PERFORMANCE OF EGYPTIAN HYBRID RICE UNDER DIFFERENT NITROGEN FERTILIZER SOURCES

EL-REWAINY, I. M., T. F. METWALLY, W. H. M. EL-KALLAWY AND E.S. NAEEM

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

Abstract

Low levels of available nitrogen in soils may limit rice growth. To characterize the response of rice to nitrogen fertilizer, this investigation was undertaken at the farm of Rice Research and Training Center, Sakha, Kafr El-Shiekh during 2008 and 2009 rice growing seasons to study the performance of Egyptian hybrid rice 1 (EHR1) under different nitrogen fertilizer sources as individual or in combination on growth, yield, and its components. All growth traits, i.e. plant height, number of tillers hill^{-1}, chlorophyll content, as well as, dry matter accumulation were significantly affected by N sources. Application of 46 kg N fed^{-1} plus 7 tons FYM fed^{-1} recorded the highest values of these traits at all different growth stages, while the untreated treatment (control) gave the lowest values. Concerning yield and its attributes, applications of 46 kg N fed^{-1} plus 7 tons FYM fed^{-1} produced the highest values of panicle length, panicle grain weight, number of panicles hill^{-1}. The control treatment gave the minimum values of the above mentioned traits.

Key words: Hybrid Rice, FYM, Composted Rice Straw

INTRODUCTION

Rice (Oryza sativa L.) is one of the most important cereal crops of the world, grown in wide range of climatic zones, to nourish the mankind. Introduction of hybrid rice is an important step towards augmentation by about 15-20% more than the promising high-yielding cultivar. Earlier studies revealed that judicious and proper use of fertilizers can markedly increase the yield and improve the quality of rice (Chaturvedi 2005). Increasing rice production can be achieved also through improving over all management system of crop culture, especially the nutrient management of the crop, as well as the proper utilization of different sources of nutrients, i.e. the natural nutrient reserve of soil, chemical, organic and bio–fertilizer. The nutrient management aims to reduce agrochemical use and enhance soil fertility through using different sources of nitrogen fertilizer.

None of such sources is complete or sufficient to sustain soil fertility and crop productivity, hence the former is obliged to use more levels of the inorganic chemical fertilizers. Generally urea is the most convenient N source for rice. The efficiency of the urea-N in rice culture is very low, generally around 30–40%, in some cases even lower (Choudhury and Kennedy 2005).

The application of the organic fertilizers such as the farmyard manure, compost and green manure, will increase the organic matter content, which serves neural advantages like conservation and slow release of nutrients. These advantages lead to increasing the fertility and productivity of the soil. Nitrogen fertilizer losses through different mechanisms can be minimized by reducing the amount of applied fertilizer with an efficient use of N by the rice plant. Plant growth promoting microorganisms can reduce the use of urea-N by growth promotion through the production of auxins, cytokinins, gibberellins, and ethylene (Dobbelaere *et. al.* 2003). Wide range of biological nitrogen fixing agents (*BNF agents*), i.e. *Cynobacteria* and *Azospirillum spp.* (bacteria are indigenous and can be grain in the flooded rice fields, where sufficient water and an aerobic condition are favorable to their growth. The BNF technology are considered important for long term maintenance of soil fertility, economically justifiable and environmentally safe if the benefits to farmers such as fertilizer savings, improving soil properties, reducing pests and diseases and reducing environmental pollutions. The replenishment can be attained by using a combination of different sources of N fertilizer.

Roger (1995), recorded an average in yield of 19.8 % due to bacterial inoculation of rice. Average increase was higher in inoculated plots (27.6%) than in the un-inoculated plots (14%). Similar trend was obtained for harvest index value. Also, N fertilizer efficiency in control plots was 18.7 Kg grain/ kg N applied while for inoculated plots was 19.1 kg grain/kg N applied. El – Hawary and Hammodua (1986), found that application of certain partially decomposed organic manure, gain significant increase in rice grain yield. They reported also that application of these amendments with *Azotobacter* spp, gave higher yield compared to their application without bacteria.

Annually, the amount of agricultural waste produced in Egypt is enormous especially rice straw. The effect of using agricultural waste composts to fertilize agricultural land has been positive from the perspective of a recycling economy and because of their valuable characteristics and ingredients (Eneji, *et. al.* 2001). Baziramakenga and Simard (2001) reported that organic materials contained many essential elements at low concentrations, which were slowly released upon decomposition. Manure is used mainly as a source of nitrogen (N) and phosphorus (P) (Materechera and Salagae 2002). The soil pH, organic carbon, and available P and potassium (K) concentrations of soils increased with the application of compost. Application of manure enhanced rice nutrient accumulation and dry matter yield (Eneji, *et. al.* 2001).

