	4083	GH	67.5	J	70.3	K	40.8	K	48.3	A	11.0	A	1.5	ABCD	2.5	BCDE	69.5	FGH
NM MO-2	3976	HI	68.5	IJ	72.0	HIJK	50.3	IJ	42.3	BC	7.5	BC	2.3	A	2.3	BCDE	70.3	EFGH
NM MO-3	3911	HI	68.8	IJ	71.8	IJK	44.0	JK	48.5	A	7.8	B	1.8	ABC	3.0	ABCD	70.5	EFG
NM MO-1	3766	HI	68.5	IJ	71.5	JK	57.8	FGH	33.3	F	9.0	B	1.8	ABC	2.8	ABCDE	70.5	EFG
NM MO-4	3427	IJ	69.3	HIJ	72.5	GHIJ	57.5	FGH	36.8	DEF	5.8	CD	2.3	A	3.3	ABC	70.8	DEFG
Valencia C (ck)	3121	J	68.3	IJ	71.5	JK	54.3	HI	38.3	CDEF	7.5	BC	1.5	ABCD	3.3	ABC	70.5	EFG
Mean	5037		71.60		74.50		65.10		444.00		4.50		1.50		2.70		72.2	
CV	20.9		4.3		3.6		23.5		44.0		66.1		53.5		44.1		5.3	
Entry F	<.0001		<.0001		<.0001		<.0001		<.0001		<.0001		0.0037		0.0011		<.0001	

S23. Southwest Uniform Peanut Performance Test Fort Cobb, OK analysis for runner lines in 2024.

	Pods/Ac. Lbs.		TSMK %		TK %		ELK%		Med.%		No.1%		DK%		OK%		100 sd wt.	
Cultivar																		
TP200625-3-2	6187	A	69.8	B	73.8	B	61.5	A	39.0	ABC	3.3	B	2.0	A	3.5	A	67.8	B
Tx144370	5811	AB	72.3	AB	75.5	AB	56.5	AB	41.0	AB	2.3	B	2.0	A	3.3	A	69.0	B
TXL 100212-03-03	5649	AB	71.5	AB	75.5	AB	63.0	A	33.3	C	3.3	B	2.0	A	4.0	A	70.5	AB
ARSOK R109-1L	5437	AB	71.8	AB	77.3	A	60.3	A	36.0	BC	4.0	AB	1.0	A	2.8	A	76.3	A
ARSOK R106-9L	5194	B	74.5	A	75.8	AB	50.3	B	44.0	A	5.8	A	2.0	A	3.5	A	66.8	B
Mean	5655		72.0		75.6		58.3		38.7		3.7		1.8		3.4		70.1	
CV	11.0		3.6		2.8		13.1		14.5		48.1		42.7		32.2		7.2	
Entry F	0		0.09		0.24		0.06		0.02		0.10		0.36		0.61		0.0	

S24. Southwest Uniform Peanut Performance Test Fort Cobb, OK Analysis for Virginia Lines in 2024.

	Pods/Ac. Lbs.		FP%		TSMK%		TK %		ELK%		Med.%		No.1%		DK%		OK%		100 sd wt.	
Cultivar																				
Comrade (ck)	6037	A	94.8	A	72.8	B	74.3	B	83.8	B	13.8	A	2.0	B	1.0	A	1.5	AB	74.3	B
TP220694-5-1	5735	AB	90.3	B	71.3	B	73.5	B	83.3	B	13.3	A	3.5	A	1.8	A	2.0	A	73.5	B
ARSOK V99	5554	B	95.3	A	74.8	A	75.8	A	88.3	A	10.5	B	1.3	B	0.8	A	0.8	B	75.8	A
Mean	5775		93.4		72.9		74.5		85.1		12.5		2.3		1.2		1.4		74.5	
CV	8.4		3.4		2.4		1.7		3.9		19.7		50.6		71.6		56.0		1.7	
Entry F	ns		ns		0.0039		0.02		0.01		0.02		0.00		ns		ns		0.0	

S25. Southwest Uniform Peanut Performance Test Fort Cobb, OK analysis for Spanish and Valencia lines in 2024.

