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2. Valencia Peanut Breeding Line and Multilocation Variety Testing

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Objective

To evaluate variety/varieties that can yield high, produce 3 or more kernels per pods, resistant to diseases, maintain red skin and taste of Valencia.

Material and Methods

In 2006 three experiments were conducted of which two were in west Texas and one in New Mexico. Genotypes included were 20 lines of which two lines were from New Mexico State University (NMSU), four from seed companies, two from University of Georgia and the rest were experimental lines under development at NMSU - Agricultural Science Center at Clovis, New Mexico. Entries were arranged in a randomized complete block with three replications. Indications about growing season (latitude, longitude, elevation, date of planting, harvest dates, days to maturity, plot length, row width, amount of rainfall received and irrigation amount applied) are presented in Table 1a. Amount of fertilizer, herbicide, and fungicide treatments are given in Table 1b. The plots at all three locations were hand planted and hand harvested.

Results and Discussion

The New Mexico peanut research is mainly focused on the improvement of inshell Valencia peanuts belonging to the subspecies *fastigiata* type. The average 2006 yield for peanut crop across all three locations was 4112 lbs./ac a reduction of 10% compared to 2005 (4541 lbs./ac.) Highly significant ($P < 0.05$) differences were found

among entries in all three locations for pod yield. The data in Table 2 to 4 represents the performance of all 20 varieties/lines for pod yield, 100 seed weight (g), shelling percent (%) and gross return (\$/ac) across each location. The Coefficient of Variance (CV) for pod yield was less than 10% for all the experimental sites. The mean pod yield was high at Sudan location (4344 lbs/ac) followed by Brownfield (4151 lbs/ac) and Portales (3840 lbs/ac). Low yields were recorded at Portales location mainly due to late planting and high infestation of pod rot and black hull diseases. Combined analysis of three locations (Table 5) resulted in variety x location interaction for pod yield, shelling percentage and gross returns largely due to soil, temperature and agronomic management.

Among 20 varieties/lines tested across three locations variety H&W 136 resulted in 12% higher pod yield, higher shelling percent with good grade (73) compared to the check Valencia – C. Breeding lines NM02322 and NM04010 had higher 100 seed weight compared to the check Valencia-C.

Table 1a. Summary of sowing, harvest dates, plot length, row width, rhizobium rate.

Location	Lat, Long, Elevation	Sowing date	Harvesting date	Days to harvest	Plot length (ft)	Row width (in.)	Previous crop	Rainfall received (in.)	Amount of irrigation water (inches)
Brownfield, J. Leeks farm, Terry County Texas	33° 10' N 102° 16' W 3263 ft.	May 1	Sep 21	134	15	40	Cotton	3	22
Portales, Roosevelt County New Mexico	103° 22" N 34° 66" W 4216 ft	May 22	Oct 2	132	15	36	Corn	9	24
Sudan, Lamb County Texas	34° 03' N 102° 32' W 3790 ft.	May 11	Oct 08	150	15	38	Cotton	14	25

Table 1b. Summary of fertilizer, herbicide and total irrigation water applied.

Location	Fertilizer applied	Herbicide applied	Fungicides applied	Irrigation System
Brownfield, Terry County Texas	20gallons./A 8-20-4-4 applied through chemigation. 3 applications of 28-0-0-5 @ 7.5 gallons/application. Foliar applications of a. 20-20-20 @ 3 lbs/acre b. southwest crop mix c. 1 gallons/acre of Coran 25-0-0	Mid April Prowl-1.5 pt /A Pre-emergence Valor 1.5 oz/A	No fungicides were applied	Center pivot
Portales, Roosevelt County New Mexico	40 lbs/A of N applied as preplant + 69 lbs/ac top dressing 40 DAP Calcium applied three times through irrigation water (5G+3G+3G)	Valor 1.5 ounces/A Sonolan 0.25 pt/A	Ridomil @ 20 lbs/a on 45 DAP Abound @ 24.6 ounces/A on August 1, 2005. Bravo 14 ounces/ac two applications were applied	Center pivot
Sudan, Lamb County Texas	30 lbs/A of N applied prior to planting.	Cobra @ 10 ounces/A Bazagram @ 8 ounces/A Butaxone @ 1.5 pint/A Blazer @ 0.9 pint/A	No fungicides were applied.	Center pivot

Table 2. Performance of peanut lines at Brownfield, Terry County, Texas - 2006.

