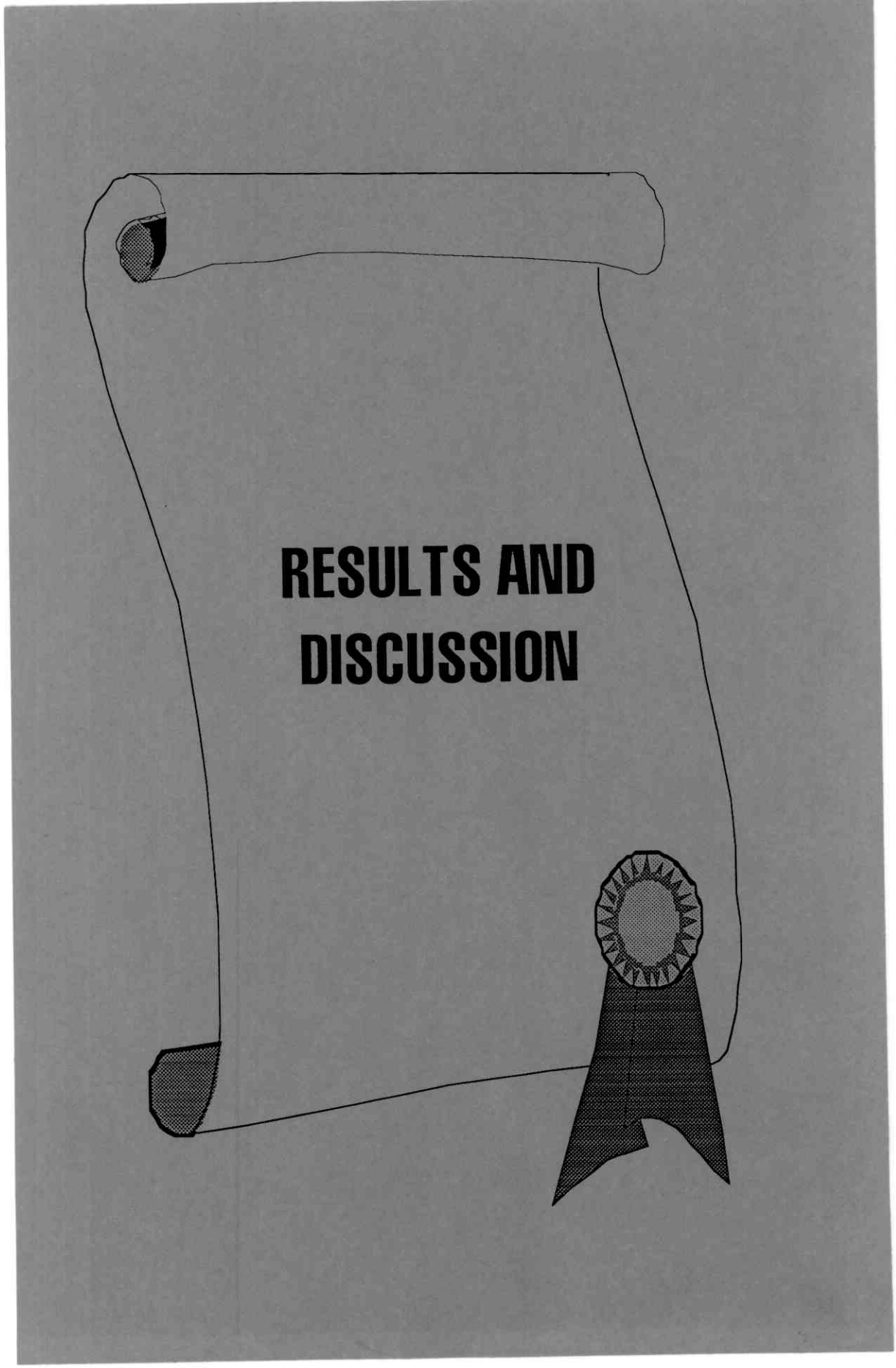
RESULTS AND
DISCUSSION

RESULTS AND DISCUSSION

In the present investigation, two field experiments were conducted to study the effects of four weed control treatments, four nitrogen levels and two wheat cultivars on weed growth , wheat growth , yield and yield components of wheat .

I.1.Effect of Weed Control Treatments on Weed Growth:

During both growing seasons, the dominant weed species found in the control treatment plots of wheat were, bishops weed (*Ammi majus, L.)* wild mustared *(Brassics nigra (L) koch)* wild beet (*Beta vulgaris,* L.), sour weed *(Rumex dentatus,* L.), bur clover weed (*Midicago hispida, Gaerten.,*) pepper weed (*Coronopus squamatus*), scarlet pimpernel *(Anagallis arvensis,* L.) and spurge *(Euphorobia pruifolia, Jacq.*).

I.1.2. Effect of Weed Control Treatments on Fresh and Dry Weight of Weeds :

Data in Table (3) show the effect of weed control treatments -ie, Grasp 10% at the rate of 1 L/ fed., Granstar at the rate of 8 g/ fed , the mixture of Grasp and Granstar (0.5L. + 4 g/ fed.) and control treatment on fresh and dry weight of weeds after 60, 90 and 120 days from sowing date.

a- After 60 days from sowing :

The results indicate clearly that the fresh weight of weeds/m^2 was significantly affected by weed control treatments in both seasons (Table 3). Granstar and the mixture of Granstar

and Grasp significantly reduced the fresh weight of weeds (g/m^2) in both growing seasons as compared with the unweeded treatment .

The reduction percentage of weeds fresh weight resulted by using Granstar and the mixture of Granstar and Grasp amounted to 74% and 54% in the first season and about 86% and 77% in the second season as compared with control treatment, respectively. On the other hand, Grasp 10% at rate of 1L/fed had no significant effect on fresh weight of weeds in both growing seasons.

Concerning weeds dry weight, Granstar and the mixture of Granstar and Grasp significantly reduced the dry weight of weeds in both grwoing seasons,Grasp also significantly reduced weeds dry weight of weeds in the second season but had no significant effect in the first season as compared with unweeded check. These results agreed with the results abtained by **Mirkamwali (1987), Varshney and Singh (1990) Yaduroju *et al.* (1992). El-Maghraby *et al.* (1993), Hassanein *et al.* (1994), Dhawan (1995), Ali and Shams El - Din (1997) , El Metwaly (1998) and Nassar (1998) .**

b - After 90 days from sowing :

Granstar, the mixture of Granstar and Grasp singficantly reduced the fresh weight of weeds in both growing seasons after 90 day from sowing as compared with the unweeded

treatment (Table 3). Grasp also singficantly reduced weeds fresh weight in the first season, but had no significant effect in the second season as compared with the unweeded check.

Regarding dry weight of weeds after 90 days from sowing, results in table (3) reveal clearly that all chemical weed control treatments significantly reduced the dry weight of weeds in both growing seasons as compared with the control treatment. The reduction percentage of weeds dry weight after 90 days from sowing compared to the unweeded check by using Grasp, Granstar and the mixture of both herbcides were 35% , 94% and 95% in the first season and by 29% , 95% and 90% in the second season, respectively .

Generally, these results agreed with those obtained by **Mirkamali (1987), El - Deepah(1989) , Varshne and Singh. (1990), Yaduraju *et al.* (1992), El- Maghraby *et al.* (1993), Balyan *et al.* (1994) , Dhawan (1995), Hassanein and Kholosy (1996), Al - Marsafy *et al.* (1997a and b) Nassar (1998) and Shebl (1998).**

C. After 120 days from sowing :

Data in Table (3) reveal that Granstar and the mixture of Granstar and Grasp significantly reduced the fresh weight of weeds in the first season and Granstar, mixture of Granstar + Grasp and Grasp alone significantly reduced fresh weight of weeds in the second season as compared with the control treatment .

Concerning weeds dry weight after 120 days , from sowing, all chemical weed control treatments significantly reduced dry weight of weeds in both growing seasons as compared with the check. The depression in the dry weight of weeds was estimated by 18%, 91% and 83% in the first season and by 32% , 92% and 84% in the second season by using Grasp, Granstar and the mixture of both compared with the check,, respectively .

Generally, it could be observed from table (3) that Grasp alone had the least effect in controlling broad - leaved weeds at all sampling periods and in both growing seasons. Granstar is specified in controlling broad-leaved weeds and it was highly effective in reducing fresh and dry weight of weeds at all growth stages in both growing seasons. The mixture of Grasp and Granstar came inbetween the two mixture components, however about similar in effect to Grasp .

Reductions of weed growth associated with wheat were obtained by several investigatores; **Prasad (1985), Mirkamali (1987), El-Deepah (1989), Yadurju *et al.* (1989), Varshney and Singh (1990), Phogat (1991), Yasuroju *et al.* (1992), El-Maghraby *et al.*(1993), Balyan *et al.* (1994), Dhawan (1995), Hassanein *et al.* (1996), Zaher (1996), Ali and Shams El-Din (1997), Al - Masrafy *et al* . (1997 a and b), Nassar (1998) and Shebl (1998) .**

Table (3) : Effect of weed control treatments on fresh and dry weight of weeds g / m^2 at three sampling dates in 1997 / 98 and 1998/99 seasons .

Weed control	1997 / 98 season		1998 / 99 season	
	Fresh weight g/m^2	Dry weight g/m^2	Fresh weight g/m^2	Dry weight g/m^2
	(a) 60 days from sowing			
Grasp 10 % (a)	386.1	40.3	356.5	70.8
Granstar (b)	111.6	11.5	60.7	7.3
Mixture (a + b)	198.2	24.2	99.2	24.0
Unweeded	429.9	59.6	424.8	128.8
L.S.D. 5%	140.3	28.5	183.3	55.7
	(b) 90 days from sowing			
Grasp 10 % (a)	911.5	108.5	807.3	165.1
Granstar (b)	45.4	8.5	41.1	11.0
Mixture (a + b)	63.2	7.9	104.3	23.0
Unweeded	1290.8	163.3	971.3	234.8
L.S.D. 5%	105.7	50.3	102.7	31.6
	(c) 120 days from sowing			
Grasp 10 % (a)	1262.4	223.9	1045.8	194.6
Granstar (b)	154.7	23.2	119.5	22.5
Mixture (a + b)	265.8	45.2	238.1	44.4
Unweeded	1317.9	274.6	1400.3	287.9
L.S.D. 5%	108.3	47.9	114.9	69.4

I.2. Effect of Weed Control Treatments on Wheat Growth.

I.2.1. Effect of Weed Control Treatments on Number of Leaves, Stalks, Spikes, Plant Height and Spike Length :

a- After 80 Days From Sowing Date:

The data reported in Table (4) indicate clearly that the number of leaves / m^2 was significantly affected by weed control treatments after 80 days from sowing in both growing seasons.

The treatment with Granstar in the first season, both Granstar and the mixture treatment in the second season significanlty increased the number of leaves/m^2 as compared with Grasp and the check. With regard to number stalks/m^2, results indicated that weed control treatments did not significantly affect the number of stalks/m2 in the first season. On the other hand, Granstar significantly increased the number of stalks / m^2 as compared with Grasp and check treatment in the second season . These results were in agreement with the results obtained by **Majid *et al.* (1985), Walia and Gill (1987), Ashraf *et al.* (1989), El- Deepah (1989) , El - Moursy (1989), Elian and El-Mashad (1994), Salem *et al.* (1994), Nassar (1998) and Shebl (1998).**

Concerning spike length (cm), results indicated that all weed control treatments had no significant effect on spike length as compared with the unweeded treatment in both growing season. These results were in agreement with the results obtained

by **Mekhaail *et al.* (1986), Ashraf *et al.* (1989), El-Deepah (1989), El-Desoky (1990). Salem *et al.* (1994), El- Badry (1995) and Ali and Shams El-Din (1997).**

b- After 101 Days From Sowing Date :

The results in Table (4) indicated clearly that the number of leaves/m^2, plant height and spike length (cm) were not significantly affected by weed control treatments in both growing seasons .

Concerning the number of stalks/m2 after 101 days from sowing, both treatments of Granstar and mixture of Grasp + Granstar significantly increased the number of stalks/m2 as compared with Grasp and the control treatment in both growing seasons. With regard to the number of spiks/m^2, the mixture and Granstar treatments significantly increased the number of spikes/ m^2 in the first season as compared with Grasp treatment and the unweeded check. In the second season, all weed control treatments significantly increased the number of spikes/m^2 as compared with the unweeded treatment (Table 4). These results were in agreement with the results obtained by **Assey *et al.* (1983a), El-Deepah (1989), El-Desoky (1990), Salem *et al.* (1994), El-Badry (1995) and Nassar (1998).**

c) After 121 Days From Sowing Date :

Obtained results revealed significant effect of weed control treatments on number of leaves, stalks, spikes/m^2 and plant height (cm) after 121 days from sowing date (Table 4) .

Granstar and the mixture of Grasp + Granstar significantly increased the number of leaves / m^2 in the first season only as compared with the unweeded treatment. On the other hand, the number of leaves / m^2 was not affected by all weed control trestments in the second season and the differences between the treatments failed to reach the 5% level of significance. With regard to the number of stalks/m^2, a significant increase in number of stalks/m^2 was observed in both seasons as compared with the unweeded check. The greatest values of number of stalks/m^2 were recorded from both the mixture and Granstar treatments. These results were in agreement with results obtaind by **El-Deepah (1989), El- Moursy (1989), Salem *et al.* (1994), El-Badry (1995), Nassar (1998) and Shebl (1998) .**

Concerning the number of spikes/m2, all weed control treatments significantly increased the number of spikes / m2 as compared with the check in both growing seasons . Also, the greatest values were obtained from both the mixture and Granstar alone in both growing seasons. These results were similar with that of number of stalks/m2 . Moreover, the mixture and Granstar treatments significantly increased the number of spikes/ m2 over the Grasp treatment in the second season only . These results were in agreement with the results obtained by **Assey *et al.* (1983a), El-Deepah (1989), El-Desoky (1990), Salem *et al.* (1994), El-Badry (1995) and Nassar (1998).**

With regared to plant height (cm) Granstar and the unweeded treatments gave the highest values that are significantly higher as compared with Grasp and mixture treatment in the first season only. In the second season, results showed insignificant differences between the weeded and the unweeded treatments. These results were in agreement with results obtained by **Mekhaail *et al.* (1986), El-Deepah (1989), El-Desoky (1990), El- Metwaly (1994), El- Badry (1995), ALi and Shams El- Din (1997), Nassar (1998) and Shebl (1998) .**

Spike length (cm) was not affected by all weed control treatments in both seasons. In other words the differences between spike lengths resulted from weed control treatment faild to reach the 5% level of significance. These results were in agreement with the results obtained by **Ashraf *et al.* (1989), El-Deepah (1989), El- Desoky (1990), Salem *et al.* (1994) El-Badry (1995) and Ali and Shams El-Din (1997) .**

From Table (4) it could be concluded that, the treatment with Granstar and the mixture treatment (Grasp + Granstar) gave the highest values for number of leaves, stalks and spikes/m^2 in all sampling dates, while the lowest values were recorded from the unweeded check and Grasp treatment. With regard to plant height and spike length, all weed control treatments did not affect both characters except, plant height after 121 days in the first season .

