Egypt. J. Agric. Res. , 76 (4) ,1998.

EFFECT OF FARM YARD MANURE AND WATER REGIME ON PRODUCTION OF RICE

M.A NOUR

Rice Research & Training Center, Field Crops Research Institute, Sakha, Kafr El-Sheikh, Egypt.

(Manuscript received 29 July 1997)

Abstract

Two field experiments were conducted at the Rice Research and Training Center. Sakha, Kafr El-Sheikh, Egypt to study the effect of irrigation intervals and the application of farm yard manure alone or in combination with nitrogen fertilizer on Giza 176 rice variety in 1995 and 1996. Irrigation intervals were 3, 6, 9 and 12 days. Urea N/ha rates were zero, 55 and 110 kg and farm yard manure rates were 9.5, 19, 28.5 ton/ha. Dry matter yield, tillers/m2 and plant height were measured at four growth stages namely; mid tillering, maximum tillering, panicle initiation and maturity. Irrigation water used was measured with a calibrated water meter.

Results showed that, growth measurments were significantly reduced due to the increase of irrigation intervals up to 12 days. Rice was most sensitive to water deficit during the stages of maximum tillering and panicle initiation than at mid tillering or maturity. Grain yield did not significantly differ when rice was irrigated every 3 or 6 days. However, yield decreased by less than 5% with irrigation every 6 days but about 17% of water consumption was saved. Nitrogen uptake and content were significantly reduced as irrigation interval increased over 3 days. However, water use efficiency was greatest with irrigation every 6 days. The use of chemical nitrogen fertilizer eith alone or combined with farm yard manure was superior to the use of farm yard manure alone.

INTRODUCTION

Rice is a major cereal grain adapted to flood irrigation conditions. Continuous flooding with 5-7.5cm of water depth is considered desirable for optimum grain yield (DeDatta 1981 and Chandler, 1979). Some studies on rice irrigation techniques such as continuous soil saturation or intermittent water application indicated that substantial water savings ranging from 25 to 50% as compared to continuous submergence are possible without rice yield loss (Subramanian et al, 1978, Sandhu et al, 1980 and Jha et al 1981).

On the other hand, other studies have indicated that water saving methods result in rice yield reduction (Ali and Morachan, 1974 and Sharma and De, 1976). Prolonged irrigation intervals decreased yield and its components, and increased water saving (Prasad et al, 1994, Parihar et al, 1995 and Nour et al, 1996). Choudhary et al, 1991 reported that the highest grain yield for continuous shallow submergence can be achieved with 7cm irrigation water applied 3 days after the disappearance of pounded water resulted in a net saving of 24% of the water requirement.

Fetilizer N is costly and causes Pollution and it could be desirable to be replaced partially by organic manure. crop. Hamissa. 1959 and Zedan, 1982 reported that farm yard manure alone or with chemical nitrogen increased yieldand total nitrogen uptake of rice. Meelu and Morris (1987) reported that application of farm yard manure provide considerable direct and residual effects on crop yields and improve soil fertility. A few long term experimets have shown that use of farm yard manure or compost at 10-15 t/ha produce a moderate to high response, saves up to 40 kg N/ha and has a residual effect. Prakash et al (1989) Found that also that grain yield of rice increased 0.52 and 0.72 t/ha by the application of 10 and 20 tons farm yard manure/ha,respectively, while the highest yield was obtained from 20 t FYM with 20 kg N/and a residual effect of FYM on the following crop. Scarcity of irrigation water steadily increasing fertilizers prices and environmental pollutaion from excessive use of chemical require studies to rationalize the use of water and fertilizer resources. The present study was conducted to investigate the possibility of saving irrigation water and chemical nitrogen in rice production by means of prolonged irrigation intervals and use of farm yard manure (FYM), with or without N fertilizer.