	Pods/Ac. Lbs.		TSMK %		TK %		ELK%		Med.%		No.1%		DK%		OK%		100 sd wt.	
Cultivar																		
TP210656-2-1	5882	A	75.3	AB	77.5	A	90.8	A	7.8	F	2.0	E	1.0	BCD	1.8	BC	77.0	A
Span17 (ck)	5757	A	75.8	A	77.8	A	73.8	C	24.0	E	2.0	E	0.5	D	1.5	C	77.3	A
ARSOK S58-B[R]	4909	B	73.3	B	75.8	B	82.8	B	10.0	F	2.3	E	1.3	BCD	2.8	AB	75.3	B
ARSOK S104-2E	4633	B	70.0	C	72.5	C	68.8	C	27.3	E	4.3	D	0.8	CD	2.8	AB	71.8	C
Schubert (ck)	4083	C	67.5	D	70.3	D	40.8	G	48.3	A	11.0	A	1.5	ABC	2.5	AB	69.5	D
NM MO-2	3976	C	68.5	CD	72.0	C	50.3	EF	42.3	B	7.5	BC	2.3	A	2.3	AB	70.3	CD
NM MO-3	3911	C	68.8	CD	71.8	C	44.0	FG	48.5	A	7.8	B	1.8	AB	3.0	AB	70.5	CD
NM MO-1	3766	CD	68.5	CD	71.5	CD	57.8	D	33.3	D	9.0	B	1.8	AB	2.8	AB	70.5	CD
NM MO-4	3427	DE	69.3	CD	72.5	C	57.5	D	36.8	CD	5.8	CD	2.3	A	3.3	A	70.8	CD
Valencia C (ck)	3121	E	68.3	CD	71.5	CD	54.3	DE	38.3	BC	7.5	BC	1.5	ABC	3.3	A	70.5	CD
Mean	4347		70.5		73.3		62.1		31.6		5.9		1.5		2.6		72.3	
CV	21.3		4.6		3.7		26.6		44.9		55.3		56.2		38.2		4.2	
Entry F	<.0001		<.0001		<.0001		<.0001		<.0001		<.0001		0.01		ns		<.0001	

S26. Southwest Uniform Peanut Performance Test Vernon, TX analysis for all lines in 2024.

	Pods/Ac. Lbs.		TSMK %		TK %		ELK%		Med.%		No.1%		DK%		OK%	
Cultivar																
ARSOK R109-1L	5842	A	70.2	A	70.9	A	30.5	ABC	36.3	A	1.4	AB	1.1	ABC	1.6	AB
ARSOK V99	4553	AB	65.6	A	62.2	ABC	33.6	A	23.7	BC	1.5	AB	1.5	ABC	1.9	AB
NM MO-2	4499	AB	61.2	AB	65.5	AB	13.9	E	44.1	A	2.1	AB	1.2	ABC	4.3	A
TP210656-2-1	4462	AB	66.3	A	66.0	AB	26.9	ABCD	34.1	AB	2.4	AB	0.9	ABC	1.7	AB
TP220694-5-1	4390	ABC	63.4	AB	61.0	ABC	32.4	AB	21.7	C	2.7	A	1.0	ABC	3.2	AB
TXL 100212-03-03	4334	ABC	50.5	B	50.5	C	25.0	ABCD	22.8	BC	0.9	B	1.0	ABC	0.9	B
ARSOK S104-2E	4118	ABC	65.6	A	66.7	AB	20.3	CDE	42.4	A	1.6	AB	0.8	BC	1.7	AB
Tx144370	3628	ABC	68.9	A	70.0	AB	23.9	ABCDE	41.6	A	1.7	AB	0.5	C	2.3	AB
NM MO-1	3555	BC	62.4	AB	64.1	ABC	21.9	BCDE	36.9	A	2.0	AB	1.7	ABC	1.6	AB
NM MO-3	2974	BC	64.0	AB	64.8	AB	22.8	ABCDE	36.9	A	2.2	AB	0.8	BC	2.1	AB
NM MO-4	2665	BC	63.7	AB	68.6	AB	19.2	DE	41.2	A	2.9	A	3.2	A	2.1	AB
Comrade (ck)	2629	BC	62.0	AB	56.0	BC	28.8	ABCD	21.2	C	1.4	AB	3.1	AB	1.6	AB
ARSOK S58-B[R]	2611	BC	66.5	A	67.2	AB	29.4	ABCD	32.8	ABC	1.7	AB	0.7	C	2.6	AB
Valencia C (ck)	2593	BC	62.9	AB	66.2	AB	22.1	BCDE	37.9	A	2.0	AB	1.8	ABC	2.3	AB
Mean	3657		64.1		64.7		64.7		34		1.8		1.3		2.1	
CV	46.0		15.3		64.7		34.8		31.9		58.3		127.2		85.9	
Entry F	ns		ns		ns		ns		0.0008		ns		ns		ns	

S27. Southwest Uniform Peanut Performance Test Vernon, TX analysis for Runner lines in 2024.