Table (4): Effect of weed control treatments on plant height, spike length (cm), No. of leaves, stalks and spikes/m^2, at three growth stages of wheat in 1997 / 98 and 1998 / 99 seasons

Characters / Weed control treatments	1997 / 98 season					1998 / 99 season				
	plant height cm	spike length cm	No. of leaves	No. of stalks	No. of spikes	plant height cm	spike length cm	No. of leaves	No. of stalks	No. of spikes
				(a) 80 days from sowing						
Grasp	43.2	-	1400.0	348.0	--	41.8	_	1095.0	339.0	--
Granstar	43.6	-	1534.0	369.0	--	42.0	--	1302.0	368.0	--
Mixture	40.9	-	1446.0	363.0	--	41.4	--	1311.0	352.0	--
Check	44.4	-	1367.0	358.0	--	44.1	--	1109.0	345.0	--
L.S.D 5%	--	-	120.0	--	--	--	--	100.8	19.5	--
				(b) 101 days from sowing						
Grasp	97.4	16.2	976.0	342.0	238.9	97.9	15.5	8171.2	342.0	232.2
Granstar	96.9	15.9	1021.0	372.3	278.6	98.3	15.8	9353.2	382.0	234.2
Mixture	94.7	16.5	1136.0	372.0	278.6	95.6	16.3	9776.3	374.6	243.6
Check	90.1	15.7	1086.0	349.0	239.7	93.6	15.3	8752.8	327.0	209.5
L.S.D 5%	--	--	--	23.2	9.9	--	--	--	29.8	22.2
				(c) 121 days from sowing						
Grasp	95.9	15.1	680.9	338.5	338.5	96.6	13.2	663.7	343.0	343.0
Granstar	100.4	15.3	980.3	351.1	351.0	99.7	13.3	789.7	362.0	358.9
Mixture	98.4	15.6	757.3	356.9	356.0	97.5	13.2	730.5	370.0	370.0
Check	100.4	15.2	577.2	272.7	272.6	97.3	13.5	632.9	307.4	307.4
L.S.D 5%	2.2	--	96.3	20.8	21.7	--	--	--	16.7	14.4

I.2.2. Effect of Weed Control Treatment on Weight of Different Plant Parts :

Data in Tables (5 a , b and c) show the average fresh and dry weights of leaves, stalks, spikes and total fresh and dry weight of plants (g/m^2) after 80, 101 and 121 days from sowing, as affected by different weed control treatments during the two seasons.

a- After 80 Days From Sowing Date :

Results in Table (5 a) showed clearly that weed control treatments had a significant effect on fresh and dry weight of leaves / m^2 in both seasons except the dry weight in the first season. The lowest fresh and dry weights were obtained with Grasp treatment, but the highest values were obtained by Granstar and check treatments in both seasons .

Concerning fresh and dry weight of stalks/m^2, weed control treatments had significant effect on this character in both growing seasons except the fresh weight in the first season. The highest values were obtained by Granstar and the mixture (Grasp + Granstar) treatments and the lowest values were recorded for the check and the Grasp treatment (Table 5 a) .

Regarding the total fresh and dry weights of plants/m^2, results in Table (5 a) reveal clearly that weed control treatments had significant effect on this character in both seasons except dry weight in the first season. Granstar and the mixture of Grasp

and Granstar treatment produced higher values of fresh and dry weight of plants (g/m^2) and significantly higher as compared with Grasp and the check treatment .

It could be noted that Granstar treatment gave the heaviest values of fresh and dry weight of leaves, stalks and total weight of plants/m^2 in both growing seasons. The lowest values for the two previous characters were obtained by the check and Grasp treatments in both growing seasons. This result was expected since, Granstar was more effective in controlling wheat associated weeds. On the other hand, Grasp was the least in efficient in this respect, (Table 3) .

These results were in agreement with the results obtained by **Walia and Gill (1987), Assey *et al.* (1993), Tahoon(1994), Tanji *et al.* (1997) Nassar (1998) and Shebl. (1998) .**

b- After 101 Days From Sowing Date :

Results in Table (5 b) showed that fresh and dry weights of leaves, stalks, spikes and total weight of plants / m^2 were significantly affected by weed control treatments in both growing seasons except fresh weight of leaves.

Higher values of leaves dry weight (g/m^2) were obtained by Granstar and the mixture treatments and significantly higher as compared with Grasp treatment in both growing seasons .

Concerning the fresh and dry weights of Stalks/m^2, the mixture of Grasp and Granstar and Granstar treatments

significantly increased fresh and dry weight of stalks / m^2 as compared with the check and Grasp treatment in both growing seasons with few exceptions. These results were in agreement with the results obtained by **Walia and Gill (1987), Gogol and Kalito (1995), Tanje *et al.* (1997), Nassar (1998) and Shebl (1998).** With regard to fresh and dry weights of spikes / m^2, the mixture and Granstar treatments in the first season and both treatments of Grasp and mixture in the second season gave the heaviest fresh and dry weights of spikes/m2 and significantly higher as compared with the control treatment.

These results were in agreement with the results obtained by **El-Deek and Abo El-Kheer (1986 a), Mekhaail *et al* (1986), Salem *et al.* (1994) and Ali and Shams El-Din (1997).**

Total fresh and dry weights of plants / m^2 was signicicantly affected by weed control treatments (Table 5 b). Both , Granstar and the mixture of Granstar + Grasp significantly increased the total fresh and dry weight of plants/m2 as compared with the control and Grasp treatments in both growing seasons. On the other hand, Grasp and the control treatments gave the lowest values of total fresh and dry weight of plants/m^2 in both growing seasons with the differences between Grasp and check treatment being insignificant in both seasons.

These results were expected since, Granstar and mixture of Granstar and Grasp gave better control of weeds associated with wheat (Table 3) .

These results were in agreement with the results obtained by **Walia and Gill (1987), Gogal and Kalito (1995), Tanji *et al.* (1997), Nassar (1998) and Shebl (1998).**

C) After 121 Days From Sowing Date :

Obtained results in Table (5 c) revealed significant effect of weed control treatments on fresh and dry weights of leaves, stalks, spikes and total fresh and dry weight of plants / m^2 in both season with few exceptions .

Concerning the fresh and dry weights of leaves / m^2 , results in Table (5 c) revealed significant effect in the first season while, in the second season the differences between the treatments were not significant. In the first season, Granstar and the mixture of Grasp + Granstar gave the highest values of fresh and dry weight of leaves / m^2 and significantly higher as compared with Grasp and the control treatment. Also, the differences between Grasp and the control treatment were not great enough to reach the 5% level of significance. These results agreed with those obtained by **Tahoon (1994) and Shebl (1998).** With regard to fresh and dry weight of stalks, all weed control treatments significantly increased fresh and dry weights of stalks in both seasons as compared with the control treatment with only one exceptian . Grasp treatment had no significant effect on dry weight of stalks in the second season as compared with the check (Table 5 c) .

Concerning the fresh and dry weight of spikes/m^2, a similar trend was obtaind. Weed control treatments significantly increased fresh and dry weight of stalks in both seasons except the fresh weight of the second season. Also, Granstar and the mixture treatments significantly increased fresh and dry weight of spikes in the first season and spikes dry weight in the second season. Whereas, Grasp treatment significantly increased apikes fresh weight in the first season and spikes dry weight in the second season as compared with the check .

These results were in agreement with the results obtained by **El-Deek and Abo El-Kheer (1986a), Mekhaail *et al* (1986), Salem *et al.* (1994), El- Badry (1995) and Ali and Shams El-Din (1997).**

Regarding fresh and dry weight of total fresh and dry weight of plants / m^2, Granstar, mixture of Granstar + Grasp significantly increased fresh and dry weight in the first season .

Whereas both treatments, Granstar and mixture significantly increased fresh and dry weight of stalks / m^2 in the second season as compared with the check (Table 5c) .

Generally, it could be observed from Table (5 a, b and c) that fresh and dry weights (g/m^2) of leaves, stalks, spikes and the total weight of whole plants significantly and progressively increased in plots treated with Granstar and mixture as plant age advanced in both growing seasons with few exceptions .

I.3. Effect of Weed Control Treatment on Chlorophy11 and Carotenoids Content :

Data in Table (6) show the effect of weed control treatments on chlorophyll A, chlorophyll B, total chlorophyll and carotenoids content (mg/g dry weight) after 80 days and 101 days from sowing date in both growing seasons .

a - After 80 Days from Sowing Date :

Chlorophyll A was not affected by all weed control treatments after 80 days from sowing date in both seasons (Table 6).

Concerning chlorophyll B, the highest value was obtained by Grasp and significantly higher as compared with Granstar and the mixture treatment in the first season (Table 6). Also, the unweeded treatment significantly increased chlorophyll B as compared with mixture treatment in the first season .

In the second season , Grasp treatment was associated with the highest value as compared with other treatments. These results were in a greement with the results obtained by **Ghafoor *et al.* (1987) and Phawa and Prokash (1988)** and these results disagree with the results obtained **by Dhawan *et al.* (1992) and Montazeri (1994).** With regard to total chlorophyll, the unweeded treatment and Grasp treatment resulted in the highest values of total chlorophyll which were significantly higher as compared with the mixture treatment in

Table (5) :Effect of weed control on fresh and dry weights of different plants organs, leaves , stalks , spikes and total weight of plants g/m^2 at three growth stages of wheat in 1997 / 98 and 1998 / 99 seasons .

Characters	1997 / 98 season								1998/99 season							
	Weight of leaves g/m2		Weight of stalks g/m2		Weight of spikes g/m2		Total weight of plants m2 .g/m2		Weight of leaves g/m2		Weight of stalks g/m2		Weight of spikes g/m2		Total weight of plants m2 .g/m2	
	Fresh	Dry	Fresh	Dry	Fresh	Dry	Fresh	Dry	Fresh	Dry	Fresh	Dry	Fresh	Dry	Fresh	Dry
a) 80 days from sowing																
Grasp	1173	188.7	1458	175.9	--	--	2635	364.5	1084	173.5	1239	155.0	--	--	2323	328.5
Granstar	1392	215.5	1706	218.9	--	--	3098	432.4	1285	190.5	1434	183.0	--	--	2711	373.5
Mixture	1292	198.4	1550	188.8	--	--	2843	384.0	1232	185.9	1393	172.0	--	--	2626	358.4
Control	1235	190.2	1725	184.5	--	--	2755	374.7	1303	200.8	1227	172.6	--	--	2531	346.3
L.S.D 5%	157.2	--	--	29.6	--	--	275.3	--	84.1	21.5	58.1	14.3	--	--	88.9	23.6
b) 101 days from sowing																
Grasp	734.6	192.2	3129	1138	586.5	201.2	4428	1532	751.7	200.3	2841	1138	631.2	249.7	4224	1582
Granstar	982.7	274.2	3719	1291	771.3	225.7	5485	1748	992.9	287.1	3402	1316	575.9	206.5	4940	1810
Mixture	995.4	263.4	4213	1334	960.5	298.4	6168	1927	1008	285.2	3664	1571	681.5	237.2	5359	2094
Control	814.8	242.8	3348	1118	630.8	193.9	4793	1555	797.7	233.7	3039	1124	491.4	156.9	4318	1515
L.S.D 5%	--	58.4	390.6	166.3	81.8	39.3	524.2	154.5	--	58.4	205.3	83.7	85.1	33.4	213.9	86.7
c)121 days from sowing																
Grasp	397.8	207.6	2459	1140	1618.3	901.1	4474	2249	1205.2	305.9	2839	946.0	1901	932.5	5806	2184
Granstar	526.0	328.6	2693	1135	1982.8	1114.1	5202	2580	1210.8	306.5	3359	1100	1998	938.2	6543	2347
Mixture	507.1	344.4	2710	1211	1997.9	1145.9	5227	2701	1256.6	386.9	3761	1304	2134	1051	7155	2743
Control	346.8	218.7	2028	1032	1349.8	786.6	3700	2033	972.7	243.6	2714	948.7	1810	841.1	5487	2033
L.S.D 5%	63.2	41.9	269.5	85.4	263.7	137.5	518.9	201.3	--	--	384.9	97.3	--	91.3	760.4	192.7

Table (6): Effect of weed control treatments on Chlorophyll A,B, total Chlorophyll and carotenoids mg / g at 80 and 101 days from sowing in 1997 / 98 and 1998 / 99 seasons .

Characters / Weed control	1997 / 98 season				1998 / 99 season			
	Chlorophyll A	Chlorophyll B	Total Chlorophyll A+B	Caratenoids	Chlorophyll A	Chlorophyll B	Total Chlorophyll A+B	Caratenoids
	at 80 days from sowing							
Grasp	2.813	2.042	4.855	1.569	2.718	2.015	4.732	1.586
Granstar	2.607	1.693	4.300	1.501	2.592	1.769	4.361	1.505
Mixture	2.718	1.482	4.201	1.448	2.751	1.627	4.378	1.503
Check	3.212	1.847	5.059	1.930	2.982	1.761	4.743	1.836
L.S.D 5%	-	0.388	0.595	0.361	-	0.233	-	-
	at101 days from sowing							
Grasp	2.808	1.376	4.184	1.793	2.909	1.397	4.288	1.887
Granstar	2.618	1.098	3.716	1.604	2.683	1.076	3.760	1.603
Mixture	2.332	0.999	3.331	1.658	2.303	1.025	3.328	1.636
Check	2.712	1.265	3.997	1.753	2.859	1.263	4.123	1.781
L.S.D 5%	0.302	0.140	0.408	0.115	0.199	0.171	0.291	0.123

the first season . In the second season, total chlorophyll was not affected by all weed control treatments (Table 6) . These results were in agreement with the result obtained by **Stahli *et al.* (1995)** and these results disagree with the results obtained by **Dhawan *et al.* (1992), Montazeri (1994), and Guh-Jaock *et al* (1997).**

Concerning carotenoids, (mg/g dry weight), the unweeded treatment significantly increased carotenoids content as compared with other treatments in the first season . However, in the second season, the differences between all treatments failed to reach the 5% level of significance (Table 6). These results were in a greement with the resuts obtained by **Kraus *et al.* (1995).**

b- After 101 Days from Sowing :

Grasp treatment and the unweeded check recorded the highest values of chlorophy A as compared with mixture treatment in both seasons .

Moreover, Grasp significantly increased chlorophyll A content as compared with Granstar in the second season. Also. Granstar significantly increased chlorophyll A as compared with mixture treatment in the second season. These results were in agreement with the results obtained by **Pahwa and Prokash (1988)** and the results disagree with the results obtained by **Ghafoor *et al.* (1987) .**

The lowest value of chlorophyll B content was recorded for the mixture and Granstar treatments in both growing seasons (Table 6).

Grasp and the unweeded treatments significantly increased chlorophyll B as compared with the mixture and Granstar treatments in the both season with only one exception. These results were in agreement with the results obtained by **Dhawan. *et al.* (1992), Montazeri (1994) .**

Concerning total chlorophyll content, the results were similar with that of chlorophyll B content (Table , 6) .

