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EFFECT OF RICE HUSK RATES AND IRRIGATION INTERVALS ON YIELD AND SOME GRAIN QUALITY OF RICE.

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ABSTRACT

Two field experiments were carried out at Zarzoura Agric. Res. Station, Etai El-Baroud, Behaira Governorate, during 2004 and 2005 seasons. It aimed to study the effect of husk rates (0, 1, 2, 3 and 4 tons/fed.) and irrigation intervals (4, 8 and 12 days during the growth stages) on growth, yield and its attributes as well as some grain quality characters of Giza 178 rice cultivar.

The differences between husk rates for root length, root dry weight,shoot dry weight, number of panicles/m^2, number of spikelets/panicle, panicle weight, number of filled grain /panicle, 1000-grain weight, grain yield /fed., harvest index and broken percentage were significant in both seasons, while, amylase percentages was not significant in both seasons. Husk at the rate of 4 ton/fed. gave the highest values for all studied attributes, while, control treatment (zero husk rate) gave the highest broken percentage in the two seasons. Irrigation at 4 days interval significantly increased average values of all estimated rice yield studied attributes in the two seasons. While irrigation at 12 days interval gave the highest length and dry weight of root and broken percentages in both seasons. The interaction between husk rates and irrigation intervals was significant for most studied attributes in both seasons.

Appling husk rice at the rate of 4 ton /fed. under the longest irrigation intervals (12day) increased grain yield by 65.31% and 38.72% as compared with without added husk rice under the same irrigation treatment in 2004 and 2005 seasons, respectively.

From results of this experiment, it may be concluded that, the adding 4 ton husk/ fed. with irrigation every 4 days interval gave the highest grain yield/ fed. on rice under the condition of this investigation at El- Behaira Governorate.

INTRODUCTION

Rice (*Oryzae sativa*. L.) is one of the most important crop in Egypt and it's production plays an important role in the strategy to overcome food shortage and improve self sufficiency. It is grown in about 1.5 million faddens (Annonymous, 2007) because of the limited water resources organic matter content in the Egyptian soil does not exceed 2%. Such low content is mainly due to high temperature, dry climate and shortage of organic fertilization and green manure. Accordingly, to support soil fertility, incorporating orgain materials in the soil either as raw material or as compost, must be practiced. Because heavy application of agrochemical fertilizers led also to environmental pollution in both soil and water. Among the available crop residues is rice husk which its production increased with increasing rice production. It ranges from 17 to 24 % of the rough rice content. Incorporating in rice husk to the soil allows progressive return of nutrition substances into

soils, as nitrogen, phosphorus, potassium and Zinc which are required for plant growth. According, saving of rice irrigation water is a necessary demand to cover the water requirement of those projects. This could be achieved through either developing new rice varieties (short duration or drought tolerant varieties) which require less water or through improving agricultural practices for rice cultivation. One of these practices is water management by increasing irrigation intervals without any drastic effect on plant growth and grain yield. Dei (1975) found that straw and compost plus chemical fertilizer yielded more paddy than chemical treatment alone. Ladha *et al.* (1987) and EL- Torky and El- Shenawy (1995) indicted that the application of coarse rice husk increased yield and its attributs on rice in the two seasons. El- Torky and Bedaiwy (1998) reported that the application of rice husk generally resulted in higher production of rose cut flowers/m^2, panicle weight, 1000 grain weight and grain yield/fed., which, were attributed to the high availability of nutrients in soil after the biodegradation of rice husk by soil microorganisms. Singh and Ghosh (1999) studied that the effect of organic (rice straw) and chemical source of nitrogen on rice yield. They reported that rice grain yield was higher with rice straw than the other nitrogen sources. Singh (2003) and Tancharaen *et al.* (2003) showed that, the application of rice straw in addition to the chemical fertilizer significantly increased grain yield and its attributes as well as total nutrient than control. Esoka *et al.* (2004) and Ebaid *et al.* (2005) revealed that, increasing rice husk rates up to 4 ton/fed. significantly increased 1000-grain weight, grain and straw yields and milling %, while, 3 ton/fad was adequate for the highest number of panicle/m^2, panicle weight, harvest index, as well as hulling and head rice %. El- Gewaily (2006) and Naiem (2006) they found that, yield and its components as well as grain quality characters of rice were significantly increased with increasing farmyard manure levels (FYM) compared to other treatments in both seasons.

