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PRODUCTIVITY OF GIZA 177 AND GIZA178 CULTIVARS UNDER ORGANIC AND INORGANIC FERTILIZATION

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ABSTRACT

Two field experiments were carried out at the Farm of Rice Research and Training Center (RRTC), Sakha, Kafr El-Sheikh, Egypt during 2013and 2014 seasons to study the effect of organic and inorganic fertilizer on growth, yield and its components of two rice cultivars. The experimental design was split-split plots with four replication , the two rice cultivars namely Giza177 and Giza178 allocated in the main plots , while fertilizer treatments i.e. N-levels (0,120 and 165 kg N/ha)were applied in the sub plots and FYM ,P ,K and their combination devoted in the sub-sub plots .

The main results revealed that Giza178cultivar surpassed Giza 177 cultivar in number of tillers hill^{-1} ,leaf area index , dry matter accumulation content (g hill^{-1}) ,number of panicles hill^{-1} panicle length(cm) ,panicle weight(g) ,number of grains panicle^{-1}, grain and straw yield (t ha^{-1}) , while Giza177 produced highest 1000-grain weight .

Plants treated with 165 kg N/ha gave the heights value of all growth character and yield component.

Farmyard manure plus phosphorus plus potassium increased the previously mentioned characters. Also, application of FYM+P+K combined with either 120 or 165 kg N/ha produced higher yield than application only P+K combined with 120 or 165 kg N/ha . It means that adding FYM with 120 or 165 kg N/ha caused on increased in yield.

INTRODUCTION

Rice is most important food crop and a major food grain for more than a third of the world's population. Fertilizer is very important input for intensive rice production the profitability of rice production systems depends on yield and input quantities. So the appropriate fertilizer input that is not only for getting high grain yield but also for attaining maximum profertility. Nitrogen, phosphorus and potassium fertilizer is a major essential plant nutrient and key input for in increasing crop yield(Chaturvedi, 2005).

Nitrogen deficiency generally results in stunted growth and chlorotic leaves caused by poor assimilate formation that leads to premature flowering and shortening of the growth cycle(Barik et al.,2004 andChoudhury and Kennedy,2005). Nitrogen excess promotes development of the above ground aground organs with abundant dark green (high chlorophyll) tissues of soft consistency and relatively poor root growth. Nitrogen contributes to carbohydrate accumulation in culms and leaf sheaths during the pre-heading stage and in the grain during the ripening stage of rice.

Phosphorus deficit is a most important restrictive factor in plant growth and recognition of mechanisms that increase plant phosphorus use efficiency is important. Phosphorus is a major component in ATP, the molecule that provides ”energy” to that plant for such processes as photosynthesis, protein synthesis, nutrient translocation, nutrient uptake and respiration.

Potassium is the most abundant nutrient in plants including rice plant. This is especially true for improved cultivars that uptake K considerably up to four-fold higher than native cultivars. It is also one of the most important treatments influencing crop metabolism, growth, development and yield. K plays a number of indispensable roles in a wide range of functions: photosynthesis, enzyme activation, protein synthesis, osmotic potential and as a counter ion to inorganic ions and organic biopolymers. Potassium deficiency resulted in a decrease in net photosynthetic rate and dramatic decrease in crop yield(Talathi,etal.2009 and DanYing,etal.2010)

Farmyard manure (FYM) is the most important and widely used. Use of organic manures has several advantages (Choudhury and Kennedy 2005). They supply plant nutrients including micronutrients. They improve soil physic

cal properties like structure, water holding capacities’. They increase the availability of nutrients. (Harne, etal., 2004 and Mankotia,etal.,2008)

Therefore, the present work aimed to study the productivity of both Giza177 and Giza178 rice cultivars under organic (FYM) and inorganic fertilization.

MATERIALS AND METHODS

Two field experiments were carried out at the Farm of Rice Research and Training Center (RRTC), Sakha, Kafr El-Sheikh - Egypt, during 2013 and 2014seasons, to study the impact of organic and inorganic fertilizer on growth and yield of Giza 177 and Giza178 rice cultivars .The preceding crop was Egyptian clover in both seasons.

Representative soil samples were taken from the experimental site before transplanting (0-30cm depth). The procedure of soil analysis followed the methods of Jackson (1967) was used. Data of some physical and chemical characters at the experimental site in both seasons are presented in Table 1.

