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Evaluation of Some Locally Grown Seeds (Peanut, corn, sesame) and their Extracted Oils in Saudi Arabia.

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ABSTRACT. The locally grown varieties of peanut, corn and sesame seeds were evaluated for physical measurements and proximate composition. The extracted oils were analyzed for physico-chemical characteristics and fatty acid composition. Soundness and shell proportions of all peanuts met grade U.S. No. 1. The highest oil and protein contents were found in Baladi (El-Gasim) and TAI-NAN-4 peanuts, respectively. Corn kernels significantly differed not only in length, weight and volume but also in oil, protein and ash contents. Dark sesame seeds were heavier and had significantly higher oil and lower protein contents than light-colored seeds.

Generally, the physico-chemical characteristics of crude peanut, corn, and sesame oils were within the range of the AOAC recommended standards. GLC showed numbers of fatty acids present in crude oils. The percentage of each fall in the range adopted by FAO/WHO committee on fats and oils. Oleic and linoleic were the principle unsaturated fatty acids while palmitic was the main saturated fatty acid.

Oilseed crops are the main sources of vegetable oils. The world's oilseeds industry is producing around 49 million metric tons of vegetable oils annually (USDA 1986). Peanuts (*Arachis hypogaea*) are cultivated in warm temperate climates and produced by many countries, prticularly India, China, Argentina, Gambia, Sudan and the United States (JAOCS 1983). Peanut oil world production is estimated to be nearly 3.21 million metric tons (Lusas, 1987). Peanuts are rich in oil and protein and the amount of each differ due to varital differences and locations. However, most peanut may contain in the range of 44.4 to 56.2% oil and 18.4 to 34.4% protein (Eckey 1954). The oil is of high quality and can be used for producing salad and cooking oils, margarine and soap, in addition to uses in the manufacture of detergents, shaving creams, hair lotions and cosmetics (JAOCS, 1983). The characteristics of the crude oil have been reported by many authors (Eckey 1954 and Formo *et al.* 1979). The fatty acid compsotion was found to very considerably by peanut maturity, genotype and growth location (Ayres 1983).

Corn (*Zea mays*) is the major cereal used commercially for the production of oil, for human and animal feeding, and for industrial processing (starch, syrup, and sugar) (Kent 1983). The oil content in the Kernel differ according to the type of corn (flint, dent, sweet, popcorn). And range between 4.0 to 9.1% (Matz 1959, Fan *et al.* 1963); Watt and Merril 1963. There is no available recent statistics on world consumption of corn oil but the oil has been promoted for uses as a cooking and frying oil or salad oil because of its high polyunsaturated and low saturated fatty acid content (Hoseney 1986). The ranges of characteristics for corn oil were reported by Eckey (1954) and Formo *et al.* (1979). The fatty acid composition of corn oil is similar to that found in other cereal (Thornton *et al.* 1969; Morrison 1978).

Sesame (Simsim, benne, til, ajonjoli, gingelly) (*Sesamum indicum*) is one of the oldest oilseed crops. It is mainly produced in China, India, Burma, Mexico and Sudan (Formo *et al.* 1979). In 1986, the world production of sesame reached 2381,000 MT. (FAO 1987). The seeds are small, vary in size, and can be light or dark-colored (Eckey 1954). The oil and protein content in the seed usually range between 44 and 54%, and 19 and 25%, respectively (Eckey 1954). The crude sesame oil is usually high in quality and can be obtained from the seeds largely by pressing, followed by solvent extraction of the press cake. The oil is used mainly as a cooking and salad oils, and is hydrogenated for margarine and shortening manufacture (Formo *et al.* 1979). The characteristics and fatty acid composition of sesame oil were reported by many authors (Eckey 1954; Formo *et al.* 1979). Linolenic acid appears to be entirely lacking in sesame oil.

