INCREASING BREAD WHEAT *(TRITICUM AESTIVUM,* L.) PRODUCTIVITY AND PROFITABILITY IN THE NEWLY RECLAIMED LANDS THROUGH THE INTEGRATED USE OF MINERAL, ORGANIC AND BIO-FERTILIZERS

Abd El-Lattief, E.A.

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ABSTRACT

The effect of integrated use of mineral fertilizers (NPK), farm yard manure (FYM) and biofertilizer (microbien) on grain yield, grain yield attributes, grain protein content and net profit of wheat was assessed. Two field experiments were carried out on a sandy soil in the Experimental Farm of the Faculty of Agriculture, South Valley University at Qena Governorate, Egypt, during the winter seasons of 2004/2005 and 2005/2006. The recommended NPK (100 kg N+23.25 kg P_2O_5+50 K_2O kg/fad.), FYM (12 tons/fad.) and biofertilizer (microbien, 1.2 kg/fad.) were applied alone and in various combinations among them. A randomized complete block design, with four replications, was used in this study. Wheat Giza 168 cv. was sown by 70 kg grains/fad.

Fertilizer treatments significantly affected plant height, number of spike/m^2, spike length, number of spikelets/spike, number and weight of grains/spike, 1000-grain weight, grain, straw and biological yields, as well as grain protein content. The highest values of such traits were obtained either in treatment T_{14} [½ recom. NPK + ½ FYM (6 tons/fad.) + biofertilizer (1.2 kg microbien /fad.)] or T_{15} [¾ recom. NPK + ¼ FYM (3 tons/fad.) + biofertilizer (1.2 kg microbien /fad.)] without significant differences between them. Also, T_{14} gave the maximum return and net profit per faddan, followed by T_{15} compared with the other fertilization treatments.

Accordingly, application of one-half dose from recommended mineral fertilizers + 6 tons FYM + biofertilizer (1.2 kg microbien) might be recommended for increasing the productivity of wheat and net profit per faddan under the conditions of the study.

***Key words**: Wheat, mineral, organic, bio- fertilizers, grain yield, profitability.*

INTRODUCTION

In Egypt, it is well known that the expansion of wheat planting in sandy soils, is one of the solutions for curtailing the gap between consumption and production of wheat. However, production of wheat in sandy soils is facing many problems. Among them, the low organic matter and poor soil fertility.

Now, increased attention is being paid to develope an integrated plant nutrition system that maintains and enhances soil productivity through balanced use of different sources of nutrients, including chemical fertilizers, organic fertilizers and biofertilizers. The basic concept, underlying the integrated plant nutrition system, is the adjustment of soil fertility and plant nutrient supply to an optimum level for sustaining a desired crop productivity. This might optimize the benefits of all sources of plant nutrients in an integrated manner (Jen-Hshuan, 2006).

The use of organic fertilizers is beneficial for improving the efficiency of nutrients uptake and soil fertility (Nijjar, 1985). The periodically furnishing sandy soils with organic manure could help in decreasing wheat mineral fertilizer requirements (Askar *et al*, 1994 and Shabayek, 1997). Organic fertilization was found to be favorable for enhancing growth, grain yield and its components (Atia and Aly, 1998 and Nawab *et al*, 2006). Also, the application of organic fertilizer increased grain protein content (El-Bagoury *et al*, 1998 and Yakout *et al*, 1998). The combination of mineral fertilizers, with organic manures, helped in increasing the grain yield of wheat and implied a saving of 50% cost, compared to a system with only mineral fertilization (Kiani *et al*, 2005). Also, Shah and Ahmad (2006) found that integrated use of urea and FYM at 75:25 or 50:50 ratios (N basis) had produced maximum yields and therefore, was recommended for profitable wheat grain yield and sustainable soil fertility.

In addition, biofertilizers may help in improving crop productivity by increasing the biological nitrogen fixation, the availability and uptake of nutrients and release of natural hormones (Subba-Rao, 1984 and Kannaiyan, 2002). Many workers reported a remarkable stimulation on wheat growth, grain yield and its components with biofertilization (Radwan and Hussein, 1996; Sharief *et al*, 1998; Elsayed *et al* 2005 and El-Garhi *et al*, 2007). Ozturk *et al* (2003) reported that grain protein content was increased by the application of chemical nutrients and biofertilizers, compared with untreated plants. Also, Jen-Hshuan (2006) stated that microbial inoculants could be used as an economic input to increase crop productivity, lowering fertilizer doses and more nutrients increasing harvested from the soil. Moreover, Hegab and Abou El-Wafa (2005) showed that the integration between chemical, organic and biofertilizers gave higher grain, straw and biological yields of wheat crop, compared with single application of such fertilizers.

