CHEMICAL AND MORPHOLOGICAL CHARACTERS OF SOME LOCAL RICE GENOTYPES

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(Manuscript received 28 July, 1999)

Abstract

Some chemical and morphological characters of 23 rice varieties were investigated to assist identifying these varieties in the quality control and certification tests. Those varieties were grown at the farm of Rice Research & Training Center, Sakha, Kafr El-Sheikh, Egypt during 1998. Laboratory tests were done in Seed Technology Lab at Sakha and Giza.

The data showed that the highest grain weight (1000 grain) were in the japonica and indicagroups. The highest length of grains were in indica group, the highest width were in the varieties which belong to japonica and indica/japonica. The shape of grains ranged between bold, medium and slender.In japonica group, the shape of Sakha 102 was round, the shape of varieties of indicagroup were slender except GZ 1368-5-4 which has medium shape.

Significant differences were obtained for seedling characters for the three groups. Giza 171 had significantly the longest mesoctyl length (5.51 mm) while Giza 176 recorded the shortest length (2.33mm) for the japonica grouop.

The shortest Coleoptyle was obtained for Giza 176 and Sakha 101 which recorded 9.61 and 9.41 mm, while the longest was obvious for Giza 171 (15.61 mm) in japonica group. The varieties in indica group had significant results for Coleoptyle length than the other groups.

The results indicated that the shortest root length was recorded with GZ 53385-29-3-3, Sakha 104, Sasashigure, Norin 22 and GZ 5844-60-3-2 while the rest of varieties in japonica group were significantly higher. In indica group GZ 1368-5-4 and Giza 182 had significant and high values of root length, and the highest value of root length was 16.56 cm in GZ 5121-5-2-1 as indica/japonica group.

The shortest leaf length was recorded in the varieties that belong to indica group and the longest seedling length showed was for varieties which belong to indica and indica/japonica groups.

Japonica group had a wide range for 50% of the time of flowering, which ranged from 89 to 125 days, while no great differences were obtained between both indic and indica/japonica group.

Highly significant differences were detected int the crude protein

content of the grains of the tested varieties. Giza 177, Sakha 104, Sakha 102 and Giza 178 genotypes had the hihest protein protein content (9.06,8.98,8.44 and 8.15% respectively).

Ether extract test of the rice grains tended to be higher in indica/japonica cultivars than indica group. GZ 5121-5-2-1 and GZ 1368-5-4 varieties had the highest ash content (7.68 and 7.01%, respectively) compared with other varieties. High values of crude fiber were recorded for E.yasmine and GZ 1368-5-4. The high content of toal carbohydrate values were obtained for the varieties; Norin 1, Norin 22 and Sasashigure which belog to japonica group, while indica types had lower values.

The varieties within the japonica group did not show any reaction for phenol test; on the other hand, indica and indica/japonica varieties gave different reaction with phenol solution with different grades of the brown color.

The total soluble protein using polyacrylamide gel electrophoresis indicated that each variety from the 23 varieties under investigation has certain number of total protein bands with certain molecular weight.

The general results, which were obtained for the tested rice varieties show that, it is possible to identify some morphological characters and reagent reactions to discriminate between such varieties.

INTRODUCTION

Rice is one of the major field crops in Egypt. It is an essential food crop preferred by a large group of the population in comparison to ay other carbohydrate rich foods (El-Hissewy et al., 1991). Extensive breeding programs were undertaken which resulted in many varieties of rice. These new varieties were selected on basis of superiority in yield, resistance to prevalent diseases, early maturing and excellent adaptation to the environment compared with old varieties. Meanwhile, the identification of varieties in seed testing was mainly carried out on seed samples. This way was quite reasonable in the last few decades. Since the varieties of any given crop were quite few with distant parents. Thus, characteristics of seed varieties were easy to identify. Nevertheless, due to recent intensive breeding programmes, numerous varieties with very close parental background were released. However, in several cases, the new seeds of the superior varieties are not distinguishable between themselves or in some cases from old varieties by visual means according to their morphological characters. This situation imposes a serious threat to the purity of the superior germplasm. Thus, the phenotypic characteristics of seed varieties were quite ambigeous, therefore, new methods of varietal identification have to be though (Gandy, 1996). Nw methods, based on modern science achievements, have been tested and developed to suit the formula of applied practices in varietal purity tests. Cook and Payne (1992) reported at the Outcome of

ISTA Variety Committee, that proliferation of different varieties of crop species and their increasing availability presents problems to those who are involved in seed analysis and seed trading. The ability to distinguish between and identify varieties was crucial to the control and monitoring of seed handling and movement. In view of the fact that identification they were not alwys applicable in many crops. They concluded therefore, that it would be adantageous to have methods for variety identification which utilized seed as a testing meterial, but which did not rely entirely on morphologucal destcriptions and which are still relatively rapid. Realistically, at the moment, this implies some biochemical "finger printing" of varieties finally, they belived that some practical applications of electrophoresis were necessary. The main objectives of this study are to develop and initiate standard uniform system for evaluating the genetic materials i.e. varieties and/or lines, establish a pproper method for identification and characterization of the varieties. Such information would supply a great deal of knoledge which in turn supports varieties identification and make this information valid for both seed production specialists and breeders.

MATERIALS AND METHODS

Grains of twenty three Egyptian and exotic rice cultivars and promising lines belonging to japonica, indica and indica/japonic groups (Table 1) were obtained from the Rice Research and Training Center, Sakha, Kakha, Kafr El-Sheikh, Egypt. Those entries were plantd at Rice Rsearch and Training Center farm during 1997/1998 growing season, in a randomized complete block design with three replicates, each entry was grown in 5 rows with spacing at 20x20 cm apart, between hills.

Samples of harvested grains were analyzed in the Laboratory of seed Technology at Giza, ARC as well as in the Laboratory of Seed Technology at Sakha Agricultural Research Station during 1998. Different traits and characters for seeds, seedlings, tillering and adult plants, were measured according to the standard system for evaluation. The chaaracters which investigated are:

1. 1000 grain weight in grams: Grain length, width and thickness were measured by using the Pocket Thickness Gauge (Mitutoyo Crop, Jap., 0.01 mm).

2. Seedling characters: Seedlings 14 days old were prepared for measuring mesoctyl, Coleoptyle length and root length in millimeter by a common ruler. These characters were measured according to IBPGR-IRRI (1980).

3. Flowering related characters: Several characters were studied and recorded i.e., flag leaf curvature of blade, 50% flowering, degree of lemma keel coloration byanthocyanin in addition the color of area below apex. Stigme color was also considered with different types (white, light green, yellow, light purple and purple),The Pocket Thickness Gauge was used to take these measurements.

