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RESPONSE OF SAKHA 106 RICE VARIETY TO DIFFERENT LEVELS OF SLOW RELEASE NITROGEN FERTILIZER COMPARED WITH THE RECOMMENDED DOSE OF UREA.

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ABSTRACT

The nitrogen efficiency is very low for rice plant under irrigated ecosystem, might be due to increasing of nitrogen losses through different ways. To increase N efficiency by using slow release nitrogen fertilizer, two field experiments were carried out at the Farm of Rice Research and Training Center (RRTC), Sakha , Kafer-El-Sheik, Egypt, during the two successive seasons of 2008 and 2009 to study the response of Sakha 106 rice variety to different levels of slow release N-fertilizer (Enciabien) i.e. 0.30,40,50 and 60 kg N/fed compared with 60 kgN /fed as urea form . The obtained results revealed that the application of 60 Kg N/ fed as urea or Enciabien gave the tallest plant, while the same rates as urea produced more tillers and dry matter content. Moreover, there was any significant among all the N-treatments in leaf area index (LAI). As for yield and its attributes, adding nitrogen at the rates of 50 and 60 kg N/fed as Enciabien or 60 kg N/fed as urea gave the highest number of panicles/hill, while number of filled grains /panicle was responded to 40 kg N / fed without any significant difference with 50 and 60 kg N/fed as urea or Enciabien and unfilled grains up to 60 kg N/fed as urea or Enciabien. The results also indicated that there were any significant difference among all the N- treatments in panicle weight, 1000-grain weight and grain yield, while straw yields reached to its maximum under the rates starting with 40 up to 60 kg N/fed as urea or Enciabien. Nitrogen % reached to the highest value in grain yield under the rate of60 kg N/fed as Enciabien and under both 50 and 60 kg N/fed in straw, while nitrogen accumulation was the greatest when rice received 60kgN/fed as Enciabien or 60 kg N/fed as urea in straw. Agronomic efficiency (AE) was the highest under the lowest N-level and reached to the minimum vales under the highest N-rates.

INTRODUCTION

Rice is the main food crop of an estimated 40% of the world's population (Buresh and De Datta 1990). Nitrogen, the most widely applied plant nutrient, has commonly been considered to be the yield limiting one. The rice crop removes large amounts of N for its growth and grain production. The estimated amount of N removal ranges from 16 to 17 kg for the production of one ton of rough rice, including straw (Sahrawat 2000). By 2020, more than 70% of the grain yield will have to depend on fertilizers The demand for plant nutrients is expected to increase continuously with population growth particularly in developing countries (Keeney, 1997). In modern agriculture, the nutrient needs of high yielding rice varieties are usually supplied thought the application of chemical fertilizers to the soil to sustain high yields. 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 Khanif 2004).The promising alternative practices are use of N-efficient rice varieties, hand or machine deep placement of urea supergranules, and use of slow release N fertilizers. Advantages of slow release fertilizers are that the nutrients are available gradually over time. This means that the gardener can fertilize less often, and the nutrients are provided slowly and steadilly. This is how most plants prefer to be fed and helps them grow well. Then the use of slow release nitrogen fertilizer is concept that can lead to increased fertilizer nitrogen use efficiency in wetland rice. The total amount of 562 000 t of synthetic controlled-release fertilizers which are applied represents only 0.15% of the world's total mineral fertilizer consumption Even though in Japan 70% of polymer coated controlled-release fertilizers are used on rice, it is doubtful whether this innovative cultivation system can be transferred to other crops (Martin E. Trenkel 1997).Several studies have shown beneficial effects of the use of slow and controlled-release fertilizers, stabilized fertilizers and/or nitrification and urease inhibitors to enhance crop productivity. An increase in rice yield and N-use efficiency through the use of slow-release fertilizers and nitrification inhibitors was reported by Carreres *et al.* (2003). Studies involving the use of slow- and controlled-release fertilizers and/or nitrification inhibitors in containerized nursery tree plants showed suitable performances of seedlings treated with those fertilizers in comparison with traditional water-soluble formulations (Walker and Huntt, 1999). Hanan Taha,(2008).in Egypt ,found that application of different levels of slow release N- fertilizer had a significant effect on growth traits and grain yield and its attributes.
This study aims to investigate the beneficial dose of slow release fertilizer (as Enciabein) for the newly modern high yielding rice variety Sakha 106. Also, to decrease amount of mineral fertilizer add.