Table 1: Some physical and chemical characters of experimental sites in2013and2014 seasons

Soil properties	2013	2014
Clay %	56.1	55.4
Silt %	31.3	33.36
Sand %	12.6	12.27
Texture	clay	clay
Organic matter %	1.4	1.5
Total nitrogen , mg/kg(pmm)	450	560
pH (1:2.5 soil suspension)	7.9	8
EC ds.m-1 (soil paste)	2	2.3

Data in Table 2 showed that the chemical analysis of farmyard manure

Table2: chemical analysis of farmyard manure

Analysis	2013	2014
N %	2.21	2.30
P %	0.67	0.67
K %	1.00	1.20
O.M %	2.30	2.50
C/N Ratio	1.25	1.23

The experiments were laid out in a split - split plot design with four replications. The main plots were occupied with two rice cultivars (Giza 177 and Giza178). The sub-plots were devoted to the three nitrogen fertilizer levels (0, 120 and 165 Kg N ha^{-1}).

Nitrogen fertilizer was applied in the form of Urea (46 % N), which was added in two equal doses, the first dose was 2/3 as basal application incorporated in plots which treated with nitrogen before transplanting, while the second dose was applied at 30 days after transplanting according to the experiments treatments. The sub- sub plots had a combination of different farmyard manure (FYM). (Farmyard manure at the rate of 10 ton ha^{-1} was applied in plots which treated it and incorporated basely in the dry soil before rice transplanting),Potassium (Potassium fertilizer in the form of Potassium Sulfate (48 % K_2O) at the rate of 57 kg K_2O ha^{-1} before plowing) . Phosphorus (phosphorus fertilizer in the form of single supper phosphate (15% P_2O_5) at the rate of 36 kg P_2O_5 ha^{-1} before blowing) according to the treatments under study in the two studied season .Fertilizers as follows as :

1-FYM + P +K
2-FYM + P
3-FYM + K
4-P +K

The area of nursery was 840 m^2 $ha^{-1}$for Giza177 and Giza178rice cultivars. The nursery area was prepared and N, P, K and Zn were applied as recommended. Seeds at the rate of 144 kg ha^{-1} for Giza177 and Giza178, respectively, were soaked in water for 24 hours then incubated for 48 hours to hasten germination. Pre-germinated seeds were uniformly broadcasted in the nursery on 4th May of the two seasons. Also, weed were chemically controlled using sateran 50% at the recommended.

After 30days three seedlings per hill were transplanted at the spaces of 15 x 15 cm between rows and hills for Giza 177 and Giza178.the sub-sub plot size was $12m^2$. Weeds were chemically controlled using Satern (50%) at the rate of 4.7 letter ha^{-1} was water and then mixed well with enough sand and applied after seven days from transplanting into 3 cm water depth.

Studied characters:

A-Growth characters: some growth characters were estimated at late booting stage namely number of tillers/$hill^{-1}$, leaf area index. (Leaf area index was computed as the ratio between the leaf area (cm^2) divided by occupied land area (cm^2)), and dry matter accumulation (g $hill^{-1}$).

B-Yield attributes: number of panicles hill^{-1}, Panicle length (cm), Panicle weight (g), 1000-grain weight (g) and number of grains panicle^{-1} were determent during ripening and maturity stage.

C-Grain and straw yields: central 10m^{-2} was identified and harvested three days after harvesting the weight of both grain and straw were weighted ,then there shed and grain yield adjusted to14% moisture and computed to ton/ha. Straw yield was the calculated as the difference between total biomass (grain+ straw) and grain yield then computed to ton/ha.

Statistical analysis

All obtained data were statistically analyzed according to technique of analysis of variance (ANOVA) for the split –split plot design as published by Gomez and Gomez (1984) by using means of MSTATC computer software package. Means of treatments were compared using Duncan's multiple rage tests of5% level of probability as described by Duncan's (1995).

RESULTS AND DISCUSSION

Growth characters:

Number of tillers hill^{-1}, leaf area index and dry matter accumulation (g hill^{-1}) strongly were affected by the studied fertilizer treatments and their combination (Table 3).

Data in Table 3 indicated that Giza178 gave the highest value of number of tillers hill^{-1}, leaf area index and dry matter accumulation (g hill^{-1}) as compared with Giza 177 in the two studied seasons. This result might be due to variation in varietal in their genetic structure. Varietal differences in their tillering ability were claimed by several investigators; Satyan *et al.* (2002) Harne *et al.* (2004) and Virdia and Mehta (2010).

