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RESPONSE OF EGYPTIAN HYBRID1 RICE TO ORGANIC AND INORGANIC SOURCES OF NITROGEN FERTILIZER

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ABSTRACT

Rice is an important food crop in Egypt and allover the world. Low levels of available nitrogen in soils may limit rice growth. An investigation was undertaken at the farm of Rice Research and Training Center, Sakha, Kafr El-Sheikh during 2010 and 2011 rice growing seasons. The objective of this investigation was aimed to evaluate the effect of different nitrogen source combinations on growth, yield and its components of Egyptian hybrid rice 1 (EHR1). Also, the effect of fertilizer combinations on rice stem borer was considered. All growth traits i.e. plant height, chlorophyll content as well as dry matter accumulation differed significantly by N sources combination. Application of 46 kg N fed^{-1} plus 7 tons of FYM fed^{-1} recorded highest values of these traits at all different growth stages, while the untreated control treatment gave the lowest ones. Applications of 46 kg N fed^{-1} plus 7 tons FYM fed^{-1} produced tallest panicles, highest panicle grain weight, and number of panicles hill^{-1}. The untreated (control) treatment gave the minimum values of all traits mentioned above.The rice stem borer infestation markedly decreased with the application of farmyard manure or rice compost as compared with mineral nitrogen.
Keywords: Hybrid Rice, FYM, Composted Rice Straw, Mineral nitrogen

INTRODUCTION

Rice (*Oryza sativa* L.) is one of the most important cereal crops of the world, grown in a wide range of climatic zones, to nourish the mankind. Introduction of hybrid rice is an important step towards enhancing the productivity by about 15-20% more than the promising high-yielding commercial varieties. 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 management systems of crop culture, especially the nutrient management of the crop as well as the proper utilization of the 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 growers are obliged to use more levels of inorganic chemical fertilizers. Generally, urea is the most convenient N source for rice. The efficiency of the urea-N in rice culture is low, 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, increase the organic matter content which serves neural advantages like conservation and slow release of nutrients

(Chaturvedi 2005). These advantages lead to increasing the fertility and productivity of the soil (Choudhury and Kennedy 2005). Nitrogen fertilizer losses through different mechanisms can be minimized by reducing the amount of applied N 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 auxines, cytokinins, gibberellins, and ethylene (Dobbelaere *et al*. 2003). Wide range of biological nitrogen fixing agents *(*BNF agents*}* i.e. *Cyanobacteria* and *Azospirillum* spp*.* (bacteria are indigenous and can be growth 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 improving soil properties, reducing pests and diseases and reducing environmental pollutions (Choudhury and Kennedy 2005). The replenishment can be attained using a combination of different sources of N fertilizer. Roger (1995) recorded an average increase in yield of 19.8 % due to bacterial inoculation of rice. 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-Hawarry and Hammouda (1986) found that application of certain partially decomposed organic manure gave significant increase in rice grain yield. Also, they reported 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 contain many essential elements at low concentrations, which are 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 increase with the application of compost. Application of manure enhances rice nutrient accumulation and dry matter yield (Eneji, *et al*. 2001).

The rice stem borer infestation in rice plants was found negatively correlated with high soil and plant silica (Djamin and Pathak 1967, Rani *et al* 2006). The positive effect of applying *Azospirillum* in raising phenolic levels, that reduce insect infestation in rice, was reported by Mohan *et al* (1988).

The objective of the present study is to evaluate Egyptian hybrid rice 1 (EHR1) response to different nitrogen source combinations. Also, the level of rice stem borer damage as affected by fertilizer combination was investigated.

