THE EFFECT OF SEED CLASSES ON THE PRODUCTIVITY OF SOME RICE CULTIVARS

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ABSTRACT

Series of laboratory and field experiments were conducted during the two successive summer seasons of 2008 and 2009, at laboratories and the Experimental Farm of Rice Research and Training Center, (RRTC), Sakha, Kafr Elsheikh, Agriculture Research Center (ARC), Egypt, to study the performance of some rice cultivars under different seed classes. The materials in the two experiments included four rice cultivars(Sk. 101, Sk. 103 , Giza 178 and Giza 182) and seed classes.

The experimental design was a split-plot with three replicates. Main plots were assigned to rice cultivars and sub plots to the seed classes. The sub plot size was 12 m^2 (3 × 4m). In each sub plot, an area 2.4m^2 (0.6 × 4m) was devoted for plant growth and yield attributes samplings and 9.6 m^2 (2.4×4 m) for determining grain and straw yields.. The other usual agricultural practices of growing rice were performed as the recommendation of Rice Research and Training Center (RRTC).

The following criteria were recorded: Germination (%); Germination index; Shoot length (cm); Root volume (mm^3); Root/ shoot ratio (%): Plant height (cm); Flag leaf angle (^{0}); Flag leaf area (cm^2); Days to heading (day); Number of panicles/hill; Panicle length (cm); Panicle weight (g); Number of filled grains/ panicle; Seed set percentage; 1000- grain weight (g) and Grain yield (t/h). From the results it could be concluded that, Sakha101 gave the best values for the growth and grain yield characters, but it is late maturing cultivar, while, Sakha103 gave lowest value of grain yield and early maturing cultivar, so, the value cultivated and used for the Sakha103 was higher than the Sakha101, because the water saving for the Sakha103 abut 15-20% comparing to the late maturing cultivar, these results suggested that, could be increase the cultivated area by early maturing cultivars with high quality seed (Breeder seed and foundation seed).

INTRODUCTION

Rice is one of the most important crops in Egypt and its production plays a significant role in the strategy to overcome food shortage and improvement of self sufficiency for local consumption

and export. It occupies, annually, about 0.60 million hectares. A big progress in rice yields and production have been achieved during the last 12 years (1990-2001). This progress was mostly due to the development and releasing the new improved varieties having a high yield potential, early maturity, and highly resistance to blast disease. These varieties are widely spread in the farmers fields because they are highly accepted by the farmers and consumers **(Badawi, 2005).**

Production of certified seed involves the use three classes of seeds: the breeder seed, foundation seed, registered seed **(Douglas 1980)**.

In the yield of a commercial crop, the total cultivated area 1.1 million fed. In Egypt annually the high quality seed cover 15-20% from the total area, the remain area cover with poor quality seed. (from house) that area about (80%) from the total area. Genetic purity of seed yield is of crucial importance, as one percent reduction in purity of seed yield results in a reduction of about 100 kg/ha. Traditional genetic purity is tested by Grow out tests (GOT), based on morphological assay, resulting in a significant increase of the seed yield and a decrease of its cost **Abo Yousef *et al.*, (2009).** The main objective is to study; The effect of seed classes on germination, seedling, and yield characters of some rice cultivars.

MATERIALS AND METHODS

Series of laboratory and field experiments were conducted during the two successive summer seasons of 2008 and 2009, at laboratories and the Experimental Farm of Rice Research and Training Center, (RRTC), Sakha, Kafr Elsheikh, Agriculture Research Center (ARC) Egypt, to study the performance of some rice cultivars under different seed classes.

Two field experiments were conducted in 2008 and 2009 seasons on a clay soil, to determine the effect of seed classes of some rice cultivars on seedling characters, growth, yield attributes and grain yield. The materials in the two experiments included four rice cultivars(Sk. 101, Sk. 103 , Giza 178 and Giza 182) and seed classes.

The experimental design was a split-plot with three replicates. Main plots were assigned to rice cultivars and sub plots to the seed classes. The sub plot size was 12 m^2 (3 × 4m). In each sub plot, an area 2.4m^2 (0.6 × 4m) was devoted for plant growth and yield attributes samplings and 9.6 m^2 (2.4×4 m) for determining grain and straw yields. Every plot consists of 15 rows and the distance between the hills and the rows were 20×20 cm. The other usual agricultural

practices of growing rice were performed as the recommendation of Rice Research and Training Center (RRTC , 2007).

