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EFFECT OF TILLAGE SYSTEMS, BIOFERTILIZATION AND SPRAYING UREA ON WHEAT PRODUCTIVITY

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ABSTRACT: Two field trails were conducted at Tag El-Ezz, Agric. Res. Station Dakhlia Governorate during 2001/2002 and 2002/2003 seasons. The aim of this investigation was study the effect of tillage systems (conventional tillage and no-tillage), three rates of biofertilizer (cerialine) i.e. 250, 500, 750 g/fad and spraying urea at 0, 4 and 8 % concentration on growth and yield of wheat (*Triticum aestivum*, L.) Gemmiza 7 cultivar.

Split-split plot design with three replications was used. The most important findings could be summarized as follows:

1- All estimated characters of wheat were greater with performing tillage compared with no-tillage.
2- Inoculation wheat grains with cerialine at the rate of 750 gm/fad recorded the highest mean values of plant height, flag leaf area, number of tillers /m^2, spike length, number of spikes/m^2, number of grains/spike, grains weight/spike, 1000-grain weight as well as grain and straw yield/fad.
3- Spraying urea at 8 % significantly increased all studied characters in both seasons compared with other concentrations of urea.
4- The interaction between tillage systems and bio-nitrogenus had significant effects on grain yield in both seasons. Meanwhile the interaction between bio-nitrogenus and spraying urea had significant effects on plant height. The interaction between tillage systems, bio-nitrogenus and spraying urea had significant effects on flag leaf area and grain yield in both seasons.

In general, it could be stated that cultivation of inoculated wheat grains with 750 g cerialine/fad with performing tillage practices and spraying urea at 8 % concentration were the most effective treatments for improving wheat productivity under the conditions of Tag El-Ezz region.

INTRODUCTION

Wheat (*Triticum aestivum*, L.) is one of the most important creal crops in the world and in Egypt. The local consumption of wheat had increased each year due to the continuous increase 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 the Egyptian production and consumption.

Tillage is described as the practice of modifying the state of the soil in order to provide conditions favorable to crop growth. Several experiments have been conducted at different parts of the world during the last decade to compare the effect of tillage and no-tillage systems, not only but to compare the effect of various tillage systems on crop yield. Different tillage operations have different effects on plant growth and yield. Arnon (1972) studied the effect of tillage on wheat yield and found that grain yield increased with the conventional tillage, Gregor and Gurley (1975) stated that no-tillage render help in erosion control, reduce fuel essential for land preparation, gives flexibility in planting and harvesting, increased land use and reduce labour requirements. Phillip and Phillips (1984) found that plowing is necessary to cover surface residues and emerging seedlings in clean soil surface, aeration of the soil and an effective measure of weed control. Maurya (1988) found that wheat grain yield increased with the conventional tillage compared with no-tillage. Hughes *et al.* (1992) concluded that zero-tillage may be unsuitable for heavier textured soils due to restricted root development. Abd El-All *et al.* (1996) found that all estimated characters of wheat were greater with performing tillage compared with no-tillage. Lawery and Stoltenberg (1998) and Abu-Hamdeh and Al-Widyan (2000) they showed that infiltration rate was strongly affected by tillage treatments from 0 to 20 cm Dry bulk density and air porosity were affected from 0 to 20 cm tillage treatments and from 20 to 40 cm by tire inflation pressure and axle load. Al-Hashem *et al.* (2001) evaluated four tillage systems on some soil physical properties and grain yield for crop. They concluded that all tillage

treatments increased grain yield of faba bean and its components when compared with no-tillage. Also, Haikel (2001) reported that highest grain yield of wheat was obtained from different tillage systems compared with no-tillage.

