RESPONSE OF SOME RICE CULTIVARS TO DIFFERENT IRRIGATION REGIMES IN NORTH NILE DELTA,EGYPT

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ABSTRACT

A field experiment conducted at El-Serw Agricultural Research Station in Demiatte Governorate, Egypt, during 2013 and 2014 seasons to determine the effect of irrigation intervals(irrigation every 6 days and 12 days)and irrigation depth(3, 5and 7 cm) on grain yield of three cultivars Sakha101, Giza177andGiza178), as well as its water productivity. The treatments were arranged in split-split plot design with four replicates, where main plots were assigned to irrigation interval, sub plots were assigned to irrigation depth and sub-sub plots were assigned to cultivars. The results indicated that there were variations among cultivars for the studied attribute under irrigation intervals, where irrigation every 12 days reduced all characters, compared to 6 day interval. Sakha101 attained the highest panicle grain weight, number of tillers, 1000-grain weight and straw yield under irrigation intervals every 6 days with 7cm of water depth in both growing seasons. Furthermore, Giza178 attained the highest 1000-grain weight, grain yield in the first growing season every 6 days irrigation interval with 7cm of water depth. The highest water productivity was obtained from Giza178 when irrigated every 6 and 12 days, with water depth 3 cm, being 0.55 and 0.57 kg/m^3, respectively. Furthermore, it showed the highest water productivity under 12 days irrigation interval and water depth 3 cm, 5 cm and 7 cm, where, water productivity were 0.57, 0.54 and 0.55 respectively. Sakha101 used the highest amounts of water, compared to Giza177 and Giza178. In general, the highest water productivity underevery 12 days irrigation interval and 3 cm water depth where indicated for Giza178, where, grain yield reduction was 10.7%, grain yield was 2.5 ton/fed and the amount of saved water was 14%.Thus, it could be concluded that the highest water productivity was shown by Giza178 under all water regimes. Thus it is tolerance water stress and recommended for cultivation in stressed conditions especially at the end of the canals.

Key words:Irrigation interval, irrigation depth, rice cultivars, water productivity.

INTRODUCTION

Allocated water for irrigation in Egypt is relatively limited and insufficient for both reclamation and irrigation purposes. Rice (Oryza sativa L.) occupies an important position in the economy of Egypt. It is not only meets the total domestic requirements, but it also contributes a lot toward foreign exchange earnings. Rice cultivation in Egypt helps in leaching the salt from upper soil layers and, thus reclaims the lands for other agricultural activities. Because of limited water resources, the government of Egypt has tried to limit rice cultivation but cultivation has continued to expand due to rice production's high profits (**Arafat *et al*., 2010**). Therefore, saving some of irrigation water applied to rice is necessary to face the current shortage of water. To solve the problem of water shortage, alternative methods of rice irrigation are important, as well as better adapted cultivar for water shortage.

Rice, in Egypt, is grown under flooding condition and it is considered a high water-consuming crop. Commonly, rice is grown under continuous flooding with 5-10 cm depth of standing water throughout the growing season Almost all Egyptian rice cultivars show better growth and higher productivity under continuous flooding conditions than the ones exposed to water deficit at certain growth stages (**Badawi *et al.,* 2006**). Several researches showed that rice can grow normally with high yield under shallow water depth than under deep submergence. Shallow water causes rising to the water temperature during the day but a decrease during the night that allow more tillering and better growth (**Badawi *et al.,* 2006**). Rice genotypes showed significant variations in physiological response to water deficit, which is known to retard physiological development and reduce growth of rice (**Lilley and Fukai, 1994 and Nour *et al.,* 1994**). Rice genotypes showed significant variation in response to water regime. (**Prasad *et al,* 1990)** found that the grain yield of rice was significantly affected by irrigation regimes.