The data were recorded on Germination (%); Germination index; Shoot length (cm); Root volume (mm); Root/ shoot ratio (%); Days to heading (day); Plant height (cm); Flag leaf angle (^{0}); Flag leaf area (cm^2); Number of panicles/hill; Panicle length (cm); Panicle weight (g); Number of filled grains/ panicle; Seed set percentage; 1000- grain weight (g) and Grain yield (t/h).

Statistical analysis:

All collected data were subjected to statistical analysis using ANOVA as described by ***Gomez and Gomez (1984).***

The treatment means were compared using Duncan's multiple range test ***Duncan, (1955)***. All statistical analysis was performed using analysis of variance technique by means of "MSTAT" computer soft ware package.

RESULTES AND DISCUSSION

These results could be discussed as follow:

A- Germination and seedling characters.

A.1- Germination (%)

Data in Table 1 show that, the germination (%) was affected by the rice cultivars in the two seasons. The maximum values of germination (%) were (96.33 and 96.25 %) of Sakha 101 rice cultivar. But, the minimum values were (95.58 and 95.33 %) of Giza182 rice cultivar in 2008 and 2009 summer seasons, respectively. Indicated to the Giza182 rice cultivar is Indica type and requires more time to physiological maturity comparing to Japonica or Indica/ Japonica varieties.

The data indicated that, there were significant differences between seed classes for germination (%). The maximum values were (98.50 and 98.41 %) of breeder seed class. But, the lowest values were (93.00 and 92.75 %) of certified seed class. Indicating to germination (%) was highly affected by high genetic purity seed. These results are in agreement with those obtained by **shatta (1999).** Germination levels exerted a significant influence on seedling vigor components like, seedling length, seedling dry weight, rate germination and vigor index in both seasons.

Germination (%) was not affected in any of the two seasons by the interaction between the two factors involved in this study indicating, thereby, that each factor affected this study independently.

Table 1: Effect of rice cultivars, seed classes and their interaction on germination (%), germination index and shoot length (cm) during 2008 and 2009 seasons.

Character / Treatment	Germination (%)		Germination index		Shoot length (cm)	
	2008	2009	2008	2009	2008	2009
Cultivar (A):						
Sakha101	96.33a	96.25a	96.42	96.42	9.42c	9.50c
Sakha103	96.33a	95.58b	96.33	96.08	12.83a	13.25a
Giza178	96.00b	96.00a	96.00	96.00	10.29b	10.54b
Giza182	95.58c	95.33c	95.00	96.08	10.25b	9.79c
f-test	**	*	NS	NS	**	**
Class (B):						
Breeder	98.50a	98.42a	99.08a	99.08a	11.25a	11.42a
Foundation	97.50b	97.33b	98.08b	98.08b	11.00a	11.08b
Registrated	94.83c	94.67c	94.50c	94.83c	10.42b	10.54c
Certified	93.00d	92.75d	92.58d	92.58d	10.13b	10.04d
f-test	**	**	**	**	**	**
Interaction A x B	NS	NS	NS	NS	NS	NS

*, ** and NS indicate that p≤ 0.05,p≤ 0.01 and not significant. Means of each factor deigned by the same letter(s) aren't significantly different at 5% level according to Duncan's multiple range test

A. 2- Germination index

Data in Table 1 showed that, the germination index was not affected by rice cultivars in the two seasons. The maximum values of germination index were (96.41 and 96.41 %) for rice cultivar Sakha101. While the minimum values were (95.00% and 96.083 %) for Giza 182 rice cultivar in 2008 and 2009 summer seasons, respectively. These findings were similar to those results, which obtained for germination (%).

The data indicated that, there were significant differences among the seed classes for the germination index. The maximum values were (99.08 and 99.08 %) for breeder seed class. But, the lowest values were (92.58 and 92.58 %) of certified seed in 2008 and 2009 summer seasons, respectively.

Non of the interaction had a significant effect on germination index in any of the two seasons under the local conditions of the present investigation. That meaning the highest volume of normal seedling was obtained when used breeder seed comparing to anther seed class.