Accordingly, the present work was aimed to use organic farm manure and biofertilizer application as an alternative to reduce chemical fertilizers and to maximize the productivity and profitability of wheat at newly reclaimed sandy soils.

Agron. Dept., Fac. Agric., South Valley University, Qena, Egypt

MATERIALS AND METHODS

Two field experiments were performed at the Experimental Farm of the Faculty of Agriculture, South Valley University at Qena Governorate, Egypt, during the winter seasons of 2004/2005 and 2005/2006. The objectives of the study were to investigate the response of wheat (*Triticum aestivum*, L.) Giza168 cv., to farm yard manure (FYM), biofertified (Microbien) and chemical fertilizer (NPK) under newly reclaimed soil conditions at south valley regions. (Table1).

Table 1: Some characteristics of soil of the experimental site.

Season	Clay (%)	Silt (%)	Sand (%)	Textural class	pH	E.C (dSm^{-1})	O.M (%)	Total N (%)	Available P (ppm)	Available K (ppm)
1st	4.0	7.0	89.0	Sandy	8.12	2.85	0.41	0.23	7.22	175
2nd	5.5	7.5	87.0	Sandy	8.02	2.80	0.45	0.25	7.45	180

The experiment included fifteen treatments, as follows:

T_1-Recommended NPK (100 kg N+23.25 kg P_2O_5+ 50kg K_2O /fad.), T_2-Biofertilizer (Microbien,1.2 kg/fad) alone, T_3-FYM (12 tons /fad.) alone, T_4-¼ FYM + biofertilizer., T_5-½FYM + biofertilizer., T_6-¾FYM + biofertilizer., T_7-¼NPK + biofertilizer., T_8-½NPK + biofertilizer., T_9-¾NPK + biofertilizer., T_{10}-¼NPK + ¾FYM, T_{11}-½NPK + ½FYM, T_{12}-¾NPK + ¼FYM, T_{13}-¼NPK + ¾FYM + biofertilizer.,T_{14}-½NPK + ½FYM + biofertilizer and T_{15}-¾NPK + ¼FYM + biofertilizer.

The treatments were arranged in a randomized complete block design, with four replications. The area of the experimental unit was 12 m^2 (3 x 4m). The preceding crop was pearl millet in the first and second seasons. Sowing date was 19th of November in both seasons. Seeding rate was 70 kg /fad.

The chemical fertilizers were applied in the forms of ammonium nitrate (33.5 % N), calcium superphosphate (15.5% P_2O_5) and potassium sulphate (50% K_2O). Nitrogen doses were applied in four equal increments, during soil preparation, at 21, 42 and 63 days from sowing, respectively. Calcium superphosphate and potassium sulphate were applied at sowing time. Farm yard manure (FYM) was added during seedbed preparation. The chemical FYM properties were 7.80 and 7.60 pH values, 16.11 and 15.55 (%) organic carbon, 2.65 and 2.52 E.C dSm^{-1}, 0.82 and 0.84 (%) total N, 0.23 and 0.25(%) total P and 1.27 and 1.25(%) total K, in first and second seasons, respectively. Biofertilizer treatments were added to seeds coated by arabic gum four hours before sowing. Microbien is a multi-strain inoculant with various functional groups, including biological nitrogen fixers, nutrients mobilizers and growth promoters. Microbien innovated and identified by Saber (1993) and commercially produced and released by the Egyptian Ministry of Agriculture and Land Reclamation. Other recommended cultural practices, prevailing in the region for growing wheat, were applied.

At harvest time, ten fertile stems were taken at random from each plot for measuring plant height, spike length, number of spikelets/spike and number and weight of grains/spike. Number of spikes/m^2 was recorded on one square meter per plot. Also, 1000-grain weight was estimated for each plot. Meanwhile, grain, straw and biological yields were estimated at plot basis. Grain protein content was determined on dry matter basis, according to A.O.A.C. (1995).

