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RESPONSE OF RICE CULTIVARS TO IRRIGATION INTERVALS AND SOME ORGANIC FERTILIZER TREATMENTS IN NEWLY RECLAIMED SOILS

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ABSTRACT

Two field experiments were carried out in El-Serw Agricultural Research Station (A.R.C.), Dammieta Governorate, during the two successive seasons of 2004 and 2005 to study the effect of three irrigation intervals i.e. irrigation every 6,9 and 12 days as well as six fertilizer treatments namely (without fertilizer zero N/fed, recommended rates 69 kg N/fed, 69 kg N/fed from farm yard manure, 69 kg N/fed poultry manure, 69 kg N/fed from farm yard manure + foliar application (Leafdrip NPK 19%), and 69 kg N/fed from poultry manure + foliar application (Leafdrip NPK 19%) on growth,yield and yield components and technological characteristics of two rice cultivars namely ,Sakha 104 and Giza 182.A Strip Split Plot Design with four replicates were used . The main results could be summarized as follows : Irrigation interval longer than 6 days caused great reduction in plant height, ,number of panicles/m2, panicle length, panicle grain weight,1000-grain weight, number of grains/panicle, grain yield, straw yield (ton/fed),hulling percentage, milling percentage as well as protein percentage in both seasons. Rice cultivars significantly differed in all previously mentioned traits. Sakha 104 surpassed cultivar Giza 182 in all the studied traitsin both seasons. Fertilization treatments had a significant differences in all studied traits in both seasons.Poultry manure + foliar application (LeafdripNPK 19 %), exceeded all fertilizer treatments in all studied . Results exhibited that the interaction effect between irrigation intervals and rice cultivars was significant on all studied traits in both seasons .Rice cultivar Sakha 104 gave the highest estimated characters at all irrigation intervals in both seasons. .These results indicated that Sakha 104 was the most tolerant one to prolonging irrigation intervals in all studied treats and gave the highest grain yield per feddans in both seasons. compared to Giza 182 in both seasons.Generaly,fertilized Sakha 104 cultivar with 69 kg N/fed.from poultry manure + foliar application with Leafdrip NPK19%)gave the highest grain yield/feddans in newly reclaimed soils.

INTRODUCTION

Rice (*Oryza sativa*) is a major food crop in Egypt and many parts of world and a cereal crop that is adapted to continuous flooding conditions. The annual area cultivated with rice in Egypt is about 1.534.000 feddans in 2005 which produced 6.375.000 tons of paddy rice with an average of 4.155 ton/fed (A.R.C.2005)*. El-Refae (2002) mentioned that rice production in Egypt is limited by various factors, i.e. water requirement problems, since water requirement of rice plants is generally greater compared with other crops .Sowing irrigation water is necessary under the Egyptian condition to fulfill the needs of reclamation and the water requirements of the different crops.

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* Ministry of Agriculture and Land Reclamation, Statistical Database,2005.

One of the ways for sowing water is increasing irrigation intervals with minimum yield reduction or using drought tolerant and short period rice cultivars. In this respect,Abo-Soliman *et al.* (1990),Nour and Mahrous. (1994), Nour *et al.* (1994) and El-Hawary (2000) reported that average number of panicles/m^2,1000-grain weight, grain yield (ton/fed) ,straw yield (ton/fed), hulling percentage, milling percentage and protein percentage were decreased by prolonging irrigation intervals from 4 to 8 and 12 days. Therefore,attempts are made to increase crop productivity in new reclaimed soils.One of these approaches to reduce rice production owing to the short of irrigation water is by planting high yielding varieties and tolerant to water shortage and applying miniral or organic fertilizers. Rice cultivars differed in water requirements. as reported by, Farah (1981) and Sharma et al (1987) showed that reduction in grain yield of rice genotypes ranging from 3.8 to 45 % under drought treatments.El-Rewainy (2002) ,Usman et al (2003) and Zayed (2005) reported that the application of the organic fertilizer such as the farm yard manure and poultry manure will increase the organic matter content which serves several advantages like conservation and slow release of macro and micro nutrients.

Modest improvements in the nitrogen availability in organic manures could be a result in a major cost saving for the farmer by reducing the requirement for mineral nitrogen fertilizers and reduce the risk of environmental pollution (Nicholson *et al.*1999).