The objective of the present study was to measure Egyptian hybrid rice 1 variety (EHR1) response to different nitrogen source combinations.

MATERIALS AND METHODS

The present investigation was conducted at the farm of Rice Research and Training Center Sakha, Kafr El- Shiekh, Egypt during 2008 and 2009 rice growing seasons to study the effect of inorganic N, organic N, bio-N fertilizers and their combinations on the productivity of Egyptian hybrid rice 1. The inorganic fertilizer as urea (46% N), farmyard manure as cattle manure and bacterial inoculation as *Azospirillum* spp (commercial name Cerialen) were used (Table2). Ten nitrogen treatments, control (T_1), 69 kg N fed.$^{-1}$ as urea (T_2), 7 t FYM fed^{-1} (T_3), 2 tons composted rice straw fed.$^{-1}$ (T_4), Bacterial inoculation (BI) 400 gm Cerialen fed.$^{-1}$ (T_5), 46 kg N fed.$^{-1}$ + 7 t FYM fed^{-1} (T_6), 46 kg N fed.$^{-1}$ + 2 tons composted rice straw fed.$^{-1}$ (T_7), 46 kg N fed.$^{-1}$ + BI (T_8), 7 t FYM fed^{-1} + BI (T_9) and 2 tons composted rice straw fed.$^{-1}$ + BI (T_{10}). Mechanical and chemical soil analysis is presented in Table 1. Also the chemical analysis of compost and farm yard manure which used in this trial are shown in Table 2.

Table 1. Some physical and chemical properties of the soil at the experimental site during 2008 and 2009 season.

Soil properties	2008	2009
Mechanical analysis		
Clay %	44.06	55.80
Silt %	28.64	32.00
Sand %	27.30	13.20
Textere	Clay	Clay
Chemical analysis		
Organic matter %	1.65	1.60
Total nitrogen , mg/kg	560.00	540.00
Available P, mg/kg	15.00	17.00
pH (1:2.5 soil suspension)	8.10	8.19
EC ds.m^{-1} (soil paste)	3.00	3.10
Soluble cations, meq. L^{-1} :		
Ca^{++}	9.50	10.00
Mg^{++}	3.94	3.98
K^+	1.76	1.80
Na^+	14.80	15.20
Solube anions, meq. L^{-1}		
$CO_3^=$	0.00	0.00
HCO_3^-	6.00	6.75
Cl^-	8.30	8.44
$SO_4^=$	15.7	15.79
Available micronutrients ppm		
Fe^{++}	6.10	5.80
Zn^{++}	1.10	1.05
Mn^{++}	3.50	3.01

Table 2 . Some chemical analysis of the organic matter (farmyard manure and composted rice straw)

Characters	C%	N%	C/N Ratio	P%	K%	Fe ppm	Mn ppm	Zn ppm
FYM	34.4	1.30	26.70	0.38	0.39	600	300	69
Composted rice straw	28.5	1.83	15.57	2.30	2.43	510	490	54

Randomized complete block design with four replication was used. Each sub-plot was 3 m in width and 5 m in length. All the recommended cultural practices were followed for seedbed preparation, as well as, for permanent field. The decomposed farm yard manure and compost fertilizer were applied in dry soil then incorporated well during tillage. Inorganic N fertilizer two third of the used dose (69 kg N/fed.) was applied before flooding in the dry soil and one third 5 days before panicle initiation stage. The inoculation of bacteria was performed according to the method described by Omer et al. 1989.

As for the bacterial inoculation treatment in the nursery, the pre-germinated seeds were mixed with the bacterial suspension overnight just before sowing (*Azospirillum as* powdered inoculums (water adhesive like sugar or gum). Thus, each seed received about 10^8 bacterial cells. Then, the seeds were broadcasted in nursery on May 5 and May 9 in 2008 and 2009 seasons respectively. In permanent field at transplanting the seedlings were inoculated again by soaking their roots over night in the corresponding bacterial suspension to complete the required rate of bacterial fertilizers. Preparation of compost from rice straw was prepared according to method described by Naeem 2006. To estimate growth characters at maximum tillering and panicle initiation stages, three hills per plot were randomly identified and the number of tillers $hill^{-1}$ was counted, chlorophyll content (SPAD value) was measured using Chlorophyll–Metter, and plant height was measured then the three hills were cut at the soil surface, washed and transferred to the lab. It was dried and weighted for determine the total dry weight. The average of the number of tillers, plant height and panicle length, the number of panicles per hill, panicle weight, number of filled grains per panicle , 1000 grain weight and grain yield were estimated at harvest in each plot, and grain yield were calibrated to 14% moisture basis.