MATERIALS AND METHODS

The present investigation was conducted at the farm of Rice Research and Training Center Sakha, Kafr El- Shiekh, Egypt during 2010 and 2011 rice seasons. The objective of this investigation was to study the effect of chemical N, organic and bio-N fertilizer and their combinations on the productivity of Egyptian hybrid rice 1. The inorganic fertilizer as urea (46.5% N), farmyard manure as cattle manure and bacterial inoculation, *Azospirillum* spp, as commercial name Cerialen were used. The nitrogen was applied as ten treatments (T_1 control, (T_2) 69 kg N fed^{-1} as urea,(T_3) 7 t FYM fed^{-1}., (T4) 2 tons composted rice straw fed. $^{-1}$. (T5) Bacterial inoculation (BI) 400 gm Cerialen fed.$^{-1}$., (T_6) 46 kg N fed. $^{-1}$ + 7 t FYM fed^{-1}, (T_7) 46 kg N fed^{-1} + 2 tons composted rice straw fed^{-1}, (T_8) 46 kg N fed^{-1} + BI, (T_9) 7 t FYM fed^{-1} + BI, (T10) 2 tons composted rice straw fed^{-1} + BI. The chemical soil analysis is presented in Table 1, and the chemical analysis of compost and farmyard manure used in this trial are shown in Table (2).

Table 1. Some chemical properties of soil of the experimental location

Soil properties	**2010**	**2011**
Elements		
Ca^{++}	9.5	10.0
Mg^{++}	3.94	3.98
K^{+}	1.76	1.80
Na^{+}	14.8	15.2
Soluble anions, m/gL^{-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

The complete randomized block design with four replications was used. Each sub-plot measured 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 farmyard manure and compost fertilizer were applied in dry soil, then incorporated well during tillage, inorganic N fertilizer was applied as two third before flooding and one third at panicle initiation stage. The inoculation was performed according to Omer *et al*. 1989.

Table 2. Chemical components of the organic matter

Nutrient	Farmyard Manure		Composted rice straw	
	2010	2011	2010	2011
C%	34.4	34.8	28.5	29.13
N%	1.30	1.42	1.83	1.92
C/N Ratio	26.70/1	27.16/1	15.57/1	16.26/1
P%	0.38	0.43	2.30	2.55
K%	0.39	0.46	2.43	2.64
Fe ppm	600	633	510	560
Mn ppm	300	340	490	489
Zn ppm	69	58	54	61

For the bacterial inoculation treatment in the nursery, the pre-germinated seeds were mixed with the bacterial (*Azospirillum*) suspension overnight just before sowing *as* powdered inoculums (water adhesive like sugar or gum). Thus, each seed received about 10^8 bacterial cells. Then, the seeds were broadcasted by hand on May 5^{th} and May 9^{th} in 2010 and 2011 seasons, respectively. In permanent field, at transplanting the seedlings were inoculated again by soaking their roots overnight in the corresponding bacterial suspension to complete the required rate of bacterial fertilizers. To determine the growth characters at maximum tillering and panicle initiation stages, three hills per plot were harvested and the number of tillers hill^{-1} was recorded, chlorophyll content was measured using chlorophyll-Meter, and plant height was measured then they were dried and weighed to determine the total dry weight. At harvest, average numbers of tillers, plant height and panicle length, panicle characters, grain and straw yields were estimated in each plot, and grain yield was calibrated to 14% moisture basis.

The collected data for each trait 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).

RESULTS AND DISSCUSION

Plant growth parameters.

The fertilizer treatments had significant effects on the plant growth at different growth stages (Tables 3, 4 and 5). Plant height increased gradually with increasing plant age. All nitrogen treatments caused significant increases in plant height over control. The application of 46 kg N as urea + 7 t FYM fed^{-1} recorded highest unfavorable value of plant height at different growth stages, while the application of 400 g 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 which enhanced leaf area resulting in higher photo assimilates and consequently more dry matter accumulation. These results are similar to the findings of Mandal *et al*. (1992) and (Chaturvedi 2005).

Table 3. Rice growth characters of hybrid 1 at maximum tillering stage as affected by different combinations of nitrogen sources

