J. Agric. Sci. Mansoura Univ., 31 (4): 1875 - 1889, 2006

PRODUCTIVITY OF SOME WHEAT CULTIVARS IN CALCAREOUS SOILS UNDER ORGANIC FARMING AND RAINFED CONDITIONS WITH SPECIAL REFERENCE TO PLANT DISEASES.

Abdel-Ati A. A.* and K.I. Zaki**
* Plant Production Dept.,
** Plant Protection Dept., Desert Research Center, Cairo, Egypt.
e-mail: ahmyosef20@ yahoo.com

ABSTRACT

Three field experiments were carried out in the Experimental Station of Desert Research Center at Maruyt, Western Delta during 2001, 2002 and 2003 winter seasons, to study the response of two wheat cultivars for three levels of compost as soil organic manure and three supplemental irrigation treatments under rainfed conditions, and its relation to wheat leaf spot blotch disease incidence caused by *Biopoluvis sovokiniana* (syn. *Helminthosporum sativum*) presented under these conditions.

Wheat variety Giza-155 was superior than Sakha-8 in most of the studied growth characters i.e (plant height/cm, number of tillers/plant, peduncle length/cm, number of leaves per plant, plant fresh & dry weights/g, days to heading), chemical compositions i.e. (free proline *U* mole/g, bound water, total pigments/SPDA and total chlorophyll µ mole m^{-2}) and days to maturity. While Sakha-8 surpassed the other wheat variety in (flag leaf area/cm^2 and % of total and free water content). While no significant differences between the two varieties in yield and its components i.e.(biological, grain and straw yields ton/fed, no of spikes /m^2, spike length/ cm, no. of spikelets and grains/ spike and 1000 grain weight /g).

Applying (one supplementary irrigation at heading stage + rainfed) increased significantly all studied growth characters, % total and free water, total pigments/SPDA, total chlorophyll / µmole m^{-2}, grain yield ton/fed, spike length/cm, no. of spikelets, no of grains per spike, no of spikes /m^2, 1000 grain weight /g, and days to maturity more than added (one irrigation at sowing + rainfed) or under rainfed only. Only free proline *U* mole/g, and bound water % were increased significantly under rainfed irrigation. Biological and straw yields ton/fed were increased significantly by applying (one supplemental irrigation at sowing date + rainfed).

Adding compost as a soil amendment increased significantly wheat growth characters, chemical compositions and yield and its attributes compared with the control treatment (0 m^3/fed). Increasing the amounts added of compost to the experimental soil had significant positive effects on encouraging the studied growth characters, chemical compositions, yield and its attributes and days to maturity, while free proline *U* mole/g and % of bound water contents didn't show any significant response to increase compost amounts added to the experimental soil.

All first and second order interactions between treatments increased significantly every studied growth characters, chemical composition, yield and its attributes except peduncle length/ cm, no. leaves/plant and free proline which didn't respond significantly under the interaction between irrigation and compost treatments.

Leaf spot blotch disease which recorded as a barley disease in Egypt, infected wheat under the experimental conditions in a light degree. All treatments effected positively in reducing disease incidence.

Keywords: Wheat varieties, rainfed, supplemental irrigation, compost, leaf spot blotch disease, *Helminthosporum sativum*.

INTRODUCTION

Wheat (*Triticum aestivum,* L.) is the main human daily meal source of carbohydrates. Wheat and Barley originated in the Middle East, an area once known as the granary of the Roman Empire. These lands bordering the Mediterranean (i.e. West Asia and North Africa, with the exception of Turkey) are experiencing increasing food deficits, largely due to burgeoning population growth (Harris, 1995). As with many countries in economic transition, many future productivity increases have to come from increased yields, with little opportunities for expansion of cropland; the sparse and precarious resources of the region, particularly water, make this a daunting task (Oweis *et al.,* 1998).In Egypt wheat is the most important cereals crop in terms of area and production. It provides the Egyptians with almost 35% of the total food calories. (El-Gizawy, 2005).

Regarding wheat varietal differences in response to water deficit, many investigators found significant differences between wheat varieties in growth traits, yield and its components as a result of water stress conditions (El-Sayed *et al.*, 2000). Mohamed *et al.,* (2005) reported that crossing of wheat genotypes possessing desired characteristics has, so far, been the most effective way to achieve the confidential progress in wheat yield under stressful conditions.

Limited water availability is one of the most widespread environmental constraints on plant growth. Soil water deficit often occurs due to lack of precipitation in its growing season particularly in arid and semiarid regions. The seasonal pattern of soil water stress coefficient showed that there were faster water losses at grain-filling stage than the other stages. (Zhang *et al.*, 2004), while Abd EL-Maaboud (1996) stated that days to heading in wheat was negatively associated to soil moisture stress, consequently it affect both biological and grain yield and similar results were obtained by (Oweis *et al.*, 1998). Bates (1973) added that proline which increase proportionately faster than the other amino acids in plants under water stress, has been suggested as an evaluating parameter for irrigation scheduling and for selecting the drought resistant varieties.

Compost is well-known to have a number of physical and chemical benefits to soil. These include the nutrients added (macro as well as micro), their slow release form, an increase in the soil cation exchange capacity (CEC), improved soil structure, aggregate stability, water infiltration. The CEC is what provides the nutrient holding capacity (for positively charges nutrients, as Ca^{++}) but the organic matter can also add some anions exchange capacity which can help in retain nutrients and sulphates. Moreover, compost increased the soil water holding capacity which is a limiting factor under new reclaimed soils. (Matsi *et al.*, 2003 and Singer *et al.*, 2004 a).