A. 3- Shoot length (cm)

The data in Table 1 indicated that, there were significant differences between the rice cultivars and seed classes for shoot length in both seasons. The maximum values were (12.83 and 13.25cm) with Sakha103 rice cultivar. While, the minimum values were (9.41 and 9.50cm) with using Sakha101 rice cultivar in the two seasons,. These data show that, the shoot length was highly affected by rice cultivars. The shoot length trait it's play important role in determine the planting method, whereas, the Sakha103 rice cultivar, could be used for direct seeded and annual transplanting, but, the Sakha101 could be used to mechanical and annual transplanting.

On the same line, for the shoot length with the seed classes, the maximum values were (11.25 and 11.41cm) with using breeder seed class. But the minimum values were (10.13 and 10.04cm) for the shoot length by the certified seed. The data showed that, the Sakha101 had short radical area comparing to the other cultivars. These finding are in agreement with those obtained by cerovich et al. (2004)

Shoot length was not affected in any of the two seasons by the interaction between the two factors involved in this study indicating, thereby, that each factor affected this study independently.

A. 4- Root volume (mm)

The results in Table 2 revealed that, the effect of cultivars were highly significant on root volume in two successive seasons 2008 and 2009, the maximum values were (25.67 and 25.50mm) when used Sakha101 rice cultivar. But, the minimum values were (21.33 and 21.67mm) when use Sakha103 rice cultivar in 2008 and 2009 summer seasons, respectively. The results showed that, the Sakha101 rice cultivar had good characters for the root system including root length and volume comparing to other rice cultivars.

For the seed classes, the maximum values were (24.33 and 24.33mm) with using breeder seed class. While, minimum values

were (22.83 and 23.25mm) of the root volume with certified seed. The results showed that, the root volume trait was highly affected by the seed classes.

Non of the interaction had a significant effect on root volume in any of the two seasons under the local conditions of the present investigation.

Table 2:Effect of rice cultivars, seed classes and their interactions on root volume (mm) and shoot/shoot ratio during 2008 and 2009 seasons

Character / Treatment	Root volume(mm)		Root/ Shoot ratio	
	2008	2009	2008	2009
Cultivar (A):				
Sakha101	25.67a	25.33a	88.48a	88.58a
Sakha103	21.33c	21.67c	61.50c	62.35c
Giza178	24.58a	24.58a	69.38b	70.22b
Giza182	22.92b	23.42b	68.87b	68.87b
f-test	**	**	**	**
Class (B):				
Breeder	24.33a	24.33a	73.03a	74.62a
Foundation	24.00a	24.08a	72.80ab	73.27ab
Registrated	23.33b	23.33b	71.83b	71.83b
Certified	22.83c	23.25b	70.57c	70.30c
f-test	**	**	**	**
Interaction A x B	NS	NS	NS	NS

*, ** and NS indicate that p≤ 0.05,p≤ 0.01 and not significant. Means of each factor deigned by the same letter(s) aren't significantly different at 5% level according to Duncan's multiple range test.

A. 5- Root/shoot ratio (%)

The results in Table 2 revealed that the effect of the rice cultivars and different of seed classes were highly significant on the root/ shoot ratio

in two successive seasons of 2008 and 2009. The maximum values (88.48 and 88.58 %) were recorded with Sakha101 rice cultivar. But, the minimum values were (61.50 and 62.35 %) were obtained from Sakha103 rice cultivar in 2008 and 2009 summer season, respectively.

On the other side, for the seed class, the maximum values were (73.03 and 74.62 %) with using breeder seed class. The minimum values were (70.57 and 70.30 %) for the root shoot/ ratio with using certified seed in 2008 and 2009 summer seasons, respectively.

Non of the interaction had a significant effect on root/shoot ratio in any of the two seasons under the local conditions of the present investigation.

All the seedling characters were not affected in any of the two seasons by the interaction between the two factors involved in this study indicating, thereby, that each factor affected this study independently.

B. Growth characters:

B.1- Days to heading (day)

Data in Table 3 show that, the days to heading were highly significantly affected by rice cultivars in the two years. The maximum number of days to heading (106.5 and 107.5 day) was recorded with using the Sakha101 cultivar. But, the minimum values were (91.0 and 91.0 day) with that Sakha103 rice cultivar in 2008 and 2009 seasons, respectively. These results indicated that the Sakha101 rice cultivar is late maturing, while the Sakha103 cultivar is early maturing. These results were in agreement with these of a **Badwi (2005)**

The data indicate also that there were significant differences among the different seed classes on days to heading. The maximum values (101.00 and 101.85 day) were recorded by certified seed. But, the minimum values were (97.50 and 97.75 day), of the breeder and foundation seed in 2008 and 2009 seasons, respectively. These results clear that the breeder and foundation seed classes were highly homogeny than the other seed classes (registered and certified seed). These foundations are in agreement with those obtained by **Aidy *et al.* (2002).**

Days to heading was not affected in any of the two seasons by the interaction between the two factors involved in this study indicating, thereby, that each factor affected this study independently.