Treatment	Plant height cm		Number of tillers hill^{-1}		Chlorophyll content (SPAD)		Dry matter accumulation g hill^{-1}	
	2010	2011	2010	2011	2010	2011	2010	2011
Control	56.0	55.49	20.50	19.77	30.41	29.84	22.17	21.94
69 kg N fed^{-1} Urea	82.50	81.81	32.75	31.21	41.54	40.10	44.12	42.96
7 t FYM fed^{-1}	73.0	71.31	28.65	27.12	41.04	39.06	42.25	40.38
2 t composted rice straw fed^{-1}	61.50	60.49	25.44	24.36	38.11	37.58	35.95	35.24
400 gm Cerialen	62.90	63.20	24.66	23.51	39.22	38.19	31.17	29.48
46 kg N fed^{-1} Urea + 7 t FYM fed^{-1}	87.0	86.41	34.18	33.11	42.17	40.61	59.22	57.94
46 kg N fed^{-1} Urea + 2 t composted rice straw fed^{-1}	83.22	82.12	28.11	27.00	38.89	38.63	56.96	55.67
46 kg N fed^{-1} Urea + 400 gm Cerialen	81.32	80.22	29.78	29.14	40.15	39.60	58.32	57.96
7 t FYM fed^{-1} + 400 gm Cerialen	73.50	73.37	32.19	31.86	41.16	40.83	43.26	42.78
2 t composted rice straw fed^{-1}+ 400 gm Cerialen	56.12	55.12	20.13	19.26	37.10	36.89	37.43	36.35
L.S.D. 0.05	3.21	3.18	1.53	1.53	1.19	1.18	2.64	2. 52

Table 4: Rice growth characters of hybrid 1 at complete heading stage as affected by different combinations of nitrogen sources

Treatment	Plant height cm		Number of tillers hill^{-1}		Chlorophyll content SPAD		Dry matter accumulation g/ hill^{-1}	
	2010	2011	2010	2011	2010	2011	2010	2011
Control	86.19	84.29	19.10	17.91	35.79	35.55	64.50	62.25
69 kg N fed^{-1} Urea	98.95	97.93	29.17	28.51	45.55	46.01	165.29	161.42
7 t FYM fed^{-1}	99.28	98.00	23.98	23.85	45.50	44.26	159.10	152.03
2 t composted rice straw fed^{-1}	93.72	92.54	20.50	19.43	42.00	41.35	117.55	114.36
400 gm Cerialen	92.16	89.14	21.13	19.71	45.61	44.51	122.18	120.33
46 kg N fed^{-1} Urea + 7 t FYM fed^{-1}	107.11	106.75	30.44	29.21	48.89	49.06	199.76	200.41
46 kg N fed^{-1} Urea + 2t composted rice straw fed^{-1}	99.32	97.01	25.44	25.29	45.82	44.62	165.10	162.31
46 kg N fed^{-1} Urea+ 400 gm Cerialen	106.25	105.63	28.00	27.43	46.87	46.60	171.00	169.90
7 t FYM fed^{-1} + 400 gm Cerialen	98.10	96.40	28.66	27.29	46.32	45.28	180.12	177.36
2 t composted rice straw fed^{-1}+ 400 gm Cerialen	92.44	90.66	17.92	18.30	45.69	44.65	122.15	118.35
L.S.D. 0.05	2.89	2.82	1.69	1.61	1.75	1.66	3.84	3.66

Number of tillers hill1^{-1} at different growth stages as affected by different combinations of N sources is presented in Tables 3, 4 and 5. With increasing the plant age, number of tillers decreased. All N treatments affected significantly 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 was recorded in non-fertilized plots. More number of tillers m"^{2} might be due to the more availability of nitrogen that plays a vital role in cell division. These results are in accordance with the findings of Chaturvedi (2005).

Table 5. Rice growth characters of hybrid 1 at harvest stage as affected by different combinations of nitrogen sources.

Treatment	Plant height cm		Number of tillers hill^{-1}		Dry matter accumulation g/ hill^{-1}	
	2010	2011	2010	2011	2010	2011
Control	87.11	86.71	16.44	14.06	86.71	84.34
69 kg N fed^{-1} Urea	104.50	104.74	28.16	26.38	185.40	180.82
7 t FYM fed^{-1}	97.23	97.05	24.00	22.51	177.19	174.04
2tcomposted rice straw fed^{-1}	93.13	92.54	19.11	17.09	131.14	126.45
400 gm Cerialen	90.21	89.99	18.55	17.14	142.60	140.5
46 kg N fed^{-1} Urea + 7 t FYM fed^{-1}	105.10	104.52	26.50	25.18	231.13	228.04
46 kg N fed^{-1}Urea + 2 t composted rice straw fed^{-1}	97.21	96.82	24.56	23.99	198.22	194.81
46 kg N fed^{-1} Urea + 400 gm Cerialen	103.60	103.19	26.17	25.43	197.00	194.82
7 t FYM fed^{-1} + 400 gm Cerialen	98.65	98.09	27.91	26.84	203.11	199.65
2 t composted rice straw fed^{-1}+ 400 gm Cerialen	93.00	92.11	17.83	16.76	150.13	145.34
L.S.D. 0.05	2.78	*2.77*	1.41	*1.31*	4.89	*4.32*