	Pods/Ac. Lbs.		TSMK %		TK %		ELK%		Med.%		No.1%		DK%		OK%	
Cultivar																
ARSOK R109-1L	5824	A	70.1	A	70.8	A	30.6	AB	43.5	A	1.5	A	1.1	A	1.6	A
ARSOK R106-9L	5194	B	74.5	A	75.8	AB	50.3	B	44.0	A	5.8	A	2.0	A	3.5	A
TXL 100212-03-03	4364	AB	67.5	A	67.5	A	33.1	A	30.9	B	1.0	A	1.3	A	1.2	A
Tx144370	3610	B	68.8	A	69.9	A	24.0	B	41.5	A	1.7	A	0.5	A	2.3	A
TP200625-3-2	2158	B	68.7	A	70.1	A	22.7	B	36.1	B	1.1	A	0.6	A	2.3	A
Mean	3964		68.9		69.7		27.2		38.5		1.3		0.8		1.9	
CV	46.1		5.6		5.2		22.9		15.3		62.3		90.2		74.5	
Entry F	0		ns		ns		ns		0.00		ns		ns		ns	

S28. Southwest Uniform Peanut Performance Test Vernon, TX Analysis for Virginia Lines in 2024.

	Pods/Ac. Lbs.		TSMK %		TK %		ELK%		Med.%		No.1%		DK%		OK%	
Cultivar																
ARSOK V99	4556	A	65.6	A	62.2	A	33.6	A	23.7	A	1.5	B	1.5	A	1.9	A
TP220694-5-1	4392	A	63.4	A	61.0	A	32.4	A	21.7	A	2.7	A	1.0	A	3.2	A
Comrade (ck)	2632	A	62.0	A	56.0	A	28.8	A	21.2	A	1.4	B	3.1	A	1.6	A
Mean	3860		63.6		63.6		31.6		22.2		1.8		1.9		2.2	
CV	49.7		6.0		6.0		14.2		27.0		44.9		105.2		58.5	
Entry F	1		ns		ns		ns		ns		0.07		ns		ns	

S29. Southwest Uniform Peanut Performance Test Vernon, TX analysis for Spanish and Valencia Lines in 2024.

	Pods/Ac. Lbs.		TSMK %		TK %		ELK%		Med.%		No.1%		DK%		OK%	
Cultivar																
NM MO-2	4501	A	61.2	A	65.5	A	13.9	B	44.1	A	2.1	A	1.2	A	4.3	A
TP210656-2-1	4465	A	66.3	A	66.0	A	26.9	A	34.1	A	2.4	A	0.9	A	1.7	A
ARSOK S104-2E	4120	A	65.6	A	66.7	A	20.3	AB	42.4	A	1.6	A	0.8	A	1.7	A
NM MO-1	3557	A	62.4	A	64.1	A	21.9	AB	36.9	A	2.0	A	1.7	A	1.6	A
NM MO-3	2977	A	64.0	A	64.8	A	22.8	AB	36.9	A	2.2	A	0.8	A	2.1	A
NM MO-4	2668	A	63.7	A	68.6	A	19.2	AB	41.2	A	2.9	A	3.2	A	2.1	A
ARSOK S58-B[R]	2614	A	66.5	A	67.2	A	29.4	A	32.8	A	1.7	A	0.7	A	2.6	A
Valencia C (ck)	2596	A	62.9	A	66.2	A	22.1	AB	37.9	A	2.0	A	1.8	A	2.3	A
Mean	3437		64.1		66.2		22.0		38.3		2.1		1.4		2.3	
CV	44.8		8.2		7.3		37.9		23.7		54.1		133.2		94.9	
Entry F	0		ns		ns		ns		ns		ns		ns		ns	

S30. Southwest Uniform Peanut Performance Test Lingo, NM analysis for all lines in 2024.

