Effect of processing stages on seeds quality, growth and yield characters for some rice cultivars (Oryza Sativa L)

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Abstract: This study was conducted at the Farm of Rice Research Section, FCRI, ARC Egypt, during 2016 and 2017 summer seasons, were used in factorial design with three replications to study The effect of processing stages for some rice varieties on seeds quality, growth and yield characters of some rice varieties four rice verities, Giza 177, Giza 178, Sakha 104 and Sakha 106 different processing stages. The data were recorded on 1- Laboratory characters i.e.,, 1000 grain weight, Grain volume, Germination index, 2- Growth characters i.e.,, Plant height, Days to heading, Flag leaf area, 3- Yield characters i.e.,, Number of panicles/plant, Panicle length, Seed set %, Panicle weight and Grain yield,. The results showed that, the processing stage number six recorded the highest values for the studied characters comparing to the other stages, sakha 106 recorded the highest values for most the studied traits except Giza 178 recorded the highest value for grain yield, From the above results could be concluded that to get high seed quality of rice varieties should be using the seed from six stage of the processing stages with different rice varieties or fourth stage which recorded the mean desirable values for yield characters.

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Key words: - processing stages, seed quality, varieties.

1. Introduction

Rice (Oryza sativa, L.) is one of the most important agricultural food crops for more than half of the world population. Moreover, it's a very important cereal crop in Egypt for both consumption and export. The total cultivated area by rice is about 1.350 million faddan which produced about 5.300.000 million tons of paddy rice (RRTC 2016). In spite of rice is salt sensitive crop, but it's considered as reclamation crop for saline soil because of its flooding condition. caroline et al (2013).

Highly productivity depends on high seed quality and apply cultural practices, so to increase the national production should be increase the total area covered with high seed quality. High quality seed reflects on the increasing national income Manzoor et al (2007). High quality seed reflects on the emphasis in seed testing, focusing on physical purity, germination capacity and moisture content. Seed health tests, varieties purity evaluations and seedling vigor tests. Seed quality control and certification is mainly based on crop inspection and laboratory testing to ensure that the seed meets minimum standards laid down in the regulations. Seeds are tested according to the procedures of International Seed Testing Association (ISTA) and Organization for Economic Cooperation and Development (OECD). Draz et al (2003). Therefore, the present study aimed to investigate the effect of processing stages of some rice varieties on seed quality, growth and yield characters.

2. Material and Methods

Series of laboratory and field experiments were conducted during the two successive summer seasons of 2016 and 2017, at Laboratories and the Experimental Farm of Rice Research Section, Agriculture Research Station, Sakha, Kafr El-Sheikh, Agriculture Research Center (ARC) Egypt, to study the effect of processing stages for some rice cultivars on some seed quality, growth, yield and yield characters. The seed of three processing stages for four rice cultivars, Giza 177, Giza 178, Sakha 104 and Sakha 106 were used, in factorial design with three replications. The processing stages included, The following:

1- Stage No. 2: included two steps, first one its pre cleaning by using skaybar machine, the second one its cleaning by using cleaning machine which containing on four layers of sevels the first and third layer having opening size with 3.5 mm, while, the second fourth layer having opening size with 1.8 mm.

2- Stage No. 4: which have two machine more with slender sevels, the third one its graduation machine for removing broken grains, while fourth one for separate the wider grains and small stone with the opening size 2 mm.

3- Stage No. 6: which have two machine more, the fifth machine its graduation machine for removing the length grain through slender sevels with the opening size 1.6 mm.

While the sixth machine for removing the light grains through graft separation. This work includes two main parts as follow, the date of sowing was may 1st during the two 2016 and 2017 seasons. The cultural practices were applied as recommended by RRTC (2015) at the Experiment Laboratory the data were recorded on 1000 grain weight, grain volume and germination index, Growth characters i.e.,, plant height, flag leaf area and days to heading, Yield characters i.e., number of panicles/plant, panicle length, panicle weight, seed set % and grain yield as recommended by SES (IRRI 1998).

Statistical analysis: All data collected were subjected to stander Statistical analysis following the proceeding described by Gomez and Gomez (1984) using ANOVA technique by computer software program (COSTAT). Indicate the significant at 5% level of probability, respectively.