For chlorophyll content, results in Tables 3 and 4 showed that all N treatments recorded higher significant chlorophyll values over control. At maximum tillering stage, the application of 7 t FYM fed^{-1} + 400 g Cerialen produced the highest chlorophyll content, but without any significant differences with 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 increased significantly with N fertilizer application in rice at all growth stages of the crop. The results presented in Table 3, 4 and 5 revealed a significant increase due to nitrogen fertilizer; all N treatments produced more significant dry matter than control. Also, dry matter increased with increasing plant age. The highest dry matter accumulation was obtained when the plants received 46 kg N as urea plus 7 t FYM fed^{-1} at the three growth stages.

Yield attributes

Yield attributes i.e. panicle length cm, 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 (7&8). Application of 46 kg N fed^{-1} as urea plus 7 t FYM fed^{-1} produced the tallest panicle and with par to the applications of 69 kg N fed^{-1} alone or 7 t FYM fed^{-1} and those treatments surpassed other treatments significantly, while the shortest panicle was obtained with control.

Concerning number of panicles hill^{-1}, application of 7 t FYM fed^{-1} + 400 g Cerialen produced highest number of panicles without significant with the values obtained from applying either 69 kg N fed^{-1} or 46 kg N fed^{-1} plus both 7 t FYM fed^{-1} and 400 g Cerialen. All N treatments gave the significant values compared with the control. The lowest values were obtained from control or when the plants were fertilized with compost and Bacteria combination.

Table 6. Panicle length, No. of panicle hill-1 and panicle weight of Egyptian hybrid rice 1 as affected by different combinations of nitrogen sources

Treatment	Panicle length (cm)		No. of panicles/ hill^{-1}		Panicle weight (g)	
	2010	2011	2010	2011	2010	2011
Control	19.98	20.57	14.12	13.02	2.80	2.82
69 kg N fed^{-1} Urea	23.19	24.12	25.44	25.07	4.37	4.41
7 t FYM fed^{-1}	24.50	24.02	22.46	22.31	4.32	4.28
2 t composted rice straw fed^{-1}	21.10	21.14	16.54	16.71	3.41	3.37
400 gm Cerialen	21.88	21.95	17.10	16.67	3.55	3.65
46 kg N fed^{-1} Urea + 7 t FYM fed^{-1}	24.50	24.48	24.85	24.62	4.65	4.76
46 kg N fed^{-1} Urea + 2 t composted rice straw fed^{-1}	23.38	23.46	23.95	23.74	4.33	4.25
46 kg N fed^{-1} Urea + 400 gm Cerialen	22.11	22.08	25.12	24.21	3.67	3.78
7 1 FYM fed^{-1} + 400 gm Cerialen	23.66	23.74	25.66	25.21	4.20	4.23
2 1 composted rice straw fed^{-1}+ 400 gm Cerialen	22.29	22.25	17.10	16.04	3.68	3.89
L.S.D. 0.05	0.50	0.51	1.20	1.123	0.14	0.16

For panicle weight, all N treatments gave significant values compared with control which recorded the lowest value of panicle weight. Increase in panicle weight due to nitrogen treatments might be primarily due to increase in chlorophyll concentration which led to higher photosynthetic rate and ultimately plenty of photosynthesis available during grain development.

The average of both 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 significantly higher number of filled grains panicle^{-1} than the other N treatments and the control (Table 6). The higher number of filled grains per panicle was probably due to better nitrogen status of plant during panicle growth period.

For 1000 grain weight, significant differences were detected among all N treatments. Application of 69 kg N Urea produced 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 of this trait.

Grain yield tons fed^{-1} as affected by N sources combination is presented in Table 7.