The collected data for traits were subjected to the analysis of variance according to the procedure outlined by Gomez and Gomez (1984). Differences among treatment means were compared using the Revised L.S.D at 5% levels of significance adopted by Waller and Duncan (1969). The homogeneity test was conducted and accordingly, the combined analysis was carried out between years because errors were homogeneous.

RESULTS AND DISCUSSION

The fertilizer treatments had a significant effect on plant growth at different growth stages (Tables 3, 4 and 5). Plant height was increased gradually with increasing plant age. All nitrogen treatments caused significant increases in plant height. The application of 46 kg N as urea + 7 t FYM fed^{-1} recorded the tallest (unfavorable) plants at different growth stages, while the application of 400 gm Cerialen alone gave the shortest plants. The increase in plant height in response to application of N fertilizers is probably due to enhanced availability of nitrogen cause an increase in cell deviation and elongation. These results are supported by the findings of Mandal et al. (1992) and (Chaturvedi 2005).

Table 3 . Plant height (cm), number of tillers $hill^{-1}$, chlorophyll content (SPAD), and dry matter accumulation (g) $hill^{-1}$ of Egyptian hybrid rice 1 at maximum tillering stage as affected by different nitrogen fertilizer sources and their combination .

Treatment	Plant height (cm)	Number of tillers $hill^{-1}$	Chlorophyll content SPAD	Dry matter accumulation (g) $hill^{-1}$
Control (no fertilizer added)	55.49	19.77	29.84	21.94
69 kg N fed^{-1} Urea	81.81	31.21	40.10	42.96
7 t FYM fed^{-1}	71.31	27.12	39.06	40.38
2 t composted rice straw fed^{-1}	60.49	24.36	37.58	35.24
400 gm Cerialen	63.20	23.51	38.19	29.48
46 kg N fed^{-1} Urea + 7 t FYM fed^{-1}	86.41	33.11	40.61	57.94
46 kg N fed^{-1} Urea + 2 t composted rice straw fed^{-1}	82.12	27.00	38.63	55.67
46 kg N fed^{-1} Urea + 400 gm Cerialen	80.22	29.14	39.60	57.96
7 t FYM fed^{-1} + 400 gm Cerialen	73.37	31.86	40.83	42.78
2 t composted rice straw fed^{-1}+ 400 gm Cerialen	55.12	19.26	36.89	36.35
L.S.D. 0.05	*3.176*	*1.529*	*1.175*	*2.52*

Table 4. Plant height cm, number of tillers $hill^{-1}$, chlorophyll content (SPAD), and dry matter accumulation (g) $hill^{-1}$ of Egyptian hybrid rice 1 at complete heading stage as affected by different nitrogen fertilizer sources and their combination.

Treatment	Plant height (cm)	Number of tillers $hill^{-1}$	Chlorophyll content SPAD	Dry matter accumulation (g) $hill^{-1}$
Control (no fertilizer added)	84.29	17.91	35.55	62.25
69 kg N fed^{-1} Urea	97.93	28.51	46.01	161.42
7 t FYM fed^{-1}	98.00	23.85	44.26	152.03
2 t composted rice straw fed^{-1}	92.54	19.43	41.35	114.36
400 gm Cerialen	89.14	19.71	44.51	120.33
46 kg N fed^{-1} Urea + 7 t FYM fed^{-1}	106.75	29.21	49.06	200.41
46 kg N fed^{-1} Urea + 2 t composted rice straw fed^{-1}	97.01	25.29	44.62	162.31
46 kg N fed^{-1} Urea + 400 gm Cerialen	105.63	27.43	46.60	169.90
7 t FYM fed^{-1} + 400 gm Cerialen	96.40	27.29	45.28	177.36
2 t composted rice straw fed^{-1}+ 400 gm Cerialen	90.66	18.30	44.65	118.35
L.S.D. 0.05	*2.815*	*1.606*	*1.660*	*3.66*

Table 5. Plant height (cm), number of tillers $hill^{-1}$, chlorophyll content SPAD, and dry matter accumulation (g) $hill^{-1}$ of Egyptian hybrid rice 1 at harvest as affected by different combinations of nitrogen fertilizer sources and their combination.