MATERIALS AND METHODS

Two field experiments were conducted at the Rice Research and Training Center, Sakha, Kafr El-Sheikh, Egypt during 1995 and 1996 seasons. Four irrigation intervals were applied, namely, irrigation every 3, 6, 9 and 12 days. Inorganic nitrogen and FYM were applied as follows: Control (No fertilizer), 55 kg N/ha., 110 kg N/ha, 9.5 t/ha FYM, 19 t/ha FYM, 28.5 t/ha FYM and 55 kg N + 28.5 t FYM/ha. split plot design with four replications was used. Irrigation intervals were allocated to the main plots (8.0 x 21.0 m). [Main plots were surrounded by 2 m wide ditches to prevent water seepage and leaching] and fertilizer treatments were assigned to the sub plots (3.0 x 8 m). Soil samples were collected before plowing and chemically analyzed according to the standard soil analysis methods (Black, 1982).

FYM and 2/3 of the inorganic nitrogen were incorporated into the dry soil before flooding, while the balance of the inorganic nitrogen was applied 7 days before panicle initiation. Phosphorous at the inorganic nitrogen was applied 7 days befor panicle initiation. Phosphorous at the rate of 36 kg P2O5, and potassium at the rate of 48 kg K2O/ha were applied to all plots during soil preparation.

Thirty days old seedling of cv-Giza 176 were transplanted into the prepared plots in 20 x 20 cm spacing. Recommended cultural practices for rice were applied. A water pump with a calibrated meter was used for measuring the amount of water delivered to each plot. Irrigation treatments were started 12 days after transplanting (after seedling establishment). Water use efficiency (kgs grain/cubic meter of water applied) was computed.

Plant samples consisting of 5 hills each were fandomly taken from each plot at mid tillering, maximum tillering, panicle initiation and maturity stages. These samples were oven-dried at 70oC for 72 hours then dry weight was recorded.

At harvest, a random sample of 10 panicles was collected from each plot, and air dry grain yield of a 10 m2 was obtained by mechanicl threshing. Grain weight was later adjusted to 14% moisture content. Grain and straw samples were collected, ground and chemically analyzed for N content to deterimne N uptake on dry weight basis. Data were subjected to standard analysis of variance according to Gomez and Gomez, (1984).

Table 1. Chemical properties of the soil at the experimental sites and applied FYM.

Soil chemical properties	1995	1996	FYM
pH	8.1	8.0	7.1
Ec ds/m	2.1	2.0	1.5
OM%	1.4	1.5	3.1
Available N (ppm)	29.0	36	59
Available P (ppm)i	17	18	36
Available K (ppm)ii	16	21	27

i Olsen Dean (1965) and ii Jackson (1958)

RESULTS AND DISCUSSION

Rice Growth:

Dry matter production of rice at different growth stages was significantly affected by the length of the irrigation interval and fertilizer treatment (Table 2). Results indicated that dry matter production was significantly reduced as irrigation interval increased up to 12 days at all growth stages. The reduction in dry matter at mid tillering stage 1.6, 26. 7and 45.5% when irrigaion intervals increased to 6.9 and 12 day,respectively in comparison to the 3-day inerval. Reduction was 10.4, 34.1 and 49.4% at maximum tillering, 10.3, 42.2, and 55.1% at panicle initiation, and 3.7, 28.8 and 38.4% at harvest. These results indicated that cv. Giza 176 is more sensitive to water deficit at maximum tillering and panicle initiation than at either early (mid tillering) or late (maturity) growth stages.

Table 2. Dry matter (g) production at different growth stages of rice as affected by different irrigation intervals (combined data of 1995 & 1996).

Treatments	Growth stages			
	Mid tillering	Maximum tillering	Panicle initiatng	Maturity
Irrigation Intervals				
3 Days	255	346	767	1806
6 days	251	310	688	1739
9 days	187	228	443	1286
12 days	139	175	344	1113
LSD 5%	71	99	216	132
Fertilizers				
Cont.	138	178	369	1175
55 kg N/ha	230	321	613	1569
110 kg N/ha	292	382	815	1814
9.5 t FYM/ha	174	120	454	1255
19 t FYM/ha	187	221	467	1437
28.5 t FYM/ha	192	251	511	1470
t FYM + 55 kg N/ha	244	291	698	1654
LSD 5%	69	91	130	161

The highest dry matter yield was obtained when plants were fertilized by the higher rates of inorganic nitrogen (110 kg N/ha) followed by the application of 55 kg N/ha of inorganic nitrogen plus 28.5 t/ha FYM at all growth stages. These data indicated that inorganic nitrogen is more effective for the short time as it was more available to the plants than the organic nitrogen which requires time for decomposition and the release of mineral nitrogen. Apparently, FYM application might be more beneficial to the succeeding crop than to the present crop. These findings are in agreement with those reported by Zedan (1982), Kogano et al (1991), Mandal et al (1991) and Nour et al (1996).