Although oilseeds and their oils have been thoroughly studied worldwide, their cultivation and industrial processing are still new to Saudi Arabia. The latest figures have shown the following values of imports in SR millions: peanuts, 15.7; corn, 187; corn oil, 94; sesame, 19.8 (Central Dept. of Statistics 1986). Many attempts have been made to locally cultivate some peanut and corn varieties by the Chinese Agricultural Technical Mission to the Kingdom of Saudi Arabia (1976, 1977, 1983/1984). The Department of Plant Production at King Saud University has undertaken many experiments to grow different varieties of peanuts and corn among which the varieties in this study were taken. Sesame is probably the most successful oilseed crop in Saudi Arabia. It is mainly cultivated in Makkah and Gizan regions. The total production of sesame in the Kingdom increased from 720 tons in 1981 to more than 2000 tons in 1985 (Dept. Economic Studies and Stat., 1984/1985).

Crops in Saudi Arabia were entirely specific on agronomic characteristics (Plant height, number of branches and pods per plant, shelling rate, ear height, rate of threshing days from sowing to maturity etc.) and yield performances of these crops. Since there is no available data on the quality of locally grown oilseeds or their oils, this study was conducted to evaluate locally grown varieties of peanuts, corn and sesame and to report the characteristics and composition of their extracted crude oils. There is a necessity to publish a local data since the quality of oilseeds and their oils can be affected by soil, rainfall and climatic conditions which are knwon to be different in Saudi Arabia from those in other countries.

Experimental Procedures

Kernel and Seed Evaluation and Measurements

Ten peanut and two corn varieties were obtained from the Agricultural Experimental Station of the College of Agriculture, King Saud University. The dark and light-colored sesame seeds were provided by Agricultural Development Project Station in Gizan, Saudi Arabia. The weight of a hundred shelled Kernels of each peanut variety was determined. The procedure was repeated five times and the means and standard deviations were statistically reported. The peanut kernels were evaluated by calculating the proportion of shells to shelled nuts and the percentage of sound kernels. Size measurements including length, breadth, and thickness of ten corn kernels were measured using a calliper. The average weight of triplicate determination of a hundered kernels and their volume were reported. The corn kernels were examined for the presence of foreign matter and damaged or broken kernels. The only physical measurement on sesame seeds was the weight of a thousand seeds. The unshelled nuts and sesame seeds were milled with BRAUN mil type 4250 KB (Braun AG Frankfurt/M, West Germany) for one minute. The corn kernels were milled to pass through 1 mm sieve with Ultra-centrifugal mill Resh type ZMI, No. 140. (F. Kurt Retsch Gmb H & Co. P.O.B 1554, West Germany). Moisture, fat, protein (N $\times$ 6.25), and ash were determined according to AOAC (1980).

Oil Extraction and Physico-chemical Analysis

Peanut, corn and sesame oils were extracted by petroleum ether (60-80°C) using Soxhelt apparatus. The oils were then analyzed for specific gravity (25/25°C), refractive index (27°C), acidity of free fatty acids (%FFA), peroxide value, iodine number, saponification number and unsaponifiable matters by the standard methods for the analysis of oils, fats, and derivatives (1979).

GLC Analysis

The fatty acid compositions of extracted peanut, corn, and sesame oils were determined by gas chromatography according to the procedure described by Metcalfe *et al.* (1966). Fatty acid methyl esters were identified on a 3700 gas chromatographic unit (Varian) with a flame ionization detector at 250°C. The flow rates for hydrogen, nitrogen, and air were 30, 40, and 300 ml/min, respectively. A sample of 1 μl of each methyl ester was injected on a 200 cm × 6.25 mm column which was packed with 15% OV-275 on 80/100 chromosorb WAW. The temperature of injector was 150°C and the chart speed was 1 cm/min. The comparison between the peaks of the samples and those of the standards were made for identification. The percentage of each fatty acid was then calculated using the peak height and the retention time.

Statistical Analysis

Data on peanut kernel weight, corn kernel measurements, proximate compositions of peanut, corn and sesame, and physico-chemical characteristics and fatty acid compositions of the crude oils were statistically analyzed using the analysis of variance (Steel and Torrie 1980) and SAS programs (SAS 1982). Number of replication differs from determination to another and will be stated as footnotes under each table in the results and discussion section. The difference among the means were determined for significance at 5% level using Duncan's New Mutiple Range Test and SAS computer programs. (Steel and Torrie 1980, SAS 1982).