Also , the highest values were obtained from Grasp and the control treatments and were significantly higher as compared with the mixture and Granstar treatments in both seasons with one exception. That is, the difference between unweeded check and Granstar in the first season . These results disagree with the results obtained by **Chi-Chu - Lo and Lo, C-C (1984), Ghafoor *et al.* (1987), Montazeri (1994), Nowicka. (1994) and Guh-Joack *et al* . (1997) .**

Regarding carotenoids content, Grasp and the unweeded treatments significantly increased carotenoids content as compared with Granstar in the first season and as compared with Granstar and mixture treatment in the second (Table 6). These results were in agreement with the results obtained by **Pahwa and Prokash (1988) and Kraus *et al.* (1995) .**

It could be concluded that , both treatments of Grasp and the unweeded resulted in the highest values of chlorophyll A, B, total chlorophyll and carotenoids content in both seasons .

Whereas, the mixture treatment (Grasp + Granstar) and Granstar treatment gave the lowest values for the previous measurements in both growing seasons .

From Table (6) it could be noted that , total chlorophyll in the first sampling date (80 days after sowing) was higher than that of the second sampling date (101/days from sowing date) in both seasons. In contrast, carotenoids content in the first sampling date was lower than the second sampling date in both seasons .

These results were expected, since at the first sampling date the plants were younger as compared with the plants of the second sampling date .

I.4. Effect of Weed Control Treatments on Yield and Yield Component of Wheat :

Data in Table (7) show the effect of weed control treatments on yield and yield components, i.e., plant height spike length number of stalks and spikes / m^2, number of spikelets and grains / spike, grain weight / spike, 1000 grain weight , grain yield, straw yield / fed., biological yield, harvest index and protein percentage in both growing seasons .

1) Plant height :

Data in Table (7) show that, plant height (cm) was significantly affected by weed control treatments in the first season only. The tallest plants were obtained from Granstar treatment and significantly higher as compored with other treatments. On the other hand, plants in the unweeded treatment were significantly taller than plants treated with Granstar and Granstar + Grasp. These resuuts were in agreement with the results obtained by **Ashraf *et al.* (1989), El - Depah (1989), El-Metwaly (1994), Nassar (1998) and Shebl (1998)** and these results were disagree with the results obtained by **El - Badry (1995) and Ali and Shams El - Din (1997) .**

2) Spike length :

Chemical weed control treatments had no significant effect on spike length (cm) as compared with the unweeded treatment in both seasons. These results were in agreement with the results obtained by **Ashraf *et al.* (1989), El - Deepah (1989)** and these results disagree with the results obtained by **El- Desoky (1990) and El - Badry (1995) .**

3) Number of stalks / m^2 :

The obtained results revealed significant effect of chemical weed control treatments on number of wheat stalks /m^2 in the first season only (Table 7). The mixture of Grasp + Granstar and Granstar treatments increased significantly, the

number of wheat stalks/ m^2 over the control treatment, Moreover, the mixture treatment was significantly higher than Grasp treatment . In the second season , Granstar and mixture gave the higher number of wheat stalks/m^2 as compared with control and Grasp treatments but the differences were not great enough to reach the 5% level of significance .

These results were expected since both chemical treatments (Granstar alone and the Mixture) significantly reduced the growth of associated weeds at all wheat stages and gave the highest number of stalks/m^2 after 101 and 121 days , from sowing (Tables 4 , b and c) in both seasons . These results were in agreement with the results obtained by **Mgjid *et al.* (1985), Walia and Gill (1987) , El- Moursy (1989), Eliam and El- Mashad (1994), Salem *et al.* (1994), El-Badry. (1995), Shebl (1998)** and these results disagree with the results obtained by **Nassar . (1998) .**

4) Number of Spikes/m^2:

The number of wheat spikes/m^2 was similar with the number of wheat stalks/m^2 in both growing seasons. Also, weed control treatments significantly increased the number of spikes/m^2 in the first season only. The mixture (Granstar + Grasp) and Granstar alone significantly increased number of wheat spikes/m^2 as compared with the check in the first season . The mixture treatment gave the greatest number of wheat

Table (7): Effect of weed control treatments on wheat yield and yield components in 1997 / 98 and 1998 / 99 seasons.

Weed control treatments / Wheat Characters	1997 / 98 season					1998 / 99 season				
	Grasp	Granstar	Mixture	Control	L.S.D 5 %	Grasp	Granstar	Mixture	Control	L.S.D 5 %
Plant height (cm)	97.19	92.10	92.18	94.47	2.11	103.68	105.10	104.58	104.40	--
Spike length (cm)	11.50	11.39	11.37	11.10	--	13.10	12.87	13.20	13.20	--
No. of stalks / m2	319.10	345.09	379.58	311.40	34.20	291.9	335.29	331.17	286.70	--
No. of spikes / m2	315.88	345.09	376.40	311.40	37.20	291.87	335.29	331.16	286.70	--
No. of spikelets / spike	19.96	21.19	20.73	20.12	0.46	21.01	20.58	20.80	20.87	--
No. of grains/spike	51.60	56.19	57.87	51.60	4.50	56.90	54.80	54.88	53.85	--
1000 grain weight(g)	45.80	49.79	50.75	43.80	2.63	47.90	49.39	48.58	48.78	--
grains weight/spike(g)	2.42	2.82	2.96	2.25	0.34	2.75	2.73	2.70	2.64	--
grain yield (kg/fed)	1681.60	2325.00	2567.69	1131.78	472.10	1707.60	2346.00	2457.77	1625.18	192.70
Straw yield (kg/fed)	1880.40	1952.90	1987.68	1729.09	34.97	1873.70	1946.00	1982.50	1728.48	36.40
biological yield (kg/fed)	3562.00	4277.86	4555.30	2863.86	489.30	3579.30	4290.10	4440.37	3353.68	223.80
harvest undex %	44.90	54.39	56.40	37.86	8.10	45.20	53.48	54.30	45.89	4.10
protein %	12.37	12.77	13.31	12.23	--	12.46	12.76	13.29	12.26	0.90
protein yield (kg/fed)	206.96	297.20	341.39	139.56	61.34	212.05	304.72	327.91	199.06	58.20

spikes/m^2 that was significantly higher than that of Grasp. On the other hand, the differences between herbicides and unweeded treatment were not significant in the second season. These results were in agreement with the results oblaind by **Assey *et al.* (1983a), El - Desoky (1990), Salem *et al.* (1994), El-Badry (1995) and Shebl (1998)** and these results were dis agree with the results obtained by **El-Deepah (1989) and Nassar (1989) .**

5) Number of Spikelets / Spike :

Results in Table (7) indicated clearly that chemical weed control treatments significantly increased the number of spikelets/ spike in the first season and had no significant effect in the second season .

Granstar treatment significantly increased the number of spikelets / spike as compared with both Grasp and the unweeded treatment in the first season only. These results were in agreement with the results obtained by **Maajid *et al.* (1985), Ashraf *et al.* (1989), Eliam and El-Mashad (1994) and Salem *et al.* (1994) .**

6- Number of Grains / Spike :

The effect of weed control treatments on number of grains/ spike of wheat was similar to their effect on the previous characters in both growing seasons. In the first season , Granstar and the mixture treatments gave the highest number of grains/

spike and were significantly higher than both Grasp and the check. In the second season , the differences between all weed control treatments were not significant (Table 7). These results were in agreement with the results obtained by **Assey *et al.* (1983a), Majid *et al.* (1985) , Ashraf *et al.* (1989), Salem *et al.* (1994) and Ali and Shams El-Din (1997) .**

7) 1000 - Grain Weight :

Data presented in Table (7) indicate clearly that weed control treatments significantly increased 1000 - geains weight (seed index) in the first season only. The treatments with Granstar and Grasp + Granstar significantly increased seed index as compared with the unweeded and Grasp treatments. In the second season the differences between all weed treatments were substantial to reach the 5% level of significance. These results were in agreement with the results obtained by **Assey *et al.* (1983 a, b), Majid *et al.* (1985) , Mekhaail *et al.* (1986) , El-Deepah (1989) , El-Desoky (1990) and Shebl (1998) .**

8) Grains Weight / Spike :

Results in Table (7) revealed that , chemical weed control treatments had significant effect on spike grains weight in the first season only. The treatments with mixture (Granstar + Grasp) and Granstar alone significantly increased grains weight/ spike as compared with both unweeded and Grasp treatments.

These results were expected since both treatments (Granstar + Grasp and Granstar) significantly increased number of spikelets / spike , number grains / spike and 1000 grain wieght as compared with check and Grasp treatments in the first season. These results were in agreement with the results obtained by **Assey *et al.* (1983a), Mekhaail *et al.* (1986), Salem *et al.* (1994), El- Badry (1995) , Ali and Shams El-Din . (1997) .**

9) Grain Yield (Kg/ fad.) :

Grain yield (kg/fed) was significantly increased by all chemical weed control treatments as compared with the unweeded treatment in the first season. In the second season , both treatments of Granstar and Granstar + Grasp significantly increased grain yield (kg / fad) as compared with the control and Grasp treatments. Chemical weed control, treatments, mixture (Granstar + Grasp), Granstar and Grasp increased wheat grain yield (kg/fad) over the check by more than 118%, 105% and 48 % in the first season and 51%, 44% and 5% in the second season , respectively .

These results were expected since chemical weed control treatment particularly Granstar and Granstar + Grasp treatments decreased fresh and dry weight of associated weeds (Table 3), fresh and dry weight of different wheat plant parts (Table 5a ,b and c) Also, Granstar and Granstar + Grasp significantly increased wheat yield components, i.e. numbers of stalks / m^2

number of spikes / m^2 number of spikeltes / spike, number of grains / spike, 1000 - grain weight and grains weight / spike specially in the first season. Therefor, the mixture of Granstar + Grasp and Granstar alone gave significantly the highest grain yield (kg/fad) and out - yielded Grasp in the two sucessive seasons. These results were in agreement with the results obtained by **Assey *et al.* (1983a), Rastogi *ey al.* (1984), Prasad (1985), El-Deeb *et al.* (1986), El Deek and Abo - El- Kheer (1986a), Mekhaail *et al.* (1986), Walia and Gil (1987), Sidhu *et al.* (1988), El-Deepah (1989), Amderson and Howat (1990), El-Desoky (1990), Kholosy *et al.* (1991), Malik *et al.* (1992), Al Maghraby *et al.* (1994), Salem *et al.* (1994), Ahmed *et al.* (1995), Hassanien and Kholosy (1996), Ali and Shams El - Din (1997), Al - Marsafy *et al.* (1997 a , b) Nassar (1998) and Shebl (1998)** and these results disagree with the results oblained by **Majid *et al.* (1985), Rola (1987), Al - Marsafy *et al.* (1992) , El-Wekil *et al.* (1994), Thukar *et al.* (1995) and Zaher (1996)**

10) Straw Yield (kg / fad) :

The results in in table (7) indicated that all chemical weed control treatments had a significant effect on straw yield / fad in the both growing seasons. The treatments with mixture (Granstar + Grasp), Granstar and Grasp significantly increased straw yield/ fed in both growing seasons as compared with control treatment. Moreover, mixture treatment significantly surpassed the other

two chemical weed control treatment in both growing seasons. Also, Granstar treatment significantly increased straw yield / fed as compared with Grasp in both growing seasons .

According to the available results in Table (7) it could be conculuded that mixtrue treatment (Granstar + Grasp) gave the highest straw yield / fed, followed by Granstar and Grasp in both growing seasons. These results were in agreement with the results obtained by **Mekhaaile *et al.* (1986), El-Deepah (1989), El-Despky (1990), Salem *et al.* (1994) and Zaher (1996)** and these results were disagree with the results obtained by **Nassar (1998) .**

11) Biological Yield / Kg/ fad :

All chemical weed control treatments significant increased the biological yield in both growing seasons as compared with control treatment. Table (7). The percentage increments in biological yield/ fed over the control treatment obtained by using Granstar + Grasp mixture, Granatar and Grasp were more than 59, 49 and 24% in the first season and more than 32, 27 and 6% in the second season, respectively . Mixture treatment and Granstar remarkably resulted in the highest biological yield and significantly higher over Grasp treatment in both growing season. This increase in biological yield / fed may be due to the considerable increase in seed yield and straw yield (Kg/ fed). These results were in agreement with results obtained by **El-Deepah (1989), Zaher (1996) and (1998) .**

12) Harvest index :

The results in Table (7) revealed that chemical weed control treatments had a significant effect on harvest index in both growing seasons. All chemical weed control treatments significantly increased havest index in the first season and both Granstar and mixture in the second season as compared with the control treatment. The highest harvest index values were obtained with both mixture and Granstar treatments in both growing seasons. These results were expected since both treatments (Granstar + Grasp and Granstar) gave considerable increases in seed yield/fad than the increases of straw yield / fad. These results were in agreement with the results obtained by **El-Deepah (1989)** and these results disagree with the results obtained by **Nassar (1998).**

13) Protein Percentage :

With regared to the protein percentage results indicate that all chemical weed control treatments had no significant effect on protein % in both growing seasons except the mixture treatment significantly increased this character as compared with the control treatment in the second season, Table (7). These results were in agreement with the results obtained by **Mekhaail. *et al.* (1986), El-Desoky (1990), Kozazenko (1994), Salem *et al.* (1994), Zaher (1996)** and these results disagree with the results obtained by **El-Ghonemy (1988), Khalil (1989) and El-Metwaly (1998).**

14) Protein Yield Kg/fad

Results in Table (7) showed that the highest protein yields were obtaind by mixture and Gramstar treatments and significantly higher as compared with control and Grasp treatment in both growing seasons . In the first season Grasp significantly increased protein yield as compared with the unweeded treatment . These results were expected since the mixture treatment (Granstar + Grasp) significantly increased grain yield (Kg/ fed) and protein percentage as compared with the unweeded treatment in both seasons .

II.1. Effect of Wheat Cultivars on Fresh and Dry Weight of Weeds :

Results in Table (8) show the effect of two wheat cultivars, i.e. Sakha 69 and sids 7 on fresh and dry weight of weeds/m^2 after 60 , 90 and 120 days from sowing date .

a) After 60 days from Sowing :

The results indicate clearly that the fresh and dry weight of weeds/m^2 were significantly affected by cultivars in the second season only . In the first season (Table 8). Sids 7 significantly reduced fresh and dry wheight of weeds/ m^2 as compared with Sakha 69. Fresh and dry weight of weeds / m^2 were not affected by both wheat cultivars in the first season (Table 8). These results were in agreement with the results obtained by **Nalewaja**

and Appleby (1993) and Zimdahl (1994) and Christensen and Rasmussen. (1996) .

b- After 90 Days from Sowing :

With regard to fresh and dry weight of weeds/m^2 after 90 days from sowing date, results indicated that cultivars had no significant effect on weed growth in both growing seasons . (Table 4). These results were in agreement with the results obtained by **Zimdahl (1994), Christensen *et al.* (1996) and Shebl (1998).**

c) AFter 120 days from Sowing :

Wheat varieties had a significant effect on fresh and dry weight of weeds/m^2 after 120 days from sowing date in both growing seasons (Table 8). Sakha 69 significantly decreased fresh and dry weights of weeds/m^2 in both growing seasons as compared with sids 7 variety. These results were expected since , the variety Sakha 69 produced more tillers / plant as compared with sids 7 variety .