4. Chemical composition of the experimental grains was datermined according to the procedures outlined A.O.A.C. (1980).

5. Phenol test (carbolic acid) was carried out for grains according to Banerjee and Chandra (1974).

6. The extract protein samples were identified by sodium dodo-ethyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE), according to the method of Laemmli (1970).

Standard analysis of variance procedures according to Snedecor and Cochran (1982) was carried out.

Table 1. Origin and group of the tested cultivars.

No	Entry	Varietal group	Origin
1	Giza 171	Japoica	Egypt
2	Giza 172	"	"
3	Giza 176	"	"
4	Giza 177	"	"
5	Sakha 101	"	"
6	Sakha 102	"	"
7	Sakha 103	"	"
8	Sakha 104	"	"
9	Reiho	"	Japan
10	GZ 5310-20-3-3	"	Egypt
11	GZ 5385-29-3-3	"	"
12	GZ 5574-1-3-3-1	"	"
13	GZ 5844-60-3-2	"	"
14	Norin 1	"	Japan
15	Norin 22	"	"
16	Sasashighure	"	"
17	Giza181	Indica	IRRI
18	Giza182	"	Egypt
19	GZ1368-5-4	"	"
20	E.Yasmine	"	IRR
21	Giza 175	Indica/Japonica	Egyypt
22	Giza 178	"	"
23	GZ 5121-5-2-1	"	"

RESULTS AND DISCUSSION

1. Grain characteristics

Grain charactristics varied among genotypes as shown from Table (2). One thousand grain weight significantly differed from group to group. For Japonica group, the range of 1000 grain weight was from 22.55 g for Giza 172 to 27.57 g for Sakha 101, while the heaviest grain weight in this group was obtained for Norin 22 (27.18 g), GZ 5844-60-3-2 (26.91 g), GZ 5385-3-3 (26.77 g) and Giza 177 (26.31 g), respectively. On the other hand, indica varieties have also high weight values. Egyptian Yasmine (27.15 g), Giza 182 (26.31 g) and Giza 181 (25.50 g).

On contrast, one thousand grain weight tended to be significantly lower in varieties beloging to indica/japonica group compared with other groups. The range values were from 20.01 g for Giza 175 to 25.45 g for GZ 5121-5-2-1. These results are in agreement with those obtained by Gandy (1996) who reported similar values for grains of Giza 171 and Giza 175 varieties (24.58 and 19.45 g, respectively).

Grain length for the paddy rice seeds of the japonica group ranged from 7.08 mm for Sakha 103 to 8.26 mm for Sakha 101. In general, the grain length of japonica varieties was more than 7 mm up to 8 mm. On the other hand, long grain length was shown for all indica varieties (10.01-10.05 mm) except GZ 1368-5-4 which showed less grain length (7.89 mm). For the indica/japonica the grain length similar to short grain type ranged from (7.37 to 8.01 mm). Giza 181, Giza 182 and E.Yasmine belong to indica group showed the highest and highly significant grain length (10.01, 10.04 and 10.05 mm, respectively) compared with all tested varieties in the other tested groups, while there were no significant differences within japonica and indica/japonica groups concerning grain length as shown in Table 2.

Grain width of the japonica group ranged from 3.02 mm for GZ 5544-1-3-3-1 to 3.32 mm for GZ 5310-20-3-3 without significant variations. Moreover, grains width of the indica varieties ranged from 2.18 to 2.73 mm and the record values were significantly less in comparison to japonica and indica/japonica groups. On contrast, grain width of the indica/japonica group are nearly similar with japonica group, the range values were from 3.02 mm. Generally the results of grain width showed no significant differences between varieties within the three groups.

The grain thickness for japonica, indica, indica/japonica group are nearly similar (2.02 to 2.45 mm) except for Giza 181 (1.70 mm), Giza 182 (1.84 mm) and Egyptian

Yasmine (1.93 mm) showed lowest values. The varieties Giza 171, Giza 177, Sakha 101, GZ 5844-60-3-23 and Norin in japonica group were highly significantly thicker, and only Giza 175 in indica/japonica group too.

According to grain shape, most of the japonica varieties have bold grain shape; some of them are medium (Sakha 101, GZ 5385-29-3-3, Sakha 104 and GZ 5574-1-3-3-1). On the other hand, all of the local indica varieties are slender except GZ 1368-5-4 which is medium while indica/japonica varieties, Giza 175 and Giza 178 are bold. but GZ 5121-5-2-1 is medium grain shape.

These results fully agreed with those obtained by El-Hissewy (1991) with Giza 171, Giza 172, Giza 175, Reiho and Giza 181.

The results obtained in this study on rice grain characters were aimed to formulate a rice grain index. These were grain weight dimensions. The grain weight results are only indicators which could be utilized in the bushel weight test in grain shape (Gandy, 1996). The length, width, thickness, the grain shape and pubescence. It was possible to categorize the 23 varieties in two groups according to their length. Grain of all varieties in japonica and indica/japonica groups are classified as short varieties (7.09 to 8.68 mm), while indica group including long varieties (10.1 to 10.05 mm) like Giza 181, Giza 182 and E.Yasmine. On the other hand, the varieties can be grouped into four categories according to their shape (ratio of length and width). Japonica group varieties including bold (B), medium (M) and round (R) grains, while indica varieties had slenger (S) and medium (M) grain shape, moreover bold (B) and medium grain were found in indica/japonic group.

Concerning grain pubescence, all tested varieties were classified into two groups [absent (A) and present (P)] as shown in Table (2).

