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EFFECT OF PRECEDING CROPS, SEEDING RATE, BIO AND MINERAL NITROGEN FERTILZER ON WHEAT PRODUCTIVITY.

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ABSTRACT

Two field experiments were conducted at Sers EL-Lian Agricultural Research Station (EL-Minufiya Governorate) during 2005 / 2006 and 2006 / 2007seasons to study the effect of some preceding summer crops (cotton, soybean and maize) ,seeding rates (50, 60 and 70 kg seeds / fed)and three treatments mineral and bio-Fertilization (70 kg mineral N/fed, 70 kg mineral N/fed + Cerialein500g/fed and 70 kg mineral N/fed + Cerialein750g/fed) / fed on grain yield ,yield components and protein yield of wheat cultivar Sakha 94. Split- split plots design with three replication was used.

The results indicated that yield, yield components and protein yield of wheat recorded the highest values when wheat was sown after soybean followed by cotton and recorded the lowest values when sown after maize.

The results showed that plant height, number of spikes / m^2, spike length (cm), number of grains / spike as well as 1000- grain weight (g), grain yield/fed and protein yield were significantly increased by increasing seed rates in both seasons, except grain weight /spike and straw yield /fed were not significantly in the first season and the number of spikelets/spike in both seasons.

Increasing mineral and bio- N fertilizer levels up to 70 kg mineral N/fed+ two package of Cerialein / fed, significantly increased all characters, except number of spikelets /spike. The highest values of these characters were obtained with 70 kg mineral N/fed + 750g Cerialein / fed) .The application of 70 kg mineral N/fed resulted in the lowest values in both seasons.

Results also, indicated that interaction between preceding crops and seeding rates significantly affected on spike length, protein yield /fed and grain yield/fed in both seasons, number of spikes / m^2 , weight of grains / spike and 1000-grain weight in second one. Also, the interaction between preceding crops and mineral or bio-N fertilization significantly affected on grain yield/fed and protein yield /fed in both seasons and 1000-grain weight in the second one only.

Recommendation: The results of this investigation revealed that sowing wheat crop yield Sakh 94 c.v after soybean with 60 kg seeding rate/fed as well as 70 kg mineral N +750g Cerialein/fed produce the highest values of wheat grain yield.

INTRODUCTION

Wheat is the most important cereal crops in the world and is considered as the first food grain consumed directly by human. In Egypt it is main winter cereal crop and the production is not sufficient to meet the local consumption. The local consumption of wheat increased each year due to the continuous increasing of population, for this reason, raising wheat production through increasing the cultivated area which is the most important national target to minimize the gab between production and consumption. Wheat yield could be increased under the optimum preceding crops.

Many investigators indicated that preceding crops showed great effect on yield and its components of wheat. Munyinda *et al*. (1988) found obtained higher wheat yield after soybean. Wheat rotation over maize, wheat rotation was attributed to residual N from biological N2 fixation by the preceding legume crops (soybean). Mohamed (1994) EL-Douby (1997) and Badr (1999) showed that growing wheat after legume crops or cotton increased grains weight / spike , number of grains / spike , 1000- grain weight , grain yield , straw yield, protein content and protein yield than that maize after or sorghum . Bassal *et al.* (2001) stated that wheat preceded by cotton markedly surpassed those preceded by maize or sunflower in growth, yield and its components. Dahy (2005) noticed that preceding crops (sesame, peanut and sunflower)had a significant effects on plant height, number of grains /spike, weight of grains /spike ,1000- grain weight , grain yield and straw yield/fed of wheat .

Wheat yield could be increased by optimal seeding rate, the response of wheat to seeding rates was investigated by several investigators, Haikel and Zohry (1996), Abd EL-Zaher (2002) indicated that number of spikes / m2, number of grains /spike, grains weight /spike and grain yield / fed of wheat increased with 100 kg seeding rate, Ashoush and Toaima (2004) they reported that number of grains /spike ,1000-grain weight , grain yield and straw yield with 60 kg seeds / fed , while the highest number of spikes / m^2, was recorded with seeding rate of 80 kg / fed .Dahy (2005) found that decreasing wheat seeding rates from 80 to 60 and 40 kg /fed significantly increased spike length, number of grains /spike, weight of grains /spike and 1000- grain weight .

