
COMPOSITION OF SEVERAL VARIETIES OF PEANUT
PLANTS AND THEIR PARTS IN RELATION TO
FEEDING VALUE AND OIL YIELD. A
PRELIMINARY REPORT

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The proposed increase in the production of peanuts in Oklahoma and the southern states during the next few years should provide large amounts of peanut hay and peanut by-products for feeding purposes. The War

Board asked that Oklahoma farmers practically double their acreage of peanuts in 1942 in order to meet the need for vegetable oils in food and other industries. The anticipated acreage of peanuts for 1943 in Oklahoma is 515,000 acres.

The purpose of the present investigation was in part to determine varietal differences in yield and oil content of peanuts adapted to production in local areas, and to determine the principal feed constituents of the vegetative parts of the plant; also to determine the loss of these constituents that occurs in harvesting and curing the plants. Peanut hay, because of its relatively high protein content, is a valuable feed. Losses in the field of leaves and small stems which carry with them a high percentage of minerals and protein result from weathering and handling the mature plants at the time they are harvested and stacked for curing. Practical measures might well be taken to avoid these losses.

EXPERIMENTAL

The peanut varieties were planted in three replicated single-row plots 125 feet long on the experiment station farms at Perkins, Lone Grove, and Heavener, Oklahoma. Six representative plants from each of five well known varieties were collected from the Perkins plots when the plants were at a mature stage of growth about five weeks previous to harvest. The plants were considered to represent the stage of growth at which the tops contained their maximum content of feed nutrients. It was planned to make a similar sampling at harvest time, with precautions necessary to avoid loss of weathered but intact parts. This latter collection was not made, however, and the second sampling was made from harvested plants which had been brought to the Stillwater farm and stacked according to variety for data on yields. It was apparent that these plants had lost many leaves as the result of weather conditions and handling and might be considered as representative of material which after removal of the nuts makes up the peanut hay of commerce.

The plants were brought to the laboratory, measured, and each variety divided into three portions consisting of stems and leaves, roots, and nuts with shell. These were cleaned by washing, in the case of green plants, while the dry, stacked plants of the second collection were cleaned by breaking up the stems and screening, only the roots and nuts being washed. All portions were air dried, weighed and ground in a Wiley mill for analysis.

The oil and protein content of cured hand-shelled nuts was determined on large representative samples taken several weeks later at the time of threshing. The small immature nuts with considerable dirt and foreign material were separated from these samples in threshing. The cleaned nuts were shelled to determine shelling percent and the meats with skins attached were chopped in a small kitchen food chopper for analysis. Oil was determined by extracting previously dried 2-gram portions for 18 hours with anhydrous diethyl ether. The residue was reground in a glass mortar and reextracted for another 18-hour period. The combined losses of weight were calculated as oil. Approximately 95 percent of the oil was removed by the first extraction. Protein was determined by the Kjeldahl method, the factor 6.25 being used to convert nitrogen to protein.

The yields per acre of hay and nuts were obtained by threshing the plants from fifty feet of each replicated plot. The yields of threshed hay are actual values and therefore are not necessarily the same as would be obtained by mowing the plants when they are at their peak of maturity. The latter practice which produces a high quality hay is sometimes employed when peanuts are grown for "hogging-down."

RESULTS

The results in Table I indicate the extent of the losses of feed nutrients in the harvesting of peanut plants. There was a marked loss of protein and a corresponding increase in percentage of crude fiber in the portions of the plant above ground, stems and leaves. Changes in the composition of the roots did not appear to be related to any single factor and are not considered significant. The composition of the nuts with shell before and after harvest indicate that these parts of the plant were not fully matured at the time of the first collection. They showed a general increase in protein and oil and a decrease in crude fiber and nitrogen-free extract during the five weeks following the first collection. Experiments especially designed to study the composition of the nuts during late development and factors that affect it need to be carried out before attaching significance to this observation. The composition of the whole plant before and after harvest was calculated from the weight and composition of the above parts and consequently showed differences in accordance with the direction and extent of the changes taking place in these parts.

The data presented in Table II are limited to the results secured during a single season in two locations. The growing season of 1942 was favorable for peanut production; consequently the yields obtained are probably somewhat higher than might be expected over a period of several years. Further, the type of soil, which is Canadian fine sandy loam at Perkins and Durant fine sandy loam at Lone Grove, probably contributed to the high yields.

Of the nine varieties, New Improved Spanish and Virginia Bunch produced the highest yield of shelled nuts at Perkins and were two of the three highest-producing varieties at Lone Grove. Improved Valencia and the Tennessee varieties were the lowest producers at both places. The high oil percentage of the nuts of both Spanish varieties combined with their high yields make these two varieties outstanding ones for oil production. Likewise, the high yields produced by Virginia Bunch and Jumbo during the 1942 season combined with a favorable oil content placed these two among the leading oil-producing varieties.

SUMMARY

Proximate analyses of five varieties of peanut plants collected about five weeks before harvest and again after harvesting and stacking showed losses of protein from the tops of the plants. The losses of protein which were due apparently to shattering of leaves in harvesting varied from 27 to 42 percent of the total amount present at maturity. The yields of air-dry hay from nine varieties of peanuts grown at Perkins during the season of 1942 varied from 2,113 to 3,604 lbs. per acre. The highest yields were produced by Improved Valencia, Virginia Bunch, and the Tennessee varieties. New Improved Spanish produced the highest yield of shelled nuts, 1,823 lbs. per acre, and was followed by Virginia Bunch, 1,716 lbs., Jumbo, 1,543 lbs., and Old White Spanish, 1,506 lbs. These varieties also led in nut yield at Lone Grove during the same season. The highest yield at the latter station, however, was only 1,324 lbs. per acre (Virginia Bunch) whereas the lowest yield at Perkins was 1,296 lbs., produced by Tennessee Long Red. North Carolina Runner, MacSpan and Improved Valencia were intermediate producers. The season of 1942 was especially favorable for peanut production, consequently the results do not represent averages for either location. The studies are being continued.

