Annals of Agric. Sci., Moshtohor **ISSN 1110-0419**
Vol. 53(4) (2015), 735–742 **http://annagricmoshj.com**

Effect of mineral fertilizers application combined with rice husk on rice crop and some soil properties of newly reclaimed salt affected soils

Awwad, M.S., ELSisi,S.E.M. and T.H.M.A, Deshesh

Soils, Water and Environment Research Institute,
Agricultural Research Center, Egypt.
Corresponding author: s.elsisi@yahoo.com

Abstract

A field experiments was carried out in the northern part of Egypt at El-Azdehar village in El-Husienia district, Sharkia governorate Egypt, during summer season of 2013. The soil texture was clay with extreme salinity levels of 7.41dS m-1. The experimental design was a randomized complete block design with three replicates. Eight treatments were assess, namely, control, and different formula of NPK alone or combined with rice husk, T1, (0,0,0), T2 (30, 15, 48), T3 (60, 15, 24), T4 (90, 30, 72), T5 (T1+rice husk), T6 (T2+rice husk) T7 (T3+rice husk) T8 (T4+Rice husk).Rice variety Giza 178 was used in the experiment. Yield and yield-contributing characteristics, N, P and K content and uptake by both straw and grain were determined for all plots. The results indicated that incorporation of mineral fertilizer at formula T4 (90, 30, 72) caused the highest growth parameters, straw, grain yields as well as content and uptake of N, P and K compared to the other rates of mineral fertilizers and control treatments. Application of mineral fertilizers with rice husk was more effective on the above mentioned parameters and the addition of mineral fertilizers as formula (90, 30, 72+rice husk) T8 recorded the highest values of growth parameters, straw, grain yields as well as content and uptake of N, P and K compared to the other treatments. Moreover, the application of mineral fertilizers with rice husk increased the available macro nutrients and improved of some chemical and physical properties i.e., EC, pH, SAR, OM, bulk density and porosity. Furthermore, mineral fertilizers at different rate alone or combined with rice husk succeeded to reduce Na+, higher N/Na, P/Na and K/Na in straw and grain rice ratio and raised N, P and K + resulted in considerable salinity withstanding.

Key words: Rice husk, rice crop, physical and chemical properties and available nutrients

Introduction

Rice is one of the most important agriculture food crops which more than of the half of the world population need. It is very important cereal crop in Egypt for both consumption and export. Rice crop is considered as reclamation crop for saline soil because of its flooding irrigation. Plant nutrients, particular (N, P and K) positively influence growth and development of salt-resistant cultivars under saline conditions compared to standard one.

Nitrogen promotes rapid growth and increases leaf size and spikelet number per panicle. N affects all parameters that contribute to yield. Leaf color, an indicator of crop N status, is closely related to the rate of leaf photosynthesis and crop production. Applying nitrogen fertilizer is necessary for enhance crop rice production. A large of literature suggests the importance of N-fertilizer for rice crop but they differ in the optimum does to apply. **El-Rewainy (2002)** recorded that applying 40 kg N/fed caused significant increase in plant height, number of panicles/m2, panicle length, panicle weight, number of filled grains/panicle as well as grain and straw yields. **El-Batal et al. (2004)** showed that increasing nitrogen rate from 50 to 80 kg N/fed significantly increased plant height, panicle length, number of filled grains/panicle and grain and straw yields, while number of panicles/m2, panicle weight and harvest index were insignificant, however 1000-grain weight were decreased. **Kamle et al. (2002)** found that both grain yield and nitrogen content of rice crop significantly increased with increasing nitrogen dose.

Phosphorus is essential for energy storage and transfer in plants. P is mobile within the plant and promotes tillering, root development, early flowering, and ripening. It is particularly important in early growth stages. The responses of rice to P fertilization were reported by several research workers **(Singh and Singh, 1980; Sharma and Mishra, 1985)**. **Mongiaet al. (1998)** reported that, in acid sulfate soils, lowland rice was more responsive to P when the source was rock phosphate comprised with superphosphates. **DeDattaet al. (1988)**

observed that the rice grain yield response to P varied greatly from site to site in the Philippines.