The rice crop response to water stress at vegetative stage has been reported primarily in terms of reduced height, tillers and leaf area (International Rice Research Institute, 1975), while at a more sensitive reproductive stage like flowering, high spikelet sterility resulted in the greatest reduction in grain yield (Matsushima, 1986). However, current knowledge is quite limited in terms of linking water stress induced physiological alterations to growth and yield. De Datta (1981) reported that dry matter production generally reduced as the plants exposed to water stress as irrigating every 10 days. Stone *et al.* (1984) and Nour (1989) found that, dry matter production, number of panicle/m^2 panicle weight, 1000- grain weight, panicle length, number of spikelets / panicle as well as grain and straw yield significantly decreased as irrigation intervals prolonged up to 12 days. Harbir *et al.* (1991), Mandel *et al.* (1991), Nour *et al.* (1994) and El- Wehishy and Abdel-Hafez (1998) reported that yield and its components of rice were decreased as irrigation intervals increased. Ghanem and Ebaid (2001), Islam (2001), El–Refaee *et al.* (2005) and El- Gewaily (2006) illustrated that water stress significantly reduced yield and its attributes of rice in the two seasons but broken and unfilled grains were dramatically increased.

The present investigation aimed to study the effect of husk rates and irrigation intervals on yield, yield components and some grain quality of rice at El- Behaira Governorate condition.

MATERIALS AND METHODS

Two field experiments were carried out at Zarzoura Agric. Res. Station, Etai El-Baroud Behaira Governorate, in 2004 and 2005 seasons. The purpose was to study the effect of rice husk rates (0, 1, 2, 3 and 4 ton /fed.) and irrigation intervals (4, 8, and 12 days) to the end of growing season on yield, yield components and some grain quality of Giza 178 rice cultivar. Three irrigation intervals, namely 4, 8 and 12 days with a flood water depth of 10 cm were used. The application of water intervals started at 10 days after transplanting. The preceding winter crop was wheat in the two seasons. The mechanical and chemical analysis of the soil at experimental site according to standard methods of Page (1982) and Arnold (1986) are presented in Table (1). The experiment was conducted in a strip plot design with three replicates. The irrigation intervals were allocated in the vertical plot, while, rice husk rates were allocated horizontally. The experimental unit area in both seasons was 20 m^2 having 4 m width x 5m long. Rice grains at the rate of 60 kg/fed. were soaked in enough water for 24 hour, then drained and incubated for 48 hours to enhance germination. Per-germination seeds were manually broadcast in to seed-bed on 15th May in both seasons. In wet leveled plots, 30 days old seedlings were manually transplanted at 20 x 20 cm spacing between rows and hills to give 25 hills/m^2. Normal agronomic practices, except the studied treatments, were adopted as the recommendation of Agric. Res. Center, Ministry of Agriculture.

Table (1): Mechanical and chemical analysis of the soil at the experimental site in 2004 and 2005 seasons.

Analysis	2004 season	2005 season
Mechanical analysis:		
Sand	12.1	13.2
Silt	22.1	23.5
Clay	65.8	63.3
Soil texture	Clay	Clay
Chemical analysis:		
PH(1:2.5 soil water suspension)	7.8	7.9
Ec(ds/m) in soil: water extc (1:5)	1.8	1.9
O.M %	1.7	1.6
Total N%	0.30	0.32
Available P ppm	18.7	19.8
Available K ppm	650	672
Available Zn ppm	1.7	1.6
Total soluble salts (mg/L)	11.2	10.7

Studied characters.

Three guarded hills were randomly taken from each sub- plot at heading stage. Metal sampler having dimensions of 20x20x50 cm (El-Serafy *et al.*

1994)was forced into the soil to including the shoot and developing root system up to 50 cm depth then extracted from the ground. Samples were soaked in water for enough time to loose the soil particles from the roots then washed with tap water on 1 mm wire screen trays until all roots become free from soil particles then shoots were carefully separated from the root. The following root characters were determined: root length (cm), root dry weight (g) and shoot dry weight (g).

Table (2): Chemical analysis of rice husk.