MATERIALS AND METHODS

Two field experiments were carried out at Farm of Rice Research and Training center, Sakha , Kafr El Shiekh , Egypt, during the two successive seasons of 2008 and 2009 to study the response of Sakha 106 rice variety to different levels of slow release N fertilizer (Enciabein 40% N) compared with the recommended dose of N fertilizer (60kg N/fed as form of urea) . Enciabien (40% N) was produced by General Organization for Agricultural Equalization Fund,Ministry of Agriculture and land Reclamation , Egypt as slow release nitrogen fertilizer (SRNF). Representative soil sample at the depth of 0-30 cm were collected from experimental site and chemically analyzed. The analytical results are presented in Table 1.

Table 1: Soil and chemical analysis of experimental site .

Seasons	pH	EC dsm^1	O.M%	Total N ppm	Av. P ppm	Sol. K mgl^1
2008	8.3	2.0	1.4	450	13.0	0.4
2009	8.2	2..3	1.5	560	16.5	0.5

Experimental design was randomize complete block with four replicates. The plot size was 15m^2 (3x5) and preceding crop was parley. Date of sowing were May,5 and May,7 in 2008 and 2009 season, respectively. Land preparation was done by ploughing and well leveled .Nitrogen fertilizer (Enciabien) at the rate of 30,40,50 and 60 kg N /fed as well as control plus the recommended dose of nitrogen 60 kg N/fed as urea were used . Each dose of Enciabien was applied basally and incorporated with soil before flooding, while the recommended dose at rate of 60 kg/fed as urea form was applied as 2/3as basal and 1/3 as topdressing one week before panicle initiation (PI).Phosphorus at the rate of 15 kg P2O5/fed was applied during land preparation. Twenty eight days old seedling was transplanted at 20x20 cm apart with three seedlings per hill. All the recommended culture practices were applied. Four hill sin each plot were identified at 65,75,and 85 days after sowing (DAS) to estimate growth characters i.e. plant hight ,leaf area index (LAI), and dry matter accumulation .Yield components were estimated at harvest. Ten hills per plot were counted to determine means of number of tillers and panicles, also 10 panicles were collected randomly in each plot to estimate panicles characters. To determine grain yield 10 m^2 guarded was harvested, threshed, weighted and adjusted at 14% moisture content and then converted to tons per fedden. Grain and straw samples were collected from each plots, dried to constant weight, ground and digested with H_2SO^4 to estimate N concentration according to kjeldahel method (A.O.A.C.1970). Nitrogen accumulation in rice grain and straw was calculated. The Nitrogen use efficiency can be defined as the maximum economic yield produced per unit of nutrient applied, absorbed or utilized by the plant to produce grain and straw. Apparent recovery efficiency and agronomic efficiency are calculated by using the following formulas according to Fageria *et al.* 1997.

Apparent recovery efficiency (ARE) = $(N_f - N_u / N_a) X 100$ (%)

Agronomic efficiency (AE) = $(G_f - G_u / N_a)$ (kg kg^{-1})

Where N_f is the nutrient accumulation by the grain yield in fertilized plot (kg), N_u is the nutrient accumulation by the grain yield in unfertilized plot (kg), G_f is the grain yield in fertilized plot (kg), G_u is the grain yield in unfertilized plot (kg) and N_a is the quantity of N applied (kg).

The analysis of variance was carried out according to Gomze and Gomze (1984).Mean comparison were followed Duncan Multiple Range Test (Duncan 1955).