Bio-nitrogenus fertile supply plants with their requirements from nitrogen, reduce the application of expensive mineral fertilizer, consequently lead to decrease the production costs and pollution rates in soil and water. Previous studies have shown different effects for bio-fertilization on the yield and its components in wheat, Ishac *et al.* (1986) found that field application of inoculation with N_2 fixers might save about of 50 % N fertilizer cost and increased grains yield of wheat, Bhandari *et al.* (1989) and Pandey and Shende (1991) stated that wheat grain yield significantly increased by application of nitrogen fertilizers and Azotobacter inoculation. Ahmed (1995) found that Azotobacters enhanced wheat plant height, flag leaf area, tillering, yield components and grain and straw yields/fad, Attallah and El-Karamity (1997) found that inoculation wheat grains with cerialine recorded higher values of grain and straw yields/fad than uninoculation. Kotb (1998) reported that inoculations of wheat grains with *Azospirillum basilense* under application of 50 kg N/fad significantly increased number of spikes/m^2, number of grains/spike, grains weight/spike, 1000-grain weight and grain and straw yields/fad. Sharief *et al.* (1998) found that inoculation of wheat grains with Azospirillum bacteria (cerialine) resulted in marked increase in plant height, grains weight/spike, number of grains/spike, 1000-grain weight and grain and straw yields/fad. Sultan *et al.* (1999) concluded that inoculation of wheat grains with *Azospirillum sp.* markedly increased plant height, number of grains/spike, grains weight/spike, 1000-grain weight and grain and straw yields/fad. Sadek and Youssef (2000) found that two out of 6 bread wheat genotypes produced the highest yields under biofertilization (Azottin) in addition to only half of the recommended nitrogen dose. Sharief *et al.* (2000) found that biological fertilizer cerialine + phosphorien with 50 kg N/fad significantly increased in tallest plants, highest values flag leaf area, grains number/spike, 1000-grain weight, grain, straw and

protein yields/fad. Bassal *et al.* (2001) indicated that inoculation wheat grains with *Azospirillum sp.* significantly increased in flag leaf area, plant height, number of spikes/m^2, spike length, grains weight/spike and grain and straw yields/fad. El-Kalla *et al.* (2002) reported that the biological fertilizer of cerialine + phosphorin + 40 m^2 farmyard manure maximized plant height, number of tillers and spikes/m^2, spike length, grains weight/spike, number of grains/spike, protein percentage, grain and straw yields/fad compared with other fertilizer treatments in both seasons.

With respect to urea foliar application, Ashour and Saleh (1983) found that plant height and grain yield significantly increased when spraying urea at rate of 10 % concentration was used compare with 6 % and zero concentration. Kadry *et al.* (1984) found that concentration of 10 % urea gave the highest values of all characters studied compared with the control and other concentrations of urea. Assey *et al.* (1987) found that highest grain yield of wheat was obtained when spraying urea at 6% concentration compared with 0 % (spraying distilled water) and 3 %. El-Kalla *et al.* (2002) concluded that using foliar application of super grow 20 + 20 + 20 NPK + trace elements at tillering + elongation stages produced highest values of plant height, flag leaf area, number of tillers and spike/m^2 and grain yield/fad.

MATERIALS AND METHODS

Two field experiments were performed during 2001/2002 and 2002/2003 at Tag El-Ezz, Agric. Res. Station, Dakhlia Governorate. The purpose was to evaluate the effect of two tillage systems, i.e. conventional tillage and no-tillage, three rates of biofertilizer (cerialine) i.e. 250, 500 and 750 gm/fad and three concentrations of spraying urea, i.e. zero (spraying with distilled water), 4 % and 8 % on growth, yield and yield components of wheat Gemmiza 7 cultivar.

In both experiments the treatments were arranged in a split-split plot design with three replications which included tillage systems in the main plots, biofertilization treatments in the sub-plots and the rates of spraying urea concentration in the sub-sub plots. The experimental unit area was 3.5 x 6 m. The preceding summer crop was rice in both seasons. Wheat grains were sown

broadcasting on November 13th and 21st in the first and second seasons, respectively. Calcium superphos-phate (15.5 P_2O_5) at 150 kg/fad was added on the dry soil before ploughing. Nitrogen in the form of urea (46% N) at the rate of 50 kg N/fad was added into three equal doses i.e. at planting, before the second irrigation and at boating stage. Grains of wheat were inoculated with cerialine as biofertilizer shortly before sowing at the previously mentioned rates. Cerialine which included Azotobacter and Azospirllum bacteria as a commercial pocket were supplied from Agriculture Research Center, Giza. The urea solution was sprayed at 40 and 70 days from sowing date as the previously mentioned concentrations. The normal cultural treatments of growing wheat crop were practiced as recommended by Ministry of Agriculture and Land Reclamation.

Soil analysis:

The soil of the experimental area was clay loam. Mechanical and chemical analysis, according to Piper (1950), are presented in Table 1.