Variety or Line	Yield (lbs/ac)	100 Seed Wt. (g)	Shelling Percent	Grade (TSMK)	Gross Return ¹ (\$/ac)
Val-A	4368	48.9	75.7	69	1187
Val-C	4628	50.1	51.0	72	1303
H&W-101	4667	49.3	74.7	70	1284
H&W-102	4610	49.3	75.0	71	1285
H&W-136	4945	53.1	74.0	69	1346
NMPR-1	4737	55.5	69.3	64	1197
NMPR-2	3511	49.2	48.0	67	924
NMPR-3	4727	47.8	46.7	69	1282
NMPR-4	4148	70.0	70.3	62	1017
G-VAL	3765	71.8	71.3	67	985
G-Red	3600	67.4	74.0	71	998
Sun-Mex	4545	50.6	55.7	70	1249
McRan	3963	54.3	74.7	70	1083
NM04010	3351	95.0	70.3	66	875
NM02385	3261	70.2	67.3	56	724
NM02322	4607	93.9	46.0	70	1265
NM02638	3784	89.1	67.3	58	870
NM02565	4084	65.0	37.0	62	1000
NM02484	3362	83.3	73.7	67	890
NM02288	4360	67.0	67.0	58	1001
Trial mean	4151	63.7	64.5	67	1088
F Test	<0.0001	<0.0001	< 0.0001	<0.0002	<0.0001
CV	10.19	7.85	5.44	3.85	10.71
LSD	699.08	8.25	5.79	4.24	192.56

¹ Gross returns calculated using national loan rate of \$ 550 per ton.

Table 3. Performance of peanut lines at Clovis, Curry County, New Mexico- 2006.

Variety or Line	Yield (lbs/ac)	100 Seed Wt. (g)	Shelling Percent	Grade (TSMK)	Gross Return ¹ (\$/ac)
Val-A	3674	46.7	68.9	63	909
Val-C	3895	51.7	68.2	63	958
H&W-101	4077	49.1	66.0	59	945
H&W-102	3896	50.8	68.0	61	935
H&W-136	4672	57.5	68.9	62	1144
NMPR-1	3354	56.1	64.5	51	671
NMPR-2	3724	46.5	64.2	53	776
NMPR-3	3870	54.5	66.3	59	902
NMPR-4	3709	65.2	66.7	59	864
G-VAL	3799	61.2	64.0	60	891
G-Red	3612	68.5	68.1	64	903
Sun-Mex	4387	35.8	58.8	64	1109
McRan	3656	53.6	67.5	60	853
NM04010	3848	100.1	62.6	58	882
NM02385	3494	73.3	57.3	49	673
NM02322	3485	104.9	60.7	54	735
NM02638	3628	85.7	64.4	60	860
NM02565	4334	67.7	65.9	63	1067
NM02484	3952	79.2	64.6	60	927
NM02288	3681	60.8	61.1	54	784
Trial mean	3840	6.6	64.6	59	890
F Test	<0.0001	<0.0001	NS	<0.0001	<0.0001
CV	3.99	12.55	7.74	5.56	6.66
LSD	253.46	13.19	8.27	5.43	97.89

¹ Gross returns calculated using national loan rate of \$ 550 per ton.

Table 4. Performance of peanut lines at Sudan, Lamb County, Texas- 2006.

