

INFLUENCE OF SOME SEEDING AND NITROGEN RATES ON GRAIN YIELD AND INSECT NATURAL INFESTATION OF SOME WHEAT CULTIVARS

KHALED, M.A.¹ and A.M. EL-RAWY²

1- Wheat Department, Field Crops Research Institute, ARC, Giza, Egypt.

2- Plant Protection Research Institute, ARC, Dokki, Giza, Egypt.

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Abstract

A Field experiment was performed on Bahteem Agric. Res. Station Farm Qalubia Governorate , during the two growing seasons 2009/10 and 2010/11 to study the effect of three seeding rates i.e. 300, 350 and 400 grains /m² and two nitrogen fertilizer levels i.e. 75 and 90 kg N/fed on yield and yield components as well as grain crude protein and total carbohydrate percentages . In addition the intensity of natural infestation with cereal aphids and leafminer on six wheat cultivars i.e. Sakha 93, Sakha 94, Gemmeiza 10 and Sids 12 (bread wheat); Beni-Sweif 4 and Beni-Sweif 5 (durum wheat) was also investigated.

Results indicated that Beni-Sweif 4 cultivar exhibited longer period to heading (89.5 days) and to maturity (140.5 days). On the other hand, Beni-Sweif 5 exhibited taller plants (101.2 cm) followed by Beni-Sweif 4 (99.9 cm) and Sids 12 (97.5 cm). While Beni-Sweif 5 and Sids 12 cultivars gave more spikes (518.5 and 516.1 spikes/m², respectively), but highest number of grains /spike was shown by Beni-Sweif 5 and Beni-Sweif 4 (67.4 and 66.0 grains/spike, respectively).The highest values of 1000-grain weight and grain yield were in Beni-Sweif 4 and Sids 12 (48.6 and 48.5 g & 16.2 and 16.3 ardab/fed., respectively). While Beni-Sweif 4 gave the highest value of straw yield (3.6 ton/fed.).On the other hand, Beni-Sweif 5 and Beni-Sweif 4 cultivars gave the highest values of grain crude protein and total carbohydrate percentages (12.2 and 11.9 % & 76.7 and 75.8%, respectively). As seeding rate increased caused a significant increase in period to heading (90 days) and to maturity (138 days), number of spikes/m² (522.1 spikes /m²) and straw yield (3.5 ton /fed.) and caused a significant decrease in plant height (89.6 cm), number of grains/spike (56.6 grains/spike), 1000-grain weight (42.9 g), grain yield (15.5 ardab/fed.) and also decrease in grain crude protein and total carbohydrate percentages (11 and 71.3%,respectively). Seeding rate of 300 grains/m² was caused a significant increase in plant height (101.4 cm), number of grains /spike (64.8 grains/spike), 1000-grain weight (49.2 g), grain yield (16.2 ardab /fed.) and also caused increase in grain crude protein and total carbohydrate percentages (11.8 and 73.2%,respectively).

Increasing nitrogen rate from 75 to 90 Kg /fed caused a significant increase in plant height (97.3 cm), number of spikes /m² (514.7 spikes /m²), number of grains /spike (61.5 grains/spike), 1000-grain weight (46.8 g), grain yield (16.2 ardab /fed.), straw yield (3.4 ton /fed.) and also caused increase in grain crude protein and total carbohydrate percentages (11.5 and 72.6%, respectively).

For insect infestation, results revealed that Beni-Sweif 4 and Sids 12 cultivars were significantly effective in decreasing number of cereal aphids (62.1 and 83.3 aphids /10 plants, respectively). On the other hand, Beni-Sweif 4 and Beni-Sweif 5 showed the least number of leafminer (2.4 and 3.4 mines & 1.5 and 2.2 larvae /100 leaves, respectively). Increasing seeding rate from 300 grains/m² to 400 grains /m² caused a significant increase in number of cereal aphids (159.5 aphids /10 plants) and leafminer (9.2 mines and 6.7 larvae /100 leaves). The least number of cereal aphids (82.1 aphids /10 plants) and leafminer (3.7 mines and 2.5 larvae /100 leaves) were obtained at a seeding rate of 300 grains /m². Increasing nitrogen rate from 75 to 90 Kg /fed caused a significant increase in number of cereal aphids (133.3 aphids /10 plants) and leafminer (7.9 mines and 5.6 larvae /100 leaves).

From these results, it could be concluded that sowing Sids 12 cultivar (bread wheat) or Beni-Sweif 4 cultivar (durum wheat) under seeding rate of 300 grains/m² and applying 90 KgN/fed gave the highest grain yield/fed and least infestation by cereal aphids and leafminer.

INTRODUCTION

Wheat (*Triticum aestivum* L.) is the most important cereal crop in the world. Because of the difficulties facing the horizontal expansion for production increase in Egypt, the vertical yield increase is the main possible mean which could be achieved by developing high yielding varieties and via good cultural practices i.e. optimum seeding rate, fertilization and pest management (El-Ghareib *et. al.*, 1998, El-Karamity, 1998, Munir *et. al.*, 2001, Abdel-Aziz *et. al.*, 2002, Slman, 2002, Slman *et. al.*, 2002, Mousa, 2006, El-Rawy *et. al.*, 2007, Swelam, 2008 and Abdel-Nour and Fateh, 2011). During the last few years, cereal aphids have become serious insect pests attacking wheat plants in Egypt. These pests cause a serious damage to the plants either directly by sucking plant cell juice or indirectly as a vector of diseases (Abdel-Aziz *et. al.*, 2002 and Slman, 2002). The leafminer *Agromyza nigrella* (Rondani) attacks wheat in Egypt in a range of 2 - 90% infestation (El-Serwy, 1996 and Slman *et. al.*, 2002). However, aphids and leafminer are considered two of the important pests

attacking wheat plants and causing sever reduction in the yield (Slman, 2002 and Slman *et. al.*, 2002).

This work aimed to study the effect of seeding and nitrogen fertilizer rates on yield, yield components as well as chemical content of wheat grains under infestation with cereal aphids and leafminer of six wheat cultivars.

MATERIALS AND METHODS

A Field experiment was carried out at Bahteem Agricultural Research Station, Qalubia Governorate during two successive wheat seasons of 2009/10 and 2010/11. The experiments were sown on December 6th, 2009 and November 27th, 2010 using a split-split plot design with four replications. Six wheat cultivars were distributed at random in the main plots, four of these cultivars were bread wheat (Sakha 93, Sakha 94, Gemmeiza 10 and Sids 12) and the other two were durum wheat (Beni-Sweif 4 and Beni-Sweif 5). Three seeding rates (300, 350 and 400 grains/m²) were assigned to the sub-plots. Two nitrogen fertilizer rates (75 and 90 KgN/fed.) were allocated to the sub-sub plots. Nitrogen was added in the form of ammonium nitrate (33.5% N) at three doses i.e. 20% at sowing, 40% at tillering and 40% at elongation stage. The area of sub-sub plot was 11.4 m² (3.8 x 3m), each plot contained 19 rows with 20 cm apart.

Agronomic data recorded in the two growing seasons were: days to heading and to maturity, plant height, number of spikes/m², number of grains/spike, 1000-grain weight and grain and straw yields. Chemical constituents of wheat grains for protein and total carbohydrate content were determined according to the A.O.A.C. (2000).

To determine aphid population and leafminer infestation, weekly samples each of ten plants, starting from 1st Feb. to 1st April were picked up at random from each sub-sub plot to record number of cereal aphid (*Rhopalosiphum padi*, *Schizaphis graminum*, *Sitobion avenae* and *Rhopalosiphum maidis*) and, at the same time, number of *Agromyza nigrella* mines and alive larvae / 25 leaves.

Data obtained in each season were statistically analysed according to procedures outlined by Steel *et. al.* (1997) and the treatment means were compared by Least Significant Difference (L.S.D.) at 5% level.

RESULTS AND DISCUSSION

Results presented in Tables (1 to 8) show the effects of seeding and nitrogen fertilizer rates on yield, yield components and chemical of wheat grain content and infestation with cereal aphids and leafminer of six wheat cultivars.