Nalewaja and Appleby (1993), Zimdahl (1994), Christensen *et al.* (1996) and Shebl (1998) , mentioned that, semi dwarf and short wheat varieties seem to be less competitive with weeds and this may have contributed to increasing weed growth and weed density than with taller wheat varieties .

Table (8) : Effect of two wheat varieties on fresh and dry weight of weeds g/m^2 at different growth stages in 1997/98 and 1998/99 seasons .

Characters / Varieties	1997 / 98 season		1998 / 99 season	
	Fresh weight g/m^2	Dry weight g/m2	Fresh weight g/m^2	Dry weight g/m^2
	(a) 60 days from sowing			
Sakha 69	289.2	32.5	308.7	72.5
Sids 7	273.7	35.3	161.9	42.9
L.S.D. 5%	--	--	61.5	17.3
	(b) 90 days from sowing			
Sakha 69	589.1	69.5	482.6	104.5
Sids 7	566.3	74.6	479.4	112.5
L.S.D. 5%	--	--	--	--
	(c) 120 days from sowing			
Sakha 69	723.1	128.3	668.6	119.1
Sids 7	777.3	155.2	733.3	155.7
L.S.D. 5%	47.3	19.5	62.8	17.5

II.2. Effect of Differential Cultivars Response :

Growth Characters :

1) Plant Characters :

The average values of number of leaves , stalks and spikes, also, plant height and spike length were influenced by wheat cultivars at different growth stages in the two seasons are presented in Table (9) . Data indicated no specific trend for each of the two grown wheat (Sakha 69 and Sids 7). Differences if present might be due to differentces in pedigree of both cultivars. Moreover , such values were higher for Sids 7 as compared with Sakha 69 at 121 days, in the first season .

II.3. Fresh and Dry Weight of Plants g / m^2 :

Fresh and dry weight of different plant organs at three sampling dates in 1997 / 98 and 1988 / 99 seasons are shown in Table (10) .

Data indicated that Sids 7 had the higher values than Sakha 69 in these characters (fresh and dry weight of leaves and stalks, fresh and dry weight of spikes and total fresh and dry weight / plants) at all growth stages in both seasons .

Data indicated clearly that, different plant organs were significantly different between the two grown varieties at the three sampling dates in both seasons. While, the two cultivars did not differ in fresh weight of leaves and fresh and dry weight of leaves at 101 and 121 days from planting in the two seasons ,

respectively. Also, fresh weights of stalks and spikes were not significantly affected by the two wheat varieties at third sampling (after 121 days from sowing) in the second season only.

In general, it could be concluded that Sids 7 was superior than Sakha 69 in these characters that are mainly due to inherent.

Table (9): Effect of two wheat varieties on plant height, spike length (cm) number of leaves, stalks and spikes / m^2 and at three growth stages in 1997/ 98 and 1998 / 99 seasons .

Characters / Cultivar	1997 / 98 season					1998 / 99 season				
	plant height cm	spike length cm	No. of leaves	No. of stalks	No. of spikes	plant height cm	spike length cm	No. of leaves	No. of stalks	No. of spikes
	(a) 80 days from sowing									
Sakha 69	37.1	--	1460.3	376.0	--	38.1	--	1165.6	378.3	--
Sids 7	48.9	--	1413.2	343.0	--	46.6	--	1224.9	323.8	--
L.S.D. 5%	1.68	--	--	12.41	--	1.20	--	54.97	14.20	--
	(b) 101 days from sowing									
Sakha 69	89.5	14.8	1075.8	378.8	239.8	91.5	13.9	8046.8	371.8	219.6
Sids 7	100.1	17.4	1033.7	345.8	274.9	101.2	17.6	9982.9	340.8	240.2
L.S.D. 5%	3.10	0.63	--	11.90	9.70	2.51	0.53	758.90	17.20	13.90
	(c) 121 days from sowing									
Sakha 69	99.2	13.9	699.2	324.4	324.4	98.8	12.4	720.5	360.7	359.1
Sids 7	98.5	16.7	798.6	335.2	334.7	96.7	14.2	687.9	330.5	330.5
L.S.D. 5%	--	0.70	53.20	--	--	0.86	0.22	--	13.40	13.22

Table (10) :Effect of two wheat varieties on fresh and dry weights of different plant parts , leaves , stalks and spikes at three growth stages in 1997 / 98 and 1998 / 99 seasons .

Characters / Varieties	1997 / 98 season								1998/99 season							
	Weight of leaves g/m2		Weight of stalks g/m2		Weight of spikes g/m2		Total weight of plants .g/m2		Weight of leaves g/m2		Weight of stalks g/m2		Weight of spikes g/m2		Total weight of plants .g/m2	
	Fresh	Dry	Fresh	Dry	Fresh	Dry	Fresh	Dry	Fresh	Dry	Fresh	Dry	Fresh	Dry	Fresh	Dry
a) 80 days from sowing																
Sakha 69	1122	161.5	1358	148.2	--	--	2378	307.2	1180	166.8	1091	130.6	--	--	2271.7	297.4
Sids 7	1424	234.6	1862	235.8	--	--	3288	470.6	1271	208.5	1556	197.5	--	--	2824	405.9
L.S.D. 5%	89.3	18.60	203.30	16.9	--	--	143.06	28.08	65.60	13.30	54.14	12.10	--	--	83.67	17.54
b) 101 days from sowing																
Sakha 69	856.7	218.5	3098	1011	574.7	182.6	4529	1412	865.6	226.4	2919	1181	521.9	193.4	4291	1601
Sids 7	907.1	267.8	4142	1430	899.8	277.3	5908	1969	904..8	276.7	3554	1393	668.1	231.8	5130	1899
L.S.D. 5%	--	36.26	282.84	107.50	52.60	20.70	341.90	110.95	N.S	26.50	160.9	64.40	46.84	25.96	202.51	73.87
c) At 121 days from sowing																
Sakha 69	425.8	272.9	2188	1066	1467	800.4	4081	2138	1223	320.5	3202	1017	1910	801.9	6276	2141
Sids 7	463.1	276.7	2758	1193	2007	1173	5220	2643	1099	300.9	3134	1132	2007	1079	6220	2512
L.S.D. 5%	--	--	194.77	73.61	201.76	85.30	328.06	124.61	--	--	--	65.52	--	68.65	--	101.71

II.4. Effect of Two Wheat Cultivars on Chlorophyll and Corotenoids (Mg / G.D.W) :

Data on chlorophyll A , chlorophyll B, chlorophyll A + B and carotenoids in wheat leaves at 80 and 101 days from planting in 1977 / 98 and 1998 / 99 seasons are presented in Table (11) .

Results showed that chlorophyll and carotenoids contents were significantly different between varieties at the two sampling date (after 80 and 101 days after sowing) in the two growing seasons. That is, Sids 7 produced the highest content from chlorophyll A, chlorophyll B - chlorophyll A + B and carotenoids. Whereas, the lowest content was obtained from Sakha 69 at 80 and 101 days from sowing in the two successive seasons.

It could be concluded that marked differences were found between the two cultivars in these characters related to differences in their genetical structure.

II.5. Effect of Cultivars on Yield and Yield Components:

1) Plant Height (cm) :

Results in Table (12) indicated that Sakha 69 was taller in plant height than Sids 7 without significant differences in 1997/ 98 season, whereas this difference in plant height was significant in 1998 / 99 season . Sakha 69 was the tallest cultivar with an average height of 94.7 and 111.1 (cm) in the two successive seasons .

It could be concluded that the marked differences found between the two cultivars in plant height are inherent differences due to differences in their genetical structure. Similar results were reported by **Shams El - Din and El - Habbak (1992) and Mady *et al.* (1996),** showed that wheat cultivars varied widely in their plant height .

2) Spike Length (cm) :

Data in Table (12) indicated that two cultivars varied significantly in their spike lengths in the two successive seasons.

In 1997 / 98 season , Sids 7 had longer spikes (12.4cm) as compared with Sakha 69 (10.3cm).

Also, in 1998 / 99 season, Sids 7 recorded the longest spikes (15.4 cm) than Sakha 69 (10.8cm).

It could be concluded that the differences in spike lengths are mainly due to genetical differences which identify each individual variety. Similar results were reported by **Eissa. (1979), Abo-Warda (1989), Hayam Mahgoub (1990), Shams El-Din and El-Habbak (1992), Mady (1996) and Abd El-Ghany (1997) .**

3) Number of stalks / m^2 :

Number of stalks/m^2 was not significantly different between the two cultivars in the first season, whereas it was significamtly different in the second season as shown in Table (12) .

Table (11): Effect of wheat cultivars on chlorophyll and carotenoids in wheat leaves (Mg / G.D.W.) at 80 and 101 days from planting in 1997/98 and 1998 / 99 seasons

Characters / Varieties	1997 / 98 season				1998 / 99 season			
	Chlorophyll A	Chlorophyll B	Total Chlorophyll A+B	Caratenoids	Chlorophyll A	Chlorophyll B	Total Chlorophyll A+B	Caratenoids
			80 days from sowing					
Sakha 69	2.677	1.583	4.260	1.495	2.632	1.636	4.268	1.488
Sids 7	2.998	1.949	4.947	1.729	2.890	1.950	4.840	1.728
L.S.D. 5%	0.182	0.195	0.232	0.093	0.153	0.147	0.197	0.080
			101 days from sowing					
Sakha 69	2.473	1.065	3.538	1.594	2.558	1.052	3.610	1.609
Sids 7	2.762	1.303	4.065	1.810	2.819	1.320	4.139	1.839
L.S.D. 5%	0.140	0.089	0.187	0.084	0.168	0.105	0.239	0.106

Table (12): Effect of wheat cultivars on yield and yield components in 1997/98 and 1998/99 seasons .

Characters	1997 / 98 season			1998 / 99 season		
	Wheat varieties		L.S.D. 5%	Wheat varieties		L.S.D. 5%
	Sakha 69	Sids 7		Sakha 69	Sids 7	
Plant height (cm)	94.7	93.3	--	111.1	97.9	1.3
Spike length (cm)	10.3	12.4	0.34	10.8	15.4	0.40
No. of stalks / m2	344.3	333.3	--	341.0	281.5	18.8
No. of spikes / m2	344.3	330.2	--	341.0	281.5	18.8
No. of spikelets / spike	19.9	21.1	0.24	20.2	21.5	0.40
No. of grains/spike	47.8	60.8	1.50	49.2	61.1	3.2
grains weight/spike(g)	2.15	3.07	0.09	2.24	3.17	0.17
1000- grain weight(g)	44.8	50.3	0.76	45.4	51.9	1.2
grain yield (kg/fed)	1817.4	2035.6	102.5	1853.8	2213.5	205.5
Straw yield (kg/fed)	1856.3	1918.7	25.8	1870.3	1895.0	--
biological yield (kg/fed	3673.8	3955.8	114.1	3724.1	4107.6	221.4
harvest index %	46.8	50.0	1.7	47.0	52.4	2.5
protein %	12.0	13.1	0.61	12.3	13.2	0.60
protein yield (kg/fed)	224.57	268.02	17.78	228.11	293.67	27.87

Results indicated that Sakha 69 produced higher number of stalks / m^2 as compared with Sids 7 in both seasons. The overall mean number of stalks / m^2 was 344.3 and 341.0 for Sakha 69 and 333.3 and 281.5 for Sids 7 in 1977 / 98 and 1988 /99 seasons, respectively. Superiority of Sakha 69 over Sids 7 in this character was expected because Sakha 69 produced greater number of tillers than Sids 7.

4) Number of Spikes / m^2:

Data on number of spikes / m^2 for the two cultivars in 1997/98 and 1998/99 seasons are shown in Table (12) .

In 1997 / 98 season , Sakha 69 produced higher number of spikes / m^2 (344.3) than Sids 7 (330.2) with no significant differences. In 1998 / 99 season , a similar trend was observed . However, the number of spikes / m^2 varied significantly in this season. The overall mean number of spikes / m^2 was 341.0 and 281.5 for Sakha 69 and Sids 7. This result was expected because Sakha 69 is characterized by higher tillering capacity than Sids 7 .

Many investigators reported marked differences among wheat cultivars in number of spikes / m^2 **(El-Helaly, 1984 ; Mohamoud, 1988; Hayam Magoub 1990; Shams El - Din and El - Habbak , 1992; Abd El - Ghany, 1994 ; Abo - Warda , 1997 and Eman Sadek and Abo - Warda 1998 b).**

5) Number of Spikelets / Spike :

Number of spikelets / spike varied significantly between the two cultivars. This result was true in the two growing seasons (Table 12) .

It is clear that Sids 7 produced higher number of spikelets per spike Sakha 69 with the being significant difference in the two successive sesons. The overall mean value of this character was 21.1 and 21.5 spikelets / spike for Sids 7 and 19.9 and 20.0 spikelets / spike for Sakha 69 in 1997 / 98 and 1998 / 99 seasons, respectively .

It could be concluded that Sids 7 is superior in number of spikelets / spike .

6) Number of Grains / spike :

The results in Table (12) indicated that the number of grains per spike varied significantly between the two cultivars in the two successive seasons .

In 1997 / 98 season, Sids 7 showed significantly higher number of kernels / spike than that of Sakha 69 . Also the same trend was obtained in 1998 / 99 season. The overall mean values were 60.8 and 47.8 kernels per spike, in 1997 / 98 and 61.1 and 49.2 kernels per spike in 1998 / 99 season for Sids 7 and Sakha 69, respectively . The superiority of Sids 7 might be attributed to the larger number of spikelets / spike (Table 12) and higher

spike length (Table 12) as compared with Sakha 69 as previously discussed .

It could be concluded that Sids 7 is superior in number of kernels / spike which is considered as an important yield component among those governing yield of wheat .

Similar results were also obtained by **Eissa (1979), Shams El-Din and EL- Habbak (1992), Sulttan *et al.* (1993), Mady (1996), Abd El - Ghany (1997), El- Naggar (1997) and Abo Warda and Eman Sadek (1998)**, who found that cultivars varied markedly in number of grains per ear .

7) Grains Weight / Spike (g) :

Data presented in Table (12) revealed that grain weight per spike significantly varied between the two wheat varieties in the two growing seasons . Sids 7 produced the highest grain weight/ spike than Sakha 69 in both seasons. The overall mean values were 3.07 and 2.15 g/ spike in 1997 / 98 season and 3.17 and 2.24 g/spike in 1998 / 99 season for sids 7 and Sakha 69, respectively .

The increases in grain weight / spike was expected because Sids 7 produced more spikelets / spike than Sakha 69, thus more kernels / spike the different plant organs that was obtained at all sampling dates than Sakha 69 in the two successive seasons .

8) Weight of 1000 - Kernels (g) :

Results recorded in Table (12) show that the weight of 1000 kernels (g) was significantly different between the two cultivars in the two successive seasons .

In 1997 / 98 seasons, the highest 1000 - kernel weight was recorded for Sids 7 (50.3 g.), whereas, the lowest was recorded for Sakha 69 (44.8 g.) .

A similar trend was obtained in the second season. Also, the highest 1000-kernel weight was recorded for Sids 7 (51.9g.) and the lowest (45 . 4 g) was recorded for Sakha 69 .