The leaf spot plotch which is a common foliar disease in barley caused by *Biopoluvis sovokiniana* (syn. *Helminthosporum sativum*), occasionally infect wheat especially when humid and high soil fertility conditions present. If it happens, it will cause significant decrease in wheat yield as a result of the reduction happens in total chlorophyll content comparative to leaf area, hence, the plant photosynthesis rate. Only the adaptive plants, which can overcome these bad effects by increasing the chlorophyll concentration in the uninfected zones of the ailing leaves, therefore plant photosynthesis rate, consequently productivity as described by Fetch *et al.*, (1999)

This study aimed to examine growth and productivity of two wheat varieties to three organic fertilization levels and supplementary irrigation at two different growth stages under rainfed conditions, and its relation to wheat foliar diseases which are common in the coastal regions of Egypt.

MATERIALS AND METHODS

Three field experiments were carried out in the Experimental Station of Desert Research Center at Maruyt, North Western Coastal Region during 2001, 2002 and 2003 seasons, respectively to study the response of two wheat cultivars to three levels of compost as soil organic manure and three supplemental irrigation treatments under rainfed conditions, besides recording the wheat foliar disease might present under these conditions.

Two bread wheat cultivars (Sakha 8 and Giza 155) were drilled at a seed rate 30 kg/fed on 25th November in the three seasons. Seeds of the two wheat varieties were obtained every season from Wheat Research Section, Agricultural Research Center (A.R.C.), Giza, Egypt. The pedigree of those wheat cultivars under study is presented in table (1)

Table 1: Name and pedigree of the two wheat cultivars under study

Wheat Cultivar	Source	Pedigree
Giza 155	ARC-Egypt	Regent 975 x Giza 139/ Mida Cadet x Hindi 62
Sakha 8	ARC-Egypt	Indus 66 x Norteno "S"- IK348

The experimental soil was tilled three overlapping times. During soil preparation, calcium super-phosphate (15.5 % P_2O_5) was added into the soil at the rate of 100 kg/fed. Nitrogen fertilization was added at a rate of 30 kg/fed as ammonium nitrate (33.5 %N) during growth stages. Potassium sulphate (48 % K_20) was added at a rate of 50 kg K_20/fed at heading stage in each season.

Weeds were controlled mechanically either by hand pulling or hoeing whenever needed during growth period.

The mechanical and chemical properties of the experimental soil at 30 cm depth are presented in tables (2 and 3).

Table 2: Mechanical properties of Maryut experimental soil (means of 2001, 2002 and 2003 seasons):

O.M	Particle size distribution (mm)				
	Course Sand	Fine Sand	Silt	Clay	Class texture
0.67	14.38	37.17	23.29	25.16	Sandy Clay Loam

Table 3: Chemical properties of Maryut experimental soil (means of 2001, 2002 and 2003 seasons):

pH	Ca Co3 %	E.C dsm^{-1}	Saturation soluble extract							
			Soluble anions (meq/L.)				Soluble cataions (meq/L.)			
			CO^{-3}	HCO^{-3}	SO^{-4}	CL^{-}	Ca^{++}	Mg^{++}	Na^{+}	K^{+}
7.6	23.38	1.43	-	4.75	3.98	6.38	5.0	3.75	6.15	0.27

The three irrigation treatments used in this study were (rainfed only, rainfed + sowing irrigation and rainfed + heading irrigation).While Nile water was used for the supplementary irrigation following the treatments scheme of the experiment.

The compost treatments were (0, 10, 15 and 20 m^3/fed), where Maryut compost was used as the source of organic manure in this study. The chemical properties of the compost were presented in table (4).

Table 4: Chemical analysis of Maryout compost:

Moisture Content	Organic Matter	C/N Ratio	PH	Available %			ppm			S%
				N	P	K	Z	Mn	Fe	
8.3%	30.2%	18.1	7.3-7.1	2.15	1.14	1.25	2.1	3.9	4.2	0.25

The meteorological data observed from Mariout automatic weather station belongs to Desert Research Center (DRC) including monthly average temperature °C, monthly evapotranspiration (Et)/(mm) and monthly rain precipitation (mm) is presented in fig (1).

The experimental design used in this experiment was split-split plot design in three replicates where irrigation treatments occupied the main plots, wheat varieties in the sub-main and compost treatments in the sub-sub ones. The area of the experimental unit was 12 m^2 (3m x 4m) with 15 rows, 20 cm apart and 4m length.

Ten guarded plants were taken as a sample at heading stage to determine growth characters i.e.(plant height /cm, no. of tillers per plant, peduncle length/cm, no. of leaves per plant, flag leaf area/ cm^2, plant shoot fresh and dry weights /g , days to heading) and chemical compositions i.e. free proline as *U*mole/g of fresh weight of the flag leaf as described by Bates, (1973); plant water relations (Total , free and bound water contents in the flag leaf) following the method described by Gosev (1960) and total pigments were measured using SPDA-502 leaf chlorophyll meter, then converted into total chlorophyll (a+b) as µmole m^{-2} following the method published by John *et al.*, (1988). In addition, percentage of disease incidence was determined at heading stage as an indicator of leaf spot blotch disease infection caused by *Helmethosporium sativum* after isolation and identification the pathogen following the proper procedures in this subject.