Potassium has essential functions in plant cells and is required for the transport of the products of photosynthesis. K provides strength to plant cell walls and contributes to greater canopy photosynthesis and crop growth. Unlike N and P, K does not have a pronounced effect on tillering. K increases the number of spikelets per panicle, percentage of filled grains, and 1000-grain weight. Successful rice production requires a consideration of soil fertility. Proper K nutrition is critical to maximize rice production. Potassium deficiency in rice can reduce grain yields and increase lodging. Visual symptoms of K deficiency in rice first appear in older leaves. These symptoms include a yellowing of leaf tips, decreased disease resistance, and reduced yields. Increased stalk strength and decreased lodging are associated with proper K nutrition. Studies of K nutrition of rice are rare compared to those of nitrogen. Tissue K levels in rice are affected by the stage of growth. The uptake of K by rice plants closely parallels the accumulation of dry matter from emergence until anthesis. Estimates of critical levels in rice leaf tissue are a function of plant growth and developmental stage. Adequate K in rice tissue during the late vegetative and early reproductive stages is important for producing optimum yields. During these growth stages, rice plants rapidly accumulate K in leaf and stem tissue. After seed development begins, K uptake slows dramatically. Transfer of K from lower leaves largely account for K accumulation in the hull and seed. **Noaman et al., (1997)** found that application of potassium at rate of 57 kg k2O on barley crop under salinity stress led to increase biological and grain yield significantly by about 20 and 14 % respectively, over the control treatment. Some essential food nutrients such as potassium, nitrogen and phosphorus are important in salt affected soil **(Noaman, 2004)**.

Rice production under saline soils with less investment on chemical inputs will reduce poverty and contribute to food security and sustainable agricultural development. Rice husk represents about 20 % by the weight of the rice harvested, about 80 by weight of the raw husk is made of organic components, also can be used for reclamation of saline-sodic soils as it offers an opportunity to improve the physical conditions of the soil and also to some extent enhanceing soil fertility. **Chang and Sipio (2001)** found that rice husk had a remarkable effect in reducing soil salinity / sodicity and increasing wheat and cotton yields as well as organic matter contents. Based on these results, rice husk could be recommended as a biological amendment at the rate of 0.2 percent in 0-15 cm soil depth to mitigate soil salinity and sodicity thereby improving the crop productivity of the salt affected soils.

The aim of the study is to investigate the influence of mineral fertilizers levels with the by-product of rice mail (rice husk) on rice crop production and some soil properties in new reclaimed salt affected soils

Materials and Methods

Field experiment was carried out during summer season 2009 in private farm in the El-Azdehar village south of El-Husienia district, Sharkia governorate. These sites were reclaimed by applying the gypsum requirement (G.R.). Soil samples were collected before the transplantation of rice seedling and physical and chemical analyzed were determined according to (Jakson, 1973). Table 1 shows the physical and chemical characteristics.

The randomized complete block design with three replications was conducted. Plot size was 5m x 5m. Rice seedlings variety Gize 187 were cultivated in the plots. Rice were transplanting at a rate of 2-4 seedlings /hill adopting a spacing of 20 cm x 20 cm. the treatments applied were: different formula of NPK alone or combined with rice husk, T1, (0,0,0), T2 (30, 15, 48), T3 (60, 15, 24), T4 (90, 30, 72), T5 (T1+rice husk), T6 (T2+rice husk) T7 (T3+rice husk) T8 T4+Rice husk). Superphosphate calcium (15% P2O5) was added on the soil before ploughing. Potassium sulfate (48% K2O) was added in two equal doses, the first was added to the soil before ploughing and the second dose was applied at 45 days after transplanting. Urea (46.5% N) was applied at rates in three equal doses, the first, the second and the third were applied at 15, 30 and 45 days after transplanting, respectively. These treatments without application rice husk and the same treatments with rice husk which was incorporated in soil and it has been added to soil one month before transplanting rice cultural practices were done as possible as. Also, 25 litters EM/fed were applied with irrigation water for 5 weeks to allow the rice husk to decomposition quickly, and also to make it is available for the rice in more efficient until the crop was harvested at maturity. Grain and straw data was recorded by harvesting the all plots. Grain and straw samples were analyzed for NPK according to **(Kalra, 1998)**. Available N, P and K, analyses were done as described by **Page et al. (1982)**.Total nitrogen in soil and plant was determined by the method of **Jackson**

(1973).The bulk density was determined from soil cores collected from the field with core sampler **(Klute, 1987)**.