For economic evaluation, the following figures were used. The price of one kilogram of ammonium nitrate (33.5% N), superphosphate (15.5% P_2O_5) and potassium sulphate (50% K_2O) were 0.84, 0.65 and 1.50 L.E, respectively (Bank of Agricultural Credit and Development, Egypt). The price of one ton FYM and one microbien kg biofertilizer were 50.0 and 16.7 L.E., respectively. Other variable and fixed costs (land preparation, irrigation, harvesting, land rent, etc.), as well as total return, included price of grain (1126 L.E./ton) and straw (350 L.E./ton) were estimated from tables of Agricultural Statistics (2005/2006), Economic Affairs Sector (EAS), Ministry of Agriculture and Land Reclamation, Egypt.

Data of each season were subjected to analysis of variance and the test of homogeneity of variance was done (Bartlett's test of homogeneity) and the combined analysis of both seasons, as described by Gomez and Gomez (1984). The least significant difference (LSD) test at 0.05 level was used to compare among means of treatments.

RESULTS AND DISCUSSION

Results of Table 1 indicated that the soil fertility of the experimental site was poor due to the low content of organic matter, total N and the available P and K. In general, the response of wheat to the applied treatments was pronounced.

I-Grain yield attributes:

Data presented in Tables 2 and 3 indicated that fertilization treatments had a significant effect on plant height, number of spike/m^2, spike length, number of spikelets/spike, number and weight of grains/spike and 1000-grain weight in the both seasons and the combined analysis of the two seasons. The greatest values of such traits were obtained either in treatment

Table 2: Effect of integrated fertilization between mineral, organic and biofertilizers on plant height, spike length, number of spike/m^2 and number of spikelets/spike of wheat in the two seasons and combined analysis.

Fertilization treatments	Plant height (cm)			Spike length (cm)			Number of spikes/m^2			Number of spikelets/spike		
	1st	2nd	Comb.	1st	2nd	Comb.	1st	2nd	Comb.	1st	2nd	Comb.
T_1-Recommended NPK	108.0	115.0	111.5	12.33	12.83	12.58	291.7	295.7	293.7	20.33	22.50	21.42
T_2-Biofertilizer (Microbien)	86.0	90.7	88.9	8.00	10.50	9.25	270.0	276.7	273.4	15.00	15.25	15.13
T_3-FYM (Farm yard manure)	95.0	101.8	98.4	10.50	11.33	10.91	285.0	287.3	286.2	18.00	18.00	18.00
T_4-¼ FYM + bio.	87.0	91.7	89.4	8.75	11.85	10.25	273.5	277.6	275.6	15.85	16.02	15.91
T_5-½FYM + bio.	92.0	96.7	94.35	10.10	11.20	10.65	281.0	283.0	282.0	17.00	17.30	17.15
T_6-¾FYM + bio.	104.7	102.3	103.5	11.00	13.33	12.17	287.0	290.0	288.5	20.00	21.00	20.50
T_7-¼NPK + bio.	98.3	103.0	100.7	10.33	11.67	11.00	287.0	290.0	288.5	19.00	19.50	19.25
T_8-½NPK + bio.	106.7	105.0	105.9	11.17	12.00	11.59	295.0	296.0	295.5	21.00	21.50	21.25
T_9-¾NPK + bio.	102.3	105.3	103.8	11.00	13.00	12.00	289.0	292.3	290.7	19.00	22.00	20.50
T_{10}-¼NPK + ¾FYM	101.7	104.0	102.9	11.67	13.67	12.67	287.0	290.3	288.7	18.50	21.00	19.75
T_{11}-½NPK + ½FYM	111.3	115.8	113.6	12.62	13.57	13.05	304.0	308.0	306.0	22.00	23.50	22.75
T_{12}-¾NPK + ¼FYM	106.0	104.5	105.3	12.50	13.50	13.00	290.0	294.0	292.0	21.50	22.50	22.00
T_{13}-¼NPK + ¾FYM + bio.	110.0	114.5	112.3	13.00	14.00	13.50	305.0	309.0	307.0	21.00	23.15	22.08
T_{14}-½NPK + ½FYM + bio.	120.0	123.5	121.8	14.50	15.25	14.87	312.0	315.0	313.5	23.70	25.00	24.35
T_{15}-¾NPK + ¼FYM + bio.	115.3	121.0	118.2	14.30	15.10	14.70	310.0	313.3	311.7	23.63	24.50	24.07
F-test	**	**	**	**	**	**	**	**	**	**	**	**
LSD at 0.05	*7.2*	*6.9*	*6.0*	*2.15*	*2.12*	*1.90*	*10.3*	*8.6*	*7.1*	*2.03*	*2.00*	*1.61*
Interaction: fertilization x season	**N.S**			**N.S**			**N.S**			**N.S**		