Several studies reported the effect of irrigation interval. **Awad, (2001)** indicated that the grain yield tended to decrease insignificantly at 8-day irrigation intervals. **Nour *et al.,* (1994)** found that increasing irrigation interval for broadcasted seed rice longer than 6 days significantly decreased plant height, biomass production and rice grain yield and its components, as well as grain quality. **Moursi (2001)** and **El-Hadidi *et al*., (2002)** found that the lowest rice yield values was recorded with 2.5 cm water depth and 7.5 cm submergence depth for rice achieved the highest values of rice grain yield and straw yield in North Delta of Egypt. Whereas, **El-Bably *et al.,* (2007)** showed that increasing the submergence depth from 4 to 7 or 10 cm significantly increased rice grain yield. **Mehla *et al*., (2006)** indicated that the highest grain yield was obtained under continuous submergence followed by irrigation one day after disappearance of standing water and irrigation every three days after disappearance of standing water. **Sarkar (2006)** reported that imposing of intermittent bonding in the early crop stage only can improve water use efficiency without significant decrease in yield. **Abou Khalifa (2010); Kumar *et al.,* (2014); Ashouri (2012); Abou Khalifa and Awad-allah (2016)** reported that irrigation every 12 days cased a significant reduction in all tested traits under study.

The objective of this study was to determine the effect of irrigation regimes on grain yield and yield components,as well as water productivity on three rice cultivars in North Nile Delta.

Materials and Methods

A field experiment carried out at El-Serw Agricultural Research Station in Demiatte Governorate (31°07 N, 30°57 E), during 2013 and 2014 growing summer seasons to study the effect of irrigation interval sand depth on growth and yield of three rice cultivars.The climate characterized by a cool winter with low rain fall reaching 38 (mm/year) and hot summer, with no rain. Data in Table 1 presents some meteorological elements during the studied growing seasons. The meteorological elements include solar radiation (MJ/m^2/day), maximum and minimum temperature (°C), wind speed (ms^{-1}) and reference evapotranspiration (mm/day).

Table (1): Weather data and reference evapotranspiration in 2013 and 2014 summer growing seasons.

Months		1th season				2nd season				
	SR	**Max. T**	**Min. T**	**WS**	**ETo**	**SR**	**TX**	**TN**	**WS**	**ETo**
May	25.4	31.1	19.3	3.3	6.4	24.8	30.0	19.0	3.4	6.2
Jun	28.1	33.0	21.7	3.5	7.3	27.9	32.8	21.6	3.4	7.2
Jul	27.7	33.1	22.8	3.7	7.2	27.7	33.9	23.3	3.4	7.3
Aug	25.8	33.6	23.8	3.1	6.9	25.4	34.6	24.4	3.3	7.0
Sep	21.9	32.0	22.8	3.3	5.9	21.5	32.5	23.4	3.0	5.8

SR =solar radiation (MJ/m^2/day), Max. T and Min.T=maximum and minimum temperature, respectively (°C), WS=wind speed (m/s), ETo= reference evapotranspiration (mm/day).

Soil analysis of the experimental site was done before rice cultivation in both growing summer season and it is included in Table 2.The soil of the experiment is clayey in texture. Soil textures were determined by the standard methods described by Tan (1996) and average over zero-60 cm soil depth.

Table (2): Some physical and chemical properties of the experimental site during both summer growing seasons.

Seasons	Sand(%)	Silt (%)	Clay (%)	$CaCO_3$(%)	EC (dS/m)	pH	Total N (%)	OM (%)
2013	11.79	22.26	65.95	1.34	7.71	8.00	0.84	0.86
2014	12.23	21.67	66.10	1.41	5.70	8.01	0.95	0.75

Furthermore, the EC of the irrigation water was 1.8 dS/m. Soil moisture constants in the experimental site are presented in Table 3.

Table (3): Soil field capacity, wilting point, available water and bulk density at different soil depth of the experimental site.