There were significant increases in grain yield with applying different N sources. As expected, applying 46 kg N fed^{-1} as Urea plus 7 t FYM fed^{-1} produced significantly maximum grain yield/fed followed by 46 kg N fed^{-1} as Urea + 400 gm Cerialen, then 69 kg N fed^{-1} as urea followed by applying 7 t FYM fed^{-1} plus 400 gm Cerialen at the same level of significant. It signifies that hybrid rice variety 'Egyptian hybrid rice 1 is adequately stable concerning its genetic potential for yield of rice. There is a very close relation between the yield and its components, especially with number of filled grains per panicle. The improved growth attributes, viz plant height, chlorophyll content and dry-matter production might be responsible for improved yield attributes. It was found that application of nitrogen improves various 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).

Table7: No of filled grain 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. $^{-1}$	
	2010	2011	2010	2011	2010	2011
Control	115.00	115.16	21.57	21.50	2.81	2.72
69 kg N fed^{-1} Urea	181.77	184.91	22.78	22.92	4.65	4.60
7 t FYM fed^{-1}	190.12	190.04	20.55	20.49	4.41	4.03
2 t composted rice straw fed^{-1}	160.13	159.13	21.89	21.77	3.31	3.23
400 gm Cerialen	160.56	161.86	21.10	20.70	3.28	3.21
46 kg N fed^{-1} Urea + 7 t FYM fed^{-1}	207.29	205.09	21.79	21.70	4.98	4.93
46 kg N fed^{-1} Urea + 2 t composted rice straw fed^{-1}	192.43	188.31	20.50	20.02	4.51	4.32
46 kg N fed^{-1} Urea + 400 gm Cerialen	167.18	173.73	22.44	22.15	4.82	4.75
7 t FYM fed^{-1} + 400 gm Cerialen	189.17	183.89	22.42	22.31	4.63	4.55
2 t composted rice straw fed'"+ 400 gm Cerialen	166.11	164.00	22.23	21.98	3.25	3.16
L.S.D. 0.05	3.38	*3.40*	1.59	*1.56*	0.49	*0.44*

White head infestation:

Results presented in Table (8) show that rice plots fertilized with mineral urea-nitrogen had the highest levels of white heads; 12.4,10.9 %(in 69kg) ,11.2,10.5% (in 46kg urea+7 t FYM) 12.7,11.4%(in 46kg urea+2t compost) in 2010 and 2011 rice seasons, respectively . When urea(46 kg N\fed) was combined with FYM (7t\fed), the rice plants suffered 11.2 ,10.5% white heads , but decreased to 8.0, 8.9%white heads when the same level of urea (46 kg N\fed) was combined with 400g Cerialen (Azospirillum sp), in the first and second seasons , respectively. Applications of sole FYM (7 t\fed), composted rice straw (2 t/fed) or Cerialen (400 g\fed) induced low stem borer infestations; 5.2, 5.6, and 5.9% white head in the first season, and 5.3, 5.2 and 6.4% in the second season.

The low rice stem borer infestation in plots treated with composted rice or with farmyard manure could be attributed to the role of silica (high in both treatments) in controlling the rice stem borer. In such concern, Djamin and pathak (1967) found that the incisor region of the mandibles of stem borer larvae fed on rice plants with high Si content were more damaged. Chandramani *et al* (2010) recorded a significant negative correlation between insect incidence (from which is the rice stem borer) and rice plant content of silica. In case of the rice stem borer, the correlation value was calculated as -0.930. Rani *et al* (2006) indicated that application of Azospirillum may activate the phenyl ammonia lyase enzyme implicated in biosynthesis of phenolics, resulting in increased plant phenolics that prevent insect damage. Similar results were reported by Mohan *et al* (1988).

Table 8: White head percentage of Egyptian hybrid rice 1 as affected by different combinations of nitrogen sources.