Constituent	Rice husk
Crude protein,%	1.9 – 3
Crude fat, %	0.3 – 0.8
Crude fiber, %	34.5 – 45.9
Available carbohydrates, %	26.5 – 29.8
Crude ash, %	13.2 – 21
Silica, %	18.8 – 22.3
Calcium, mg/g	0.6 – 1.3
Phosphorus, mg/g	0.3 – 0.7
Neutral detergent duber, %	66 – 74
Acid detergent fiber, %	58 – 62
Lignin,%	9 – 20
Cellulose, %	28 – 36
Pentosans, %	21 – 22
Hemicelluloses, %	12
Total digestible nutrients, %	9.3 – 9.5

At harvest, number of panicles/m^2 was measured. Ten main panicles were chosen at random from each plot for estimating number of spikelets /panicle, panicle weight (g), number of filled grains/ panicle and 1000 grain weight (g). Ten square meters from the center area of each sub-plot were harvested and threshed for Biological yield and grain yield (ton/fed) was adjusted to 14% moisture content as well as harvest index was estimated using the following equation:

$$\text{Harvest index} = \frac{\text{Grain yield (t/fed)}}{\text{Biological yield (t/fed)}}$$

Grain yield/straw yield and some grain quality characters (broken percentage and amylase content). The amylase content procedure of Juliano (1973) was used to determine the amylase percentage in the milled rice.

Data of the two seasons were subjected to the analysis of variance (anova) according to Gomez and Gomez (1984) and the treatment means were compared by the least significant difference test (L. S. D) at 5% level.

RESULTS AND DISCUSSION

Effect of husk rates and irrigation intervals on yield, yield components and some grain quality of Giza 178 rice cultivar in 2004 and 2005 seasons are presented in Tables (3, 4, 5 and 6).

Table (3):Effect of husk rates and irrigation intervals on root length (cm), root dry weight (g) and shoot dry weight (g) of rice at heading stage in 2004 and 2005 seasons.

Husk treatment ton/fed. (H)	2004 Season Irrigation intervals (day) (I) 4	8	12	Mean	2005 Season Irrigation intervals (day) (I) 4	8 day	12 day	Mean
Root length(cm)								
0	14.00	15.33	17.00	15.44	14.50	15.67	17.00	15.72
1	14.67	15.67	18.00	16.11	15.00	16.50	17.50	16.33
2	15.33	16.00	18.00	16.44	15.50	16.67	17.67	16.61
3	15.33	16.33	18.33	16.66	15.67	17.00	18.17	16.94
4	15.67	16.67	25.67	19.33	15.83	17.33	26.5	19.88
Mean	15.00	16.00	19.40	16.80	15.30	16.63	19.36	17.09
L.S.D at 0.05 for	H 1.99	I 1.06	H x I 3.19		H 1.82	I 1.42	H x I 3.05	
Root dry weight (g)								
0	14.97	14.72	13.54	14.41	11.55	10.45	21.99	14.66
1	16.29	16.03	18.80	17.04	12.27	11.08	21.65	15.00
2	17.14	16.89	22.22	18.75	14.96	11.45	23.99	16.80
3	18.87	18.63	29.13	22.21	17.40	15.14	29.87	20.80
4	18.43	18.88	42.91	26.74	17.72	25.53	40.99	28.08
Mean	17.14	17.03	25.32	19.83	14.78	14.73	27.69	19.06
L.S.D at 0.05 for	H 2.92	I 1.15	H x I N.S		H 2.49	I 1.97	H x I 4.15	
Shoot dry weight (g)								
0	63.35	47.50	20.55	43.80	55.81	47.17	21.94	41.64
1	69.43	53.60	44.88	55.97	61.59	52.94	45.04	53.19
2	69.59	53.84	45.50	56.31	64.05	55.40	54.88	58.11
3	70.67	54.84	49.80	58.43	79.68	56.99	52.22	62.96
4	63.35	46.46	66.67	58.83	88.86	69.46	50.87	69.73
Mean	67.28	51.25	45.48	54.67	69.99	56.39	44.99	57.12
L.S.D at 0.05 for	H 3.56	I 3.802	H x I N.S		H 4.13	I 4.76	H x I N.S	