Soil depth (cm)	Field capacity (% mass)	Wilting point (% mass)	Available water (% mass)	Bulk density (g/cm^3)
0-15	48.43	26.31	22.12	1.11
15-30	45.58	24.77	20.21	1.20
30-45	46.99	25.53	21.46	1.23
45-60	42.86	23.29	19.57	1.11
Average	45.96	24.97	20.84	1.16

The experimental design was split-split plot design with four replicates, where main plots were assigned to irrigation interval, sub plots were assigned to irrigation depth and sub-sub plots were assigned to cultivars. The treatments under study were:

1- Irrigation intervals (every 6 and 12 days),

2- Irrigation depth (3, 5 and 7 cm),
3- Three cultivars (Sakha101, Giza177 and Giza178).
Rice was sown on 8^{th} and 9^{th} of May in the first and second growing seasons, respectively. The site of the experiment was ploughed twice by using chisel plough. A disk harrow was also used to find a suitable size of aggregates then the soil was leveled. The field of the experiment area was divided into 72 plots, each plot was 52.5 m^2 (7.5 X 7) = 1/80 feddan and isolated from the other to prevent horizontal water movement.To avoid the lateral movement of water and for more water control, 2 m wide ditches separated each main plot. Field preparation and nursery practices were performed according to the traditional local rice management. The amount of fertilizers was applied for each cultivar according to recommendations of Agriculture Research Center (ARC). Nitrogen fertilizer as urea form (46.5%N), where the recommendation nitrogen requirements for three cultivars are 60 nitrogen unit/fed divided into doses (2/3 dose was applied during land preparation and the second dose was applied 25 days after transplanting). The phosphates fertilizer was added in the two seasons during tillage implementation as the recommended dose of 100kg single superphosphate (15.5 P_2O_5/fed.). The potassium fertilizer was applied in the two seasons as recommended dose 50 kg K_2O was divided into two doses (1/2 was applied during land preparation and the second dose 1/2 was applied after transplanting by 45 days.All agricultural practices for rice crop were used according to the technical recommendation of ARC. Grain yield was adjusted to 14% moisture content and harvest index was determined according to **Yoshida (1981).**

Irrigation water was controlled and measured by rectangular weir and water was distributed by spills inserted beneath the bank of each irrigated furrows set. Applied irrigation water was determined according to **Michael, (1978)** as follows:

$Q = 1.84\ LH^{1.5}$

Where:

Q= water discharge, $m^3 sec^{-1}$; L= width of weir, cm; H= the head above weir crest, cm.

Productivity of irrigation water (PIW, kg m^{-3}) was calculated according to Ali *et al.*, (2007).

PIW = Y/I

Where:

Y= yield, kg fed^{-1}, and I= applied irrigation water (m^3 fed^{-1}).

Studied plant attributes

1. Plant height (cm).
2. Panicle length (cm).
3. Panicle grain weight (g).
4. Number of tillers.
5. 1000-Grain weight (g).
6. Grain yield (t fed^{-1}.)
7. Straw yield (t fed^{-1}.)

Data were statistically analyzed according to the technique of analysis of variance (ANOVA) as published by **Gomez and Gomez (1984).** Means of the treatments were compared using Least Significant Difference (LSD) at 5% level of significance as developed by **Waller and Duncan (1969).**

Results and Discussion

1- Effect of treatments on plant height and panicle length

Data in Table 4 showed significant differences for plant height and panicle length in both growing seasons andcultivars under all irrigation treatments. For irrigation interval, every 6 days, Giza178 gave the tallest plant height under 7cm of water depth in both growing seasons.Regarding to irrigation interval every 12 days, Giza178 exhibited the highest plant height under 7cm of water depth in both growing seasons. Cultivar Sakha101 have the longest panicle length with 6 days interval under7cm of water depth in both growing seasons. The same trend was shown for Giza178 under irrigation interval every 12 days. In general, plant height and panicle length decreased with increasing irrigation intervals from 6 to 12 days. These results were the same trend with those obtained by **Abou Khalifa (2010), Abou Khalifa and Awad-allah (2016), Ashouri (2012), Kumar *et al*., (2014).**

Table (4): Effect of irrigation intervals and depth and on plant height and panicle length for three cultivars in two growing seasons.