The present study was mainly directed to maximize the productivity of some rice cultivars through optimum irrigation intervals and applying adequate organic fertilizer to reduce the environmental pollution in addition to improving soil chemicale and physical properties which led to improving grain yield and grain quality of rice under newly reclaimed soils at North Delta of Egypt.

MATERIALS AND METHODS

Two field experiments were conducted at the Experimental Farm of EL-Serw Agricultural Research Station (A.R.C.), Dammieta, Egypt during 2004 and 2005 rice growing seasons . To inspect the impact of three irrigation intervals namely; irrigation every 6,9 and 12 days and six fertilizer treatments i.e. 1-Without fertilizer (Zero kg N/ fed).2-The recommended rate (69 kg N/ fed).3- Farm yard manure (based on the N% the amount of FYM applied equal to 69 kg N/ fed).4-poultry manure (based on the N% the amount of poultry manure applied equal to 69 kg N / fed).5-Farm yard manure (based on the N% the amount of FYM applied equal to 69 kg N/ fed) + foliar application (LeafdripNPK 19%) and 6-poultry manure (based on the N% the amount of poultry manure applied equal to 69 kg N / fed) + foliar application (LeafdripNPK 19%). On growth, yield and yield components and technological characteristics of two rice cultivars namely, Sakha 104 (short grain,japonica) and Giza 182 (long grain,japonica x indica).

The field experiments were laid out in a strip –split plot design with four replications. The horizontal plots were devoted to the three irrigation intervals ,the vertical plots were allocated to two rice cultivars and the sub -

plots were devoted to the six nitrogenous fertilizer treatmentsThe sup plot area was (12 m^2,20 rows x 4 m,long 3 m wide.The horizontal plots were surrounded by 2 m wide ditches to avoid the seepage of water and control irrigation treatments.The plots irrigated of each irrigation treatments up to 7 cm heightThe irrigation started after 15 days after transplanting. Soil chemical analysis of mixed ground soil samples for the experimental site revealed the following PH=7.8, EC ds/m =1.9, cations meq/lit were as follows: Na^+= 11.5, Ca^{++} + Mg^{++}=6.7and K^+= 0.33 and the anions meq/lit were as follows: $Co3^-$ = 0.0, Cl^- = 13.5 and So_4^- = 1.321 and N content was 29 p.pm..The texture soil was clay.

Each of the farmyard manure and poultry manure treatments applied was thoroughly mixed with the soil 15 days before the expected date of transplanting. Phosphorous fertilizer was applied as superphosphate (15.5 P_2O_5) at the rate of 15.5 Kg P_2O_5 /fed.during the permanent land preparation. Concerning the foliar applied LeafdripNPK 19% (2.5 g/ liter)it was dissolving the exact amount of fertilizer application in 100 liter water and sprayed late in the afternoon before sunset with the concentration of 2.5 g/ liter .The foliar application was applied at the two time at first and second dose of urea was applied in soil application.

Rice seeds were soaked in sufficient water for 24 hours and then incubated for 48 hours to enhance germination.Thereafter,it were handly broadcasted on 15th May in 2004 and 2005 seasons,respectively.Thirty days old seedlings were manually transplanted at 20 x 20 cm between rows and hills in the permanent land. .Nitrogen in the form of urea (46 % N) at the rate of 69 Kg N/fed was applied in two split applications,2/3 of N applied at 20 days after planting and 1/3 of N added after 20 days from the first dose at panicle initiation. The recommended cultural practices for growing rice were performed.

At harvest time ,representative plant samples were taken randomly from each treatment using iron frame (50x50 cm) to estimate plant height (cm), number of panicles/m^2,panicle length (cm),panicle weight (g) ,1000-grain weight (g),number of grains/panicle, grain yield (ton/fed),straw yield (ton/fed)hulling percentage, milling percentage and protein percentage .Ten panicles were randomely selected from each treatment to determine weight of grains per panicle (g) and 1000-grain weight .An area of gurded six square meters was harvested and threshed mechanically to determine the grain yield (ton/fed) and straw yield (ton/fed.) .

The data of each season were subjected to the proper statistical analysis of variance and differences among the means of the studied traits were judged by N-LSD at 5% and 1% level of significance according to Gomez and Gomez (1984).