Results showed that prolonging the irrigation interval caused a significant reduction in number of tillers per unit area. The reduction was more pronounced at both maximum tillering and panicle initiation stage than at mid-tillering or at harvesting. This could be attributed to the fact that, at these two growth stages, plants need carbohydrates and more energy for panicle initiate and water is needed for energy production and translocation. These results are in agreement with those reported by Nour et al (1996).

Table 3. Number of tillers at different growth stages of rice as affected by irrigation interval and fertilizer treatment (combined data of 1995 & 1996).

Treatments	Growth stages			
	Mid tillering	Maximum tillering	Panicle initiatng	Maturity
Irrigation Intervals				
3 Days	482	576	536	419
6 days	474	537	480	399
9 days	461	520	418	366
12 days	429	395	370	340
LSD 5%	NS	NS	NS	NS
Fertilizers				
Cont.	367	401	371	328
55 kg N/ha	506	536	482	409
110 kg N/ha	530	638	509	464
9.5 t FYM/ha	431	433	412	348
19 t FYM/ha	451	488	445	359
28.5 t FYM/ha	451	496	463	370
28.5 t FYM+55kg N/ha	457	558	447	389
LSD 5%	95	65	59	51

Results indicated also that plant hight was significantly affected by prolonged irrigation every 9 and 12 days, while it was less affected by increasing the interval from 3 to 6 days. Plant height at mid tillering was reduced from 52 cm with continuous flooding to 24 and 37 cm with irrigation every 9 and 12 days, respectively. A similar trend was found at maximum tillering, panicle initiation and harvesting. Fertilers application produced a similar trend as found dry matter production and number of tillers. Inorganic nitrogen at the rate of 110 kg N/ha gave the tallest plants followed by 55 kg inorganic N plus 28.5 t FYM /ha. Furthermore, these results reveal that organic manure cannot be as immediate substitute for chemical fertilizers but it could be applied as a supplement.

Table 4. Plant height (cm) at different growth stages as affected by irrigation interval and fertilizer treatment (combined data of 1995 & 1996 seasons) .

Treatments	Growth stages			
	Mid tillering	Maximum tillering	Panicle initiation	Maturity
Irrigation Intervals				
3 Days	52	67.9	81.2	96.7
6 days	47.6	67.5	79.5	96.3
9 days	41.9	58.8	72.0	86.9
12 days	36.8	55.3	66.2	79.8
LSD 5%	5.3	7.80	8.4	5.1
Fertilizers				
Control	38.7	55.0	66.3	85.7
55 kg N/ha	46.3	62.6	75.8	88.8
110 kg N/ha	49.4	68.4	80.8	94.6
9.5 t FYM/ha	41.8	59.8	72.9	89.2
19 t FYM/ha	43.3	61.3	74.0	89.1
28.5 t FYM/ha	45.4	63.1	74.7	92.9
28.5 t FYM+55kg N/ha	47.2	66.5	78.6	2.9
LSD 5%	3.8	2.8	3.1	2.5

Grain yield and its components :

Table 5 presents the results of grain yield as affected by the different treatments. There was no significant difference in grain yield between continuous flooding and irrigation every 6 days. But increasing irrigation interval to 9 or 12 days, caused a significant reduction of 31 and 40% in grain yield, respectively. These results revealed that yield reduction has to be expected if irrigation water need to be saved which is in agreement with Nour et al (1996).

The application of either chemical nitrogen nitrogen or organic manure significantly increased grain yield compared with control. The highest grain yield was obtained when 55 kg N/ha plus 28.5 t/ha FYM/ha was applied followed by the application of 110 kg N/ha. Application of 9.5 t/ha FYM gave yield almost comparable to that obtained from the application of 55 kg N/ha. These data indicae that although the application of FYM to rice did not show a significant effect on growth characters, it had a significant effect on grain yield. This indicates some of the organic manure was already decomposed and their nitrogen was mineralized and released to the plants.

