Egypt. J. Agric. Res. , 72 (2), 1994.

EFFECT OF N-LEVEL AND ITS TIME OF APPLICATION ON GROWTH CHARACTERS OF SOME RICE VARIETIES

S.E. HEGGY, S.S. MEGALAH, A.S. ABD EL-NOUR AND A.Z. EL-BABLY

Soil and Water Research Institute, Agricultural Research Centre, Giza, Egypt.

(Manuscript received 29 April 1991)

Abstract

Two field experiments were conducted in 1988 and 1989 seasons at Al-Khadmia, Kafr El-Sheikh Governorate to study the effect of five levels of nitrogen and three times of its application on the growth characters of two rice varieties, namely, Giza 181 and Giza 175. Over two seasons, Giza 181 surpassed Giza 175 in most of growth characters, while Giza 175 gave the largest number of panicles/m2. Ascending N-levels up to 60 kg N/fed. as half of N on dry soil and the other half of N at 20 days after transplanting significantly increased most of growth characters.

The interaction between rice varieties, N-levels and its time of application signficantly affected different growth characters under study.

INTRODUCTION

Rice is one of the major cereal crops in Egypt. Increasing nitrogen efficiency is one of the most important factors that limit productivity of rice varieties. Bhatti and Khan (1981) found that application of nitrogen at transplanting or 21 days later gave higher yields than when applied after that date. Split application gave higher yields than single application. Reddy *et al.* (1986) noticed higher increase in plant height and number of tillers when nitrogen was applied at 2 split dressing, 50% at transplanting and 50% at panicle emergence stage than 2 equal ones, at transplant-

ing and tillering or as single application at transplanting. Agasimani *et al.* (1983) reported that application of 160 kg N/ha increased tillers number as compared with 80 kg N/ha. Ismail (1989) found that increasing nitrogen rate up to 60 kg N/fed. significantly increased plant height, 1000-grain weight, number of tillers, panicle weight and protein grain content.

Therefore, the aim of the present work is to study the effect of timing and rates of nitrogen fertilization on growth characters of rice plants.

MATERIALS AND METHODS

Two field experiments were conducted during the two summer seasons of 1988 and 1989 at El-Khadmia, Kafr El-Sheikh, using Giza 175 and 181 rice varieties to study the effect of three timing of nitrogen application namely (0.5 N on dry soil, before transplanting "BT" and the other half at 20 days after transplanting "AT", half of the N at transplanting and the other half at panicle initiation (PI), and 1/3 at transplanting + 2/3 N) and five nitrogen levels namely (0, 20, 40, 60 and 80 kg N/fed.) on growth characters of the previous two rice cultivars. The calcium monophosphate (15.0% P_2O_5) was added before flooding, immediately at a rate of 100 kg/fed. Nitrogen as urea (46.5% N) was added according to the previously mentioned timing and rates of nitrogen application.

Irrigation and inter culture operation were given whenever necessary. The experiment was laid out in a split-split plot design with four replicates. Some soil chemical and physical properties are given in Table 1. At the time of harvest the following characters were measured:

1. Plant height, cm
2. Flag leaf area, cm^2
3. Number of panicles, / m^2
4. Panicle length, cm
5. Number of filled grain / panicle
6. Spikelets sterility percentage
7. Panicle weight / g
8. Thousand grain weight / g.

Total N, available NH_4 and available NO_3 were determined according to Page

Table 1. Some chemical and physical properties of the experimental soil.

Properties	Seasons	
	1988	1989
Mechanical analysis		
Sand %	12.50	12.20
Silt %	31.20	31.50
Clay %	56.30	55.30
Soil texture	Heavy clay	
Chemical analysis		
E.C. mmoh/cm at 25°	1.80	1.70
Organic matter content	1.52	1.53
Calcium carbonate %	1.32	1.34
Soil pH (1:2.5)	8.30	8.10
Total N ppm	360	434
Available NH4 ppm	1.90	2.10
Available NO3 ppm	18.30	17.20
Available P ppm	19.10	18.60
Available K ppm	310	350

(1982). Available P was determined using Olsen's method (Jackson 1967). Available K was determined using EEL flame photometer (Jackson 1967).