RESULTS AND DISCUSSIONS

1-Irrigation intervals effect

It is evident from Tables 1,2 and 3 that prolonging irrigation interval had a negative effect on plant height, ,number of panicles/ m^2 ,panicle length (cm),panicle weight(g), number of grains/panicle,1000-grain weight(g),grain

yield(ton/fed) ,straw yield (ton/fed),hulling%, milling% as well as protein% in both seasons. The highest values of yield and yield components were produced when rice plots were irrigated every 6 days, followed by irrigation every 9 days and irrigated every 12 days.Irrigation rice plants every 9 or 12 days caused 8.46 and 8.27 % or 32.74 and 30.33% reduction in grain yield per feddans compared to those irrigated every 6 days in 2004 and 2005 seasons,respectively. These results are in accordance with those reported by Mandel *et al.*(1991) ,El-Wehishy and Ghanem (1996) and Abd El-Rahman *et al.*(2004) they found that the reduction in number of panicles/m^2 of rice plants when irrigated at 9 and 12 days intervals may be due to exposing rice plants for the soil water deficit during tillering stage .these results are in harmony with those of Nour (1989) who reported that reduction percentage in number of panicles/m^2 was increased by prolonging irrigation interval to 8 or 12 days. The reduction in panicle grain weight caused by increasing irrigation intervals might be attributed to the decrease in photosynthesis ability during grain filling stage which led to the decrease in metabolites quantity which translocated and stored in grains resulting in a decrease in 1000-grain weight as shown in Table (1) which led to reduction in panicle grain weight . These results are in the same line with those recorded by Chattarjee and Maiti (1983) who found decrease in photosynthetic rate of rice plant by increasing the irrigation interval.

Table 1 : Average of plant height ,number of panicles/m^2panicle length (cm) and panicle weight (g) of Sakha 104 and Giza 182 rice cultivars as influenced by irrigation intervals and fertilization treatments during 2004 and 2005 seasons.

Treatments	Plant height(cm)		Number of panicles/m^2		Panicle length (cm)		panicle weight (g)	
	2004	2005	2004	2005	2004	2005	2004	2005
A. Irrigation treatments								
1.Every 6 days	92.1	95.0	340.5	340.2	21.2	21.3	2.4	2.4
2.Every 9 days	87.9	91.4	326.2	328.4	20.3	20.2	2.3	2.3
3.Every 12 days	82.9	88.9	273.7	275.0	19.5	19.8	2.0	2.1
F-Test	**	**	**	**	**	**	**	**
N.LSD at level for 5%	0.4	0.5	0.5	0.6	0.8	0.1	0.8	0.5
N.LSD at level for 1%	0.6	0.7	0.7	0.8	0.8	0.2	0.1	0.7
B.Rice cultivars								
1.Sakha 104	89.8	93.0	315.4	317.2	20.2	20.4	2.3	2.4
2.Giza 182	85.7	90.4	311.5	311.9	20.5	20.3	2.1	2.2
F-Test	**	**	**	**	**	**	**	**
C.Fertilization treatments								
1.Without fertilization	71.2	77.0	305.5	306.0	18.3	18.7	2.0	2.1
2.Recommended rate	89.9	94.4	311.4	313.0	20.2	20.3	2.2	2.3
3.Farmyard manure	90.2	94.5	312.7	314.1	20.4	20.4	2.2	2.3
4.Poultry manure	90.8	94.6	314.7	315.8	21.0	20.6	2.3	2.3
5.Farmyard manure + foliar app	91.6	94.8	316.8	317.9	21.0	20.0	2.3	2.3
6.Poultry manure + foliar app	92.2	95.1	319.7	320.3	21.1	21.2	2.4	2.4
F-Test	**	**	**	**	**	**	**	**
N.LSD at level for 5%	0.3	0.4	0.3	0.4	0.8	0.2	0.1	0.7
N.LSD at level for 1%	0.4	0.6	0.4	0.6	0.1	0.3	0.2	0.9

The reduction in grain yield/fed. caused by increasing irrigation interval might be attributed to that prolonging the interval of irrigation caused a significant decrease in each of the number of panicles/m^2,panicle grain weight and 1000-grain weight, These results are in harmony with those of Abo-Soliman *et al.*(1990) and Nour *et al.*(1994).It is quit interesting to mention that the mean of the reduction on combined data in the grain yield was 9 % when irrigation every 9 days followed and reached to 31 % when irrigation every 12 days.