Table. 1 Physical and chemical characteristics of the soil used for study

Soil characters	Values
Sand %	27.5
Silt%	28.10
Clay%	44.10
Textural Class	Clay
pH (1:2.5)	8.58
EC (SP) (dS m^{-1})	7.41
SAR (m.molecL^{-1})$^{1/2}$	15.18
Organic Matter (%)	0.60
CaCO3%	6.12
(NO_3-N+NH_4-N) (mg kg^{-1})	28.36
K (mg kg^{-1})	209.32
P (mg kg^{-1})	6.31

Porosity (%) = (1 – BD/PD) x 100…………………. (1)

The soil porosity was computed from the relationship between bulk density and particle density using the Equation 1.

Data were subjected to an analysis of variance using the statistical package of MSTATC program **Snedecor and Cochran (1982).**

Results and Discussion

Plant growth and yield

Data in Table 2 indicate that application of mineral fertilizer at different of rates alone or incorporation with rice husk significantly affected plant height, number of tillers, panicle length, 1000 of grain weight, straw and grain yields and harvest index. In case of application different mineral (N, P and K) at different rate individually, maximum plant height (93.15 cm), numbers of tillers (11.34) and panicle length (19.12 cm), 1000 grain weight (22.99 g).

Table 2. Impact of mineral fertilizers levels alone and in conjunction with rice huck on plant growth parameters, straw, grain and biological yields.

Treatment NPK	Plant height (cm)	Number of tillers /plant	Panicle of length	1000 of grain Weight (g)	Straw yield (kg/fed)	Grain yield (kg/fed)	Biological yield (kg/fed)
T1 (0,0,0**)**	47.87	4.33	11.32	14.47	1456.54	1100.36	2556.90
T2 (30,15,48**)**	68.45	6.90	13.90	18.11	2689.32	1578.75	4268.07
T3 (60,15, 48**)**	82.90	8.32	17.03	21.80	3344.89	2834.28	6379.17
T4 (90,30,72**)**	93.15	11.34	19.12	22.99	3878.52	3154.33	7032.09
T5 (0,0,0**)+rice husk**	50.08	4.42	1.87	14.95	1543.38	1177.36	2720.74
T6(30,15,48**)+ rice husk**	70.50	7.19	15.01	19.17	2823.45	1704.65	4528.10
T7 (60,15, 48**)+ rice husk**	86.24	8.74	18.05	22.26	3756.64	3032.83	6789.49
T8 (90,30,72**)+ rice husk**	99.82	12.02	21.04	24.50	4110.84	3343.24	7454.08
LSD., 0.05	0.82	0.61	0.21	0.56	101.23	78.47	90.54

Straw yield (3878.52 kg fed.$^{-1}$), grain yield (3154.33kg fed.$^{-1}$) and biological yield (7032.08 kg fed.$^{-1}$) compared with the control treatment. These results may be due to at higher doses of N, P and K increased of straw and grain yields were caused mainly by the successive increasing in the number of tillers, filled spikelets per panicles and 1000-grain weight of rice. **Heluf and Seyoum(2006)** found that application of both N and P fertilizers have increased the magnitudes of the important yield attributes including number of panicles per m^2, number of spikelets per panicle, panicle length, plant height, straw and grain yields and harvest index. **Yosef (2012)** reported that interaction effect of N and P-fertilizer was significant in