Bio-fertilizer as a natural organic fertilizer known helps to provide most of nutrients required by plants and helps to increase the content of the soil with natural microorganisms. The concern for environmental safety and increase in costs of chemical fertilizers led to the enhanced use of biofertilizer. Represent a promising technique to enrich soil with N could reduce the amount of applied N and improve nutrient uptake by field crops, Fayez (1989), El– Ganbeehy (1994) and Wafaa *et al.* (1997) mentioned that application of bio- fertilizer led to increase wheat plant height ,number of grains / spike and individual grain weight, Hamed (1998) observed that the inoculated treatments recorded higher values of plant height, spike length ,number of spikes/m2,grain,straw and protein yields/fed surpassing the unioculated treatment, Kotb (1998) and Mitkees *et al.* (1998) reported that the inoculated wheat grains with Azospirillum brasilense under application of 50 kg N /fed significantly increased wheat plant height ,number of spikes m^2, number of grains/spike ,spike grains weight,1000-grain weight ,grain and straw yields /fed .Sharief *et al*. (2000) found that inoculation of wheat grain with Cerialein resulted in marked increases in plant height , spike length , number of grains/ spike , 1000 – grain weight and straw yield / fed . Also, Yaser (2007) found that inoculation of wheat grain with Cerialein resulted increases in plant height , number of spikes/m2, grains weight /spike ,1000- grain weight ,grain yield /fed and straw yield / fed.

The effect of the interaction, Bassal *et al*. (2001) stated that interaction between preceding crops and N-fertilizer rates had significant effects on

wheat number of grains / spike, grain yield /fed and straw yield / fed. , Khalil and El-Ganbeehy (2004) indicated that application of 120 kg mineral N/ha + 1.2 kg biofertilizer/ha with 192 kg seeding rate produced the greatest wheat grain yield/ha, Dahy (2005) cleared that the interaction between preceding crops and seeding rates significantly affected on wheat spike length and 1000-grain weight. Mekhemer (2008) reported that the interaction between inoculation and different N-fertilizer levels into consideration, the best results of wheat growth, yield and its components were increased when wheat plants were inoculated with mixture strains followed by Bacillus polymyxa in combination with 50 kg N/fed, that showed a positive response and gave values nearly similar to or higher using the full dose of mineral N -fertilizer (100kg N/fed).He added that the inoculation withN2– fitting bacteria, particularly in a mixture form, may be acting as a good practice for enhancing wheat growth aspects and improving the crop yield and yield components.

The objective of this investigation was to study the effect of preceding crop and seeding rate as well as bio and mineral N fertilizer on wheat productivity also for how much to reduce mineral nitrogen fertilizer and replace bio-fertilizer to avoid environmental pollution with the high quality of wheat seeds.

MATERIALS AND METHODS

Two field experiments were carried out at Sers EL- Lian Agricultural Research Station farm, EL-Minufiya Governorate during 2005 /2006 and 2006 /2007 seasons to study the effect of some preceding crops and wheat seeding rates under different levels of mineral and bio- N fertilization on yield and its components of Sakha 94 wheat cultivar .The experiment was laid- out in a split split –plots design with three replications as follows:

A- Main plots were allocated to three preceding crops, cotton, soybean and maize.

B- The sub -plots were occupied with the following three Seeding rates, 50, 60 and 70 kg wheat seeds/fed.

C-The sub sub-plots included the mineral and bio- N fertilization:

1- 70 kg mineral N /fed
2- 70 kg mineral N + 500 g Cerialein/fed
3- 70 kg mineral N + 750 g Cerialein /fed

Calcium super phosphate (15.5 % P2 O5) was applied during soil preparation at the rate of 100 kg /fed. Mineral nitrogen fertilizer treatments were given in the form of ammonium nitrate (33.5 % N) at the rate of 70 kg N/fed and added into three equal doses i.e at planting, before the first and second irrigation. Seeds were divided into two parts:

First-Was washed with water to remove the races of pesticide, and then was treated with Cerialein.

Second –Was left without washing water

Grains of wheat were inoculated with Cerialine as N- biofertilizer before planting at the previously mentioned rates, 500g Cerialein and 750g Cerialein).Cerialein which included Azotobacter and Azospirllum bacteria as

commercial products were produced by biofertilizer unit, A.R.C. Egypt. Wheat grains were hand sown and irrigated immediately; on November 17 th and 22 th in the first and second seasons, respectively.The experimental basic unit area was 3x3.5 m occupying an area of 10.5 m^2 (1 /400 fed).

The soil texture of the experimental area was clay loam. Physical and chemical analysis of the soil before preceding crops under study are shown in Table 1: a and b.

Table 1- a: Physical analysis of experimental soil during in both seasons.

Seasons / Physical analysis	2005/2006	2006/2007
Coarse sand %	1.41	1.37
Fine sand %	31.21	31.72
Silt %	27.77	28.11
Clay %	39.61	38.80
Soil texture	Clay loam	Clay loam

Table 1-b: Chemical analysis of the soil before and after preceding crops during in both seasons.