Results and Discussion

Kernels and Seeds

The evaluation of peanut kerenels is presented in Table. 1. Baladi (El-Gasim) peanut kernels were the heaviest while those of Barberton were the lightest. Usually, the shells are separated and their proportions to the shelled nuts are known before the nuts are utilized. These proportions along with soundness of mature kernels are factors in the grading of unshelled peanuts for trading purposes (Eckey 1954). The proportions of shell to shell nut as shown in Table 1 differ from those reported for Spanish peanuts (20:80) and for Carolina Runner peanuts (26:74) grown in the USA (Eckey 1954). The soundness of the kernels of the studied varieties were higher than the minimum of 70 percent sound kernels which set for peanuts grade U.S. No. 1. The different conditions under which peanuts were grown could affect the shell proportion and the soundness of the kernel even for the same variety.

Table 2 shows the physical characteristics and quality of corn kernels. The dimensions of the kernel indicated that Alex-11 kernel was nearly square while XL-77-F2 kernel was rectangular in shape. The latter was darker in color, significantly ($P < 0.05$) heavier in weight, and bigger in volume compared to the former. The kernels of both varieties were not damaged or broken and contained a very low amount of foreign matter. These criteria is important for grading of corn (Kent 1983).

The seeds of sesame were small and the average weights for dark-colored seeds and light-colored seeds were 3.8 and 2.2 grams per 1000 seeds. The weight of this number of seeds usually range between 2 and 3.5 grams, depending on variety and cultural conditions (Eckey 1954)).

Table 1. Evaluation of peanut kernels of different varieties

Varieties[a]	Wt. of 100 shelled nuts (g)	Proportion of shells to shelled nuts	% Sound mature kernels
El–Jammaz	174.18 ± 1.31[b]	39.76 : 60.24	86
Ho-TIEN-KANG	181.07 ± 2.75	34.46 : 65.54	91
TAI-NAN-4	158.23 ± 3.10	37.67 : 62.33	95
TAI-NAN-9	173.65 ± 2.82	37.21 : 62.79	85
72-IX-009	208.46 ± 2.97	34.72 : 65.28	86
Egyptian Baladi	159.50 ± 1.30	47.74 : 52.26	79
Ashford	130.47 ± 0.93	33.70 : 66.30	83
Barberton	92.68 ± 0.33	30.86 : 69.14	87
Baladi (El-Gasim)	226.55 ± 1.78	33.86 : 66.14	86
Bambey 73-30	106.21 ± 1.22	35.49 : 64.51	90

[a]Varieties; names corrospond to origins: El-Jammaz, Saudi Arabia; Ho-TIEN-KANG, Taiwan; TAI-NAN-4, Taiwan; TAI-NAN-4, Taiwan; 72-IX-009, Sudan; Egyption Baladi, Egypt; Ashford, Sudan; Barberton, Sudan; Baladi (El-Gasim), Saudi Arabia; Bambey 73-30, Sudan.

[b]Average ± sd. of five replications.

Table 2. Physical characteristics and quality of corn kernels of different varieties[a]

Meausrement	Alex-11	XL-77-F2
Length (mm)[b]	8.4 ± 0.55[c]	9.9 ± 0.54[d]
Breadth (mm)[b]	8.4 ± 1.14[c]	8.5 ± 0.50[c]
Thickness (mm)[b]	4.6 ± 0.55[c]	4.5 ± 0.49[c]
Wt. of 100 kernels (g)[e]	19.5 ± 0.53[c]	24.0 ± 0.26[d]
Volume of 100 kernels (ml)[ef]	16.9 ± 0.35[c]	25.6 ± 0.53[d]
Foreign matter (%)	0.1	0.3
Damaged kernels (%)	0.0	0.0
Visual color	Gold	Brownish yellow

[a]Varieties names corrospond to origins: Alex-11, Egypt; XI-72-F2, U.S.A.

[b]Calliper, values are means ± sd. of ten kernels.

[c,d]Means followed by different letters of different superscript (within a raw) are significantly difference ($P < 0.05$).

[e]Average ± sd. of triplicate determinations.

[f]Water.

