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The Genetic Potential of the Nutritive Value of Beniseed (*Sesamum indicum* L.)

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ABBSTRACT: Seeds from 15 cultivars of beniseed grown in a southern guinea savanna agro-ecology were evaluated for their mineral composition as well as their physico-chemical characterization. Average percentage crude protein (15.40), crude fat (53.27), crude fibre (6.10), ash (2.33) and Nitrogen free extract (16.61) compare favourably with those of groundnut as a reference crop. However mineral composition are fairly similar in all the cultivars with calcium being the most abundant in two varieties (85-3-1 and T-4). While magnesium and potassium are appreciably high phosphorus appears to be the poorest major element. Physico-chemical analysis shows that the cultivars Potskun 98, S-530 (4) and Cameroun 98 are appreciably rich in iodine and saponification values.

Key Words: Plant genetics; Nutritive value; Sesame (*Sesamum indicum* L.); Beniseed,

Introduction

Sesame (*Sesamum indicum* L.) popularly known as beniseed is probably the most ancient oilseed known and used by man (Weiss, 1984). Traditional sesame producing areas in Nigeria are Kwara, Kogi, Benue, Plateau, Nasarawa and other marginal producing states (Agboola, 1979).,

In spite of the nutritive potentiasl of benisees in terms of protein (Purseglove – 19-25%), 1974; Ustimenko – Bakumovsky – 17-19%, 1983) as well as a source of essential elements like calcium, magnesium, potassium and phosphorus (Uzo, *et al*., 1985) the genetic potential of beniseed in terms of food value and physico-chemical properties of the crop species has not been adequately covered. This study attempts to evaluate the proximate and physico-chemical characterization of 15 cultivars of beniseed in a southern guinea agro-ecosystem.

Materials and Method

Table 1 shows the 15 cultivars of the beniseed materials originating from National Cereals research Institute, Badeggi, Niger State. The following procedures were carried out.

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Proximate Analysis

The proximate composition in terms of moisture content, crude protein, crude fat, crude fibre, ash and carbohydrate contents of the air-dried milled samples were determined according to Official Analytical Chemists (OAC, 1984).

Lipid extraction and purification followed the same steps by Folch *et al*., (1957). The physico-chemical properties of the oil contents were determined according to Cock and Van Rede (1966).

Collected data were subjected to analysis of variance as indicated in the results and discussion that follow.

Results and Discussion

Table 2 shows the proximate composition of the beniseed accessions in respect of dry matter content. Also the carbohydrate content expressed as nitrogen free extract (N.F.E) as well as Energy content in terms of Kilo calories is indicated. Crude protein range of between 11.5 and 18.20 compares favourably with Ustimenko-Bakunovsky (1983) in a similar analysis. Low coefficient of variation observed in the crude fat of the sesame cultivars suggests that there are no appreciable differences in the oil contents of the experimental lot.

However high values observed in Eva '98, 73A – 82B and 859 – 3 – 1 will suggest the potential of these cultivars for oil exploration and exploitation (Purseglove, 1974). High crude fibre in the sesame cultivars is an advantage when the seeds are used to compound livestock feeds since this will add bulk to stool and encourage easy defaecation (Natarajan, 1980).

The high coefficient of variation in carbohydrate content among the cultivars would be nutritionally unacceptable since the quality of carbohydrate is a majoir factor in the determination of the energy system in crop species (Oke, 1967).

Ash fibre scores compare favourably with FAO Report (1985). This indicates the potential of the sesame cultivars with respect to their mineral supply values. However the high quantities of energy contents exhibited by the materials show their superiority to soyabeans (452) and cowpea (350) in terms of this attribute (Oke, 1967).

Mineral Composition

Table 3 indicates the spread of both the macro and microelement status in the beniseed accessions. Observations from the Table indicate that the calcium status of the materials is relatively higher than those of phosphorus, magnesium and potassium. This is contrary to the work of Smart (1994) and Awopetu and Ojo (2001) on groundnuts.