Results showed that the effect of husk rates on root length, root dry weight, shoot dry weight, number of panicles/m^2, number of spikelets/panicle, panicle weight, number of filled grain/panicle, 1000-grain weight, grain yield/fed., harvest index and broken percentage was significant in the two seasons, while amylose content was not significant in the two seasons. Results also showed that the differences between husk rates (ton/ fed.) of zero, 1 and 1,2 (ton/fed) for root dry weight and 1, 2, 3 and 4 (ton/fed) for shoot dry weight and 0, 1 and 2, 3 (ton/fed) for number of panicles/m^2 and 2, 3 (ton/fed) and 3, 4 (ton/fed) for the number of spikelets/panicle and 0, 1 and 1, 2 and 2, 3 and 3, 4(ton/fed) for number of filled grain/ panicle and 0, 1 and 3, 4 (ton/fed) for 1000- grain weight and 0, 1 for grain yield/fed. and 0, 1 for harvest index the differences between them not reach the significant level in the first season, while, the differences between husk rates ton/ fed. of zero,1 and 2 for root dry weight and and 2, 3 and 3,4 for number of spikelets/panicle and 1, 2 and 3, 4 for number of filled grain/ panicle and 3, 4 for 1000- grain weight and 0, 1 and 1, 2 and 2, 3 and 3, 4 for grain yield/fad and 0, 1 for broken percentage were not significant in the second season. Also, the differences between husk rates ton/fad of 0, 1, 2 and 3 (ton/fed) for root

length and 0, 1 and 2, 3 and 4 (ton/fed) for panicle weight were insignificant in the first and second seasons, respectively.

Table (4):Effect of husk rates and irrigation intervals on number of panicles/m^2, Number of spikelets/ panicle and panicle weight (g) of rice in 2004 and 2005 seasons.

Husk treatment ton/fed. (H)	2004 Season Irrigation intervals (day) (I)			Mean	2005 Season Irrigation intervals (day) (I)			Mean
	4	8	12		4	8	12	
Number of panicles/m2								
0	499.20	418.30	407.50	441.66	500.00	400.00	391.70	430.56
1	500.00	457.50	405.00	454.16	500.00	450.00	400.00	450.00
2	532.50	476.70	479.20	496.13	533.30	466.70	408.30	469.43
3	571.20	501.70	468.30	513.73	525.00	533.30	416.70	491.66
4	649.20	510.00	494.20	551.13	566.70	541.70	475.00	527.80
Mean	550.42	472.84	450.84	491.36	525.00	478.34	418.34	473.89
L.S.D at 0.05 for	H 21.35	I 20.17	H x I 36.84		H 25.67	I 24.83	H x I 44.48	
Number of spikelets/ panicle								
0	141.31	120.21	84.14	115.22	138.30	119.22	80.82	112.78
1	151.14	130.05	123.48	134.89	147.93	128.79	119.61	132.11
2	155.80	134.70	142.10	144.20	154.04	134.87	144.95	144.62
3	157.94	136.84	150.66	148.48	156.13	136.96	152.26	148.45
4	160.96	139.84	162.67	154.53	160.07	140.50	165.79	155.45
Mean	153.43	132.33	132.61	139.46	151.29	132.07	132.68	138.68
L.S.D at 0.05 for	H 6.12	I 5.81	H x I N.S		H 5.35	I 6.07	H x I N.S	
Panicle weight (g).								
0	2.87	2.49	1.54	2.30	2.60	2.39	2.01	2.33
1	3.03	2.66	2.20	2.63	2.72	2.5	2.02	2.41
2	3.14	2.77	2.64	2.85	2.86	2.64	2.58	2.69
3	3.15	2.76	2.64	2.85	2.85	2.64	2.59	2.69
4	3.17	2.81	2.84	2.94	3.64	2.37	2.22	2.86
Mean	3.07	2.69	2.37	2.71	2.93	2.58	2.28	2.59
L.S.D at 0.05 for	H 0.37	I 0.25	H x I N.S		H 0.26	I 0.19	H x I N.S	