Data were subjected to analysis of variance according to the procedure outlined by Gomez and Gomez (1984). Treatment means were compared by the new LSD of Waller and Duncan (1969).

RESULTS AND DISCUSSION

1. Plant height (cm):

Data in Table 2 show that, in both seasons, rice varieties did not significantly differ in plant height, meanwhile, Giza 181 was taller than Giza 175. Also plant height was highly significant affected by the time of N-application. the application of nitrogen in two equal portions (1/2 of N as basal + 1/2 of N, 20 days "AT" recorded the tallest plants in the first and second seasons. While the shortest plants were taken from the plants those received 1/3 of N at 20 days "AT" + 2/3 of N at "PI". Also, plant height was significantly increased when nitrogen rates increased. The increase in plant height due to nitrogen application may be attributed to the role of nitrogen in the stimulation of cell division and internode elongation (Leilah and El-Kalla 1989).

Data in Tables 3, 4 and 5 reveal that, the interaction between rice varieties and either time or levels of N-application and the interaction between time and levels of N-application had a significant effect on plant height.

2. Flag leaf area (cm^2):

Data in Table 2 indicate that, in both seasons, there was a significant difference between two rice varieties (Giza 181 and Giza 175) in flag leaf area, Giza 181 recorded the highest flag leaf area, data also reveal that, flag leaf area was significantly affected by the time of N-application. N-application as 1/3 of N at 20 days "AT" + 2/3 of N at "PI" gave the highest flag leaf area, while adding N in two equal portions (1/2 of N in dry soil + 1/2 of N at 20 days "AT" recorded the lowest means of flag leaf area in the first and second seasons

Data in Table 2 also reveal that, each increase in N level up to 80 kg N/fed. significantly increased flat leaf area. The increase in flat leaf area due to N may be due to the role of N in the formation of the metabolites, which encourages the vegetative growth and increases leaf size. The previous results are in good agreement with those obtained by El-Kalla *et al.* (1988) and Ismail (1989).

Data in Tables 3, 4, 5 and 6 show that, in both seasons, flag leaf area was significantly affected by the interaction between rice varieties and either time or levels of N-application. Also, data reveal that, in both seasons, the interaction

Table 2. Effect of rice varieties, time of nitrogen application and nitrogen levels on growth characters of rice plant through two