RESULTS AND DISCUSSION

Data of Plant height of Sakha 106 rice variety at the three studied dates as affected by different doses of slow release N fertilizer (SRNF) compared with the recommended dose of N fertilizer as urea form are present in Table 2. Data revealed that there was significant effect on plant height of all sampling at different dates in the two seasons. The plants received 60 kg N as either urea or Enciabein form recorded the highest values at the three sampling dates in both seasons without any significant difference between Enceaabien – N and urea –N in this aspect while, the lowest values were recorded when the plants didn't receive any fertilizers (contol). This was fact in the three samples in both studied seasons. It can be also noticed that there were any significant difference among the treatments which received Enciabien at the rate of 30,40,or 50 kg N/fed in the three tested dates in the two studied seasons .The increases in plant height due to the application of 60 kg N /fed as Enciabien or urea form might be due to the role of nitrogen for increase in the bio synthesis of plant hormones or ouxenes such as indol acetic acid (IAA) or Gibberellins (GA3) which increase both cell division and elongation in cell internodes resulted in increase the plant height. These results are in harmony with those obtained by Abd El Rahman *et al.* (1992),Kareem(1993) and Hanan Taha (2008).

Table (2): Plant height (cm) at 65, 75 and 85 days after sowing (DAS) of Sakha106 rice variety as affected by nitrogen treatments in 2008 and 2009 seasons.

Nitrogen treatments kg N fed^{-1}	Plant Height (cm)					
	2008			2009		
	Days from sowing			Days from sowing		
	65	75	85	65	75	85
Control	70.0 c	89.0 c	91.0 c	71.7 c	91.2 c	94.0 c
30 (Enciabein)	72.9 bc	91.3 b	98.2 b	73.6 bc	93.0 b	101.3 b
40 (Enciabein)	75.0 b	92.0 b	99.1 b	76.5 bc	95.3 b	103.2 b
50 (Enciabein)	76.1 b	93.1 b	99.8 b	78.0 b	95.4 b	105.0ab
60 (Enciabein)	80.1 ab	97.6 ab	1060ab	83.0 a	101.4ab	109.1 a
60 (Urea)	83.9 a	100.3 a	109.0 a	86.2 a	103.5 a	113.5 a
F test	**	*	**	**	**	*

Leaf area index (LAI) of Sakha 106 rice variety at the studied three sampling dates in 2008 and 2009 seasons as affected by nitrogen treatments is presented in Table3. Data indicated that at frist sampling date in 2008 season adding 60 kg N/fed as urea form produced the highest LAI as compared with the other nitrogen treatments as Enciabien –N . Moreover ,there were any significant difference between the treatments which received nitrogen as urea form and the treatments that had 60,50,or 40 kg N/fed as Enciabien in the frist season or with all the Enciabien treatments at the three dates in the second season. The inconstant trend in LAI under the tested N treatments at the three studied dates may be due to he differences in response of the tested variety to nitrogen under advanced its age . The increase in LAI as result to application of nitrogen might be due to the increase of tillers number and leaves beside the role of nitrogen for increase the bro syntheses of promoting hormones auxines which increase the leaves area consequently leaf area indix.These results are in agree with those obtained by the work done by Singh (1998), Pulley *et al.* (1999), Luo and Li (2000) and Mhaskar *et al.* (2005)

Table 3: Leaf area index at 65, 75 and 85 days after sowing (DAS) of Sakha106 rice variety as affected by nitrogen treatments in 2008 and 2009 seasons.