	Pods/Ac. Lbs.		TSMK %		TK %		ELK%		Med.%		No.1 %		100 sd wt.	
Cultivar														
TP200625-3-2	5466	A	74.4	EFGH	74.4	EFGH	48.1	BC	39.5	D	6.7	DEFG	68.0	DE
TP220694-5-1	5067	AB	71.7	J	71.7	J	53.2	AB	24.1	G	5.8	EFG	59.1	G
ARSOK R109-1L	5012	ABC	77.5	A	77.5	A	54.4	AB	38.0	DE	3.7	G	73.4	AB
TXL 100212-03-03	4964	ABCD	76.2	ABCD	76.2	ABCD	60.1	A	33.3	DEF	4.7	FG	73.7	A
Comrade (ck)	4476	BCDE	73.7	GHI	73.7	GHI	43.2	C	28.6	FG	11.3	BCD	60.8	FG
Tx144370	4455	BCDE	75.8	BCDE	75.8	BCDE	46.8	BC	36.8	DE	7.1	DEFG	67.3	E
ARSOK V99	4283	BCDEF	73.2	HIJ	73.2	HIJ	51.1	BC	28.0	FG	7.5	CDEFG	62.7	F
Span17 (ck)	4132	BCDEFG	75.4	CDEF	75.4	CDEF	21.1	DE	64.1	B	9.9	BCDE	70.4	BCD
TP210656-2-1	4118	BCDEFG	77.4	AB	77.4	AB	28.5	D	51.2	C	9.1	BCDEF	67.7	DE
ARSOK S104-2E	4091	CDEFG	75.0	DEFG	75.0	DEFG	12.7	EF	72.8	A	9.3	BCDEF	69.6	CDE
ARSOK S58-B[R]	4049	DEFG	76.7	ABC	76.7	ABC	53.9	AB	31.2	EFG	6.0	EFG	68.6	CDE
NM MO-2	3864	EFG	75.0	DEFG	75.0	DEFG	7.4	F	74.2	A	13.1	B	69.2	CDE
NM MO-1	3816	EFG	72.7	IJ	72.7	IJ	14.5	EF	68.8	AB	13.0	B	68.4	CDE
NM MO-4	3726	EFG	76.0	ABCDE	76.0	ABCDE	12.0	F	69.9	AB	13.1	B	70.1	CDE
Georgia-09B (ck)	3719	EFG	75.3	CDEF	75.3	CDEF	53.5	AB	31.6	DEFG	9.5	BCDEF	69.9	CDE
NM MO-3	3719	EFG	75.0	DEFG	75.0	DEFG	7.4	F	69.4	AB	20.3	A	71.3	ABC
Schubert (ck)	3403	FG	72.9	HIJ	72.9	HIJ	16.0	EF	69.2	AB	12.2	BC	69.8	CDE
Valencia C (ck)	3211	G	74.1	FGHI	74.1	FGHI	9.6	F	72.7	A	12.9	B	69.0	CDE
Mean	4198		74.90		74.9		32.9		50		9.8		68.6	
CV	20.1		2.5		2.5		61.6		38.9		50.7		6.2	
Entry F	0.0005		<.0001		<.0001		<.0001		<.0001		<.0001		<.0001	

S31. Southwest Uniform Peanut Performance Test Lingo, NM Analysis for runner lines in 2024.

	Pods/Ac. Lbs.		TSMK %		TK %		ELK%		Med.%		No.1%		100 sd wt	
Cultivar														
TP200625-3-2	5466	A	74.4	B	74.4	B	48.1	B	39.5	A	6.7	AB	68.0	BC
ARSOK R109-1L	5012	AB	77.5	A	77.5	A	54.4	AB	38.0	A	3.7	B	73.4	A
TXL 100212-03-03	4964	AB	76.2	AB	76.2	AB	60.1	A	33.3	A	4.7	AB	73.7	A
Tx144370	4455	AB	75.8	AB	75.8	AB	46.8	B	36.8	A	7.1	AB	67.3	C
Georgia-09B (ck)	3719	B	75.3	B	75.3	B	53.5	AB	31.6	A	9.5	A	69.9	B
Mean	4723		75.8		75.8		52.6		35.8		6.3		70.4	
CV	22.4		1.9		1.9		15.2		18.0		55.5		4.5	
Entry F	0		0.03		0.03		ns		ns		ns		0.00	

S32. Southwest Uniform Peanut Performance Test Lingo, NM analysis for Virginia lines in 2024.