Fertile tiller and 1000-grain weight, maximum of this parameter were in application 150 kg/ha N-fertilizer at 90 kg/ha P-fertilizer. Concerning the effect of rice husk, data in Table 2 revealed that rice husk application increased the above mentioned of growth parameters. The increment percentage values were (4.88%), (7.23%), (4.555), (5.74%), (6.84%), (6.81%) and (6.20%) for plant height, numbers of tillers, panicle length,1000 grain weight, straw yield, grain yield and biological yield, respectively compared to the treatments without rice husk. **Bhowmick and Nayak (2000) and Meena et al. (2003)** found that increase in grain weight at higher nitrogen rates might be primarily due to the increase in chlorophyll content of leaves which led to higher photosynthetic rate and ultimately plenty of photosynthates available during grain and also, enhanced tillering by increased nitrogen application might be attributed to more nitrogen supply to plant at active tillering stage development. Regarding the interaction between mineral fertilizer and rice husk application, results in Table 2 indicated that rice husk with application of mineral fertilizer gave the highest values of growth parameters compared to the plots not received the rice husk. Also the high rates of mineral fertilizers combined with rice husk recorded the highest values of plant growth parameters. These results may be due to favorable physical and chemical conditions created by application of rice husk and also reduced the salinity. Also, increased yield because it was produced some sticky like substances to create favorable physico-chemical condition, reduced bulk density, increased water movement to wash out salinity and released various plant nutrients after the decomposition. **Yang et al (2004)** studied the effect of application of a single chemical fertilizer and combined application of chemical and organic fertilizers on dry matter accumulation and distribution of nutrients in rice plants. The results showed that combined application of organic and inorganic fertilizers promoted the transfer of nutrients to the grains and improved rice yields.

N, P and K contents and uptake by rice straw and grain

Nitrogen, phosphorus and potassium contents and uptake showed a significant variation by the application of mineral fertilizers individually or combined with rice husk (Table 3). Rice crop treated with mineral fertilizers (90: 30: 72) at high levels combined with rice husk (T8) recorded the highest values of N, P and K contents and uptake (1.03, 0.26 and 1.83% & 1.40, 0.31 and 0.49%) and (42.34, 10.68 and 75.22 & 46.30, 10.36 and 16.36 kg fed.$^{-1}$) for straw and grain, respectively. Therefore, using rice husk with mineral fertilizers achieved the best concentration as well as uptake of macronutrients. These results may be attributed to the application of rice husk residues incorporation with mineral fertilizers helps plant to attain more N, P and K also, enhancing fertility and productivity of soil through improving the soil physical, chemical and biological properties. These results are in agreement with those obtained by **Fatema and Harunor (2013)** who found that application of gypsum, rice hull and saw dust at highest dosages increased the uptake of N, P, K and S in rice plant.

Data in Table 4. Revealed the effect of different treatments on the N/Na, P/Na and ``K/ Na ratio in both straw and grain rice plants. The obtained data indicated that the highest ratio between N/Na, P/Na and K/ Na was observed in the plant received the highest formula of mineral fertilizer combined with rice husk. Also, sodium concentrations in both straw and grain decreased while concentration of N, P and K was increased due to applied different treatments. Likewise, the high yield of rice obtained may be due to the low concentration of Na.

Some soil properties and soil fertility

Data presented in Table 5.pointed that the highest reduction in EC and pH were recorded by formula (90: 30: 48) mineral fertilizers. The effect of different mineral fertilizers on reduction in EC and pH could be arranged in the following order: formula T4 (90: 30: 48) > formula T3 (60: 15: 24) > T2 formula (30: 15: 24) > (control). Application of Rice husk combined with mineral fertilizer at formula (90: 30: 48) were the superior and optimum interaction treatments. It is worthy to notice that the combination between mineral fertilizer at formula (90: 30: 48) and rice husk, caused the highest decreased in soil EC and pH. The production of NH_4^+, CO_2 and organic acids during microbial metabolism in rice husk may be contributed to the decrease in soil pH.

These data are in harmony with those obtained by **Walker et al. (2003)** who found that addition of compost to soil let to decrease soil pH. Also, the addition of rice husk can accelerate the leaching of Na^+ then the decreasing the electric conductivity. **EL-Etreiby et al., (1996)** stated that application of rice straw compost may increase the moisture holding capacity, maintains sufficient pore spaces to permit good air circulation and drainage of the excessive water and dilution of salt concentrations in the soil solution.

The influence of mineral fertilizers alone or combined with rice husk on organic carbon are presented in Table 5 the results indicated that higher organic carbon were observed on soils treated with rice husk compared to the soil without rice husk application. The highest organic carbon on such plots was as a result of the decomposition of the rice husk.

Table 3. Impact of mineral fertilizers levels alone and in conjunction with rice husk on concentration and uptake of N, P and K by straw and grain of rice plant.