TABLE I
Composition of five varieties of peanut plants and their parts before and after harvest, 1942.

Description	Variety ^a	Percentage composition of dry matter									
		Ash		Protein ^b		Ether extract ^c		Crude fiber		Nitrogen-free extract	
		before ^d	after ^d	before	after	before	after	before	after	before	after
Stems and leaves	N.I.S.	8.98	8.76	11.01	8.68	1.65	1.60	23.61	26.39	54.75	54.57
	V.B.	10.15	10.27	12.14	6.92	1.59	1.48	23.52	33.10	52.60	48.23
	I.V.	7.58	6.61	9.65	6.97	1.96	1.56	21.98	26.30	58.83	58.56
	T.R.	8.12	8.26	9.95	6.76	2.03	1.51	22.56	26.43	57.34	57.04
	N.C.R.	9.47	8.33	13.27	7.66	1.84	1.70	23.55	29.45	51.87	52.86
Roots	N.I.S.	5.50	5.06	6.53	8.32	0.79	1.40	30.47	28.93	56.71	56.29
	V.B.	6.79	8.08	8.28	6.73	0.78	0.97	32.86	39.92	51.29	44.30
	I.V.	4.32	5.07	6.51	7.22	0.99	0.75	30.72	28.81	57.46	58.14
	T.R.	4.06	4.88	6.27	8.50	0.82	0.78	31.22	32.30	57.61	58.54
	N.C.R.	6.61	5.79	9.17	7.63	0.88	0.83	31.88	33.58	51.46	52.17
Nuts with shell	N.I.S.	2.79	2.87	22.68	24.36	42.60	42.20	15.66	15.53	16.30	15.05
	V.B.	2.73	2.37	17.89	19.17	25.47	35.44	29.10	22.02	24.81	21.00
	I.V.	2.51	2.36	22.22	23.36	32.67	36.75	24.87	21.61	17.73	15.92
	T.R.	2.44	2.64	22.82	21.32	33.11	35.21	23.45	22.15	18.18	18.67
	N.C.R.	2.53	2.46	18.88	19.89	22.57	30.93	24.94	22.25	31.06	24.47
Whole plant	N.I.S.	6.75	6.17	14.79	15.20	15.44	18.52	21.19	21.95	41.80	38.17
	V.B.	7.84	6.04	13.66	13.36	8.47	19.32	25.50	27.48	44.52	33.80
	I.V.	5.98	4.81	13.22	13.68	10.92	15.84	23.13	24.48	46.74	41.19
	T.R.	6.28	6.12	13.70	12.03	11.34	13.52	23.11	25.12	45.57	43.21
	N.C.R.	7.90	5.93	14.39	12.52	6.31	13.29	24.05	26.69	47.35	41.57

^a Varieties abbreviated are New Improved Spanish, Virginia Bunch, Improved Valencia, Tennessee Red, and North Carolina Runner.

^b Nitrogen x 6.25.

^c Anhydrous diethyl ether used for extraction.

^d Plants gathered before harvest on September 23 and after harvest following a frost and stacking, on November 3, 1942.

TABLE II
Yields of hay, nuts, and oil, and composition of nuts from nine varieties of peanuts produced during the season of 1942

Variety ^a	Location	Composition of shelled nuts							
		Threshed hay	Nuts with shell	Shelling percent	Shelled nuts	Moisture	Protein	Oil	Theoretical oil yield ^b
		lbs. per acre	lbs. per acre	%	lbs. per acre	%	%	%	lbs. per acre
N.I.S.	Perkins	2506	2370	76.92	1823	4.18	27.75	51.55	939.7
	Lone Grove		1680	78.10	1312	3.75	26.13	52.57	689.2
V.B.	Perkins	3243	2623	65.40	1715	4.20	24.90	50.53	866.5
	Lone Grove		1991	66.50	1324	3.81	25.75	49.96	661.5
Jumbo	Perkins	2921	2325	66.35	1543	4.26	25.63	50.06	772.4
	Lone Grove								
O.W.S.	Perkins	2258	1976	76.20	1506	3.93	27.16	52.24	786.7
	Lone Grove		1752	75.10	1315	3.53	25.78	53.01	697.1
N.C.R.	Perkins	3082	2187	68.32	1494	4.07	25.59	50.52	754.8
	Lone Grove		1717	64.00	1099	3.73	25.43	48.78	536.1
Mac.	Perkins	2113	2056	69.81	1435	4.03	28.22	51.45	738.3
	Lone Grove		1543	71.50	1103	3.80	29.97	49.46	545.5
I.V.	Perkins	3604	1993	70.35	1402	3.77	29.28	51.53	722.3
	Lone Grove		1086	68.55	744	3.88	28.81	50.90	378.7
T.R.	Perkins	3190	1936	70.51	1365	3.92	28.78	52.20	712.5
	Lone Grove		1553	69.25	1075	3.70	31.00	50.60	543.9
T.L.R.	Perkins	3157	1839	70.46	1296	4.01	28.84	51.29	664.7
	Lone Grove		1552	68.75	1067	3.63	29.81	51.20	546.3

^a Additional varieties not given in Table I are Jumbo, Old White Spanish, MacSpan, and Tennessee Long Red.

^b Pounds of shelled nuts per acre times percent oil.