It could be concluded that the long spike wheat variety Sids 7 was superior in 1000 - kernel weight as compared with Sakha 69 variety .

Differences among wheat varieties in 1000 - kernel weight were also reported by **Eissa (1979), Abo-Warda (1989), Shams El-Din and El-Habbak (1992), Mady (1996) and Abd El - Ghany (1997).**

9) Grain yield (Kg / Fed) :

Results showed that the difference between the two cultivars in grain yield was significant in the two seasons as it is clear from Table (12). Sids 7 was superior than Sakha 69 in this character in both seasons .In 1997 / 98 season the highest grain

yield was obtained from Sids 7 (2035 Kg / fed) while , Sakha 69 produced the lowest grain yield (1817 Kg / fed) .

The same trend was obtained in 1998 / 99 season. The highest grain yield was recorded for Sids 7 (2213 Kg / fed) compared with Sakha 69 (1853 Kg / fed) which produced the lowest grain yield .

In could be concluded that this increase in grain yield is expected since Sids 7 was significantly superior in some important yield components such as spike length, number of spikelets / spike, number of grain / spike, grain weight / spike (g) and weight of 1000 kernels (g) (Table 12) .

Many investigators reported marked differences in yield potentiality between cultivars **Eissa. (1979), El-Helaly (1984), Abd El- Gawad. *et al.* (1985), Abo -Warda. (1989), Hayam Mahgoub (1990), Shams El -Din and El- Habbak (1992), Mady (1996), Abd El-Ghany (1997) and Abo-Warda (1997).**

10) Straw Yield Kg / fed :

Data in Table (12) indicated that cultivars varied significantly in straw yield in the first season only. Apparently Sids 7 produced the highest straw yield as compared with Sakha 69 in the two successive seasons. In the first season , Sids 7 produced straw yield (1919 Kg / fed) while, Sakha 69 produced (1856 Kg / fed). Also , a similar trend was obtained in

1998 / 99 season. That is , Sids 7. gave straw yield of (1895 Kg/ fed) as compared with Sakha 69 which produced the lowest straw yield (1870 kg/fed.) without significant differences between the two cultivars .

The higher straw yield of Sakha 69 variety over Sids 7 coud be due to its higher dry matter accumulation at all wheat growth stages in the two growing seasons .

Differences in straw yield among wheat varieties were also reported by **Essia (1979), El-Helaly (1984), Shams El- Din and El Habbak (1992), Mady (1996), Abd-El-Ghany (1997) and Abo-Warda (1997).**

11) Biological Yield kg / fed :

Results recorded in Table (12) showed that the biological yield per fed significantly differed between the two cultivars in the two growing seeasons .

Data indicated that the biological yield / fed. was significantly higher for Sids 7 than for Sakha 69 in both seasons. Mean biological yield were 3674 and 3956 kg / fed in 1997 / 98 and 3724 and 4108 kg / fed in 1998 / 99 for Sakha 69 and Sids 7 , respectively .

Similar results were obtained by **Essia (1979), El- Helaly (1984), Shams El-Din and El - Habbak (1992), Mady (1996),**

Abd-El-Ghany (1997) and Abo-Warda (1997), who found differences in biological yield among wheat varieties .

12) Harvest Index % :

Harvest index percentage was found significant within the two cultivars in the two seasons as presented in Table (12) .

In 1997 / 98 season , the highest harvest index was obtained for Sids 7 (50.0%) compared with Sakha 69 (46.8%). Also, in the second season Sids 7 was superior in harvest index than Sakha 69, Mean values were 47.0 and 52.4% in 1998/99 for Sakha 69 and Sids 7 , respectively .

13) Protein %

Grain protein percentage was significantly different in the two seasons as presented in Table (12) .

In 1997 / 98 season, the highest grain protein presentage was recorded for Sids 7 (13. 1 %) and the lowest value (12.0%) was observed for Sakha 69. The Same trend was also noticed in the second season, the high grain protein percentage was recorded for Sids 7 (13.2%) while, the lowest protein percentage (12.3%) was obtained for Sakha 69. These obtained results are mainly due to inherent differences and their interaction with the environmental factors .

14) Protein Yield Kg / fed :

Results recorded in Table (12) showed that protein yield per feddan was significantly different between the two cultivars in the two growing seasons .

Data indicated that protein yield / fed was significantly higher for Sids 7 than for Sakha 69 in both seasons. Mean values were 224 . 57 and 268 . 02 Kg / fed in 1997 / 98 and 228.11 and 293.76 Kg / fed. in 1998 / 99 for Sakha 69 and Sids 7, respectively .

III.1. Effect of Nitrogen Fertilization on Fresh and Dry Weight of Weeds :

The effect of nitrogen levels, i.e., 60 , 90 , 120 , and 150 Kg N / fed. on fresh and dry weight of weeds/m2 after 60 , 90 and 120 days from sowing date are shown in Table (13) .

a) After 60 Days from Sowing :

Results in Table (13) showed clearly that N-fertilizer levels had significant effect on fresh and dry weight of weeds /m^2 in both seasons. Fresh and dry weight of weeds/m^2 significantly increased by increasing nitrogen level to 150 Kg N / fed. as compared with the lowest levels (60 Kg N / fed.) in both seasons .

b) After 90 Days from Sowing :

Concerning the fresh and dry weight of weeds/m^2 after 90 days from sowing date, the treatments with higher levels of N

- fertilizer significantly increased weed growth as compared with the lowest levels of N (Table 13) .

Generally, increasing nitrogen levels up to 150 Kg N / fed. significantly increased fresh and dry weight of weeds / m^2 in both growing seasons. The increases of weed growth were 2 - 4 times more with the highest N-level (150 Kg N /fed) as compared with the lowest N - level (60 Kg N / fed).

C - After 120 Days from Sowing :

Results in Table (13) showed clearly that N-fertilizer treatments had significant effect on fresh and dry weight of weeds / m^2 in both growing seasons. Fresh and dry weight of weeds/m^2 increased gradually and significantly with increasing N-level up to 150 Kg N / fed. The lowest values of fresh and dry weights of weeds/m^2 were obtained by applying the lowest level of N - fertilizer (60 Kg N/fed) in both growing seasons. The percent increments of fresh and dry weight of weeds/m2 reached 552.5% and 534.9% in the first season, 384.2% and 532.0% in the second season by increasing N - level from 60 to 150 Kg N/ fed., respectively .

These results were in agreement with those obtained by **Fayed *et al.* (1993), Nalewaja and Appleby (1993), El- Bially and Abd El- Samie (1995), Zaher (1996) and El-Metwaly (1998)** who found that, increasing nitrogen levels significantly increased the dry weight of weeds associated with wheat .

Table (13) :Effect of nitrogen levels on fresh and dry weight of weeds at different growth stages of wheat plants in 1997 / 98 and 1998 /99 seasons.

N level Kg / fed .	1997 / 98 season		1998 / 99 season	
	Fresh weight g/m^2	Dry weight g/m^2	Fresh weight g/m^2	Dry weight g/m^2
	(a) 60 days from sowing			
60	206.5	19.8	149.3	29.8
90	237.7	23.5	197.9	42.7
120	309.0	40.5	263.1	67.4
150	372.6	51.8	330.8	90.8
L.S.D 5%	89.1	14.3	86.9	24.4
	(b) 90 days from sowing			
60	299.2	32.9	154.7	31.2
90	319.9	37.4	211.4	53.5
120	678.7	81.6	705.3	154.3
150	1013.0	136.3	852.5	195.0
L.S.D 5%	86.2	27.9	73.6	18.4
	(c) 120 days from sowing			
60	258.5	49.2	318.5	65.0
90	398.2	86.4	443.8	96.5
120	915.9	168.1	817.8	159.2
150	1428.3	263.2	1223.7	228.8
L.S.D 5%	66.9	27.6	88.8	24.8

III.2. Effect of Nitrogen Fertilizer Levels on Wheat Growth:

- **Growth Characters :**

1) Plant Characters :

Results presented in Table (14) showed that applied nitrogen levels to wheat plants had influence on the average values of plant characters number of leaves, stalks and spikes/m2 in addition to plant height and spike length at three growth stages in (1997 / 98 and 1998 / 99 seasons .

Data indicated no specific trend for each of the nitrogen levels on these character at all growth stages in both seasons .

Generally, application of 120 and 150 Kg N / fed significantly increased these characters compared with the two lowest N levels of 60 and 90 Kg N / fed at all growth stages in the two growing seasons while the number of leaves , spike length and number of stalks at first and second sampling were not significantly affected by nitrogen levels in the first and second seasons .

Table (14) :Effect of nitrogen fertilization on number of leaves, stalks spikes / m^2 plant height and spike length at three sampling date of wheat in 1997/98 and 1998/99 seasons .

Characters / Nitrogen levels kg N / fed	1997 / 98 season					1998 / 99 season				
	plant height cm	spike length cm	No. of leaves	No. of stalks	No. of spikes	plant height cm	spike length cm	No. of leaves	No. of stalks	No. of spikes
	(a) 80 days from sowing									
60	40.0	--	1381.5	347.0	--	39.4	--	1099.7	326.0	--
90	41.9	--	1452.5	364.5	--	41.8	--	1276.7	365.5	--
120	43.7	--	1487.6	370.5	--	43.1	--	1252.1	362.0	--
150	46.4	--	1425.5	356.0	--	45.0	--	1152.6	350.5	--
L.S.D. 5%	2.4	--	--	17.5	--	1.7	--	77.7	20.1	--
	(b) 101 days from sowing									
60	87.6	15.9	967.3	359.3	316.1	90.5	15.2	84445.2	348.5	260.9
90	93.5	16.4	1134.1	376.9	280.2	95.8	16.1	9878.3	373.5	236.2
120	97.8	16.1	1101.8	366.8	229.0	98.5	15.6	8928.2	355.5	225.9
150	100.3	15.9	1015.8	346.1	204.2	100.6	16.1	9807.8	347.5	196.6
L.S.D. 5%	4.3	--	104.0	16.9	13.7	3.6	0.8	1073.3	--	19.7
	(c) 121 days from sowing									
60	95.0	14.9	690.6	314.5	314.5	92.6	12.5	640.0	313.5	313.5
90	97.7	15.4	850.5	353.0	353.0	97.5	13.3	732.3	349.9	349.9
120	100.3	15.6	843.4	333.5	333.5	99.6	13.6	776.9	365.6	362.5
150	102.3	15.1	611.3	318.2	317.1	101.3	13.7	667.8	353.4	353.4
L.S.D. 5%	1.4	0.5	75.3	19.2	19.2	1.2	0.3	88.6	18.9	18.7

2- Fresh and Dry Weight of Plants G. / m2 :

The data reported in Table (15) show the average values of fresh and dry weight of leaves and stalks, fresh and dry weight of spikes and total fresh and dry weight of plants at three growth stages in two growing seasons.

Data indicated clearly that, all these characters were significantly affected by applied nitrogen levels at the three growth stages in the two growing seasons. Whereas, they did not significantly affect fresh weight of stalks at three growth stages in the first season. Also, dry weight of stalks and fresh and dry weight of spikes were not significantly affected by applied nitrogen levels at 80 days in the second season as well as at second and third samples in the first and second season, respectively. Under the conditions of this study, 90 and 120 Kg N / fed could be recommend for producing the highest values of fresh and dry weight of different plant organs and total fresh and dry weights of plant at 80, 101 and 121 days from planting in the two growing seasons .

It could be concluded that N is an essential element for wheat growth and adequate supply of N is necessary for stimulation of vegetative growth as a result of increasing the photosynthetic activity in the plant which leads to an increase in dry matter accumulation .

Table (15): Effect of nitrogen fertilization on fresh and dry weight of leaves, stalks and spike at three growth stages of wheat in 1997/98 and 1998/99 seasons .

Characters / Nitrogen levels kg / fed	1997 / 98 season								1998/99 season							
	Weight of leaves g/m2		Weight of stalks g/m2		Weight of spikes g/m2		Total weight of plants .g/m2		Weight of leaves g/m2		Weight of stalks g/m2		Weight of spikes g/m2		Total weight of plants .g/m2	
	Fresh	Dry	Fresh	Dry	Fresh	Dry	Fresh	Dry	Fresh	Dry	Fresh	Dry	Fresh	Dry	Fresh	Dry
a) 80 days from sowing																
60	1147	171.4	1635	167.7	--	--	2576	339.6	1132	170.0	1229	153.1	--	--	2361	323.1
90	1328	216.3	1627	200.1	--	--	2956	416.4	1275	199.8	1335	161.9	--	--	2610	361.8
120	1369	222.3	1695	211.9	--	--	3065	431.0	1334	210.3	1386	174.2	--	--	2712	384.5
150	1247	182.2	1482	188.3	--	--	2734	368.6	1163	170.5	1344	166.8	--	--	2507	337.4
L.S.D.	178.7	26.4	--	23.9	--	--	202.3	39.7	92.9	18.8	76.6	-	--	--	118.33	24.7
b) 101 days from sowing																
60	831.5	238.2	3328	1165	907.3	283.5	5067	1687	826.4	239.1	3085	1167	584.4	202.8	4495	1603
90	1006	280.4	3862	1292	764.8	239.3	5633	1806	991.7	274.4	3475	1418	672.2	249.6	5139	1943
120	930.5	254.8	3997	1243	673.9	202.4	5242	1731	954.7	286.5	3277	1309	602.4	211.8	4834	1807
150	759.6	199.2	3591	1181	602.5	194.7	4932	1537	768.2	205.9	2109	1255	521.1	186.2	4373	1647
L.S.D.	156.2	51.3	--	--	74.4	29.3	483.5	156.9	123.5	37.4	227.6	91.1	66.2	36.7	286.4	104.5
c) At 121 days from sowing																
60	422.1	250.9	2368	1084	1617	952.7	4408	2285	970.2	232.3	2846	968.9	1795	887.5	5600	2088
90	508.5	318.6	2576	1214	1981	1128	5035	2668	1196	320.0	3401	1231	1959	966.4	6441	2517
120	479.5	305.9	2626	1197	1751	982.7	4872	2486	1377	368.3	3437	1113	2150	993.8	6966	2476
150	367.7	223.8	2321	1022	1597	883.6	4285	2124	1100	322.2	2988	985.7	1930	914.8	5985	2225
L.S.D.	53.2	37.5	--	104.1	285.3	120.6	463.9	176.2	164.2	46.9	298.0	92.7	--	--	489.4	143.8

3. Effect of Nitrogen Fertilizer on Chlorophyll and Carotenoids (Mg/ G.D.W) :

The data presented in Table (16) show the averages of chlorophyll A, B, A + B and carotenoids in leaves at 80 and 101 days from planting as affected by N fertilization treatments. It is clear from the results that N fertilizer levels significantly increased chlorophyll A, B, A + B and carotenoids in both seasons as compared with the lowest nitrogen level (60 Kg N/fed.).