Table 3: Effect of rice cultivars, seed classes and their interaction on days to heading (day), plant height (cm) and flag leaf angle (^{0}) during 2008 and 2009 seasons.

Character / Treatment	Days to heading (day)		Plant height (cm)		Flag leaf angle (^{0})	
	2008	2009	2008	2009	2008	2009
Cultivar (A):						
Sakha101	106.5a	107.5a	96.38b	96.50b	31.68a	31.83a
Sakha103	91.00d	91.00d	95.33b	95.50b	29.21b	29.17b
Giza178	101.5b	101.8b	101.1a	101.42a	19.69d	19.71d
Giza182	96.25c	96.50c	91.33c	92.67d	24.03c	24.08c
f-test	**	**	**	**	**	**
Class (B):						
Breeder	97.50c	97.75c	98.75a	96.33a	26.93a	27.00a
Foundation	97.50c	97.75c	97.67b	95.25b	26.67a	26.63a
Registrated	99.25c	99.50b	94.88c	93.08c	25.88b	25.92b
Certified	101.0a	101.8a	92.88d	91.42d	25.14c	25.25c
f-test	**	**	**	**	**	**
Interaction A x B	NS	NS	NS	NS	NS	NS

*, ** and NS indicate that p≤ 0.05,p≤ 0.01 and not significant. Means of each factor deigned by the same letter(s) aren't significantly different at 5% level according to Duncan's multiple range tests.

B.2- Plant height (cm)

Data in Table 3 show that, the plant height was highly affected by rice cultivars in the two seasons. The maximum values of plant height (101.25 and 101.42cm) were recorded with the Giza178 rice cultivar. But, the minimum values were (91.33 and 92.66cm) with the Giza182 rice cultivar in 2008 and 2009 seasons respectively.

The data indicated that there were significant differences among seed classes on the plant height. The maximum values (98.75 and 96.33cm) were recorded with used the breeder seed. But, the lowest values were (92.87 and 91.41cm) with used the certified seed in 2008 and 2009 seasons, respectively. These results showed that, the Giza178 rice cultivar was taller than the other varieties, moreover, the breeder seed class was highly similarity than the other seed

classes, because the variance value of certified seed was higher than the value in breeder seed.

Plant height was not affected in any of the two seasons by the interaction between the two factors involved in this study indicating, thereby, that each factor affected this study independently.

B.3- Flag leaf angel (^{0})

Data in Table 3 showed that the flag leaf angel was highly affected by rice cultivars in the two seasons. The maximum values of flag leaf angel was (31.68 ^{0}) recorded for the Sakha101 rice cultivar in 2008 summer season, but the minimum value was (19.7 ^{0}) for flag leaf angel of the Giza178 rice cultivar during 2008 summer season. But, 2009 summer season, the data showed that the maximum value was (31.83 ^{0}) of Sakha101 rice cultivar. But, the minimum value was (19.70 ^{0}) of Giza178 rice cultivar. These results indicated that, the flag leaf angle was genetically and highly affected by type of rice cultivar, whereas, Sakha 101 is Japonica type, but, the Giza178 variety belongs to Indica/japonica type.

Data in table show that the data indicated that, there were significant differences among the seed classes for flag leaf angel. The maximum values were (26.93 ^{0} and 27.00 ^{0}) of the breeder seed class. But, the minimum values were (25.14 ^{0} and 25.25 ^{0}) of the certified seed class during 2008 and 2009 seasons, respectively, indicated to the variance of certified seed was higher than the variance in breeder or foundation seed. The erect flag leaf angle periment to the second and third leaves to absorb high amount of sun, to accumulate the carbohydrate to increase the grain filling rate.

The interaction between the rice cultivars and seed classes was insignificant for flag leaf angle during the two seasons.