1st, 2nd and comb. means first season (2004/2005), second season (2005/2006) and combined analysis between the two seasons, respectively.
** Denotes significance at 0.01 probability level. N.S: Indicate not significant

Table 3: Effect of integrated fertilization between mineral, organic and biofertilizers on number of grains/spike, weight of grains /spike and 1000-grain weight of wheat in the two seasons and combined analysis.

Fertilization treatments	Number of grains/spike			Weight of grains /spike (g)			1000-grain weight (g)		
	1st	2nd	Comb.	1st	2nd	Comb.	1st	2nd	Comb.
T_1-Recommended NPK	55.33	59.00	57.17	2.467	2.863	2.665	40.00	42.50	41.25
T_2-Biofertilizer (Microbien)	47.00	48.00	47.50	2.00	2.100	2.050	34.00	36.00	35.00
T_3-FYM (Farm yard manure)	53.00	54.00	53.50	2.550	2.500	2.525	38.50	41.70	40.10
T_4-¼ FYM + bio.	48.50	49.00	48.75	2.24	2.15	2.20	35.02	38.00	36.51
T_5-½FYM + bio.	49.00	53.50	51.25	2.300	2.450	2.375	35.00	38.00	36.50
T_6-¾FYM + bio.	54.00	57.00	55.50	2.600	2.700	2.650	41.00	42.00	41.50
T_7-¼NPK + bio.	54.00	55.00	54.50	2.400	2.550	2.480	40.00	42.10	41.05
T_8-½NPK + bio.	58.00	60.33	59.17	2.590	2.750	2.667	39.00	42.00	40.50
T_9-¾NPK + bio.	55.00	59.00	57.00	2.450	2.800	2.630	39.50	42.30	40.90
T_{10}-¼NPK + ¾FYM	54.00	56.00	55.00	2.530	2.620	2.580	39.00	42.00	40.50
T_{11}-½NPK + ½FYM	57.00	61.50	59.25	2.650	2.850	2.750	41.20	43.17	42.19
T_{12}-¾NPK + ¼FYM	57.00	60.00	58.50	2.533	2.870	2.702	39.50	42.33	40.92
T_{13}-¼NPK + ¾FYM + bio.	57.50	61.50	59.50	2.600	2.860	2.730	41.00	43.00	42.00
T_{14}-½NPK + ½FYM + bio.	63.23	66.00	64.62	3.000	3.311	3.156	45.73	47.50	46.62
T_{15}-¾NPK + ¼FYM + bio.	61.80	65.75	63.78	2.950	3.200	3.075	44.65	46.55	45.10
F-test	**	**	**	**	**	**	**	**	**
LSD at 0.05	*4.08*	*4.12*	*3.70*	*0.272*	*0.326*	*0.280*	*3.41*	*3.04*	*2.90*
Interaction: fertilization x season	**N.S**			**N.S**			**N.S**		

1st, 2nd and comb. means first season (2004 2005), second season (2005/2006) and combined analysis between the two seasons, respectively.
** Denotes significance at 0.01 probability level. N.S: Indicate not significant

T_{14} [½ recom. NPK + ½ FYM (6 tons/fad.) + biofertilizer (1.2 kg microbien /fad.)] or T_{15} [¾ recom. NPK + ¼ FYM (3 tons/fad.) + biofertilizer (1.2 kg microbien /fad.)] with insignificant differences. Also, T_{14} significantly increased plant height, number of spikes/m^2, spike length, number of spikelets/spike, number and weight of grains/spike and 1000-grain weight by 9.2, 13.7, 6.7, 13.7, 13.0, 18.4, 13.0%, respectively, compared to T_1 [recommended mineral of NPK(100 kg N+23.25 kg P_2O_5+50 K_2O kg/fad.)] as an average of the two seasons. These findings are in agreement with those of Atia and Aly (1998), Elsayed *et al* (2005) and El-Garhi *et al* (2007).