Trace element values in the beniseed accessions are much higher than the values in groundnut (Awopetu and Ojo, 2001).

Table 4 represents the physico-chemical properties of the sesame seeds. Observationbs from the Table show that acid, iodine and peroxide values are comparable with contemporary indices in groundnut investigations by Awopetu and Ojo (2001).

However saponification values in Table 4 are comparable with the works of Sekhon *et al*., (197)), Worthington *et al*., (1972), Badami *et al*., (1980) and Wallersten *et al* (1989). genetic structures as well as the genetic stratum of oil seeds are vulnerable to ambient environmental factors of ultraviolet radiation, moisture, heart and oxygen status (Awopetu, 1982).

Except in varieties 530-3, Kano 98 and Panshin 98 the beniseed varieties are favourably disposed as materials for protein-based concentrates especially for livestock feeds. Crude fibre values in Table 4 are acceptable in terms of effective digestibility in livestock compilations. Other nutritive advantages especially in high calorie supplies for energy-oriented livestock programmes can be inferred from Tables 2-4.

Table 1: Physical characters of the experimental materials.

Variety No	Accession	Seed colour	Seed coat texture	Seed shape	Wt. of 100 seed (g)
1	Eva 98'	Dirty white	Smooth and tough	Small ovate	40
2	T-4	Cream white	Smooth	Ovate	40
3	Kano 98'	Pale white	Smooth	Ovate	60
4	Domu 98'	Dirty white	Smooth and tough	Ovate	60
5	Wamba	Dirty white	Smooth and tough	Small ovate	40
6	Panshin 98'	Cream white	Smooth	Ovate	60
7	SM-11	Dirty white	Smooth	Ovate	60
8	530-3	Pale white	Smooth and tough	Ovate	40
9	73A-82B	Dirty white	Smooth	Small ovate	40
10	Yandev	Pale white	Smooth and tough	Ovate	60
11	Cameroun 98'	Dirty white	Smooth	Ovate	60
12	859-3-1	Dirty white	Smooth and tough	Ovate	40
13	Poskun 98'	Dirty white	Smooth	Ovate	40
14	S-530(4)	Pale white	Smooth	Ovate	60
15	CHM-kwallu 98'	Dirty white	Smooth	Ovate	40

Table 2: Proximate compositionm of Sesame varieties (% dry matter)

Variety No	Accession	Dry Matter	Crude Protein	Crude Fat	Crude Fibre	Ash	N.F.E	Energy Content (Kcal)
1	Eva 98'	93.44	18.20	55.00	3.50	2.33	14.41	625.44
2	T-4	93.98	15.05	50.00	2.00	2.58	24.35	607.60
3	Kano 98'	93.20	13.30	51.50	4.50	2.35	21.55	602.90
4	Domu 98'	94.45	14.35	51.50	8.00	2.26	18.34	594.26
5	Wamba	93.75	16.10	53.00	9.00	1.99	13.66	596.04
6	Panshin 98'	94.09	13.65	54.50	4.50	1.97	19.47	622.98
7	SM-11	94.33	15.00	55.00	4.00	1.96	18.37	628.48
8	530-3	93.87	11.20	53.50	5.00	1.98	22.19	615.06
9	73A-82B	93.98	17.85	55.00	4.50	2.75	13.88	621.92
10	Yandev	92.62	15.75	54.00	6.50	2.80	13.57	603.28
11	Cameroun 98'	93.30	17.85	55.00	7.50	2.46	10.49	608.36
12	859-3-1	93.15	14.70	51.50	9.00	2.55	15.40	583.90
13	Potskun 98'	94.15	16.10	54.00	9.00	2.13	12.92	602.08
14	S-530(4)	93.49	15.75	52.50	8.00	2.78	14.46	593.34
15	CHM-kwallu 98'	93.79	16.10	53.00	6.50	2.07	16.12	605.88
Mean x		93.71	15.40	53.27	6.10	2.33	16.61	607.43
SD		0.50	1`.86	1.59	2.26	0.30	3.94	13.10
C.V (%)		0.53	12.08	2.98	37.05	12.88	23.72	2.16