Treatment	Plant Height (cm)		Flag leaf area (cm^2)		No. of panicle / m^2		Panicle length (cm)		No. filled grain / panicle		Sterility %		Panicle weight (g)		1000-grain weight (g)	
	1988	1989	1988	1989	1988	1989	1988	1989	1988	1989	1988	1989	1988	1989	1988	1989
Rice varieties																
Giza 175	81.70	82.50	28.42	29.11	517.50	525.70	24.70	24.71	120.50	122.90	9.76	10.26	2.90	2.91	20.06	20.12
Giza 181	82.40	82.70	23.52	24.10	428.70	226.20	24.76	24.38	129.30	131.20	6.11	6.40	3.77	3.83	24.52	24.54
F-test	N.S.	N.S.	ll	ll	ll	ll	N.S.	N.S.	ll	ll	ll	ll	ll	ll	ll	ll
Time of N-application																
T_1	28.80	28.80	22.54	23.59	508.50	509.20	25.19	24.69	132.30	135.30	7.40	7.79	3.50	3.51	22.42	22.51
T_2	81.92	81.92	27.44	28.05	458.00	461.70	24.47	24.55	122.50	125.70	8.13	8.51	3.36	3.37	22.25	22.30
T_3	81.51	81.51	27.61	28.18	453.00	456.70	24.56	24.39	117.60	120.10	8.27	8.69	3.15	3.22	22.21	22.17
L.S.D. at 5%	0.42	0.42	0.16	0.15	0.64	0.53	0.32	N.S.	1.36	1.35	0.14	0.11	0.06	0.05	0.02	0.15
L.S.D. at 1%	0.59	0.59	0.23	0.22	0.91	0.74	0.45	N.S.	1.82	1.89	0.20	0.16	0.09	0.07	0.12	0.21
N-levels																
00 kg N/fed.	76.65	76.65	16.66	17.90	408.20	400.00	24.06	24.01	103.80	106.50	6.73	7.05	2.82	2.93	21.46	21.52
20 kg N/fed.	81.16	81.16	23.52	24.20	462.50	460.00	24.52	23.66	115.60	118.10	7.52	7.91	3.16	3.18	21.87	21.87
40 kg N/fed.	83.09	83.09	28.01	28.13	476.60	480.00	24.90	24.87	126.40	129.00	8.05	8.49	3.44	3.44	22.57	22.57
60 kg N/fed.	84.22	84.22	28.90	29.93	514.50	525.00	24.08	25.02	139.10	142.40	8.47	8.90	3.65	3.66	22.79	22.85
80 kg N/fed.	84.20	84.20	32.07	32.86	504.00	510.00	25.13	25.10	136.20	139.20	8.85	9.29	3.62	3.65	22.77	22.83
L.S.D. at 5%	0.51	0.51	0.16	0.17	0.57	0.49	0.40	1.05	1.90	1.93	0.12	0.09	0.07	0.06	0.11	0.13
L.S.D. at 1%	0.68	0.68	0.20	0.22	0.76	0.64	0.54	1.39	2.50	2.55	0.16	0.12	0.09	0.08	0.14	0.17

T_1 = 1/2 of N in dry soil + 1/2 of N at 20 days "AT".
T_2 = 1/2 of N at 20 days "AT" + 1/2 of N at "PI".
T_3 = 1/3 of N at 20 days "AT" + 2/3 of N at "PI".

N.S. = Not signficant.
ll = Highly significant at 1%.

Table 3. Growth characters as affected by the interaction between rice varieties and time of nitrogen application.

Growth characters	Season	Rice varieties	Time of N-application			L.S.D.	
			T_1	T_2	T_3	5%	1%
Plant height (cm)	1988	G. 175	82.60	82.70	81.89	0.59	0.83
		G. 181	82.94	81.13	81.10		
	1989	G. 175	83.60	82.40	82.30	0.50	0.70
		G. 181	83.80	83.50	80.50		
Flag leaf area (cm^2)	1988	G. 175	22.54	24.50	24.81	0.22	0.31
		G. 181	23.52	30.38	31.36		
	1989	G. 175	23.00	24.52	24.79	0.20	0.31
		G. 181	24.18	31.59	31.56		
Filled grains/panicle	1988	G. 175	128.30	120.50	110.70	11.01	15.31
		G. 181	136.20	124.40	125.00		
	1989	G. 175	131.50	123.90	113.30	11.11	15.58
		G. 181	139.20	127.50	127.00		
Sterility %	1988	G. 175	8.96	10.05	10.28	0.20	0.28
		G. 181	5.85	6.22	6.27		
	1989	G. 175	10.55	12.44	12.69	0.16	0.23
		G. 181	6.39	6.77	6.91		
Panicle weight (g)	1988	G. 175	3.14	2.94	2.64	0.10	0.14
		G. 181	3.86	3.79	3.76		
	1989	G. 175	3.13	2.88	3.71	0.08	0.11
		G. 181	3.89	3.86	3.12		
1000-grain weight (g)	1988	G. 175	20.30	20.02	19.87	0.13	0.18
		G. 181	24.53	24.49	24.54		
	1989	G. 175	20.40	20.11	19.85	0.22	0.31
		G. 181	24.62	24.50	24.49		

T_1 = 1/2 of N in dry soil + 1/2 of N at 20 days "AT".
T_2 = 1/2 of N at 20 days "AT" + 1/2 of N at "PI".
T_3 = 1/3 of N at 20 days "AT" + 2/3 of N at "PI".