Table 5. Yield and yield components as affected by irrigation interval and fertilizers treatment (combined data of 1995 & 1996 seasons).

Treatments	Grain yield (t/ha)	No Panicles /m2	Panicle weight (g)	1000 grain weight (g)	No of Filled grains	% of unfilled grains	Panicle length (cm)
Irrigation							
3 Days	8.82	406	2.31	25.54	91.89	8.11	20.95
6 days	8.45	388	2.20	25.81	91.06	8.94	20.77
9 days	6.08	332	2.10	24.14	92.20	7.86	20.18
12 days	5.26	325	2.00	24.08	92.09	7.91	19.18
LSD 5%	0.56	60	2.20	0.58	0.22	0.21	0.52
Fertilizers							
Cont.	5.39	295	1.93	25.03	95.10	7.13	19.67
55 kg N/ha	6.82	375	2.09	24.89	105.30	9.15	19.89
110 kg N/ha	8.35	413	2.25	24.50	116.30	9.76	20.30
9.5 t FYM/ha	6.48	330	2.06	24.97	101.80	8.14	20.27
19 t FYM/ha	6.96	338	2.20	25.03	107.20	7.94	20.44
28.5 t FYM/ha	7.44	393	2.24	25.02	111.80	7.46	20.45
28.5 t FYM+ 55kg N/ha	8.62	394	2.30	25.32	113.20	6.85	20.84
LSD 5%	0.52	38	0.21	NS	7.30	0.86	0.64

Data in Table 5 show that number of panicles per square meter, grain weight, 1000-grain weight, number of filled grain and panicle length were significantly reduced as the irrigation intervals increased up to 12 days. The data also reveal that such reduction due to increasing the irrigation intervals to 6 days was less than that resulting from irrigation every 9 or 12 days. Unfilled grains per panicle showed a significant increase with the increase in irrigation interval up to 12 days. This explains the reduction of yield since all its components are reduced. These findings are in agreement with those repored by Nour et al (1996).

Furthermore, yield components showed significant variations among the different fertilizer treatments. The highest number of panicles was obtained from 110 kg N/ha followed by the application of 28.5 t FYM plus 55 kg chemical N/ha. On the other hand,all fertilizer treatments gave higher values compared with control. A similar trend was observed with grain weight and number of filled grains per panicle. 1000-grain weight did not show significant variation due to the application of fertilizers. Unfilled grain increased as nitrogen rate increased. This was expected since the high rates of nitrogen delays heading and maturity and increased sterility. These results are in harmony with those reported by Ali and Morachan (1974) and Sharma and De, (1976) Castillo et al (1991), Harbir et al (1991), and Nour et al (1996).

Nitrogen content and uptake :

Table 6 show nitrogen content of rice grain and straw as affceted by irrigation interval and fertilizing treatment. Nitrogen content decreased as irrigation interval increased up to 12 days. Apparently due to the reduction in N availability under when water strees which agrees with Sharma and De (1979).

Data also showed that N content varied with fertilizer treatment. The highest N content was found in plants fertilized with inorganic nitrogen at the rate of 110 kg N/ha. The application of FYM at the rate of 19 or 28.5 t/ha gave similar nitrogen content values. This could be attributed to very slow release of N under flooding conditions suggesting that this N would be of more benefit to the succeeding crop than the rice crop which agrees with Mali and Shaikh (1993).

Table 6 presents also N uptake by grain and straw and total N uptake. Data show a significant reduction in nitrogen uptake by both grain and straw which could be attributed to the effect of water deficit on plant growth and dry matter production. Inorganic nitrogen at the rate of 110 kg N/ha gave highest value of N uptake, followed by the application of 28.5 t FYM plus 55 kg N/ha. More studies are needed to follow up the applied FYM and its benefits to the next crop.

The interaction between irrigation interval and nitrogen fertilizer treatments is illustrated in Fig 1 (a and b). Highest nitrogen content and uptake values were found under irrigation every 3 days (continuous flooding) and with the highest rate of inorganic nitrogen, followed by irrigation every 6 days also and the highest rate of inorganic nitrogen. Under the prolonged interval irrigation such as every 9 and 12 days the nitrogen content and uptake was less than other treatments. This could be attributed to the fact that under wet and dry conditions, nitrification and denitrification processes play a significant role in nitrogen losses.