At harvest, one square meter plants were harvested then converted into ton per feddan to determine yield and its components i.e. (biological , grain and straw yields ton/fed , no. of spikes/m^2 , spike length /cm, no. of spikelets per spike, no. of grains per spike, 1000 grain weight/g) and days to maturity.

All recorded data of the three seasons were exposed to the proper statistical combined analysis method according to the ANOVA procedure given by Snedecor and Cochran (1967), while Duncan's multiple range test was used to verify the significant differences between treatments mean as described by Duncan (1955).

RESULTS AND DISSCUSSION

I-Effect of varietal differences:

Results illustrated in table (5) indicated that wheat variety Giza-155 was superior than Sakha-8 in most of studied growth characters i.e (plant height/cm, no. of tillers/plant, peduncle length/cm, no. of leaves per plant, plant fresh & dry weights/g, days to heading), chemical compositions i.e. (free proline *U* mole/g, bound water, total pigments/SPDA and total chlorophyll µ mole m^{-2}). While Sakha-8 surpassed Giza-155 in (flag leaf area/cm^2 and % of total and free water content). On the other hand, none of the two varieties overcome the other in yield and its attributes parameters i.e. (biological, grain and straw yields ton/fed, no of spikes /m^2, spike length/ cm, no. of spikelets and grains/ spike and 1000 grain weight /g), while Giza-155 stated significantly longer days to maturity compared with Sakha-8. Probably the significant differences between the two varieties revealed to the differences in pedigree presented in table (1). Similar results obtained by (Abd El-Maaboud, 1996, Oweis *et al.*, 1998 and El-Gizawy, 2005).

Table 5 : Effect of wheat varietal difference on certain growth characters, chemical compositions at heading stage and yield & its attributes at harvest (combined analysis of 2001, 2002 and 2003 seasons).

Certain Criteria	Wheat cultivar	
	Sakha 8	Giza 155
Growth Characters:		
Plant height / cm	59.4 b	72.1 a
No. of tillers/ plant	1.28 a	1.66 a
Peduncle length/cm	15.2 b	23.8 a
No. of leaves/ plant	3.47 b	5.57 a
Flag leaf area/ cm^2	16.6 a	12.3 b
Plant Fresh weight/g	4.4 b	6.7 a
Plant Dry weight/ g	2.4 b	3.1 a
Days to heading/ day	70.8 b	90.8 a
Chemical compositions		
Free Proline *U* mole/ g	14.63 a	13.37 a
Total water %	52.1 a	50.13 b
Free water %	32.27 a	21.42 b
Bound water %	19.83 b	28.71 a
Total Pigments/ SPDA	20.2 b	22.8 a
Total Chlorophyll (a+b) µ mole m^{-2}	165 b	176.9 a
Yield and its attributes		
Biological yield ton/ fed	2.99 a	3.26 a
Grain yield ton/fed	1.02 a	1.00 a
Straw yield ton/fed	1.97 a	2.26 a
No. of spikes / m^2	335.6 a	360.1 a
Spike length / cm	8.8 a	8.1 a
No. of spikelet per spike	17.9 a	18.1 a
No. of grains per spike	42.9 a	43.6 a
1000 grain weight / g	36.8 a	36.6 a
Days to maturity / days	149.6 b	162.3 a

- **Means having similar letters at same row has no significant differences at $P \geq 0.05$**