1- Effects on the yield

1.1. Cultivar performance

Data presented in Tables (1 to 5) showed significant differences among the tested cultivars for all the studied wheat traits. Beni-Sweif 4 cultivar gave the highest values for days to heading and to maturity, 1000-grain weight, grain and straw yields/fed (89.5 and 140.5 days, 48.6 g, 16.2 ardab/fed and 3.6 ton/fed., respectively), while Sakha 93 cultivar gave the lowest values for number of spikes/m², number of grains /spike, 1000-grain weight and grain and straw yields (493.4 spikes/m², 54 grains /spike, 43.7g, 15.5 ardab/fed and 3.3 ton/fed., respectively). Sids 12 (bread wheat) and Beni-Sweif 4 (durum wheat) cultivars gave the highest values for 1000-grain weight and grain yield/fed (48.5 and 48.6g & 16.3 and 16.2 ardab/fed., respectively). The differences in 1000-grain weight and grain yield between Sids 12 and Beni-Sweif 4 cultivars were insignificant. Beni-Sweif 5 (durum wheat) gave the highest values of plant height, number of spikes/m², number of grains/spike, protein and total carbohydrate percentages (101.2 cm, 518.5 spikes/m², 67.4 grains/spike, 12.2 % and 76.7%, respectively). These results are in agreement with those obtained by El-Ghareib *et. al.* (1998), El-Karamity (1998), Sharaan and Abdel-Samie (1999), El-Naggar (2003), Mousa (2006) and Abdel-Nour and Fateh (2011).

1.2. Seeding rates

Data compiled in Tables (1 to 5) show significant increase in days to heading and to maturity, number of spikes/m² and straw yield/fed with increasing seeding rates. Whereas, seeding rate at 300 grains/m² gave the highest values for plant height, number of grains/spike, 1000-grain weight, grain yield, protein and total carbohydrate percentages (101.4 cm, 64.8 grains/spike, 49.2g, 16.2 ardab/fed., 11.8% and 73.2%, respectively) as compared with the two higher seeding rates. While increasing seeding rates from 300 grains/m² to 400 grains/m² caused increase

in days to heading and to maturity, number of spikes/m² and straw yield (90 and 138 days, 522.1 spikes/m² and 3.5 ton/fed., respectively) and caused a significant decrease in plant height, number of grains/spike, 1000-grain weight, grain yield and also decrease in grain crude protein and total carbohydrate percentages (89.6 cm, 56.6 grains/spike, 42.9 g, 15.5 ardab/fed., 11% and 71.3%, respectively). Beni-Sweif 4 cultivar (durum wheat) and Sids 12 cultivar (bread wheat) gave the highest grain yield (16.8 and 16.6 ardab/fed., respectively) when sown with a rate of 300 grains/m², while Beni-Sweif 4 and Beni-Sweif 5 cultivars (durum wheat) and Sakha 94 cultivar (bread wheat) gave the highest straw yield (3.6, 3.5 and 3.5 ton/fed., respectively) when the seeding rate was increased to 400 grains/m². Comparable data have been reported by Hefni *et al.* (1979), El-Ghareib *et al.* (1998), El-Karamity (1998), Sharaan and Abdel-Samie (1999), Munir *et al.* (2001) and Mousa (2006).

1.3. Nitrogen rates

As shown in Tables (1 to 5), significant increase in all studied characters were studied with increasing nitrogen rates. The highest values for days to heading and to maturity, plant height, number of spikes/m², number of grains/spike, 1000-grain weight, grain yield, straw yield, protein and total carbohydrate percentages were 89 and 137 days, 97.3 cm, 514.7 spikes/m², 61.5 grains/spike, 46.8g, 16.2 ardab/fed., 3.4 ton/fed., 11.5% and 72.6%, respectively. Beni-Sweif 5 and Beni-Sweif 4 cultivars (durum wheat) gave highest values for plant height (101.2 and 99.9 cm, respectively), number of spikes/m² (537.8 and 522.6 spikes/m², respectively), number of grains/spike (68.5 and 66.4 grains/spike, respectively), 1000-grain weight (49 g), protein (12.2 and 12%, respectively) and total carbohydrate percentages (76.8 and 76.1%, respectively) at the highest nitrogen rate (90 KgN/fed.). While Sids 12 (bread wheat) and Beni-Sweif 4 (durum wheat) gave the highest value for grain yield (16.5 ardab/fed), but Beni-Sweif 4 and Beni-Sweif 5 (durum wheat) and Sakha 94 (bread wheat) gave the highest values for straw yield (3.4, 3.3 and 3.3 ton/fed., respectively) at the highest nitrogen rate (90 KgN/fed.). Similar results were reported by El-Ghareib *et al.* (1998), El-Karamity (1998), Sharaan and Abdel-Samie (1999), Munir (2001), El-Naggar (2003), El-Rawy *et al.* (2007), Swelam (2008) and Abdel-Nour and Fateh (2011).

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Table 1. Effect of seeding and nitrogen fertilizer rates on days to heading and to maturity of some wheat cultivars during the two successive seasons (2009/10 and 2010/11).

Cultivar		Days to heading																													
		2009/10													2010/11						Mean										
		Seeding rate									Seeding rate						Seeding rate														
		300grains/m ²		350grains/m ²		400grains/m ²		Mean		General	300grains/m ²		350grains/m ²		400grains/m ²		Mean		General	300grains/m ²		350grains/m ²		400grains/m ²		Mean		General			
75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	mean			
Sakha 93	Bread wheat	83	86	85	86	90	91	86	87	86.5e	84	85	85	86	89	91	86	87	86.5c	84	85	85	86	90	91	86	87	86.5e			
		Sakha 94	85	87	87	88	89	92	87	89	88.0d	84	85	85	86	87	90	85	87	86.0cd	84	86	86	87	88	91	86	88	87.0d		
		Gemmeiza10	86	88	87	90	91	92	88	90	89.0b	87	88	88	89	90	91	88	89	88.5a	87	88	88	90	91	92	89	90	89.5b		
		Sids 12	84	87	85	87	86	89	85	88	86.5e	84	85	86	86	86	88	85	86	85.5d	84	86	86	86	86	89	85	87	86.0f		
Beni-Sweif 4	Durum wheat	87	88	91	91	91	92	89	90	89.5a	87	88	90	89	91	91	89	89	89.0a	87	88	90	90	91	92	89	90	89.5a			
		Beni-Sweif 5	85	87	89	90	90	92	88	90	89.0c	86	86	89	89	90	92	88	89	88.5b	86	87	89	90	90	92	88	90	89.0c		
Mean		85	87	87	89	90	91	87b	89a	-	85	86	87	88	89	91	87b	88a	-	85	87	97	88	89	91	87b	89a	-			
General mean		86.0 C		88.0b		90.5a		-			85.5c		87.5b		90.0a		-			86.0c		87.5b		90.0a		-					
Interaction		N.S.													N.S.						N.S.										
Cultivar		Days to maturity																													
		Sakha 93	Bread wheat	130	131	131	132	135	136	132	133	132.5e	129	130	130	132	134	135	131	132	131.5e	129	131	131	132	135	136	132	133	132.5e	
				Sakha 94	130	132	131	132	133	136	131	133	132.0e	128	130	129	131	132	136	130	132	131.0f	129	131	130	132	133	136	131	133	132.0f
				Gemmeiza10	135	136	136	138	138	139	136	138	137.0c	136	137	136	138	138	140	137	138	137.5c	135	137	136	138	138	140	136	138	137.0c
Sids 12	131			131	132	133	132	143	132	136	134.0d	130	133	132	133	134	136	132	134	133.0d	131	132	132	133	133	140	132	135	133.5d		
Beni-Sweif 4	Durum wheat	139	140	140	141	140	142	140	141	140.5a	138	139	140	141	141	142	140	141	140.5a	139	140	140	141	141	142	140	141	140.5a			
		Beni-Sweif 5	136	136	140	141	140	142	139	140	139.5b	136	136	140	141	140	142	139	140	139.5b	136	136	140	141	140	142	139	140	139.5b		
Mean		133	134	135	136	136	140	135b	137a	-	133	134	135	136	137	139	135b	136a	-	133	135	135	136	137	139	135b	137a	-			
General mean		133.5c		135.5b		138.0a		-			133.5c		135.5b		138.0a		-			134.0c		135.5b		138.0a		-					
Interaction		N.S.													N.S.						N.S.										