2. Seedling characters

Seedling characters of the 23 rice varieties were recorded in order to check for possible differences and to discriminate between the entries under investigation. The results of seedling characters are shown in Table (3). Mesoctyl and Coleoptyle lengths were recorded after 9 days from germination of seeds. The results of mesoctyl length showed highly significant variation between tested varieties, mesoctyl length values of japonice varieties ranged from 2.33 mm for Giza 176 to 5.51 mm for Giza 171, while this value ranged from 2.98 mm for Giza 182 to 3.75 mm for Giza 181 in indica group. As for indica/japonica group, Giza 175 had longest mesoctyl length (3.88 mm) com-

Table 2. Grain characters of the tested rice varieties

Entry	1000-grain weight (g)	Length (mm)	Width (mm)	Thichness (mm)	Thichness (mm)		Grain pubescence
Japonica:	23.95	7.43	3.11	2.22	B	2.39	A
Giza 171	22.55	7.35	3.26	2.13	B	2.25	P
Giza 172	23.86	7.40	3.18	2.02	B	2.33	P
Giza 176	26.31	7.53	3.23	2.20	B	2.33	P
Giza 177	27.57	8.26	3.19	2.23	M	2.60	P
Sakha 101	25.97	7.86	3.26	2.17	R	1.09	A
Sakha 102	24.18	7.08	3.10	2.05	B	2.28	P
Sakha 103	23.69	7.84	3.16	2.13	M	2.48	A
Sakha 104	25.94	7.09	3.09	2.06	B	2.29	P
Reiho	25.88	7.27	3.23	2.19	B	2.19	A
GZ 5310-20-3-3	26.77	7.49	3.04	2.14	M	2.61	A
GZ 5385-29-3-3	23.58	7.48	3.02	2.05	M	2.47	P
GZ 5574-1-3-3-1	26.91	7.41	3.26	2.24	B	2.27	P
GZ 5844-60-3-2	22.65	7.30	3.26	2.03	B	2.24	P
Norin 1	27.18	7.48	3.23	2.23	B	2.32	P
Norin 22	25.77	7.25	3.15	2.16	B	2.30	P
Sasashighure							
Indica:	25.50	10.01	2.18	1.70	S	4.69	P
Giza 181	26.31	10.04	2.28	1.84	S	4.61	A
Giza 182	23.89	7.89	2.73	2.07	M	2.89	P
GZ1368-5-4	27.15	10.05	2.51	1.93	S	4.61	A
E.Yasmine							
Indica/Japonica:							
Giza 175	20.01	7.37	3.30	2.45	B	2.23	A
Giza178	20.85	8.01	3.02	2.05	B	2.65	A
GZ 5121-5-2-1	24.45	7.70	3.10	2.15	M	2.48	A
L.S.D.5%	1.41	0.89	0.45	0.45			

R = Round (Less than 2.00)
B = Bold (2.00 - 2.39)
M = Medium (2.40 - 3.00)

A = Absent
P = Present
S = Slender (more than 3.00)

Table 3. Seedling characters of the testd entries.

Entry	Mesoctcyl length* (mm)	Coleoptyle length** (mm)	Root length*** (mm)	Leaf length*** (cm)	Seedling length *** (cm)	Dry matter weight (mg)***	Leaf area*** (cm^2)
Japonica:							
Giza 171	5.51	15.61	10.59	10.58	25.40	7.4	1.07
Giza 172	3.95	13.91	11.49	12.63	27.45	10.2	1.11
Giza 176	2.33	9.61	9.08	6.80	17.46	10.6	0.70
Giza 177	3.15	12.56	11.33	9.07	24.70	11.8	0.92
Sakha 101	2.98	9.41	14.69	3.86	20.92	26.1	0.39
Sakha 102	3.83	12.79	13.44	10.03	25.67	22.4	0.47
Sakha 103	3.21	12.31	8.03	7.99	16.01	9.2	0.71
Sakha 104	3.01	12.01	8.02	7.56	15.70	9.1	0.70
Reiho	3.79	14.89	14.24	10.18	24.92	18.6	1.07
GZ 5310-20-3-3	3.89	14.32	10.30	7.00	17.29	11.7	0.69
GZ 5385-29-3-3	3.21	12.98	11.99	9.01	21.01	13.9	0.96
GZ 5574-1-3-3-1	3.31	10.18	15.03	8.56	23.04	11.6	0.91
GZ 5844-60-3-2	3.39	16.01	9.21	19.01	26.99	21.3	1.01
Norin 1	2.86	12.11	10.01	14.98	25.03	23.9	1.01
Norin 22	2.73	10.12	9.03	15.01	19.53	30.5	1.04
Sasashighure	3.01	11.15	8.52	12.31	20.53	22.6	0.99
Indica:							
Giza 181	3.75	15.75	16.83	6.46	26.63	24.6	0.66
Giza 182	2.98	15.32	19.98	7.99	28.01	10.4	0.79
GZ1368-5-4	3.62	13.71	20.21	6.40	29.75	22.3	0.64
E.Yasmine	3.06	13.23	15.18	4.70	22.00	22.9	0.56
Indica/Japonica:							
Giza 175	3.88	13.94	13.30	8.74	25.99	12.4	0.88
Giza 178	3.16	11.89	13.50	9.55	26.00	13.9	0.96
GZ 5121-5-2-1	3.01	8.99	16.56	13.03	29.98	27.1	1.32
L.S.D.5%	0.71	1.34	1.89	1.41	3.00	0.04	0.22

* Measuring after 9 days from germination with ruler.
** Measuring after 9 days from germination with ruler.
*** Measuring after 14 days from germination.

pared with 3.16 mm for mm for GZ 5121-5-2-1 and Giza 178, respectively.

Results of Coleoptyle values showed highly significant variations between tested varieties. The lowest values were obtained for Giza 176 and Sakha, 101, in japonica group which recorded 9.61 and 9.41 mm, respectively, while, the longest Coleoptyle length in the same group was evident for GZ 5844-60-3-2 (16.01 mm) and Giza 171 (15.6 mm). The rest of the entries in this group were medium and ranged between 10.12 to 14.89 mm. In indica group, Giza 182 and Giza 181 recorded highly significant values (16.32 and 15.75 mm) compared with (13.71 and 13.23 mm) for E.Yasmine and GZ 1368-5-4, respectively. Moreover, the longest Coleoptyle length in indica/ japonica group were Giza 175 and Giza 178 which had significant higher values (13.94 and 11.89 mm), while GZ 5121-5-2-1 recorded the shortest Coleoptyle length in this group (8.99 mm). This character is very important for direct and broadcasted seeded rice where the emergence is the main criteria for this method of rice planting, IBPGR-IRRI (1980).

In indica group, the lines GZ 1368-5-4 and Giza 182 had significant and higher values of root length (20.21 and 19.98 cm) compared with the root length of Giza 181 and E.Yasmine (16.83 and 15.18 cm, respectively). On the other hand, in indica/ japonica group, the entry GZ 5121-5-2-1 recorded the highest value of root length (16.56 cm) compared with Giza 178 (13.50 cm) and Giza 175 (13.30 cm) in the same group.

Data of leaf length (Table 3) showed significant variations between and within the three tested groups. Japonica group recored great and significant variations between varieties, the values of leaf length ranged between 3.86 to 15.01 cm, while the values in indica group ranged between 4.86 to 15.01 cm, while the values in indica group raged between 4.70 and 7.99 cm, moreover, indica/japonica group recorded values between 8.74 to 13.03 cm.