Nitrogen treatments kg N fed^{-1}	Leaf Area Index (LAI)					
	2008			2009		
	Days from sowing					
	65	75	85	65	75	85
Control	2.8 d	3.7c	3.9 c	3.0 b	3.9 b	4.2 b
30 (Enciabein)	3.8 c	5.6 b	6.5 b	4.0 a	5.8 a	6.7 a
40 (Enciabein)	4.3 b	6.0 ab	6.7ab	4.3 a	6.2 a	6.9 a
50 (Enciabein)	4.6 b	6.3 ab	6.8 a	4.9 a	6.4 a	7.1 a
60 (Enciabein)	4.9 b	6.6 ab	7.4a	5.1 a	6.8 a	7.7 a
60 (Urea)	5.7 a	6.9 a	7.7 a	5.9 a	7.1 a	7.8 a
F test	**	**	**	*	**	**

Data in Table 4 reveled that application of different levels of slow release N fertilizer (Enciabein) or urea have a significantly effect on dry matter accumulation at 65, 75 and 85 days after sowing (DAS). Data showed that the highest level (60 kg N/fed) of nitrogen fertilizer as urea form gave the highest values of dry matter accumulation (g/hill) at the three dates followed by60 kg N / fed as Enciabien - N while, the lowest values were obtained from the plants grown under control treatment in the three samples in both season. Data revealed also that there were no significant differences among Enciabein treatments at the rates of 40, 50 and 60 kg N fed^{-1}. Thus the increase in dry matter due to the application of nitrogen fertilizer could be attributed mainly the increase in plant height and leaf area index as well as chlorophyll content consequently increase the photosynthesis. These results are supported by the data reported by Behera (1998), Pulley *et al.* (1999), Ebaid and Ghanem (2000) and Shivay and Singh (2003).

Table 4: Dry matter accumulation (g hill^{-1}) at 65, 75 and 85 days after sowing (DAS) of Sakha106 rice variety as affected by nitrogen treatments in 2008 and 2009 seasons.

Nitrogen treatments kg N fed^{-1}	Dry matter accumulation (g hill^{-1})					
	2008			2009		
	Days from sowing			Days from sowing		
	65	75	85	65	75	85
Control	16.5 d	24.8 d	44.2 d	17.3 c	27.7 c	50.4 c
30 (Enciabein)	21.4 c	35.9 c	55.5 c	22.7 b	38.3 b	61.2 b
40 (Enciabein)	25.2 bc	44.4bc	59.3 bc	26.5 b	49.4 b	63.3 b
50 (Enciabein)	25.7 bc	48.8 bc	54.8 b	27.7 b	50.2 ab	66.8 ab
60 (Enciabein)	28.5 ab	49.6 b	61.4 b	29.6 ab	53.5 a	70.4 ab
60 (Urea)	31.5 a	55.3 a	68.2 a	31.4 a	56.7 a	74.6 a
F test	**	**	**	**	*	**

Regarding number of tillers hill^{-1} and number of panicles hill^{-1}. Data in Table 5 demonstrated that the application of different doses of slow release N fertilizer and recommended dose of urea had highly significant increase in both number of tillers and panicles as compared with control. The maximum values were obtained from the plants which received 60 kg N fed^{-1} either as urea or Ensiabien form in both seasons followed by Ensiabien at the rates of 30 or 40kg N/fed without any significant difference between them .While, the minimum values were obtained from the plants when did not receive any nitrogen fertilizer (control) in 2008 and 2009. It could be concluded that application of 50 kg N/fed Enciabien was sufficient to produce the highest number of tillers and panicles without any significant difference with those produced by 60kgN/fed as urea or Enciabien. The application of 60 kg /fed as urea or 50 to 60 kgN/ fed as Enciabien cause continuous supply of nitrogen which enhance activity of upground nodes to produce more early tillers and initiate more panicles. These results is in quite agreement with Badawi *et al.* (1990), Ghosh *et al.* (1993) and (1997), Hanan Taha (2008).Data in Table 5 presented the effect of the application of different levels and sources of nitrogen on panicle length in the two seasons. The application of nitrogen at the rates of 50 or 60 kg N/ fed as Enciabien or 60 kgN/fed. as urea significantly increased panicle length. The shortest panicles were obtained when no nitrogen fertilizer was applied.

Table 5: Number of tillers hill^{-1}, number of panicles hill^{-1}and panicle Length (cm) of Sakha106 rice variety as affected by nitrogen treatments in 2008 and 2009 seasons.

