TABLE V
Bench-Scale Filtration-Extraction Data

Experiment No.	1	2	3	4	5A	5B	6A	6B
Solvent/seed ratio	1.5	1.5	1.7	1.7	1.7	1.7	1.7	1.7
Slurry time, minutes	30	30	30	30	30	60	30	60
Extraction temperature, °F.								
Slurry[a]	85	135	140	135	140	140	135	130
Washes[a]	85	135	140	135	135	135	135	135
Vacuum, in. Hg	4	4	4	4	4	4	4	4
No. of washes	3	3	3	3	3	3	3	3
Cake thickness, in.	2.0	2.0	1⅝	1⅝	2.0	2.0	1¾	1¾
Mass velocity, lbs./hr./ft.²	120	5,420	2,810	520	4,150	3,660	3,230	3,350
Desolventized meal analysis								
Moisture, %	5.6	9.4	7.8	8.0	8.1	8.0	7.4	7.6
Residual lipides, %	5.24	6.27	2.47	0.90	1.56	1.27	1.21	0.92
Extraction efficiency, %	95.3	94.6	98.0	99.2	98.6	98.9	99.0	99.2

[a] Commercial hexane used for slurry and washes.

coarser, and not less than 50% passing through 300-mesh screen (predrying of the seed to 1.5–2.5% moisture content will increase degree of comminution at the same rolls settings and rate of throughput); preheating to 170 to 180°F.; addition of moisture to about 16 to 18%; cooking, followed by drying up to 225 to 230°F. to a moisture content of the discharged material of about 7 to 9%, and a total cycle time of about 30 min.; crisping by evaporative cooling to a temperature of about 130° F. and a final moisture content for extraction of about 5–7%. Conditions found adequate for efficient extraction are: slurrying for 45 to 60 min., solvent ratio of 1.7 to 1.0, three washes, cake thickness of 1¾ to 2 in., and temperature of extraction of about 130°F.

Based on the close correlation obtained to date between bench- and pilot-plant scale, filtration-extraction results for a wide variety of vegetable oil-bearing materials and between pilot-plant and industrial scale in the case of cottonseed and soybeans, it is anticipated that no serious difficulties should be encountered in the commercial processing of sesame seed by filtration-extraction.

Acknowledgment

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Seasonal Variation in Character of Lipides in Pure Lines of Spanish Peanuts

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SOME YEARS AGO Spanish peanuts were reported to be slightly more susceptible to oxidative rancidity development than either Runners or Virginias (4, 7). This characteristic is associated with a slightly higher percentage of linoleic glycerides in Spanish oils (4).

The results reported here are incidental to an investigation which has as its primary objective the selection of Spanish strains less susceptible to the above-mentioned oxidative rancidity development than those now in production. As data began to accumulate in this general investigation of rancidity, it became evident that these Spanish oils were not showing the variation in unsaturation which the literature shows is the case with oils from other plants. It was then decided that the seasonal variation in composition of Spanish oils should be investigated further, even though only a limited number of samples were available.

[1] Presented at the meeting of the American Oil Chemists' Society, Houston, Tex., April 23–25, 1956.
[2] Published as Journal Paper 301 with the approval of the Director of Georgia Experiment Station.

Experimental

Nuts were obtained over a period of four seasons from the Botany Department of the Georgia Experiment Station, which has conducted a peanut breeding program for many years. Most of the strains examined resulted from crosses made at least 15 years previous to this investigation. The others were selected from old, standard types. Usually peanuts are self-pollinated, and genetic character is well maintained under field conditions. However the Spanish peanut is subject to some crossing, and for that reason the Spanish strains were grown in isolated fields and line-selected each year in the field to maintain the character of each strain. Inasmuch as changes have not been observed over a period of several years, genetic character must have been fixed in these strains long before the present study was undertaken.

Peanuts grown on sandy loam soil near Tifton in the Coastal Plain area of Georgia were obtained during the 1952, 1953, and 1955 seasons. Nuts were also obtained in 1954 and in 1955 from Experiment in the

Piedmont section of this state. The latter soil, a Lloyd clay loam, is quite different from the sandy type characteristic of most commercial peanut-growing areas of the Southeast.

The cultural practices followed at both locations and the method of curing in properly constructed field stacks were those commonly recommended for peanut production. Although neither the number of seasons nor locations are extensive since the original plan did not include this type of investigation, the results are unique because very pure genetic strains of an oilseed from a plant which is physiologically peculiar were examined.

As is to be expected over any four-year period, weather conditions varied considerably (Figure 1). The 1952 growing season, for example, was dry and slightly warmer than normal. The crop year, 1953, was above normal in rainfall and slightly below normal in temperature in Tifton while 1954 was about normal in temperature during the early part of the season and both hot and exceptionally dry at Experiment during the late summer. In 1954 rainfall was so low at Tifton that a total peanut crop failure resulted. The crop year, 1955, was below normal in rainfall at Tifton and above at Experiment while the temperatures were slightly above normal at both locations.