Data also indicated that application of 165 kg N ha^{-1} gave the greatest number of tillers hill^{-1}, leaf area index and dry matter accumulation (g hill^{-1}) fallowed by 120 kg N ha^{-1}as compared with control in the two studied seasons. The increasing in the studied growth characters could be attributed to the role of N for in enhancing the biosynthesis of auxins which activate and encourage the up ground nodes of rice to emerge more tillers those results are in good agreement with those Kumar J. and M. P.Yadav (2008).

Application of FYM + P + K produced the highest value of previously mentioned characters fallowed by FYM + P, FYM + K and P+K.while, FYM as organic compound is readily decomposed and improved soil fertility plus the continuous supplying the rice plants by the essential nutrient elements consequently improve rice growth and increase number of tillers hill^{-1}, leaf area index and dry matter accumulation (g hill^{-1}). These findings are in agreement with those Hasanuzzaman *et al.* (2010). Kharub and Chander (2010) and Muhammad *et al.* (2010).

Table3. Number of tillers hill^{-1}, leaf area index and dry matter accumulation (g hill^{-1}) of Giza 177 and Giza178 rice cultivars as affected by fertilizers treatments and their interaction during 2013and 2014seasons .

Treatments \ character	Number of tillers hill^{-1}		Leaf area index		Dry matter accumulation (g hill-1)	
	2013	2014	2013	2014	2013	2014
cultivars(A)						
Giza 177	18.27 b	18.69 b	5.05b	4.38b	30.41b	30.08b
Giza178	25.57 a	24.18 a	5.97a	5.73a	35.61a	336.27a
N-levels(B)						
0	16.15 c	15.54 c	3.05c	2.95c	27.83c	28.50c
120	21.84 b	20.27 b	6.06b	5.44b	34.25b	34.91b
165	27.26 a	27.49 a	7.42a	6.76a	38.45a	39.12a
Combinationtreatments (C)						
FYM + P + K	24.78 a	23.81 a	6.47a	5.97a	38.11a	38.77a
FYM + P	21.87 b	21.05 b	5.57b	5.10b	30.61c	31.27c
FYM + K	21.02 b	21.53 b	5.45b	4.89b	34.33 b	35.00b
P + K	19.66 c	19.34 c	4.55c	4.25c	31.00c	31.66c
Interaction :						
A x B	**	**	**	**	**	**
A x C	**	**	*	*	**	**
B x C	NS	NS	NS	NS	**	**
A x B x C	NS	NS	NS	NS	**	**

Data in Table 4 indicated that the interaction between nitrogen rates and rice cultivars had a significant effect on number of tillers hill^{-1}, leaf area index and dry matter accumulation (g hill^{-1}) in both seasons .Giza178 rice cultivar gave the highest number of tillers hill^{-1}, leaf area index and dry matter accumulation (g hill^{-1}) when plants received with 165 kg N ha^{-1} followed by 120 kg N ha^{-1} with the same cultivars in the two seasons. The lowest value of number of tillers hill^{-1}, leaf area index and dry matter accumulation (g hill^{-1}) were obtained from Giza177 cultivar under control (without any fertilizers).

Table4. Number of tillers hill^{-1}, leaf area index and dry matter accumulation (g hill^{-1}) as affected by the interaction between rice cultivars and nitrogen rates

N-levels kg	N. of tillers hill^{-1}				leaf area index				dry matter accumulation(g hill^{-1})			
	2013		2014		2013		2014		2013		2014	
	Giza177	Giza178	Giza177	Giza178	Giza177	Giza178	Giza177	Giza178	Giza177	Giza178	Giza177	Giza178
0	13.6f	23.8c	13.9f	22.1c	2.4f	3.6e	2.0f	3.8e	23.2d	32.4c	23.9d	33.8c
120	17.3e	26.3b	17.7e	24.8b	4.6d	6.0b	4.9d	6.1b	31.8c	37.4b	31.7c	38.8b
165	18.6d	31.6a	19.3d	30.6a	5.4c	7.7a	5.9c	7.4a	36.9b	40.0a	37.5b	40.6a

Data in Table 5 indicated that the interaction between P, K and their combination with FYM and varieties had a significant effect in number of tillers hill^{-1} ,leaf area index and dry matter accumulation (g hill^{-1}) in the two seasons. The highest number of tillers hill^{-1}, leaf area index and dry matter accumulation (g $hill^{-1}$) was obtained by applying FYM + P + K to G178, followed by FYM +K with the same cultivars while the lowest value resulted from the application of P + K to Giza177 in the two seasons. These findings are in agreement with those reported by Talathi et al.(2009) and Dan Ying *et al.* (2010)