Nitrogen treatments kg N fed^{-1}	No. of tillers hill^{-1}		No. of panicles hill^{-1}		Panicle Length (cm)	
	2008	2009	2008	2009	2008	2009
Control	16.2 c	16.8 c	15.4 c	16.4 c	19.2 c	19.4 c
30 (Enciabein)	21.5 b	21.9 b	21.2 b	21.4 b	21.5 b	21.8 b
40 (Enciabein)	22.6 b	22.9 b	21.6 b	21.9 b	21.9 ab	21.9 b
50 (Enciabein)	23.6 ab	23.7 b	22.1 ab	22.5 ab	22.0 a	22.2 a
60 (Enciabein)	24.3 a	24.8 ab	23.2 a	23.4 a	22.1 a	22.6 a
60 (Urea)	26.3 a	26.7 a	23.6 a	23.7 a	22.3 a	22.9 a
F test	**	**	**	**	*	*

Data in Table 6 presented the effect of nitrogen application on panicle weight in the two seasons. The application of any of the tested nitrogen rates under study significantly increased panicles weight without any significant difference among them. The lightest panicles were obtained when no nitrogen was applied. The increase in panicle weight by nitrogen application could be attributed to the role of nitrogen for increase photosynthesis which increase the metabolite streeme that translocated to the panicle spicklets resulted in increase filling % consequently increase weight of panicles . These findings are in agreed with Raghuwanshi *et al.* (2003) and Metwally *et al.* (2007).

Number of filled and unfilled grains panicle^{-1} as affected by the nitrogen application in the two seasons are shown in Table 6. Data showed that application of 40 kg N/fed gave the highest number of filled grains panicle-1 without any significant difference with those produced by 50 or 60 kg N/ fed as Enciabien or 60 kg N/fed. as urea form .While the lowest value was produced under unfertilized treatment . It could be attributed to the increase in the amount of metabolites synthesized as aresult of high photosythess due to the sufficient amount of nitrogen and this, in turn , might account much for the superiority of filled grains. These results were true in both seasons. The pervious results are in good agreement with those obtained by Khanda and Dixit (1995) and Metwally *et al.* (2007).

Table 6: Panicle weight (g), number of filled grains panicle^{-1} and number of unfilled grains panicle^{-1} of Sakha 106 rice variety as affected by nitrogen treatments in 2008 and 2009 seaasons.

Nitrogen treatments kg N fed^{-1}	Panicle weight (g)		No. of filled grains panicle^{-1}		No. of unfilled grains panicle^{-1}	
	2008	2009	2008	2009	2008	2009
Control	3.2 b	3.3b	119.6 c	119.9 c	2.9 c	3.1 c
30 (Enciabein)	3.9 a	4.0 a	126.8 b	126.2 b	3.4 b	3.9 bc
40 (Enciabein)	4.2 a	4.3 a	138.2 a	140.1a	3.5 b	4.1 b
50 (Enciabein)	4.4 a	4.3 a	143.3 a	148.2 a	3.7 b	5.1 a
60 (Enciabein)	4.0 a	4.2 a	140.9 a	143.4 a	4.6 a	5.5 a
60 (Urea)	4.0 a	4.1 a	142.1 a	146.1 a	4.4 a	6.0 a
F test	*	**	**	*	**	*

Data in the same Table 6 revealed that adding 60 kg N/fed as.urea or Enciabien in 2008 season or the same level and 50 kgN/fed as Enciabien in2009 season produced the greatest number of unfilled grains per panicle as compared with the other studied treatments . It might be due to the increase in number of spikelts per panicle under the high levels of nitrogen with the insufficient carbohydrates for fill all there number of spikelts consequently high number of unfilled grains panicle^{-1}. This finding are in agreement with those obtained by Metwally *et al.* (2007).

Application of nitrogen had no significant effect on 1000 - grain weight in the two seasons of study .The differences in 1000 grain weight mostly depended on the genetic pack ground more than most of agronomic treatments.