Means followed by the same letter (s) in each column within each treatment are not significant.

Table 2. Effect of seeding and nitrogen fertilizer rates on plant height and number of spikes/m² of some wheat cultivars during the two successive seasons (2009/10 and 2010/11).

Cultivar		Plant height (cm)																										
		2009/10										2010/11										Mean						
		Seeding rate					Seeding rate					Seeding rate					Seeding rate											
		300grains/m ²		350grains/m ²		400grains/m ²		Mean	General	300grains/m ²		350grains/m ²		400grains/m ²		Mean	General	300grains/m ²		350grains/m ²		400grains/m ²		Mean	General			
75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	mean		
Sakha 93	Bread wheat	94.33	98.33	90.67	91.67	85.67	88.33	90.22	92.78	91.50c	93.33	94.67	90.00	90.00	85.67	83.33	89.67	89.33	89.50c	93.83	96.50	90.33	90.83	85.67	85.83	89.94	91.06	90.50c
Sakha 94	Bread wheat	103.33	108.33	95.00	95.67	90.00	91.67	96.11	98.56	97.53b	98.33	98.33	96.67	98.33	90.00	88.33	95.00	95.00	95.00b	100.83	103.33	95.83	97.00	90.00	90.00	95.56	96.78	96.17b
Gemmeiza10	Bread wheat	91.67	96.67	89.00	96.33	85.00	83.33	88.56	92.11	90.33c	91.67	91.67	87.33	88.33	84.00	86.33	87.67	88.78	88.22c	91.67	94.17	88.17	92.33	84.50	84.83	88.11	90.44	89.28c
Sids 12	Bread wheat	106.67	110.00	93.33	100.00	93.33	91.67	97.78	100.56	99.17b	100.00	103.33	93.33	98.33	88.33	91.67	93.89	97.78	95.83b	103.33	106.67	93.33	99.17	90.83	91.67	95.83	99.17	97.50b
Beni-Sweif 4	Durum wheat	103.33	110.00	98.33	103.33	90.00	95.00	97.22	102.78	100.00ab	101.67	108.33	98.33	106.67	90.00	93.33	96.67	102.78	99.72a	102.50	109.17	98.33	105.00	90.00	94.17	96.94	102.78	99.86a
Beni-Sweif 5	Durum wheat	106.67	111.67	100.00	105.00	91.67	96.67	99.44	104.44	101.94a	105.00	106.67	100.00	105.00	90.00	96.00	98.33	102.56	100.44a	105.83	109.17	100.00	105.00	90.83	96.33	98.89	103.50	101.19a
Mean		101.00	105.83	94.39	98.67	89.28	91.11	94.89b	98.54a	-	98.33	100.50	94.28	97.78	88.00	89.83	93.54b	96.04a	-	99.67	103.17	94.33	98.22	88.64	90.47	94.21b	97.29a	-
General mean		103.42a		96.53b		90.19c		-			99.42a		96.03b		88.92c		-			101.42a		96.28b		89.56c		-		
Interaction		N.S.										N.S.										N.S.						
Cultivar		No. of spikes / m ²																										
		2009/10										2010/11										Mean						
		Seeding rate					Seeding rate					Seeding rate					Seeding rate											
		300grains/m ²		350grains/m ²		400grains/m ²		Mean	General	300grains/m ²		350grains/m ²		400grains/m ²		Mean	General	300grains/m ²		350grains/m ²		400grains/m ²		Mean	General			
75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	mean		
Sakha 93	Bread wheat	477.00	484.67	487.33	490.67	495.00	504.00	486.44	493.33	489.84a	490.67	491.00	498.67	492.00	495.00	519.00	494.11	500.67	497.39b	483.83	487.83	493.00	491.33	494.00	511.83	490.28	497.00	493.44c
Sakha 94	Bread wheat	488.33	486.33	497.67	502.33	513.33	523.00	499.78	503.89	501.83a	514.00	498.67	499.67	497.33	537.00	544.33	516.89	513.44	515.17a	501.17	492.50	498.67	499.83	525.17	533.67	508.33	508.67	508.50ab
Gemmeiza10	Bread wheat	476.67	484.33	481.00	503.67	487.00	519.33	481.56	502.44	492.00a	486.67	499.00	484.67	495.67	498.00	508.00	489.78	500.89	495.33b	481.67	491.67	482.83	499.67	492.50	513.67	485.67	501.67	493.67c
Sids 12	Bread wheat	479.67	492.67	486.33	520.00	527.33	540.00	497.78	517.67	507.72a	507.00	504.33	517.33	512.67	551.67	553.33	525.33	523.44	524.39a	493.33	498.50	501.83	516.33	539.50	546.83	511.56	520.56	516.06a
Beni-Sweif 4	Durum wheat	479.00	496.00	480.33	515.33	505.00	536.00	488.11	515.78	501.94a	474.67	517.67	475.67	527.67	489.00	543.00	479.78	529.44	504.61b	476.83	506.83	478.00	521.50	457.00	539.50	483.94	522.61	503.28bc
Beni-Sweif 5	Durum wheat	485.67	522.33	486.67	526.33	511.00	556.00	494.44	534.89	514.67a	492.33	534.00	496.00	536.00	523.00	552.00	503.89	540.67	522.28a	489.00	528.17	491.33	531.17	517.17	554.00	499.17	537.78	518.47a
Mean		481.06	494.39	486.56	509.72	505.44	529.89	491.35b	511.33a	-	494.22	507.44	495.33	510.22	515.33	536.61	501.63b	518.09a	-	487.64	500.92	490.94	509.97	510.89	533.25	496.49b	514.71a	-
General mean		487.72c		498.14b		518.17a		-			500.83b		502.78b		525.97a		-			494.28b		500.46b		522.07a		-		
Interaction		N.S.										N.S.										N.S.						

Means followed by the same letter (s) in each column within each treatment are not significant.

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Table 3. Effect of seeding and nitrogen fertilizer rates on number of grains/spike and 1000-grain weight of some wheat cultivars during the two successive seasons (2009/10 and 2010/11).