After removal from the field stacks the peanuts were picked off the vines and stored a maximum of five months until hand-shelled. The seed were very carefully hand-graded, and the oil was expressed cold from plump, mature seed in a silver-plated press. After filtering, the oils were cold-stored under nitrogen for a few weeks before the determinations were made each year. The samples represented a total of 14 strains with Spanish vegetative characteristics and two of the late-maturing bunch types (61-23 and 207-3-4). Iodine and thiocyanogen values were determined by A.O.C.S. methods (1).

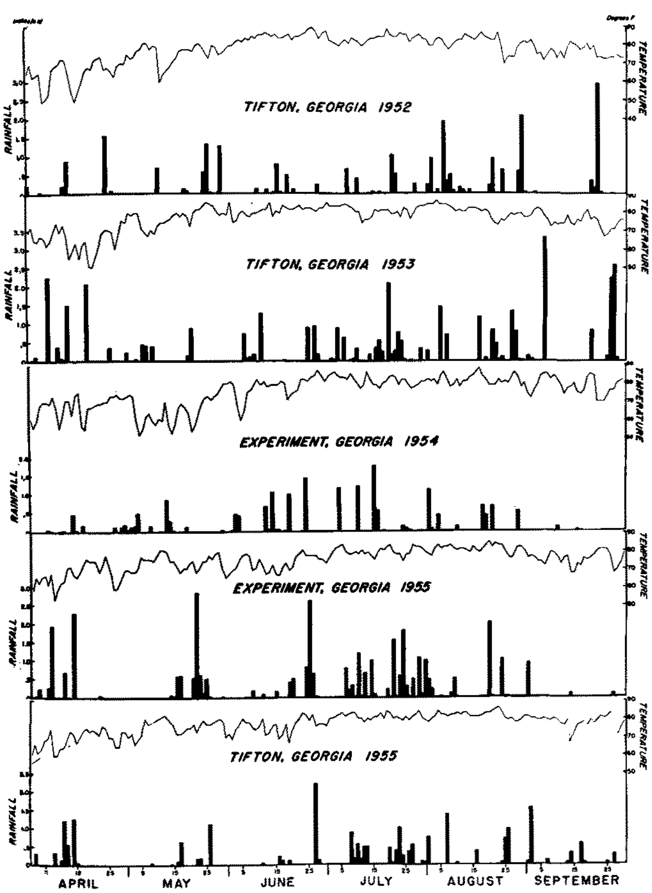

FIG. 1. Mean air temperatures and rainfall.

TABLE I

Iodine and Thiocyanogen Numbers

Strain	Mean iodine no.	Standard deviation		Mean thio. no.	Standard deviation	
		Sample	Repl.		Sample	Repl.
5-crop years		±	±		±	±
Shaffer	97.1	0.3	0.2	69.2	0.2	0.2
18-38	96.8	0.1	0.1	69.4	0.4	0.2
X-L-2	99.8	1.6	0.2	70.3	0.8	0.2
51-45	97.1	0.4	0.2	69.9	0.2	0.2
155-1	95.5	0.6	0.2	68.9	0.7	0.3
155-19	99.4	0.5	0.1	70.4	0.3	0.3
155-21	99.3	0.6	0.1	70.6	0.5	0.4
157-1	99.4	0.4	0.3	70.4	0.3	0.2
61-23	94.3	1.3	0.1	71.6	0.6	0.3
207-3-4	97.8	2.2	0.2	72.8	0.3	0.2
4-crop years						
121070	96.1	0.6	0.1	69.9	0.3	0.3
G.F.A.	97.8	0.5	0.1	69.5	0.4	0.2
Dixie	96.2	0.4	0.2	69.5	0.3	0.5
155-9	96.3	0.8	0.2	69.2	0.5	0.2
155-16	99.2	0.6	0.1	70.6	0.7	0.2
191-1	99.5	1.0	0.1	70.6	0.3	0.1

The mean iodine number, reported in Table I, is the average of four- to five-crop samples for 16 strains and each determination was replicated.

In Table I the column, standard deviation (iodine number) of the samples, shows the deviations from the mean iodine number in a specific strain for four or five crops while standard deviation of the replicates shows how well the determinations were reproduced. The standard deviations for iodine numbers for each strain over the four seasons (four to five samples) were usually not much greater than those found for the replicates. However the exceptions, X-L-2, 61-23, 207-3-4, and 120-1 showed deviations greater than one point in iodine number. Even these differences are very small when compared with variations that have been reported (6) on iodine numbers for other oilseeds. As previously noted, all strains examined had Spanish vegetative characteristics with the exception of two late-maturing bunch types, 61-23, a cross between Spanish and Philippine White, and 207-3-4, a cross between Spanish and Basse. It remains to be seen whether such mixing of types materially changes the reproducibility of the iodine number.

Mean thiocyanogen values and standard deviations of both the samples and replicates are also presented in Table I and it is evident that variations in these follow the same pattern shown by the iodine numbers.

The calculated linoleic and oleic glyceride values in Table II show good agreement from season to season both at Tifton and at Experiment, as is to be expected from the iodine and thiocyanogen results. Even the maximum variations are not large when it is considered that strains were examined at yearly intervals with new batches of Wijs and thiocyanogen solutions. Similar results, although not included here, were obtained on two- and three-crop samples from an additional 10 strains of peanuts.