Proximate Composition of Kernels and Seeds

The proximate composition of peanuts of different varieties is illustrated in Table 3. Significantly higher oil contents were found in Baladi (El-Gasim), 72-IX-009, El-Jammz, and HO-TIEN- KANG peanuts while TAI-NAN-4 and 72-IX-009 peanuts contained significantly higher protein values over the others. On the other hand, Egyption Baladi and Ashford had the lowest values for protein and oil. Generally, the percentages of oil and protein shown in Table 3 fall in the ranges of values reported for Spanish Runner and Vriginia peanuts (Eckey 1954). The variations, particularly in oil content and fatty acid composition can be due to genotype and growth location as well as to maturity of the peanut (Pattee *et al.* 1969).

Table 3. Proximate composition[a] of peanuts of different varieties

Varieties	Moisture (%)	Oil (%)	Protein (%)	Ash (%)
El-Jammaz	3.15	52.55^{b}	28.67^{c}	2.71^{b}
Ho-TIEN-KANG	3.85	51.79^{bc}	27.08^{d}	2.71^{b}
TAI-NAN-4	3.62	49.29^{d}	32.37^{b}	2.53^{d}
TAI-NAN-9	3.70	50.05^{cd}	26.12^{d}	2.51^{d}
72-IX-009	3.75	52.95^{b}	31.27^{b}	2.52^{d}
Egyption Baladi	3.80	44.47^{e}	23.92^{e}	2.61^{c}
Ashford	3.40	48.40^{d}	24.18^{e}	2.37^{e}
Barberton	3.78	49.52^{cd}	28.91^{c}	2.68^{b}
Baladi (El-Gasim)	3.70	53.19^{b}	29.53^{c}	2.50^{d}
Bambey 73-30	3.70	49.61^{cd}	29.16^{c}	2.60^{c}

[a]Dry weight basis, values are means of three estimates.

[b,c,d,e]Means followed by different letters or different superscript (within a column) are significantly different ($P < 0.05$).

Table 4 shows the proximate composition of corn kernels and sesame seeds. The whole kernels of Alex-11 and XL-77-F2 were found to contain 6.33 and 4.19% oil, 13.49 and 12.05% protein, and 1.87 and 1.44% ash, respectively. The two varieties differed significantly at the 5% level. However, all the values reported in Table 4 exceeded the ranges for all corn types (Matz 1959, Fan *et al.* 1963; Watt and Merril 1963). Dark sesame seeds were significantly higher in oil but lower in protein contents than those for light-colored seeds. Usually the oil and protein contents in sesame seeds range between 44 and 54%, and 19 and 25%, respectively (Eckey 1954).

Table 4. Proximate composition[a] of corn kernels and sesame seeds

Assay	Corn		Sesame	
	Alex-11	XL-77-F2	Dark	White
Moisture (%)	8.10	9.08	4.45	3.65
Oil (%)	6.33[b]	4.19[c]	54.00[b]	49.03[c]
Protein (%)	13.49[b]	12.05[c]	21.05[b]	23.18[c]
Ash (%)	1.87[b]	1.44[c]	7.51[b]	6.31[b]

[a]Dry weight basis, values are means of three estimates.

[b,c]Means followed by different letters or different superscript (within a raw) are significantly different ($P < 0.05$).

Physico-chemical Characteristics of Extracted Oils

The physico-chemical characteristics of crude peanut oils from different varieties are presented in Table 5. The extracted oils had pale yellow color and the odor and flavor of peanuts. The characteristics of these oils were generally similar to the usual characteristics of peanut oils (Formo *et al.* 1979). The unsaponifiable matter was slightly low but it is still within the range for most peanut oils (0.2-1.0%). This may be because of lower phospholipids and other constituents present in peanut oil in comparison with crude soybean or cottonseed oils (Eckey 1954). The free fatty acid (%FFA) content was generally low for all varieties but some peanut oils could have a wide range from hardly appreciable amounts up to 5% (Eckey 1954; Formo *et al.* 1979). The peroxide values in Table 5 were relatively higher than were expected for currently extracted peanut oil which is known to have excellent oxidation stability among the oleic/linoleic oils under normal conditions (Ayres 1983). The lower moisture in the nuts might have contributed to oxidative rancidity initiation before milling and oil extraction (Halton and Fisher 1937; Fennema 1976; Kaced *et al.* 1984).