Cultivar		No. of grains / spike																															
		2009/10										2010/11										Mean											
		Seeding rate										Seeding rate										Seeding rate											
		300grains/m ²		350grains/m ²		400grains/m ²		Mean		General mean	300grains/m ²		350grains/m ²		400grains/m ²		Mean		General mean	300grains/m ²		350grains/m ²		400grains/m ²		Mean		General mean					
		75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN
Sakha 93	Bread wheat	54.57	53.83	51.50	53.97	49.67	50.23	51.91	52.68	52.29b	57.13	58.27	57.27	57.70	50.80	53.13	55.07	56.37	55.72b	55.85	56.05	54.38	55.83	50.23	51.68	53.49	54.52	54.01d					
Sakha 94		58.17	58.83	53.57	54.57	50.63	51.83	54.12	55.08	54.60c	58.93	59.63	53.87	54.87	49.90	51.93	54.23	55.48	54.86b	58.55	59.23	53.72	54.72	50.27	51.88	54.18	55.28	54.73d					
Gemmeiza10		60.43	61.93	53.63	57.63	49.40	55.23	54.49	58.27	56.38c	61.00	63.13	57.93	59.57	49.97	56.40	56.30	59.70	58.00b	60.72	62.53	55.78	58.60	49.68	55.82	55.39	58.98	57.19c					
Sids 12		67.67	69.10	58.43	64.00	54.87	59.63	60.32	64.24	62.28b	72.20	72.13	61.60	64.93	60.17	61.40	64.66	66.16	65.41a	69.93	70.62	60.02	64.47	57.52	60.52	62.49	65.20	63.84b					
Beni-Sweif 4	Durum wheat	67.90	73.90	66.30	64.63	61.80	62.20	65.33	66.91	66.12a	72.27	68.87	63.33	65.73	61.93	62.93	65.84	65.84	65.84a	70.08	71.38	64.82	65.18	61.87	62.57	65.59	66.38	65.98ab					
Beni-Sweif 5		68.13	72.00	63.80	65.60	61.50	64.53	64.48	67.38	65.93a	71.47	73.13	69.40	70.60	62.97	65.40	67.94	69.71	68.83a	69.80	72.57	66.60	68.10	62.23	64.97	66.21	68.54	67.38a					
Mean		62.81	64.93	57.87	60.07	54.64	57.28	57.28	60.76a	-	65.50	65.86	60.57	62.23	55.96	58.53	60.67a	62.21a	-	64.16	65.40	59.22	61.15	55.30	57.91	59.56b	61.48a	-					
General mean		63.87a		58.97b		55.96c		-			65.68a		61.40b		57.24c		-			64.78a		60.18b		56.60c		-							
Interaction		N.S.										N.S.										N.S.											
		1000 – grain weight (g)																															
Sakha 93	Bread wheat	46.53	47.27	43.97	44.57	40.73	41.77	43.74	44.53	44.14b	47.76	47.90	45.55	46.40	29.64	42.64	40.98	45.65	43.31b	47.15	47.58	44.76	45.48	35.19	42.20	42.36	45.09	43.73b					
Sakha 94		46.17	46.80	45.13	45.17	42.33	41.03	44.54	44.33	44.44b	46.43	47.58	44.76	45.61	43.31	41.47	44.83	44.89	44.86b	46.30	47.19	44.95	45.39	42.82	41.25	44.69	44.61	44.65b					
Gemmeiza10		43.77	44.97	43.10	44.87	40.83	40.67	42.57	43.50	43.03c	45.71	46.02	45.37	45.61	42.65	42.59	44.58	44.74	44.66b	44.74	45.49	44.23	45.24	41.74	41.63	43.57	44.12	43.84b					
Sids 12		50.37	50.93	46.73	46.77	44.50	45.50	47.20	47.73	47.47a	55.04	54.37	48.63	49.54	44.50	45.22	49.39	49.71	49.55a	52.71	52.65	47.68	48.15	44.50	45.36	48.30	48.72	48.51a					
Beni-Sweif 4	Durum wheat	51.83	51.73	47.43	47.67	44.47	45.33	47.91	48.24	48.08a	52.10	52.94	48.60	51.03	44.90	45.54	48.53	49.84	49.18a	51.97	52.34	48.02	49.35	44.68	45.44	48.22	49.04	48.63a					
Beni-Sweif 5		49.53	50.60	47.53	48.67	43.57	45.50	46.88	48.26	47.57a	51.21	52.40	49.28	50.69	45.20	46.02	48.56	49.70	49.13a	50.37	51.50	48.41	49.68	44.38	45.76	47.72	48.98	48.35a					
Mean		48.03	48.72	45.65	46.28	42.74	43.30	45.47b	46.10a	-	49.71	50.20	47.03	48.15	41.70	43.91	46.15b	47.42a	-	48.87	49.46	46.34	47.21	42.22	43.61	45.81b	46.76a	-					
General mean		48.38a		45.97b		43.02c		-			49.96a		47.59b		42.81c		-			49.17a		46.78b		42.91c		-							
Interaction		N.S.										N.S.										N.S.											

Means followed by the same letter (s) in each column within each treatment are not significant.

Table 4. Effect of seeding and nitrogen fertilizer rates on grain and straw yields of some wheat cultivars during the two successive seasons (2009/10 and 2010/11).

Cultivar		Grain yield (ardab / fed.)*																													
		2009/10														2010/11										Mean					
		Seeding rate														Seeding rate										Seeding rate					
		300grains/m ²		350grains/m ²		400grains/m ²		Mean		General		300grains/m ²		350grains/m ²		400grains/m ²		Mean		General		300grains/m ²		350grains/m ²		400grains/m ²		Mean		General	
75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	mean	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	mean	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	mean	
Sakha 93	Bread wheat	14.87	15.47	14.70	15.00	14.43	14.67	14.67	15.04	14.86c	15.87	16.80	15.76	16.77	15.40	16.34	15.68	16.64	16.16b	15.37	16.13	15.23	15.88	14.91	15.51	15.17	15.84	15.51c			
		Sakha 94	14.83	15.53	14.60	15.43	14.63	15.27	14.69	15.41	15.05c	15.75	17.30	15.55	17.07	15.53	16.50	15.61	16.96	16.28b	15.29	16.42	15.08	16.25	15.08	15.88	15.15	16.18	15.66bc		
		Gemmeiza10	15.01	15.67	14.83	15.33	14.77	15.17	14.90	15.39	15.14bc	16.13	16.58	15.80	16.47	15.37	16.20	15.77	16.42	16.09b	15.57	16.13	15.32	15.90	15.07	15.68	15.32	15.90	15.61bc		
		Sids 12	16.03	16.50	15.43	16.00	15.17	15.77	15.54	16.09	15.82a	16.70	17.10	16.67	17.00	16.43	16.40	16.60	16.83	16.71a	16.37	16.80	16.05	16.50	15.80	16.08	16.07	16.46	16.26a		
Beni-Sweif 4	Durum wheat	15.93	16.83	15.63	15.83	15.50	15.70	15.69	16.12	15.91a	16.57	17.73	16.50	16.73	15.80	15.90	16.29	16.79	16.54ab	16.25	17.28	16.06	16.28	15.65	15.80	15.99	16.45	16.22a			
Beni-Sweif 5		15.53	16.17	14.93	16.00	14.80	15.70	15.09	15.96	15.52ab	16.17	17.27	15.77	16.20	15.17	16.07	15.70	16.51	16.11b	15.85	16.72	15.35	16.11	14.98	15.88	15.39	16.24	15.81b			
Mean		15.37	16.03	15.02	15.60	14.88	15.38	15.10b	15.67a	-	16.20	17.13	16.01	16.71	15.62	16.23	15.94b	16.69a	-	15.79	16.58	15.51	16.15	15.25	15.81	15.52b	16.18a	-			
General mean		15.70a		15.31b		15.13c		-		16.67a		16.36b		15.92c		-		16.19a		15.83b		15.53c		-							
Interaction		N.S.														N.S.										N.S.					
Cultivar		Straw yield (ton/fed.)*																													
		Seeding rate																													
		300grains/m ²		350grains/m ²		400grains/m ²		Mean		General		300grains/m ²		350grains/m ²		400grains/m ²		Mean		General		300grains/m ²		350grains/m ²		400grains/m ²		Mean		General	
		75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	mean	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	mean	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	mean	
Sakha 93	Bread wheat	2.96	3.28	3.11	3.32	3.27	3.43	3.11	3.34	3.23a	3.14	3.35	3.24	3.35	3.39	3.35	3.26	3.35	3.30a	3.05	3.32	3.17	3.34	3.33	3.39	3.25	3.18	3.36c			
		Sakha 94	3.41	3.32	3.39	3.49	3.60	3.51	3.47	3.44	3.45a	3.23	3.33	3.30	3.41	3.54	3.41	3.36	3.38	3.37a	3.32	3.32	3.35	3.45	3.57	3.46	3.40	3.32	3.51ab		
		Gemmeiza10	3.04	3.10	3.25	3.31	3.33	3.56	3.21	3.32	3.26a	3.30	3.35	3.20	3.39	3.48	3.51	3.33	3.42	3.37a	3.17	3.23	3.22	3.35	3.40	3.53	3.29	3.20	3.47b		
		Sids 12	3.09	3.32	3.32	3.52	3.39	3.58	3.27	3.47	3.37a	3.30	3.45	3.26	3.45	3.38	3.50	3.32	3.47	3.39a	3.20	3.38	3.29	3.48	3.39	3.54	3.39	3.29	3.46bc		
Beni-Sweif 4	Durum wheat	3.34	3.39	3.47	3.51	3.64	3.69	3.48	3.53	3.51a	3.30	3.47	3.35	3.49	3.46	3.53	3.37	3.49	3.43a	3.32	3.43	3.41	3.50	3.55	3.61	3.45	3.37	3.58a			
Beni-Sweif 5		3.20	3.23	3.47	3.44	3.49	3.48	3.38	3.38	3.38a	3.29	3.46	3.42	3.53	3.51	3.52	3.41	3.50	3.45a	3.25	3.34	3.44	3.48	3.50	3.50	3.46	3.29	3.50ab			
Mean		3.17	3.27	3.34	3.43	3.45	3.54	3.32b	3.42a	-	3.26	3.40	3.29	3.44	3.46	3.47	3.34b	3.43a	-	3.22	3.33	3.38	3.36	3.50	3.46	3.33b	3.42a	-			
General mean		3.22c		3.38b		3.50a		-		3.33b		3.36b		3.46a		-		3.28c		3.37b		3.48a		-							
Interaction		N.S.														N.S.										N.S.					