B.4- Flag leaf area (cm^2)

Data in Table 4 showed that, the flag leaf area was highly affected by the rice cultivars in the two seasons. The maximum values of flag leaf area (43.19 and 43.2 cm2) were recorded of the Giza182 rice cultivar. But, the minimum value was (23.00 and 23.00 cm^2) for flag leaf area of the Sakha103 rice cultivar during 2008 and 2009 summer season respectively. These results indicated that, Rice cultivar Giza182 have a good plant type for flag leaf area and consider as a good downer for this trait.

The data indicate that, there were significant differences among the seed classes for flag leaf area. The maximum values were (34.31 and 34.17 cm^2) of the breeder seed class. But, the lowest values were (32.25 and 32.23 cm^2) of the certified seed class in 2008 and 2009 summer seasons, respectively.

Table 4: Effect of rice cultivars, seed classes and their interaction on flag leaf area (cm^2), Number of panicle/hill and panicle length (cm) during 2008 and 2009 seasons.

Character / Treatment	Flag leaf area (cm^2)		Number of panicles/hill		Panicle length (cm)	
	2008	2009	2008	2009	2008	2009
Cultivar (A):						
Sakha101	28.35c	28.33c	14.41a	14.50a	23.54a	23.52a
Sakha103	23.00d	23.00d	11.91c	12.08d	18.29c	18.27d
Giza 178	39.00b	39.00b	14.08a	14.00b	22.35b	22.35c
Giza 182	43.19a	43.20a	12.83b	12.83b	22.59b	22.59b
f-test	**	**	**	**	**	**
Class (B):						
Breeder	34.31a	34.17a	14.50a	14.33a	22.30a	22.30a
Foundation	34.01a	34.03a	13.75b	13.66b	22.10b	22.10a
Registration	32.95b	32.92b	12.66c	13.00c	21.38c	21.38b
Certified	32.25c	32.23c	12.33c	12.41d	20.95d	20.95c
f-test	**	**	**	**	**	**
Interaction A x B	NS	NS	NS	NS	NS	NS

*, ** and NS indicate that p≤ 0.05, p≤ 0.01 and not significant. Means of each factor deigned by the same letter(s) aren't significantly different at 5% level according to Duncan's multiple range tests

Indicated that the flag leaf area, was highly affected by the seed class. Flag leaf area was not affected in any of the two seasons by the interaction between the two factors involved in this study indicating, thereby, that each factor affected this study independently.

C. Yield and its components:

C.1- Number of panicles/hill

The data in Table 4 show that, the number of panicles/hill were affected by the rice cultivars in two summer seasons of 2008 and 2009. The maximum values for number of panicles/hill were (14.41 and 14.50panicle); of the Sakha101 rice cultivar. But, the minimum values for number of panicles/hill were (11.91 and 12.08 panicle) of Sakha103 rice cultivar in 2008 and 2009 summer season, respectively.

In the other side, the maximum values for number of panicles/hill (14.5 and 14.33panicle) were recorded with breeder seed class. But, the minimum values (12.33 and 12.41panicle) were recorded with certified seed. in 2008 and 2009 summer seasons respectively. These results referred to the Sakha101 rice cultivar was highly tillering ability than the other cultivars. Moreover, the breeder seed class was highly tillering ability than the other seed classes, because the growth rate for the high quality seed was more than the poor quality seed.

None of the interaction had a significant effect on number of panicles/hill in any of the two seasons under the local conditions of the present investigation.

C.2- Panicle length (cm)

The data in Table 4 showed that, the panicle length was affected by the rice cultivars in two summer seasons of 2008 and 2009. The maximum values for panicle length were (23.54 and 23.52cm) of the Sakha101 rice cultivar. But, the minimum values for plant height were (18.26 and 18.27cm) of Sakha103 rice cultivar in 2008 and 2009 summer seasons, respectively. The results indicated to the panicle length was highly affected by rice Variety and controlled by genetic background.

In the other side, the maximum values for panicle length were (22.30 and 22.30cm) with using Breeder seed class. But, the minimum values were (20.95 and 20.95cm) with certified seed class, in 2008 and 2009 summer seasons, respectively.

Panicle length was not affected in any of the two seasons by the interaction between the two factors involved in this study indicating, thereby, that each factor affected this study independently.

C.3- Panicle weight (g)

Data in Table 5 showed that, the panicle weight was highly affected by the rice cultivars in the two seasons. The maximum values of panicle weight (4.28 and 4.28g) were recorded with using Sakha101 rice cultivar. But, the minimum values (3.22 and 3.22g) were recorded with the Sakha103 rice cultivar in 2008 and 2009

summer seasons, respectively. These results referred to the Sakha101 cultivar its high yielding Variety.