3. Results and Discussions:

Results in Table. (1) Showed the effect of processing stages for rice cultivars as well as, their interaction on laboratory characters. 1000 grain weight, grain volume and germination index, the highest values were (27.65-27.95) for 1000 grain weight, (3.87-3.92) for grain volume and (98.47-98.57) for germination index for the seed after six stage and **Mathur *et al* (2004)** during 2016 and 2017 seasons. But the lowest values were (25.79-25.79), (2.89-2.94) and (91.10-91.29) respectively for the seed after two stage during 2016-2017 seasons. That referred to the high uniformity seed from six stage comparing to two stage which doesn't have disc separator. The results agreement **Koutroubas *et al* (2004).**

Also, the results indicated that, 1000 grain weight, grain volume, germination index were affected by rice cultivars during two seasons, the highest values were (29.23-29.27) for 1000 grain weight, (3.91-3.96) for grain volume and (97.41-97.88) with cultivar sakha 106 respectively during two seasons. While the variety Giza 178 recorded the lowest values for the studied characters during the two seasons, that referred to the genetic back ground where the Sakha 106 it is Japonica type, but the Giza 178 was Indicia/Japonica type. more over the interaction between stages of processing and rice cultivars were highly significant for grain volume and germination index that referred to grain ship for the studied varieties which belong to Japonica or Indicia types these results agreement with **Dimaporo, and Fernandez (2007)**.

Table (1): The effect of processing stage of some rice cultivars and their interactions on 1000 grain weight, Grain volume and Germination index during 2016 and 2017 seasons.

Treatment	laboratory characters					
	1000 grain weight (gm)		Grain volume (cm)		Germination index (%)	
Processing stages	2016	2017	2016	2017	2016	2017
Stage 6	27.65	27.95	3.87	3.92	98.47	98.57
Stage 4	26.74	26.795	3.38	3.42	94.55	93.97
Stage 2	25.79	25.79	2.89	2.94	91.10	91.29
LSD 0.05	0.76	1.17	0.04	0.01	0.77	1.22
Varieties						
Giza 177	29.17	29.20	3.55	3.85	96.59	96.52
Giza 178	20.49	20.63	2.50	2.74	94.94	94.53
Sakha 104	28.31	28.26	3.36	3.56	96.55	96.31
Sakha 106	29.23	29.27	3.91	3.96	97.41	97.88
LSD 0.05	0.38	0.66	0.03	0.01	0.52	0.80
Interaction						
Pro. stages x Varieties	NS	NS	**	**	**	**

**.*: highly significant at the 1% level of probability.In a season, the values having the same letter (s) aren't significantly different according to Duncan*

On the other hand, highly significant and differences between different processing stages were found for plant height, flag leaf area and days to heading. The highest values were (106.67-106.96) for plant height, (46.89-47.96) for flag leaf area and desirable value (98.91-98.25) for days to heading for

the seed after six stage during 2016 and 2017 seasons. But the lowest values were obtained from the seed after that referred to the highly homogeny seed reflected on the growth characters two stage of processing.

Also, the results indicated that, the plant height, flag leaf area and days to heading we affected by rice cultivars during the two seasons. The values were (100.51-100.18) of Giza 177 for plant height, (48.59-49.61) of Sakha 104 for flag leaf area and desirable (96 -96) for days to heading of the cultivar Giza 177. The interaction between the stages of processing and rice cultivars was significant for flag leaf area, where the Sakha 104 rice variety with high homogeny seed produced healthy seedling then desirable growth characters. These results were conformed with the results obtained by **Aidy *et al* (2002) and Draz *et al* (2003)**. They reported that, the high quality seed with the foundation seed produced good growth characters.

Table (2): The effect of processing stages of some rice cultivars with their interactions on Plant height (cm), Flag Leaf area (cm) and Days to heading (day) during 2016 and 2017 seasons.

Treatment	Growth characters					
	Plant height (cm)		Flag Leaf area (cm)		Days to heading (day)	
Processing stages	2016	2017	2016	2017	2016	2017
Stage 6	106.67	106.96	46.89	47.96	98.91	98.25
Stage 4	105.56	105.85	43.72	44.04	99.83	99.25
Stage 2	103.43	103.91	40.09	41.49	101.41	100.75
LSD 0.05	1.72	0.71	2.64	1.56	0.60	1.78
Varieties						
Giza 177	100.51	100.18	46.56	47.97	96	96
Giza 178	102.38	102.81	38.35	39.006	99.66	99.33
Sakha 104	109	109.18	48.59	49.61	106.66	106
Sakha 106	107.34	107.46	38.64	39.49	96.88	96.33
LSD 0.05	1.70	0.83	1.50	0.70	0.64	0.79
Interaction						
Pro. stages x Varieties	NS	NS	**	**	NS	NS

**.*: highly significant at the 1% level of probability. In a season, the values having the same letter (s) aren't significantly different according to Duncan*

Table (3): The effect of processing stage of some rice cultivars with their interactions on Number of panicles/plant, panicle weight (gm) and panicle length (cm) during 2016 and 2017 seasons.