Treatments	Consternation (%) Straw				Consternation (%) grain			
	N	P	K	Na	N	P	K	Na
T1 (0,0,0)	0.43	0.06	1.05	0.098	0.94	0.07	0.16	.044
T2 (30,15,48)	0.68	0.14	1.24	0.064	0.98	0.18	0.24	0.042
T3 (60,15, 48)	0.89	0.17	1.21	0.051	1.08	0.19	0.29	0.04
T4 (90,30,72)	0.95	0.23	1.65	0.050	1.33	0.25	0.41	0.035
T5 (0,0,0)**+rice husk**	0.44	0.07	1.09	0.049	0.99	0.12	0.22	0.04
T6(30,15,48)**+ rice husk**	0.71	0.15	1.31	0.032	1.04	0.24	0.30	0.031
T7 (60,15, 48)**+ rice husk**	0.93	0.18	1.32	0.030	1.14	0.24	0.36	0.021
T8 (90,30,72)**+ rice husk**	1.03	0.26	1.83	0.024	1.40	0.31	0.49	0.02
LSD., 0.05	**N.S**	**N.S**	**N.S**	**N.S**	**N.S**	**N.S**	**N.S**	**N.S**
Treatments	**Uptake kg/fed Straw**				**Uptake kg/fed grain**			
	N	**P**	**K**	**Na**	**N**	**P**	**K**	**Na**
T1 (0,0,0)	6.26	0.87	15.29	1.42	10.34	0.77	1.76	0.48
T2 (30,15,48)	18.28	3.76	33.34	1.72	15.47	2.84	3.78	0.66
T3 (60,15, 48)	31.54	6.02	42.89	1.80	30.61	5.38	8.21	1.13
T4 (90,30,72)	36.84	8.92	63.99	1.93	41.95	7.88	12.93	1.10
T5 (0,0,0)**+rice husk**	6.79	1.08	16.82	0.75	11.65	1.41	2.59	0.47
T6(30,15,48)**+ rice husk**	20.04	4.23	36.98	1.18	17.72	4.09	5.11	0.52
T7 (60,15, 48)**+ rice husk**	34.93	6.76	49.58	1.50	34.57	7.27	10.91	0.63
T8 (90,30,72)**+ rice husk**	42.34	10.68	75.22	1.39	46.80	10.36	16.38	0.66
LSD., 0.05	**0.37**	**0.24**	**0.57**	**N.S**	**1.12**	**0.41**	**0.64**	**N.S**

Table 4. N/Na, P/Na and K/Na ratio in straw and grain rice as affected by different treatments

Treatments	Straw $\frac{N}{Na}$	$\frac{P}{Na}$	$\frac{K}{Na}$	Grain $\frac{N}{Na}$	$\frac{P}{Na}$	$\frac{K}{Na}$
T1 (0,0,0)	4.38	0.61	10.71	21.36	1.52	3.63
T2 (30,15,48)	10.62	2.18	19.37	23.33	4.28	5.71
T3 (60,15, 48)	17.45	3.33	23.72	27.00	4.75	7.25
T4 (90,30,72)	19.00	4.60	33.00	38.00	7.14	11.71
T5 (0,0,0)**+rice husk**	8.97	1.42	22.24	24.75	3.00	5.50
T6(30,15,48)**+ rice husk**	22.18	4.68	40.93	33.54	7.74	9.67
T7 (60,15, 48)**+ rice husk**	31.00	6.00	44.00	54.28	11.42	17.14
T8 (90,30,72)**+ rice husk**	42.91	10.83	76.25	70.00	15.50	24.50
LSD., 0.05	**4.56**	**1.01**	**3.94**	**3.87**	**0.69**	**0.94**

Table 5. Impact of mineral fertilizers levels alone and in conjunction with rice husk on EC, pH, OM and available N, P and K after harvest or rice crop.