2- Rice cultivars performance

Highly significant differences were detected among the tested rice cultivars regarding to plant height, tillers number/m^2 ,number of panicles/ m^2 ,panicle length (cm),panicle weight(g),number of grains/panicle,1000-grain weight(g),grain yield(ton/fed) ,straw yield (ton/fed).hulling%, milling% as well as protein% Tables(1,2and 3).Sakha 104 cultivar gave the highest values in all studied traits ,however Giza 182 cultivar gave the lowest values in all studied traits in both seasons. The superiority of Sakha 104 over Giza 182 may be attributed to it is genetic make up to ability to gave the highest yield components led to raising grain yield/fed. Similar data were obtained by El-Kalla *et al.*(1994),Shehata (1995) Usman *et al.*(2003) and Abd El-Rahman *et al.*(2004).

Table 2 : Average of 1000-Grain weight (g) ,Number of grains/panicle, Grain yield (ton/fed) and Straw yield (ton/fed) of Sakha 104 and Giza 182 rice cultivars as influenced by irrigation intervals and fertilization treatments during 2004 and 2005 seasons.

Treatments	1000-Grain weight (g)		Number of grains/panicle		Grain yield (ton/fed)		Straw yield (ton/fed)	
	2004	2005	2004	2005	2004	2005	2004	2005
A. Irrigation treatments								
1.Every 6 days	24.9	24.8	123.3	122.7	3.335	3.350	4.260	4.295
2.Every 9 days	23.9	23.7	122.0	120.7	3.053	3.073	4.093	4.043
3.Every 12 days	22.5	22.6	119.5	119.4	2.262	2.334	3.168	3.319
F-Test	**	**	**	**	**	**	**	**
N.LSD at level for 5%	0.6	0.2	0.2	0.2	0.025	0.012	0.149	0.013
N.LSD at level for 1%	0.8	0.3	0.3	0.3	0.036	0.017	0.215	0.018
B.Rice cultivars								
1.Sakha 104	24.0	23.8	126.6	126.1	3.013	3.043	3.915	4.003
2.Giza 182	23.6	23.6	116.5	115.8	2.753	2.796	3.766	3.768
F-Test	**	**	**	**	**	**	**	**
C.Fertilization treatments								
1.Without fertilization	22.6	22.6	114.5	114.0	2.550	2.630	3.483	3.595
2.Recommended rate	23.7	23.6	121.5	121.0	2.830	2.874	3.744	3.849
3.Farmyard manure	23.7	23.7	121.9	121.4	2.911	2.938	3.884	3.905
4.Poultry manure	23.9	23.9	122.5	122.1	2.947	2.966	3.932	3.926
5.Farmyard manure + foliar app	24.2	24.1	123.8	123.0	2.997	3.014	3.975	3.978
6.Poultry manure + foliar app	24.5	24.3	125.5	124.3	3.064	3.094	4.026	4.060
F-Test	**	**	**	**	**	**	**	**
N.LSD at level for 5%	0.6	0.2	0.2	0.2	0.020	0.008	0.060	0.015
N.LSD at level for 1%	0.8	0.3	0.3	0.3	0.027	0.011	0.080	0.020

3-Fertilization treatments effect

The data listed in Tables (1 and 2) show that fertilization treatments had a significant effect on all studied traits in both seasons. The application of

poultry manure + foliar application (Leafdrip NPK 19%) gave significantly higher plant height, number of panicles/ m^2 ,panicle length (cm),panicle weight(g), number of grains/panicle,1000-grainweight(g), grainyield(ton/fed), straw yield (ton/fed). hulling%, milling% as well as protein%. These data are in harmony with those reported by Usman *et al.*(2003) and Zayed (2005). The lowest mean values of the estimated traits were recorded when no fertilizer was applied. These data are in accordance with those reported by Bharadwaj *et al.* (1994) and Amiera (1997).It is worth to mention here that the response of rice yield and its related characters to the application of FYM and poultry manure may be attributed to the increase of the nutrient availability in the soil solution. In addition,FYM might improve the chemical and physical properties of soil. Furthermore,FYM and poultry manure play an effective role as soil amendment and it increased its organic matter and reduced environmental pollution.

Table 3: Average of hulling %, milling % and protein %of Sakha 104 and Giza 182 rice cultivars as influenced by irrigation intervals and fertilization treatments during 2004 and 2005 seasons.