Results indicated hat the grain yield (ton/fed.), increased with increasing husk rates from zero up to 4 (ton/fed.), but broken rice percentage decreased with increasing husk rates in the two seasons. In general, husk at the rate of 4 (ton/fad) gave the highest values of the studied traits while, the lowest values of the studied traits were obtained from control treatment (without rice husk application) in the two seasons. It can be stated that the beneficial effect of rice husk may be attributed to its role of better conservation of soil moisture, which might have helped in improving the grain yield. The results showed that organic amendments increased grain yield this may be attributed to its vital role not only in improving the soil physical condition, but also in providing the plant nutrients. The incorporation of organic amendments possibly helps in reducing the leaching loss of nutrients and economic use of water (Pakiara and Venkataraman, 1991). These results are completely in agreement with that found by

Table (5): Effect of husk rates and irrigation intervals on number of filled grains/ panicle, 1000- grain weight (g) and grain yield /fed.(ton) of rice in 2004 and 2005 seasons.

Husk treatment ton/fed. (H)	2004 Season Irrigation intervals (I) (day) 4	8	12	Mean	2005 Season Irrigation intervals (I) (day) 4	8	12	Mean
Number of filled grains/ panicle.								
0	110.00	100.10	107.90	105.96	106.80	99.13	106.43	104.12
1	142.00	122.50	100.00	121.50	133.33	111.13	107.58	117.34
2	157.70	121.80	115.90	131.80	144.00	117.13	115.43	125.52
3	159.90	128.70	119.90	136.16	156.80	132.87	130.90	140.19
4	195.70	140.40	125.60	153.90	163.87	139.43	131.90	145.06
Mean	153.06	122.70	113.80	129.86	140.96	119.94	118.44	126.44
L.S.D at 0.05 for	H 18.28	I 17.84	H x I N.S		H 10.8	I 16.31	H x I 20.93	
1000- grain weight (g)								
0	24.93	21.20	17.38	21.17	23.83	20.79	13.03	19.23
1	25.29	21.56	18.82	21.89	25.68	22.59	20.24	22.82
2	25.90	22.18	21.28	23.12	25.88	22.84	21.22	23.33
3	26.58	22.86	24.00	24.48	26.46	23.42	23.59	24.49
4	26.97	23.24	25.54	25.25	26.52	23.48	23.83	24.61
Mean	25.93	22.20	21.40	23.18	25.67	22.62	20.38	22.89
L.S.D at 0.05 for	H 1.04	I 1.45	H x I N.S		H 1.08	I 1.07	H x I N.S	
Grain yield /fed.(ton)								
0	2.33	1.90	1.47	1.90	2.03	1.87	1.73	1.88
1	2.53	2.13	1.63	2.09	2.43	2.00	1.93	2.12
2	2.87	2.30	2.07	2.41	2.90	2.23	2.07	2.40
3	3.23	2.57	2.33	2.71	3.10	2.53	2.33	2.65
4	3.93	2.67	2.43	3.01	3.73	2.63	2.40	2.92
Mean	2.98	2.31	1.98	2.42	2.84	2.25	2.09	2.39
L.S.D at 0.05 for	H 0.29	I 0.53	H x I 0.69		H 0.36	I 0.45	H x I 0.65	

El-Torky and Bedaiwy (1998), Ebaid *et al.* (2005), El-Gewally (2006) and Naiem (2006).

As shown in Tables (3, 4, 5 and 6) results showed that, the effects of irrigation intervals on all attributes studied were significant in both seasons, except amylose percentage in the two seasons. The first irrigation treatment (irrigation every 4 days during the growth period) significantly increased grain yield/fed., compared with other irrigation treatments (8 and 12 days) in the two seasons. Root length, root dry weight and broken percentage increased with increasing irrigation intervals which reached its maximum with irrigation every 12 days in the two seasons. From obtained results it can concluded that, the differences between irrigation intervals of 4 and 8 days for root length and root dry weight and between 8 and 12 days for number of spikelets/panicle, number of filled grain panicle and grain yield/fed. were not significant in the two seasons, respectively.