Treatments	EC dS/m	pH	SAR (mmole cL^{-1})$^{1/2}$	OM (%)	Bulk density (g cm^{-3})	Porosity %	Available status (mg kg^{-1})		
							N	P	K
T1 (0,0,0)	6.23	8.19	13.12	0.40	1.48	44.15	22.8	3.24	205.11
T2 (30,15,48)	4.42	8.09	10.78	0.47	1.47	44.52	33.4	6.2	281.01
T3 (60,15, 48)	4.26	8.01	10.77	0.47	1.47	44.52	39.9	9.23	279.05
T4 (90,30,72)	4.11	7.99	10.11	0.48	1.45	45.28	42.5	11.35	299.57
T5 (0,0,0)	4.14	7.88	9.45	0.52	1.44	45.66	25.99	5.89	243.95
T6 (30,15,48)	3.45	7.81	8.57	0.53	1.43	46.34	39.07	10.94	328.77
T7(60,15, 48)	3.23	7.97	8.01	0.61	1.42	46.41	46.68	12.14	332.69

T8 (90,30,72**)**	2.64	7.93	7.25	0.64	1.41	46.79	50.15	14.32	349.84
LSD., 0.05	**0.05**	**N.S**	**0.62**	**0.021**	**N.S**	**0.024**	**0.69**	**0.82**	**1.67**

These result are harmony with **Muhammed et al., (2003)** who found that the highest increase (31.9%) of organic matter with the maximum application of rice husk in the 0-15 cm layer of soil apparently, however without rice hush, also showed some small increase in organic matter, as varying from 4 to 9 percent, respectively in 0-15 cm and 15-30 cm layers of soil. The reason to this small increase was that the roots, stubbles and leaves of crops ploughed in soil, tended to enhance organic matter contents.

The data in Table 5 indicated that the initial SAR was 15.18 (mmol L-1)$^{1/2}$, after the harvest of rice, treatments significantly affected SAR, maximum decrease in SAR was recorded with T8 at 0-20 cm (44.74 %) followed by T7 (38.94%), T6 (34.67%) and T5 (27.97%) relative to the control treatment.

Bulk density values of the soils decreased with rice husk application compared to the control treatment and mineral fertilizers (Table 5). The highest bulk density value (1.48 g cm^{-3}) was obtained in the control treatment while the lowest BD value (1.41 g cm^{-3}) was in the rice husk combined with the highest mineral fertilizer treatment. Adding rice husk residues to the soils improve their physical properties cause an increase in organic matter content and a decrease in bulk density. Also, the reduction in bulk density may be attributed to the fact that the rice husk is lighter compared to the soil particles and therefore there would be reduction in the mass of the soil to which rice husk has been added which consequently resulted in the reduction in bulk density. The total porosity for the treatments with rice husk was significantly higher than the control and NPK fertilizer treatments. The reduced bulk density due to the application of rice husk resulted in higher porosity. **Anikwe (2000)** determined that addition of rice husk at increasing doses to the clay textured soil decreased bulk density and increased porosity of soils.

Available N, P and K the available ranged from (22.80 to 50.15, 3.24 to 14.32 and 205.11 to 349.84 mg kg-1, respectively. The highest available N, P and K were registed under T8 treatment and the lowest was noticed under T1. There was significantly difference among treatments. All treatments having application rice husk combined with mineral fertilizer at formula (90: 30: 48) recorded higher available N, P and K than other ones. This may have been because the high moisture levels and temperatures in rice fields promoted the decomposition of rice husk. **Poweret. al., (1998)** showed that the return of increasing amounts of residues to a soil depth of 30 cm in a silty clay loam enhanced the soil AN and AP contents compared with NPK fertilizer alone. **Ting et. al., (2015)** found that when compared with control, the average soil available N, available P, available K and SOC levels were higher in the 0–40 cm soil layers after straw incorporation treatments,

Conclusion

Application of rice husk was found to be effective in improving the adverse effect of salinity on yield performance of rice. Therice husk applications with mineral fertilizers improved soil physicochemical properties and increased growth parameters and both straw and grin yields of rice crop as well as biological yield compared to the control treatment. Rice husk added into the soil as an organic matter source increased the available N, P and K contents, and decreased, Na of the soil. Recycling rice husk in agricultural lands provides soil fertility and sustainability, and also makes a great contribution to the environment ecologically.

References

Anikwe, M. A. N. (2000). Amelioration of a heavy clay loam soil with rice husk dust and its effect on soil physical properties and maize yield. Bioresource Technology 74: 169-173.

Bhowmick, N. and R. L. Nayak (2000). Response of hybrid rice (Oryza saliva) varieties 'to nitrogen, phosphorus and potassium fertilizers during dry (boro) season in West Bengal. Indian J. Agron. 45(2):323-326.