Seedling length values (Table 3) indicated that, significant variations between japonica varieties, the values recorded 15.70 to 27.45 cm. On the other hand, the differences in seedling length were significant and ranged between and ranged between 22.00 and 29.75 cm, for indica group, while these vlaues ranged from 25.99 to 29.98.

As for leaf area, the results in Table (3) show that all varieties in japonica group were significantly variable and ranged between 0.39 to 1.11 cm2. While no significant differences were obtained for indica and indica/japonica group, except Giza 182 (indica group) which had 0.79 cm2 as well as GZ 5121-5-2-1 in indica/japonica group which

had 1.32 cm^2 leaf area.

The great differences of Coleoptyle length between the tested varieties supplies useful information for varieties identification. For instance Coleoptyle of the variety GZ 5121-5-2-1 (8.99 mm) could be easily recogized with its short characteristics in contamination with the other varieties under test. The same trend was obvious on the length of root and leaf. GZ 5385-29-3-3 and Sakha 104 (8.02 and 8.03) could be easily recognized with their short root length and GZ 1368-5-4 with long root length. Moreover, it is possible to identify of Sakha 101 (3.86 cm) with the shortest leaf length and GZ 5844-60-3-2 (19.01 cm) which achieved the longest length. The other studied characters showed variation between the varieties. Although there are some differences between varieties, these characters may not be usually shown under field conditions.

The root, leaf, seedling lengths, dry matter weight and leaf area were recorded after 14 days from the germination of seed and the results are recorded in Table (3). The results indicate that, the shortest root length was recored with Sakha 104, GZ 5385-29-3-3, Sasashigure, Norin 22, Giza 176 and GZ 5844-60-3-2 (8.02, 8.03, 8.52, 9.03, 9.08 and 9.21, respectively), while the rest of varieties were significantly higher and ranged between (10.01 to 14.69 cm) in respect to the japonica group.

3. Flowering related characters

Certain flowering related characters were also studied with the aim of differences in order to discriminate between the varieties under test, data are represented in Table (4). The results showed that the flag leaf curvature of the blade ranged from (10o) in Giza 177 and Sakha 104 to (60oC) for GZ 5310-20-3-3 in japonica group. While for the indica group, it ranged from (15oC) for Giza 181 to to (40oC) for both Giza 182 and E.Yasmine. As for indica/japonica group, the group, the flag leaf blade ranged from (13o) to (25oC).

Time of flowering as a genetic character strongly affected by the genotype and group as well photoperiod sensitivity. japonica group had a wide range for 50% of the time of flowering, which ranged from 89 up to 125 days, while there no great differences were obtained for both indica and indica/japonica group.

Early varieties were Giza 177, Sakha 102, GZ 5310-20-3-3, GZ 5574-1-3-3-1, Norin 22 and Sasashigure (89 to 98 days).

Table 4. Flowering related characters of the tested (V/L).

Entry	Flag leaf curvature of blade	Time of heading 50%	Lemma anthocyanin coloration of kell					Lemma anthocyanin coloration of area below apex	Spikelet color of stigma				
			ab	we	me	st	vst		w	Lg	y	Lp	p
Japonica:													
Giza 171	30°	125	+					+			+		
Giza 172	50°	122	+					+			+		
Giza 176	20°	119	+					+			+		
Giza 177	10°	97	+					+			+		
Sakha 101	20°	109	+					+			+		
Sakha 102	20°	95	+					+			+		
Sakha 103	15°	95	+					+			+		
Sakha 104	10°	102	+					+			+		
Reiho	20°	112	+					+			+		
GZ 5310-20-3-3	60°	89	+					+			+		
GZ 5385-29-3-3	20°	108	+					+			+		
GZ 5574-1-3-3-1	50°	93	+					+			+		
GZ 5844-60-3-2	50°	107	+					+			+		
Norin 1	20°	96	+					+			+		
Norin 22	20°	98	+					+			+		
Sasashigure	20°	95	+					+			+		
Indica:													
Giza 181	15°	110	+					+			+		
Giza 182	40°	100	+					+			+		
GZ 1368-5-4	25°	111	+					+					+
E. Yasmine	40°	109	+					+			+		
Indica/Japonica:													
Giza 175	20°	109	+					+			+		
Giza 178	13°	103	+					+			+		
GZ 5121-5-2-1	25°	110	+					+			+		
L.S.D. 5%		**5.6**											

Giza 171, Giza 172 and Giza 176 (japonica group) can be considered as late maturing cultivars (116 to 125 days). The intermediate heading time of the rest of varieties ranged between these two extremes. Lemma anthocyanin coloration of keel to absent for all the tested varieties, while lemma anthocyanin coloration of area below apex was present for all the tested varieties.

Stigma color was yellow for all the tested varieties except GZ 1368-5-4 which has purple stigma color and this character is a recognizable one especially for this line. The angle of the flag leaf curvature of blade is a highly reliable criterion for the recognition of varietal differences. The angle of the flag leaf of the variety GZ 531-20-3-3 (6^{o}) considerably distinguishable being the largest in comparison with the others whereas Giza 178 (13^{o}) was the narrowest. On other hand, time of 50% heading is one of the indicative parameters in varietal dicrimination. The varieties consequwntly may be grouped in two groups concerning the time of heading. Those varieties which reached heading in less than 100 days are considered early maturing varieties, while late maturing varieties take more than 100 days to reach normal heading time.

4. Chemical composition:

Chemical analyses for the 23 rice varieties were also studied with the aim of recognizing the differences in order to discriminate between tested varieties (Table 5). Highly significant differences were detected in the crude protein content of the grains for the tested varieties. Results showd that, Giza 177 (9.06%), Sakha 104 (8.08-9%), and GZ 5844-60-3-2 (8.02%) have the highest crude protein content content in comparison to the other varieties. On the other hand, Giza 176 (6.86%) variety gave the lowest value. These results are in agreement with El-Kady et al. (1995). The other varieties under test occupied a middle range from 7.12 to 7.94%. Regarding crude protein contents of the grains within the different three types (japonica, indica and indica/japonica), the results showed that great variation were recorded between tested varieties belonging to japonica group, crude protein contents values ranged between (6.86 to 9.06%) in Giza 176 and Giza 177, respectively. In contrast this variation decreased in the other two groups, with the range of 7.12 to 7.82% for indica group and 7.76 to 8.15% for indica/japonica group, without significant differences between tested varieties within indica and indica/japonica groups.