The highest N / level (150 Kg N / fed.) produced the highest contents and the lowest dose of 60 Kg N / fed gave the lowest ones. Also , increasing N level over the initial dose of 60 Kg N / fed caused an increase in values of most of the studied characters. Generally the highest response was for 120 Kg N / fed. So , it could be concluded that , applying N at 90, 120 and 150 Kg N / fed significantly increased chlorophyll A, B, A + B and carotenoids compared with the lowest N level (60 Kg N / fed.) at 80 and 101 days from planting in both seasons. Nitrogen is an essential element for chlorophyll formation. These results were in agreement with the results obtaind by **Mamedov (1978), Moursi *et al.* (1978), Mader *et al.* (1981), El-Deepah *et al.* (1984) , Khaled. (1994) and Abd El-Fatah. (1995) .**

Table (16) :Effect of nitrogen fertilizer levels on chlorophyll and carotenoids in wheat leaves Mg/g at 80 and 101 days from sowing in 1997/98 and 1998/99 seasons .

Characters / Nitrogen levels kg / fed	1997 / 98 season				1998 / 99 season			
	Chlorophyll A	Chlorophyll B	Total Chlorophyll A+B	Caratenoids	Chlorophyll A	Chlorophyll B	Total Chlorophyll A+B	Caratenoids
				80 days from sowing				
60	2.073	1.312	3.385	1.242	2.045	1.344	3.389	1.245
90	2.553	1.627	4.181	1.460	2.439	1.693	4.132	1.492
120	2.940	1.836	4.777	1.717	2.908	1.880	4.788	1.670
150	3.784	2.288	6.072	2.029	3.649	2.254	5.903	2.024
L.S.D. 5%	--	0.275	0.329	0.131	0.217	0.208	0.279	0.114
				101 days from sowing				
60	1.869	0.809	2.678	1.263	1.971	0.821	2.792	1.292
90	2.390	1.029	3.419	1.465	2.515	1.031	3.546	1.492
120	2.867	1.313	4.180	1.864	2.961	1.309	4.270	1.872
150	3.344	1.587	4.931	2.216	3.307	1.585	4.890	2.241
L.S.D. 5%	0.198	0.125	0.265	0.119	0.238	0.149	0.338	0.151

III.4. Effect of Nitrogen Fertilizer levels on Yield and Yield Components:

1) Plant Height (Cm) :

Results presented in Table (17) indicated a significant effect of N levels on plant height in the two growing seasons .

In 1997 / 98 applying 150 Kg N / fed. significantly increased plant height over the control treatment (60 Kg N / fed.) by 9.6% . Additional appling N level of 90 and 120 Kg N / fed did not induce any further increase in plant height .

Applying 90, 120 and 150 Kg N / fed. significantly increased plant height by 3.0, 6.5 and 9.6 % as compared with 60 Kg N / fed respectively. Increasing nitrogen levels from 120 up to 150 Kg did not significantly affect plant height .

Asimilar trend was obtained in the second season, where increasing nitrogen level from 60 to 90, 90 to 120 and 120 to 150 Kg / fed caused signifcant increases in plant height by 2.3 , 3.3 and 4.1 %, respectively .

Also, Applying N at 150 Kg / fed significantly increased plant height over all of the applied nitrogen levels. While, no significant differences were obtained between 90, 120 and 150 Kg N / fed.

It could be concluded that N is an essential element for wheat growth and an adequate supply of N is necessary for

stimulation of vegetative growth as a result of increasing photosynthetic activity .

The present results are in general agreement with those obtained by **Eissa (1979), El- Helaly (1984), Eman Sadek (1985), Eissa (1990), Hayam Mahgoup (1990), Shams El -Din and El-Habbak (1992), Abo-Warda (1993), Sultan *et al.* (1993) and Mady (1996)** who found that N application significantly increased plant height of wheat.

2- Spike Length (Cm) :

Increasing nitrogen rates significantly affected spike length in the two successive seasons as it is clear from the data presented in Table (17).

In 1997/98 season , spike length increased by 4.6 , 7.3 and 3.7 % as a result of increasing nitrogen rate from 60 to 90 , 90 to 120 and 150 Kg N / fed., respectively. It could be generally noticed that spike length significantly increased as nitrogen rates increased up to 120 Kg N / fed .

Applying N at 90, 120 and 150 Kg N / fed increased significantly spike length over the lowest N rate (60 Kg N / fed) by 0.7, 3.9 and 5.5 % respectively in 1998 / 99 season . The highest value was recorded at (120 and 150 Kg N / fed) in first and second season , respectively .

It could be concluded that N is essential element for cereals and a good supply of N is necessary for formulating and building

up longer spikes. This result is mainly due to the role of N on photosynthetic activity and the vegetative growth of wheat plants

Similar results were obtained by **El-Helaly (1984), Eissa (1990), Hayam Mahgoup (1990), Shams El-Din and El-Habbak (1992) , Eissa (1996) and Abd - El-Ghany (1997)** where they indicated that N application significantly increased spike length .

3- Number of Spikes / m2 :

As it is clear from Table (17), the effect of nitrogen application on number of spikes /m^2 was not significant in both growing seasons.

In 1997 / 98 season, applying N at 90 and 120 Kg N / fed. insignificantly increased spikes / m^2 over the lowest N level of 60 Kg N / fed by 3.2 and 5.2 % , respectively .

On the other hand, increasing N rate to 150 Kg N / fed decreased the number of spikes / m^2 by 2.6% as compared with 60 Kg N / fed .

The same trend was obtained in the second season without significant differences between different levels of nitrogen .

Applying N at 90 , 120 and 150 Kg N / fed insignificantly increased spikes / m2 over lowest N level of 60 Kg N / fed by 4.2 , 6.3 and 2.1%, respectively . Generally, the highest response to N was for the application of 120 Kg N / fed . So it could be

concluded that N encouraged tillering in wheat . Also, many investigators reported that the increase in N level markedly increased No. of spiks/m^2 of wheat **El-Helaly (1984), Hayam Mahgoub. (1990), Shams El- Din and El - Habbak (1992), Sultan *et al.* (1993), Mady (1996) and Abd El-Ghany (1997).**

4) Number of Stalkes / m^2 :

Data obtained for the number of stalkes / m^2 as affected by the applied nitrogen levels were almost similar to that obtained for number of spikes / m^2 as shown in Table (17) .

In 1997 / 98 season , applying N at 90 and 120 Kg N / fed insignificantly increased stalkes / m^2 over the lowest N level of 60 Kg N / fed by 4.1 and 6.1 %, respectively. On the other hand , increasing the application of N level to 150 Kg N / fed decreased the number of stalkes / m^2 by 2.6% as compared with the lowest level (60 Kg N / fed) .

Also in 1998 / 99 season, the same trend was obtained without significant differences between the applied different levels of nitrogen .

Application of nitrogen fertilizer at the rates of 90, 120 and 150 Kg N / fed did not cause significant increase in number of stalkes / m2 as compared with the initial nitrogen level of of 60 Kg / fed as the increase was 4.2 , 6.3 and 2.1 % , respectively .

It could be noticed that the highest number of stalkes / m^2

was obtained from the application of 120 Kg N / fed . Such result could be explained by the potential effect of nitrogen as a major and essential nutrient in stimulating the tillering behaviour of wheat plants. This results is in a greement with those of many other investigators who indicated that the increase in N level markedly increased number of spikes / m^2 of wheat plants **(El-Helaly, 1984; Hayam Mahgoub, 1990; Shams El-Din and El -Habbak, 1992; Sulttan *et al.*, 1993; Mady , 1996 and Abd El - Ghany , 1997) .**

5- Number of Spikelets / Spike :

Results presented in Table (17) showed that N application significantly affected number of spikelets per spike of wheat in the two growing seasons.

In 1997 / 98 season, applying N at 120 Kg N / fed significantly increased number of spikelets / spike by 4.6% over the lowest level (60 Kg N / fed) . The other N levels, as 60 , 90 and 150 Kg N / fed did not cause any significant differences in number of spikelets per spike .

In the second season , application of 90 and 150 Kg N / fed significantly increased number of spikelets per spike by 2.9 and 4.8%, respectively over the lowest level of 60 Kg / fed. While , no significant differences were between the two N levels of 60 and 120 Kg / fed as well as between 90 and 120 Kg N /fed.

It could be concluded that the highest number of spikelets per spike were recorded at 120 and 150 Kg N / fed in the first and second seasons, respectively. Similaryly , the positive effect of N on number of spikelets / spike were reported by **Eissa (1979), Eman Sadek (1985) , Shams El -Din and El- Habbak. (1992) and Mady (1996) .**

6) Number of Grains / Spike:

Number of grains per spike was significantly affected by increasing nitrogen rates in a similar way to that obtained on number of spikelets per spike as shown in Table (17) .

In 1997 / 98 season , number of grains / spike increased by 4.4, 7.7 and 5.0 % by increasing the application levels of nitrogen to 90, 120 and 150 Kg / fed, respectively as compared with the lowest level of 60 Kg / fed. However , number of grains tended to increase by increasing nitrogen level from 90 to 120 and 150 Kg / fed without significant differences.

Similar results were observed in the second season, applying N at 90, 120 and 150 Kg / fed significantly increased number of grains / spike by 10.7, 1.0 and 8.8 %, respectively over the lowest level (60 Kg N / fed.). Also, no significant differences were obtained by increasing nitrogen level from 60 to 120 Kg / fed.

Table (17):Effect of nitrogen fertilization on yield and yield components of wheat grown in 1997/98 and 1998/99 seasons .

Characters	1997 / 98 season					1998 / 99 season				
	Kg N / fed				L.S.D	Kg N / fed				L.S.D
	60	90	120	150	5 %	60	90	120	150	5 %
Plant height (cm)	89.7	92.4	95.5	98.3	2.81	102.0	104.3	105.4	106.2	1.9
Spike length (cm)	10.9	11.4	11.7	11.3	0.47	12.9	12.9	13.3	13.5	0.52
No. of spikes / m2	332.5	343.0	349.8	323.7	--	301.7	314.4	320.8	308.1	--
No. of stalks / m2	332.5	346.1	352.8	323.7	--	301.7	314.4	320.8	308.1	--
No. of spikelets / spike	20.13	20.40	21.06	20.42	0.33	20.35	20.99	20.67	21.32	0.56
No. of grains/spike	52.1	54.4	56.1	54.7	2.1	52.4	58.0	52.9	57.0	4.5
grains weight/spike(g)	2.48	2.64	2.73	2.59	0.12	2.55	2.84	2.85	2.78	--
1000 - grain weight (g)	46.8	48.1	47.9	47.4	1.1	48.2	48.9	49.0	48.5	--
grain yield (kg/fed)	1792.8	1982.1	2002.8	1928.3	144.9	1912.1	2114.2	2119.8	1988.6	--
Straw yield (kg/fed)	1864.4	1912.3	1904.9	1868.3	36.5	1867.4	1909.1	1900.7	1853.5	41.2
biological yield (kg/fed)	3657.3	3894.4	3907.7	3799.3	161.4	3779.5	4023.3	4020.5	3840.2	--
harvest undex %	46.5	48.6	49.4	49.1	--	48.5	50.7	49.7	49.9	--
protein %	11.8	12.9	13.2	12.8	0.87	11.8	12.9	13.3	12.8	0.85
protein yield (kg/fed)	210.26	257.76	268.00	249.16	25.15	228.12	280.16	281.68	253.99	39.41

It could be concluded that the highest number of grains per spike were obtained at 120 and 90 Kg N / fed. in the first and second seasons, respectivelly. The encouraging effect of N on kernels number is mainly due to its effect on photosynthetic activity and on the activity of the vegetative growth of wheat as well as extending the grain filling period that is give more time for forming and accumulating the material used in this important stage .

The postive effect of N on number of kernels / spike was similary reported by **Eissa (1979), Eman Sadek (1985), Shams El-Din and El - Habbak (1992) and Mady (1996) .**

7) Grains Weight / Spike (g) :

The effect of nitrogen fertilizer levels on the weight of grains per spike was significant in the first season only as it is clear from Table (17) .

In the first season , weight of grains per spike reached its maximum weight by the application of 120 Kg N / fed. The difference in kernels weight due to the applied different N levels (90, 120 and 150 Kg N / fed) were insignificant as well as between 60 and 150 Kg N / fed .

Also, in the second season, the highest weight of kernels per spike was recorded at 120 Kg N / fed, while, the differences in kernels weight / spike between 60, 90 , 120 and 150 Kg N / fed were not significant .

Generally, application of 120 Kg N / fed significantly increased weight of kernels per spike as compared with the different N levels of 60, 90 and 150 Kg N / fed in the two growing seasons, respectively. These results are quite expected since nitrogen application increased dry matter accumulation through different growth stages , also spike length and number of spikes / m2 were the highest with increasing N level at 120 Kg N / fed . This result is in agreement with those of **Eissa (1979), Eman Sadek (1985), Shams El - Din and El -Habbak (1992) and Mady (1996) .**

8) Weight of 1000 -Kernels (g) :

Data obtained on 1000 - kernel weight as affected by the applied nitrogen fertilizer rates are presented in Table (17) .

Results revealed that nitrogen rates significantly affected 1000-kernel weight in the first season, whereas it was insignificant in the second one .

In 1997 / 98 season , applying N at 90 , 120 and 150 Kg N / fed significantly increased weight of 1000 kernels by 2.8, 2.4 and 1.3%, respectively as compared with the lowest level (60 Kg N/fed). However the differences in weight of 1000 - kernels due to increasing the rate from 90 to 120 Kg N / fed was not significant as well as between 60 and 150 Kg N / fed. The highest weight of 1000 - kernels (48.1 g) was recorded by appling 90 Kg N / fed and the lowest value (46.8 g) was recorded at 60 Kg N / fed .

In the second season, slight increases in weight of 1000 - kernels were obtained by increasing nitrogen levels from 60 to 90, 120 and 150 Kg N / fed without significant differences between rates.These increases were 1.5, 1.7 and 0.6%, respectively as compared with the lowest nitrogen level of 60 Kg N / fed. Generally, the application of 90 and 120 Kg N / fed produced the heaviest weight of 1000 kernels which was 48.1 and 49.0 g in the two growing seasons, respectively . Nitrogen as a major nutrient element proved to have well known role on all of the metaboilic processes in the plant which lead to an increase in the dry matter accumulation and consquently the 1000 - kernel weight .

These results agree with those obtaind by **Eissa (1979), El-Helaly (1984), Eman Sadek (1985) and Abd El - Ghany (1997)**. Where they reported that the increase in N level, increased 1000 - kernel weight . However, **Saleh et al. (1985) , El -Zein (1994) and Mady (1996)** reported that the weight of 1000 kernels was decreased by increasing N fertilizer over to 90 Kg N / feddan .

9) Grain Yield (Kg / fed) :

Data for the effect of nitrogen fertilizer levels on wheat grain yield / fed are presented in Table (17) .

The increase in N level significantly increased grain yield of wheat in the first season , whereas, such effect was not clear with insignificant differences in the second one .

In 1997 / 98 season , applying N at 90 , 120 and 150 Kg N/ fed. significantly increased grain yield by 10.6 , 11.7 and 7.6 % , respectively compared with the lowest rate of 60 Kg N / fed .

The differences in grain yield due to increasing the rates of nitrogen from 90 to 120 and 150 Kg N/fed. were not significant whereas, the only significant differences in that season were obtained between 60 and each of 90 and 120 Kg N / fed .