Variety or Line	Yield (lbs/ac)	100 Seed Wt. (g)	Shelling Percent	Grade (TSMK)	Gross Return ¹ (\$/ac)
Val-A	4183	49.8	74.3	69	1139
Val-C	4632	50.1	72.8	67	1213
H&W-101	4798	52.8	74.8	69	1307
H&W-102	4271	49.6	73.7	69	1153
H&W-136	5081	54.4	76.0	70	1398
NMPR-1	3711	59.0	65.7	59	855
NMPR-2	5096	49.7	74.0	71	1417
NMPR-3	4337	53.1	71.2	64	1096
NMPR-4	3653	64.9	70.1	63	887
G-VAL	4025	63.4	68.1	63	990
G-Red	3646	58.2	71.4	67	960
Sun-Mex	4723	52.7	74.0	69	1274
McRan	4959	51.2	72.9	67	1305
NM04010	4338	84.2	65.7	63	1068
NM02385	4148	76.0	68.7	62	1016
NM02322	4725	89.3	68.5	61	1127
NM02638	4396	77.6	71.8	67	1151
NM02565	3784	63.8	70.5	66	982
NM02484	4470	74.3	70.7	69	1206
NM02288	4000	69.0	68.2	61	952
Trial mean	4344	62.2	71.2	65.7	1125
F Test	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
CV	2.72	7.83	1.81	3.8	4.89
LSD	195.63	8.04	2.13	4.12	90.90

¹Gross returns calculated using national loan rate of \$ 550 per ton.

Table 5. Performance of peanut lines at all locations combined, 2006.

Variety or Line	Yield (lbs/ac)	100 Seed Wt. (g)	Shelling Percent	Grade (TSMK)	Gross Return ¹ (\$/ac)
Val-A	4075	48.5	72.9	67	1078
Val-C	4385	50.6	64.0	67	1158
H&W-101	4514	50.4	71.8	66	1178
H&W-102	4259	49.9	72.2	67	1124
H&W-136	4899	55.0	73.0	67	1296
NMPR-1	3934	56.8	65.5	58	908
NMPR-2	4110	48.5	62.1	64	1039
NMPR-3	4311	51.8	61.4	64	1093
NMPR-4	3807	64.7	69.1	62	922
G-VAL	3863	65.5	67.8	63	955
G-Red	3619	64.7	71.2	67	954
Sun-Mex	4552	46.4	64.2	68	1211
McRan	4217	52.9	72.2	66	1109
NM04010	3846	93.1	66.2	62	942
NM02385	3634	73.2	64.5	56	804
NM02322	4272	96.0	58.4	61	1042
NM02638	3936	84.1	67.8	62	960
NM02565	4068	65.5	57.8	64	1016
NM02484	3928	78.9	70.0	65	1008
NM02288	4014	65.6	65.4	56	912
Trial mean	4112	61.3	69.4	64	1035
Var	<0.0001	0.0005	<0.0001	NS	0.0005
Loc	0.0071	NS	<0.0001	NS	NS
Var*Loc	<0.0001	NS	<0.0001	NS	0.0008
CV	9.41	10.39	6.86	8.03	15.01
LSD	639.7	10.85	7.58	8.46	256.95

¹ Gross returns calculated using national loan rate of \$ 550 per ton.

Molecular Characterization of the U. S. Peanut MiniCore Collection Using Microsatellite Markers

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Objective

To characterize the subset of U.S. peanut core of core (COC) collection for molecular diversity using SSR marker and to assess genetic affinity of peanut botanical and market types based on mapped markers.

Material and Methods

The core subset of the US peanut minicore collection consists of 112 accessions (Holbrook and Dong, 2005). These were planted at the Texas Tech University experimental farm in Lubbock, TX, and in the greenhouse of the New Mexico State University Agricultural Sciences Center at Clovis, New Mexico, USA. Of these 99, 27 accessions appeared to segregate for multiple morphological characteristics in the field and were excluded from the analysis, leaving 72 accessions representing the two subspecies and four botanical varieties of peanut grown in the US. Information about the accessions used (accession identity as designated by Plant Introduction (PI) number, core collection number, botanical type, proposed market type and country of origin) is listed in Table 1.

The 73 primer sets were tested first using DNA of four accessions for optimizing the PCR conditions and concentrations of the reaction mix, and products were visualized on 1.5% agarose gels. All the primers detected amplified PCR products. These primers were used for genotyping the 72 available, homogeneous accessions of the U.S. peanut minicore. After initial fragment analysis, 18 primers were used to reamplify the missing genotypes and test the repeatability of patterns. During the