Table 1. Mechanical and chemical analysis of the soil at the experimental site during the two seasons.

	2001/2002	2002/2003
1- Physical analysis		
Soil fractions		
Sand %	9.1	11.7
Silt %	31.5	32.0
Clay %	59.4	56.3
Texture class	clay loam	clay loam
2- Chemical analysis		
Organic matter %	1.36	1.47
Available N ppm	19.30	18.66
Available P ppm	11.38	13.02
Available K ppm	249	263
pH	7.1	7.0
E.C.	3.5	3.3

The studied characters:

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

1- 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.

2 Flag leaf area (cm^2): The flag leaf area was calculated using the following equation of Palamiswamy and Gomex (1974).

Leaf area (L.A) = K (L.W).

Where: L= leaf length, W = maximum width of the leaf and K= factor of 0.75.

3- Number of tillers/m^2: Counted in randomly chosen one meter square in each plot.

4- Spike length (cm).

5- Number of spikes/m^2: Counted in randomly chosen one meter square in each plot.

6- Number of grains/spike.

7- Grains weight/spike (g). It was estimated from 10 randomly chosen main spikes from each plot.

8- 1000-grain weight (g). Average weight of 1000-grain randomly taken from each plot.

9- Grain yield (ardab/fad): Weight of grains harvested from each plot converted to ardab (ardab= 150 kg).

10- Straw yield (ton/fad): It was calculated by subtracting grain yield from the total yield for each plot and converted to ton/fad.

Statistical analysis:

The obtained data were subjected to the statistical analysis as the usual technique of analysis of variance (ANOVA) of the split-split plot design as published by Gomez and Gomez (1984). The treatments means were compared using the least significant differences (LSD) according to the procedure outlined by Waller and Duncan (1969).

Correlation studies:

Estimates of correlation coefficient (r) between different wheat characters were calculated according to the following equation:

$$r = \frac{SP_{xy}}{\sqrt{SS_x \cdot SS_y}}$$

Where:

$$SP_{xy} = \sum xy - \frac{\sum x \cdot \sum y}{n}$$

$$SS_x = \sum x2 - \frac{(\sum x)2}{n}$$

$$SS_y = \sum y2 - \frac{(\sum y)2}{n}$$

RESULTS AND DISCUSSION

Wheat grain yield and its components as affected by the studied factors, tillage systems, bio-fertilization and spraying with urea are listed in Tables 2 and 3.

Table 2: Plant height (cm), flag leaf area (cm^2), number of tillers/m^2, spike length (cm) and number of spikes/m^2 as influenced by tillage systems, biofertilization rates and spraying urea concentration in 2001/2002 and 2002/2003 seasons.

Characters	Plant height (cm)		Flag leaf area (cm^2)		No. of tillers/m^2		Spike length (cm		No. of spikes/m^2	
Treatments	2001/2002	2002/2003	2001/2002	2002/2003	2001/2002	2002/2003	2001/2002	2002/2003	2001/2002	2002/2003
A- Tillage systems:										
Tillage	90.11	93.22	35.81	37.17	348.41	355.11	15.96	17.13	310.4	323.5
No-tillage	82.07	84.22	33.69	34.57	331.04	342.85	15.18	16.39	298.3	308.3
F-test	*	*	**	**	*	NS	NS	NS	**	NS
B- Biofertilizer rates:										
250 g/fad	82.22	84.00	32.76	33.71	331.44	339.28	14.67	15.56	277.6	281.2
500 g/fad	84.94	87.50	34.47	35.91	338.44	349.56	15.50	16.75	306.4	312.7
750 g/fad	91.11	94.66	37.01	37.99	349.28	358.11	16.56	17.97	329.2	353.9
F-test	**	**	**	**	**	**	**	**	**	**
LSD at 5%	2.32	2.83	0.18	0.31	6.4	3.22	0.71	0.62	7.03	8.37
at 1%	3.37	4.12	0.26	0.45	9.3	4.68	1.03	0.90	10.23	12.18
C- Spraying urea concentration:										
0%	83.00	85.33	32.78	33.94	318.94	329.56	14.56	15.83	289.3	302.8
4%	86.11	88.67	34.72	35.71	343.94	353.00	15.58	16.72	301.5	315.3
8%	89.16	92.17	36.74	37.96	356.28	364.39	16.58	17.72	322.3	329.6
F-test	**	**	**	**	**	**	**	**	**	**
LSD at 5%	0.87	0.79	0.24	0.34	3.37	5.05	0.31	0.36	7.30	8.62
at 1%	1.18	1.06	0.33	0.47	4.56	6.85	0.42	0.48	11.86	13.01
D- Interaction:										
A x B	NS	NS	**	**	*	NS	NS	NS	NS	NS
A x C	*	NS	**	**	NS	NS	NS	NS	NS	*
B x C	**	**	**	**	NS	NS	NS	*	NS	**
A x B x C	*	NS	**	**	NS	NS	NS	NS	NS	**