Table 5. Number of tillers $hill^{-1}$, leaf area index and dry matter accumulation (g $hill^{-1}$) as affected by the interaction between rice cultivars and combination of FYM, P and K fertilizer during 2013and 2014seasons

FYM , P K and their combination	N. of tillers $hill^{-1}$				leaf area index				Dry matter accumulation (g $hill^{-1}$)			
	2013		2014		2013		2014		2013		2014	
	Giza 177	Giza 178	Giza 177	Giza 178	Giza 177	Giza 178	Giza 177	Giza 178	Giza 177	Giza 178	Giza 177	Giza 178
FYM+P+ K	19.5e	27.0a	19.7e	25.9a	4.9bc	6.0a	4.2cd	5.6a	34.8c	39.3a	35.5c	40.0a
FYM + P	17.9f	23.8c	18.1f	22.5c	4.3cd	4.7bc	3.6e	4.5bc	25.3g	33.8cd	26.0g	34.5cd
FYM + K	16.5g	25.5b	16.9g	24.0b	3.6e	5.2b	2.9f	4.8b	30.0e	36.6b	30.7e	37.2b
P + K	15.0h	21.2d	15.6h	20.9d	3.2e	3.8de	2.6f	3.8de	27.3f	32.6d	28.0f	33.2d

The interaction between nitrogen rates and combination of FYM, P and K had a significant effect on dry matter accumulation (g $hill^{-1}$) in both seasons. Data in Table 6 showed that the best combination were found when application of 165kg N ha^{-1} +FYM + P + K gave the highest value of dry matter accumulation(g $hill^{-1}$) in the two seasons as compared with the other studied treatments .

Table 6.Dry matter accumulation (g $hill^{-1}$) as affected by the interaction between nitrogen rates and combination of FYM, P and K fertilizer

FYM , P K and their Combination	Nitrogen rates (kg ha^{-1})					
	2013			2014		
	0	120	165	0	120	165
FYM + P + K	32.83d	37.33b	44.17a	33.50d	38.00b	44.83a
FYM + P	25.33f	29.33e	37.17b	26.00f	30.00e	37.83b
FYM + K	28.83e	36.00bc	38.17b	29.50e	36.67bc	38.83b
P + K	24.33f	34.33cd	34.33cd	25.00f	35.00cd	34.28cd

The interaction among rice cultivars, nitrogen rates and FYM, P and K of fertilizers in the two seasons had a significant effect on dry matter accumulation in both seasons are presented in Table 7.Data in Table 7 showed that Giza178cultivar superior Giza 177culitvar in dry matter accumulation (g $hill^{-1}$) under any of fertilizer combinations and nitrogen rates in both seasons. The best combination was found when G178 treated with 165 kg N ha^{-1} with FYM + P + K in the both seasons. While the lowest value was obtained from Giza177 cultivar when fertilized by P+K under control of nitrogen treatments (without nitrogen fertilizer).The increases in dry matter accumulation (g $hill^{-1}$) in Giza178cultivar when fertilized by 165 kg N ha^{-1} with FYM + P + K might be due to reasonable provide the plant by adequate amount of essential nutrients and other growth substances due to decomposition of FYM beside the increase in the activity of enzymes related to the formation of carbohydrates, lipids and proteins because of physiological role of both P as energetic elements and K as co- activator of plenty of enzyme necessary for the formation of dry matter accumulation (g $hill^{-1}$). Moreover fast decomposition of FYM which led to increase the availability of essential nutrients for rice plant as well as the role of FYM for increasing the fertility of soil due to the continuous supplying some growth substances beside the available nutrients which increase root power and plant growth characters related to high photosynthesis consequently more dry matter accumulation (g $hill^{-1}$). Those results are in agreement with these reported by Barik *et al.* (2004),Kumar and Yadav (2008) and Mankotia *et al.* (2008)

Table7. Dry matter accumulation (g $hill^{-1}$) as affected by the interaction among rice cultivars ,nitrogen rates and combination of FYM, P and Kin the two seasons