The data indicated that, there were significant differences among the seed classes for panicle weight. The maximum values were (3.79 and 3.78gm) with Breeder seed class. But, the minimum values were (3.53

Table 5: Effected of rice cultivars, seed classes and their interaction on panicle weight (g), number of filled grains/panicle and seed set (%) during 2008 and 2009 seasons

Character / Treatment	Panicle weight (g)		Number of filled grains/panicle		Seed set (%)	
	2008	2009	2008	2009	2008	2009
Cultivar (A):						
Sakha101	4.28a	4.28a	151.16a	152.33a	96.39a	96.29a
Sakha103	3.22c	3.22c	103.41c	103.66d	95.56b	95.4bc
Giza178	3.62b	3.60b	150.00a	150.25b	95.17c	95.20c
Giza182	3.57b	3.54b	133.91b	133.17c	95.55b	95.66b
f-test	**	**	**	**	**	**
Class (B):						
Breeder	3.79a	3.78a	139.00a	139.16a	97.17a	97.12a
Foundation	3.74b	3.73a	136.83b	137.00b	96.29b	96.29b
Registration	3.62c	3.60b	132.66c	132.91c	95.16c	95.04c
Certified	3.53d	3.53c	130.00d	130.33d	94.05d	94.08d
f-test	**	**	**	**	**	**
Interaction A x B	NS	NS	NS	*	**	**

*, ** and NS indicate that p≤ 0.05, p≤ 0.01 and not significant. Means of each factor deigned by the same letter(s) aren't significantly different at 5% level according to Duncan's multiple range tests

and3.53gm) of the certified seed class in 2008 and 2009 summer seasons, respectively. The results indicated to, the breeder seed class had heavy panicle comparing to other seed classes.

None of the interaction had a significant effect on panicle weight in any of the two seasons under the local conditions of the present investigation.

C.4- Number of filled grains/panicle

The results in Table 5 revealed that, the affect by rice cultivars and different seed classes were highly significant on the number of field grains panicle in two successive seasons of 2008 and 2009. The maximum values were (151.16 and 152.33 grain) with Sakha101 rice cultivar. But, the minimum values were (103.41 and 103.66 grain) with Sakha103 rice cultivar in 2008 and 2009 summer seasons, respectively. These results referred to the Sakha101 rice cultivar had long period for vegetative phase then develop high quantity of accumulation to carbohydrate comparing to early maturing rice cultivar Sakha103.

The data indicated that, there were significant differences among the seed classes for number of filled grains/ panicle, the maximum values were (139.00 and 139.16 grain) with breeder seed class. The minimum values were (130.00 and 130.33 grain) for the number of filled grains/ panicle with certified seed in 2008 and 2009 summer seasons respectively. The results showed that, the seed quality played importing role to enhancement the grain filling.

Table 6 show that the number of field grains/ panicle as affected by the interaction between rice cultivar and seed class in 2009 seasons. The highest number of filled grains/ panicle was recorded by Sakha101 rice cultivar with breeder seed class (156.67 grain). While the lowest one (100.33 grain) was given by rice cultivar Sakha103 with certified seed class. These results indicated that, the number of field grains was highly affected by rice cultivar and seed class.

Table 6: Number of filled grains/panicle as affected by the interaction between rice cultivars and seed classes during 2009 season.

Seed class	Cultivar			
	Giza182	Giza178	Sakha103	Sakha101
Breeder	139.000g	154.333bc	106.667k	156.667a
Foundation	134.667h	153.000c	105.333k	155.000b
Registrated	130.667i	148.333e	102.333l	150.333d
Certified	128.333j	145.333f	100.333m	147.333e

Means designed by the same letter are not significantly different at 5%level, using Duncan multiple range test.

C.5- Seed set (%)

The data in Table 5 indicate that, there were significant differences between rice cultivars and seed classes for the seed set (%) in the both seasons, the maximum values of the seed set (%) were (96.39 and 96.29 %) of the Sakha101 rice cultivar as well as with using breeder seed class were (97.17 and 97.12 %) during 2008 and 2009 summer seasons, respectively .