Table 6 shows the physicochemical characteristics of crude corn oils. The extracted oils from both varieties had dark reddish-amber color and clouded upon cooling at room temperature. This might be due to the waxy materials which are usually present in corn oil. The characteristics shown in Table 6 are comparable to that of AOAC standards for corn oil (Eckey 1954; Formo *et al.* 1979). However, the saponification number, which is a measure of the average molecular weight of the acids was low for both varieties. On the other hand, the unsaponifiable matter, particularly in oil extracted from XL-77-F2 corn, was high (> 2.0%). This might be due to large amounts of phosphatides and other non-oil substances mainly sterols which are usually present in crude corn oil (Formo *et al.* 1979). The free fatty acids percent (%FFA) is significantly higher in XL-77-F2 oil than that of Alex-11 oil. Some corn oils might contain above 1.5%FFA. However, the low FFA is prefered since it might render the process of refining easier.

Table 5. Physio-chemical Characteristics of crude peanut oils from different varieties

Varieties	Specific gravity (25/25°C)	Refractive index (27°C)	Acidity[a] (%FFA)	Peroxide value (meq/kg)	Iodine number	Sap. number	Unsap. matter (%) (%)
El-Jammaz	0.9121^{f}	1.468^{b}	0.20^{de}	11.43^{cd}	93.68^{c}	188.06^{be}	0.24^{cd}
HO-TIEN-KANG	0.9118^{g}	1.469^{b}	0.34^{c}	13.54^{bc}	93.67^{c}	184.39^{bc}	0.21^{d}
TAI-NAN-4	0.9128^{bc}	1.469^{b}	0.25^{d}	11.49^{bcd}	98.45^{b}	191.76^{b}	0.21^{d}
TAI-NAN-9	0.9127^{cd}	1.468^{b}	0.36^{d}	12.93^{bc}	99.00^{b}	193.56^{b}	0.23^{cd}
72-IX-009	0.9126^{cd}	1.468^{b}	0.22^{d}	9.90^{a}	99.87^{b}	190.06^{b}	0.24^{cd}
Egyptian Baladi	0.9121^{f}	1.469^{b}	0.51^{b}	12.11^{bcd}	98.00^{b}	193.19^{b}	0.31^{b}
Ashford	0.9126^{cd}	1.469^{b}	0.48^{b}	13.76^{b}	100.72^{b}	188.78^{bc}	0.28^{bc}
Barberton	0.9123^{e}	1.468^{b}	0.38^{c}	11.90^{bcd}	98.55^{b}	191.60^{b}	0.28^{bc}
Baladi (El-Gasim)	0.9129^{b}	1.469^{b}	0.17^{e}	11.42^{cd}	100.34^{b}	190.63^{b}	0.22^{d}
Bambey 73-30	0.9123^{e}	1.469^{b}	0.23^{de}	12.87^{bc}	98.30^{b}	189.86^{b}	0.26^{bcd}

[a]Calculated as oleic acid

[b,c,d,e,f]Means followed by different letters or different superscript (within a column) are significantly different ($P < 0.05$), values are means of triplicate determination.

Table 6 shows also the physico-chemical characteristics of crude sesame oils. The oils had clear yellow color free of haziness and there was no visual difference between the oil extracted from the dark seeds and that from the light seeds. The characteristics of both oils generally fall in the ranges of the AOAC recommended standards for sesame oil (Eckey 1954; Formo *et al.* 1979). However, the specific gravity of dark-colored seed oil was slightly lower than the standard (0.914-0.919). The unsaponifiable matter in light-colored seed oil was significantly higher ($P < 0.05$) than that in dark-colored seed oil. This fraction is known to contain sesamin and sesamolin which give the distinctive color reactions (Baudouin and Villavecchia tests) (Mattil *et al.* 1964).