FYM , P K and their combination	Rice cultivars					
	Giza177			Giza178		
	Nitrogen rates (kg ha^{-1})					
	0	120	165	0	120	165
	2013 season					
FYM + P + K	28.16j	34.16e-h	43.16ab	37.50cde	40.50bc	45.16a
FYM + P	20.50l	23.50kl	35.16d-g	30.16ij	35.16d-g	39.16c
FYM + K	23.83k	33.50gh	35.83d-g	33.83fgh	38.50cd	40.50bc
P + K	20.50l	33.16ghi	31.50hi	28.16j	35.50d-g	37.16c-f
2014 season						
FYM + P + K	28.83j	34.83e-h	43.83ab	38.16cde	41.16bc	45.83a
FYM + P	21.16l	24.16kl	35.83d-g	30.83ij	35.83d-g	39.83c
FYM + K	24.50k	34.16gh	36.50d-g	34.50fgh	39.16cd	41.16bc
P + K	21.16l	33.83ghi	32.16hi	28.83j	36.16d-g	37.83c-f

Yield and yield components:

Number of panicles $hill^{-1}$,Panicle length (cm),Panicle weight(g), 1000-grain weight (g) and number of grains $panicle^{-1}$of the two rice cultivars as affected by fertilizers treatments in the two seasons are presented in Table 8.

Data in Table 8 indicated that there was highly significant difference between Giza177 and Giza178 rice cultivar in all the previously mention characters.Giza178 surpassed Giza 177 cultivars in all these characters except 1000- grain weight which gave the opposite trend.

Mineral nitrogen significantly increased yield characters as compared without nitrogen treatment in the both seasons. Plants received nitrogen at the rate of 165 kg N ha^{-1} gave the greatest yield attribute characters under study as compared with the other treatments except 1000-grain weight in both seasons

Data also indicated that the application of FYM + P + K is better than the other combination under study. This mainly due to the decomposition of farmyard manure which cause continuous supply of macro and micro nutrient elements which improve the viability of rice plant consequently the increase in the most of plant organs such as number of tillers, area of leaves and number of panicles .Also the present of both P and K increase the plant energy required for establishment of plant organs, one of them is number of panicles. These findings are in agreement with those reported by Ramakrishna *et al.* (2007)

Table 8. Number of panicles hill^{-1} ,panicle length(cm) ,panicle weight(g) ,1000-grain weight(g) and number of grains panicle^{-1} of Giza 177 and Giza178 rice cultivars as affected by fertilizer treatments in the two seasons

character / Treatments	N. of panicles hill^{-1}		Panicle length(cm)		Panicle weight(g)		1000-grainweight(g)		N. of grains panicle^{-1}	
	2013	2014	2013	2014	2013	2014	2013	2014	2013	2014
cultivars(A)										
Giza 177	18.37b	18.28b	17.47b	18.22b	2.89b	3.05b	26.46a	26.56a	89.26b	117.6b
Giza178	23.90a	24.07a	21.17a	22.22a	3.72a	3.48a	23.06b	23.95b	132.2a	156.6a
N-levels(B)										
0	15.23c	15.43c	17.96c	18.49c	2.33c	2.27c	25.46a	26.56a	103.7c	122.0c
120	20.91b	20.72b	19.25b	20.57b	3.31b	3.16b	25.68a	25.20b	109.8b	140.5b
165	27.26a	27.37a	20.76a	21.60a	4.28a	4.30a	23.14b	24.25c	118.5a	148.8a
Combination treatments (C)										
FYM + P + K	24.68a	23.69a	19.9a	21.31a	3.72a	3.58a	24.90a	26.55a	113.7 a	140.5a
FYM + P	21.06b	20.78b	19.3ab	20.10b	3.26b	3.21b	25.07a	24.63a	110.9 b	138.0b
FYM + K	21.13b	21.15b	19.15b	20.37b	3.40ab	3.35ab	24.68a	25.15a	110.3 b	136.7b
P + K	19.68c	19.07c	18.84b	19.10c	2.85c	2.83c	24.39a	25.02a	107.8 c	133.2c
Interaction :										
A x B	**	**	**	**	**	NS	NS	NS	NS	NS
A x C	**	**	NS	**	NS	NS	NS	NS	NS	NS
B x C	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
A x B x C	NS	NS	NS	NS	NS	NS	NS	NS	Ns	Ns

Data in Table 9 showed that the interaction between rice cultivars and nitrogen rates had significant effects on number of panicle hill^{-1}, panicle length (cm) in both seasons and panicle weight (g) in the first season. Data demonstrated that application of 165 kg N ha^{-1} to Giza178 cultivar produced the highest number of panicle hill^{-1}, panicle length (cm) and panicle weight (g), while the lowest value of number of panicle hill^{-1}, panicle length (cm) and panicle weight (gm) were obtained from Giza177 cultivar under control treatment (with any fertilizer) .These findings are in agreement with those reported by Chaudhary *et al.* (2008)