Means followed by the same letter (s) in each column within each treatment are not significant.

* Ardab = 150kg. Ton = 1000 Kg. Fed. = 4200m²

INFLUENCE OF SOME SEEDING AND NITROGEN RATES ON GRAIN YIELD
AND INSECT NATURAL INFESTATION OF SOME WHEAT CULTIVARS

Table 5. Effect of seeding and nitrogen fertilizer rates on grain crude of protein and total carbohydrate percentages of some wheat cultivars during the two successive seasons (2009/10 and 2010/11).

Cultivar		Protein %																											
		2009/10										2010/11										Mean							
		Seeding rate										Seeding rate										Seeding rate							
		300grains/m ²		350grains/m ²		400grains/m ²		Mean		General		300grains/m ²		350grains/m ²		400grains/m ²		Mean		General		300grains/m ²		350grains/m ²		400grains/m ²		Mean	
75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	mean	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	mean	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	mean	
Sakha 93	Bread wheat	10.47	10.67	10.27	10.50	10.13	10.30	10.29	10.49	10.39d	10.52	10.67	10.46	10.53	10.36	10.43	10.44	10.55	10.49d	10.49	10.67	10.36	10.52	10.25	10.37	10.37	10.52	10.44e	
Sakha 94		11.80	11.67	11.27	11.47	10.67	10.63	11.24	11.26	11.25c	12.12	12.19	11.99	11.88	11.32	11.32	11.81	11.80	11.80b	11.96	11.93	11.63	11.68	10.99	10.98	11.53	11.53	11.53c	
Gemmeiza10		12.17	12.20	11.83	11.90	10.87	10.83	11.62	11.64	11.63b	12.08	12.43	10.50	12.10	11.65	11.68	11.41	12.07	11.74b	12.12	12.31	11.17	12.00	11.26	11.26	11.52	11.86	11.69c	
Sids 12		11.00	11.07	10.53	10.57	10.03	10.17	10.52	10.60	10.56d	10.87	11.17	12.02	10.73	10.27	10.31	11.05	10.74	10.89c	10.93	11.12	11.27	10.65	10.15	10.24	10.79	10.67	10.73d	
Beni-Sweif 4	Durum wheat	12.20	12.17	11.83	11.93	11.40	11.60	11.81	11.90	11.86ab	12.40	12.53	12.02	12.13	11.67	11.57	12.03	12.08	12.05ab	12.30	12.35	11.92	12.03	11.53	11.58	11.92	11.99	11.95b	
Beni-Sweif 5		12.40	12.80	12.03	11.87	11.67	11.87	12.03	12.18	12.11a	12.79	12.80	12.10	12.43	11.84	11.67	12.24	12.30	12.27a	12.59	12.80	12.07	12.15	11.75	11.77	12.14	12.24	12.19a	
Mean		11.67	11.76	11.29	11.37	10.79	10.90	11.25b	11.34a	-	11.79	11.96	11.51	11.64	11.18	11.16	11.50a	11.59a	-	11.73	11.86	11.40	11.50	10.99	11.03	11.38b	11.47a	-	
General mean		11.72a		11.33b		10.85c		-			11.88a		11.57b		11.17c		-			11.80a		11.45b		11.01c		-			
Interaction		N.S.										N.S.										N.S.							
Cultivar		Total carbohydrate %																											
		2009/10										2010/11										Mean							
		Seeding rate										Seeding rate										Seeding rate							
		300grains/m ²		350grains/m ²		400grains/m ²		Mean		General		300grains/m ²		350grains/m ²		400grains/m ²		Mean		General		300grains/m ²		350grains/m ²		400grains/m ²		Mean	
75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	mean	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	mean	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	mean	
Sakha 93	Bread wheat	71.27	71.67	69.50	70.77	69.30	70.73	70.02	71.06	70.54c	71.17	72.67	70.27	71.37	68.97	69.17	70.13	71.07	70.60b	71.22	72.17	69.88	71.07	69.13	69.95	70.08	71.06	70.57c	
Sakha 94		71.10	72.40	70.17	71.37	69.83	70.43	70.37	71.40	70.88c	71.13	73.40	70.27	70.67	69.13	69.80	70.18	71.29	70.73b	71.12	72.90	70.22	71.02	69.48	70.12	70.27	71.34	70.81c	
Gemmeiza10		69.50	70.20	68.83	69.93	67.40	69.17	68.58	69.77	69.17d	69.60	70.63	69.20	69.50	68.17	68.67	68.99	69.60	69.29c	69.55	70.42	69.02	69.72	67.78	68.92	68.78	69.68	69.23e	
Sids 12		70.77	72.00	69.33	70.57	68.73	69.53	69.61	70.70	70.16c	70.63	71.30	70.10	70.37	68.87	69.43	69.87	70.37	70.12b	70.70	71.65	69.72	70.47	68.80	69.48	69.74	70.53	70.14d	
Beni-Sweif 4	Durum wheat	76.40	76.53	74.57	75.87	74.67	74.43	75.21	75.61	75.41b	76.43	77.63	76.53	76.80	75.00	75.37	75.99	76.60	76.29a	76.42	77.08	75.55	76.33	74.83	74.90	75.60	76.11	75.85b	
Beni-Sweif 5		78.10	77.43	76.40	76.53	75.97	75.67	76.82	76.54	76.68a	76.70	78.17	76.17	77.43	76.17	75.80	76.34	77.13	76.74a	77.40	77.80	76.28	76.98	76.07	75.73	76.58	76.84	76.71a	
Mean		72.86	73.37	71.47	72.51	70.98	71.66	71.77b	72.51a	-	72.61	73.97	72.09	72.69	71.05	71.37	71.92b	72.68a	-	73.11	73.29	71.99	72.39	71.32	71.21	71.84b	72.59a	-	
General mean		73.11a		71.99b		71.32b		-			73.29a		72.39b		71.21c		-			73.20a		72.19b		71.27c		-			
Interaction		N.S.										N.S.										N.S.							

Means followed by the same letter (s) in each column within each treatment are not significant.

2. Effects on insect infestation

2.1. Cereal aphids

The results illustrated in Table (6) showed percentages of four aphid species recorded on wheat field during 2009/10 and 2010/11 seasons. The bird cherry-oat aphid *Rhopalosiphum padi* was found with high density level (39.4%) followed by greenbug *Schizaphis graminum* (36.2%). The least species were english grain aphid *Sitobion avenae* (16.1%) and corn leaf aphid *Rhopalosiphum maidis* (8.3%) .

Table 6. Average percentages of four aphid species recorded on wheat field during 2009/10 and 2010/11 seasons.