Results also showed that irrigation every 4 days gave the highest values of shoot dry weight (67.28 and 69.99, g) and number of panicles/m^2 (550.42 and 525.00), number of spikelets/panicle (153.43 and 151.92), panicle weight (3.07 and 2.93, g), number of filled grain/ panicle (153.06 and

140.96), 1000-grain weight (25.93 and 25.67, g), harvest index (36.03 and 44.04) in the first and second seasons, respectively. The lowest values for the previous characters were obtained by the third irrigation treatments (irrigation every 12 days during he growth period) in the both seasons. From these results, it could be concluded that high soil moisture deficit by irrigation every 12 days during different stages, would also reduce the capacity of plant in building up metablites and this may account in turn to depression of photosynthesis efficiency of the leaves with consequent reduction in yield of rice and its components. These results are in accordance with those obtained by Nour *et al.* (1994), Ghanem and Ebaid (2001), Islam (2001), El-Refaee *et al.* (2005) and El- Gewaily (2006).

Table (6):Effect of husk rates and irrigation intervals on harvest index, broken percentage and amylase percentage of rice in 2004 and 2005 seasons.

Harvest index								
Husk treatment ton/fed. (H)	2004 Season Irrigation intervals (I)			Mean	2005 Season Irrigation intervals (I)			Mean
	4 day	8 day	12day		4 day	8 day	12day	
0	31.36	27.61	22.38	27.11	36.53	33.77	24.93	31.74
1	31.23	28.55	22.08	27.65	42.33	35.00	29.17	35.50
2	30.98	29.86	27.71	29.51	40.53	37.60	30.57	36.23
3	39.89	30.01	30.67	33.51	45.32	39.00	31.73	38.68
4	46.75	33.85	31.04	37.21	55.53	45.93	33.17	44.87
Mean	36.03	29.97	26.97	30.99	44.04	38.26	29.91	37.40
L.S.D at 0.05 for	H 1.20	I 1.74	H x I 2.29		H 1.73	I 2.1	H x I 4.52	
Broken percentage								
0	7.42	13.53	15.14	12.03	7.37	10.57	14.36	10.76
1	6.92	10.61	14.71	10.74	7.27	11.30	14.01	10.86
2	5.62	11.15	13.03	9.93	6.01	10.20	13.85	10.02
3	5.16	10.34	12.37	9.29	5.82	9.93	12.06	9.45
4	4.90	7.44	10.57	7.63	4.60	8.03	13.60	8.74
Mean	6.00	10.61	13.16	9.92	6.21	10.00	13.68	9.96
L.S.D at 0.05 for	H 0.18	I 0.15	H x I 0.32		H 0.30	I 0.38	H x I 0.56	
Amylase percentage								
0	18.23	19.77	19.17	19.05	19.52	18.50	18.54	18.85
1	18.30	19.40	19.13	18.94	19.41	18.37	18.53	18.77
2	18.50	19.03	19.73	18.75	19.08	18.41	18.57	18.47
3	18.53	18.74	18.17	18.48	18.38	17.88	18.49	18.25
4	19.33	17.87	18.07	18.42	18.42	17.87	18.45	18.24
Mean	18.57	18.96	18.85	18.70	18.79	18.21	18.52	18.52
L.S.D at 0.05 for	H N.S	I N.S	H x I 0.15		H N:S	I N.S	H x I 0.07	

The interactions between husk rates and irrigation intervals significant by root length, number of panicle/m^2, grain yield/fed., harvest index, broken and amylose percentage in the two seasons. Root dry weight and number of filled

grains/panicle were significant in the second season only. On the other hand, interaction between husk rates and irrigation intervals was not significant for shoot dry weight, number of spikelets/panicle, panicle weight and 1000- grain weight, in the two seasons, Results in Tables (3, 4, 5 and 6) reveal that increasing husk rates from 1, 2, 3, and 4 (tons/ fed.), irrigation activity on all studied attributes significantly increased. On the other hand, under the same seed husk rates the differences irrigation intervals were significant in the two seasons However, the highest values for number of panicle/m^2 (649.20 and 566.70), grain yield/fed. (3.93 and 3.73, ton), and harvest index (46.75 and 55.53) were produced by adding seed husk at the rate of 4 ton/fed. with the irrigation every 4 days interval in both seasons, compared with the other interaction. On the other hand, control treatment (without application of seed husk) with irrigation every 12 days gave the highest broken rice (15.14 and 14.36 %), under the same irrigation treatment and adding seed husk at a rate of 2 ton/fed. gave the highest amylose content (19.73 and 18.57 %) also under the same of irrigation interval with 4 tons/fed. husk gave the highest root length (25.67 and 26.50, cm), in the first and second seasons, respectively.