The interaction effect of fertilization season was not significant for all traits (Tables 2 and 3). Such results indicated that fertilization treatments showed similar effects from season to season.

II-Grain, straw and biological yields:

It is evident from the data in Table 4 that grain, straw and biological yields significantly varied, according to various proportions of mineral, organic and biofertilizers. That held true in the two seasons and in the average of them. Combined application of these fertilizers were favorable in enhancing grain yields than using mineral, FYM or biofertilizer alone. Like grain yield attributes, the maximum grain, straw and biological yields of 2.600, 4.134 and 6.734 tons/fad., respectively, were obtained from the treatment of T_{14} [½ recom. NPK + ½ FYM (6 tons/fad.) + biofertilizer (1.2 kg microbien /fad.)], followed by T_{15} [¾ recom. NPK + ¼ FYM (3 tons/fad.) + biofertilizer (1.2 kg microbien /fad.)], being 2.536, 4.017 and 6.553 tons/fad., respectively, without significant differences between them. The grain, straw and biological yields were minimum (1.344, 2.400 and 3.744 tons/fad., respectively) in the T_2 (biofertilizer microbien), as an average of the two seasons.

The application of T1 [recommended mineral of NPK (100 kg N + 23.25 kg P_2O_5 + 50 K_2O kg/fad.)] had significantly lower grain, straw and biological yields by 23.8, 29.2 and 27.1 %, respectively, relative to T_{14}.

Such increase in yields (grain, straw and biological) and grain yield attributes, due to application of T_{14} or T_{15}, might be due to the role of organic fertilizer in enhancing soil biological activity, which improved nutrient mobilization from organic and chemical sources. Also, the organic matter lead to enhance root growth because of better soil structure, improving the capacity exchanging of nutrients and, then, increasing soil water retention. The significant responses of yields (grain, straw and biological) and grain yield attributes to the application of organic fertilizers were in harmony with the findings of Atia and Aly (1998) Nawab *et al* (2006). Also, Kiani *et al* (2005) found that combination of mineral fertilizers with organic manures helped in increasing the grain yield of wheat and implied a saving of 50% cost, compared to a system with only mineral fertilization.

The biofertilizer plays a significant role in regulating the dynamics of organic matter decomposition and the availability of plant nutrients and in increasing nitrogen fixer and nutrients mobilization, which lead to enhancing growth, grain yield and its attributes. In this case, Radwan and Hussein (1996), Sharief *et al* (1998), Elsayed *et al* (2005) and El-Garhi *et al* (2007) found positive effects on grain yield and its attributes of wheat when inoculated with biofertilizers. Meanwhile, in a study on integrated fertilization, Hegab and Abou El-Wafa (2005) showed that the integrated fertilization of chemical, organic and biofertilizers gave higher grain, straw and biological yields of wheat crop, compared with the single application of these fertilizers.

The interaction effect of fertilization and season was not significant for all traits (Table 4).

III- Grain protein content (%):

The results in Table 4 indicated that fertilization treatments had a significant effect on grain protein content in the both seasons and in the average of two seasons. Application of T_{14} [½ recom. NPK + ½ FYM (6 tons/fad.) + biofertilizer (1.2 kg microbien /fad.)] to wheat plants produced grains significantly higher in protein content than those of plants applied with T_2 (1.2 kg microbien alone) or T_4 (¼ FYM + 1.2 kg microbien) by 2.28 and 2.17%, respectively as an average of the two seasons. The results obtained by El-Bagoury *et al* (1998) and Yakout *et al* (1998) agreed with these results and they concluded that grain protein contents responded to organic matter application. In this case, Ozturk *et al* (2003) reported that grain protein content was increased by application of chemical and biofertilizers, compared with untreated plants.

IV- Economic evaluation:

It is noticed from the results in Table 5 that the maximum return and net profit per faddan of 4375 and 2029 L.E., respectively, were obtained in the treatment of T_{14} [½ recom. NPK + ½ FYM (6 tons/fad.) + biofertilizer (1.2 kg microbien /fad.)], followed by T_{15} [¾ recom. NPK + ¼ FYM (3 tons/fad.) + biofertilizer (1.2 kg microbien /fad.)] of 4262 and 1941, respectively. The return and net profit per faddan were minimum (2353 and 557 L.E./fad., respectively) in the T_2 treatment (biofertilizer microbien alone). Applied T_{14} increased return and net profit per faddan by 25.5 and 67.3 (%), compared to T_1 (recommended mineral of NPK), respectively. Also, the highest value of return-cost ratio (1.86) was obtained by the application of T_{14}, while, the lowest (1.28) was obtained from T_3 (FYM alone).These results are in agreement with those reported by Shah and Ahmad (2006) who found that

Table 4: Effect of integrated fertilization between mineral, organic and biofertilizers on grain yield, straw yield, biological yield and grain protein content (%) of wheat in the two seasons and combined analysis.