1- Effect of tillage systems:

The results in Tables 2 and 3 show that the effect of two tillage systems on growth, yield and yield components of wheat in both seasons. Results of statistical analysis revealed that the tillage systems had significant effects on plant height, flag leaf area, number of grains/spike and grain and straw yields/fad in both seasons, while number of tillers/m^2, number of spikes/m^2, grains weight/spike and 1000-grain weight were significant in the first season only. Wheat plants grown after conventional tillage surpassed on the other one in all the studied characters.

Table 3: Number of grains/spike, grains weight /spike (g), 1000-grain weight (g), grain yield (ardab/fad) and straw yield (ton/fad) as influenced by tillage systems, biofertilization rates and spraying urea concentration in 2001/2002 and 2002/2003 seasons.

Characters	No. of grains /spike		Grains weight/ spike (g)		1000-grain weight (g)		Grain yield (ardab/fad)		Straw yield (ton/fad	
Treatments	2001/2002	2002/2003	2001/2002	2002/2003	2001/2002	2002/2003	2001/2002	2002/2003	2001/2002	2002/2003
A- Tillage systems:										
Tillage	72.93	75.94	2.07	2.43	47.28	50.35	16.88	17.14	2.963	3.142
No-tillage	57.59	59.81	1.89	2.02	44.95	46.49	15.13	15.93	2.600	2.786
F-test	*	*	*	NS	*	NS	*	*	*	*
B- Biofertilizer rates:										
250 g/fad	59.72	61.11	1.71	1.94	43.18	45.62	13.87	14.25	2.54	2.73
500 g/fad	64.56	67.44	2.07	2.20	45.84	47.92	16.36	16.96	2.72	2.89
750 g/fad	71.50	75.06	2.14	2.53	49.33	51.72	17.80	18.41	3.08	3.27
F-test	**	**	**	**	**	**	**	**	**	**
LSD at 5%	3.55	4.65	0.09	0.18	0.97	0.19	0.33	0.42	0.09	0.27
at 1%	5.17	6.77	0.13	0.26	1.41	0.28	0.48	0.61	0.13	0.39
C- Spraying urea concentration:										
0%	61.56	64.16	1.83	2.06	44.74	46.15	14.58	15.18	2.69	2.81
4%	64.94	67.39	1.98	2.22	46.05	48.45	15.72	16.18	2.78	2.97
8%	69.28	72.06	2.12	2.39	47.56	50.66	17.72	18.25	2.88	3.10
F-test	**	**	NS	**	**	**	**	**	**	**
LSD at 5%	1.99	2.79	---	0.15	0.40	0.40	0.29	0.31	0.02	0.09
at 1%	2.70	3.78	---	0.20	0.55	0.55	0.39	0.42	0.04	0.12
D- Interaction:										
A x B	NS	NS	*	NS	*	NS	**	**	**	*
A x C	**	NS	NS	NS	*	NS	NS	NS	NS	NS
B x C	NS	NS	NS	NS	**	NS	*	*	NS	NS
A x B x C	NS	NS	NS	NS	**	NS	**	**	NS	NS

The highest grain yield recorded 16.88 and 17.14 ardab/fad in the first and second seasons respectively. On the other hand, the reverse trend was true for wheat plants were grown without tillage 15.13 and 15.93 ardab/fad in both seasons, respectively. These results may be attributed to soil changes in the physical and engineering properties brought about by tillage operations. It has been found that soil tillage has a major influence on water intake, storage, evaporation of water from the soil by plant root and microbial activity which influences soil aeration, moisture and temperature.