Table 9.Number of panicle hill^{-1}, panicle length (cm) and panicle weight(g) as affected by the interaction between rice cultivars and nitrogen rate

N– levels kg ha-1	N. of panicles hill^{-1}				Panicle length(cm)				Panicle weight(g)	
	2013		2014		2013		2014		2013	
	Giza177	Giza178	Giza177	Giza178	Giza177	Giza178	Giza177	Giza178	Giza177	Giza178
0	13.80e	18.66d	13.77e	17.09d	15.50f	16.15e	16.83f	18.40e	2.20e	2.46d
120	17.52d	25.30b	17.18d	25.25b	17.78d	21.35b	19.43d	22.74b	2.95c	3.66b
165	23.80c	32.33a	23.88c	30.85a	19.43c	22.74a	20.15c	23.78a	3.53b	4.04a

Data in Table 10 indicated that the interaction between rice cultivars and combination of FYM, P and K fertilizers had significant effects on number of panicles hill^{-1} in both seasons and panicle length (cm) in the first seasons.

Application of farmyard manure combined with phosphorus and potassium to Giza178 cultivar gave the highest number of panicles hill^{-1} in the two studied season and Panicle length (cm) only in the first season as compared with Giza177 cultivar under the same treatment. Data also revealed that the combination of FYM+P +K produced the highest values of the two tested characters of both cultivars and then gradually decreased with the other combination i.e. FYM+P, FYM+K and P+K. These results may be due to the decomposition of farmyard manure which release macro and micronutrients and improve the soil fertility and provide rice plants with the released nutrients particularly nitrogen, Potassium and phosphorus as an essential element which is playing an important role in the manufacture of building plant organs. Also P as energetic elements and N which is essential for the biosynthesis of auxuns that increases of cell division and elongation of panicles during panicle initiation which emerge more panicles.

Table10.Number of panicles hill^{-1} and panicle length (cm) as affected by the interaction between rice cultivars and combination of FYM, P and K fertilizers

FYM , P K and their combination	N. of panicles hill^{-1}				Panicle length(cm)	
	2013		2014		2013	
	Giza177	Giza178	Giza177	Giza178	Giza177	Giza178
FYM + P + K	20.54e	28.82a	20.34d	27.03a	18.96d	23.66a
FYM + P	19.06f	24.07c	18.87e	22.68c	18.46de	21.73b
FYM + K	17.78g	26.44b	17.55f	24.75b	17.87e	22.86a
P + K	16.12h	22.25d	16.35g	21.80c	17.57e	20.63c

Data in Table 11 revealed that, highly varietals differences were observed between the tested cultivars in grain and straw yields in the two seasons under studied.Giza178 cultivar gave the higher grain and straw yields than Giza 177 cultivars The superiority of Giza178 cultivar in this respect mainly due to its heterosis in dry matter production, LAI, number of panicle m^{-2} and number of grains panicle^{-1}. Similar results were found by Virdia *et al.* (2010).

Plants received 165 kg N ha^{-1} gave the highest grain and straw yields in the both seasons as compared to the other treatments. The lowest grain and straw yields was obtained when rice did not receive any nitrogen fertilizer. The increases in grain yields with application of N can be attributed to the role of N for increase tillers, LAI and chlorophyll consequently increase photosynthesis and accumulate more dry matter which translocated to panicles and improve filling %.

It can be observed that the combination of FYM+P+K gave higher grain and straw yields as compared with the other tested combination. Plants received FYM + P + K gave the highest grain and straw yields followed by application of FYM plus phosphorous or potassium than P+K alone in both seasons. The combination of FYM + P + K cause an increase in grain and straw yield through improved early growth, in terms of dry matter accumulation, leaf area index and tillers number, and reflected in higher number of panicles m^{-2}, number of grain $panicle^{-1}$, and 1000-grain weight as a result to the decomposition of FYM which led to release inorganic elements that improve soil fertility and continuous supply the plant by the essential micro and macro nutrient elements.