Table 3: Mineral composition of Sesame varieties

Variety No	Accession	Macro elements (g/kg DM)					Micro elements (g/kg DM)			
		P	Ca	Mg	K	Na	Mn	Fe	Cu	Zn
1	Eva 98'	0.07	1.269	0.406	0.580	34.36	27.29	132.97	30.99	94.81
2	T-4	0.08	1.557	0.469	0.466	155.03	52.67	145.79	28.47	60.99
3	Kano 98'	0.06	1.478	0.398	0.413	128.44	28.45	216.74	32.50	97.69
4	Domu 98'	0.07	1.355	0.437	0.399	92.33	28.29	169.14	33.83	62.92
5	Wamba	0.07	1.093	0.401	0.421	73.05	34.88	122.94	32.56	64.50
6	Panshin 98'	0.07	1.122	0.393	0.377	116.75	30.65	241.19	37.94	106.60
7	SM-11	0.08	1.034	0.352	0.484	82.32	43.13	446.85	35.92	92.02
8	530-3	0.08	1.015	0.397	0.483	84.71	24.52	96.15	35.32	69.61
9	73A-82B	0.12	1.535	0.481	0.605	115.33	53.49	412.81	44.25	76.18
10	Yandev	0.08	1.504	0.457	0.758	65.27	31.31	144.58	42.71	89.76
11	Cameroun 98'	0.08	1.317	0.424	0.636	73.07	28.41	359.23	35.57	71.20
12	859-3-1	0.05	1.617	0.392	0.487	193.66	24.25	92.76	35.57	93.20
13	Potskun 98'	0.06	1.041	0.386	0.640	96.14	26.14	97.53	40.31	73.83
14	S-530(4)	0.10	1.563	0.497	0.615	95.02	56.44	322.65	38.45	76.64
15	CHM-kwallu 98'	0.08	1.014	0.370	0.602	104.85	27.91	251.05	41.83	81.34
Mean x		0.08	1.30	0.42	0.53	100.69	34.52	216.83	36.41	80.75
SD		0.02	0.23	0.04	0.11	38.50	11.19	118.66	4.51	14.12
C.V.(%)		25.00	17.69	9.52	20.75	38.24	32.42	54.72	12.39	17.49

Table 4: Physicochemical properties of Sesame oil

Variety No	Accession	Acid value (mg KOH/g oil)	Iodine value (mgI^2/g oil)	Saponification value (mg KOH/g oil)	Peroxide value (meq./g oil)
1	Eva 98'	13.94	23.03	36.40	11.80
2	T-4	16.35	20.16	33.60	1.00
3	Kano 98'	15.29	17.71	50.40	9.98
4	Domu 98'	9.97	28.38	31.30	2.58
5	Wamba	10.36	13.58	56.00	0.33
6	Panshin 98'	14.78	19.66	47.60	2.00
7	SM-11	11.48	21.54	44.80	3.60
8	530-3	11.82	17.52	44.80	1.20
9	73A-82B	10.42	24.61	50.30	8.10
10	Yandev	9.86	17.52	33.60	1.20
11	Cameroun 98'	11.98	23.29	39.20	3.20
12	859-3-1	12.60	15.88	72.80	1.53
13	Potskun 98'	14.00	26.97	44.80	3.80
14	S-530(4)	14.22	26.40	44.80	17.60
15	CHM-kwallu 98'	11.82	17.57	44.80	3.80
Mean x		12.59	20.92	45.01	4.78
SD		2.06	4.41	10.40	4.93
C.V (%)		16.37	21.09	23.10	103.15

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