Table 6. Nitrogen content and uptake by rice plant at harvest as affected by irrigation regime and fetrilizer application (combined data of 1995 & 96).

Treatments	N contet (%)		N uptake kg/ha		
	Grain	Straw	Grain	Straw	Total
Irrigation every					
3 Days	1.06	0.53	0.53	0.53	0.53
6 days	1.02	0.46	0.46	0.46	0.46
9 days	0.97	0.43	0.43	0.43	0.43
12 days	0.80	0.40	0.40	0.40	0.40
Fertilizers					
Control	1.02	0.40	0.40	0.40	0.40
55 kg N/ha	0.81	0.44	0.44	0.44	0.44
110 kg N/ha	1.10	0.54	0.54	0.54	0.54
9.5 t FYM/ha	0.88	0.42	0.42	0.42	0.42
19 t FYM/ha	0.93	0.43	0.43	0.43	0.43
28.5 t FYM/ha	0.94	0.47	0.47	0.47	0.47
28.5 t FYM+55kg N/ha	1.05	0.49	0.49	0.49	0.49

Water Relations :

Table 7 presents the reduction in yield and some water relations as affected by irrigation interval. Data show that yield was reduced by less than 5% when irrigation interval increased from 3 to 6 days. But about 17% of irrigation water was saved. While, when irrigation interval increased to 9 days, the yield reduction was about 31%, with about 27% water saved. Data also showed that less water was used to produce one kelogram of rough rice when a 6-day interval was used. On the other hand, with continuos flooding irrigation every 6 days or 12 days more water was used to produce one kelogram of rough rice. This means that under our experimental condition, irrigation every 6 days is recommended since it saves some irrigation water with higher water use efficiency and minimum reduction in yield. These findings are similar to those reported by Prasad et al (1974), Parihar et al (1995) andNour et al (1996).

Table 7. Yield reduction and some water relations under different irrigation intervals (Combined data of 1995 & 1996 seasons).

Irrigation intervals	Yield n %	Water saved %	Total water used m3/ha	Water use *efficiency
Irrigation every 3 days	-		16200	1.84
Irrigation every 6 days	4.2	16.7	13496	1.60
Irrigation every 9 days	310	27.4	11756	1.93
Irrigation every 12 days	40.0	36.7	10239	1.95

WUE = Total water used (m3) / grain yield (kg)

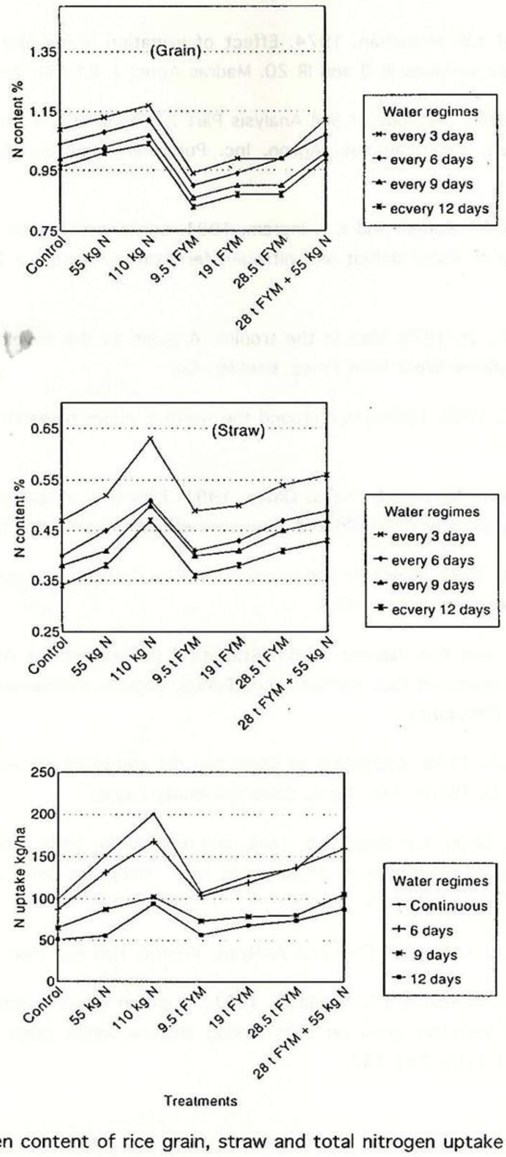

Fig.1. Nitrogen content of rice grain, straw and total nitrogen uptake as affected by water regime and nitrogen source.