Irrigation interval	Irrigation depths	Cultivars	Plant height (cm)		Panicle length (cm)	
			1th season	2nd season	1th season	2nd season
6days		Sakha101	78.5	80.6	18.7	16.8
	3 cm	Giza177	85.7	79	16.1	16.5
		Giza178	87.9	90.6	19.3	18.9
	Mean (3 cm)		83.1	84.5	18.3	17.7
		Sakha101	80.3	84.3	18.5	20.6
	5 cm	Giza177	82	82.9	17.4	16.8
		Giza178	90.8	90.8	19.5	19.1
	Mean (5 cm)		85.8	87.1	18.7	18.7
		Sakha101	81.6	86.7	20.5	21.4
	7 cm	Giza177	85.7	83.7	18.1	18.2
		Giza178	92.6	92	20.1	21.2
	Mean (7 cm)		88	88.5	19.6	20.1
	Mean (6 day)		85.6	86.7	18.8	18.9
12 days		Sakha101	78.2	75.7	14.2	13.4
	3 cm	Giza177	75.2	74	14.4	13.2
		Giza178	85	80.1	17.2	17.4
	Mean (3 cm)		78.5	77.3	15.3	15.1
		Sakha101	79.1	78.3	14.5	14.6
	5 cm	Giza177	76.9	77.3	14.3	14.2
		Giza178	86.8	86.1	17.9	18.1
	Mean (5 cm)		81.8	81.3	16.1	16.2
		Sakha101	83.5	84	16.3	15.3
	7 cm	Giza177	78.7	81.3	15.7	14.5
		Giza178	90.1	87.3	18.5	18.6
	Mean (7 cm)		85.2	84.8	17.2	16.7
	Mean (12 day)		81.8	81.1	16.2	16
F test	P		**	**	**	**
	D		**	**	**	**
	V		**	**	**	**
	P*D		*	**	**	**
	P*V		**	**	*	**
	D*V		**	**	NS	**
	P*D*V		**	**	NS	**

Irrigation intervals = (P); Water of depths = (D); Cultivars = (V)

2- Effect of treatments on panicle grain weight and number of tillers

Data in Table 5 indicated significant differences for panicle grain weight and number of tillers in both growing seasons for cultivars and irrigation treatments. As for irrigation interval and water depth treatments, it is interesting to find that Sakha101 hadthe highestvalue ofpaniclegrain weight in both growing seasons.

As for number of tillers under irrigation intervals every 6 days with 7cm of water depth, Giza178 exceeded all tested cultivars, as well as 12 day irrigation interval with 7cm of water depth.

Table (5): Effect of treatments on panicle grain weight and number of tillers for three cultivars in two growing seasons.

Irrigation intervals	Irrigation depths	Cultivars	Panicle grain weight (g)		Number of tillers/m^2	
			1th season	2nd season	1th season	2nd season
6days		Sakha101	2.6	2.7	387	394
	3 cm	Giza177	2.3	2.3	375	374
		Giza178	2.0	2.1	443	441
	Mean (3 cm)		2.2	2.3	407	408
		Sakha101	3.2	2.8	402	407
	5 cm	Giza177	2.3	2.4	392	395
		Giza178	2.5	2.4	445	457
	Mean (5 cm)		2.6	2.5	417	423
		Sakha101	3.3	2.9	418	420
	7 cm	Giza177	2.8	2.6	413	407
		Giza178	2.6	2.5	455	466
	Mean (7 cm)		2.8	2.6	432	433
	Mean (6 day)		2.5	2.4	419	422
12 days		Sakha101	2.4	1.8	282	294
	3 cm	Giza177	1.8	1.7	225	219
		Giza178	1.7	2.0	343	334
	Mean (3 cm)		1.9	1.8	297	293
		Sakha101	2.0	2.0	282	286
	5 cm	Giza177	1.8	1.8	251	261
		Giza178	1.8	2.1	351	342
	Mean (5 cm)		1.9	2.0	302	307
		Sakha101	2.4	2.4	299	300
	7 cm	Giza177	2.0	1.9	265	284
		Giza178	2.1	2.2	358	352
	Mean (7 cm)		2.2	2.2	319	320
	Mean (12 day)		2.0	2.0	306	307
F test	P		**	**	**	**
	D		**	**	**	**
	V		**	**	**	**
	P*D		**	*	NS	NS
	P*V		**	**	**	**
	D*V		*	**	*	**
	P*D*V		**	**	NS	**

