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EFFICACY OF FARMYARD MANURE IN INTEGRATION WITH UREA IN RICE PRODUCTION AND THEIR RESIDUAL EFFECT ON SOIL ORGANIC MATTER

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ABSTRACT

A field experiment was conducted at Rice Research and Training Center farm Kafr El-Sheikh during summer season 2007 to study the influence of farmyard manure (FYM) with different rates of urea and their combinations on both rice yield and its attributes of ♀Giza178 rice variety and soil organic matter. The obtained data showed that the increase in yield was a maximum with 9 tons FYM plus 150 kg urea.fed^{-1}, while the minimum was with the control. The combination of urea plus FYM gave higher yield than either urea or FYM alone. Data showed significant increase in number of panicles hill^{-1} as fertilizer level increase from 0 kg N to 9 ton FYM plus 150 kg urea.fed^{-1}. Results showed that, there were insignificant differences in panicle length among all treatments except the control. Data showed also that there was an increase in organic matter in all treatments which treated with FYM compared to the other treatments.

INTRODUCTION

The need of rice plants to nitrogen fertilizer is very important. Nitrogen can be supplied to rice plants either through chemical fertilizer or organic fertilizer. Nitrogen fertilizers are widely used in agriculture. The role of N fertilizer in Egyptian economy in general and Egyptian agriculture in particular is far reaching. Therefore laboratory and field studies have been conducted by several research centers and universities concerning on the amount of N-fertilizer used and pollution of the environment. FYM is an effective material for improving the soil properties especially soil organic matter. The continuous application of organic manure to flooded rice soil normally causes accumulation organic matter (Park *et al*., 1990). The present work was designed to evaluate the combination of FYM with different rates of nitrogen as urea on

1. Rice yield and its attributes.
2. Soil organic matter.

MATERIALS AND METHODS

A field experiment was conducted using transplanted rice plant (Oryza sativa L.), Giza 178 rice variety during 2007 rice season at the farm of Rice Research and Training Center Sakha Kafr El sheikh . Representative soil sample was taken subjected to chemical analysis followed the standard procedures by Cottenie et al., (1982) and Page et al.,

(1982) and the results showed that this soil was clayey in texture with 1.65 % organic matter, pH 8.1, EC 3 dS/m, 31.8 available N, 13 ppm P and 305 ppm K. The randomized complete block design with four replications was used, involving 12 treatments derived from 3 N- fertilizer (0 , 46 and 69 Kg N. fed^{-1}) combined with Farm yard manure at the rate of 0, 3, 6 and 9 ton FYM .fed^{-1}. FYM was added before transplanting. Urea was added in two splits 2/3 before transplanting and the other 1/3 one month after transplanting. Plants in each plot were harvested for grain yield; plants were left for air drying about three days, then threshed. The weight of grains was recorded and moisture content was measured then grains weight was calibrated to 14 percent moisture basis. All data collected were subjected to the statistical analysis, according to Gomez and Gomez (1984).

RESULTS AND DISCUSSION

1-Grain and straw yield:

Data in Table 1 show the effect of farmyard manure (FYM) and urea treatment and their combinations on grain and straw yield of Giza 178 rice variety during 2007 season. Data showed that, there was a significant increase in yield under all treatments over the control. The highest yield of rice grain was recorded by applications of 9 tons FYM plus 150 Kg urea.fed^{-1} (4883 kg. fed^{-1} with increasing 68.08 % over the control) but the lowest yield was observed under the treatment, which received no fertilizer (2905 kg. fed^{-1}). The increase in grain yield with the combined use of both those source is advantageous and substantial amount of inorganic N can be saved. This mainly could be attributed to that combined use of FYM and chemical fertilizer increase nutrients availability for plant through their growth stages. These results are in agreement with those obtained by Hammad *et al*., (2006).

Table 1: Means of rice grain yield and straw yield (kg. fed^{-1}) as affected by the applications of farmyard manure (FYM), urea treatments and their combination at harvest in 2007season.