Chemical analysis	Before preceding crops		After preceding crops					
			Maize		Soybean		Cotton	
	2005/ 2006	2006/ 2007	2005/ 2006	2006/ 2007	2005/ 2006	2006/ 2007	2005/ 2006	2006/ 2007
N (ppm)	1.45	1.53	1.11	1.19	2.79	2.85	1.18	1.24
P (ppm)	1.73	1.81	3.19	3.28	3.37	3.55	5.13	5.21
K (ppm)	138.45	138.19	136.10	136.15	135.25	135.40	110.42	110.26

***Available N, P and K were determined according to Black (1965).**

The studied characters:

At harvest, plant samples were taken at random from each sub- plot to determine the following characters:

1- Number of spikes/m^2: counted in randomly chosen one meter square in each plot.
2- Plant height (cm): the average height of ten randomly chosen plants from each plot and measured from ground level to the spikes tip, excluding owns.
3- Spike length (cm).
4- Number of spikelets / spike.
5- Number of grains / spike.
6- Grains weight / spike (g): it was estimated from 10 randomly chosen main spikes from each plot.
7-1000- grain weight (g): average weight of 1000-grain randomly taken from each plot.
8- Grain yield (ardab/ fed): weight of grains harvested from each plot converted to ardab (ardab= 150 kg).

9- Straw yield (ton / fed): it was calculated by subtracting grain yield from the total yield for each plot and converted to ton/fed.

10- Protein (kg/fed): in grains was determined by the improved kjeldahl method of the A.O.A.C. (1965).

Statistical analysis.

The collected data were statistically analyzed according to Sendecor and Cocharn .(1980) and treatment means were compared by the least significant differences (LSD) at 5 % level of probability.

RESULTS AND DISCUSSION

1-Effect of preceding crop:-

Data presented in Table 2 indicated that all characters under study were significantly affected by preceding summer crops in both seasons , except weight of grains /spike, straw yield / fed (in the first season) and spike length (in the second season). Results indicated that when wheat plants were grown after soybean they gave the highest values followed by those after cotton and the lowest values were maize .This was completely true for plant height, spike length, number of spike / m^2, number of spiklets / spike, number of grains / spike, grain weight and 1000 grains weight in both seasons. The superiority of wheat grain yield/fed which preceded by soybean may be due to enrichment of the soil with nitrogen from biological N2 fixation. Moreover, residues of soybean increase organic matter of soil and improve the physical, chemical and biological characters of the soil and that contributed much to superiority of yield and its attributes of wheat when the previous crop was soybean. These results were coincided with those obtained by Munyinda *et al*. (1988), EL-Douby (1997) and Bassal *et al*. (2001).

Grain yield / fed had the same trend of the previous characters in both seasons as shown in Table2. The increase in wheat yield/fed grown after soybean up to 21.15 and 20.68 ardab /fed in the respective seasons may be due to effect soybean residues as a legume crop which increase levels of soil nitrogen and then reflect on growth of wheat plants. Similar results were reported by Bassal *et al*. (2001). The increase in straw yield may be due to the increase in plant height .These results are in agreement with those reported by Mohamed (1994), EL-Douby (1997) and Dahy (2005).

Data presented in Table 2 indicated that protein yield/fed was related to grain yield//fed of wheat as influenced by the preceding crops .Significant effect for the preceding crop was detected with regard to grain protein yield/fed (kg) in both seasons. Growing wheat after soybean produced the highest grain protein/fed 232.4 and 240.8 kg followed by that preceded by cotton 212.5 and 223.3 kg ,while the lowest value 195.9 and 210.3 kg was achieved by maize. The superiority effect of soybean crop as a preceding crop for protein yield/fed in grain wheat may be attributed to high residue of nitrogen into the soil .This result are in agreement with El- Douby (1997) and Badr (1999).

2-Effect of seeding rate:-

Data in Table 3 shows that wheat characters were significantly affected by seeding rates in both seasons, except number of spiklets / spike in both seasons; weight grain / spike and straw yield / fed in the first season. Seeding rate of 70 kg / fed, enhanced wheat plant height to the maximum 94.2 and 94.7cm whereas 50 kg / fed had less effect on plant height 85.5 and 89.9 cm in both seasons, respectively. This result might be due to the competition between wheat plants for light in dense plant population resulting in elongation of internodes, consequently taller plants .Similar results were obtained by Abd EL-Zaher (2002).

Spike length, number of grains/spike, 1000-grain weight and grains weight /spike, were significantly decreased by increasing seeding rate as shown in Table 3. Significant differences were observed between 60 and 70 kg/fed. Similar results were obtained by Haikel and Zohry (1996), Ashoush and Toaima (2004) and Dahy (2005).