Irrigation intervals = (P); Water of depths = (D); Cultivars = (V)

3- Effect of treatments on 1000-grain weight, straw yield and grain yield

Results in Table 6showed that there were significant differences for the studied attributes in both growing seasons, under irrigation intervals, depths and cultivars. Sakha101 and Giza177gave the highest 1000-grain weight, in the two irrigation intervals with7cm of water depth treatment in both growing seasons, respectively. As for straw yield Giza 178 showed the highest in the two irrigation intervals with7cm of water depth treatment in both growing seasons. Giza178 gave the highest grain yield in the first growing season every 6 days irrigation interval with 7cm of water depth, whereas Sakha101 gave the highest value in the second season. It is interesting to indicate that Giza178 showed superiority for grain yield every12 days interval with 7cm of water depth, this due my be to tolerance to salinity beside the high yield and yield components (**Abuo El-Darag, 2000 and El-Refaee, *et al*., 2006**).

Data in Table 6 revealed that irrigation every 6 days produced the greatest grain yield and straw yield, as well as higher value for the studied attributed. On the other hand irrigation every 12 days caused a significant reduction in all the studied characters. The decreased in the grain yield and most the yield attributed could be due to water shortage around the root zone which causes a decrease in the uptake in both water and nutrient elements. Also, the water deficit led to decreased in plant growth canopy, and consequently a decrees in photosynthesis products resulted in low filling process that cause a decrease in the weight of grain yield and most of its components **El-Refaee *et al*, (2008).** Generally, there was reduction in the studied plant attributes when irrigation occurred every 12 day.

Table (6): Effect of treatments on 1000-grain weight, straw yield and grain yield in two growing seasons.

Irrigation intervals	Irrigation depths	Cultivars	1000-grain yield (g)		Straw yield (ton/fed)		Grain yield (ton/fed)	
			1^{th} season	2^{nd} season	1^{th} season	2^{nd} season	1^{th} season	2^{nd} season
6days		Sakha101	26.1	24.8	3.3	3.3	2.5	3.3
	3 cm	Giza177	25.4	24.8	2.3	2.3	2.2	2.3
		Giza178	19.8	19.3	2.9	2.8	2.7	2.9
	Mean (3cm)		22.7	22	2.9	2.8	2.5	2.9
		Sakha101	27	26.7	3.5	3.4	2.8	3.9
	5 cm	Giza177	25.4	25.5	3.3	3.2	2.5	3.6
		Giza178	22.4	23.5	3.4	3.4	3	3.9
	Mean (5cm)		23.8	23.8	3.4	3.3	2.8	3.8
		Sakha101	28.3	28.5	3.8	3.6	3.3	3.5
	7 cm	Giza177	25.7	26.5	3.6	3.4	2.7	3.1
		Giza178	23.2	22.5	3.9	3.8	3.4	3.4
	Mean (7 cm)		24.8	24.9	3.8	3.7	3.2	3.3
	Mean (6day)		23.8	23.6	3.3	3.2	2.8	3.3
12 days		Sakha101	21.7	23.2	2.7	2.4	1.9	2.4
	3 cm	Giza177	21.7	22.2	2	1.8	1.7	1.8
		Giza178	18.7	19.3	2.7	2.4	2.5	2.6
	Mean (3cm)		19.6	20.4	2.5	2.3	2.1	2.3
		Sakha101	24.2	24.4	2.7	2.6	2.1	2.5
	5 cm	Giza177	22.2	22.7	2.5	2.1	1.8	2.1
		Giza178	19.3	19.6	2.9	2.7	2.6	2.8
	Mean (5cm)		20.6	20.9	2.7	2.5	2.2	2.5
		Sakha101	25.2	24.6	3	2.7	2.3	2.8
	7 cm	Giza177	24.6	23.3	2.6	2.3	2	2.2
		Giza178	19.4	20	3.3	3.2	2.7	3
	Mean (7cm)		21.8	21.4	2.9	2.9	2.4	2.7
	Mean (12day)		20.7	20.9	2.7	2.5	2.2	2.5
F test	P		**	**	**	**	**	**
	D		**	**	**	**	**	**
	V		**	**	NS	**	**	**
	P*D		NS	**	**	**	**	**
	P*V		NS	NS	*	**	**	**
	D*V		NS	NS	**	**	NS	**
	P*D*V		**	NS	NS	**	*	**