Fertilization treatments	Grain yield (ton/fad).•			Straw yield (ton/fad).			Biological yield (ton/fad).			Grain protein content (%)		
	1st	2nd	Comb.	1st	2nd	Comb.	1st	2nd	Comb.	1st	2nd	Comb.
T_1-Recommended NPK	2.000	2.200	2.100	2.948	3.450	3.199	4.948	5.650	5.299	12.00	11.85	11.93
T_2-Biofertilizer (Microbien)	1.244	1.444	1.344	2.350	2.450	2.400	3.594	3.894	3.744	10.10	10.00	10.05
T_3-FYM (Farm yard manure)	1.680	1.845	1.763	2.833	3.133	2.983	4.513	4.978	4.746	11.67	11.42	11.55
T_4-¼ FYM + bio.	1.413	1.591	1.502	2.480	2.710	2.595	3.893	4.301	4.097	10.20	10.12	10.16
T_5-½FYM + bio.	1.450	1.950	1.700	2.850	3.150	2.950	4.300	5.100	4.650	11.60	11.40	11.50
T_6-¾FYM + bio.	1.688	2.126	1.907	2.833	3.433	3.133	4.521	5.559	5.040	11.80	11.63	11.72
T_7-¼NPK + bio.	1.700	1.860	1.781	2.833	3.133	2.983	4.533	4.993	4.764	11.73	11.50	11.62
T_8-½NPK + bio.	1.826	2.175	2.001	3.000	3.533	3.267	4.826	5.708	5.268	11.70	11.66	11.68
T_9-¾NPK + bio.	1.691	2.115	1.904	2.900	3.200	3.050	4.591	5.315	4.954	11.85	11.74	11.80
T_{10}-¼NPK + ¾FYM	1.706	2.025	1.866	2.850	3.150	3.000	4.556	5.175	4.866	11.77	11.60	11.69
T_{11}-½NPK + ½FYM	1.788	2.160	1.974	3.103	3.510	3.307	4.891	5.670	5.281	11.80	11.72	11.76
T_{12}-¾NPK + ¼FYM	2.150	2.475	2.313	3.283	3.783	3.533	5.433	6.258	5.846	11.75	11.65	11.70
T_{13}-¼NPK + ¾FYM + bio.	2.235	2.480	2.358	3.300	3.850	3.575	5.535	6.300	5.899	11.95	11.83	11.89
T_{14}-½NPK + ½FYM + bio.	2.400	2.800	2.600	3.867	4.400	4.134	6.267	7.200	6.734	12.40	12.25	12.33
T_{15}-¾NPK + ¼FYM + bio.	2.336	2.735	2.536	3.733	4.300	4.017	6.069	7.035	6.553	12.20	12.10	12.15
F-test	**	**	**	**	**	**	**	**	**	*	*	*
LSD at 0.05	***0.209***	***0.246***	***0.202***	***0.349***	***0.390***	***0.358***	***0.399***	***0.442***	***0.345***	***1.39***	***1.25***	***1.22***
Interaction: fertilization x season	**N.S**			**N.S**			**N.S**			**N.S**		

1st, 2nd and comb. means first season (2004/2005), second season (2005/2006) and combined analysis between the two seasons, respectively.
•One fad. (one faddan) = 4200 m^2 = 0.42 hectare - *, ** Denotes significance at 0.05 and 0.01 probability levels, respectively - N.S : Indicates not significant.

Table 5: Some economics of wheat productivity per faddan at various fertilization treatments (combined analysis of the two seasons).