Similar trend was obtained in 1998/ 99 season without significant differences between the applied nitrogen levels. The application of 90 , 120 and 150 Kg N / fed . increased grain yield by 10.6, 10.9 and 4.0%, respectively as compared with the lowest nitrogen level of 60 Kg / fed .

It could be concluded that N is essentially needed for producing higher grain yield. Under the conditions of this study, 120 Kg N / fed could be recomended for producing the highest values of growth characteristies as well as yield and its companents. The increase in the grain yield is mainly due to the role of nitrogen fertilizer in increasing the accumulation of dry matter contents through the growing season. This was reflected on the yield component as spike length , number of spikes / m^2, number of spikelets and grains / spike, grain weight of spike and the weight of 1000 kernels. Also, a good supply of N extended the vegetative growth period and grain filling stage which consequently reflected on grain yield .

Similar results were obtained by **Eissa (1979), El - Helaly (1984), Eman Sadek (1985), Hayam Mahgoub (1990), Shams El -Din and El-Habbak (1992), Abo - Warda (1993), Fayed *et al.* (1993) , Sulttan *et al.* (1993) and Eman Sadek and Abo-Warda (1998 b).**

10) Straw Yield per Feddan (Kg / fed) :

Results in Table (17) indicated that the increase in N level significantly increased straw yield / fed of wheat in the two successive seasons .

In 1997 /98 season , straw yield was increased by 2.6 , 2.2 and 0.2 % with increasing nitrogen level to 90, 120 and 150 Kg N / fed., respectively as compared with N rate of 60 Kg / fed.

The highest response was recorded at 90 Kg N / fed. level . However, further increase in N level of 120 and 150 Kg N / fed. reduced the straw yield.

Similarly, in 1998 / 99 season the application of 90 and 120 Kg / fed significantly increased straw yield by 2.2 and 1.8 % compared with 60 Kg N / fed. The highest response was recorded at 90 Kg N / fed level. Whereas, increasing N level up to 150 Kg / fed decreased straw yield as compared with the application of 60 Kg N / fed level .

In could be concluded that N at 90 Kg N / fed. was the best level for producing the highest straw yield. The increase in

straw yield is mainly due to the effect of N on plant height, number of tiller/m^2 and the other growth component characters.

Similar results were obtained by **Eissa (1977), El-Helaly, (1984), Eman Sadek (1985), Gheith *et al.* (1989), Abo-Warda (1993), Mady (1996) and Abd -El -Ghany (1997) .**

11) Biological Yield per Feddan (Kg / fed) :

Data in Table (17) revealed that biological yield per feddan was significantly affected by the applied nitrogen levels only in the first season. Whereas, the differences were not significant in the second season .

In 1997 / 98 season , applying N at 90 , 120 and 150 Kg N / fed significantly increased biological yield by 6.5, 6.8 and 3.9 %, respectively as compared with the lowest level (60 Kg / fed.). Whereas, the differences in biological yield between 60 and 150 Kg N / fed failed to reach the significant level .

The highest biological yield was obtained by applying 120 Kg N/fed, whereas, increases N rate up to 150 kg N / fed decreased the biological yield .

In 1998 / 99 season , the application of 90 , 120 and 150 kg N / fed insignificantly increased biological yield by 6.5 , 6.4 and 1.6% respectively as compared with the application of 60 kg N / fed .

It was generally observed that the highest biological yield was obtained by applying 90 kg N / fed , and a reduction in the

biological yield resulted from applying the higher N level (150 Kg N / fed). This result showed the negative effect of the excessive N levels on the biological yield. The increase in biological yield resulting from N application is mainly due to the positive effects of nitrogen on vegetative growth and grain formation . The role of N as the most essential nutritive element for growth and development of wheat is clearly demonstrated. Similar results were obtained by **Abd El - Gawad *et al* (1993 b) and Abd El - Ghany (1997).**

12) Harvest Index % :

As it is clear from Table (17) the effect of nitrogen application on harvest index percentage was not significant in both growing seasons .

In 1997 / 98 season , applying N at 120 and 150 Kg N / fed insignificantly increased harvest index than as compared with either 60 or 90 Kg / fed. The highest response was recorded at 120 Kg N / fed .

In the second season, applying 90 and 150 Kg N / fed insignificantly increased harvest index than either 60 or 120 Kg N / fed. Similar results were obtained by **Shehab El - Din and Eissa (1992), Mady (1996) , Abd El - Ghany .(1997) and Mostafa. *et al.* (1997).** However, **El -Helaly (1984) and El - Gharieb and Monoufi. (1988)** found that harvest index was reduced by the application of nitrogen .

13) Protein % :

Results in Table (17) indicated that the increase in protein percentage was significantly affected by the applied nitrogen level in the two successive seasons .

In 1997 / 98 season , the highest protein content (13.2%) was recorded for 120 Kg N / fed and the lowest protein percentage (11.8%) was recorded for 60 Kg N / fed .

It was observed that slight increases in percentage protein were obtained with increasing N level from 90 to 120 and 150 Kg N/fed. but these increases were below the level of significance .

A similar trend was observed in the second growing sesaon, applying nitrogen at 120 kg N / fed produced the highest protein content in grain (13.3%) while, the lowest protein percentage (11.8%) was recorded at 60 Kg N/fed, slight increases in percentage protein were induced with increasing N level from 90 to 120 and 150 Kg N / fed without significant differences .

In general, increases in percentage protein in grain were observed due to increasing nitrogen level in the two growing seasons .

Similar results were also obtained by **El-Helaly (1984), Abd El-Gawad *et al.* (1993b) Abo-Warda (1993), Mady (1996) and Abd El -Ghany (1997)** who found that increasing N rate resulted in an increase in grain percentage protein .

14) Protein Yield Kg / fed . :

Data in Table (17) revealed that protein yield kg/fed was significantly affected by the applied nitrogen level in the two growing seasons .

In 1997 / 98 season , the highest protein yield (268.00 Kg / fed) was recorded at 120 Kg N / fed, and the lowest protein yield (210.26 Kg /fed) was recorded at 60 Kg N / fed.

It was observed that slight increases in protein yield were obtained with increasing N level from 90 to 120 and 150 Kg N / fed but these increases were below the level of significance .

A similar trend was observed in the second growing season , applying nitrogen at 120 Kg N / fed produced the highest protein yield (281.68 Kg / fed) while , the lowest protein yield (228.12 kg / fed) was recorded at 60 Kg N / fed. Slight increases in protein yield were induced with increasing N level from 90 to 120 and 150 Kg N/ fed wihout significant differences .

In general, increases in protein yield were observed due to increasing nitrogen level in the two growing seasons .

These results in agreement with those obtained by **El-Helaly (1984), Abd El-Gawad *et al.* (1993 b), Abo -Warda (1993) , Mady (1996) and Abd El-Ghany (1997)** who found that increasing N application rate resulted in an increase in protein yield per feddan .

IV. Effect of the Interaction Between Chemical Weed Control and wheat Cultivars:

a) Dry Weight of Weeds :

Data reported in Table (18) showed that there was a significant effect of the interaction between chemical weed control and wheat varieties on dry weight of weeds / m2 after 60 days from sowing in both growing seasons and after 121 days from sowing in the second season.

The lowest values from dry weight of weeds / m^2 of previous dates were obtained by Granstar treatment and Sakha 69 and greatest values were recorded for unweeded treatment and Sids 7 after 60 days in the first season , after 121 day in the second season and unweeded treatment with Sakha 69 after 60 days in second season. Moreover, the difference between herbicide - wheat combination was in magnitude not in direction. That is , Granstar with Sids 7 and Sakha 69 combinations were better in suppressing weed growth as indicated by fresh and dry weight of weeds (g/m^2) these results are in agreement with the results obtained by **Niemann (1990), Valenti and Wicks (1992) and Lemerle D. *et al.* (1996) .**

b) Total Fresh and Dry weight of wheat plants :

Results of the interaction of chemical weed control treatments and the two wheat varieties on total fresh and dry weight of wheat plant after 80 and 101 days from sowing date in the second season and after 121 fays in both growing seasons was significant (Table 19) .

Table (18):Effect of interaction of weed control treatments and wheat cultivars on dry weight of weeds G. D.W. / m^2 at 60 days from sowing in 1997/98 and at 60 and 121 days from sowing in 1998 / 99 .

Weed control	Grasp		Granstar		Mixture		Control		L.S.D
Varieties / Characters	Sakha 69	Sids 7	Sakha 69	Sids 7	Sakha 69	Sids 7	Sakha 69	Sids 7	5 %
60 days from sowing in 1997 / 98 season									
Dry weight of weeds g/ m^2	40.75	39.82	13.62	9.40	29.84	18.45	45.61	73.64	20.31
60 days from sowing in 1998/99 season									
Dry weight of weeds g/ m^2	71.67	69.95	6.07	8.44	27.60	20.39	184.49	73.04	34.46
121 days from sowing in 1998/99 season									
Dry weight of weeds g/ m^2	160.2	229.0	18.58	26.48	37.72	51.09	259.59	316.04	35.04

Table (19): Effect of interaction of weed control treatments and wheat cultivars on total fresh weight and Total dry weight of plants (g / m2) at 80 , 101 and 121 days from sowing in 1998 / 99 season .

Weed control	Grasp		Granstar		Mixture		Control		L.S.D
Varieties / Characters	Sakha 69	Sids 7	Sakha 69	Sids 7	Sakha 69	Sids 7	Sakha 69	Sids 7	5 %
80 days from sowing in 1998 / 99 season									
Total fresh weight of plants g./m^2	2113	2532	2418	3005	2244	3007	2309	2752	167.34
Total dry weight of plants g/m^2	298.2	359.9	315.2	431.7	286.3	430.6	289.8	402.7	34.9
101 days from sowing in 1998.99 season									
	3315	5132	4584	5296	5059	5660	4205	4432	405.02
Total fresh weight of plants g/m^2	1345	1819	1636	1983	1895	2293	1528	1502	147.73
Total dry weight of plants g/m^2	121 days from sowing in 1997.98 season								
	3634	5314	4911	5493	5020	5429	2758	4642	656.11
Total fresh weight of plants g/m^2	121 days from sowing in 1998/99 season								
	5432	6181	7117	5969	6667	7643	5888	5086	692.14
Total fresh weight of plants g/m^2	1877	2491	2193	2502	2444	3041	2049	2016	203.41
Total dry weight of plants g/m^2									

The highest values for the previous characters were obtained by the mixture treatment of Granstar with Sids 7 variety. On the other hand the lowest fresh and dry weights were recorded by the unweeded treatment with Sakha 69 variety. These results in agreement with the results obtained by **Shebl. (1998) .**

c) Some Wheat Growth Characters :

Results in Table (20) Showed significant effect of the interaction between chemical weed control treatments and the two cultivars on plant height (cm) number of stalks and spikes / m^2, fresh weight of stalks and spikes (g/m^2) and dry weight of leaves and spikes (g/m^2) in the first season. Also, plant hight (cm) , spike length (cm), fresh weight of stalks (g/ m^2) and dry weight of stalks / m^2 in the second season after 121 days from sowing date. Unweeded treatment was significantly lower than all herbicide-wheat combination. The highest values were obtained by Granstar treatment or the mixture treatment (Grasp + Granstar) in some characters with Sids 7 and in other character with Sakha 69 variety .

These results are in agreement with the results obtained by **Barhoma. *et al.* (1990), Saad and Shaban (1991), Lemerle *et al.* (1996) and Shebl (1998).**

Table (20) :Effect of interaction of weed control treatments and wheat cultivars on some wheat growth characters at 121 dys from sowing in 1997 / 98 and 1998/99 seasons .

Weed control	Grasp		Granstar		Mixture		Control		L.S.D
Varieties / Characters	Sakha 69	Sids 7	Sakha 69	Sids 7	Sakha 69	Sids 7	Sakha 69	Sids 7	5 %
121 days from sowing in 1997/98 season									
Plant height (cm)	97.81	94.12	97.62	103.19	100.81	96.00	100.37	100.50	2.01
No. of stalks / m^2	329	348	351	351	365	347	252	293	27.03
No. of spikes / m^2	329	348	351	351	365	346	252	293	27.12
Fresh weight of stalks g./m^2	2112	2807	2558	2829	2560	2861	1523	2535	389.55
Fresh weight of spikes g./m^2	1131	2105	1852	2114	1992	2003	894	1806	403.52
Dry weight of leaves g/ m^2	228.5	186.6	315.0	342.1	314.0	374.8	234.2	203.2	53.01
Dry weight of spikes g. / m^2	588.3	1214	995.4	1233	1075	1216	542.7	1030	170.6
121 days from sowing in 1998/99 season									
Plant height (cm) .	96.31	96.81	101.3	98.00	99.87	95.12	97.68	96.81	2.01
Spike length (cm)	12.00	14.44	12.88	13.69	12.25	14.13	12.56	14.38	0.44
Fresh weight of stalks g./m^2	2701	2977	3824	2894	3337	4186	2949	2479	389.55
Dry weight of stalks g./ m^2	901.9	990.2	1078	1122	1141	1469	947.9	949.5	131.05

d) Chlorophyll and Carotenoids Content :

Results in Table (21) showed that there was a significant effect of the interaction between chemical weed control treatments and the two cultivars on chlorophyll A, B, total chloroplyll and carotenoids after 80 days from sowing in both seasons (except chlorophyll A in the second season).

After 101 days from sowing, chlorophyll affected by this interaction were chlorophyll A and total chlorophyll in the first season and chlorophyll B in the second season .

The mixture treatment (Grasp + Granstar) with Sakha 69 variety gave the lowest values from all previous chlorophyll and carotenoids content (mg / g D.W.) as compared with other herbicide - wheat combinations inculding un weeded treatment .

e) Yield and Yield Components :

Number of grains / spike, 1000-grain weight, grains weight/ spike, grain, straw and biological Yields (Kg / fed), in the first season, harvest index, protein percentage in grains and total protein yield (kg /fed.) were significantly affected by the interaction between chemical weed treatment and the two wheat varities.

The greatest values from previous characters were obtanied by mixture treatment or Granstar treatment with Sids 7 variety with few exceptions. On the other hand the lowest values were recorded by Sakha 69 variety with unweed treatment and Sakha 69 variety with unweeded treatment .

These results are in agreement with the results oblained by **Barhoma *et al.* (1990), Saad and Shaban (1991) and Shabl (1998).**

Table (21) :Effect of interaction of weed control treatments and wheat cultivars on chlorophyll A , B , Total chlorophyll (A + B) and Carotenoids at 80 and 101 days from sowing in 1997 / 98 and 1998/99 seasons (Mg / g) .