Irrigation intervals = (P); Water depth = (D); Cultivars = (V)

4- Water productivity

Data in Table 7 showed that water regimes affected the applied irrigation water (m^3/fed), yield (ton/fed) and water productivity. In general, irrigation intervals each 12 days decreased the values for applied water, as well as water productivity under all studied treatments for the studied cultivars. The least amount of applied water was found for Giza177 under all water regimes, Generally, the highest water productivity was obtained from Giza178 when irrigated every 6 and 12 days, being 0.55 and 0.57, respectively for water depth 3cm.It is of interest to indicate that Giza178 also, gave high values for water productivity under 12 days irrigation interval and water depth 3 cm, 5 cm and 7 cm, where, water productivity were 0.57, 0.54 and 0.55 respectively. This because Giza178 is more tolerate to water deficit than the short duration cultivar. This cultivar is suitable in areas characterized with irregular irrigation such as the canals terminals. The highest yield which obtained with Giza178 under all water regimes. This can be contributed to its high tillering and drought tolerance (**Badawi *et al.*, 2006**) .Regarding to water productivity under irrigation every 6 days, it was considered the highest water productivity compared with every 12 days in the Table 7 at all water depth.

Table (7): Average applied irrigation water (AW), grain yield (GY) and water productivity (WP) of the tested cultivars.

Depths (cm)	Cultivars	AW (m^3/fed)	GY (ton/fed)	WP (kg/m^3)	AW (m^3/fed)	GY (ton/fed)	WP (kg/m^3)
		6 days			12 day		
3cm	Sakha101	5186	2.9	0.56	4510	2.1	0.47
	Giza177	4695	2.2	0.47	4017	1.8	0.44
	Giza178	5079	2.8	0.55	4399	2.5	0.57
5cm	Sakha101	5657	3.1	0.55	4982	2.3	0.46
	Giza177	5145	2.9	0.56	4542	2.0	0.43
	Giza178	5478	3.1	0.57	4870	2.6	0.54
7cm	Sakha101	6205	3.5	0.57	5248	2.5	0.47
	Giza177	5486	3.1	0.57	4692	2.1	0.44
	Giza178	6054	3.6	0.60	5113	2.8	0.55

5- Water input and productivity

Data in Table 8 showed that grain yield was already reduced by 16, 14.3 and 10.7 % under 12 days irrigation interval with 3 cm of water depth for Sakha101, Giza177 and Giza178, respectively. This means that Giza178 is more tolerate to water deficit than Giza177 and Sakha101 comparing the different treatments of irrigation (Table 8). Sakha101 rice cultivar used higher amounts of water than Giza177 and Giza178. The best way to save water and increase water productivity without decreasing rice productivity with 3 cm water depth and every 12 days irrigation interval for Giza178, where, grain yield reduction was 10.7%, grain yield was 2.5 ton/fed and water save was 14%. **Tabbal *et al*., (2002).** Reported reduced water input and increasing water productivity of rice grown under just-saturated soil conditions, compared with traditional flooded rice.

Table (8): Total applied water, saved water, grain yield, yield reduction and water productivity (WP) of the tested cultivars as average over the two growing seasons.