Treatments	Urea Kg. fed^{-1}	FYM t. fed^{-1}	Grain	% increase or decrease	straw	% increase or decrease
N0F0	0	0	2905.0 h	-	3437.5 h	-
N0F1	0	3	3740.0 f	28.74	4176.3 g	21.49
N0F2	0	6	3900.0 e	38.12	4754.2 e	38.30
N0F3	0	9	4705.0 b	61.96	4968.2 d	44.52
N1F0	100	0	3423.2 g	17.83	4175.0 g	21.45
N1F1	100	3	4232.0 d	45.67	4890.0 d	42.25
N1F2	100	6	4540.0 c	56.28	5165.0 c	50.25
N1F3	100	9	4832.5 ab	66.36	5302.5 b	54.25
N2F0	150	0	4299.0 d	34.25	4487.5 f	30.54
N2F1	150	3	4492.5 c	54.64	4895.0 d	42.40
N2F2	150	6	4738.7 ab	63.12	5297.5 b	54.10
N2F3	150	9	4872.5 a	68.08	5530.75 a	60.89

Data illustrated that grain yield increased up to 9 tons FYM plus 150 kg urea.fed^{-1}. Data reported also, that 9 tons FYM alone and 9 tons FYM.fed^{-1} plus 100 kg urea .fed^{-1} gave higher grain yield (4705 and 4832.5 kg. fed^{-1}) with increasing 61.96 and 66.33 % over the control than 150 kg urea fed^{-1} alone (4299 Kg. fed^{-1} with increasing 47.98 % over the control) in addition from urea to FYM gave higher grain yield than that observed with FYM alone at the same treatment. The straw yield followed similar trend as that of rice grain.

2-Yield attributes:

Data in Table 2 show significant increase in number of panicles.hill^{-1} as fertilizer level increase from 0 Kg N. fed^{-1} (15) to 9 tons FYM.fed^{-1} plus 150 kg urea.fed^{-1} (32). Data revealed also, that integrations of FYM with urea give higher number of panicles.hill^{-1} than FYM or urea alone. It be concluded that the increase in number of panicles.hill^{-1} resulted from increasing nitrogen may be due to stimulation effect branches initiation which gave more panicles.hill^{-1}. These results are in a quite agreement with those reported by Hemalatha *et al*., (2000). Data indicated that significant increase in panicle length at all treatments compared with the control, but no significant difference in panicle length with increasing the levels of fertilizer. This might be due to the fact that panicle length is controlled genetically more than environmentally. The highest panicle lengths (22.85, 22.83 and 22.80cm) were recorded by the applications of 9 tons FYM.fed^{-1}, 6 tons FYM plus 150 Kg urea.fed^{-1} and 9 tons FYM plus 150 Kg urea.fed^{-1} respectively, but the lowest (21.05 cm) was observed under the treatment which received no fertilizer. These results are in agreement with those obtained by Abd- El-Rhman (1999). Results illustrated that there was no remarkable difference in 1000 grains weight among the different treatments. The highest 1000 grain weight value (20.90) was recorded at 100 Kg urea + 3 ton FYM.fed $^{-1}$ compared with the control, while the lowest 1000 grain weight value was obtained when 100 Kg urea.fed^{-1} + 6 ton FYM.fed $^{-1}$ was added (18.66).

Table 2: yield attributes of rice variety Giza 178 as affected by the applications of farmyard manure (FYM), urea treatments and their combination.

Treatments	Urea Kg. fed^{-1}	FYM t. fed^{-1}	No. of Panicle. hill^{-1}	1000 grain weight(g)	Panicle length (cm)
N0F0	0	0	15.00 h	19.70 bc	21.05 d
N0F1	0	3	20.25 g	20.37 ab	22.57 ab
N0F2	0	6	22.00 f	20.45 ab	22.60 ab
N0F3	0	9	23.50 e	20.50 ab	22.85 a
N1F0	100	0	20.00 g	20.65 ab	21.62 c
N1F1	100	3	22.75 ef	20.90 a	22.13 bc
N1F2	100	6	25.25 d	18.66 c	22.72 a
N1F3	100	9	27.25 c	20.35 ab	22.77 a
N2F0	150	0	26.75 c	20.35 ab	21.72 c
N2F1	150	3	28.00 c	20.15 ab	22.70 a
N2F2	150	6	30.25 b	20.17 ab	22.83 a
N2F3	150	9	32.00 a	19.68 bc	22.80 a