	Pods/Ac. Lbs.		TSMK %		TK %		ELK%		Med.%		No.1%		100 sd wt	
Cultivar														
TP220694-5-1	5067	A	71.7	B	71.7	B	53.2	A	24.1	A	5.8	A	59.1	A
Comrade (ck)	4476	A	73.7	A	73.7	A	43.2	A	28.6	A	11.3	A	60.8	A
ARSOK V99	4283	A	73.2	AB	73.2	AB	51.1	A	28.0	A	7.5	A	62.7	A
Mean	4609		72.8		72.8		49.2		26.9		8.2		60.8	
CV	16.2		1.8		1.8		16.7		17.1		52.8		4.9	
Entry F	1		ns		ns		ns		ns		ns		ns	

S33. Southwest Uniform Peanut Performance Test Lingo, NM analysis for Spanish and Valencia lines in 2024.

	Pods/Ac. Lbs.		TSMK %		TK %		ELK%		Med.		No.1		100 sd wt	
Cultivar														
Span17 (ck)	4132	A	75.4	BC	75.4	BC	21.1	C	64.1	B	9.9	BC	70.4	AB
TP210656-2-1	4118	A	77.4	A	77.4	A	28.5	B	51.2	C	9.1	BC	67.7	B
ARSOK S104-2E	4091	A	75.0	BC	75.0	BC	12.7	DE	72.8	A	9.3	BC	69.6	AB
ARSOK S58-B[R]	4049	AB	76.7	AB	76.7	AB	53.9	A	31.2	D	6.0	C	68.6	AB
NM MO-2	3864	ABC	75.0	BC	75.0	BC	7.4	E	74.2	A	13.1	B	69.2	AB
NM MO-1	3816	ABC	72.7	D	72.7	D	14.5	CDE	68.8	AB	13.0	B	68.4	AB
NM MO-4	3726	ABC	76.0	AB	76.0	AB	12.0	DE	69.9	AB	13.1	B	70.1	AB
NM MO-3	3719	ABC	75.0	BC	75.0	BC	7.4	E	69.4	AB	20.3	A	71.3	A
Schubert (ck)	3403	BC	72.9	D	72.9	D	16.0	CD	69.2	AB	12.2	B	69.8	AB
Valencia C (ck)	3211	C	74.1	CD	74.1	CD	9.6	DE	72.7	A	12.9	B	69.0	AB
Mean	3813		75.0		75.0		18.3		64.3		11.9		69.4	
CV	13.1		2.4		2.4		77.6		21.3		39.1		3.1	
Entry F	ns		<.0001		<.0001		<.0001		<.0001		0.0003		ns	

S35. Multiple Disease Resistance Test #1 in Frio County (Derby) in 2024.