These factors in turns contribute to the quantity and the quality of the crop grown. The soil without tillage was more compacted which reflected in the aeration and the lowest uptake of nutrients. Similar results were obtained by Arnon (1972), Phillip and Phillips (1984), Maurya (1988), Hughes *et al.* (1992), Abd El-All *et al.* (1996), Lawery and Stoltenberg (1998), Abu-Hamdeh and Al-Widyan (2000), Al-Hashem *et al.* (2001) and Haikel (2001). They reported that all tillage treatments increased in grain yield and its components.

2- Effect of biofertilization:

Results indicated that cerialine at the rate of 750 g/fad was more benefit for wheat plants where caused remarkable increase in yield and yield components i.e. plant height, flag leaf area, number of tillers/m^2, spike length, number of spikes/m^2, number of grains/ spikes, grains weight/spike, 1000-grain weight and grain and straw yields/fad. Wheat grain yield recorded 13.87, 16.36 and 17.80 ardab/fad in the first season, and 14.25, 16.96 and 18.41 ardab/fad in the second season when added cerialine at the rate of 250, 500 and 750 g/fad in both seasons, respectively (Tables 2 and 3). The increase of grain yield/fad due to bacterial inoculation may be attributed to their effect on nitrogen fixation and increasing the endogenous phytohormones i.e. IAA, GA_3 and CKS which plays an important role in formation a big active root system and hence, increasing the nutrient uptake. photosynthesis rate and translocation. Similar results were obtained by Ishac *et al.* (1986), Bhandari *et al.* (1989), Pandey and Shende (1991), Ahmed (1995), Kotb (1998), Sherief *et al.* (1998), Sadek and Yousef (2000) and Bassal *et al.* (2001). They found that inoculate wheat grains with cerialine recorded the highest means values of grain yield and its major components compared with uninoculation and save about from 25 to 50 % of N fertilizer cost.

3- Effect of spraying urea:

It is clearly apparent from data in Tables 2 and 3 that spraying urea at 8 % concentration markedly affected all the estimated traits of wheat in both seasons. Increasing spraying urea concentration from zero to 4 and 8 % /fad caused significant increase in all studied characters of wheat. The maximum values of plant height, flag leaf area, number of

tillers/m^2, spike length, number of spikes/m^2, number of grains/spike, grains weight/spike, 1000-grain weight as well as grain and straw yields/fad was obtained with spraying urea at the concentration 8 %. Grain yield recorded 17.72 and 18.25 ardab/fad compared with 14.58, 15.18 and 15.72, 16.18 at the concentrations of zero and 4 % /fad in both seasons, respectively. The increase in grain yield/fad with increasing spraying urea up to 8 % may be due to the promotive role of nitrogen which is an essential element of nucleic acids and proteins that allow plants to grow and increase the growth of leaf area that increased light, interception, then increased leaf photosynthetic rates resulting in more accumulated crop biomass that increased spike length, grains weight/spike, 1000-grain weight that influencing grain crop yields. Similar results were obtained by Ashour and Saleh (1983), Kadry *et al.* (1984), Assey *et al.* (1987), El-Kalla *et al.* (2002).

4- Interaction effects:

The interaction between tillage systems and biofertilization rates had significant effect on grain yield. The highest grain yield were 18.45 and 18.99 ardab/fed in both seasons respectively was obtained when inoculated wheat grains with 750 gm/fad and was grown after conventional tillage systems as shown in Table (4).

The effect of interaction between biofertilization rates and spraying urea had significant effect on plant height in both seasons. The tallest plants were 96.33 and 100.5 cm in both seasons respectively was obtained with inoculate wheat grains with 750 g cerialine/fad and adding urea fertilizer as foliar application at 8 % concentration (Table 4).

Table 4: Grain yield (ardab/fad) as affected by the interaction between tillage systems and biofertilization rates in 2001/2002 and 2002/2003 seasons.

Tillage systems / Biofertilizer rates	2000/2001		2001/2002	
	Tillage	No-tillage	Tillage	No-tillage
250 g/fad	15.23	13.81	15.67	14.34
500 g/fad	17.08	14.65	17.27	15.60
750 g/fad	18.45	16.81	18.99	17.32
F-test	**		**	
LSD at 5%	0.05		0.07	
at 1%	0.08		0.10	

Table 5: Plant height (cm) as affected by the interaction between biofertilization rates and spraying urea concentration in 2001/2002 and 2002/2003 seasons.