Table 11 Grain yield (t ha^{-1}) and straw yield (t ha^{-1}) of Giza 177 and Giza178rice cultivars as affected by fertilizers treatments during 2013 and 2014 seasons

Character / Treatments	Grain yield(t ha^{-1})		Straw yield (t ha^{-1})	
	2013	2014	2013	2014
cultivars(A)				
Giza 177	7.40b	7.48b	8.29b	8.98b
Giza178	10.42a	9.40a	11.47a	10.13a
N-levels(B)				
0	6.97c	6.47c	7.81c	7.21c
120	9.45b	8.23b	10.50b	9.24b
165	10.31a	10.65a	11.32a	12.22a
Combination treatments (C)				
FYM + P + K	9.62a	9.08a	10.70a	10.36a
FYM + P	8.87b	8.49b	9.78b	9.39b
FYM + K	8.90b	8.41b	9.84b	9.60b
P + K	8.25c	7.80c	9.19c	8.86c
Interaction :				
A x B	NS	**	NS	NS
A x C	**	**	NS	**
B x C	NS	**	NS	**
A x B x C	**	Ns	**	Ns

The interaction between rice cultivars and nitrogen rates had a significant effect in grain yield (t ha^{-1}) in 2014season as presented in Table 12. Data showed that the highest grain yields (t ha^{-1}) were recorded by Giza178 cultivar when received 165 kg N ha^{-1}, while the lowest one was found in unfertilized Giza 177cultvar. In this connection the results are in agreement with those obtained by Pal and Mahunta (2010)

Table 12. Grain yields as affected by the interaction between rice cultivars and nitrogen rates in 2014 season

N levels kg ha^{-1}	Giza177	Giza178
0	5.69d	7.24cd
120	7.50bc	8.95bc
165	9.26b	12.03a

The interaction between rice cultivars and combination of FYM, P and K fertilizer treatments had a significant effect on grain yields (t ha^{-1}) in Table13. Data in Table 13 showed that the highest grain and straw yield (t ha^{-1}) were recorded by Giza178 cultivar when received FYM + P + K as combination .While the lowest value was found by adding P + K to Giza 177variety . These data were hold true in 2013 and 2014with grain yields and only 2013 with straw yields. These results may be due to the important role of both P and K for provide the plants by energy and activated enzymes related to photosynthesis activity and biosynthesis of carbohydrates which export to sink of rice with sufficient amount that fill most of spikelet's completely consequently increase grain yield as a result to the increase in number of filled grain and weight of 1000-grain.Moreover ,FYM decompositions cause a continuous supply by essential of macro and micro nutrients and some growth substance which increase root power and uptake as well as the improvement in soil fertility

Table 13.Grain and straw yield as affected by the interaction between rice cultivars and combinations of FYM, P and K fertilizers

FYM , P K and their combination	Grain yield (t ha^{-1})				straw yield(t ha^{-1})	
	2013		2014		2013	
	Giza177	Giza178	Giza177	Giza178	Giza177	Giza178
FYM + P + K	8.05e	11.18a	8.20d	9.96a	9.86c	10.86a
FYM + P	7.58f	10.16c	7.67e	9.31b	8.84e	9.94c
FYM + K	7.12g	10.68b	7.09f	9.73a	8.80e	10.40b
P + K	6.84g	9.64d	6.97f	8.63c	8.41f	9.29d

Data in Table 14 present the interaction between nitrogen rates and the combination of FYM, P and K fertilizers, ingrain and straw yields. Data in Table 14 showed that the highest grain and straw yields were recorded in plants received 165 kg N ha^{-1} combined with FYM + P + K , while the lowest one was obtained from control (without) nitrogen fertilizer) and P + K treatments. These results are in harmony with those obtained by Kharub and Chander (2010) and Muhammad *et al.* (2010)

Table 14. Grain and straw yields as affected by the interaction between nitrogen rates and combination of FYM, K and P fertilizers in2013season

FYM , P K and their combination	Grain yield(t ha^{-1})			straw yield (t ha^{-1})		
	Nitrogen rates (kg ha^{-1})			Nitrogen rates (kg ha^{-1})		
	0	120	165	0	120	165
FYM + P + K	7.09g	8.65d	11.50a	8.00h	9.70e	13.39a
FYM + P	6.66h	8.21e	10.60b	7.22i	9.16fg	11.80c
FYM + K	6.25i	8.25e	10.73b	7.03i	9.35ef	12.42b
P + K	5.85j	7.78f	9.76c	6.57j	8.74g	11.25d

The interaction among rice cultivars, nitrogen rates and FYM, P and K fertilizers had a significant effect on grain and straw yields (t ha^{-1}) in 2013 season, in Table 15. Data in Table 15 showed that the best grain and straw yields were found when Giza178cultivar which treated with nitrogen at the rate of 165 kg N ha^{-1} combined with FYM + P + K followed by FYM + K and FYM + P. While, the lowest one was found when P + K without nitrogen were added to Giza177cultivar. The application of 120 kg N ha^{-1} came in the second rank with the same cultivars (after165 kg N ha^{-1}) and performs the same trend.