Table 4. Some growth characters as affected by the interaction betewen rice varieties and nitrogen levels.

Growth characters	Season	Rice variety	Nitrogen levels 0 kg N/fed.	20 kg N/fed.	40 kg N/fed.	60 kg N/fed.	80 kg N/fed.	L.S.D. 5%	1%
Plant height (cm)	1988	G. 175	75.80	81.80	83.70	84.70	85.80	0.73	0.96
		G. 181	77.40	80.50	82.40	83.70	84.60		
	1989	G. 175	76.90	82.20	83.70	84.80	86.00	0.57	0.76
		G. 181	79.10	81.80	83.60	84.50	83.40		
Flag leaf area (cm^2)	1988	G. 175	17.30	20.60	24.60	27.10	28.60	0.24	0.30
		G. 181	17.70	25.60	30.50	31.50	35.40		
	1989	G. 175	17.60	21.60	25.10	27.20	28.80	0.24	0.32
		G. 181	18.10	26.70	31.10	32.60	36.90		
Panicle weight (g)	1988	G. 175	2.38	2.65	2.79	3.25	3.27	0.10	0.13
		G. 181	3.26	3.67	3.91	4.05	3.97		
	1989	G. 175	2.47	2.64	2.96	3.02	3.27	0.09	0.12
		G. 181	3.33	3.72	3.93	4.18	4.02		
1000 - grain weight (g)	1988	G. 175	18.71	19.30	20.54	20.93	20.84	0.15	0.20
		G. 181	24.21	24.45	42.60	24.65	24.71		
	1989	G. 175	18.86	19.27	20.57	20.97	20.94	0.18	0.24
		G. 181	24.19	24.48	24.58	24.72	24.72		

Table 5. Some growth characters as affected by the interaction betewen time of nitrogen application and nitrogen levels.

Growth characters	Season	Time of N-application	Nitrogen levels (kg N/fed.) 00 kg	20 kg	40 kg	60 kg	80 kg	L.S.D. 5%	1%
Plant height (cm)	1988	T_1	75.70	81.10	84.10	85.50	87.10	0.89	1.19
		T_2	76.80	80.80	82.80	83.90	85.00		
		T_3	77.30	81.50	82.20	82.80	35.50		
	1989	T_1	76.70	82.10	85.00	86.60	88.10	0.70	0.94
		T_2	77.20	81.30	82.80	83.90	82.10		
		T_3	80.20	82.70	83.10	83.60	84.00		
Flag leaf area (cm^2)	1988	T_1	16.60	20.50	23.50	24.50	26.60	2.24	3.28
		T_2	16.90	24.50	27.40	29.40	34.30		
		T_3	16.60	24.90	29.50	32.30	34.30		
	1989	T_1	17.90	21.70	24.40	25.70	27.90	2.24	3.25
		T_2	18.00	25.60	29.10	31.50	35.80		
		T_3	17.60	25.20	30.80	32.40	34.70		
Field grains/panicle	1988	T_1	104.80	117.60	136.20	151.90	150.90	3.36	4.47
		T_2	105.80	116.60	123.40	137.20	131.30		
		T_3	101.90	112.70	118.50	128.30	125.40		
	1989	T_1	107.70	120.10	139.20	155.20	154.50	3.45	4.53
		T_2	108.00	117.10	126.20	140.70	134.30		
		T_3	104.00	115.10	121.70	131.20	128.70		
Sterility %	1988	T_1	6.75	7.06	7.44	7.67	8.10	0.30	0.39
		T_2	6.71	7.72	8.30	8.79	9.14		
		T_3	6.73	7.96	8.42	8.95	9.32		
	1989	T_1	7.11	7.44	7.83	8.08	8.47	0.23	0.31
		T_2	7.02	7.98	8.70	9.24	9.60		
		T_3	7.02	8.32	8.94	9.38	9.80		

T_1 = 1/2 of N in dry soil + 1/2 of N at 20 days "AT".
T_2 = 1/2 of N at 20 days "AT" + 1/2 of N at "PI".
T_3 = 1/3 of N at 20 days "AT" + 2/3 of N at "PI".