Wheat grains and protein yield**s** /fed at the rate of 60 kg / fed seed /fed outyielded those 50 and 70kg /fed in both seasons. The highest grain of 20.3 and 19.9 ardab /fed were obtained by 60 kg seeds /fed in both respective seasons which significantly out yielded those of 50 and 70 kg/fed These results may be interpreted by the fact that which were increased by 60 kg/fed yield attributes These results are in accordance with those of Haikel and Zohry (1996) and Ashoush and Toaima (2004).

3- Effect of mineral and bio- N fertilizer:-

Data presented in Table 4 indicated that wheat characters were significantly affected by mineral and bio-N fertilization in both seasons, except number of spikelets / spike in both seasons. Results showed that, 70kg N + two packages of Cerialein (750g) gave the tallest wheat plants 93.6 and 94.5 cm in both seasons .On the other hands, the plants of the control treatments (no bio-fertilizer application) were the shortest 88.5 and 89.8 cm in both seasons ,respectively . The increase in plant height may be attributed to the favorable effect of nitrogen in the metabolic processes and physiological activities of epistemic tissue, which responsible for cell division and elongation in addition to formation of plant organs. Data revealed that when wheat plants fertilized with 70 kg N + Cerialein 750g gave the highest values 386.6 , 11.8, 18.8, 47.7, 2.5, and 41.7 , 373.5, 12.4, 19.0 ,47.0 ,2.8 and 42.6 in the first and second seasons, for, numbers of spikes / m^2, spike length, numbers of spikelets / spike, numbers of grains/spike, weight of grain/spike and 1000- grain weight respectively followed by those fertilized with 70 kg N + 500g Cerialein; simultaneously wheat with control treatment (no bio fertilizer application) was the lowest. This was completely true

From these results, it could be conduced that high bio- N fertilizer added to wheat plants increased filling of grains by increasing photosynthetic productivity of the plants and increasing the rate of dry matter translocation to the grains, leading in a significant increase in the total grains weight. Also, it could be attributed to the role of nitrogen element in enhancing the vegetative growth of wheat plants.

These results are in the same trend with those obtained by Fayez (1989), EL-Ganbeehy (1994),Waffaa *et al*.(1997) and Yaser (2007).

The data presented in Table 4 showed increase in grain yield due to the increase in biofertilizer level as a result of its effect on yield components, i.e. spike length, number of spikes / m^2 , number of spiklets / spike ,grains / spike and weight of grains/spike. Also straw and protein yields were increased .These results may be attributed to the nitrogen fixation by` associative bacteria in Cerialein, which could stimulate germination, improve plant stand synthesis of chlorophyll, secretes growth hormones and consequently increase uptake of nutrients by plants. These findings are in harmony with those of Hamed (1998), Kotb (1998), Sheriff *et al*. (2000) and Yaser (2007).

4- Interaction effects: -

4-A. **Preceding crops and seeding rates**.

Results in Table 5 revealed that spikes length ,grain yield/fed and protein yield /fed in both seasons and number of spikes / m^2, spike grain weight /spike and 1000-grain weight in the second one were significantly affected by the interaction between preceding crops and seeding rates. In general, number of spikes / m^2 grain yield and protein yield/fed were significantly higher with 60 and or 70 kg seeds /fed after the three preceding summer crops. The three other characters, i.e. grain weight /spike, 1000 – kernel weight and spike length were higher under 50 kg seeds/fed after the three preceding crops.

Table 5: Effect of the interaction between preceding crop and seeding rate on wheat characters during 2005 / 2006 and 2006 / 2007 seasons.

Preceding crop	Seeding rate	No of spikes / m^2	Weight of grain / spike (g)	1000-grain weigh (g)	Spike length (cm)		Grain yield / fed (ardab)		Protein yield / fed (kg)	
		2006/ 2007	2006/ 2007	2006/ 2007	2005/ 2006	2006/ 2007	2005/ 2006	2006/ 2007	2005/ 2006	2006/ 2007
Cotton	50	316.77	2.83	45.40	11.98	12.03	19.53	18.56	194.92	208.95
	60	388.47	2.28	41.80	11.57	11.86	20.20	19.55	221.56	224.16
	70	369.25	2.14	37.12	10.83	10.63	20.61	19.51	220.88	236.13
Soybean	50	349.23	3.06	50.60	12.18	12.04	20.66	19.72	210.88	222.18
	60	348.60	2.87	47.91	11.88	11.79	22.23	21.70	246.24	259.29
	70	388.52	2.67	40.26	11.25	11.73	20.68	20.61	239.94	240.87
Maize	50	315.05	2.36	37.59	11.03	11.63	18.81	18.28	191.21	199.83
	60	341.84	2.13	36.98	10.60	11.28	19.59	18.45	199.13	214.97
	70	319.97	2.09	36.59	10.50	10.58	20.26	17.82	197.52	216.12
LSD at 5%		4.27	0.13	2.25	0.34	0.32	0.74	0.70	5.15	5.78

Also, data shows that when wheat was sown after soybean with 50 kg / fed seed rate, spike length 12.2 and 12.0 cm in the first and second season respectively, weight of grains / spike 3.1 g and 1000-grain weight 50.6 g in the second season only, were always greater compared with other treatments. On the other hand when wheat was sown after maize with 70 kg /

fed these characters showed the opposite trend. These results may be attributed to residual N from biological N2 fixation by soybean as a preceding crop; also these characters were increased by reducing seed rate in Table 3. Similar results were obtained by Dahy (2005).