Season	Aphid species			
	<i>R. padi</i>	<i>S. graminum</i>	<i>S. avenae</i>	<i>R. maidis</i>
2009/10	34.0	37.7	18.2	10.1
2010/11	44.7	34.8	13.9	6.6
Mean	39.4	36.2	16.1	8.3

The results illustrated in Table (7) show the counts of cereal aphids recorded on the six wheat cultivars. These counts pointed out that, Beni-Sweif 5 was more favorable for the aphid infestation. It received higher counts (193.8 individuals/10 plants) followed by Sakha 94 and Gemmeiza 10 cultivars with an average of 138.6 and 127.9 individuals/10 plants, respectively. However, Beni-Sweif 4 and Sids 12 cultivars harbored lower counts (62.1 and 83.3 individuals/10 plants, respectively). The varietal effect as reported earlier by Abdel-Aziz *et. al.* (2002) Giza 163 and Sakha 69 were tolerant to all cereal aphids. El-Rawy *et. al.* (2007) revealed that, Gemmeiza 9 cultivar proved to be more tolerant against cereal aphids comparing to Gemmeiza 7cultivar.

INFLUENCE OF SOME SEEDING AND NITROGEN RATES ON GRAIN YIELD
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Table 7. Effect of seeding and nitrogen fertilizer rates on number of cereal aphids/10 plants of some wheat cultivars during the two successive seasons (2009/10 and 2010/11).

Cultivar		2009/10									2010/11									Mean								
		Seeding rate									Seeding rate									Seeding rate								
		300grains/m ²		350grains/m ²		400grains/m ²		Mean		General	300grains/m ²		350grains/m ²		400grains/m ²		Mean		General	300grains/m ²		350grains/m ²		400grains/m ²		Mean		General
		75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	mean	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	mean	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	75KgN	90KgN	mean
Sakha 93	Bread wheat	60.0	80.0	99.3	114.0	137.7	156.5	99.0	116.8	107.9bc	67.5	86.0	115.0	131.7	152.5	194.3	111.7	137.3	124.5bc	63.8	83.0	107.1	122.8	145.1	175.4	105.3	127.1	116.2bc
Sakha 94		80.3	110.5	115.0	132.5	149.0	183.5	114.8	142.2	128.5b	97.0	118.3	136.0	160.7	169.0	211.3	134.0	163.4	148.7b	88.6	114.4	125.5	146.6	159.0	197.4	124.4	152.8	138.6b
Gemmeiza10		75.3	103.0	102.3	122.5	141.7	157.5	106.4	127.7	117.1b	90.0	110.0	130.0	153.7	148.0	200.3	122.7	154.7	138.7b	82.6	106.5	116.1	138.1	144.8	178.9	114.5	141.2	127.9bc
Sids 12		35.3	52.5	58.0	87.0	94.0	120.0	62.4	86.5	74.5cd	45.5	71.0	86.5	102.3	115.5	132.0	82.5	101.8	92.2bc	40.4	61.7	72.2	94.6	104.7	126.0	72.4	94.1	83.3cd
Beni-Sweif 4	Durum wheat	29.7	46.0	39.0	65.5	53.7	85.5	40.8	65.7	53.3d	42.0	62.3	59.0	79.7	72.0	110.7	57.7	84.2	71.0c	35.8	54.1	49.0	72.6	62.8	98.1	49.2	74.9	62.1d
Beni-Sweif 5		100.3	130.5	149.7	171.5	216.7	250.0	155.6	184.0	169.8a	127.0	150.7	208.5	243.3	266.5	311.3	200.7	235.1	217.9a	113.6	140.6	179.1	207.4	241.6	280.6	178.1	209.5	193.8a
Mean		63.5	87.1	93.9	115.5	132.1	158.8	96.5b	120.5a	-	78.2	99.6	125.5	145.2	153.9	193.3	118.2b	146.0a	-	70.8	93.4	108.2	130.3	143.0	176.1	107.3b	133.3a	-
General mean		75.3c		104.7b		145.5a		-			88.9c		133.8b		173.6a		-			82.1c		119.2b		159.5a		-		
Interaction		*									*									*								

Means followed by the same letter (s) in each column within each treatment are not significant.

The infestation of wheat plants by cereal aphids was significantly increased with the coincide increase of wheat seed rates. When the wheat crop was sown with a rate of 300 grains/m², the mean number of aphids was 82.1 individuals/10 plants, while the mean number of aphids was reached to its maximum showing mean number of 159.5 individuals/10 plants when the seeding rate was increased to 400 grains/m². These results are in agreement with those obtained by Ali and Ahmed (1996) and Slman (2002) who found that the population density of cereal aphids was increased with the increase of seed rate of wheat.

The highest rate of nitrogen (90 Kg/fed.) significantly increased the population of cereal aphids (133.3 individuals/10 plants) compared with 75 KgN/fed (107.3 individuals/10 plants). These results were confirmed with those obtained by Ali and Ahmed (1996), Slman (2002) and El-Rawy *et. al.* (2007).

2.2. Leafminer

As for *Agromyza nigrella* counts, the data found in Table (8) showed an opposite varietal trend against the infestation. Sakha 93 cultivar was more susceptible. It harbored 9.4 alive larvae/100 leaves which caused 12.8 mines followed by Gemmeiza 10 cultivar harbored 6.2 alive larvae/100 leaves and caused 8.5 mines. However, Beni-Sweif 4 and 5 durum cultivars harbored the least numbers of alive larvae/100 leaves (1.5 and 2.2) which caused 2.4 and 3.4 mines. The varietal effect is in harmony with El-Serwy (1996) who found that Giza 163 and Giza 165 were leas susceptible cultivars to leafminer. El-Rawy *et. al.* (2007) showed that Gemmeiza 7 cultivar was more susceptible to leafminer comparing with Gemmeiza 9.

The infestation of wheat plants by *A. nigrella* was significantly increased with the coincide increase of wheat seed rates. When wheat crop was sown with a rate of 300 grains/m², the mean number of alive larvae/100 leaves was 2.5

INFLUENCE OF SOME SEEDING AND NITROGEN RATES ON GRAIN YIELD
AND INSECT NATURAL INFESTATION OF SOME WHEAT CULTIVARS

Table 8. Effect of seeding and nitrogen fertilizer rates on number of *A. nigrella* mines and alive larvae/100 leaves of some wheat cultivars during the two successive seasons (2009/10 and 2010/11) .