Treatments	Hulling %		Milling %		Protein %	
	2004	2005	2004	2005	2004	2005
A. Irrigation treatments:						
1.Every 6 days	82.6	81.0	74.1	73.0	7.1	7.3
2.Every 9 days	78.5	80.4	70.8	72.6	6.8	7.4
3.Every 12 days	70.0	74.3	80.5	66.6	6.4	7.1
F.Test	**	**	**	**	**	**
N.LSD 5%	0.4	0.4	0.4	0.3	0.3	0.1
N.LSD 1%	0.5	0.6	0.6	0.4	0.4	0.2
B.Rice cultivars:						
1.Sakha 104	77.4	79.5	70.3	72.4	6.8	7.7
2.Giza 182	76.6	77.7	66.6	69.0	6.7	7.5
F-Test	**	**	**	**	**	**
C.Fertilization treatments:						
1.Without fertilization	74.6	73.1	64.5	65.3	5.7	6.7
2.Recommended rates	77.9	79.9	69.0	70.7	6.9	7.1
3.Farmyard manure	78.4	79.4	67.5	71.4	6.9	7.1
4.Poultry manure	76.6	80.0	70.7	71.9	7.0	7.1
5.Farmyard manure+ foliar app	77.3	79.5	69.1	72.6	7.5	7.1
6.Poultry manure + foliar app	77.0	79.5	69.9	72.7	7.7	7.2
F-Test	**	**	**	**	**	**
N.LSD at level for 5%	0.6	0.4	0.6	0.4	0.5	0.1
N.LSD at level for 1%	0.7	0.5	0.8	0.6	0.7	0.2

4.Interaction effect

Data presented in Table 4 show that the interaction between irrigation intervals and rice cultivars had highly significant effect on grain yield (ton/fed) in both seasons. The highest grain yield per feddan was produced by Sakha 104 cultivar when irrigated every 6 days. On the other hand,the lowest values of grain yield per feddans produced from Giza 182 cultivar when irrigated every 12 days .At the longest irrigation intervals (every 12 days) Sakha 104 rice cultivar gave the lowest reduction in grain yield 28.73% and 27.96%,but Giza 182 rice cultivar gave the highest reduction 35.92% and 32.89% in 2004 and 2005 seasons,respectively.These results indicated that

Sakha 104 rice cultivar more tolerant than Giza 182 rice cultivar for irrigation water shortage.These data are in accordance with those reported by Nour *et al.*(1994),Abd El-Rahman *et al.*(2004).

Table 4: Average of grain yield (ton/fed) of rice cultivars as affected by irrigation intervals during 2004 and 2005 seasons.

Cultivars	Irrigation Intervals	Grain yield	
		2004	2005
Sakha 104	6 days	3.463	3.480
	9 days	3.108	3.141
	12 days	2.468	2.507
Giza 182	6 days	3.207	3.220
	9 days	2.998	3.006
	12 days	2.055	2.161
NLSD at level 5%		0.023	0.017
NLSD at level 1%		0.033	0.024

Data presented in Table 5 show that the interaction between irrigation intervals and fertilization treatments had highly significant effect on grain yield (ton/fed).The highest grain yield was produced by irrigated every 6 days and fertilized with poultry manure + foliar application (LeafdripNPK 19 %). Whereas,the lowest values of grain yield when irrigated every 12 days and without fertilization.Also,this treatment surpassed all other fertilization treatments in grain yield per feddans at different irrigation intervals (6,9 and 12 days) in both seasons.The data are in accordance with those reported by Nour *et al.*(1994), Abd El-Rahman *et al.*(2004) and Zayed (2005).

Table 5 : Average of grain yield (ton/fed) as affected by the interaction between the irrigation and fertilization treatments in 2004 and 2005 seasons:

Fertilization& Irrigation treatments	2004						2005					
	F1	F2	F3	F4	F5	F6	F1	F2	F3	F4	F5	F6
Every 6 days	2.891	3.223	3.380	3.441	3.489	3.587	2.902	3.250	3.400	3.440	3.500	3.609
Every 9 days	2.739	3.025	3.055	3.093	3.170	3.233	2.767	3.048	3.081	3.126	3.175	3.241
Every 12 days	2.020	2.242	2.298	2.306	2.333	2.371	2.220	2.323	2.332	2.331	2.367	2.431
F Test	**						**					
N LSD 5%	0.022						0.014					
N LSD1%	0.028						0.019					

F1: Without fertilizer. F2: recommended rates. F3:farmyard manure.
F4:poultry manure. F5:farmyard manure + foliar app. F6:poultry manure + foliar app.