Table 6: Effect of the interaction between preceding crop and bio –N fertilizer level on wheat characters during 2005/2006 and 2006/2007 seasons.

Preceding crop	Mineral and bio –N fertilizer	1000-grain weight(g)	Grain yield / fed (ardab)		Protein yield / fed (kg)	
		2006/ 2007	2005/ 2006	2006/ 2007	2005/ 2006	2006/ 2007
Cotton	70 kg mineral N	39.22	19.11	17.98	193.04	208.92
	70 kg mineral N +500g Cerialein	41.48	20.14	19.34	216.75	223.15
	70 kg mineral N +750g Cerialein	43.62	21.09	20.30	227.52	237.97
Soybean	70 kg mineral N	44.01	19.93	19.22	209.94	222.60
	70 kg mineral N +500g Cerialein	46.40	21.17	20.50	229.26	241.64
	70 kg mineral N +750g Cerialein	48.35	22.48	22.30	257.90	258.10
Maize	70 kg mineral N	35.98	18.39	16.98	179.58	198.16
	70 kg mineral N +500g Cerialein	36.87	19.32	18.14	195.70	212.84
	70 kg mineral N +750g Cerialein	38.30	20.24	19.43	212.57	219.92
LSD at 5%		0.84	0.29	0.31	4.80	3.60

4-B. Preceding crops and bio–N fertilizer level.

Data presented in Table 6 showed that grain yield / fed 22.5 and 22.3 protein yield/fed 257.9 and 258.1 in both seasons, respectively and 1000-grain weight 48.4 in the second season were significantly affected by the interaction between preceding crops and mineral and bio–N fertilizer level. Wheat plants preceded by soybean and fertilized with 70 kg mineral N +750g Cerialein / fed recorded the highest values, whereas wheat plants preceded by maize and fertilized with 70 kg mineral N recorded the lowest values .This is completely true for grain yield / fed 18.4 and 17.0, proteins yield/fed 179.6 and 198.2 in both seasons, respectively and 1000-grain weight 36.0 in the second one. The increase by raising mineral and bio N fertilizer level or when wheat was sown after soybean as a legume crop may be due increase in nutrient uptake by the preceding crop under inoculation and bacterial population, which helped in greater fixation of N at morphemic nitrogen and increasing the a availability of more nitrogen for wheat plants attributed to the role of nitrogen in increasing number of spike / m2 and 1000-grain weight and reflected that on grain yield / fed. Similar results were obtained by Mitkees *et al*. (1998). and Bassal *et al*.(2001).

4-C. Seeding rates and mineral and bio –N fertilizer.

Data presented in Table 7 recorded that the highest values for number of spikes / m^2 395.1 in the second season, 1000- grain weight 44.5 and 46.8g in the first and second season respectively and grain yield / fed 21.92 aradb/fed in the first season when wheat plants were sown by 60 kg seeding rate and 70 kg mineral N +750g Cerialein. On the other hand , the lowest values for those characters were showed when wheat plants were sown by 50 kg seeding rate and fertilized with 70 kg mineral N / fed. The previous results are in agreement with those obtained by Khalil and EL-Ganbeehy (2004) and Mekhemer (2008) .

In conclusion, planting wheat after soybean with 60 kg seeding rate/fed as well as 70 kg mineral N +750g Cerialein/fed recorded the highest values of wheat grain yield, however ,biofertilization is a better choice to reduce cost of crop production as well as better fertilizer in terms of environmental safety

Table 7: Effect of the interrelation between seeding rate and bio –N fertilizer level on wheat characters in 2005 / 2006 and 2006 / 2007 seasons.