cultivar		No. of mines / 100 leaves																																																					
		2009/10										2010/11										Mean																																	
		Seeding rate										Seeding rate										Seeding rate																																	
		300grains/m ²		350grains/m ²		400grains/m ²		Mean		General	300grains/m ²		350grains/m ²		400grains/m ²		Mean		General	300grains/m ²		350grains/m ²		400grains/m ²		Mean		General																											
75KgN		90KgN		75KgN		90KgN		75KgN		90KgN		75KgN		90KgN		75KgN		90KgN		75KgN		90KgN		75KgN		90KgN		75KgN		90KgN		mean																							
Sakha 93	Bread wheat	8.0	12.0	14.0	19.0	18.0	23.0	13.3	18.0	15.7a	4.3	5.5	7.7	13.5	10.7	17.2	7.6	12.1	9.9a	6.1	8.7	10.8	16.2	14.3	20.1	10.4	15.1	12.8a																											
Sakha 94		3.0	5.7	5.5	8.0	7.3	11.3	5.3	8.3	6.8c	2.7	3.3	4.3	7.0	5.5	10.3	4.2	6.9	5.6c	2.8	4.5	4.9	7.5	6.4	10.8	4.7	7.6	6.2c																											
Gemmeiza10		4.0	7.0	8.5	10.7	11.5	14.0	8.0	10.6	9.3b	3.3	4.5	5.3	9.0	9.0	14.7	5.9	9.4	7.7b	3.6	5.7	6.9	9.8	10.2	14.3	6.9	10.0	8.5b																											
Sids 12		2.5	5.1	5.0	7.3	7.0	10.7	4.8	7.7	6.3c	2.0	3.0	3.3	5.7	5.7	9.5	3.7	6.1	4.9c	2.2	4.0	4.1	6.5	6.3	10.1	4.2	6.9	5.6c																											
Beni-Sweif 4	Durum wheat	0.5	2.0	2.0	4.7	3.0	6.0	1.8	4.2	3.0d	0.3	1.5	1.3	2.7	2.0	3.7	1.2	2.6	1.9d	0.4	1.7	1.6	3.7	2.5	4.8	1.5	3.4	2.4d																											
Beni-Sweif 5		1.3	2.5	3.0	5.5	5.0	7.5	3.1	5.2	4.2d	1.0	2.3	2.0	3.5	3.0	4.3	2.0	3.4	2.7d	1.1	2.4	2.5	4.5	4.0	5.9	2.5	4.3	3.4d																											
Mean		3.2	5.7	6.3	9.2	8.6	12.1	6.0b	9.0a	-	2.3	3.4	4.0	6.9	6.0	10.0	4.1b	6.8a	-	2.7	4.6	5.1	8.0	7.3	11.0	5.0b	7.9a	-																											
General mean		4.5c		7.8b		10.4a		-			2.9c		5.5b		8.0a		-			3.7c		6.6b		9.2a		-																													
Interaction		*										*										*																																	
		No. of alive larvae / 100 leaves																																																					
		5.5		9.0		10.3		14.5		14.3		19.0		10.0		14.2		12.1a		2.7		4.0		5.3		8.6		7.7		12.5		5.2		8.4		6.8a		4.1		6.5		7.8		11.5		11.0		15.7		7.6		11.3		9.4a	
		2.0		3.7		4.0		6.0		4.5		9.5		3.5		6.4		5.0c		1.7		2.5		3.3		4.7		4.7		6.5		3.2		4.6		3.9c		1.8		3.1		3.6		5.3		4.6		8.0		3.3		5.5		4.4c	
		2.7		5.0		6.5		8.0		8.0		11.7		5.7		8.2		7.0b		2.3		3.7		4.0		6.3		6.3		10.0		4.2		6.7		5.5b		2.5		4.3		5.2		7.1		7.1		10.8		4.9		7.4		6.2b	
Sakha 93	Bread wheat	5.5	9.0	10.3	14.5	14.3	19.0	10.0	14.2	12.1a	2.7	4.0	5.3	8.6	7.7	12.5	5.2	8.4	6.8a	4.1	6.5	7.8	11.5	11.0	15.7	7.6	11.3	9.4a																											
Sakha 94		2.0	3.7	4.0	6.0	4.5	9.5	3.5	6.4	5.0c	1.7	2.5	3.3	4.7	4.7	6.5	3.2	4.6	3.9c	1.8	3.1	3.6	5.3	4.6	8.0	3.3	5.5	4.4c																											
Gemmeiza10		2.7	5.0	6.5	8.0	8.0	11.7	5.7	8.2	7.0b	2.3	3.7	4.0	6.3	6.3	10.0	4.2	6.7	5.5b	2.5	4.3	5.2	7.1	7.1	10.8	4.9	7.4	6.2b																											
Sids 12		1.3	3.3	3.0	5.0	5.0	8.3	3.1	5.5	4.3c	1.3	2.0	2.3	3.5	3.7	5.5	2.4	3.7	3.1c	1.3	2.6	2.6	4.2	4.3	6.9	2.7	4.6	3.7c																											
Beni-Sweif 4	Durum wheat	0.3	0.8	1.5	2.7	1.5	3.7	1.1	2.4	1.8d	0.0	0.7	0.7	2.0	1.3	2.3	0.7	1.7	1.2d	0.2	0.7	1.1	2.3	1.4	3.0	0.9	2.0	1.5d																											
Beni-Sweif 5		0.7	1.5	2.3	3.5	3.0	5.3	2.0	3.4	2.7d	0.7	1.3	1.3	2.7	2.0	3.0	1.3	2.3	1.8d	0.7	1.4	1.8	3.1	2.5	4.1	1.6	2.8	2.2d																											
Mean		2.1	3.9	4.6	6.6	6.1	9.6	4.2b	6.7a	-	1.5	2.4	2.8	4.6	4.3	6.6	2.8b	4.6a	-	1.8	3.1	3.7	5.6	5.2	8.1	3.5b	5.6a	-																											
General mean		3.0c		5.6b		7.9a		-			2.0c		3.7b		5.5a		-			2.5c		4.6b		6.7a		-																													
Interaction		*										*										*																																	

Means followed by the same letter (s) in each column within each treatment are not significant.

which caused 3.7 mines, while the mean number of alive larvae/100 leaves was 6.7 which caused 9.2 mines when increasing the seed rate to 400 grains/m². These results are in agreement with those obtained by Slman *et. al.* (2002).

The mean numbers of mines and alive larvae were significantly lower on plants receiving 75 KgN/fed than those receiving 90 KgN/fed showing values of 5.0 mines and 3.5 larvae/100 leaves and 7.9 mines and 5.6 larvae/100 leaves, respectively. These results confirmed by those obtained by Slman *et. al.* (2002) and El-Rawy *et. al.* (2007).

Data illustrated in Tables (1 to 5) pointed out that, the interaction between the tested cultivars, seeding rates and N rates did not show any significant effect on all studied wheat traits. These results are in agreement with those obtained by El-Gharieb *et. al.* (1998), El-Karamity (1998), Munir *et. al.* (2001) and El-Rawy *et. al.* (2007). On the contrary, the interaction revealed significant effects on the aphid and leafminer infestation as shown in Tables (7and 8).

From these results, it could be concluded that sowing Sids 12 cultivar or Beni-Sweif 4 cultivar under seeding rate of 300 grains/m² and applying 90 KgN/fed gave the highest grain yield/fed and least infestation by cereal aphids and leafminer, in both beard wheat commercial cultivars as well as durum wheat commercial cultivars.

REFERENCES

1. Abdel-Aziz, M.A., A.A. Abdel-Alim, N.A. Abdel-Aziz and G. A. Morsi 2002. Susceptibility of different wheat varieties to infestation to cereal aphids with reference to safe control approach. 2nd Inter. Conf., Pl. Port. Res. Inst., Cairo, Egypt, 21-24 Dec. 2:685-690.
2. Abdel-Nour, N.A.R. and H.S.A. Fateh 2011. Influence of sowing date and nitrogen fertilization on yield and its components in some bread wheat genotypes. Egypt. J. Agric. Res. 89 (4): 1413-1433.
3. Ali, A.G. and A.A.S. Ahmed 1996. Effect of plant density and nitrogen fertilization on the infestation of wheat plants with cereal aphid. Assiut J. Agric. Sci. 27(2): 119-124.
4. A.O.A.C. 2000. Official Methods of Analysis of the Association of Official Analytical Chemists, 17th Ed, Published by A.O.A.C. Arlington, Virginia, USA.
5. El-Ghareib, E.A., A.M.Azab, M.M. El-Monoufi and G.A. El-Shaarawy 1998. Effect of nitrogen fertilizer and seeding rate on yield and yield components of some new wheat cultivars. Al-Azhar J. Agric. Res. 27: 31-46.
6. El-Karamity, A.E. 1998. Response of some wheat cultivars to seeding and N fertilization rates. Mansoura J. Agric. Sci. 23(2): 643-655.
7. El-Naggar, G.R. 2003. Yield and quality of some spring wheat genotypes subjected to different nitrogen fertilizer rates. Assiut J. Agric. Sci. 34 (2): 43-63.
8. El-Rawy, A.M., M.A. Khaled and S.M. Osman 2007. Impact of NPK fertilizers, wheat varieties and their interactions on the infestation with cereal aphids and leafminer, yield and its components. J.Agric. Sci. Mansoura Univ. 32 (4): 3113-3122.
9. El-Serwy, S.A. 1996. Evaluation of certain wheat varieties for susceptibility to infestation with the leafminer *Agromyza nigripes* (Meigen) (Diptera : Agromyzidae) and grain yield at El-Gemmeiza and Sids regions. Bull. Ent. Soc. Egypt 74: 139-148.