The highest ether extract content of the grains was recorded for Giza 176 (2.23%), Giza 177 (2.09%) and Giza 178 (2.03%). Moreover, GZ 5478-14-1-2 had (1.16%), E. Yasmine (1.19%) and Sakha 103 (1.22%). The values of the rest varieties ranged between these two extreems. Ether extract content of the rice grains tended

Table 5. The chemical composition of the tested entries.

Entry	Moisture content (%)	On dry matter basis				
		Crude protein %	Ether extract %	Ash %	Crude fiber%	Total carbo-hydrate %
Japonica:						
Giza 171	12.34	7.32	1.67	5.60	7.99	77.42
Giza 172	12.70	7.33	1.99	5.43	9.22	76.03
Giza 176	12.16	6.86	2.23	5.46	9.44	76.01
Giza 177	12.23	9.06	2.09	6.31	8.34	74.20
Sakha 101	13.52	7.93	1.46	5.17	8.88	76.56
Sakha 102	13.41	8.44	1.55	4.95	7.34	77.72
Sakha 103	13.07	7.92	1.22	5.41	7.76	77.69
Sakha 104	13.60	8.89	1.47	5.65	9.88	74.11
Reiho	13.54	7.33	1.60	6.05	7.56	77.46
GZ 5310-20-3-3	13.57	7.68	1.52	5.86	8.26	76.68
GZ 5385-29-3-3	13.42	8.53	1.52	5.11	8.87	75.97
GZ 5574-1-3-3-1	13.41	7.11	1.74	6.60	7. 41	77.14
GZ 5844-60-3-2	13.36	8.02	1.60	6.02	7.20	77.07
Norin 1	11.13	7.94	1.64	5.15	6.62	79.15
Norin 22	11.01	7.66	1.78	5.06	6.35	79.15
Sasashighure	10.84	7.74	193	5.34	6.05	79.48
Indica:						
Giza 181	13.67	7.82	1.55	5.70	9.18	75.75
Giza 182	12.97	7.65	1.16	4.99	9.41	76.79
GZ1368-5-4	13.22	7.12	1.36	7.01	10.84	73.67
E.Yasmine	13.19	7.26	1.19	6.37	11.45	73.73
Indica/Japonica:						
Giza 175	12.28	7.87	1.83	9.25	9.25	74.49
Giza 178	11.82	8.15	2.03	9.59	9.56	74.19
GZ 5121-5-2-1	10.61	7.76	1.58	8.22	8.22	74.76
L.S.D.5%	0.38	0.38	0.33	0.41	0.41	0.66

to be higher in varieties belonging to indi/japonica group (1.58 to 2.03%) than in indica group (1.16 to 1.55%) without significant difference within each group, while japonica group showed significant variation within group and the values of ether extract percentage ranged between 1.22 to 2.09%.

Ash content of grains was also determined (Table 5). Data showed that GZ 5121-5-2-1 (7.68%) and GZ 1368-5-4 (7.01%) had higher significant values over the other tested varieties, whereas Sakha 102 (4.95%) and Giza 182 (4.99%) recorded significantly lower values. The values of the rest of varieties rangrd between these limits. Moreover, the ash content significantly varied in the different varieties within the three tested types.

The crude fiber values revealed obvious differences between tested tested varieties (Table5). In this respect, the grains of E. Yasmine (11.45%) and GZ 1368-5-4 (10.84%) recorded the hgihest percantage of fiber in comparison with the other varieties. Mareeover, Sasashigure (6.05%), Norin 22 (6.35%) and Norin 1 (6.62%) showed significatly lower values.It is quite remarkable that crude fiber percentage values of indica varieties were the hgihest (9.18 to 11.45%) followed byindica/japonica varieties (8.22 to 9.59%).The lowest values were exhibited by japonica varieties (6.05 to 9.88%).

Data in Table (5) illustrate the carbohdrate content for the (japonica) group ranged from 74.11 to 79.48% and was hgihest in the varieties Norin 1, Norin 22 and Sasashigure which belong to japonica group. On the other hand, indica varieties have low values of total carbohydrates from 73.67% for GZ 1368-5-4 to 76.79% for Giza 182. Intermediate values were obtained for indica/japonica group without significant differences between the three genotypes in this group.

5. Phenol reaction:

The phenol reaction was datermined so that differences might be detected between these varieties of rice. Observations are recorded in Table (6). Grain treated with phenol solution at the concentration of (0.1%, 1.0% and 2.0%) showed no reaction during one, two, three four and five hours observation period in all varieties in Japonica group. On the other hand, all varieties belonging to the indica and indica/japonica gave different reaction with phenol solution with different grades of the brown color. The results revealed that by using the concentration of 0.1%, the grains of GZ 1368-5-4, Giza 182 and GZ 5121-5-2-1 took light brown colour the intensity of which was deepened after 2 hours, while, Giza 181 and Giza 175 began to react from the 3

rd japonica hour. Novertheless, fined brown colour began to appear after the elapse of hours on the grain of E.Yasmine and Giza 178 with the same coneentration (0.1) of phenol.

This reaction was achieved at the concentration of phenol of 1.0% and the reaction began at the 2nd hour with GZ 1368-5-4, E.Yasmine Giza 178 and GZ 5121-5-2-1. On the other hand, the colouration was achieved with the 1.0% concentration of phenol up to 3 hours period of time for Giza 181 and Giza 175. Concerning the hgiher concentrtion (2.0%) of phenol, faint brown colour began to appear after one hour with the grains of Giza 181 and GZ 5121-5-2-1, followed by GZ 1368-5-4, Giza 182 and Giza 178 began after the elapse of 2 hours, while E.Yasmine began to react after 3 hours. On the other hand, the grains of Giza 175 took colouration with the highest concentration (2.0%) of phenol up to four hours period of time. The results achieved in this study with Giza 171 and Giza 172 (Japonica group) fully agreed with those obtained by Gandy (1996) at the same concentration of phenol (0.1 and 1.0%). However, phenol test can be used to assist in distinguishing rice seed varieties as a rapid, not expensive, requiring no sophisticated equipment and completed in a relatively short time.

The present study reveals that grains of japonica varieties did not get stained while indica and indica/japonica varieties grains got stained when subjected to application of phenol. The initial staining is faint brown. The colour gets deeper by elapse of time. This directly indicates that grain of the varieties in indica and indica/japonica groups contain tyrosinase enzyme.