Grain yield of sakha106 rice variety as affected by the application of nitrogen in 2008 and 2009 rice growing seasons are presented in Table 7. Data indicated that there were any significant differences among the all nitrogen levels under study in grain yield. It can observed that all the tested N-levels gave nearly the grain yield ,so economically, 30 kg N/fed. is sufficient for the greatest grain yield . It means that Sakha 106 rice variety responded to 30 kg N/fed in the form of Enciabien s slow nitrogen fertilizer which cause a continuous supply of N through all the stages of the tested variety consequently nitrogen fertilizer increase photosynthesis product resulted in increase grain yield and most of its component such as number of panicles/m^2, panicle weight and number of filled grains per panicle. Similar conclusion was previously drawn by Ebaid and Ghanem (2000), Singh *et al.* (2004), Mhaskar *et al.* (2005) and Metwally *et al.* (2007).

Table 7: 1000 - grain weight (g), grain yield t fed^{-1} and straw yield t fed.$^{-1}$ of Sakha106 rice variety as affected by nitrogen treatments in 2008 and 2009 seasons.

Nitrogen Treatments kg N fed^{-1}	1000 grain weight (g)		Grain yield t fed.$^{-1}$		Straw yield t fed.$^{-1}$	
	2008	2009	2008	2009	2008	2009
Control	29.5	30.4	2.50 b	2.36 b	2.71 c	2.88 d
30 (Enciabein)	30.2	30.2	4.10 a	4.22 a	4.18 b	4.46 c
40 (Enciabein)	29.9	30.0	4.21 a	4.25 a	4.54 ab	4.62 bc
50 (Enciabein)	30.1	30.1	4.29 a	4.30 a	4.67 ab	4.95 b
60 (Enciabein)	29.8	29.8	4.28 a	4.29 a	4.96 a	5.05 b
60 (Urea)	29.2	29.0	4.26 a	4.27 a	5.29 a	5.45 a
F test	NS	NS	**	**	**	**

The effects of nitrogen application on straw yield in the two seasons are shown in Table 7. Straw yield was significantly affected by nitrogen application. Increasing nitrogen level up to 60 kg N /fed significantly increased straw yield. There was no significant difference between Enciabein and urea in 2008 on straw yield while, urea superior Enciabein in 2009. This mainly due to the fact that nitrogen application increased dry matter, leaf area index and number of tillers. These results are in agreement with those reported by many investigators such as Khanda and Dixit (1995), Mhaskar *et al.* (2005) and Metwally *et al.* (2007).

The effect of nitrogen application on N % and N accumulation kg fed^{-1} in rice grain and straw are shown in Table 8. Data showed that N concentration % in rice grain and straw significantly increased as nitrogen level increased up to 50 kg N/fed. The highest N content in treated plants could be connected with the positive effect of nitrogen in some important physiological processes and also to the increase in N- up take which associated with growth (big canopy) resulted in an increase in the chemical compounds inside the plant which contain nitrogen in its structure such as protein ,auxine acids, nucleic acids...etc. consequently increase both N% o accumulation in grain or straw of rice . The lowest N content of the straw at maturity in comparison with the content in the grain clearly indicates N remobilization from the vegetative parts. The same trend was observed by Metwally *et al.* (2011). Nitrogen accumulation kg fed^{-1} at harvest by grain and straw were significantly affected by nitrogen application. Nitrogen uptake increased significantly with the increase in the rate of applied nitrogen. This increase in N uptake is related to biomass production.

Table 8: N % and N accumulation kg fed^{-1} in rice grain and straw of Sakha106 rice variety as affected by nitrogen treatments in 2008 and 2009 seasons.