Seeding rates	Mineral and bio –N fertilizer	No. of spikes / m^2	1000 - grain Weight (g)		Grain yield /fed (ardab)
		2006 / 2007	2005 / 2006	2006 / 2007	2005 / 2006
50	70 kg mineral N	310.08	41.27	42.05	18.61
	70 kg mineral N +500g Cerialein	333.85	41.34	44.01	19.67
	70 kg mineral N +750g Cerialein	336.47	42.84	44.77	21.74
60	70 kg mineral N	321.21	39.10	40.42	19.48
	70 kg mineral N +500g Cerialein	368.68	40.29	42.26	20.62
	70 kg mineral N +750g Cerialein	395.06	44.50	46.75	21.92
70	70 kg mineral N	310.73	37.76	36.74	19.23
	70 kg mineral N +500g Cerialein	372.60	38.77	37.70	20.22
	70 kg mineral N +750g Cerialein	389.03	39.14	39.49	21.14
LSD at 5 %		5.13	0.89	0.84	0.28

REFERENCES

Abd EL-Zaher,Sh.R. (2002): Studied on some cultural and chemical weed Control methods in wheat .Ph.D. Thesis fac. Agric., Cairo Univ., Egypt.

Ashoush, H. A. and S. E. A Toaima (2004): Evaluation of four F6 wheat lines Under different N-fertilizer levels and seeding rates. Egypt. J. Agric. Res., 82(4):1609-1625.

A.O.A.C. (1965): Official methods of analysis, pp. 158, 8 th Ed. Association of Official Agricultural chemists, Washington, D.C.

Badr, S.K.A. (1999): Rotation and preceding crop effects on growth, yield, yield components and grain protein content of wheat (*Tritium aeaestivum L*.). Egypt .J.Appl .Sci., 14 (2): 174 – 196.

Bassal, S.A.A.; E.M.Ibrahim and M.M.A.Bader (2001): .Effect of preceding summer crops , nitrogen fertilizer rates and biofertilizer on wheat crop productivity .AL-Azhar J. Agric .Res., 24 (12) : 85 – 98 .

Black, C.A. (1965): Methods of soil analysis .Agron, No. 9 part 2; Amer. Soc. Agronomy. Madison, wisc. USA.

Dahy, S.M.E. (2005): Effect of preceding summer crops and seeding rate on growth and yield of wheat in newlw sandy soil . M.Sc. Thesis, Fac. Agric., Suez Canal Univ., Egypt.

EL – Douby, K.A. (1997): Effect of some preceding crops and nitrogen fertilizer on yield of some wheat cultivars. Egypt. J. Appl. Sci., 12 (4) 172 – 185.

EI- Ganbeehy, M.M. (1994): Response of field grown wheat to biofertilizer and nitrogen fertilization. Com. In Sci., and Dev.Res. 16 (8): 25-42.

Fayez, M. (1989): Untradition N2 – fixing bacteria as biofertilizer for wheat and barley. Ann. Agric. Sci., Ain Shams Univ., 34 (4): 731-740.

Haikel , M. A. and A.A .Zohry (1996) : Effect of some population densities and different nitrogen levels on growth and yield of wheat under sandy soil conditions .J. Agric. Sci., Mansoura Univ., 21 (2): 493 - 501

Hamed, M. F. (1998): Performance of wheat under nitrogen level. Ann. Agric. Sci., Moshtohor , 36 (1): 21 – 31 .

Khalil, H.E.and M.M. EL-Ganbeehy (2004): Wheat productivity and agronomic traits as influenced by plant population densities and different nitrogen sources. J. Adv. Agric. Res., 9 (3): 563 – 576.

Kotb, M.T.A. (1998): Response of wheat to bio- fertilizer and inorganic N and P levels. J. Agric. Sci., Mansoura Univ., 12 (9): 4067 -4078.

Mekhemar, G. A.A. (2008): Response of wheat (Triticum aestivum L.) to different mineral nitrogen levels and inoculation with N2- fixing bacteria .J. Agric. Sci., Mansoura Univ., 33 (1): 447- 467.

Mitkees, R.A.; M.M Sadek, Iman, H. Hendawy, H.; Essad, H. Bedaiwi and A.A El- Banna (1998): Screening for high responsive wheat genotypes to N- biofertilization.Reg. Symp. Agrotech. bio. N- Fixation, Desert Agric., 14- 16 April, El- Arish, pp. 285-289.

Mohamed, A.H.M. (1994): Effect of some preceding crops and nitrogen fertilizer growth and yield of wheat. M.Sc . Thesis, Fac. Agric. Moshtohor, Zagazig Univ., Egypt.

Munyinda, K.; R.E.Karamanos and I.P .Ohalloran (1988): Yields of wheat in rotation with maize and soyban in Zambia . Canadian J. of Soil Sci., 68 (4): 747 - 753.

Sendecor, G.W.and W.G.Cocharn. (1980): .Statistical Methods. 7th ed. Iowa State Univ., Press. Ames. Iowa. U.S.A.

Sharief, M.E.; A.A. Hassan, and S.I. Hafiz (2000): Response of wheat to some bio- chemical fertilization regimes and foliar nitrogen by micronutrients. Egypt, J. Appl. Sci., 15 (1): 83-98.