REFERENCES

1. Ali, A.M. and Y.B. Morachan. 1974. Effect of irrigation levels and forms of manure of rice varieties IR 8 and IR 20. Madras Agric. J. 61 (8): 268-272.

2. Black, C.A. 1982. Methods of Soil Analysis Part 2. Chemical and Microbiological properties. American soc. Agron. Inc. Publisher, Madison, Wisconsen, USA.

3. Castelo, E.G, RJ. Buresh and K.T. Ingram. 1991. Lowland rice yield as affected by timing of water deficit and nitrogen fertilization. Agron. J 84 : 152-159.

4. Chandler-R.F., Jr. 1979. Rice In the tropics. A guide to the development of national programs. West View Press, Boulder, Co.

5. De Datta S.K. 1965. Upland rice around the world in major research in upland rice. p 254.

6. Choudhury A.K., M. Saikid, and K. Datta. 1991. Effect of irrigation and non transplanting summer rice yield and water use efficiency. IRRN 16: (4) P18.

7. De Datta. S.K. 1991. Principals and practices of Rice Production. John Wily and sons. Inc., New York pp 102-132.

8. Gomez, K.A. and A.A. Gomez. 1984. Statistical Procedures for Agricultural Research International Rice Institute, Los Banos, Laguna, Philippines. P.O.Box 933, Manila Philippines.

9. Hamissa M.R.A. 1959. Evaluation of some organic and Inorganic nitrogenous sources. Ph. D. Thesis. Fac. Agric. Cairo University-Egypt.

10. Harber, S.T. Singh, K.P Singh, D.S. Tonk, and A. Sfarode. 1991. Components analysis of yield responses to irrigation in rice - Nerendra Deva Journal of Agric.Res - 6 (1): 119-123.

11. Jackson, M.L. 1958. Soil Chemical Analysis. Prentic. Hall Inc. New Jersy.

12. Jha, K.R.P; C-Dinesh and S. Challaiah. 1981. Irrigation requirements for high yielding rice varieties grow on soils having shallow water table. Indian J. Agric. Sci. 51 (10): 732-737.

13. Kogano, K.; K Toriyamd and H. Sekiya. 1991. Studies on nitrogen application on clayey paddy soil and early drainage for rice-Bulletin of the Hokuriku National Agric Experiment station. No. 33: 107-125.

14. Mali, C.V., and A.R. Shaikh. 1993. Influence of different sources of zinc with and without FYM on yield and nutrient content in rice-gram cropping sequence. Mysore J.Agric. Sci. 27 (3): 243-251.

15. Mandal, N.N., A.M. Pust and P.P Paul Choudhury. 1991. Effect of water regime sand levels and methods of nitrogen application on growth and yield of rice. Indian J. 35 (1) 85-88.

16. Meelu, O.P.,and R.A. Morries. 1987. Integrated management of green manure, farm yard manure and inorganic nitrogen fertilizers in rice and rice based cropping sequences. In Efficiency of Nitrogen Fertilizer forRice. International Rice Reseach Institute, los Banos laguna, Manila Philippines. P. 185-193.

17. Nour, M.A., S.A. Ghanem, A.E. Abdel Wahab, and A. O. Bastawisi. 1996. Behavior of some rice cultivars under different water regimes, Menofiya J.Agric. Res. 21 (4): 837-850.

18. Olsen, S.R. and L.A. Dean. 1965. Phosphorous analysis in Methods of Soil Analysis Part Chemical and Microbiological properties. American Soc. Agron. Inc. Publisher. Madison, Wisconsen, USA.

19. Parihar, S.S., V.K. Verma, R.K. Shukla, D. Oandey and R.B. Sharma. 1995. Reponse of transplanted rice to planting time under irrigation schedule. Indian J. Agron. 40 (3): 402-406.