Table 6. Some growth characters as affected by the interaction betewen rice varieties, time of nitrogen application and nitrogen levels.

Growth Characters	Season	Rice varieties	Treatment	Nitrogen levels (kg N/fed.) 00 kg	20 kg	40 kg	60 kg	80 kg	L.S.D. 5%	1%
Flag leaf area (cm^2)	1988	G175	T_1	17.70	20.70	23.80	24.50	26.30	0.46	0.59
			T_2	17.80	24.50	28.10	30.60	34.60		
			T_3	17.50	24.70	26.70	32.70	33.80		
		G181	T_1	17.60	22.50	23.50	26.40	28.40		
			T_2	16.60	26.40	32.30	35.30	41.80		
			T_3	17.60	28.40	34.20	34.80	38.20		
	1989	G175	T_1	17.90	21.70	24.40	25.70	27.90	0.24	0.56
			T_2	18.00	25.60	27.10	31.50	35.80		
			T_3	17.60	25.20	30.80	32.40	34.70		
		G181	T_1	18.30	23.30	24.60	26.20	28.50		
			T_2	18.00	27.90	33.60	33.80	24.40		
			T_3	18.00	29.00	35.20	35.80	39.70		
No. of panicles $/m^2$	1988	G175	T_1	467.50	512.50	537.50	580.00	575.00	1.41	1.87
			T_2	430.00	525.00	512.50	537.50	530.00		
			T_3	474.00	505.00	512.50	537.50	517.50		
		G181	T_1	355.00	430.00	462.50	529.50	562.50		
			T_2	367.50	400.00	417.50	430.00	425.00		
			T_3	350.00	400.00	412.50	405.00	412.50		
	1989	G175	T_1	424.50	512.50	567.50	605.00	600.00	1.21	1.61
			T_2	467.50	505.00	530.00	530.00	542.00		
			T_3	475.00	505.00	512.50	550.00	530.00		
		G181	T_1	372.50	450.00	424.50	605.00	537.50		
			T_2	317.50	405.00	430.00	442.50	437.50		
			T_3	355.00	400.00	417.50	417.50	405.00		
Sterility %	1988	G175	T_1	7.79	8.95	9.09	9.37	10.11	0.29	0.39
			T_2	7.81	8.99	10.40	11.23	11.81		
			T_3	7.63	9.69	10.57	11.46	12.05		
		G181	T_1	5.71	5.67	5.79	5.79	6.09		
			T_2	5.61	6.45	6.12	6.36	6.46		
			T_3	5.83	6.23	6.26	6.44	6.59		
	1989	G175	T_1	8.22	8.89	9.55	9.78	10.55	0.23	0.30
			T_2	8.10	9.85	10.94	11.89	12.44		
			T_3	8.03	10.67	11.13	11.96	12.96		
		G181	T_1	6.05	5.89	6.11	6.28	6.39		
			T_2	5.93	6.38	6.46	6.59	5.77		
			T_3	6.02	6.28	6.74	6.80	6.91		

G. = Giza

among rice varieties, N-levels and time of its application had a marked effect on flag leaf area. The highest value was recorded from Giza 181 when fertilized with 80 kg N/fed. added as 1/3 of N 20 days "AT" + 2/3 of N at "PI".