Treatment	White head%	
	2010	2011
Control	10.14	10
69 kg N fed^{-1} Urea	12.4	10.9
7 t FYM fed^{-1}	5.2	5.3
2 t composted rice straw fed^{-1}	5.6	5.2
400 gm Cerialen	5.9	6.4
46 kg N fed^{-1} Urea + 7 t FYM fed^{-1}	11.2	10.5
46 kg N fed^{-1} Urea + 2 t composted rice straw fed^{-1}	12.7	11.4
46 kg N fed^{-1} Urea + 400 gm Cerialen	8.0	8.9
7 t FYM fed^{-1} + 400 gm Cerialen	8.7	8.2
2 t composted rice straw fed^{-1}+ 400 gm Cerialen	6.2	6.9
L.S.D. 0.05	2.9	2.8

CONCLUSION

It could be concluded that utilization of 46 kg N fed^{-1} as Urea in combination with 7 t FYM fed^{-1} is more favorable, most efficient way for rice production under the present experimental conditions for increase rice grain yield. However, to produce the organic rice without reduction in grain yield, utilization of 7 tons FYM fed^{-1} plus 400 gm. Cerialen could to be applied.

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استجابة الأرز الهجين مصري١ إلى مصادر مختلفة من التسميد النيتروجيني العضوى والغير عضوي

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مركز البحوث والتدريب فى الأرز – سخا – كفر الشيخ, معهد بحوث المحاصيل الحقلية – مركز البحوث الزراعية - مصر

أجريت تجربة حقلية بمزرعة مركز البحوث والتدريب في الأرز بسخا- كفر الشيخ – مصر خلال موسمي صيف ٢٠١١,٢٠١٠م وذلك لدراسة تأثير مصادر مختلفة للنيتروجين على النمو والمحصول ومكوناته فى مراحل نمو النبات المختلفة حيث تم استخدام الأسمدة غير العضوية مثل اليوريا (٤٦.٥٪ N) وقش الأرز والسماد البلدي (الحيواني) واللقاح البكتيري SPP Azospirillum (Cerialen) وتم استخدام مخاليط منهم وقد تضمنت التجربة عشرة معاملات كالأتي:-

١ - بدون معاملة control ٢ - يوريا (٤٦.٥٪ N) بمقدار٦٩ كيلوجرام/ فدان
٣ - سماد بلدي بمقدار ٧طن/ فدان ٤- قش أرز بمقدار ٢طن / فدان
٥ - لقاح بكتيري Cerialen ٤٠٠جرام / فدان ٦- ٤٦ كجم يوريا +٧طن سماد بلدي/فدان
٧ - ٤٦كجم يوريا + ٢طن قش أرز/فدان ٨- ٤٦ كجم يوريا +٤٠٠جرام Cerialen
٩ - ٧طن سماد بلدي+٤٠٠جرام Cerialen ١٠- ٢طن قش أرز +٤٠٠جرام Cerialen

واستخدم في التجربة تصميم القطاعات كاملة العشوائية في ثلاثة مكررات

ويمكن تلخيص النتائج التي تم الحصول عليها فيما يلي:-

- أوضحت النتائج أن المعاملات المختلفة للتسميد أدت إلى اختلافات معنوية لمعظم صفات النمو والمحصول و مكوناته موضع الدراسة وكانت أعلى القيم لهذه الصفات فى جميع مراحل النمو المختلفة مع المعاملة ٤٦ كجم يوريا +٧طن سماد بلدي (حيواني)/فدان للصفات - ارتفاع النبات و عدد الأشطاء / الجورة والمادة الجافة المتجمعة محتوى الكلوروفيل بينما كانت أقل قيم للنسبة المئوية للإصابة بالثاقبات عند المعاملة بالسماد أو قش الأرز مع الخلط باللقاح البكتيري وكانت أقل القيم لهذه الصفات فى القطع غير المعاملة (control)
- وبالنسبة للمحصول ومكوناته :
أوضحت النتائج أن أعلى القيم للصفات المختلفة} طول الدالية و عدد الداليات/الجورة ووزن الداليه (جم)و عدد الحبوب الممتلئة/ الداليه و وزن الألف حبة (جم) و محصول الحبوب (طن/فدان){ فى حالة المعاملة ٤٦ كجم يوريا +٧طن سماد بلدي (حيواني)/فدان وكذلك أقل القيم لهذه الصفات فى القطع غير المعاملة (control)

* توصى الدراسة بإمكانية استخدام اليوريا بمقدار ٤٦كيلوجرام /فدان مع إضافة ٧طن من السماد البلدي المتحلل جيدا إلى الفدان لتعظيم إنتاجية وحدة المساحة تحت ظروف محافظة كفر الشيخ

قام بتحكيم البحث

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