6. S.D.S. polyacrylamide gel electrophoresis:

Characterization of total soluble proteins using polyacrylamide gel electrophoresis of the tested 23 rice varieties were investigated. The results in Table (7) and Figure (1) indicate that the lines in japonica group, Sakha 103 and Sakha 101 had 14 and 9 total proteins bands on the gel, respectively. But the varieties Sakha 102, Norin 1 and Giza 171 had 10 of total proteins bands on the gel, the high intensity bands of protein observed on the gel with molecular weights were 39.85, 30.88 and 17.56 kd, respectively.

Reiho, Sasashigure, Norin 22 and GZ and GZ 5574-1-3-1, exhibited 11 of total proteins bands. The high intensity with molecular weight (199000) for Reiho and Sasashigure were 32.65 and 37.44 kd, respectively, but Norin 22 was 21.40 kd (94450 MW) and 17.28 kd (83114 MW) for GZ 5574-1-3-3-1.

On the other hand, the varieties of Giza 177, Giza 176, Sakha 104, GZ 5385-29-

3-3 and GZ 5844-60-3-2 demonstrated 12 bands of protein within the japonica group. The high intensity with MW (29100) were 20.24, 14.68 and 14.32 kd for GZ 5844-60-3-2, Giza 176, respectively, while Sakha 104 and GZ 5385-29-3-3 had 18.75 and 16.59 kd with MW (206900). In this group Giza 172 and GZ 5310-20-3-3 varieties showed 13 total of protein bands, and the intensity were 15.72 and 13.11 kd with MW (1606 and 88091), respectively.

Indica group varieties showed different number of protein bands i.e. Giza 181 had 12 bands, E.Yasmine had 10 bands. On the other hand, Giza 182 showed 9 bands and GZ 1368-5-4 recorded 8 bands of protein after running the gel.

Moreover, the varieties in indica/japonica showed intermediate reactions between other tested groups where Giza 175 had, 12, GZ 5121-5-2-1 showed 10 bands and Giza 178 exhibited 9 bands of total protein on the gel, respectively. Generally, it is cleared from the previous results of SDS-PAGE test that each variety from the 23 varieties under investigation has certain number of total protein bands with a certain molecular weight. The finger printing methods for crop varieties using electrophoresis techniques was recommended by Cooke and Payne (1992). The study of protein extracted from rice grain of various varieties (Saruyama and Shinbashi, 1992 and Yupsnia et al., 1992) gave chace to the possibility to discriminate between some varieties in groups. The application of SDS-PAGE method for protein banding in the present investigation, indicated that the majority of the varieties possessed a single discriminating band. Also, it was possible to group varieties according to other banding. Saruyama and Shinbashi (1992) studied protein extracted from seed embryos of twenty-nine different cultivated rice varieties (*O.Sativa* L.) and wild rice (*O.rufipogon* L.) by using two-dimensioned gel electrophoresis. Some varieties in protein spots were detected. This variation indicated that certain spots of protein were observed in all indica cultivars, but were not found in those of japonica. Also some kinds of protein, existed in most of the japonica cultivars which could not found in indica cultivars.

Table 6. Reaction of various rice cultivars to different concentrations of phenol solution after different treatment times.

Entry	0.1% Period/hr					0.1% Period/hr					0.1% Period/hr				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Japonica:															
Giza 171	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Giza 172	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Giza 176	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Giza 177	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sakha 101	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sakha 102	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sakha 103	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sakha 104	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Reiho	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GZ 5310-20-3-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GZ 5385-29-3-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GZ 5574-1-3-3-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GZ 5844-60-3-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Norin 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Norin 22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sasashighure	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indica:															
Giza 181															
Giza 182	-	-	+	+	+	-	-	+	+	+	+	+	+	+	+
GZ1368-5-4	-	+	+	+	+	-	-	+	+	+	-	+	+	+	+
E.Yasmine	-	+	+	+	+	-	+	+	+	+	-	+	+	+	+
	-	-	-	-	+	-	+	+	+	+	-	-	+	+	+
Indica/Japonica:															
Giza 175															
Giza 178	-	-	+	+	+	-	-	+	+	+	-	-	-	+	+
GZ 5121-5-2-1	-	-	-	-	+	-	-	+	+	+	-	+	+	+	+
	-	+	+	+	+	-	-	+	+	+	+	+	+	+	+

Table 7. Electrophoretic banding patterns of grain protein of the tested rice entries

Mol. Weight	Giza 171	Giza 172	Giza 176	Giza 177	Sakha 101	Sakha 102	Sakha 103	Sakha 104	Reiho	GZ 5310-20-3-3	GZ 5385-29-3-3	GZ 5574-1-3-3-1	GZ 5844-50-3-2	Nonin 1	Nonin 22	Sasashigure	Giza 181	Giza 182	Giza 1368-5-4	E.Yasmin	Giza 175	Giza 178	GZ 5121-5-2-1
206900								18.75		6.76	16.59												
203647		5.86		6.84																		11.24	
202950							7.93					8.93						7.87					
199000									32.65				19.21	30.88	12.44	37.44				33.86			16.29
191232					41.88	39.85																	
126985										6.3									14.08				
124043								6.06			11.39												
122645							6.35																
121614	13.38	4.1	12.74																		16.92		
120000				4.54					7.68							3.53	11.46			7.93		6.07	
114964		3.08																					
114706							3.96	5.75		6.00									5.56				
114293												6.42	7.45					8.38					
118347													1.05										
101601	9.09	4.15		12.2																	3.67		
101000							12.64				6.69	6.09	7.25	8.49	2.16	23.01	5.02	11.34		1.02			10.52
100743					5.16	0.79			13.7														
96376														16.97						17.91			
95991					9.37	13.63																	
94869			13.37																				
94450															21.4								
89569									7.44														
89440					7.89	2.26																	
88091								10.19		13.11	4.59								3.59				
87161			8.17																				
87000	12.49	7.33		9.74								7.22	3.71				10.5	8.08			7.00	10.81	5.38
86724														4.42	9.15					4.77			
83778	3.56																						
83343							12.17			12.82	6.92												
83114							17.28												17.99				
83000	0.82	5.8		6.8	3.17	0.48			0.43				14.45	3.18	5.50	2.57	7.97			3.38	7.17		11.11
61406							7.19	6.97			7.37								9.06				
52366					20.71	1.01			0.81					15.48	17.03					17.28			
52111		3.46																					