Wafaa,L.L. F.M. Thabet, El-S.Nafusa, and H.A. Abo-K-ora. (1997): Effect of using local isolates of Azotobacter chroococcum as biofertilizer on growth parameters of wheat plant .Minufiya J. Agric. Res., 22 (3) : 1491 –1510 .

Yaser, A.A.H. (2007): Effect of mineral and bio-Nitrogen fertilization on productivity of cotton intercropping on wheat . M.Sc.Thesis, Fac.of Agric.Al-Azhar Univ., Egypt.

تـأثير المحصـول السـابق ومعدل التقـاوي و التسـميد النتروجينـى المعدنى والحيـوى على إنتاجية محصول القمح

شعبان رمضان عبد الظاهر، كامل علي عبد الحميد الدوبي و رجب أحمد أحمد عطا اللة
قسم بحوث التكثيف المحصولى- معهد بحوث المحاصيل الحقلية – مركز البحوث الزراعية – الجيزة - مصر

أقيمت التجربة الحقلية بمحطة بحوث سرس الليان بمحافظة المنوفية خلال موسمى ٢٠٠٥ / ٢٠٠٦ و ٢٠٠٦ / ٢٠٠٧ لدراسة تأثير بعض المحاصيل السابقة(قطن – فول الصويا – الذرة الشامية) ومعدلات التقاوى (٥٠ و ٦٠ و٧٠ كجم / فدان) وثلاث معاملات من التسميد المعدني والحيوي (٧٠ كجم أزوت /فدان + بدون حيوي) و(٧٠ كجم أزوت /فدان+٥٠٠ جرام سيريالين) بالإضافة إلي (٧٠ كجم أزوت /فدان+٧٥٠ جرام سيريالين) على المحصول ومكوناتة ومحتوى البروتين للقمح صنف سخا ٩٤ وقد تم إ ستخدام تصميم القطع المنشقة مرتين .

ويمكن تلخيص أهم النتائج المتحصل عليها كالاتى :-

- أدت زراعة القمح بعد فول الصويا إلى الحصول علي أعلى القيم لصفات النمو والمحصول ومكوناتة وكذلك محصول البروتين للفدان بحبوب للقمح وتلتها تلك المنزرعة بعد القطن بينما أدت زراعة القمح بعد الذرة الشامية إلى الحصول على اقل القيم لتلك الصفات خلال موسمي الزراعة.
- أدت زيادة معدلات التقاوى إلى ٦٠ كجم للفدان إلى زيادة معنوية لكل من طول النبات وعدد السنابل/م٢ وطول السنبلة وعدد حبوب السنبلة ووزن الالف حبة ومحصول الحبوب والبروتين في كلا الموسمين ماعدا عدد السنيبلات/ سنبلة فى كلا الموسمين وكذلك وزن حبوب السنبلة ومحصول القش الذي لم يتأثر معنويا فى الموسم الاول فقط.
- أدت زيادة مستوى التسميد من ٧٠ كجم أزوت /فدان إلى ٧٠ كجم أزوت /فدان + ٧٥٠ جرام سيريالين / فدان إلى زيادة معنوية لكل الصفات تحت الدراسة خلال موسمي الزراعة ماعدا عدد السنبيلات / سنبلة في كلا الموسمين
- أثر التفاعل بين المحاصيل السابقة ومعدلات التقاوى معنويا على طول السنبلة ومحصول الحبوب والبروتين في كلا الموسمين و علي عدد السنابل/م٢ ووزن حبوب السنبلة ووزن الالف حبة فى الموسم الثاني فقط. كما أثر التفاعل بين المحاصيل السابقة و التسميد المعدنى والحيوى معنويا على محصول الحبوب والبروتين في كلا الموسمين ووزن الالف حبة فى الموسم الثاني فقط

التوصية:-

من النتائج المتحصل عليها يمكن التوصية بأ نة للحصول على أفضل انتاجية لمحصول القمح هى زراعتة عقب محصول بقولى صيفى بمعدل تقاوى ٦٠ كجم / فدان و باستخدام التسميد النيتروجيني بمعدل ٧٠ كجم / فدان مع السماد الحيوي السيريالين٧٥٠ جرام /فدان .

Table 2: Effect of proceeding crops on growth, yield and yield components of wheat during 2005/ 2006 and 2006/ 2007 seasons.