20. Prasad, P., A. Kumar and U.K. Prasad. 1994. Effect of irrigation and nitrogen on yield of medium-duration direct seeded rice. Indian J. Agron. 39 (2): 294-296.

21. Sondhu, B.S., K.L. Khard, S. Prihari and B. Singh. 1980. Irrigation needs and yield of rice on sandy-loam soil as affected by continuous and intermittent submergence. Indian J. Agric. Science, 50 (6): 492-496.

22. Sharma, S.K., and R.De. 1976. Grain yield and mineral N content in soil as influenced by water regimes, levels of N and methods of N applicaion. Indian Soc. Soil Sci. 24 (4) : 414-420.

23. Sharma, S.K., and R.De. 1979. Effect of water regimes, levels of nitrogen and methods of application on grain yield, protein percentage and nitrogen uptake in rice. El-Rizo 28 (1) : 73-76.

24. Subramanian, S., S.D. Singh and K.P. Randswaml. 1978. Crop sequence studies under different irrigation regimes and manuring. Madras Agric. J. 65 (9): 567-571.

25. Zedan, M.E. 1982. The fertilizing value for some organic manures. Ph.D. Thesis Fac. Agric. Zagazig Univ. Egypt.

تأثير السماد العضوى ونظام الرى على إنتاجية صنف الأرز جيزة ١٧٦

محمد أحمد نور

مركز البحوث والتدريب فى الأرز - معهد بحوث المحاصيل الحقلية، سخا - كفر الشيخ .

أقيمت تجربتان حقليتان بمركز البحوث والتدريب فى الأرز بسخا خلال موسمى الأرز ١٩٩٥ و ١٩٩٦ لدراسة تأثير مناوبات الرى والسماد البلدى والسماد الآزوتى الكيماوى على إنتاجية الأرز جيزة ١٧٦ . وكانت مناوبات الرى كما يلى : رى كل ٣ ، ٦، ٩، ١٢ يوما. أما السماد الأزوتى أضيف بالمعدلات التالية: بدون سماد ، ٥٥ كجم/هكتار . ١١٠كجم/هكتار. وقد أضيف السماد البلدي بالمعدلات التاليه : بدون سماد، ٩,٥ طن سماد بلدى / هكتار، ٢٨,٥ طن سماد بلدى/هكتار، ٢٨,٥ طن سماد بلدى/هكتار + ٥٥ كجم بدون / هكتار تم أخذ عينات نباتية (خمسة جور) عند فترة وسط التفريع فترة اقصى تفريع، فترة تكوين النورة. وقد أوضحت النتائج أن كلا من المادة الجافة وعدد الأفرع وأطوال النباتات نقصت نقصا معنويا بإطاله مناوبات الرى حتى ١٢ يوم. أوضحت النتائج أن فترة التفريع القصوى وبداية تكوين النورة أكثر الفترات حساسية لإطالة فترات الرى. وقد وجد أن المحصول ومكوناته ومحتوى الحبوب والقش من النتروجين وكذلك النتروجين الممتص تأثرت تأثرا معنويا باطالة فترات الرى إلى ١٢,٩ يوما. وقد أوضحت النتائج ايضا أن زيادة فترة الرى إلى رى كل ستة أيام بدلا من ثلاثة أيام أدت الى خفض المحصول بأقل من ٥٪ وهذا يوفر حوالى ١٧٪ من مياه الرى. كذلك وجد أن اقصى كفاءة استخدام لمياه الرى هى مع الرى كل ستة أيام. أما بخصوص تسميد الأرز، فقد اظهرت النتائج ان السماد الكيماوى يعطى نتائج افضل سواء بمعدل ١١٠ كجم أزوت منفردا أو إضافة ٥٥ كجم أزوت بالإضافة الى ٢٨,٥ طن من السماد البلدى، يرجع ذلك أساسا الى بطء تحلل السماد البلدى مما لايفى بمتطلبات نبات الارز فى حينه لكن قد تزيد الفائدة للمحاصيل التالية بالإضافة الى تحسين خواص التربة الطبيعية والكيماوية والبيلوجية.