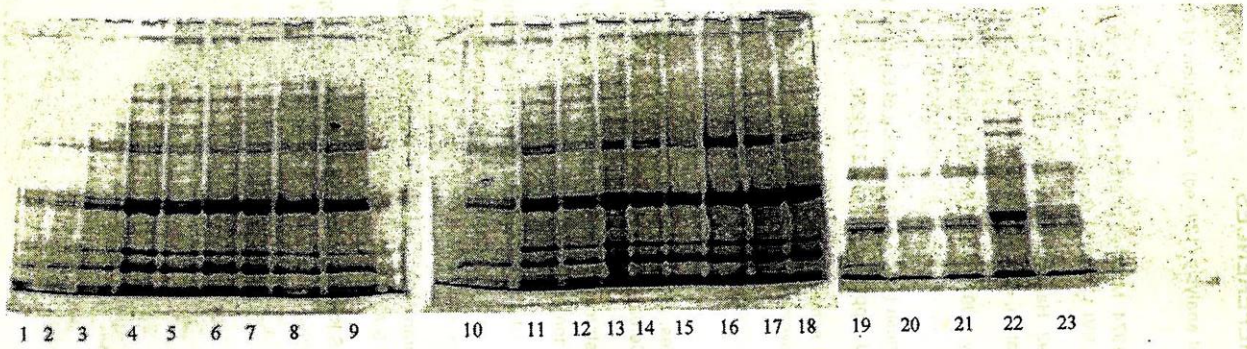
Table 7. Continued

Mol. Weight	Giza 171	Giza 172	Giza 176	Giza 177	Sakha 101	Sakha 102	Sakha 103	Sakha 104	Reiho	GZ 5310-26-3-3	GZ 5365-26-3-3	GZ 5574-1-3-3-1	GZ 5644-50-3-2	Nonia 1	Nonn 22	Sesesihgure	Giza 181	Giza 182	Giza 1368-5-4	E. Yasmin	Giza 175	Giza 178	GZ 5121-5-2-1
50600			2.43	2.60									1.53			6.10	3.77				3.17	4.18	4.83
49279	5.79		5.39	6.31																			
49167		4.33																			4.18		
48675						18.25																	
48520								5.85		4.48									6.88				
48418							5.05			5.37													
48208											5.74												
48124		11.47																					
48083			3.56	4.57																	5.23	10.38	
48000									13.48				7.63			5.92	9.12						4.79
36737	12.73																						
36122			10.42	12.06													10.94						
35580												6.59			7.66	6.38					9.06	21.80	
35163							6.22	6.23		5.89	7.87												
35080																				4.73			
31795							6.68	6.63		4.22	9.21												
29123									5.67											4.73			
29100		13.06	14.32	14.68			4.85				9.71	17.05	20.24			3.72							27.42
28851																		22.35					
28214														4.75	2.89								
26558							13.69	10.99		12.45									24.00				
22117										10.81									15.74				
21510								13.15			12.23												
21115		6.26																			6.27		
20960			10.21	7.05	2.28	2.63			2.45					2.12	3.45	2.32	8.69			2.83		11.92	3.61
17684	11.99																						
15594								1.28		2.40	5.45												
15112							5.02																
14826						0.68										2.14							
14626												4.39	6.77										10.85
14522									0.45					0.94	2.76					6.29			

Table 7. Continued

Mol. Weight	Giza 171	Giza 172	Giza 176	Giza 177	Sakha 101	Sakha 102	Sakha 103	Sakha 104	Reiho	GZ 5310-20-3-3	GZ 5385-29-3-3	GZ 5574-1-3-3-1	GZ 5844-60-3-2	Norin 1	Norin 22	Sasashigure	Giza 181	Giza 182	Giza 1368-5-4	E.Yasmin	Giza 175	Giza 178	GZ 5121-5-2-1
13915					1.26	12.31																	
13343				12.35													4.34					12.61	
12378			4.09																				
10288							1.78	8.20		5.12								8.74	10.54				
9967					8.27				12.06					12.77									
9002	12.57																					23.99	
8680		15.36	7.96														7.92						
8037																	6.70						
6429							6.35					8.65	5.84					6.09					
6322																6.87							
5411															15.52								
1927			7.34														6.70				8.52	10.97	
1606	17.56	15.72																					
1365										8.72													
NO PROTEIN	10	13	12	12	9	10	14	12	11	13	12	11	12	10	11	11	12	9	8	10	12	9	10

Fig. 1. Electrophoretic banding pattern of grain protein of 23 entries.



1. Giza 171
2. Giza 172
3. Giza 175
4. Giza 176
5. Giza 177
6. Giza 178
7. Sakha 101
8. Sakha 102
9. Giza 181

10. Reiho
11. GZ 1368-5-4
12. E.Yasmin
13. GZ 5310-20-3-3
14. Sakha 104
15. GZ 5385-29-3-3
17. Sakha 103
18. Giza 182
19. GZ 5574-1-3-3-1

19. GZ 5844-60-3-2
20. GZ 5121-5-2-1
21. Norin 1
22. Norin 22
23. Sasashigure

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بعض الخصائص الكيماوية والمورفولوجية لبعض أصناف وسلالات الأرز المحلية

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تم دراسة بعض الصفات الكيماوية والمورفولوجية لعدد ٢٣ صنف وسلالة من الأرز المنزرعة في مصر بغرض تحديد بعض صفات هذه الأصناف والسلالات التي تتميز بها أثناء إختبارات جودة التقاوي وعمل شهادة لها.

زرعت هذه الأصناف والسلالات بمزرعة مركز البحوث والتدريب في الأرز بسخا – كفر الشيخ وأجريت الإختبارات المعملية علي الحبوب بمعامل بحوث تكنولوجيا البذور بسخا والجيزة.

وقد أوضحت النتائج مايلي:

١. سجلت أصناف وسلالات المجموعة اليابانية والهندية أعلي قيم لوزن الألف حبة بينما كان أطول الحبوب في الأصناف والسلالات التابعة للمجموعة الهندية فيما عدا السلالة جيزة ٤ – ٥ – ١٣٦٨ يليها الأصناف والسلالات التابعة للمجموعة الهندية / اليابانية. تراوح شكل الحبة لجميع الأصناف والسلالات المختبرة ما بين الممتلئ والمستدير والمتوسط والأسطواني. وقد تميزت المجموعة الهندية بالشكل الأسطواني فيما عدا السلالة جيزة ٤ – ٥ – ١٣٦٨ حيث تميزت بالشكل المتوسط.

٢. كانت هناك فروق معنوية واضحة بين الأصناف والسلالات المختلفة تحت الدراسة لصفات البادرات، حيث سجلت أعلي القيم لطول السويقة الجنينية السفلي لصنف جيزة ١٧١ (٥,٥١ مم) بينما سجل الصنف جيزة ١٧٦ أقل القيم (٢,٣٣ مم). كذلك سجلت الأصناف جيزة ١٧٦ وسخا ١٠١ أقل القيم للسويقة الجنينية العليا، وكانت النتائج ٩,٦١ ، ٩,٤١ مم علي التوالي مقارنة بالأصناف والسلالات الأخري داخل المجموعة اليابانية، وسجل الصنف جيزة ١٧١ أطول سويقة جنينية سفلي (٥,٥١ مم)و أطول سويقة جنينية عليا داخل هذه المجموعة (١٥,٦١ مم).