Fertilization treatments	Total costs (L.E/fad)*	Return (L.E/fad)		Total return (L.E/fad)	Net profit (L.E/fad)	Return-cost ratio
		Grain	Straw			
T_1-Recommended NPK	2272	2365	1120	3485	1213	1.53
T_2-Biofertilizer (Microbien)	1796	1513	840	2353	557	1.31
T_3-FYM (Farm yard manure)	2372	1985	1044	3029	657	1.28
T_4-¼ FYM + bio.	1946	1691	908	2599	653	1.34
T_5-½FYM + bio.	2096	1914	1033	2947	851	1.41
T_6-¾FYM + bio.	2246	2147	1097	3244	998	1.44
T_7-¼NPK + bio.	1921	2005	1044	3049	1128	1.59
T_8-½NPK + bio.	2046	2253	1143	3396	1350	1.66
T_9-¾NPK + bio.	2171	2144	1068	3212	1041	1.48
T_{10}-¼NPK + ¾FYM	2347	2101	1050	3151	804	1.34
T_{11}-½NPK + ½FYM	2322	2604	1237	3841	1519	1.65
T_{12}-¾NPK + ¼FYM	2297	2223	1157	3380	1083	1.47
T_{13}-¼NPK + ¾FYM + bio.	2371	2655	1251	3906	1535	1.65
T_{14}-½NPK + ½FYM + bio.	2346	2928	1447	4375	2029	1.86
T_{15}-¾NPK + ¼FYM + bio.	2321	2856	1406	4262	1941	1.84

* Denotes Egyptian pound per faddan

integrated use of urea and FYM at 75:25 or 50:50 ratios (N basis) had produced maximum yields and was, then, recommended for profitable wheat grain yield. While, Jen-Hshuan (2006) reported that microbial inoculants could be used as an economic input to increase crop productivity and fertilizer doses might be lowered.

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الملخص العربي

زيادة إنتاجية وأربحية قمح الخبز (*Triticum aestivum*, L.) في الأراضي حديثة الاستصلاح من خلال الاستخدام المتكامل للأسمدة المعدنية والعضوية والحيوية.

عصام الدين عبد الهادي عبد اللطيف

قسم المحاصيل-كلية الزراعة -جامعة جنوب الوادي-قنا- مصر

تمت إقامة تجربة في ارض رملية بمحطة التجارب بكلية الزراعة جامعة جنوب الوادي بقنا-مصر في موسمين شتويين (٢٠٠٤/٢٠٠٥و٢٠٠٥/٢٠٠٦) لدراسة تأثير الاستخدام المتكامل من الأسمدة المعدنية والعضوية والحيوية على محصول الحبوب ومكوناته ومحتوى الحبوب من البروتين وصافى الربح لقمح الخبز. وقد تمت إضافة المعدل الموصى به من الأسمدة المعدنية (١٠٠ كجم N + ٢٣,٢٥ كجم P_2O_5 + ٥٠ كجم K_2O للفدان) والسماد العضوي (١٢طن للفدان) والمخصب الحيوي "الميكروبين" (١,٢ كجم للفدان) منفردة وكذلك توليفات مختلفة من هذه الأسمدة. و كان التصميم التجريبي المستخدم هو القطاعات كاملة العشوائية في أربع مكررات للصنف "جيزة ١٦٨".

وتتلخص أهم النتائج في الأتي:

أدى استخدام معاملات التسميد إلى وجود فروق معنوية في ارتفاع النبات و عدد السنابل بالمتر المربع وطول السنبلة وعدد السنيبلات بالسنبلة وعدد ووزن حبوب السنبلة ووزن الألف حبة و محصول الحبوب و القش والمحصول البيولوجي و محتوى الحبوب من البروتين.

وامكن الحصول على أعلى القيم من الصفات المذكورة عند إضافة نصف المقرر السمادى المعدني الموصى به مع إضافة ٦طن من السماد العضوي للفدان مع استخدام المخصب الحيوي "الميكروبين" أو ثلاث أرباع الموصى به من السماد المعدني مع ٣طن من السماد العضوي للفدان وإضافة المخصب الحيوي "الميكروبين".

وحققت إضافة نصف المقرر السمادى المعدني الموصى به مع إضافة ٦ طن من السماد العضوي للفدان مع استخدام المخصب الحيوي "الميكروبين" (١,٢ كجم للفدان) أعلى دخل و أعلى اربحية لقمح الخبز المنزرع بالأراضي حديثة الاستصلاح. لذلك يمكن التوصية باستخدام هذه المعاملة تحت ظروف الدراسة.