Treatment	Plant height (cm)	Number of tillers $hill^{-1}$	Dry matter accumulation (g) $hill^{-1}$
Control (no fertilizer added)	86.71	14.06	84.34
69 kg N fed^{-1} Urea	104.74	26.38	180.82
7 t FYM fed^{-1}	97.05	22.51	174.04
2 t composted rice straw fed^{-1}	92.54	17.09	126.45
400 gm Cerialen	89.99	17.14	140.5
46 kg N fed^{-1} Urea + 7 t FYM fed^{-1}	104.52	25.18	228.04
46 kg N fed^{-1} Urea + 2 t composted rice straw fed^{-1}	96.82	23.99	194.81
46 kg N fed^{-1} Urea + 400 gm Cerialen	103.19	25.43	194.82
7 t FYM fed^{-1} + 400 gm Cerialen	98.09	26.84	199.65
2 t composted rice straw fed^{-1}+ 400 gm Cerialen	92.11	16.76	145.34
L.S.D. 0.05	*2.772*	*1.314*	*4.32*

Number of tillers hill^{-1} at different growth stages as affected by different N sources and their combinations is presented in Table 4. With increasing rice plant age number of tillers per hill decreased. Also, data showed that all N treatments significantly affected number of tillers at all studied growth stages. Application of 46 kg N ha^{-1} as urea plus 7 t FYM fed^{-1} produced the highest number of tillers hill^{-1} followed by the application of 69 kg N fed^{-1} urea alone, while the lowest value was recorded at the control (untreated treatments). More number of tillers m^{-2} might be due to the more availability of nitrogen that played a vital role for enhancing the ground nodes to raise more tillers. These results are in accordance to the findings of (Chaturvedi 2005).

Regarding chlorophyll content, data in Table 3 and 4 showed that all N treatments recorded significant increases in chlorophyll content compared with control. At maximum tillering stage, the application of 7 t FYM fed^{-1} + 400 gm Cerialen gave the highest values of chlorophyll content with no significant differences with the application of either 46 kg N fed^{-1} Urea + 7 t FYM fed^{-1} or 69 kg N fed^{-1} Urea. At complete heading stage, application of 46 kg N fed^{-1} Urea + 7 t FYM fed^{-1} produced the highest values of chlorophyll content.

Dry matter accumulation hill^{-1}, was determined at the three different growth stages. Dry matter accumulation significantly increased when N fertilizer applied to Egyptian hybrid rice 1 at all the growth stages of the crop Table 6. All N treatments significantly produced more dry matter than control. Also, dry matter was increased with advanced age. The highest value of dry matter accumulation at the three growth stages was obtained when plants received 46 kg N as urea plus 7 t FYM fed^{-1}.

Yield attributes, viz panicle length, no. of panicles hill^{-1}, panicle weight, 1000-grain weight, number of filled grains panicle^{-1}, as well as grain yield t fed^{-1} are presented in Tables 6&7. Application of 46 kg N fed^{-1} as urea plus 7 t FYM fed^{-1} produced the longest panicles and with par at both either applied 69 kg N fed^{-1} or 7 t FYM fed^{-1} alone and those treatments surpassed the rest treatments, while the shortest panicles were obtained from control.

Table 6 . Panicle length (cm), No. of panicles hill-1 and Panicle weight (g) of Egyptian hybrid rice 1 as affected by different combinations of nitrogen sources.

Treatment	Panicle length cm	No. of panicle hill^{-1}	Panicle weight g
Control (no fertilizer added)	20.573	13.02	2.82
69 kg N fed^{-1} Urea	24.121	25.07	4.409
7 t FYM fed^{-1}	24.023	22.31	4.282
2 t composted rice straw fed^{-1}	21.138	16.71	3.373
400 gm Cerialen	21.946	16.67	3.647
46 kg N fed^{-1} Urea + 7 t FYM fed^{-1}	24.479	24.62	4.758
46 kg N fed^{-1} Urea + 2 t composted rice straw fed^{-1}	23.455	23.74	4.250
46 kg N fed^{-1} Urea + 400 gm Cerialen	22.075	24.21	3.784
7 t FYM fed^{-1} + 400 gm Cerialen	23.736	25.21	4.228
2 t composted rice straw fed^{-1}+ 400 gm Cerialen	22.254	16.04	3.890
L.S.D. 0.05	*0.5111*	*1.123*	*0.159*