3. Number of panicles /m^2:

Data in Table 2 show that, rice varieties significantly differed in numbers of panicles/m^2, in both seasons, Giza 175 surpassed Giza 181 in number of panicles/m^2. Data also, reveal that, timing and levels of nitrogen application had a significant effect of panicles/m^2 in the two seasons. Adding nitrogen in two equal portions, 1/2 of N in dry soil + 1/2 of N at 20 days "AT", recorded the highest number of panicles/m^2 followed by the treatment of 1/2 of N at 20 days "AT" + 1/2 of N at "PI" and treatment of 1/3 of N at 20 days "AT" + 2/3 of N at "PI". On the other hand, data in Table 2 indicate that 60 kg N/fed. was more efficient for producing the highest number of panicles/m^2 . The increase in number of panicles/m^2 by increasing N-levels may be due to the beneficial effect of available nitrogen on growth and development of panicles. Similar results were reported by Mahrous *et al.* (1986) and Ismail (1989).

Data in Table 6 indicate that, the interaction between rice varieties, N-levels and time of N-application was significant with respect to number of panicles/m^2 in both seasons.

4. Panicle length (cm):

Data in Table 2 show that, the rice varieties did not significantly differ in panicle length in both seasons, data also indicate that, timing and levels of N-application had a significant effect on panicle length in both seasons.

5. Number of filled grains/panicle:

Data in Table 2 indicate that, the highest numbers of filled grains per panicle were obtained from Giza 181 cultivar in both seasons. While Giza 175 produced the lowest number of filled grains/panicle. Data also reveal that, number of filled grains/panicle was significantly affected by time of N-application in both seasons. N-application in two equal portions 1/2 of N in dry soil + 1/2 of N at 20 days "AT" gave the highest number of filled grain/panicle, while 1/3 of N at 20 days "AT" + 2/3 of N at "PI" produced the lowest one.

Data in Table 2 reveal that, increase in N-levels up to 60 kg N/fed. significantly increased number of filled grains/panicle. These results are in harmony with those obtained by Aly *et al.* (1984) and Ismail (1989).

Data in Tables 3 & 5 indicate that, the interaction between time of N-application and either rice varieties or N-levels had a significant effect on number of filled grains/panicle in both seasons.

6. Spikelets sterility percentage:

In both seasons, data in Table 2 indicate that, sterility percentage was significantly differed in the two rice varieties. On one hand, the sterility percentage was significantly affected by the time of N-application, the treatment (1/3 of N at 20 days "AT" + 2/3 of N at "PI") recorded the highest sterility percentage while the treatment (1/2 of N in dry soil + 1/2 of N at 20 days "AT" recorded the lowest one. On the other hand, the sterility percentage was significantly affected by N-levels, each increase in nitrogen rate up to 80 kg N/fed. markedly increased spikelets sterility percentage. Similar results were obtained by Badawi and Mahrous (1985).

Data in Tables 3, 5 and 6 indicate that, the interaction between time of N-application and the rice varieties had a significant effect on sterility percentage. The interaction between time of N-application and N-levels was also significant. Again, the interaction between rice varieties, N-levels and time of N-application had a significant effect on sterility percentage. Sterility percentage recorded its maximum from treatment including Giza 181when fertilized with 80 kg N/fed. added in 2 equal portions, 1/2 of N in dry soil + 1/2 of N at 20 days "AT" in both seasons.

7. Panicle weight (g):

Data in Table 2 in both seasons indicate that, panicle weight value was significantly affected by either time of N-application or N-levels. The highest values of panicle weight were obtained with treatment (1/2 of N in dry soil + 1/2 of N at 20 days "AT") while the lowest ones were obtained with treatment (1/3 of N at 20 days "AT" + 2/3 of N at "PI"). Data also reveal that the N-level as 80 kg N/fed. did not induce an increase in panicle weight compared with 60 kg N/fed. Similar observations were reported by Niao (1987) and Ismail (1989).

Data in Tables 3 & 4 show that, panicle weight value was significantly affected by the interaction between the rice varieties and either time of N-application or

N-levels in the two seasons under study.