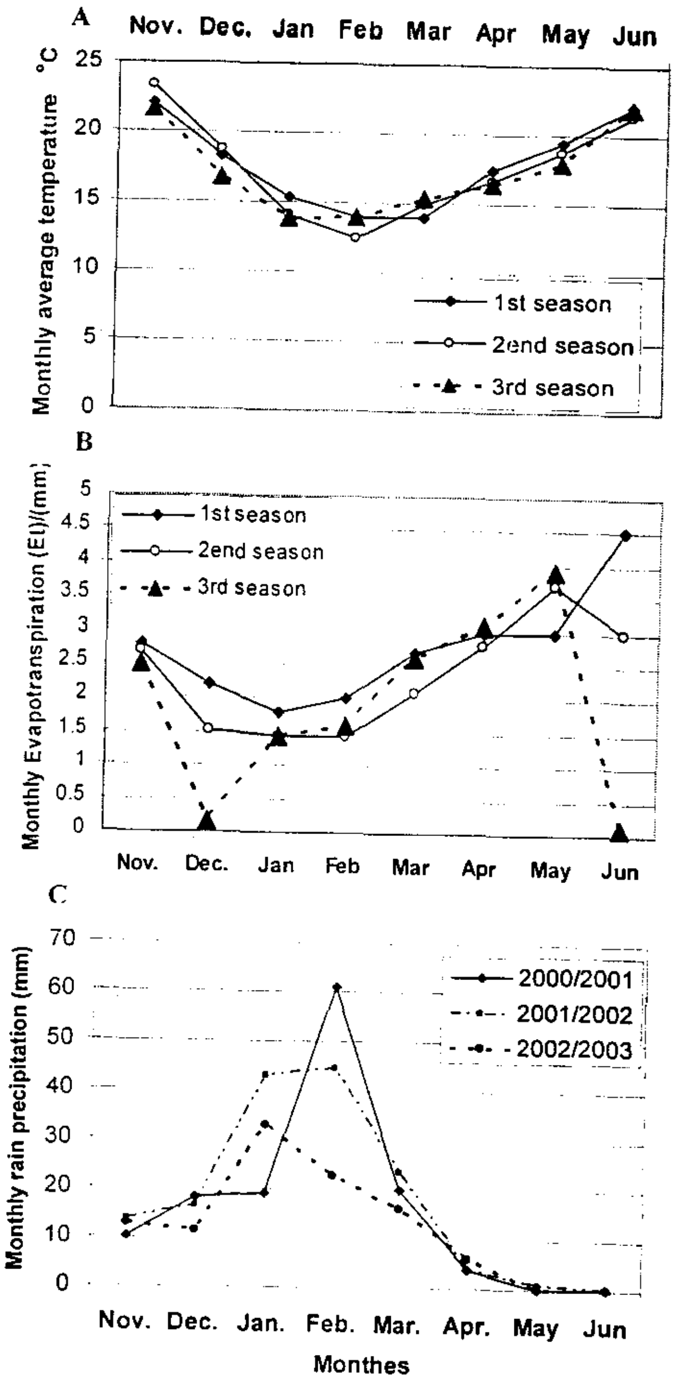

Fig 1: Monthly average (A) Temperature / °C, (B) Evapotranspiration Et/mm, and (C) Rainfall/mm of 2000/2001, 2001/2002 and 2002/2003 growing seasons.

II- Effect of supplementary irrigation treatments:

As indicated in table (6), applying one supplementary irrigation at heading stage + rainfed increased significantly all studied growth characters i.e. (plant height/cm, no. of tillers/plant, peduncle length/cm, no. of leaves per plant, flag leaf area/cm^2 ,plant fresh & dry weights/g, days to heading) more than those having one irrigation at sowing + rainfed or rainfed only.

Table 6: Effect of supplementary irrigation treatments on wheat certain growth characters, chemical composition at heading stage and yield & its attributes at harvest (combined analysis of 2001, 2002 and 2003 seasons).

Certain Criteria	Supplementary irrigation treatments		
	I	II	III
Growth Characters:			
Plant height / cm	44.3 c	46.2 b	60.4 a
No. of tillers/ plant	1.00 c	1.06 b	1.18 a
Peduncle length/cm	17.3 b	18.2 b	20.8 a
No. of leaves/ plant	3.80 b	3.82 b	4.80 a
Flag leaf area/ cm^2	9.11 c	12.7 b	14.67 a
Plant Fresh weight/g	3.11 c	4.18 b	6.15 a
Plant Dry weight/ g	1.01 c	2.16 b	3.02 a
Days to heading/ day	66.2 c	75.7 b	8.3 a
Chemical composition			
Free Proline *U* mole/ g	15.5 a	11.6 b	10.3 b
Total water %	49 c	50 b	59 a
Free water %	26 c	32 b	43 a
Bound water %	23 a	18 b	16 c
Total Pigments/ SPDA	21.1 c	25.3 b	27.2 a
Total Chlorophyll (a+b) μ mole m^{-2}	175.6 c	233.4 b	250.6 a
Yield and its attributes			
Biological yield ton/ fed	2.40 c	3.48 a	3.30 b
Grain yield ton/fed	0.74 c	0.85 b	1.07 a
Straw yield ton/fed	1.66 c	2.63 a	2.23 b
No. of spikes / m^2	360 a	290.1 c	334 b
Spike length / cm	8.04 c	9.3 b	10.27 a
No. of spikelet per spike	16.3 c	18.07 b	19.4 a
No. of grains per spike	25.3 c	42.9 b	44.5 a
1000 grain weight / g	28.6 c	37.2 b	39.4 a
Days to maturity / days	138 c	147 b	150 a

I- Rainfed only.
II- Rainfed + one irrigation at sowing.
III- Rainfed + one irrigation at heading
- **Means having similar letters at same row has no significant differences at P≥ 0.05**

Similarly, % total and free water, total pigments/SPDA and total chlorophyll/ μmole m^{-2} showed the same growth characters trend. Only (free proline *U* mole/g, and bound water %) which increased significantly under rainfed only more than rainfed + one supplementary irrigation at sowing or at heading .

Most of yield and its attributes studied parameters i.e.(grain yield ton/fed, spike length/cm, no. of spikelets and grains/ spike , 1000 grain weight /g, and days to maturity) showed significant increase after applying one supplementary irrigation at heading stage more than the other treatments. While adding supplemental irrigation at sowing was fair enough to increase significantly both biological and straw yields compared with one supplemental irrigation at heading or rainfed treatments. Similar results obtained by (Abd El-Maaboud, 1996, Oweis *et al.,* 1998).