Concerning number of panicles hill^{-1}, application of 7 t FYM fed^{-1} + 400 gm Cerialen gave the highest number of panicles without significant difference from applying either 69 kg N fed^{-1} or 46 kg N fed^{-1} plus either 7 t FYM fed^{-1} or 400 gm

Cerialen. However, the lowest no. of panicles values was obtained when plants fertilized with compost and Bacteria together. All N treatments gave significant values compared with the control..

Regarding panicle weight, all N sources gave higher significant values compared with control which recorded the lowest value of panicle weight. The increase in panicle weight with N-fertilizer application might be due to the increase in photosynthetic rate and ultimately high amount of assimilates available during grain development.

Results of the combined analysis of the two seasons indicated that the number of filled grains panicle^{-1} was significantly affected by the different nitrogen treatments. The application of 46 kg N fed^{-1} Urea + 7 t FYM fed^{-1} produced the highest number of filled grains panicle^{-1} compared with the other N treatments (Table 7).

The increase in number of filled grains per panicle was probably due to better nitrogen status of plant which caused increase the photosynthesis during filling period.

Table 7. No of filled grains panicle^{-1}, 1000 grain weight (g) and grain yield (t) fed.$^{-1}$ of Egyptian hybrid rice 1 as affected by different combinations of nitrogen sources.

Treatment	No of Filled grains panicle^{-1}	1000 grain weight (g)	Grain yield (t) fed.$^{-1}$
Control (no fertilizer added)	115.16	21.50	2.72
69 kg N fed^{-1} Urea	184.91	22.92	4.60
7 t FYM fed^{-1}	190.04	20.49	4.03
2 t composted rice straw fed^{-1}	159.13	21.77	3.23
400 gm Cerialen	161.86	20.70	3.21
46 kg N fed^{-1} Urea + 7 t FYM fed^{-1}	205.09	21.70	4.93
46 kg N fed^{-1} Urea + 2 t composted rice straw fed^{-1}	188.31	20.02	4.32
46 kg N fed^{-1} Urea + 400 gm Cerialen	173.73	22.15	4.75
7 t FYM fed^{-1} + 400 gm Cerialen	183.89	22.31	4.55
2 t composted rice straw fed^{-1}+ 400 gm Cerialen	164.00	21.98	3.16
L.S.D. 0.05	*3.398*	*1.56*	*0.44*

As for 1000 grain weight, significant differences were detected among all N treatments. Application of 69 kg N Urea produced the heaviest 1000-grain weight, while application of 46 kg N as Urea mixed with 2 t composted rice straw fed^{-1} gave the lowest value.

Grain yield tons fed^{-1} as affected by N sources or their combinations are presented in Table 7.There were significant increases in grain yield with applying different N sources. As a logic result applying 46 kg N fed^{-1} as Urea plus 7 t FYM fed^{-1} produced the maximum value of grain yield with no significant differences from 46 kg N fed^{-1} as Urea + 400 gm Cerialen, 69 kg N fed^{-1} as urea and applying 7 t FYM fed^{-1} plus 400 gm Cerialen. There was a very close relation between the yield and its components, especially with number of filled grains per panicle. The improved growth traits, such as plant height, chlorophyll content and dry-matter production improved yield attributes. It was found that application of nitrogen fertilizer improved various rice crop parameters like panicle length, more productive tillers, number of filled grains per panicle and 1000–grain weight thus resulting in higher yields (Chaturvedi 2005)

In the light of obtained results it could be deduced that utilization of 46 kg N fed^{-1} as Urea in combination with 7 t FYM fed^{-1} is more favorable, most efficient and best economically way for rice production under the present experimental conditions for the following reason, increase rice grain yield and maintain the soil fertility.

However, in case of producing the organic rice without reduction in grain yield, utilization of 7 tons FYM fed^{-1} plus 400 gm Cerialen could be recommended.