Irrigation intervals	Depths (cm)	Applied water (m^3/fed)	Water saved (%)	Grain yield(ton/fed)	Grain yield reduction (%)	WP
Sakha101						
6 days	7 cm	6205	-	3.5	-	0.57
	5 cm	5657	8.8	3.1	11.4	0.55
	3 cm	5186	16.4	2.9	17.1	0.56
12 day	7 cm	5248	-	2.5	-	0.47
	5 cm	4982	5.1	2.3	8.0	0.46
	3 cm	4510	14.1	2.1	16.0	0.47
Giza177						
6 days	7 cm	5486	-	3.1	-	0.57
	5 cm	5145	6.2	2.9	6.5	0.56
	3 cm	4695	14.4	2.2	29.0	0.47
12 day	7 cm	4692	-	2.1	-	0.44
	5 cm	4542	3.2	2.0	4.8	0.43
	3 cm	4017	14.4	1.8	14.3	0.44
Giza178						
6 days	7 cm	6054	-	3.6	-	0.60
	5 cm	5478	9.5	3.1	13.9	0.57
	3 cm	5079	16.1	2.8	22.2	0.55
12 day	7 cm	5113	-	2.8	-	0.55
	5 cm	4870	4.8	2.6	7.1	0.54
	3 cm	**4399**	**14.0**	**2.5**	**10.7**	**0.57**

Conclusion

According to our results it can be observed that Giza177 used less amount of irrigation water followed by Giza178, while Sakha101 used the highest amount of total water. Giza178 gave the highest grain yield under all irrigation intervals and water depth treatments, being drought tolerate cultivar. Furthermore, the results pointed out that the highest water productivity was shown by Giza178 under all water regimes. This is due to its tolerance to salinity beside its improved yield and yield components. Thus, it is recommended to be used at the terminals of irrigation canal where water supply is irregular.

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استجابة بعض أصناف الأرز لمعاملات ري مختلفة في شمال دلتا النيل، مصر

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أجريت تجربتين حقليتان فى محطة بحوث السرو لمحافظة دمياط خلال موسمى ٢٠١٣ و ٢٠١٤ لدراسة تأثير فترات الرى (٦، ١٢ يوم) وعمق الرى (٣، ٥، ٧ سم) على المحصول ومكوناته لثلاثة أصناف من الأرز هما (سخا١٠١، جيزه١٧٧، جيزه ١٧٨) وكذذلك نتاجية وحدة المياه. واستخدم التصميم الاحصائى قطع منشقة مرتين فى اربعة مكررات حيث اشتملت القطع

الرئيسية على معاملات فترات الرى والقطع المنشقة الاولى على عمق مياه الرى والقطع تحت المنشقة هى اصناف الارز.

وقد وأشارت النتائج الى وجود اختلافات بين الأصناف المدروسة تحت معاملات فترات الرى حيث انخفضت كل الصفات عند الرى كل ١٢ يوم بالمقارنة بالرى كل ٦ أيام.

واعطى الصنف سخا١٠١ أعلى وزن لحبوب الدالية، وعدد الفروع ، ووزن ال١٠٠٠ حبة ووزن القش تحت معاملة الرى كل ٦ يوم وعمق مياه الرى ٧سم فى كلا الموسمين، واعطى الصنف جيزه ١٧٨ اعلى وزن لل ١٠٠٠ حبة ومحصول الحبوب عند معاملة الرى كل ٦ يوم وعمق مياه الرى ٧ سم فى الموسم الاول، وكانت اعلى انتاجية لوحدة المياه للصنف جيزه١٧٨ لمعاملة الرى كل ٦ و ١٢ يوم وعمق مياه الرى ٣ سم (٠.٥٥و ٠.٥٧ كجم/م^{٣}) ، على التوالى. وبلغ الاستهلاك المائى اقصاه للصنف سخا١٠١ بالمقارنة بالصنف جيزه١٧٧، وجيزه١٧٨.

وعموما نجد ان جيزه١٧٨ اعطى أعلى انتاجية لوحدة مياه الرى عند الرى كل ١٢ يوم وعلى عمق ٣سم وانخفض المحصول ١٠.٧% حيث اعطى ٢.٥ طن/فدان ووفر كمية مياه ١٤%. وهكذا، يمكن الاستنتاج بأن جيزه١٧٨ اعطى أعلى إنتاجية لوحدة انتاجية المياه تحت جميع معاملات الرى المائية. وتحت الإجهاد المائي ونوصى به للزراعة خصوصا في نهاية الترع.