Nitrogen Treatments kg N fed^{-1}	N concentration %				N accumulation kg fed-1			
	Grain		Straw		Grain		Straw	
	2008	2009	2008	2009	2008	2009	2008	2009
Control	0.50	0.63	0.39	0.40	12.50	13.67	10.56	11.52
30 (Enciabein)	0.72	0.87	0.40	0,39	29.53	36.71	16.72	17.34
40 (Enciabein)	0.76	0.86	0.42	0.45	31.94	36.55	19.06	20.79
50 (Enciabein)	0.78	0.88	0,43	0.44	33.46	37.84	20.08	21.79
60 (Enciabein)	0.85	0.82	0.40	0.42	36.83	35.18	20.32	21.34
60 (Urea)	0.79	0.85	0.40	0.45	33.65	36.30	21.80	24.53

Apparent recovery efficiency (ARE%) and agronomic efficiency (AE) as influenced by nitrogen levels are presented in Table 9. Data demonstrated that both ARE% or AE were increased as Nitrogen levels decreased up to 60 kg N / fed. the percent of ARE% were ranged between 53.98 and 59.90 to 77.3 to 96.20 in 2008 and 2009 seasons, respectively, while AE, were ranged between 29.3 and 28.2 to 53.3 and 54.7 in 2008 and 2009 season respectively .Enciabien as slow release fertilizer had higher efficiency than nitrogen as urea form , So the use of Enciabien was better than urea fertilizer. Sedeque *et al.* (2004) and Metwally *et al.* (2011) reported that AE is greater under low doses of nitrogen than higher levels.

Table 9: Apparent recovery efficiency (ARE%) and Agronomic efficiency (AE) kg kg^{-1} of Sakha106 rice variety as affected by nitrogen treatments in 2008 and 2009 seasons.

Nitrogen treatments kg N fed^{-1}	Apparent recovery efficiency (ARE) %		Agronomic efficiency (AE) kg kg^{-1}	
	2008	2009	2008	2009
Control	-	-	-	--
30 (Enciabein)	77.30	96.20	53.3	54.7
40 (Enciabein)	69.85	80.38	42.7	41.8
50 (Enciabein)	60.96	68.88	35.8	34.4
60 (Enciabein)	56.82	52.22	29.7	28.5
60 (Urea)	53.98	59.40	29.3	28.2

Concern economic evaluation of rice production under different N treatments data in Table 10 revealed that application of nitrogen fertilizer at rate of 50 kg N/fed as *Enciabien* form gave the highest amount of yield increase over control which reflected in value addition LE/fed. While the lowest values were recorded when nitrogen applied at rate of 30 kgN/fed as *Enciabien* form.AS for the net return LE /fed the highest value achieved when plants received 60 kg N/fed as urea form followed by the application of 30 kgN /fed as *Enciabien* while, the lowest value when 60kg N/fed as *Enciabien* was applied.

Table: 10 Economic evaluation of rice production as affected by different nitrogen treatment

Nitrogen treatments kg N fed^{-1}	Yield increase over control kg/fed		Value addition LE / fed		Net return LE/fed		Amount of fertilizer kg/fed	*Applied fertilizer cost LE
	2008	2009	2008	2009	2008	2009		
Control	-	-	-	-	-	-	-	-
30 (Enciabein)	1600	1860	3200	3720	1215	1475	75	385
40 (Enciabein)	1710	1890	3420	3780	1200	1380	100	510
50 (Enciabein)	1790	1940	3580	3880	1155	1305	125	635
60 (Enciabein)	1780	1930	3560	3860	1020	1170	150	760
60 (Urea)	1760	1910	3520	3820	1544	1674	131	216

*Applied fertilizer cost=price of fertilizer+ Fertilizer broadcast in the field, Price of kg Enciabien =5 LE. Price of kg urea = 1.5 LE. Price of paddy rice =2000 LE.

Conclusion

In spite of application of N fertilizer at rate of 30 kg N /fed as *Enciabien* produce nearly value of grain yield which produce by application of 60 kg N/fed as urea, it could be saved about 50% for amount of applied N fertilizer , but in point of view economical study still utilization of 60 kg N/fed as urea consider as economical rate because it gaves the highest value of net return LE/fed for rice grower.