REFERENCES

1. Baziramakenga, R. and R.R. Simard. 2001. Effect of deinking paper sludge compost on nutrient uptake and yields of snap bean and potatoes grown in rotation. Compost Sci. and Utiliz. 9: 115–126.
2. Chaturvedi, Indira. 2005. Effect of nitrogen fertilizers on growth, yield and quality of hybrid rice *(oryza sativa)*. Journal of Central European Agriculture. 6(4):611-618.
3. Choudhury, A. T. M. A. and I. R. Kennedy. 2005. Nitrogen Fertilizer Losses from Rice Soils and Control of Environmental Pollution Problems. Communications in Soil Science and Plant Analysis, 36: 1625–1639.
4. Dobbelaere, S., J. Vanderleyden and Y. Okon. 2003. Plant growth promoting effects of diazotrophs in the rhizosphere. Critical Rev. Plant Sci., 22: 107–149.
5. El-Hawarry, F.I.F. and M. Hamouda. 1986. Effect of certain organic amendments on the efficiency of inoculation with Azotobacter ssp. J. Agric. Sci. Mansoura Univ.13(2) 629-634.
6. Eneji, A.E., S.Yamamoto and T. Honna. 2001. Rice growth and nutrient uptake as affected by livestock manure in four Japanese soils. Journal of Plant Nutrition, 24: 333–343.
7. Gomez, K.A. and A.A. Gomez. 1984. Statistical procedure for agicultural research. 2nd Ed. Johin Wiley Sons. New yourk. USA.
8. Mandal, N.N., P.P. Chaudhry and D. Sinha. 1992. Nitrogen, phosphorus and potash uptake of wheat (var. Sonalika). Env. and Eco. 10: 297 (Field Crop Abst. 46 (1): 30.

9. Materechera, S.A. and A.M. Salagae. 2002. Use of partially decomposed cattle and chicken manure amended with wood ash in two South African arable soils with contrasting texture: Effect on nutrient uptake, early growth, and dry matter yield of maize. Communications in Soil Science and Plant Analysis, 33: 179–201.
10. Naeem, E.S. 2006. Availability of some nutrient elments in flooded rice soils fertilized with organic and mineral nitrogen fertilizers. Ph.D. thesis. Fac. Aric., Mansoura Univ.
11. Omer, N. , T. Heulin, P. Weinhord, M.N. Alaa El Deen and J. Balandreau. 1989. Field inoculation of rice with vitro selected plant growth promoting rhizobacteria. Agronomie.9 (8):803-808.
12. Roger, P.A. 1995. Biological N2 fixiation and its managmentsin wetland rice cultivation. Fertilizer Res. 42:261-276.
13. Waller, R.A. and D.B. Duncan. 1969. Base rule comparison symmetric multiple comparison proplem. Amer – stat Assoc. J. 1485-1503.

سلوك صنف الأرز "هجين مصري ١" تحت مصادر مختلفة من التسميد الازوتي

ابراهيم محمد الرويني، تامر فاروق متولي، وائل حمدي الكلاوي، السيد سعد نعيم

مركز البحوث والتدريب في الارز- معهد بحوث المحاصيل الحقلية - مركز البحوث الزراعية

تعتيـــر المـــستويات المنخفـــضة مـــن النتـــروجين الميـــسر بالتربـــة احـــد العوامـــل المحـــددة لنمـــو محـــصول الارز . قـــد اجريـــت تجربتـــان حقليتـــان فـــي موســـمي الزراعـــة ٢٠٠٨و٢٠٠٩ م فـــي مزرعـــة مركـــز البحـــوث والتـــدريب فـــي الارز بـــسخا , كفـــر الـــشيخ , لتقيـــيم تـــاثير التوليفـــات المختلفـــة مـــن النتـــروجين المعـــدني والعـــضوي والحيـــوي علـــي ســـلوك صـــنف الأرز هجـــين مـــصري ١ . اوضـــحت النتـــائج ان معظـــم الـــصفات المدروســـة أظهـــرت اختلافـــات معنويـــة بـــين المعـــاملات المدروســـة كمـــا اظهـــرت النتـــائج ايـــضا ان اســـتخدام ٤٦ كجـــم نيتـــروجين / فـــدان + ٧ طـــن ســـماد بلدي / فدان قـــد اعطـــت اعلـــي القـــيم فـــي كـــل الـــصفات المدروســـة والتـــي تتمثـــل فـــي النمـــو الخـــضري والمحـــصول ومكوناتـــه بينمـــا اظهـــرت معاملـــة الكنتـــرول اقـــل القـــيم في كل الصفات المدروسة.