But, the minimum values of the seed set (%) were (95.17 and 95.20%) when used Giza178 rice cultivar. while, the minimum values of the seed set (%) were (94.05 and 94.08 %) with certified seed class during 2008 and 2009 seasons. These findings referred to Sakha101 rice cultivar is pure Japonica type, but, Giza178 rice variety is Indica/Japonica type, meaning that, the genetic background played important role to controlling the sterility genes effect.

Table 7 show the seed set (%) as affected by the interaction between rice cultivars and seed classes during 2008 and 2009 seasons, the maximum seed set percentage was recorded by Sakha101 rice cultivar with breeder seed class (97.5 and 97.17 %). while the minimum one (93.03 and 93.00 %) was given by rice cultivar Giza178 with certified seed class in both seasons. These results indicated that, the seed set (%) was highly affected by rice cultivar and seed class, where, the japonica type gave highest value comparing to Indica type varieties.

Table 7: Seed set (%) as affected by the interaction between rice cultivar and seed class during 2008 and 2009 seasons

:lass	Rice cultivar							
	2008 season				2009 season			
	Sk101	Sk103	Gz178	Gz182	Sk101	Sk103	Gz178	Gz182
der	97.50a	97.1ab	97.10ab	97.0ab	97.17a	97.00a	97.17a	97.17a
latio	. 96.85a	96.20c	96.03c	96.10c	96.83a	96.17b	96.00b	96.17b
trate d	96.07b	95.03d	94.53d	95.03d	96.00b	94.33b	94.67d	95.17c
fied	95.17c	93.97e	93.03e	94.07e	95.17c	94.00d	93.00e	94.17d

Means designed by the same letter are not significantly different at 5%level, using Duncan multiple range test.

C.6- 1000-grain weight (g)

The data in Table 8 indicated that there were significant differences between rice cultivars and seed class for 1000-grain weight in both seasons 2008 and 2009. The highest values were (27.23 and 27.21g) with using the Sakha101 rice cultivar. But the lowest values were (21.93 and 21.42gm) with using the Giza178 rice cultivar in 2008 and 2009 seasons, respectively.

Moreover, the maximum values of 1000-grain weight were (24.62 and 24.58gm) with breeder seed class. But, the minimum values (23.15 and 22.17gm) were obtained with certified seed class in the two seasons 2008 and 2009, respectively. these results indicated to, the increasing of genetic purity will increase number of filled grains/panicle. Moreover, this trait was under genetic control, because the Japonica type varieties were heavy 1000- grain weight than the Indica type varieties. These results were agreement with those of **Badawi (2005)**

C.7- Grain yield (t/ha)

Data in Table 8 show that there were highly significant differences among rice cultivars and seed classes for grain yield. Equally for the grain yield the maximum values were (11.33 and 11.35 t/ha) which obtained by Sakha101 rice cultivar. But, the minimum values were (9.68 and 9.69 t/ha) when Sakha103 rice cultivar was cultivated, in 2008 and 2009 summer seasons, respectively.

More over the maximum grain yield/ha (11.97 and 11.99 t/ha) was given by breeder seed class. But, the minimum values were (9.41 and 9.43 t/ha) was produced by certified seed classes, during 2008 and 2009 summer seasons, respectively. These results indicated that, Sakha101 rice cultivar recognized as a high yielding and late maturing cultivar, but Sakha103 rice
cultivar recognized as low yielding and early maturing cultivar. Moreover, the high seed quality gave the highest value of grain yield comparing with poor seed quality, These findings referred to decrease in number of offtype (alien plant) of breeder seed, but, increase the No. of offtype plants in certified seed.

From the above results it could be concluded that, the Sakha101 gave the best values for the growth and grain yield characters, but is late maturing cultivar, while, the Sakha103 gave lowest value of grain yield and early maturing cultivar, so, the value cultivated and used for the Sakha103 was higher than the Sakha101, because the water saving for the Sakha103 about 15-20% comparing to the late maturing cultivar, these results suggested that, it could be increase the cultivated area by early maturing cultivars with high quality seed (Breeder seed and foundation seed).

Table 8: Effect of rice, cultivars, classes and interaction on 1000-grain weight (g) and grain yield (t/ha) during 2008 and 2009 seasons.