	2001/2002			2002/2003		
Biofertilizer rates	**250**	**500**	**750**	**250**	**500**	**750**
Spraying urea:						
0%	80.00	82.67	84.00	81.67	85.17	89.17
4%	82.67	85.00	87.17	84.17	87.50	94.33
8%	86.33	90.67	96.33	86.17	89.83	100.5
F-test		**			**	
LSD at 5%		0.25			0.22	
at 1%		0.34			0.30	

Data in Table (6) show that the interaction between tillage systems, biofertilization rates and spraying urea had significant effect flag leaf area in both seasons. The highest mean value were 41.70 and 43.23 cm^2 in the first and second seasons, respectively had obtained it when inoculated wheat grains with 750 g cerialine were grown in tillage land and added urea fertilizer as foliar application at 8% concentration.

Table 6: Flag leaf area (cm^2) as affected by the interaction among tillage systems, biofertilization rates and spraying urea concentration in 2001/2002 and 2002/2003 seasons.

	2001/2002					
Tillage systems	**Tillage**			**No-tillage**		
Biofertilizer rates	**250**	**500**	**750**	**250**	**500**	**750**
Spraying urea:						
0%	32.33	33.50	35.33	30.20	31.70	33.67
4%	33.90	35.10	38.00	32.17	33.60	35.57
8%	34.97	37.50	41.70	33.03	35.43	37.80
F-test			**			
LSD at 5%			0.54			
at 1%			0.80			
	2002/2003					
	Tillage			**No-tillage**		
	250	**500**	**750**	**250**	**500**	**750**
0%	33.00	34.83	36.77	31.53	32.63	34.90
4%	34.53	37.07	39.20	33.17	34.30	35.97
8%	36.07	39.86	43.23	33.93	36.77	37.90
F-test			*			
LSD at 5%			0.84			
at 1%			--			

Data in Table 7 show that the interaction between tillage systems, biofertilization rates and spraying urea had significant effect on grain yield in both seasons, which observed that the highest grain yield of wheat were 20.10 and 20.50 ardab/fad in the first and second seasons, respectively could be obtained it when inoculated wheat grains with 750 g cerialine/fad were grown in conventional tillage land and added urea fertilizer as foliar application at 8 % concentration.

Table 7: Grain yield (ardab/fad) as affected by the interaction among tillage systems, biofertilization rates and spraying urea concentration in 2001/2002 and 2002/2003 seasons.

	2001/2002					
Tillage systems	**Tillage**			**No-tillage**		
Biofetilizer rates	**250**	**500**	**750**	**250**	**500**	**750**
Spraying urea:						
0%	13.71	15.06	17.30	13.20	14.20	15.00
4%	14.06	16.03	19.02	13.75	15.15	16.81
8%	16.24	18.64	20.10	15.08	16.90	18.61
F-test	**					
LSD at 5%	0.27					
at 1%	0.37					
	2002/2003					
	Tillage			**No-tillage**		
	250	**500**	**750**	**250**	**500**	**750**
0%	14.19	16.86	17.82	13.74	14.83	15.64
4%	15.06	16.49	18.17	14.73	15.71	17.00
8%	16.75	18.95	20.50	15.56	16.37	19.24
F-test	**					
LSD at 5%	0.24					
at 1%	0.32					

Correlation coefficient:

The results of phenotypic correlation coefficient (r) between grain yield/fad and each of its attributing variables (Table 8) show that grain yield /fad was positively and high significantly associated with plant height, flag leaf area, number of tillers/m^2, spike length, number of spikes/m^2, grains weight/ spike, number of grains/spike and 1000-grain weight. It be concluded that, selection program for one or more of those characters may result in an increase in grain yield and its attributes. These results are in agreement with those obtained by

Abd-Alla *et al.* (1999), Badr (1999) and Atalla (2001).

Table (8): Simple correlation coefficient among wheat characters (average of combined analysis for two seasons, 2001/2002 and 2002/2003).