The strategy of applying restricted amounts of water at critical growth stages based on available soil moisture, and plant consumptive use at a certain growth stage to minimize the drought stress, and its bad impacts on plant growth and metabolism. Yield and its components is the target from applying the supplementary irrigation treatments in this study. When drought stress occurs, the endogenous levels of ABA and ethylene are increased, therefore levels of the osmotic regulators such as proline and glycine betain is raised, to increase the starch and other combounds which plays a very important role in increasing the plant cell sap concentration and osmotic pressure to maximize the bound water content relatively to the total and free water content. Therefore, the plazmodesmata bands were cut, consequently reduction in chlorophyll content, thus, photosynthesis rate and photosynthate production and transport out of the stomatal closer. So it riches the maturity earlier than it should be producing insignificant yield (Raschke and Hedrich, 1985). Unlikely the water stressed plants, when supplementary irrigation is added particularly at heading stage, the bad effects of the water stress is driven away , so the plants enjoys longer growth periods out of juvenility as upshot of the reduction happened in the growth inhibitors content. On the other hand, increase the plant growth promoters such as auxins, gibberellins or cytokinins, (Plaut ,1985) . Supplementary irrigation at sowing date is important only when rainfed water is inadequate to produce seed germination in a proper time to the crop growth and productivity. (Sabery *et al.,* 1994)

III- Effect of compost treatments:

Results in table 7 illustrate that adding compost as a soil amendment increased significantly wheat growth characters, chemical compositions and yield and its attributes compared with the control treatment (0 m^3/fed).

Increasing the amounts added of compost into the experimental soil from zero up to 20 m^3/fed had significant positive effects on encouraging the studied growth characters i.e. (plant height/cm, no. of tillers/plant, peduncle length/cm, flag leaf area/cm^2, plant fresh & dry weights/g, days to heading), chemical composition i.e. (%of total, free and water, total pigments/SPDA and total chlorophyll µ mole m^2), yield and its attributes i.e. (biological , grain and straw yields , no. of spikes/m^2 , spike length /cm, no. of spikelets per spike, no. of grains per spike, 1000 grain weight/g) and days to maturity, while free proline *U* mole/g and % of bound water content didn't show any significant response to increase compost amounts added to the experimental soil. Similar results obtained by Matsi *et al.*, (2003).

Table 7: Effect of different dosage of compost as a soil amendment on wheat certain growth characters, chemical compositions at heading stage and yield & its attributes at harvest (combined analysis of 2001, 2002 and 2003 seasons).

Certain Criteria	Compost treatments			
	I	II	III	IV
Growth Characters:				
Plant height / cm	38 d	45 c	60.1 b	78.2 a
No. of tillers/ plant	1.0 c	1.1 c	1.6 b	1.27 a
Peduncle length/cm	16.4 d	17.5 c	20.7 b	24.2 a
No. of leaves/ plant	3.6 a	3.8 a	3.8 a	3.9 a
Flag leaf area/ cm^2	8.9 d	12.1 c	16.3 b	18 a
Plant Fresh weight/g	3.1 d	4.3 c	6.1 b	7.2 a
Plant Dry weight/ g	1.7 d	2.6 c	3.1 b	3.8 a
Days to heading/ day	65.1 d	73.2 c	90.6 b	92.4 a
Chemical compositions				
Free Proline *U* mole/ g	9.8 a	8.6 a	8.9 a	9.2 a
Total water %	42 d	48 c	54 b	61 a
Free water %	22 d	28 c	33 b	40 a
Bound water %	20 a	20 a	21 a	21 a
Total Pigments/ SPDA	12.2 d	78.7 c	26.1 b	31.4 a
Total Chlorophyll (a+b) μ mole m^{-2}	112.4 d	172.3 c	240.5 b	285.6 a
Yield and its attributes				
Biological yield ton/ fed	2.14 d	3.32 c	3.46 b	3.86 a
Grain yield ton/fed	0.71 d	1.15 c	1.44 b	1.85 a
Straw yield ton/fed	1.43 c	2.17 b	2.02 a	2.03 a
No. of spikes / m^2	281 d	308 c	330 b	345 a
Spike length / cm	6.6 d	8.4 c	9.2 b	10.3 a
No. of spikelet per spike	13.1 d	14.6 c	16.2 b	18.7 a
No. of grains per spike	26 c	38.2 b	40.1 ab	34.4 a
1000 grain weight / g	28.1 d	30.4 c	43.2 b	38.6 a
Days to maturity / days	147 d	148 c	150 b	156 a

I- 0 m^3 / fed. II- 10 m^3 / fed.
III- 15 m^3 / fed. IV- 20m^3 / fed.

- **Means having similar letters at same row has no significant differences at P≥ 0.05**

Application of compost to the arable soils probably the most economical and environmentally sound solution to the problem of their dispersal. Beside its beneficial effect on the environment either on soil fertility or the chemical, physical features and the microbial activity of the soil, it has as well, preferable effects on the plant nutrition, and metabolism, so that it increases the plant productivity.

Under new reclaimed soils, particularly when irrigation water is inadequate, or under rainfed agriculture, soils mostly suffering from insignificant productivity and low water holding capacity. If chemical fertilizers applied into the soil under these conditions, it would be unacceptable risk, and may be lost by water erosion under high rain precipitation conditions. Compost can provide the plants with macro and micro elements beside its good effects on reducing many diseases incidence. Moreover, it is also an ideal solution to combat desertification by minimizing the air and water erosion of the fertile surface of the soil. (Singer *et al.*, (2004,b)

IV- Effect of the interactions:

As indicated in table (8), all first and second order interactions between varietal differences, supplementary irrigation and compost treatments increased significantly most of the studied growth characters, chemical compositions and yield and its attributes. Only peduncle length/ cm, no.leaves/plant and free proline which didn't gave significant response under the interaction between varietal differences and compost treatments.