Discussion

Several workers have reported that variation in mean temperature during development of the seed is a major factor in variation in the iodine number of the oil in cottonseed (8), soybean (2), linseed (3), and sunflower (5). Other factors in the biogenesis

TABLE II
Calculated Unsaturated Glycerides in Spanish Peanut Oils

Strain	Linoleic glycerides					St. dev.	Oleic glycerides					St. dev.
	a 1952	a 1953	b 1954	b 1955	a 1955		a 1952	a 1953	b 1954	b 1955	a 1955	
	%	%	%	%	%	±	%	%	%	%	%	±
Shaffer	34.4	34.8	33.7	34.2	34.3	0.4	44.1	43.3	44.6	43.6	43.7	0.5
18-38	33.4	32.9	33.7	34.3	33.9	0.5	45.0	46.3	44.6	43.3	44.4	1.1
X-L-2	37.3	36.2	37.6	35.9	34.7	1.2	42.6	43.9	41.5	42.7	43.6	0.9
51-45	34.0	32.9	33.1	33.3	34.0	0.5	44.8	46.5	45.9	45.3	44.9	0.7
155-1	32.5	31.9	33.5	32.5	33.0	0.6	45.7	47.1	44.4	44.5	44.2	1.2
155-19	36.0	35.4	35.7	35.0	36.0	0.4	43.7	44.4	43.8	44.0	43.2	0.4
155-21	36.1	35.1	35.0	35.3	35.2	0.4	43.5	45.0	45.2	43.8	44.0	0.8
157-1	35.4	35.9	36.0	35.4	35.7	0.3	44.4	43.5	43.6	43.6	43.4	0.4
61-23	28.0	27.6	25.4	29.9	27.7	1.6	53.2	55.0	55.8	50.7	54.4	2.0
207-3-4	33.5	33.4	27.5	29.2	29.4	2.7	48.9	49.2	55.1	53.2	53.9	2.8
121070	32.4	32.6	31.2	......	32.5	0.7	46.9	46.8	48.2	......	46.1	0.9
G.F.A.	35.5	34.2	35.2	......	33.9	0.8	42.5	45.0	43.0	......	44.4	1.2
Dixie	33.2	33.3	32.0	32.6	......	0.6	45.1	45.3	47.1	45.9	......	0.9
155-9	32.9	33.8	33.5	32.9	......	0.5	45.3	44.5	45.3	44.5	......	0.5
155-16	35.5	34.3	......	35.1	35.8	0.7	44.7	46.3	......	43.7	43.3	1.3
191-1	36.8	35.4	34.2	......	35.7	1.1	43.1	44.6	45.4	......	43.8	1.0

[a] Tifton. [b] Experiment.

of fatty acids have been considered in discussions of the physiology of oilseed development, but none of these has been as directly related to unsaturated glyceride formation as has air temperature. In the study reported here, strain character of the peanuts was well reproduced, insofar as unsaturation of the oils is concerned, over several seasons at two locations despite geographical and climatic variations.

There are at least three probable causes of this stability. First and probably foremost, the seed were from strains line-selected over a period of many years, and genetic character was well defined. Second, the seed used in this study were not run of the mill or grade Number 1, such as have apparently been used in many studies on other oilseeds. The standard for selecting the samples examined here was higher than that for U. S. Grade No 1. Third, as peanut seed develop at least two inches under soil shaded by the plant, variable air temperature should not play such a role in unsaturated oil formation in them as in all other commercially grown oilseeds which develop above ground and are therefore subject to wide fluctuations in environment during the period of oil formation.

Summary

Several strains of Spanish peanuts in four or more crop years at two locations showed very little variation in calculated oleic and linoleic glyceride values.

Acknowledgment

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Letter to Editor

The term "Official and Tentative Methods of Analysis" as used by both the American Oil Chemists' Society and the Association of Official Agricultural Chemists is misleading and confusing. In contradistinction, the American Association of Cereal Chemists and the American Public Health Association use the term "Standard Methods." The latter term is more accurate.

The term "official" carries the connotation of legal authority. Such legal authority may be by legislation, regulation, or a mutually entered-upon contract. The head of the feed control laboratory in a given state may issue a regulation that the methods as approved by the Association of Official Agricultural Chemists shall be official and exclusively used in his laboratory for the control of feeds sold in that state. This action only affects the laboratory in question and does not carry over into any private laboratory operations. A trade association may rule that a given method shall be official for the referee testing in the case of disputes as to the analysis of a given lot of a commodity. This does not make the test official for any other purpose.

In the practice of legal chemistry such "official methods" carry no weight unless evidence is introduced to show that they apply to the specific case either by legislation, regulation by legally constituted authority, or by the terms of the contract in question. The choice of method in legal testimony depends upon the judgment of the chemist himself and not on any group of chemists.

It would appear better to term methods standard rather than official when published by a scientific society such as the American Oil Chemists' Society. Such methods form an excellent standard for the analytical chemist, they are NOT straight jackets, holding all chemists into a close pattern of action.

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