Characters	1	2	3	4	5	6	7	8	9
Plant height (cm)	1.000								
Flag leaf area (cm^2)	0.843**	1.000							
Number of tillers/m^2	0.651**	0.897**	1.000						
Spike length (cm)	0.893**	0.932**	0.886**	1.000					
Number of spikes/m^2	0.594**	0.771**	0.596**	0.738**	1.000				
Grains weight/spike (g)	0.779**	0.891**	0.807**	0.900**	0.718**	1.000			
Number of grains/spike	0.833**	0.861**	0.763**	0.756**	0.681**	0.859**	1.000		
1000-grain weight (g)	0.613**	0.929**	0.831**	0.911**	0.772**	0.934**	0.869**	1.000	
Grain yield (ardab/fad)	0.759**	0.928**	0.822**	0.876**	0.784**	0.897**	0.855**	0.909**	1.000

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تأثير نظم الخدمة المزرعية والتسميد الحيوى والرش باليوريا على انتاجية محصول القمح

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أقيمت تجربتان حقليتان فى محطة البحوث الزراعية بتاج العز بمحافظة الدقهلية خلال موسمى الزراعة ٢٠٠١/٢٠٠٢ و ٢٠٠٢/٢٠٠٣ لدراسة تأثير نظم خدمة الأرض (١ــ خدمة عادية ، ٢ــ بدون خدمة) وثلاث مستويات من التسميد الحيوى (تلقيح حبوب القمح بالسريالين (تسميد حيوى) بمعدلات ٢٥٠ و ٥٠٠ و ٧٥٠ جرام/فدان) مع استخدام ثلاث تركيزات من الرش باليوريا (صفر % ، ٤ % ، ٨ % للفدان) على نمو ومحصول

القمح (صنف جميزة ٧) ، وقد استخدم تصميم القطع المنشقة مرتين فى ثلاث مكررات وقد أوضحت أهم النتائج المتحصل عليها ما يلى:

١ــ أظهرت معاملة الخدمة العادية زيادة معنوية فى كل الصفات المدروسة فى الموسمين فيما عدا صفات عدد السنابل/م^{2}، ووزن حبوب السنبلة بالجرام ووزن ١٠٠٠ حبة بالجرام فى الموسم الثانى.

٢ــ أدى تلقيح حبوب القمح بالسريالين (سماد حيوى) قبل الزراعة بمعدل ٧٥٠ جم / فدان إلى زيادة معنوية فى جميع الصفات المدروسة خلال موسمى الزراعة.

٣ــ أظهرت النتائج أن رش نباتات القمح باليوريا بتركيز ٨ % أدى إلى زيادة معنوية فى جميع الصفات المدروسة حيث أدى الرش باليوريا بتركيز ٨ % إلى زيادة فى محصول الحبوب (أردب/فدان) بمقدار ١٧,٧٢ % و١٦,٨٢ % خلال موسمى الزراعة على الترتيب وذلك عند المقارنة بعدم الرش باليوريا.

٤ــ أظهر التفاعل بين عوامل الدراسة تأثيرا معنويا على محصول القمح ومكوناته كما يلى:

ــ أطول نباتات القمح تم الحصول عليها عند تداخل الفعل عند تلقيح البذور بالسريالين بمعدل ٧٥٠ جرام / فدان مع الرش باليوريا بتركيز ٨ % خلال موسمى الزراعة.

ــ محصول الحبوب أردب / فدان قد أعطى أعلى قيمة له عند تلقيح حبوب القمح بالسماد الحيوى (السريالين) بمعدل ٧٥٠ جرام / فدان وإجراء عملية الخدمة العادية.

ــ محصول الحبوب أردب / فدان أعطى أعلى قيمة من زراعة حبوب قمح ملقحة (بالسريالين) بمعدل ٧٥٠ جرام فى أرض أجرى لها عملية خدمة قبل الزراعة ورشت باليوريا بتركيز ٨ % / فدان.

وعموما يمكن التوصية بأن زراعة القمح بعد تلقيح حبوبه بالسريالين (سماد حيوى) بمعدل ٧٥٠ جرام للفدان ورش النباتات بمحلول اليوريا بتركيز ٨% مع ضرورة إجراء عملية الخدمة العادية للتربة (الحرث مرتين متعامدتين والتزحيف) كان أفضل المعاملات لزيادة انتاجية محصول القمح تحت ظروف منطقة تاج العز بمحافظة الدقهلية.