Chang, M. H. and Q. A. Sipio (2001). Reclamation of saline-sodic soils by rice husk. Journal of Drainage and Water Management, Vol.5(2): 1-5.council, Inc., CRS Pres, London, UK.

De Datta, S. K., Gomez, K. A. and Descalsota, J. P. 1988. Changes in Yield Response to Major Nutrients and in Soil Fertility under Intensive Cropping. Soil Sci., 149: 350-358.

EL Etreiby, N., T. S. Shehata, and J. J. Scalbroeck (1996). The influence of composting on the fertilizing value of rice straw and the evaluation of these composts on soil properties and rice productivity. Alex. Sci. Exch., 17 (2), 41-153.

El-Batal, M. A., M. H. Abd El-Gawad, A. A. Fatma, and El-Set A. Abd. El-Aziz (2004). Uniconazole application as antilodging for rice plants fertilized with high nitrogen rate. Zagazig J. Agric. Res., 31:

El-Rewainy, I. M. O. (2002). The effect of different nitrogen fertilizer source on yield and some agricultural characters in rice. Ph. D., Thesis, Fac. Agric., Shebin El-Kom, Menofia Univ., Egypt.

Fatema, K. and M. R. K. Harunor (2013). Reclamation of saline soil using gypsum, rice hull and saw dust in relation to rice production. Journal of Advanced Scientific Research 4(3):01-05.

Heluf, G. and M. Seyoum (2006).Effects of mineral N and P fertilizers on yield and yield components of flooded lowland rice on vertisols of Fogera Plain, Ethiopia.Journal of Agriculture and Rural Development in the Tropics and Subtropics. Vol. 107, No. 2,p. 161–176.

Jackson, M. L. (1973). Soil chemical analysis. Prentic-Hall, India

Kalra, Y.P. (1998). Handbook of reference methods for plant analysis.Soil and plant analysis and microbiological properties.(2nd Ed), Am. Soc. Agron. Monograph No. 9, Madison,

Kamla, K., Sc. Paliyal and K. Kanwar (2002). Use of green algae as a biofertilizer for paddy crop. Himachal J. Agric. Res., 28: 96-98.

Klute, A. (1987). Methods of Soil Analysis, Part 1: Physical and Mineralogical Methods. 2nd Wisconsin

Knudsen, D., Peterson, G., Pratt P. (1982). Methods of soil analysis Part 2 Chemical and microbiological properties. 1982; 225–246.

Meena, S. L., S. Surendra, Y. S. Shivay and S. Singh (2003). Response of hybrid rice (Oryza sativa)to nitrogen and potassium application in sandy clay loam soils. Indian J. Agri. Sci. 73(1): 8-11.

Mongia, A. D., Singh, N. T., Mandal, L. N.andGuha, A. (1998). Effect of Liming, Superphosphateand Rock Phosphate Application to Rice on the Yield and Uptake of Nutrientson Acid Sulphate Soils. *J. Indian Soc. SoilSci.,* **46**: 61-66.

Muhammad, A. K., H. C. Muhammad and A. Muhammad (2003). Salt affected soils and their reclamation. Research Report.1-87.

Noaman, M. N., M. Khodir, A. A. El-Syed and W. Kadry (1997). Field screening of barley genotypes under different levels of soil salinity and potassium.Emir. J. Agric. Sci., 9: 23-33.

Noaman, M. N. (2004). Effect of potassium and nitrogen fertilizers on the growth and biomass of some halophytes grown under high levels of salinity. Journal of Agronomy, 3, 25-30. http://dx.doi.org/10.3923/ja. 2004. 25.30

Page, A. L., R. H. Miller, and D. R. Keeny (1982). Methods of soil analysis, Part 2: Chemical Plant Soil, **91**: 161-170.

Power J, P. Koerner , J. Doran and W. Wilhelm (1998). Residual effects of crop residues on grain production and selected soil properties. Soil Sci. Soc. Am. J.; 62(5):1393–1397.

Sharma, R. D. and Mishra, B. (1985). Phosphorus Availability to Rice in Submerged. Soils. J. Indian Soc. Soil Sci., **33**: 688-691.

Singh, M. and S. P. Singh, (1980). Zinc and Phosphorus Interaction in Submerged Paddy. *Soil Sci.*, 129: 283-289.