VI – Pathogenic studies

Leaf spot blotch disease caused by *H. sativum* is a foliar disease which infects wheat and barley particularly in the coastal regions when suitable environmental factors are presented; such as sensitive variety accompanied with appropriate climatic factors; which enhance the disease incidence. Usually, the pathogen spores reach the infected fields by air from other infected places may be thousands of kilometers away from the target fields. Unless there is enough inoculum concentration in the air, the pathogen fails to infect the target crop and produce irrevocable damage in the economic yield.

Therefore, and during our three growing seasons the disease incidence was not aggressive enough to cause significant reduction in growth characters, chemical compositions, yields and its attributes of both wheat cultivars under study as presented in Tables (5-8). However, significant reduction in disease incidence was recognized as a result of applying the experimental treatments.

Disease inoculum normally present in low concentration in the atmosphere, the way it produces insignificant damage in wheat and barley yields in the region. Accidentally during our work, there was a study on infected barley field with the same pathogen which played a very important role in increasing the inoculum concentration in the air. So it was able to infect our experiment but in a slight degree following the scale published by Fetch *et al.*, (1999), to give us a good chance to study this pathogen response to our experimental treatments on wheat.

Concerning the varietal differences and their impacts on disease incidence (%), Sakha-8 showed high resistance to the pathogen more than Gizaa-155. The latter was able to be infected in 90% percent compared with 10% for the formal as shown in Fig(2-A). These differences in disease incidence may be come as a result of the differences between the two varieties in the pedigree which presented in table (1). Which probably played a very important role in producing some physiological or morphological transforms in the tolerant host thus resistance to the pathogen.

Table 8: Effect of the interactions between (V) varietal differences, (I) supplementary irrigation and (C) compost treatments on wheat certain growth characters, chemical compositions at heading stage and yield & its attributes at harvest (combined analysis of 2001, 2002 and 2003 seasons).

Certain Criteria	Interactions			
	V x I	V x C	I x C	V x I x C
Growth Characters:				
Plant height / cm	S	S	S	S
No. of tillers/ plant	S	S	S	S
Peduncle length/cm	S	S	NS	S
No. of leaves/ plant	S	S	NS	S
Flag leaf area/ cm^2	S	S	S	S
Plant Fresh weight/g	S	S	S	S
Plant Dry weight/ g	S	S	S	S
Days to heading/ day	S	S	S	S
Chemical compositions				
Free Proline *U* mole/ g	S	S	NS	S
Total water %	S	S	S	S
Free water %	S	S	S	S
Bound water %	S	S	S	S
Total Pigments/ SPDA	S	S	S	S
Total Chlorophyll (a+b) µ mole m^{-2}	S	S	S	S
Yield and its attributes				
Biological yield ton/ fed	S	S	S	S
Grain yield ton/fed	S	S	S	S
Straw yield ton/fed	S	S	S	S
No. of spikes / m^2	S	S	NS	S
Spike length / cm	S	S	NS	S
No. of spikelet per spike	S	S	NS	S
No. of grains per spike	S	S	S	S
1000 grain weight / g	S	S	S	S
Days to maturity / days	S	S	S	S

S = significant at $P \geq 0.05$ **NS = not significant at $P \geq 0.05$**

Compost as an eco-friend resistance inducer for many pathogens as reported by many investigators, played an important role in minimizing the spot blotch disease incidence (%) as presented in Fig (2-B). Disease incidence was in an opposite relation with increasing the amount of compost added up to 20 m^3/fed. The positive effects of applying compost on the spot blotch disease incidence may be come as an upshot of improving the plant nutrition, thus metabolism, consequently induced resistance to the pathogen (McElroy, 1999).

Relative humidity ranked the major favorable environmental conditions for increasing many diseases incidence; it increases as a consequence of increasing rain precipitation and decreasing the evapotranspiration at the same time. Within the wheat growth curve, these conditions were available in the period from 1st December up to 1st March in the three growing seasons as presented in Fig (1-B & C).