Conclusion

From results of this experiment. it may be concluded that, the addition of rice seed husk 3 ton/ fed. with the irrigation every 4 days interval gave the highest rice grain yield/ fed. under the condition of this investigation .

REFERENCES

Annonymous (2007). The final report of nationl cagaupian for rice production in Egypt.

Arnold, K. (1986). Methods of soil analysis, physical methods. Second America, Inc. Madison Wisconsin.

De Datta, S.K. (1981). Water management practices for rice. In principles and practices of rice production. Whilus Inter Cinene press. New- York, 297-347.

Dei, Y.(1975). Effects of cereal crop residue on paddy soils. ASPAC ext. Bull. 49:1-29.

Ebaid, R.A.; El- Hissewy, A.A. and El- Dalil, M. (2005). Preliminary study on utilization of rice husk in rice cultivation. Egypt. J. Agric. Res., 83(5): 369-376.

El- Gewaily, E.E.A. (2006). Behaviour of some nutrient elements in rice soils under different irrigation intervals. Ph.D. Thesis. Soils Dept. Fac. Agric., Mansoura Univ., Egypt.

El- Refaee, I.S.; Mosalem , M.E. and Sorour, F.A. (2005). Effect of irrigation regimes on productivity of Giza 178 and Sakha 102 Rice cultivars under broadcasting method.Egypt.J.Agric.Res.,83(5)377 -391.

El-Serafy, A.M.; El- Hissewy, A.A; Ghanem, S.A.; and Noure, M.A. (1994). Root characters and productivity of rice as influenced by seeding rutes and nitrogen in direct sowind rice Egy. 3 sppl. Sci. 9:10-18

El-Torky, M.G. and Bedaiwy, M.N. (1998). Effect of rice husks and nitrogen fertilizer on the production of open field roses and the improvement of soil charateristics. Alex. J. Agric. Res. 43(2): 143-162.

El-Torky, M.G. and El- Shenawy, O. (1995). Possible uses of rice husk as a growing medium for ormental plants and floniculture crops. J. Agric. Sci., Mansoura Univ. 20(1):355-368.

El- Wehishy, M.M. and Abdel- Hafez(1998). Response of flooded Rice to water deficit. J. Agric. Res. Tanta Univ. 24 (3) 273-283.

Esoka, A.A.; Oku, E.E. and Esoka, P.A. (2004). Improving soil productivity by Agro industrial waste recycling. J. Agric. forestry and the Social. Sci. 2 (1): 74-79.

Ghanem, S.A and Ebaid, R.A. (2001). Effect of farmyard manure and water regimes on productivity of rice and succeeding clover crop. Egypt, J. Appl. Sci.; 16(6): 115-128.

Gomez, K.A. and Gomez, A.A. (1984). Statistical Procedures for Agricultural Research. Johan Wiley and Sons, Inc., New York, U.S.A.

Harbir, S.; Singh, K. T.; Singh, K.P.; Tonk, D. S. and Faroda, A.S. (1991). Components analysis of yield to irrigation conditions in rice. Narendra Deva J. of Agric. Res. 6 (1): 119-123.

International Rice Research Institute (1975). Major Research in upland rice. Los Banos Philippines. 255 p.

Islam, M.T. (2001). Screening of some transplanted aman rice cultivars under water stress condition. Bangladesh. J. of Training and Development 4 (1-2): 213-220.

Juliano, B.O. (1973). Quality of milled rice Riso 22; 171-184.

Ladha, J.K.; Tirol, A.P.; Daroy, M.G.; Punzalan, G. and Watanabe, I.(1987). The effects N_2 fixation, bacterial population and rice plant growth of two modes of straw application to a wetland rice field biology and fert. Soils. (2): 106-111.

Mandel, N.N.; Pusta, A.M.; Choudhury, P.P. and Sinha, D. (1991). Effect of water regimes, levels and methods of nitrogen application on yield rice. Indian Agriculturist. 35(1): 33-38.

Matsushima, S. (1986). Water and physiology of Indica rice. P. 102-109. In Proc. Crop Sci. Soc. Jpn. Rice cultivation in Southeast Asia. Tokyo, Japan.