Snedecor, G. W. and Cochran, W. G. (1982). In : Statistical Methods. 7^{th} ed., 593 p., Iowa state Univ., Ammes., Iowa, U.S.A.

Ting W., Z. Peng, W. Ke, D. Ruixia, Y. Baoping, N. Junfeng, J. Zhikuan and Ha. Qingfang (2015). Effects of wheat straw incorporation on the availability of soil nutrients and enzyme activities in semiarid areas. PLoSONE10(4):1-15.

Walker, D. J., R. Clemente, A. Roig and M. P. Bernal (2003). The effects of soil amendments on heavy metal bioavailability in two contaminated Mediterranean soils. Environ. Pollut., 122: 303–312.

Yang C M, L Z. Yang, T. M. Yan and Y Z. Ou (2004). Effects of nutrient regimes on dry matter production and nutrient uptake and distribution by rice plant. Chin J Soil Sci, 35(2): 199–202.

Yosef, T. S. (2012). Effect of nitrogen and phosphorus fertilizer on growth and yield rice (OryzaSativaL).International journal of Agronomy and Plant Production. Vol., 3 (12): 579-584. 473-490.

تأثير اضافة الاسمده المعدنيه بمصاحبة قشر الارز على محصول الارز وبعض خواص الارض المتأثره بالاملاح و المستصلحه حديثا

محمد سعيد عواد ، صلاح الدين محمدعويس السيسى، طارق هاشم محمد عبد العزيز دشيش
معهد بحوث الاراضى و المياه و البيئه- مركزالبحوث الزاعيه- الجيزه-مصر

تم اجراء تجربه حقليه فى قرية الازدهار وهى تقع بمنطقه سهل الحسينيه الجزء الشمالى الشرقى من محافظة الشرقيه بمصر وذلك فى خلال موسم صيف 2013 حيث كان قوام هذه الارض قوام طينى و مستوى ملوحه 6.50 ديسسمينز/م^{2}وكان التصميم الاحصاءى هو تصميم قطع كاملة العشوائيه و ثلاث مكررارت.

وكانت المعاملات كالتالى:.,(T1, (0,0,0), T2 (30, 15, 48), T3 (60, 15, 24), T4 (90, 30, 72

T5 (T1+rice husk), T6 (T2+rice husk) T7 (T3+rice husk) T8 (T4+Rice husk)

وتم زراعة الارز بالتجربه صنف جيزه 178 ، وقد قدر المحصول وبعض القياسات الهامه مثل المحتوى و الممتص من النيتروجين و الفوسفور و البوتاسيوم بواسطة كلا من القش و الحبوب. و ايضا بعض خواص التربه الكميائيه و الطبيعيه.

وقد اشارت النتائج الى الاتى:

وضع الاسمده المعدنيه على النحو الاتى (90 نيتروجين-30 فوسفور-72 بوتاسيوم) T4 تسببب فى الحصول على اعلى القيم للقياسات الخاصه بنمو المحصول و محصول كلا من القش و الحبوب و بالتالى المحتوى و الممتص من النيتروجين و الفوسفور و البوتاسيوم.و ذلك مقارنة بالمعدلات الاخرى المضافة من الاسمده المعدنيه و الكنترول.

أدي اضافة الاسمده المعدنيه مع قشر الارز الى الحصول على قيم أعلى للقياسات السابقة و المذكوره سابقا و قد سجلت المعامله التى تم اضافة الاسمده المعدنيه فى الصوره التاليه (90 نيتروجين-30 فوسفور-72 بوتاسيوم) + قشر الارز (T8) الى الحصول على أعلى القيم لقياسات النمو و محصول القش و الحبوب و التركيز و الممتص من النيتروجين و الفوسفور و البوتاسيوم مقارنة بجميع المعاملات الاخرى.

أيضا فقد أوضحت النتائج ان استخدام الأسمده المعدنيه مع قشر الأرز قد ادى الى زيادة قيم الميس من بعض العناص الكبرى بالتربة وتحسن بعض الخواص الكيميائيه والفزيائية مثل EC , pH , SAR , OM الكثافة الظاهريه والمساميو وعلاوة على ذلك فان اضافة الأسمده المعدنية سواء بمفردها او مع قشر الأرز فأن ذلك قد ادى الى تقليل تركيز الصوديوم فى القش والحبوب.