	Pods/Ac. Lbs.		Val/Ac. $		TSMK %		Seed Wt g/100		Seed/Lbs		SS%		SMK%		TK%		DK%		OK%	
Cultivar																				
TP210614-1-2-1	6726	A	1241.30	A	73.3	CDEF	58.5	I	776	A	5.2	CDE	68.0	CDE	77.2	ABC	0.3	A	3.6	ABC
TP220670-12RN	6503	AB	1157.90	ABC	71.3	GHIJ	77.3	A	587	H	7.5	AB	63.8	FG	73.7	IJ	0.1	AB	2.4	EFG
TP200610-3-6	6491	ABC	1211.60	AB	74.6	ABCD	68.8	CDE	659	EF	2.7	GHIJ	71.9	AB	77.3	ABC	0.1	AB	2.7	CDEFG
Tx144370	6361	ABCD	1150.10	BCD	71.4	FGHIJ	64.0	F	710	D	4.1	CDEFGHI	67.3	DE	75.1	EFG	0.0	B	3.7	ABC
TP210625-3-4	6260	ABCDE	1101.00	CDEF	69.9	IJK	68.3	DE	666	EF	4.7	CDEFGH	65.2	EF	73.6	IJ	0.3	A	3.4	ABCDE
Georgia 16HO	6134	BCDEF	1135.20	BCDE	74.7	ABC	69.7	CD	651	FG	5.4	BCD	69.3	BCD	76.3	CDE	0.0	B	1.6	G
TP210625-3-1	6128	BCDEF	1077.30	CDEFG	69.8	JK	73.5	B	617	GH	4.8	CDEFG	65.0	EFG	73.3	J	0.2	AB	3.3	ABCDE
TP200610-4-4	6050	BCDEF	1117.80	CDEF	73.5	BCDE	63.2	FGH	719	D	5.1	CDEF	68.4	CD	76.5	CD	0.0	B	3.0	BCDEF
NemaTAM II	6046	BCDEF	1073.70	CDEFG	70.0	HIJK	69.8	CD	651	FG	6.0	BC	64.0	FG	73.8	HIJ	0.0	B	3.8	ABC
TP220670-13RN	6019	CDEF	1120.80	CDEF	74.4	ABCD	65.2	EF	696	DE	6.1	BC	68.2	CD	77.0	BC	0.0	B	2.7	CDEFG
TP200610-2-4	6011	CDEF	1139.00	BCDE	76.2	A	59.8	GHI	759	ABC	3.7	DEFGHI	72.5	A	78.3	A	0.0	B	2.1	FG
TP210628-1-1	5937	DEFG	1038.30	FG	68.5	K	68.2	DE	665	EF	4.9	CDEFG	63.7	FG	72.9	J	0.1	AB	4.3	A
TP200610-2-10	5919	DEFG	1112.90	CDEF	75.3	AB	59.6	HI	762	AB	3.1	EFGHIJ	72.2	AB	77.7	AB	0.0	B	2.5	DEFG
AG18	5901	DEFG	1068.20	DEFG	72.3	EFG	62.6	FGH	725	BCD	1.3	J	70.9	ABC	74.9	GH	0.0	B	2.7	BCDEFG
Georgia O9B	5873	EFG	1059.10	EFG	71.7	EFGHI	63.3	FG	717	D	9.6	A	62.1	G	74.7	GHI	0.0	B	3.0	BCDEF
TP210615-2-2-1	5821	EFG	1056.90	EFG	72.7	DEFG	63.4	FG	717	D	2.5	HIJ	70.2	ABCD	75.1	FG	0.0	B	2.4	DEFG
TP200610-4-9	5798	EFG	1062.80	DEFG	72.4	EFG	62.9	FGH	723	CD	4.9	CDEFG	67.4	DE	76.2	CDEF	0.0	B	3.8	AB
TP220670-11RN	5798	EFG	1052.60	EFG	71.9	EFGH	72.1	BC	630	FG	4.4	CDEFGH	67.5	DE	75.5	DEFG	0.1	AB	3.5	ABCD
TP210621-2-1-5	5704	FG	1001.50	G	69.5	JK	69.6	CD	652	FG	1.9	IJ	67.6	DE	72.9	J	0.0	B	3.4	ABCDE
Georgia 14N	5504	G	1041.30	FG	75.6	A	62.2	FGH	729	BCD	2.9	FGHIJ	72.7	A	78.2	A	0.0	B	2.6	CDEFG
Mean	6049		1100.97		72.4		66.1		691		4.5		67.9		75.5		0.1		3.0	
CV	7.5		8.0		3.3		8.0		7.8		49.6		5.1		2.5		241.8		29.1	
Entry "F"	0.003		0.0019		<.0001		<.0001		<.0001		<.0001		<.0001		<.0001		ns		0.002	

S36. Multiple Disease Resistance Test #2 in Frio County (Dilley) in 2024.