Fatty Acid Composition of Extracted Oils

The fatty acid distributions for peanut oils from different varieties are shown in Table 7. The saturated fatty acids consisted mainly of palmitic while oleic and linoleic were the principle unsaturated fatty acids. Other fatty acids such as C 18:0, 18:3, 20:0, 22:0 and 24:0 were also detected by GLC. Worthington *et al.* (1972) reported the following ranges for 82 different genotypes of peanuts: 16:0, 7.4-12.9%; 18:0, 1.6-5.3%; 18:1, 35.7–68.5%; 18:2, 14.0-40.3%; 20:0, 0.9-2.2%; 20:1, 0.6-2.0%, 22:0, 1.3-5.1%, and 24:0, 0.6-2.0%. However C 18:3 was detected in all peanut oils in this study and this is in agreement with FAO/WHO standards for peanut oil (Spencer *et al.* 1976). In addition, the percentages of the detected fatty acids fall in the ranges adopted by the FAO/WHO committee on fats and oils for peanut oil.

Table 6. Physico-chemical characteristics of crude corn and sesame oils from different varieties

Characteristics	Corn		Sesame	
	Alex-11	XL-77-F2	Dark	White
Specific gravity 25/25°C	0.9153*	0.9154**	0.9008*	0.9147**
Refractive index (25°C	1.4720*	1.4725*	1.4715*	1.4715*
Acidity (%FFA)[a]	0.98*	2.02**	0.19*	0.34**
Peroxide value[b]	0.80*	1.20**	1.55*	2.06*
Iodine number	104.73*	107.54*	107.18*	108.15*
Saponifican number	173.32*	171.35*	193.58*	189.49**
Unsaponifiable matter (%)	2.10*	2.83**	1.01*	1.47**

*, **Significant difference ($P < 0.05$), values are means of triplicate determination.

[a]Calculated as oleic acid.

[b]meq./kg.

Table 7. Fatty acid distributions for peanut oils from different varieties

Fatty acids	Varieties									
	1	2	3	4	5	6	7	8	9	10
Palmitic (16:0)	10.76	10.17	12.81	10.57	11.14	10.82	10.29	11.71	12.22	10.55
Stearic (18:0)	3.33	3.32	4.80	3.11	4.99	3.07	2.44	3.62	4.47	4.1
Oleic (18:1)	47.57	47.57	38.44	46.42	42.24	46.53	45.48	42.95	40.45	44.53
Linoleic (18:2)	30.79	30.08	35.45	30.67	33.93	30.66	33.03	34.01	35.13	31.25
Linolenic (18:3)	1.21	1.35	1.07	1.71	1.00	1.58	1.96	1.11	0.84	1.27
Arachidic (20:0)	1.76	1.62	1.87	1.66	2.25	1.58	1.35	0.63	2.02	1.95
Behenic (22:0)	3.15	3.37	3.68	3.47	2.91	3.61	3.42	3.97	3.13	3.81
Lignoceric (24:0)	1.82	2.01	1.87	2.38	1.54	2.16	2.10	2.02	1.74	2.54

[a]% Fatty acid composition, values are means of two determinations.

[b]Varieties from 1 to 10 corrospond to names in Table 1.

Table 8 illustrates the fatty acid distributions for corn oils from the two studied corn varieties. Linoliec acid was the dominant fatty acid, followed by oleic, and palmitic acid. Neither fatty acids of chain length smaller than 16:0 nor 16:1, 20:1 and 24:0 were detected eventhough their presence in very small amounts was adopted by FAO/WHO committee on fats and oils (Spencer *et al.* 1976). Thompson *et al.* (1973) and Weber and Alexander (1975) reported that 16:0, 18:0, 18:1, 18:2 and 18:3 were found in corn oils by GLC during the period 1965-1975.

Table 8. Fatty acid distributions[a] for crude corn and sesame oils from different varieties

Fatty acids	Corn		Sesame	
	Alex-11	XL-77-F2	Dark seeds	White seeds
Palmitic (16:0)	17.49	15.59	12.43	10.78
Stearic (18:0)	3.71	2.74	4.75	5.90
Olic (18:1)	33.76	35.28	38.84	41.14
Linoleic (18:2)	44.05	44.46	44.52	41.23
Linolenic (18:3)	0.45	0.91	—[b]	—[b]
Arachidic (20:0)	0.37	0.77	—	0.94
Behenic (22:0)	0.17	0.24	—	—[b]

[a]% Fatty acid composition, values are means of two determinations.
[b]not detected.