Naiem,E. S. B. (2006). Availability of some nutrient element in flooded rice soils fertilized with organic and mineral nitrogen fertilizer. Ph.D. Thesis, Fac. Agric. Mansoura Univ. Egypt.

Nour, M.A.M. (1989). Studies on fertilization and irrigation on rice. Ph. D. Thesis, Fac. of Agric., Kafr El-Sheikh, Tanta Univ. Egypt.

Nour, M.A.M; Abd El Wahab, A.E. and Mahrours, F.N. (1994). Effect of water stress at different growth stages on rice yield and contributing variable J. Agric. Sci. Mansoura Univ., 19 (2): 403-412.

Page, A.L. (1982). Chemical and microbiological properties America; Inc Madison Wisconsim.

Pakiara, J.S.P. and Venkataraman, N.S.(1991). Influence of irrigation regimes, organic a mendment and sources of phosphorus on lowland rice (*Oryza sativa* L.,). Indian J. Agron. 36:14-17.

Singh. D.D. (2003). Management of crop residue in summer rice and its effect on the soil properties and crop yield. Crop Res. Hisar 25(1):191- 193.

Singh. S.K. and Ghosh, B.C. (1999). Effect of organic and chemical source of nitrogen on yield and nitrogen uptake of jute and rice grown in rain fed low- land. Oryza 36 (3): 278-280.

Stone. L.F.; Libardi, P . L. and Reichardt, K. (1984). Water stress, vermiculite and cultivars. 1- Effect on rice yield . Resquisa Agropecuaria, Gbeasileria. 19(6): 695-707.

Tancharaen, S.; Chanchareonsook, J.; Suwannarate,C. and Panichjakul, C. (2003). Combined effect of rice straw and chemical fertilizer on yield and nutrient uptake of Khaopagg Haum suphanburi rice grown in paddy calcareous. Lop Buri soil series plant and Agriculture Extension and communication. 251-257.

تأثير معدلات السرسه وفترات الري على المحصول وبعض صفات جودة الحبـــوب في الأرز

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أجريت تجربتان حقليتان بمزرعة محطة البحوث الزراعية بزرزورة – اتياي البـارود– محافظة البحيرة خلال موسمي الزراعـة ٢٠٠٤، ٢٠٠٥م لدراسـة تـأثير معـدلات السرسـه (١،٢،٣و ٤ طن/فدان) وفترات الري (٤،٨و١٢ يوم) على المحصول ومكوناته وبعـض صـفات جودة حبوب الأرز صنف جيزة ١٧٨.

ويمكن تلخيص أهم النتائج فيما يلي:-

١- أظهرت النتائج وجود اختلافات معنوية بين معدلات السرسه في صفات طول ووزن الجـذر ووزن الساق، عدد السنابل /م٢، عدد حبوب السنبلة، وزن السنبلة، عدد الحبوب الممتلئة فـي السنبلة ، وزن الـ ١٠٠٠ حبة ، محصول الحبوب للفدان ودليل الحصاد والنسـبة المئويـة للحبوب المكسورة . حيث أدى إضافة السرسة بمعدل ٤ طن / فدان إلى زيادة معنويـة فـي جميع الصفات المقاسة مقارنة بالكنترول، بينما أدت معاملة الكنترول إلى زيادة نسبة الحبوب المكسورة في الموسمين مقارنة بمعدلات الإضافة الأخرى.

٢- أظهرت النتائج تأثيرا معنويا لفترات الري على جميع الصفات المدروسـة مـا عـدا نسـبة الأميلوز في الموسمين. حيث أدى تطبيق فترة الري كل ٤ أيام إلى زيادة جميـع الصـفات مقارنة بفترات الري الأخرى المستخدمة بينما أدى تطبيق فترة الري كل ١٢ يوما إلى زيادة معنوية في طول ووزن الجذر ونسبة الكسر في حبوب الأرز في الموسمين .

٣- كان للتفاعل تأثيرا معنويا على بعض الصفات المدروسة في كلا الموسمين.

وعموما:

أوضحت الدراسة أن استخدام السرسة بمعدل ٤ طن / فدان مع الري كل ٤ أيام أدي إلى زيادة محصول الأرز تحت ظروف التجربة.