Generally, it can be concluded that raising rice productivity under water deficit condition could be achieved through sowing high yielding rice cultivars, such as Sakha 104 and applying poultry manure + foliar application (Leafdrip NPK 19%) under newly reclaimed soils at North Delta of Egypt.

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استجابة بعض أصناف الأرز لفترات الري وبعض معاملات التسميد العضوي في الاراضى حديثة الاستزراع

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أقيمت تجربتان حقليتان بمحطة البحوث الزراعية بالسرو – دمياط - مصر- خلال موسمي 2004 و2005م لدراسة إنتاجية صنفي الأرز سخا 104 ،جيزة 182 وتأثير ثلاث فترات ري وهى الري كل 6 أيام ،الري كل 9 أيام،الري كل 12 يوم وكذلك ستة معاملات سمادية وهى: بدون إضافة سماد،التسميد بتوصيات وزارة الزراعة،التسميد بالسماد البلدي فقط ، التسميد بسبلة الدواجن فقط، ،التسميد بالسماد البلدي + الرش بورقى (ليف درب19% نتروجين- فوسفور- بوتاسيوم) و التسميد بسبلة الدواجن + الرش الورقى (ليف درب 19% نتروجين- فوسفور- بوتاسيوم) واستخدم تصميم الشرائح المتعامدة في قطع منشقة في اربع مكررات.

أهم النتائج المتحصل عليها:

أظهرت النتائج ان الري كل 6 أيام ادى إلى زيادة معنوية في طول النبات و عدد السنابل/م2وطول الدالية و وزن الدالية و وزن الألف حبة و عدد الحبوب / الدالية و محصول الفدان من الحبوب والقش وكذلك النسبة المئوية للتقشير والتبييض وأيضا نسبة البروتين في كلا الموسمين.واظهرت النتائج انة كلما زادت الفترة بين الريات نقصت قيم كل الصفات المدروسة فى كلا الموسمين.حيث ان الرى كل 9 ايام ادى الى انخفاض فى محصول الحبوب (طن/فدان) يقدر بحوالى 8,46 و8,27%.

بينما الري كل 12يوم أدى إلى انخفاض يقدر بحوالي 74و32% مقارنة بالري كل 6يوم فى كلا موسمي الدراسة على التوالي.

أظهرت النتائج أن الصنف سخا 104تفوق على الصنف جيزة 182فى كل الصفات المدروسة فى كلا الموسمين.وأعطى أعلى كمية لمحصول الحبوب للفدان 3.013 طن و3.043 طن فى موسمى الدراسة على التوالي بينما أعطى الصنف جيزة 182 اقل محصول للحبوب للفدان 2.753 و 2.796 طن فى موسم 2004 و موسم 2005على التوالى.

أظهرت النتائج انة كان هناك اختلافات معنوية بين معاملات السماد فى كل الصفات المدروسة فى كلا الموسمين حيث تفوقت المعاملة بسبلة الدواجن + الرش الورقى (ليف درب19% نتروجين- فوسفور- بوتاسيوم) على المعاملات السمادية الأخرى فى كل الصفات المدروسة فى كلا الموسمين حيث اعطت اعلى كمية لمحصول الحبوب للفدان 3, 064 و3.094 طن بينما اعطت المعاملة بدون اضافة سماد اقل كمية لمحصول الحبوب للفدان 2.550 و 2.630 طن مقارنة ببباقى معاملات السماد الاخرى فى كلا الموسمين على التوالى.

أظهرت النتائج أن تأثير التفاعل بين معاملات الري والأصناف كان معنويا فى كلا الموسمين حيث أعطى الصنف سخا 104أعلى محصول حبوب للفدان تحت كل فترات الري المدروسة في كلا الموسمين.حيث أعطت معاملة التسميد بسبلة الدواجن + الرش بسماد ليف درب (19%) تحت كل فترات الري تحت الدراسة أعلى كمية لمحصول الحبوب مقارنة ببباقى المعاملات الأخرى في كلا الموسمين.

توصى هذة الدراسة باستخدام الصنف سخا 104 والري كل 6 أيام واستخدام المعاملة بسبلة الدواجن + الرش الورقى (ليف درب 19% نتروجين- فوسفور- بوتاسيوم) وذلك للحصول على أعلى إنتاجية من محصول الأرز وتقليل التلوث البيئي بالإضافة إلى الوصول إلىافضل إنتاجية من الزراعة النظيفة.