The percentages of fatty acids shown in Table 8 are within the ranges adopted by FAO/WHO for corn oil. The very low content of linolenic acid (0.45, 0.91%) in conjunction with the high degree of unsaturation could combine the higher stability and the good nutritional value of corn oil.

The fatty acid distributions for sesame oils are shown in Table 8. Oleic and linoleic acid are the principle fatty acids and are present in approximately equal amounts, particularly in light-colored seed oil. The fatty acids (C 16:0, 18:0, 18:1 and 18:2) present in dark-colored seed oil in this study were previously reported by El-Tinay *et al.* (1976) for Sudan sesame oil. The light-colored seed oil contained the same fatty acids in addition to arachidic acid. This is in accordance with some American sesame oils (Formo *et al.* 1979). However, FAO/WHO have adopted other fatty acids having chain length less than C 16:0, 16:1, 18:3, 20:1 and 22:0 which might be present in very small amounts in sesame oils (Spencer *et al.* 1976). These fatty acids are usually found in Indian sesame oil (Sreenivasan 1968). Generally, the percentages of fatty acids in both oils (Table 8) are within the ranges of fatty acid distributions adopted by FAO/WHO for sesame oil.

Conclusion

The data on the quality of peanuts, corn and sesame varieties and their respective oils were reported. The different climatic conditions in Saudi Arabia seem not to affect the quality of the kernels and seeds, or the characteristics of the crude oils since they were comparable with the international standards. This local data would be of importance to growers, researchers, and others who are interested in conducting feasibility studies leading to establishing vegetable oil industry in the Kingdom of Saudi Arabia.

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تقييم بعض البذور (الفول السوداني، الذرة الشامية، السمسم) المزروعة محلياً والزيوت المستخلصة منها في المملكة العربية السعودية

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تمت دراسة عدة أصناف من الفول السوداني والذرة الشامية والسمسم والتي نجحت زراعتها محلياً. وتناولت الدراسة تقييم لبعض الصفات الطبيعية والتركيب الكيمائي للبذور بالإضافة إلى تحليل الزيوت المستخلصة لمعرفة الثوابت الطبيعية والكيماوية وما تحتويه هذه الزيوت من أحماض دهنية.

أظهرت النتائج أن سلامة الفول السوداني ونسب القشور إلى الوزن الكلي تضاهي الدرجة الرقمية الأولى وفقاً للتدريج الأمريكي. ويعتبر الصنف البلدي (القصيم) ن والصنف TAI-NAN-4 من أحسن الأصناف في نسبة الزيت وفي نسبة البروتين على التوالي. كما وجدت اختلافات معنوية بين صنفي الذرة الشامية سواء في الشكل أو الحجم أو الوزن أو نسبة كل من الزيت والبروتين والرماد. أما السمسم ذو البذور الداكنة فكان أثقل في الوزن وأعلى في نسبة الزيت ولكنه أقل في نسبة البروتين مقارنة بالسمسم الأبيض.

أشارت النتائج بأن الثوابت الطبيعية والكيماوية لجميع الأصناف لكل من الفول السوداني والذرة الشامية والسمسم تنحصر في القالب داخل المدى التي وضعته جمعية التحليل الكيماوي الرسمية لهذه الثوابت. وبالتحليل الكروماتوجرافي الغازي ظهر العديد من الأحماض الدهنية وقدرت نسب كل منها فوجدت ضمن القيم التي تبنتها الهيئة المنبثقة من كل من منظمة الصحة العالمية (WHO) ومنظمة الأغذية والزراعة الدولية (FAO) والمتخصصة في مجال الزيوت

والـدهون . كـما أظهر التحليـل الكرومـاتـوجـرافي أن الأوليـك واللينـوليـك هي الأحمـاض غير المشبعـة الرئيسيـة بينما كـان حمض البالمتيـك هو الحـامض الرئيسي المشبع .