8. 1000-grain weight (g):

Data in Table 2 show in both seasons that, 1000-grain weight was markedly different for the two rice varieties. Giza 181 cultivar surpassed Giza 175 in this trait. Data also reveal that, 1000-grain weight was significantly affected by the time of N-application, the highest values of 1000-grain weight were obtained with treatment (1/2 of N in dry soil + 1/2 of N at 20 days "AT", while the lowest ones were obtained with treatment (1/3 of N at 20 days "AT" + 2/3 of N at "PI").

As regards of the N-levels, 1000-grain weight was significantly increased as N-levels increased. The highest values of 1000-grain weight were obtained by 60 kg N/fed. Similar results were in agreement with those obtained by Lielah *et al.* (1988).

Data in Tables 3 & 4 reveal in both seasons that, 1000-grain weight was significantly affected by the interaction between rice varieties and time of N-application. The highest 1000-grain weight was obtained from Giza 181 when nitrogen was applied as (1/2 of N in dry soil + 1/2 of N at 20 days "AT"), while the lowest ones obtained from Giza 175 when nitrogen was added as (1/3 of N at 20 days "AT" + 2/3 of N at "PI").

Also, in both seasons, 1000-grain weight was markedly affected by the interaction between rice varieties and N-levels. The highest 1000-grain weight was obtained from Giza 181 when fertilized with 60 or 80 kg N/fed.

REFERENCES

1. Agasimani, C.A., S.K. Hazra, and A.K. Ghesh. 1983. Influence of stand geometry and nitrogen on growth parameters and yield of two rice varieties. Indian J. of Agric. Res., 17(4): 198-202.
2. Aly, A.E., M.I. Shaalan, and M.E. Shaalan. 1984. Effect of nitrogen and zinc sulphate levels on transplanted rice. J. Agric. Res. Tanta Univ., 10(4): 125-158.
3. Badawi, A.T. and F.N. Mahrous. 1985. Optimizing agronomic practices for broadcast-seeded rice. J. Agric. Res. Tanta Univ., 11(2) 1985, pp 286-278.
4. Bhatti, A. and A.W. Khan. 1981. Comparative study on the time of application of

nitrogenous fertilizer to IRRI paddy at various stages of growth. Agric. Pakistan 1977, 28(1): 47-53. (EN, 12 ref.) Agric. Res. Sta., Dera Ismail Khan Pakistan (c.f. Field Crop Abstr., 1981 Vol. 34 No. 1).

5. El-Kalla, S.E., A.T. El-Kassaby, A.N. Attia, and I.O. El-Sayed. 1988. Response of rice cultivar (IR 50) to nitrogen and zinc sulphate application. J. Agric. Sci. Mansoura Univ., 13(2): 629-634.
6. Gomez, K.A. and A.A. Gomez. 1984. Statistical procedures for agricultural roses. 2nd Ed., John Wiley & Sons.
7. Ismail, M.M. 1989. Response of some rice cultivars to fertilizers and Weed control treatments. M.Sc. Thesis Fac. of Agric. Mansoura Univ., Egypt.
8. Jackson, K.L. 1967. Soil Chemical Analysis. Prentice-Hall of India Pvt. Ltd., New York.
9. Leilah, A.A. and S.E. El-Kalla. 1989. Effect of rates and timing of nitrogen application on growth and yield of some rice cultivars. J. Agric. Sci. Mansoura Univ., 14(1): 52-57.
10. Leilah, A.A., S.M. Hassan, and A.H. Abdel-Rahman. 1988. Effect of nitrogen fertilization levels, herbicides and plant growth regulator (PGR-IV) on transplanted rice and its associated weeds. J. AGric. Sci. Mansoura Univ., 13(4): 1531-1537.
11. Mahrous, F.N., A.T. Badawi and M.S. Balal. 1986. IR 1626. Long grain rice variety as influenced by sowing dates, seeding spacing and nitrogen levels. Proc. 2nd Conf. Agron. Alex. Egypt., Vol. 1: 115-117.
12. Naio, A.B. 1987. Response of rice to nitrogen split application on a saline soil (IRRN) International Rice Res. Newsletters, 2: 1 (Feb.) 27.
13. Page, A.L. 1982. Methods of Soil Analysis, Part II, Chemical and Microbiological Properties. Second Edition. Madison, Wisconsin USA.
14. Reddy, G.R.S., G.B. Reddy, N.V. Ramish, and G.V. Reddy. 1986. Effect of different levels of nitrogen and forms of urea on growth and yield of wetland rice. Indian J. of Agron. 31(2): 195-197.
15. Waller, R.A. and D.B. Duncan. 1969. A bayes rule for symmetric multiple comparison problem. J. Amer. Stat. Assoc., 64: 1484-1503.