Treatment	Yield characters					
	Number of panicles/plant		panicle weight (gm)		panicle length (cm)	
Processing stages	2016	2017	2016	2017	2016	2017
Stage 6	27.67	27.92	3.84	3.99	23.35	23.60
Stage 4	25.87	25.98	3.74	3.85	21.45	21.79
Stage 2	22.44	22.97	3.12	3.11	19.65	19.91
LSD 0.05	1.95	1.51	0.17	0.18	0.57	0.85
Varieties						
Giza 177	22.03	22.70	3.54	3.69	21.22	21.62
Giza 178	28.14	28.11	4.19	4.23	21.67	21.80
Sakha 104	24.67	25.05	3.82	3.84	21.73	21.58
Sakha 106	26.46	26.62	3.41	3.64	22.33	22.08
LSD 0.05	1.04	0.93	0.14	0.17	0.49	0.61
Interaction						
Pro. stages x Varieties	**	**	NS	NS	NS	NS

**.*: highly significant at the 1% level of probability. In a season, the values having the same letter (s) aren't significantly different according to Duncan*

Data in Table (3) showed that, significant difference between different processing stages were found for number of panicle/plant, panicle weight and panicle length, The highest values were (27.67-27.92) for number of panicle/plant, (3.84-3.99) for panicle weight and (23.35-23.60) for panicle length recorded with high quality seed which used after (six stage) processing comparing to poor quality seed which used after (tow stage) which recorded undesirable values of the studded characters that referred to high quality seed produced seedling with high growth rate then good yield characters these results were agreement with **Sinha *et al* (2003)**.

On the other side, the rice cultivars Giza 178 recorded the mean desirable values for number of panicles / hill and panicle weight, while the sakha 106 recorded the desirable value for panicle length. That referred to the differences in the genetic make up for varieties – on the some line. The interaction between different stages of processing and rice varieties was highly significant for no. of panicles/plant, where the Giza 178 high tillering ability comparing to other studied varieties, these results were agreement with **Krishnan and Suryarao (2005)**.

Table (4): The effect of processing stages of some rice cultivars with their interactions on seed set (%) and grain yield (t/ha.) during 2016 and 2017.

Treatment	Yield characters			
	Seed set (%)		Grain yield t/ha.	
Processing stages	2016	2017	2016	2017
Stage 6	94.95	94.75	12.22	12.44
Stage 4	92.47	93.32	11.24	11.38
Stage 2	90.49	88.82	10.44	10.57
LSD 0.05	0.21	0.41	1.99	1.25
Varieties				
Giza 177	92.46	92.59	10.89	11.11
Giza 178	94.63	93.71	11.78	12.06
Sakha 104	93.37	91.50	11.33	11.59
Sakha 106	90.09	91.40	11.21	11.33
LSD 0.05	0.71	0.39	0.78	0.92
Interaction				
Pro stages x Varieties	**	**	**	**

**.*: highly significant at the 1% level of probability. In a season, the values having the same letter (s) aren't significantly different according to Duncan*

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Data in Table (4) showed that highly significant difference among processing stages for seed set % (94.95-94.75) and (12.22 and 12.44) for grain yield of the seed used after six stage these referred to the homogeny for the seed after six stage. While, the lowest values over these characters were recorded with poor seed quality where the seed used after (two stages) of processing the same results were obtained by **Abo Youssef *et al* (2009)** they found the high productivity produced from high purity seed. On the other side, the rice cultivar Giza 178 recorded the highest values (94.63 - 93.71) for seed set % and (11.78 and 12.06) t/ha. For grain yield. While, the rice cultivar sakha 106 for seed set % and cultivar Giza 177 recorded the lowers value for grain yield, and that meaning high quality seed reflected on seedling characters then increase grain yield and its components similar results were obtained by **Punithavathi *et al* (2003).**

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