10. Hefni, E.S.H.M., A.A. El-Kholany and N.A. Abdel-Hamid 1979. Effect of seed rates and nitrogen fertilizer levels on the yield, yield components, chemical content and technological properties of Egyptian wheat. II: Chemical content and technological properties. First Conf. Agric. Res. Center, 22-29 May vol. I: 54-60.
11. Mousa, A. 2006. Effect of different seeding rate on grain yield of two released cultivars. Annual Workshop for Winter Field Crops, 8-9 Nov. : 9.
12. Munir, A.A.E., I.E.M.A. El-Beially, H.Y.M. Yousif and M.S. El-Karmany 2001. Effect of irrigation intervals and seeding and nitrogen fertilizer rates on yield and yield components of wheat. Al-Azhar J. Agric. Res. 34 (Dec.): 69-83.
13. Sharaan, A.N. and F.S. Abdel-Samie 1999. Effect of seeding rates and N fertilization levels on growth and yield of two wheat varieties (*Triticum aestivum* L.). Annals Agric. Sci. Ain Shams Univ., Cairo 44 (2): 589-601.
14. Slman, F.A.A. 2002. Influence of some agricultural practices on the infestation of wheat crop by cereal aphids in Upper Egypt. Assiut J. Agric. Sci. 33 (3): 1-12.
15. Slman, F.A.A., H.A. Mohamed, H.E.M. Salem and K.H. El-Laithy 2002. Effect of some agricultural practices on wheat infestation by leafminer *Agromyza nigripes* (Meigen) (Diptera: Agromyzidae) in Sohag Governorate Upper Egypt. Egypt. J. Appl. Sci. 17 (10): 428-439.
16. Steel, R.G., J.H. Torrie and D. A.Dickey 1997. Principles and Procedures of Statistics : A Biometrical Approach. 3rd ed. McGraw-Hill Book Co., New York, USA, 666pp.
17. Swelam, A.A. 2008. Mean performance, correlation and path coefficient analysis for grain yield and its components of four bread wheat cultivars grown under four nitrogen levels. Egypt. J. Agric. Res. 86 (2): 561-573.

تأثير بعض معدلات التقاوى والتسميد النيتروجيني على محصول الحبوب والإصابة الطبيعية بالحشرات لبعض أصناف القمح

محمد عبد الكريم خالد¹ ، عادل محمد الراوي²

1- قسم بحوث القمح - معهد بحوث المحاصيل الحقلية - مركز البحوث الزراعية - جيزة - مصر.

2- معهد بحوث وقاية النباتات - مركز البحوث الزراعية - الدقي - جيزة - مصر.

أجريت الدراسة بمزرعة محطة البحوث الزراعية ببهيم (قليوبية) خلال موسمي 2009/10، 2010/11 بهدف دراسة تأثير ثلاث معدلات تقاوي هي 300، 350، 400 حبه/م² ومعدلين من السماد الأزوتي وهي 75، 90 كجم نيتروجين/فدان على محصول الحبوب ومكوناته بالإضافة الى نسبة البروتين والكربوهيدرات الكلية في الحبوب وكذلك على الإصابة بحشرات المن وصانعة أنفاق الأوراق لأربعة أصناف من قمح الخبز (سحا 93، سحا 94، جميزة 10، سدس 12) وصنفين من قمح المكرونة (بني سويف 4، بني سويف 5).

أظهرت النتائج أن الصنف بني سويف 4 إحتاج لفترات أطول نسبياً سواء لبلوغ طور طرد السنابل (89.5 يوم) أو طور النضج (140.5 يوم). وأن نباتات الصنف بني سويف 5 كانت الأطول (101.2 سم) يليه الصنف بني سويف 4 (99.9 سم) ثم الصنف سدس 12 (97.5 سم). من ناحية أخرى أشارت النتائج أن الصنفان بني سويف 5، سدس 12 أعطى سنابل أكثر عدداً (518.5، 516.1 سنبله / م² بالترتيب) بينما كانا أعلى من حيث عدد الحبوب/سنبله في الصنفين بني سويف 5، 4 (67.4، 66.0 حبة/سنبله بالترتيب) وكذلك كان أعلى وزناً لل 1000 حبه في الصنفين بني سويف 4، سدس 12 (48.6، 48.5 جم بالترتيب) لذلك كان الصنفين بني سويف 4، سدس 12 الأعلى محصولاً من الحبوب (16.2، 16.3 أردب/فدان بالترتيب). بينما أعطى الصنف بني سويف 4 أعلى محصول من القش (3.6 طن/فدان). بينما كان الصنفين بني سويف 5، 4 الأعلى بالنسبة للمحتوى الكلي للبروتين والكربوهيدرات الكلية للحبوب (12.2، 11.9% و 76.7، 75.8% بالترتيب). وأظهرت الدراسة أن زيادة معدل التقاوي أحدث زيادة معنوية في البلوغ لطور طرد السنابل (90 يوم) أو لطور النضج (138 يوم) وعدد السنابل / م² (522.1 سنبله / م²) ومحصول القش الناتج (3.5 طن) وتقل من ارتفاع النباتات (89.6 سم) وعدد الحبوب /سنبله (56.6 حبة /سنبله) ووزن ال 1000 حبة (42.9 جم) ومحصول الحبوب الناتج (15.5 أردب/فدان) وكذلك تقل من نسبة البروتين والكربوهيدرات الكلية في الحبوب (11، 71.3% بالترتيب). وأن أفضل معدل للتقاوى هو 300 حبة/م² حيث كان

يُزيد من ارتفاع النباتات (101.4 سم) وعدد الحبوب /سنبلة (64.8 حبة/سنبلة) ووزن الـ1000 حبة (49.2 جم) ومحصول الحبوب الناتج (16.2 أردب/فدان) وكذلك تزايد من نسبة البروتين والكربوهيدرات الكلية في الحبوب (11.8 ، 73.2 % بالترتيب). كذلك أظهرت الدراسة أن زيادة السماد الأزوتي من 75 الى 90 كجم/فدان سببت زيادة معنوية في ارتفاع النباتات (97.3 سم) وعدد السنابل/م² (514.7 سنبلة/م²) وعدد الحبوب/سنبلة (61.5 حبة /سنبلة) ووزن الـ1000حبة (46.8جم) ومحصول الحبوب (16.2 أردب/فدان) ومحصول القش (3.4 طن/فدان) وكذلك على زيادة في نسبة البروتين والكربوهيدرات الكلية في الحبوب (11.5 ، 72.6 % بالترتيب).

أما بالنسبة للإصابة بالحشرات فقد أظهرت النتائج أن صنفى سوفى 4 وسدس 12 كانا أقل الأصناف تعداداً بحشرات المن (62.1 ، 83.3 حشرة من/10نباتات بالترتيب). من ناحية أخرى أشارت النتائج الى أن صنفى بنى سوفى 4، 5 كانا أقلها إصابة بصناعة أنفاق الأوراق (2.4 ، 3.4 نفق و 1.5 ، 2.2 يرقة/100 ورقة بالترتيب). وأظهرت الدراسة أن زيادة معدل التقاوى أحدث زيادة معنوية في تعداد حشرات المن (159.5 حشرة من/10نباتات) وصناعة أنفاق الأوراق (9.2 نفق ، 6.7 يرقة/100ورقة) وأن أفضل معدل للتقاوى هو 300حبة / م² حيث كان أقل تعدادا بحشرات المن (82.1 حشرة من/10نباتات) وصناعة أنفاق الأوراق (3.7 نفق ، 2.5 يرقة/100ورقة). كذلك أظهرت النتائج أن زيادة السماد الأزوتي من 75 الى 90كجم/فدان سببت زيادة معنوية فى تعداد حشرات المن (133.3حشرة من/10نباتات) وصناعة أنفاق الأوراق (7.9 نفق ، 5.6 يرقة/100ورقة).

وعموماً تشير النتائج إلى أن زراعة الصنف سدس 12 (خبز) أو بنى سوفى 4 (مكرونه) بمعدل تقاوى 300 حبه/م² مع 90كجم أزوت/فدان تعطي أفضل محصول مع أقل مستوى للإصابة سواء بالمن أو بصناعة أنفاق الأوراق.