Character / Treatment	1000-grain weight (g)		Grain yield (t/ha)	
	2008	2009	2008	2009
Cultivar (A):				
Sakha101	27.23a	27.21a	11.33a	11.35a
Sakha103	24.58b	24.58b	9.68c	9.69d
Giza178	21.93d	21.42d	11.07a	11.07b
Giza182	22.65c	22.62c	10.764b	10.79c
f-test	**	**	**	**
Class (B):				
Breeder	24.62a	24.58a	11.97a	11.99a
Foundation	24.40a	24.33a	11.11b	11.14b
Registration	23.68b	23.75b	10.34c	10.33c
Certified	23.15c	23.17c	9.41d	9.43d
f-test	**	**	**	**
Interaction A x B	NS	NS	NS	NS

*, ** and NS indicate that p≤ 0.05,p≤ 0.01 and not significant. Means of each factor deigned by the same letter(s) aren't significantly different at 5% level according to Duncan's multiple range test

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الملخص العربى

تأثير درجات التقاوي على الإنبات و صفات البادرات و إنتاجية بعض أصناف الأرز

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أجريت تجارب معملية وحقلية في موسمي ٢٠٠٨ و ٢٠٠٩م. لدراسة تأثير درجات التقاوي (المربى – الأساس – المسجل – المعتمد) لأربعة أصناف من الأرز (سخا ١٠١ – سخا ١٠٣ – جيزة ١٧٨ – جيزة ١٨٢) على صفات البادرة والنمو والمحصول و مكونات المحصول. واستخدم في تنفيذ التجربة تصميم القطع المنشقة split-plot في ثلاث مكررات، وزعت الأصناف في القطع الرئيسية ودرجات التقاوي في القطع الشقية وأجريت كل العمليات الزراعية طبقا لتوصيات مركز البحوث والتدريب في الأرز وسجلت بيانات على الصفات الآتية : نسبة الإنبات للتقاوي، دليل الإنبات، طول الريشة، حجم جذر البادرة، ونسبة المجموع الجذري /المجموع الخضري، ميعاد التزهير، طول النبات، زاوية ورقة العلم، مساحة ورقة العلم، عدد السنابل بالجورة ، طول السنبلة ، وزن السنبلة ، عدد الحبوب الممتلئة

بالسنبلة ، نسبة العقد، وزن ١٠٠٠ حبة ومحصول الحبوب/هكتار. تفوق الصنف سخا ١٠١ على الأصناف الأخرى ودرجة تقاوي المربى على درجات التقاوي الأخرى معنويا في صفات البادرة

* فقد كان الصنف سخا ١٠٣ أبكر الأصناف في صفة ميعاد التزهير يليه الصنف جيزة ١٨٢ ثم جيزة ١٧٨ ثم سخا ١٠١. وقد كانت نباتات الصنف جيزة ١٧٨ أكثر القيم ارتفاعا في طول النبات واقل القيم لزاوية ورقة العلم بالمقارنة بالأصناف الأخرى في الموسمين. وسجل الصنف جيزة ١٨٢ اعلي قيمة لمساحة ورقة العلم في الموسمين.
* اختلفت الأصناف معنويا في محصول الحبوب وجميع مكوناته في الموسمين. تفوق الصنف سخا ١٠١ معنويا عن باقي الأصناف في عدد السنابل بالجورة ، طول السنبلة ، وزن السنبلة ، عدد الحبوب الممتلئة بالسنبلة ، وزن ١٠٠٠ حبة ،محصول الحبوب/هكتار في الموسمين.
لم يختلف الصنف جيزة ١٧٨ عن الصنف سخا ١٠١ معنويا في محصول الحبوب /هكتار في الموسمين.
* أدى انخفاض درجة التقاوي إلى انخفاض معنوي في محصول الحبوب ومكوناته في الموسمين. فقد أدى استخدام تقاوي المربى أو تقاوي الأساس الحصول على اعلي عدد من السنابل / جوره ، أطول سنبلة ، وأثقل وزن للسنبلة ، أكثر عدد من الحبوب الممتلئة بالسنبلة، أثقل وزن ت لل ١٠٠٠ حبة وأعلى محصول للحبوب/هكتار عن استخدام درجات التقاوي الأخرى. بينما أدى استخدام التقاوي المعتمدة إلى الحصول على اقل القيم للصفات السابقة في الموسمين.
* ويستنتج من نتائج هذه التجربة أنة للحصول على أعلى محصول يتم استخدام تقاوي المربى أو تقاوي الأساس للصنفين سخا ١٠١ أو جيزة ١٧٨.