تأثير مستوى التسميد النيتروجيني ومواعيد الاضافة على صفات النمو لبعض أصناف الأرز

سعيد السيد حجى ، سمير صديق مجلع ، امير شكرى عبد النور ، علاء البابلى

معهد بحوث الاراضى والمياه – مركز البحوث الزراعية – الجيزة

أقيمت تجربتان حقليتان فى موسمى ١٩٨٨ و ١٩٨٩ فى مزرعة الخادمية بكفر الشيخ لدراسة تأثير خمسة معدلات تسميد نيتروجين (صفر و ٢٠ و ٤٠ و ٦٠ و ٨٠ كجم نيتروجين للفدان) بثلاث مواعيد اضافة (نصف كمية النيتروجين مختلط بالارض الجافة قبل الشتل + نصف الكمية بعد ٢٠ يوم من الشتل نصف كمية التيتروجين بعد ٢٠ يوم من الشتل + نصف الكمية عند بداية تكوين الداليات ٣/١ كمية التيتروجين بعد ٢٠ يوم من الشتل + ٣/٢ الكمية عند بداية تكوين الداليات) على صفات النمو (طول النبات /سم ، مساحة ورقة العلم/ سم^{٢} ، عدد السنابل /م٢ ، طول الدالية/ سم ، عدد الحبوب الممتلئة / دالية ، النسبة المئوية للعقم ، وزن الدالية/ جم ، وزن الالف حبة /جم) لصنفين من الارز جيزة ١٧٥ وجيزة ١٨١.

اوضحت النتائج تفوق الصنف جيزة ١٨١ على الصنف جيزة ١٧٥ فى مساحة ورق العلم وعدد الحبوب الممتلئة واقل نسبة عقم ووزن الداليات ووزن الالف حبة. كما ان اضافة النيتروجين على دفعتين متساويتين نصف الكمية مختلطة بالارض قبل الشتل + نصف الكمية بعد ٢٠ يوما من الشتل أدت الى زيادة معنوية فى طول النبات وعدد الحبوب الممتلئة وأقل نسبة عقم وزيادة وزن الدالية ووزن الالف حبة.

أثرت مستويات التسميد النيتروجينى معنويا على معظم صفات النمو تحت الدراسة فى كلا الموسمين حيث أدى زيادة معدلات التسميد النيتروجينى حتى ٦٠ كجم / فدان الى زيادة معنوية في عدد الداليات / م^{٢} وعدد الحبوب الممتلئة / دالية ووزن الدالية ووزن الالف حبة. وكان للتفاعل بين الاصناف ومواعيد الاضافة تأثير معنوى على صفة طول النبات ومساحة ورق العلم ووزن الدالية ووزن الالف حبة وعدد الحبوب الممتلئة للعقم حيث سجلت المعاملة التى تحتوى على صنف الارز جيزة ١٨١ عند اضافة النيتروجين على دفعتين متساويتين نصف الكمية مختلطة بالارض قبل الشتل + نصف الكمية بعد ٢٠ يوم الشتل اعلا قيم لصفة عدد الحبوب الممتلئة ووزن الدالية ووزن الالف حبة وأقل نسبة مئوية للعقم بينما سجل الصنف جيزة ١٧٥ اعلا قيم فى صفة طول النبات تحت تأثير المعاملة السابقة.