	Pods/Ac. Lbs.		Val/Ac. $		TSMK %		Seed Wt g/100		Seed/Lbs		SS%		SMK%		TK%		DK%		OK%	
Cultivar																				
Tx144370	6795	A	1163.50	A	68.7	ABCD	62.8	CDEF	722.7	CDEF	4.4	EFG	64.3	ABCD	72.07	BCDE	0.6	ABCD	2.8	E
TP240752-2-1	6566	AB	1128.80	AB	69.7	ABC	75.2	A	605.1	G	8.1	ABC	61.6	CDE	73.59	ABCD	1.2	AB	2.7	E
TP240753-2-3	6557	AB	1083.50	ABC	69.7	ABC	67.4	BCDE	675.9	DEFG	5.8	CDE	63.9	ABCD	73.39	ABCD	1.0	ABCD	2.7	E
TP210626-2-1	6541	AB	1157.00	A	70.6	AB	67.5	BCDE	675.4	DEFG	2.9	FG	67.7	A	73.87	ABCD	0.4	BCD	2.8	E
TP210614-2-1	6437	AB	1155.30	A	70.0	ABC	55.1	GH	824.9	AB	4.9	DEFG	65.1	ABC	75.47	AB	0.3	BCD	5.1	ABC
TP240754-1-5	6386	AB	1125.10	AB	68.8	ABCD	54.7	GH	831.6	AB	8.7	A	60.1	CDE	74.25	ABCD	0.3	BCD	5.1	ABC
Georgia 16HO	6208	ABC	1103.10	ABC	71.0	A	74.1	AB	614.4	G	8.6	AB	62.3	ABCDE	74.47	ABC	0.5	ABCD	3.0	DE
TP220670-15RN	6136	ABCD	1072.10	ABC	68.7	ABCD	69.2	ABCD	656.7	FG	6.0	BCDE	62.7	ABCDE	72.89	ABCDE	0.1	D	4.0	BCDE
TP220673-3-1	6028	ABCD	1066.90	ABC	69.9	ABC	58.9	FGH	776.7	ABC	2.6	G	67.3	AB	74.05	ABCD	0.2	CD	4.0	BCDE
TP210614-2-1-5	5920	ABCDE	1065.00	ABC	69.9	ABC	53.5	H	852.4	A	4.9	DEFG	65.0	ABC	75.63	A	0.1	D	5.6	ABC
Georgia O9B	5818	ABCDE	1019.70	ABCD	69.5	ABC	60.6	EFG	751.8	BCDE	5.6	CDE	63.9	ABCD	74.23	ABCD	1.0	ABCD	3.7	CDE
Georgia 14 N	5702	ABCDE	1006.00	ABCD	69.7	ABC	57.5	FGH	789.9	ABC	4.4	EFG	65.4	ABC	74.95	ABC	0.8	ABCD	4.4	ABCDE
NemaTAM II	5546	BCDE	934.20	ABCD	66.6	ABCD	62.3	DEF	728.6	CDEF	5.6	CDEF	61.0	CDE	71.59	CDE	0.6	ABCD	4.5	ABCDE
TP220670-6RN	5510	BCDE	884.70	BCD	64.2	D	68.6	ABCD	661.5	FG	4.9	DEFG	59.3	DE	69.76	E	1.2	ABC	4.3	ABCDE
TP220670-11RN	5494	BCDE	947.90	ABCD	67.6	ABCD	69.8	ABC	651.0	FG	5.2	DEFG	62.5	ABCDE	73.36	ABCD	0.5	ABCD	5.2	ABC
AG18	5467	BCDE	933.20	ABCD	66.0	BCD	57.8	FGH	789.6	ABC	3.8	EFG	62.2	BCDE	72.13	BCDE	0.3	BCD	5.8	AB
TP220673-6-1	5421	BCDE	920.30	ABCD	66.1	ABCD	60.2	FGH	754.2	BCD	3.9	EFG	62.2	BCDE	71.00	DE	0.2	D	4.8	ABCD
TP220673-5-1	5110	CDE	869.70	CD	65.7	CD	57.1	FGH	797.5	ABC	2.6	G	63.1	ABCDE	72.56	ABCDE	0.7	ABCD	6.2	A
TP240724-1-3	4941	DE	806.50	D	65.2	CD	55.0	GH	825.9	AB	7.4	ABCD	57.8	E	72.32	ABCDE	1.5	A	5.6	ABC
TP220673-2-1	4754	E	798.10	D	66.0	BCD	68.0	BCD	668.8	EFG	3.8	EFG	62.3	BCDE	71.60	CDE	0.7	ABCD	4.9	ABC
Mean	5867		1012.04		68.2		62.8		732.7		5.2		63.0		73.16		0.6		4.4	
CV	14.3		16.8		4.6		11.9		11.8		43.7		5.7		3.1		102.7		33.4	
Entry "F"	ns		ns		ns		<.0001		<.0001		0.000		ns		ns		ns		0.002	