It can be observed that application of FYM with either 120 or 165 kg N ha^{-1} cause an increase in grain and straw yield as compared with120 or 165 kg N ha^{-1} combined with P+K only.Also, the data revealed that the application of FYM + P + K increased the yield than application of P + K only even under control (without N -application).It means that the application of FYM to rice is important for improve the yield beside the improve soil fertility.

Table15.Grain and straw yield as affected by the interaction among rice cultivars, nitrogen rates and FYM, P and K fertilizers in 2013 season

FYM , P K and their combination	Grain yield(t ha^{-1})					
	Giza177			Giza178		
	0	120	165	0	120	165
FYM + P + K	6.55j	8.33ghi	9.27ef	8.96efg	11.84bc	12.73a
FYM + P	5.92j	8.17ghi	8.67fgh	8.56f-i	10.40d	11.52bc
FYM + K	4.74k	7.88hi	8.73e-h	843f-i	11.67bc	11.93b
P + K	4.16k	7.73i	8.63fgh	8.37ghi	9.56e	11.01cd
FYM , P K and their combination	**Straw yield(t ha^{-1})**					
	Giza177			**Giza178**		
	0	**120**	**165**	**0**	**120**	**165**
FYM + P + K	7.80i	9.70f	10.03ef	9.70f	12.80b	14.17a
FYM + P	7.28j	9.23fgh	9.58f	9.23fgh	11.60cd	12.73b
FYM + K	5.86j	8.50hi	9.56fg	9.33fgh	12.87b	12.90b
P + K	4.86k	8.56 hgi	9.43fgh	9.40fgh	10.73de	12.13bc

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إنتاجية أصناف الأرز جيزة ١٧٧و جيزة ١٧٨ تحت التسميد العضوي والمعدني

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

اجريت تجربتان حقليتان بالمزرعة البحثية بمركز البحوث والتدريب في الأرز بسخا – مركز البحوث الزراعية خلال موسمي ٢٠١٣ و ٢٠١٤ لدراسة تأثير معدلات التسميد النيتروجيني (صفر,١٢٠و١٦٥كجم ن /هكتار) وتواليف السماد البلدي بمعدل(١٠طن /هكتار)مع كل من والفوسفور بمعدل (٣٦كجم فو٢ ا٥ /هكتار) و البوتاسيوم بمعدل (٥٧كجم بو١٢ /هكتار) على نمو و محصول صنفي الأرز(جيزة ١٧٧و جيزة ١٧٨).وكان تصميم التجربة المستخدم القطع المنشقه مرتين فى اربعة مكررات وحيث تم وضع الاصناف في القطع الرئسيه ومعدلات النتروجين في القطع المنشقه الاولي و التواليفات السماديه في القطع المنشقه الثانية.

وقد اوضحت النتائج ان الصنف جيزة ١٧٨قد تفوق على الصنف جيزة ١٧٧فى عدد الفروع – الوزن الجاف –دليل مساحة الأوراق - كما تفوق في صفات المحصول (عدد الداليات في الجورة ,طول الداليه , وزن الداليه ,عدد الحبوب في الداليه وكذلك محصول الحبوب والقش .

اظهرت النتائج ان معدل النيتروجين 165كجم /ن /هكتار قد اعطي اعلي القيم لجميع الصفات المدروسه خلال الموسمين.

كان لاضافة السماد بلدي مع الفوسفور و البوتاسيوم اثر جيد علي زيادة المحصول ومكوناته بالاضافة لصفات النمو. وعند اضافة ١٦٥كجم/ن/هكتار + السماد البلدي +الفوسفور +البوتاسيوم فان المحصول ومكوناته وصفات النمو قد وصلت لاعلي القيم .

وعند مقارنة اضافة النتروجين بالمعدل الاعلي مع السماد البلدي +الفوسفور +البوتاسيوم مع اضافة النتروجين بالمعدل ١٢٠ او١٦٥ كجم /هكتار +فوسفور +بوتاسيوم اي بدون سماد بلدي , فقد ظهر جليا ان عدم اضافة السماد البلدي سبب نقصا في كل من محصول الحبوب والقش .مما يعني ان اضافة السماد البلدي كانت له فائده كبري في تحسين المحصول من خلال تحسين التربة وامداد النباتات بالعناصر الضروية وكذلك بعض المواد المشجعة للنمو .