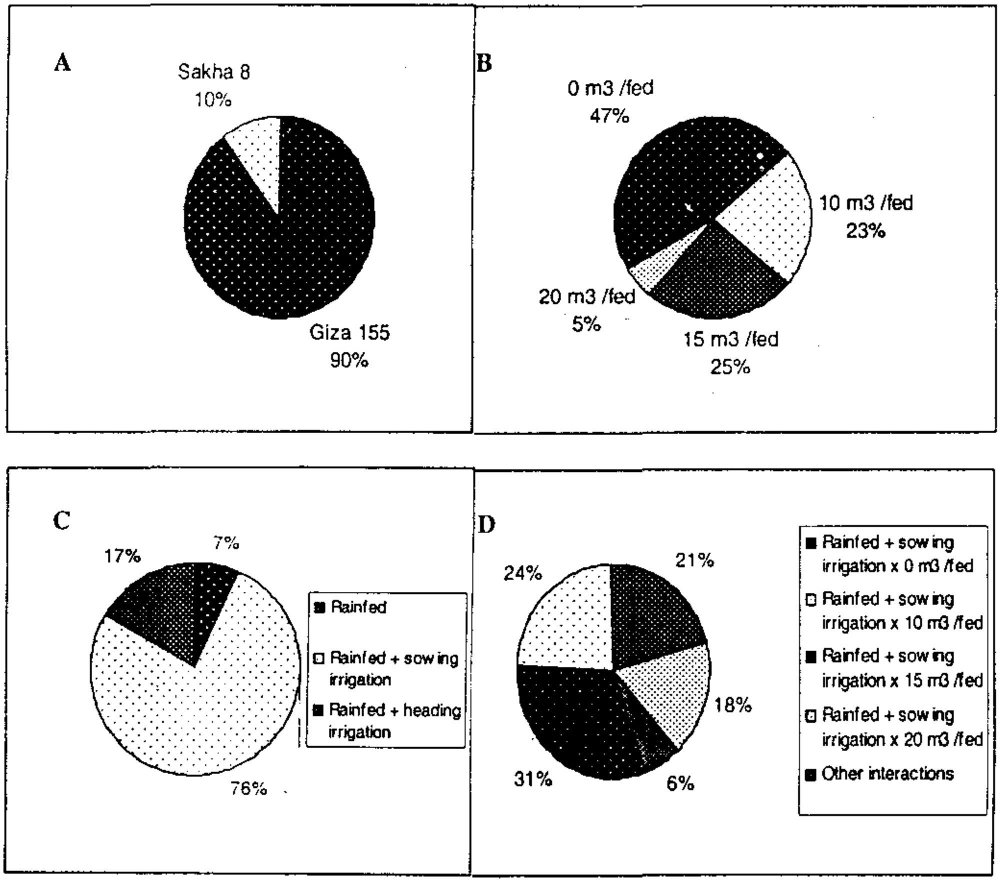

Fig (2): Effect of (A) wheat cultivars, (B) organic manure treatments, (C) supplementary irrigation treatments, (D) second order interactions on spot blotch disease incidence %.

Yet, this was typically the response of spot blotch disease incidence (%) to the increase of relative humidity by applying one supplementary irrigation at the date sowing to cause (76%) disease incidence in comparison to adding one irrigation at heading (17%) or under only rainfed conditions (7%) as presented in Fig (2-C).

Concerning the first and second order interactions between the experimental treatments, {(Giza-155) x (Rainfed + supplementary irrigation at sowing) x (0 m^3/ fed. compost)} ranked the first, producing 31% disease incidence, while the other treatments varied in producing disease incidence from 6% up to 24% as shown in Fig (2-D).

Perhaps leaf spot blotch disease isn't important enough in our situation, but further wheat varietal screening is a must to prevent the disease incidence on wheat, even the pathogen was marked as a barley disease inducer in Egypt. Breaking one of the disease triangle arms i.e. (presence of the pathogen inoclum + suitable environmental conditions + sensitive variety) should be a fundamental target and may be need further studies.

Acknowledgements

The author wishes to drive his sincere thanks to Prof. Dr. Maher El-Sersawy, Soil Physics Unit for kindly providing the compost used in this study, Prof. Dr. Kamal Wadea Soil Fertility Unit. for his interest during this work.

REFERENCES

Abd EL-Maaboud M. S. (1996). Evaluation of certain wheat varieties under rainfed conditions. Ph.D. thesis, Ain Shams Univ. Fac. of Agric. Agron. Dept.

Bates, L. S. (1973), Rapid determination of proline for water stress studies. Plant and Soil, 39: 205-207.

Duncan, D. B., (1955). Multiple range and multiple F-test biometrics, 11: 1-24.

El-Gizawy N. Kh. B. (2005). Yield and nitrogen use efficiency as influenced by rates and sources of nitrogen fertilizers of some wheat varieties. The 11th conf. of Agron., Agron. Dept., FAc. of Agric., Assiut Univ., pp. 51-64.

El-Sayed, M. A. A.; M. F. El-Krmany and A. Abo Ellil (2000). Effect of irrigation and nitrogen fertilizer on yield and yield components of some wheat cultivars. Al-Azhar J. Agric. Res. 32, 73-88.

Fetch G., J. Brian and J. Steffenson (1999). Rating scales for assessing infection responses of barley infected with *Coshliobolus sativus*. Plant Dis. 83: (3), 213-217.

Gosev, N. A. (1960). Some Methods in studying plant water relations. Leningrad Acad. Of Science, U.S.S.R, pp. 214-222.

Harris, H. C. (1995). Long- term trials on soil and crop management at ICARDA. Adv. Soil Sci. 19:447-469.

John M., J. C. Osterman and Jennifer L. Mitchell (1988). Calibration of the Minolta SPDA-502 leaf chlorophyll meter. Photosynthesis Research 48: 467-472.

Matsi T. ; S.Anastasios and A.Athanasios (2003) Effects of injected liquid cattle manure on growth and yield of winter wheat and soil characteristics.
Agron. J. 95:592-596.

McElroy, F. D. (1993). Commercial development of disease suppressive compost. Rrport No.B12 Clean Washington Center, Seattle, W.A.

Mohamed. A.A.; K.A. El-Shouny; Afiah, S.A.N.; and H.I.A. Farag (2005). Heterosis and selection criteria for grain yield and its contributors under normal and drought stress conditions in bread wheat (*Triticum astivum* L.). The 11th conf. of Agron., Agron. Dept., Fac. of Agric., Assiut Univ., pp. 31-50.

Oweis T., M. Pala, and R. John (1998). Stabilizing rainfed wheat yields with supplemental irrigation and nitrogen in the Mediterranean Climate. Agron. J. 90: 672-681.

Plaut Zvi (1985). Photosynthesis in plant / crop under water and salt stresses. In Handbook of plant and crop physiology (Zvi Plaut Ed). pp 587- 603. Marcel Dekker, Inc. press.