Characters / Treatments	No. of spikes/ m^2	Plant height (cm)	Spike length (cm)	No. of spikelets/ spike	No of gains/ spike	Weight of grain/ spike (g)	1000-grain weight (g)	Grain yield / fed (ardab)	Straw yield /fed (ton)	Protein yield kg/fed
preceding crops	**2005 / 2006 season**									
Cotton	359.16	91.58	11.46	18.47	45.33	2.30	39.83	20.11	4.17	212.45
Soybean	373.22	93.84	11.77	19.21	50.19	2.43	43.75	21.15	4.31	232.35
Maize	346.84	87.74	10.71	18.05	43.07	2.16	38.09	19.27	4.03	195.95
LSD at 5 %	4.13	1.16	0.39	0.19	2.18	NS	1.31	0.90	NS	3.14
C.V	6.22	4.16	3.74	3.46	3.25	2.90	4.17	3.55	3.27	5.40
preceding crops	**2006 / 2007season**									
Cotton	358.16	91.51	11.51	18.49	45.79	2.42	41.44	19.21	4.11	223.29
Soybean	362.12	94.99	11.85	19.37	47.80	2.87	46.26	20.68	4.50	240.78
Maize	325.62	89.94	11.16	18.17	43.44	2.19	37.05	18.18	3.78	210.31
l SD at 5 %	4.46	1.33	NS	0.37	1.91	0.13	1.18	0.76	0.15	2.75
C.V	6.63	3.80	3.40	3.19	3.84	3.47	4.60	3.28	3.07	4.75

Table 3: Effect of seeding rates on growth, yield and yield components of wheat during 2005 /2006 and 2006 / 2007 seasons.

Characters / Treatments	No.of Spikes m^2	Plant height (cm	Spike length (cm)	No.of spikelets spike	No.of grains /spike	Weight of grain /spike (g)	1000-grain weight (g)	Grain yield/ fed (ardab)	Straw yield/ fed (ton)	Protein yield/ fed (kg)
Seeding rates	**2005 / 2006 season**									
50	327.02	85.52	11.73	19.13	48.17	2.38	41.87	19.66	4.05	199.00
60	352.97	93.45	11.35	18.72	46.40	2.37	41.24	20.27	4.32	222.33
70	399.25	94.19	10.86	17.89	44.02	2.12	38.56	20.16	4.13	219.43
SD at 5 %	5.19	2.33	0.20	NS	2.13	NS	1.14	0.46	NS	4.42
C.V	6.22	4.16	3.74	3.46	3.25	2.90	4.17	3.55	3.27	5.40
Seeding rates	**2006 / 2007 season**									
50	328.26	89.92	11.90	19.16	47.67	2.75	43.53	18.85	3.80	210.32
60	364.15	91.89	11.64	18.98	45.96	2.43	43.23	19.90	4.28	233.07
70	385.82	94.63	10.98	17.88	43.41	2.30	37.99	19.31	4.22	231.04
LSD at 5 %	4.23	1.03	0.19	NS	2.27	0.12	1.30	0.42	0.16	3.92
C.V	6.63	3.80	3.40	3.19	3.84	3.47	4.60	3.28	3.07	4.75

Table 4: Effect of mineral and bio- N fertilizer levels on growth, yield and yield components of wheat during 2005 / 2006 and 2005 / 2006 seasons.

Characters / Treatments	No of spikes/ m^2	Plant Height (cm)	Spike length (cm)	No of spikelets / spike	No of grains/ spike	Weight of grain /spike (g)	1000-grain weight (g)	Grain yield / fed (ardab)	Straw yield / fed (ton)	Protein yield / fed (kg)
Mineral and bio –N fertilizer	**2005 / 2006 season**									
70 kg mineral N	329.35	88.45	10.35	18.33	43.54	2.09	39.00	19.11	4.00	194.19
70 kg mineral N **+500g Cerialein**	363.28	91.15	11.75	18.64	47.35	2.32	41.01	20.17	4.09	215.90
70 kg mineral N **+750g Cerialein**	386.60	93.55	11.83	18.77	47.71	2.46	41.66	21.24	4.23	230.66
LSD at 5%	4.57	0.43	0.18	NS	0.93	0.12	0.61	0.17	0.20	3.35
C.V	6.22	4.16	3.74	3.46	3.25	2.90	4.17	3.55	3.27	5.40
Mineral and bio –N fertilizer	**2006 /2007 season**									
70 kg mineral N	314.07	89.76	10.65	18.32	43.75	2.02	39.74	18.06	3.60	209.89
70 kg mineral N **+500g Cerialein**	358.38	92.21	11.53	18.70	46.30	2.66	42.42	19.33	4.12	225.88
70 kg mineral N **+750g Cerialein**	373.52	94.47	12.35	19.01	47.00	2.80	42.58	20.67	4.59	238.66
LSD at 5 %	4.12	0.51	0.24	NS	1.15	0.15	0.48	0.18	0.33	2.58
C.V	6.63	3.80	3.40	3.19	3.84	3.47	4.60	3.28	3.07	4.75