3-Organic matter content:

Organic matter percentage (OM %) of soil as affected by the applications of farmyard manure (FYM) and urea treatments at different stages of growth are presented in Table 3. Data showed that the percentage of organic matter increased with increasing the mount of FYM either applied alone or in combinations with urea at all levels compared with the control at all stages (maximum tillering, panicle initiation, flowering and at harvest). These results are agree with obtained by Awad (2001) who indicated that soil organic matter content increased by adding organic materials. Also, El-Kouny *et al* (2004) found that the soil organic matter was significantly increased by 1.78 % as a result of using compost. The highest values of OM% (1.95, 2.28, 2.31 and 2.36) were recorded with the combinations of urea at 150 Kg.fed^{-1} plus the rate of 9 tons FYM.fed^{-1} at maximum tillering, panicle initiation, flowering and at harvest stages respectively. Data in the same Table showed that the percentage of organic matter in the control treatment gradually decreased with control (1.50, 1.47, 1.45 and 1.42 %) at maximum tillering, panicle initiation, flowering and at harvest stages respectively, compared to the values of OM in initial soil (1.57 %). Also, the reduction of OM was observed with urea alone at all applications rates (0, 100, 150 Kg. fed^{-1}) at all stages. The reduction of organic matter percentage with the control or urea may be due to the decomposition of the initial organic matter in the soil. These results are in agreement with those obtained by Naeem (2006).

Table 3: Organic matter of soil (%) as affected by the applications of farmyard manure (FYM) and different rates of urea and their combination at different stages.

Treatments	Urea Kg. fed^{-1}	FYM t. fed^{-1}	Maximum tillering	Panicle initiation	Flowering	Harvest
N0F0	0	0	1.50	1.47	1.45	1.42
N0F1	0	3	1.71	1.86	1.90	1.86
N0F2	0	6	1.79	1.93	1.95	1.98
N0F3	0	9	1.88	2.20	2.16	2.07
N1F0	100	0	1.52	1.54	1.57	1.55
N1F1	100	3	1.74	1.91	1.95	1.94
N1F2	100	6	1.83	1.96	1.97	2.01
N1F3	100	9	1.91	2.30	2.25	2.10
N2F0	150	0	1.49	1.52	1.54	1.55
N2F1	150	3	1.77	1.95	1.90	1.95
N2F2	150	6	1.89	2.09	2.12	2.16
N2F3	150	9	1.95	2.28	2.31	2.36

Conclusion

An experiment was conducted during the summer season 2007 to study the efficacy of farmyard manure in integration with nitrogen fertilizer as a urea in flooded rice indicated that the integration of farm yard manure with urea increased the production of rice. Integration of farmyard manure and mineral fertilizer had better build up of soil organic matter.

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فعالية دمج السماد البلدي مع اليوريا علي انتاجية محصول الارز والتأثير المتبقي منهما علي محتوي التربة من المادة العضوية.

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****مركز البحوث والتدريب فى الأرز- سخا- كفرالشيخ**

أجريت تجربه حقلية في في موسم ٢٠٠٧ في مزرعة مركز البحوث والتدريب في الأرز – سخا – كفر الشيخ مستخدماً صنف الأرز جيزة ١٧٨ وذلك بهدف دراسة تأثير بعض الأسمدة العضوية (السماد البلدي) والأسمدة الكيماوية (اليوريا) على انتاجية محصول الارز ومحتوي التربة من المادة العضوية تم استخدام تصميم القطاعات الكاملة العشوائية مع استخدام ٤ مكررات في التجربة. أوضحت النتائج أن أعلى قيمة لمحصول الحبوب والقش ظهرت عند استخدام ٩ طن سماد بلدي + ١٥٠ كجم يوريا. فدان.ادي خلط السماد المعدني عند معدل ١٥٠ كجم يوريا. فدان والسماد العضوي عند معدل٩ طن سماد بلدي الي زيادة عدد السنابل في الجورة. اوضحت النتائج ايضا ان كل المعاملات التي تم فيها خلط السماد البلدي مع المعدني ادي الي زيادة المادة العضوية بالمقارنة بالمعاملات الاخري.