Raschke, K.and R. Hedrich (1985). Simultaneous and independent effects of ABA on stomata and photosynthetic apparatus in whole leaves. Planta 163, 105-118.

Sabery,S. R.S; M. M. Abdelaleem and N. S. Hanna (1994). The effect of one supplementary irrigation at sowing on grain yield of rainfed wheat in the Northwest Coast Region of Egypt. Bull. Fac. Agric. Univ. Cairo. 45: 3, 629-638.

Singer, J. W.; K. A. Kohler, M. Liebman and D.D. Buhler (2004,a). Tillage and compost affect yield of corn, soybean and wheat and soil fertility. Agron J. 96: 531-537 (2004).

Singer, J.W.; K. A. Kohler ; M. Liebrman ; T. L. Richard ; C. A. Cambardella and D.D. Buhler (2004,b) Tillage and compost affect yield of corn, soybean and wheat and soil fertility. Agron. J. 97: 1612-1621.

Snedecor, G. W. and G. W. Cochran (1967). Statistical methods 6th ed. Iowa Stat. Univ. Press, Ames., Iowa, U.S.A.

Zhang Y. ; Qiang Y.; Changming L.; Jie. J. ; and Xiying Z. (2004). Estimation of winter wheat evapotranspiration under water stress with two semi-empirical approaches. Agron J. 96:159-168.

إنتاجية بعض أصناف من القمح بالأراضي الجيرية تحت ظروف الزراعة العضوية والمطرية وعلاقتها بأمراض النبات

أحمد عبد العاطي أحمد* ، خالد إسماعيل زكي**
* قسم الإنتاج النباتي و ** قسم وقاية النبات - مركز بحوث الصحراء- القاهرة.

أقيمت ثلاث تجارب حقلية بمحطة بحوث مريوط التابعة لمركز بحوث الصحراء ، بالإقليم الساحلي لغرب الدلتا خلال مواسم النمو الشتوية ٢٠٠١ ، ٢٠٠٢ ، ٢٠٠٣ علي الترتيب ، لدراسة إستجابة صنفين من القمح لثلاثة مستويات سمادية من الكمبوست كمصدر للتسميد العضوي ، وثلاثة معاملات من الري التكميلي تحت الظروف المطرية ، إلي جانب دراسة مرض تخطيط أوراق الشعير الذي أصاب القمح تحت هذة الظروف.

أظهرت النتائج المتحصل عليها تفوق واضح لصنف القمح جيزة-١٥٥ علي الصنف سخا-٨ في معظم صفات النمو المدروسة علي سبيل المثال (طول النبات / سم ، عدد الأفرع الكلية للنبات ، طول حامل السنبلة ، عدد الأوراق للنبات ، والوزن الغض والجاف للنبات ، إضافة إلي عدد الأيام اللازمة لطرد السنابل) و التركيب الكيماوي مثل (محتوي النبات من كل من البرولين الكلي ، الماء المرتبط ، الصبغات الكلية ، والكلوروفيل الكلي). في حين أظهر سخا-٨ تفوقاً واضحاً في مساحة ورقة العلم والماء الكلي والحر . هذا ولم تظهر أية فروق معنوية بين الصنفين في المحصول ومكوناتة.

أظهرت إضافة (رية واحدة تكميلية في طور طرد السنابل + الري عن طريق الأمطار) زيادة معنوية في كل صفات النمو المدروسة إضافة إلي الماء الكلي و الحر و الصبغات الكلية ، محصول الحبوب ، وطول السنابل ، وعدد سنيبلات و حبوب السنبلة ، وعدد سنابل المتر المربع ، ووزن الـ ١٠٠٠ حبة ، وعدد الأيام اللازمة للحصاد ، وتفوقت هذة الرية علي معاملة (رية واحدة تكميلية عند الزراعة + الري عن طريق الأمطار) و كذلك الري بالأمطار فقط. وقد زاد معنويا فقط تحت ظروف الري بالأمطار محتوي البرولين والماء المرتبط ، في حين زاد المحصول البيولوجي و محصول القش تحت ظروف (رية واحدة تكميلية عند الزراعة + الري عن طريق الأمطار).

أدي إضافة الكمبوست إلي التربة كتسميد عضوي إلي زيادة صفات النمو و التركيب الكيماوي والمحصول ومكوناتة للقمح مقارنة بتلك المعاملة التي لم يضاف إليها الكمبوست. كما أدت زيادة الكمية المضافة من الكمبوست من صفر و حتي ٢٠ متر مكعب للفدان إلي زيادة صفات النمو و التركيب الكيماوي والمحصول ومكوناتة وعدد الأيام اللازمة للحصاد. بينما لم يظهر محتوي النبات من البرولين والماء المرتبط أية إستجابة معنوية لإضافة الكمبوست أو زيادة الكمية المضافة منة.

أدت جميع التفاعلات بين المعاملات إلي زيادة معنوية في صفات النمو و التركيب الكيماوي والمحصول ومكوناتة فيما عدا طول حامل السنبلة ، و عدد الأوراق للنبات و البرولين الحر تحت ظروف التفاعل بين معاملات الري التكميلي و التسميد بالكمبوست.

يعتبر مرض تخطيط الشعير من الأمراض التي تصيب الشعير في مصر، إلا أنة أصاب محصول القمح ولكن بدرجة بسيطة ، وقد أثرت جميع المعاملات إيجابيا علي نسبة الإصابة بالمرض