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إستجابة صنف الأرز سخا ١٠٦ لمستويات مختلفة من السماد الأزوتي بطيء التحلل مقارنة بالجرعة الموصى بها من اليوريا

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مركز البحوث والتدريب فى الأرز بسخا – معهد بحوث المحاصيل الحقلية – مركز البحوث الزراعية.

إن كفاءة إستخدام السماد النيتروجينى قليلة جداً لنبات الأرز تحت ظروف الغمر،ربما يرجع إلى فقد النيتروجين بطرق متعددة، ولزيادة كفاءة إستعمال النيتروجين بإستخدام السماد النيتروجينى بطئ التحلل. إقيمت تجربتان حقليتان فى مزرعة مركز البحوث والتدريب فى الأرز بسخا – كفرالشيخ ، مصر ، خلال موسمى الزراعة ٢٠٠٨ و ٢٠٠٩ لدراسة إستجابة صنف الأرز المنزرع سخا ١٠٦ لمستويات مختلفة من السماد بطيء التحلل والمسمي (إنسيابين) بمعدلات صفر (كنترول)، ٣٠، ٤٠، ٥٠، ٦٠ كجم نتروجين/فدان مقارنة بالمعدل الموصى به من السماد الأزوتى فى صورة يوريا ٦٠ كجم نيتروجين /فدان. أظهرت النتائج المتحصل عليها إضافة ٦٠ كجم نتروجين /فدان فى صورة يوريا او إنسيابين أعطتأعلي القيم لطول النبات بينما نفس المعدل من اليوريا اعطى أكبر عدد من الأشطاء / جوره وأكبر كمية من الماده الجافة وعلاوة على ذلك لا توجد أى فروق معنوية بين كل مستويات النيتروجين لصفة دليل مساحة الأوراق،وقد وجد كذلك لمحصول الحبوب ومكوناتة أن إضافة كل من ٥٠- ٦٠ وحدة فى صورة إنسيابين او ٦٠ كجم نتروجين /فدان من اليوريا أعطت أعلى عدد من السنابل للجورة بينما عدد الحبوب فى الجورة كانت إستجابتها حتي ٤٠ وحدة ازوت بدون فرق معنوى مع كل من ٥٠، ٦٠ وحده نتروجين /فدان فى صورة إنسيابين أو ٦٠ وحدة فى صوره يوريا بينما كانت أعلى قيمة للحبوب الفارغة عند إضافة ٦٠ وحدة من النتروجين /فدان فى صورة يوريا أو إنسيابين. وأوضحت النتائج كذلك بأنه لا توجد أى فروق معنوية بين كل معاملات إضافة النيتروجين لصفتى وزن السنبلة وكذلك وزن الألف حبة ومحصول الحبوب بينما بلغت إستجابة محصول القش من ٤٠وحدة حتي ٦٠ وحدة نتروجين /فدان فى صورة إنسيابين أو ٦٠ وحدة فى صورة يوريا.كذلك بلغت نسبة النيتروجين فى النبات الي اعلى قيمة فى الحبوب مع إضافة معدل ٦٠ وحدة نتروجين /فدان فى صورة إنسيابين بينما كانت-فى محصول القش من ٥٠ – ٦٠ وحدة نتروجين /فدان. أما كمية النيتروجين المتجمعة أعطت أعلى قيمة لها عند إضافة ٦٠ وحدة نتروجين إما فى صورة إنسيابين أوفي صورة يوريا وذلك فى قش نبات الأرز.وقد سجلت الكفاءة المحصولية أعلى قيمة لها تحت المستويات المنخفضة من الأزوت بينما بلغت الى اقل قيمه لها تحت المستويات المرتفعه من الأزوت.

وتوصى الدراسة باضافة المعدل الموصي به ٦٠ وحدة نتروجين / فدان في صورة يوريا الذي أعطي أعلي إنتاجية وأعلي قيمة من صافي الربح للفدان.

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