سجلت الأصناف والسلالات جيزة ٣ –٣ – ٢٩ – ٥٣٨٥ ، سخا ١٠٤ Sasahigure نورين ٢٢ ، جيزة ٢ – ٣ – ٦٠ – ٥٨٤٤ أقل قيم لطول البادرة بعد عمر ١٤ يوم من الإنبات، وكانت النتائج (٨,٠٢ ، ٨,٠٣ ، ٨,٥٢ ، ٩,٠٣ ، ٩,٢١ مم علي التوالي).

بينما سجلت باقي الأصناف أكبر القيم داخل المجموعة اليابانية. سجلت السلالة جيزة ١٣٦٨–٥–٤ وجيزة ١٨٢ أعلى قيم لطول الجزير (٢٠,٣١ ، ١٩,٩٨ مم على التوالى) عن بقية الأصناف داخل المجموعة الهندية ، كذلك تميزت السلالة جيزة ١ – ٢ –٥ –٥١٢١ بأعلى قيمة لطول الجزير (١٦,٥٦ مم) داخل المجموعة الهندية/ اليابانية. سجلت الأصناف والسلالات التابعة للمجموعة الهندية أعلى قيم للوزن الجاف للباردة بعد ١٤ يوم الإنبات فيما عدا جيزة ١٨٢ ، كذلك تميزت بعض الأصناف والسلالات داخل المجموعة اليابانية بنفس القيم العالية للوزن الجاف الباردة وهذه الأصناف هى : نورين ٢٢، سخا ١٠١ ، نورين ١ ، Sasashigure ، سخا ١٠٢ ، جيزة ٢ – ٣ – ٦٠ –

٥٨٤٤ ، بينما تفاوتت أوزان المادة الجافة للبادرة ما بين الكبير والقليل فى الأصناف والسلالات داخل المجموعة الهندية / اليابانية . تراوحت مساحة الورقة فى الأصناف والسلالات داخل المجموعة اليابانية ما بين (١,١١إلى ٥,٤٧) سم ٢) بينما تراوحت مساحة الورقة للأصناف والسلالات داخل المجموعة الهندية ما بين (٠,٠٥٦ - ٠,٧٩ سم ٢) وكانت ما بين (٠,٠٨٨ - ١,٣٢ سم ٢) للأصناف والسلالات التابعة للمجموعة الهندية / اليابانة .

٣-إختلفت قيم قياس زاوية العلم ما بين (١٠ ° ألى ٦٠ °) للأصناف والسلالات داخل المجموعاليابانية، يبينما تراوحت ما بين (١٥٥ألى ٤٠ °) للأصناف والسلالات داخل المجموعة الهندى». وقد سجلت قيم زواية العلم ما بين (١٣٥ألى ٢٥٥) للأصناف والسلالات داخل المجموعة الهندية / اليابانية . وقد تميزت المجموعة اليابانية بمدى واسع لفترة طرد السنابل (٥٠٪) حيث تراوحت ما بين ٨٩ - ١٢٥ يوما، بينما لم يكن هناك فروق كبيرة لمجموعتى الأصناف والسلالات التابعة للمجموعتين الهندية والهندية / اليابانية . وقد تميزت القنابة فى الأصناف والسلالات تحت الدراسة بعدم وجود صبغة الأنثوسيانين ، بينما تميز لون المياسم فى السنيبلة فى جميع الأصناف والسلالات داخل المجموعات الثلاثة باللون الأصفر فيما عدا السلالة جيزة ٤ - ٥ - ١٣٦٨ الذى فيه لون المياسم قرمزى (داخل المجموعة الهندية).

٤- إختلف التركيب الكيماوى للحبوب معنويا بين الأصناف تحت الدراسة ، حيث إحتوت الأصناف والسلالات جيزة ١٧٧ ، سخا ١٠٤ ، سخا ١٠٢ وجيزة ١٧٨ على أعلى قيم للبروتين (٩,٠٦ ، ٨,٩٨ ، ٨,٤٤ ، ٨,١٥٪ على التوالى). بالنسبة لمحتوى الحبوب من المستخلص الإيثيرى فقد مال للإرتفاع فى الأصناف والسلالات التى تنتمى إلى المجموعة اليابانية والمجموعة الهندية / اليابانية عن أصناف وسلالات المجموعة الهندية حيث إحتوت أصناف جيزة ١٧٦ جيزة ١٧٧ وجيزة ١٧٨ على نسب متفاوتة من المستخلص الاثيرى . وتميزت السلالة جيزة ١ -٢ - ٥ - ٥١٢١ التابعة للمجموعة الهندية / اليابانية والسلالة جيزة ٤ - ٥ - ١٣٦٨ التابعة للمجموعة الهندية على أعلى قيم للرماد (٧,٦٨ ، ٧,٠١٪ على التوالى) مقارنة بالأصناف الأخرى . وسجل صنف الياسمين المصرى والسلالة جيزة ٤ - ٥ - ١٣٦٨ أعلى قيم للألياف داخل المجوعة الهندية مقارنة بالأصناف والسلالات فى المجموعة الأخرى ، حيث سجلت (١١,٤٥ ، ١٠,٨٤٪ على التوالى). بينما سجلت أعلى قيم للكربوهيدرات فى أصناف نورين ١ ، نورين ٢٢ (٧٩,١٥ فى كلا الصنفين) داخل المجموعة اليابانية مقارنة بالأصناف والسلالات الأخرى تحت الدراسة.

٥- لم تتأثر جميع الأصناف والسلالات داخل المجموعة اليابانية بالنقع فى محلول الفينول، بينما ظهر لون بنى بين الأصناف والسلالات المختلفة داخل المجموعات الهندية والهندية اليابانية على فترات مختلفة من النقع فى تركيزات مختلفة من محلول الفينول، وهكذا يمكن إتخاذه إختباراً لتمييز الأصناف داخل المجموعات والكشف عن إنزيمات الأكسدة .

٦-أوضحت نتائج تحليل البروتين بطريقة الإلكتروفوريسيس عدد حزم البروتينات لكل صنف وكل سلالة تحت الدراسة داخل المجموعات والوزن الجزيئى لكل بروتين .