Weed control	Grasp		Granstar		Mixture		Control		L.S.D
Varieties / Characters	Sakha 69	Sids 7	Sakha 69	Sids 7	Sakha 69	Sids 7	Sakha 69	Sids 7	5 %
80 days from sowing in 1997/98 season									
Chlorophyll . A.	2.64	2.98	2.54	2.67	2.53	2.91	2.99	3.44	0.36
Chlorophyll B .	1.75	2.34	1.77	1.62	1.12	1.85	1.69	1.99	0.39
Total Chlorophyll	4.39	5.32	4.32	4.28	3.65	4.75	4.68	5.43	0.46
Carotenoids	1.40	1.74	1.39	1.61	1.27	1.63	1.92	1.94	0.19
80 days from sowing in 1998/99 season									
Chlorophyll . B.	1.72	2.31	1.83	1.71	1.39	1.86	1.60	1.92	0.29
Total Chlorophyll	4.26	5.21	4.38	4.35	3.96	4.79	4.47	5.01	0.39
Carotenoids	1.91	1.75	1.39	1.62	1.32	1.68	1.82	1.86	0.16
101 days from sowing in 1997/98 season									
Chlorophyll . A.	2.47	3.14	2.41	2.82	2.21	2.46	2.80	2.63	0.28
Total Chlorophyll	3.76	4.60	3.44	3.99	2.99	3.67	3.96	3.99	0.37
101 days from sowing in 1998/99 season									
Chlorophyll . B.	1.32	1.44	1.00	1.15	0.75	1.30	1.14	1.39	0.21

Table (22): Effect of interaction of weed control treatments and wheat cultivars on wheat yield and its components in 1997 / 98 and 1998/99 seasons .

Weed control	Grasp		Granstar		Mixture		Control		L.S.D
Varieties / Characters	Sakha 69	Sids 7	Sakha 69	Sids 7	Sakha 69	Sids 7	Sakha 69	Sids 7	5 %
	in 1997 / 98 season								
No. of grains / spike	43.13	60.00	51.88	60.50	52.63	63.19	43.75	59.50	3.01
1000 grains weight (g)	40.98	50.70	46.09	53.46	48.94	52.67	43.12	44.49	1.51
grains / spikes weight (g)	1.79	3.05	2.39	3.24	2.58	3.33	1.84	2.66	0.17
Grain yield Kg / fed	1476	1887	2305	2345	2547	2589	942	1322	205.04
Straw yield Kg / fed	1854	1907	1918	1988	1992	1984	1662	1796	51.55
Biological yield Kg / fed .	3330	3794	4223	4333	4538	4572	2604	3124	228.25
Harvest index	41.91	47.96	54.60	54.13	56.11	56.62	34.41	41.48	3.37
Protein % in grains	11.65	13.08	13.16	12.38	12.20	14.42	11.79	12.67	1.22
Total protein yield Kg / fed	170.1	243.8	303.8	290.8	311.1	371.6	113.2	165.9	35.56
	in 199 8 / 99 season								
Harvest index	39.54	50.81	51.91	55.07	54.21	54.42	42.38	49.44	4.91
protein % in grain	11.78	13.15	13.24	12.42	12.22	14.36	11.84	12.67	1.21
Total protein yield Kg / fed	148.6	275.5	296.9	312.5	304.4	351.4	162.5	235.6	55.74

IV. Effect of Interactions Between Weed Control treatment and nitrogen fertilization :

1) Weed Growth :

Data reported in Table (23) showed that there was statistical significant effects of the interaction between chemical weed control treatments and nitrogen fertilizer levels on fresh and dry weight of associated weeds/m^2 after 90 and 121 days from sowing in both growing seasons.

The lowest values from fresh and dry weight of weeds/m^2 were obtained from mixture treatment (Granstar + Grasp) and Granstar with the lowest level of applied nitrogen (60 kg/ N / fed). On the other hand, the greatest values were recorded by unweeded treatment with higher levels of applied nitrogen after 90 and 121 days from sowing in both growing seasons . These results are in agreement with the results obtained by **El-Desoki *et al.* (1993), Sultan *et al* (1995) and Zaher (1996) .**

2) Wheat Growth Charcecters :

The interaction between chemical weed control treatments and different levels of nitrogen fetilizer had a significant effect on total dry weight / plant (g) after 101 days from sowing in the second season (Table 24) the highest values were obtained by mixture treatment and Grnstar treatment with the 90, 120 and 150 kg N/fed. Whereas, the lowest values resulted from the control treatment and Grasp treatment with 60 and 150 Kg N/fed

Table (23): Effect of interaction of weed control treatments and Nitrogen fertilization on fresh and Dry weight of weeds G./m^2 at 90 and 121 days after sowing in 1997 / 98 and 1998/99 seasons .

Weed control	Grasp				Granstar				Mixture				Control				L.S.D
Nitrogen levels Kg N / fed / Characters	60	90	120	150	60	90	120	150	60	90	120	150	60	90	120	150	5 %
after 90 days from sowing 1997 / 98 season																	
Fresh weight of weeds gm^2	454.0	473.2	1290	1428	32.2	34.1	44.9	70.2	35.9	47.2	75.0	94.6	675	725	1304.0	2459	172.4
Dry weight of weeds g/ m^2	48.14	54.49	162.90	168.6	3.32	4.03	11.03	15.69	2.78	6.54	8.86	13.39	77.61	84.52	143.7	347.3	55.86
after 121 days from sowing 1997 / 98 season																	
Fresh weight of weeds gm^2	464.2	514.8	1508	2563	79.62	142.00	172.2	225.0	154.2	254.5	303.6	350.9	335.8	681.4	1680	2574	133.9
Dry weight of weeds g / m^2	88.77	113.3	252.7	441.2	15.33	19.76	23.40	34.31	26.47	41.20	52.67	60.50	66.32	171.4	343.5	516.9	55.32
after 90 days from sowing 1998/99 season																	
Fresh weight of weeds g/m^2	202.5	269.9	1315	1442	24.0	29.0	45.8	65.5	67.5	96.0	108.4	145.1	324.9	450.6	1352.4	1757.0	147.1
Dry weight of weeds g / m^2	37.68	64.15	272.7	286.0	6.01	7.44	12.73	18.02	13.31	20.54	22.40	35.80	67.89	121.8	309.2	440.3	36.88
after 121 days from sowing 1998/99 season																	
Fresh weight of weeds g/m^2	570.9	634.0	1213	1765	80.37	106.2	132.8	158.5	176.0	202.0	254.0	320.5	446.6	833.1	1671	2650	177.6
Dry weight of weeds g / m^2	125.5	142.6	212.1	298.2	15.63	21.86	25.23	27.38	31.11	35.13	51.09	60.29	87.83	186.8	348.4	529.3	49.56

Table (24): Effect of significant interaction of weed control treatments and nitrogen fertilization on some wheat growth characters after 121 days from sowing in 1997 / 98 and after 101 , 121 days from sowing in 1998/99 season .

Weed control	Grasp				Granstar				Mixture				Control				L.S.D
Nitrogen levels Kg N / fed / Characters	60	90	120	150	60	90	120	150	60	90	120	150	60	90	120	150	5 %
					after 121 days from sowing 1997 / 98 season												
No. of leaves / m^2	680.1	751.6	779.1	512.6	682.5	1299	1165	774.3	857.0	779.1	826.1	567.1	542.8	571.9	603.4	590.8	150.6
Fresh weight of stalks g/ m^2	2686	2951	2246	1955	3392	2605	2959	2818	2706	2733	2889	2515	1690	2017	2410	1997	550.9
Total dry weight of plants g/m^2	2403	2616	2276	1701	2325	2892	2628	2477	2582	2914	2933	2376	1830	2250	2106	1945	352.4
					after 101 days from sowing 1998/99 season												
Total dry weight of plants g/m^2	1484	1799	1670	1376	1638	2001	1921	1682	1936	2175	2036	2231	1355	1800	1604	1301	208.9
					after 121 days from sowing 1998/99 season												
Spike length (cm)	12.00	13.87	13.87	13.12	13.00	13.37	13.37	13.37	12.62	13.12	13.50	13.50	12.37	12.87	13.75	14.87	0.63
No . of leves / m2	582.1	679.6	758.2	635.0	849.2	826.9	784.1	698.5	714.6	809.9	783.8	613.90	414.0	612.6	781.6	723.6	150.6
Total fresh weight of plants g/m^2	4773	5778	6778	5897	6169	6589	7198	6217	7372	7324	7493	6432	4085	6073	6394	5397	978.8
Dry weight of stalks g . /m^2	768	1201	1037	777	995	1169	1121	1114	1317	1486	1286	1129	795	1067	1010	922	185.3

After 121 days from sowing the previous interaction had also significant effect on fresh weight of stalks / m^2 in the first season , number of leaves / m^2 in both seasons, dry weight of stalks/m^2 in the second season, spike length in the second season, total fresh weight / plant in the second season and total dry weight / plant in the first season.

With regard to fresh weight of stalks/m^2 the greastest values resulted from the mixture and Granstar treatment and the highest levels of nitrogen (120 and 150 kg N / fed) .

The treatments of Granstar with 90 and 120 kg N / fed. recorded the number of leaves/ m^2 in the first season, whereas, the treatment with Granstar with 60 and 90 Kg N / fed gave the highest number of leaves/m^2 in the second season .

Concerning dry weight of stalks /m^2, spike length, total fresh weight / plant in the second season and total dry weight / plant in the first season , the greatest values were obtained by the mixture and Granstar treatments with 90 and 120 kg N / fed with a few exceptions. On the other hand, the lowest values of all previous growth characters were obtained by unweeded and Granstar for lowest levels of nitrogen fertilizer. These results are in agreement with the results obtained by **Tayebi and Dudhan (1985), Hooda and Agarwal (1987), Thakur and Singh (1988), Bhagawati *et al.* (1992), El-Desoki *et al.* (1993), Fayed *et al.* (1993), Sultan *et al.* (1994), Sultan *et al.* (1995), Zaher (1996) and El Metwaly (1998).**

3) Chlorophyll A,B , Total Chlorophyll and Carotenoids :

Chlorophyll A, total chlorephyll and carotenoids after 80 days from sowing in the first season and chlorophyll B after 101 days from sowing in the second season were significantly affected by the interaction between chemical weed control and different levels of N fertilizer (Table 25) .

The highest values of chlorophyll were recorded by the highest level of N fertilizer (150 kg. N/ fed.) with the unweeded treatment whereas, the lowest values were obtained by lower level of N fertilizer (60 kg N / fed) and the mixture treatment . Unweeded treatment with 150 kg N/fed gave values of chlorophyll A, total chlorophyll and carotenoids two folds that of 60 Kg N / fed with the mixture treatment after 80 days from sowing in the first season .

4) Yield and Yield components :

Results reported in Table (26) showed that there was a significant effect of the interaction between chemical weed control and different levels of nitrogen fertilizer on number of spikelets / spike, number of grains / spike, 1000 - grain weight , grain weight / spike, grain yield (kg/fed) biological yield (kg / fed), harvest index, protein percentage and protein yield (kg / fed) in the first season and protein percentage in the second season .

The greatest values of number spikelets / spike were obtained by the mixture treatment with 120 kg N / fed , Granstar

Table (25) :Effect of interaction of weed control treatments and Nitrogen fertilization on Chlorophyll A , Total Chlorophyll and carotenoids at 80 days from sowing in 1997 / 98 and on Chlorophyll B at 101 days from sowing in 1998/99 Mg / g .

Weed control	Grasp				Granstar				Mixture				Control				L.S.D
Nitrogen levels Kg N / fed / Characters	60	90	120	150	60	90	120	150	60	90	120	150	60	90	120	150	5 %
	after 80 days from sowing 1997 / 98 season																
Chlorophyll A . Mg / g	2.36	2.37	2.83	3.69	2.05	2.04	2.48	3.87	1.78	2.53	3.03	3.54	2.10	3.28	3.43	4.04	0.51
Total Chlorophyll Mg / g.	4.10	4.24	4.85	6.23	3.29	3.50	4.35	6.05	3.01	3.74	4.42	5.63	3.14	5.24	5.49	6.36	0.66
Carotenoids Mg / g	1.26	1.31	1.59	2.11	1.22	1.32	1.47	1.99	1.12	1.28	1.63	1.76	1.36	1.94	2.17	2.25	0.26
	after 101 days from sowing 1998/99 season																
Chlorophyll B . Mg / g	0.99	1.15	1.60	1.76	0.70	0.94	1.11	1.55	0.91	0.76	1.05	1.38	0.68	1.26	1.47	1.64	0.30

Table (26) :Effect of interaction of weed control treatments and Nitrogen fertilization on wheat yield and its components in 1997 / 98 and 1998/99 seasons .

Weed control	Grasp				Granstar				Mixture				Control				L.S.D
Nitrogen levels Kg N / fed / Characters	60	90	120	150	60	90	120	150	60	90	120	150	60	90	120	150	5 %
1997 / 98 season																	
No. of spikelets / spike	19.34	19.73	20.51	20.26	21.39	21.20	21.90	20.24	20.27	20.84	21.61	20.21	19.50	19.82	20.22	20.95	0.76
No. of grains / spike	47.50	54.00	53.00	51.75	57.00	56.00	58.25	53.50	56.62	58.62	60.50	55.87	47.25	49.00	52.50	57.75	4.26
1000 grains weight (g)	44.66	45.81	46.86	46.02	50.70	50.8	49.32	48.19	50.52	52.41	51.64	48.65	41.17	43.28	44.04	46.72	2.13
Grains weight / spikes (g)	2.18	2.51	2.55	2.44	2.91	2.86	2.91	2.59	2.87	3.08	3.14	2.73	1.95	2.13	2.32	2.60	0.24
Grain yield Kg / fed	1508	1897	1897	1426	2278	2349	2363	2311	2469	2622	2648	2532	917	1061	1104	1446	289.9
Biological yield Kg / fed .	3359	3789	3817	3283	4200	4333	4314	4265	4456	4659	4648	4450	2615	2797	2852	3192	322.80
Harvest index	42.60	47.44	48.26	41.42	54.24	54.2	54.82	54.18	55.41	56.27	56.96	56.79	33.57	36.60	37.55	44.04	4.77
Protein %	12.42	11.34	13.90	11.79	11.31	13.26	12.80	13.69	11.66	14.18	13.72	13.67	11.61	12.87	12.49	11.92	1.73
Total protein yield Kg / fed	187.2	209.5	266.3	164.8	257.7	311.9	302.9	316.4	288.3	370.2	363.6	343.4	107.8	139.39	139.1	171.9	50.29
1998/99 / season																	
Protein %	12.58	11.38	14.03	11.86	11.35	13.38	12.83	13.75	11.63	14.15	13.77	13.60	11.67	12.81	12.52	12.01	1.71

treatment with 60, 90 and 120 kg N / fed. These results are in agreement with the results obtained by **Shams El-Din and Abdrabou (1995).**

Concerning number of grains / spike, 1000 - grain weight and grains weight / spike, the greatest values resulted from mixture treatment and Granstar with 60, 90 and 120 kg N/fed. These result in agreement with the results obtained by **El-Desoki *et al.* (1993), Shams El-Din and Abd Rabou (1995) and El-Metwaly (1998).**

With regard to grain yield (kg / fed) biological yield (kg / fed.) and harvest index both chemical weed control treatment (mixture and Granstar) with all nitrogen fertilizer levels resulted the greatest values. These results were agree with the results obtained by **Tayebi and Dudhane (1985), Hooda and Agarwal (1987), Bhagawati *et al.* (1992), El-Desoki *et al* (1993), Fayed *et al.* (1993), Sultan *et al.* (1994), Shams El-Din and Abd Rabou (1995), *Sultan et al.* (1995) and El-Metwaly (1998).** Higher protein percentages were recorded from the mixture treatment with 90, 120 and 150 kg N / fed. and Grasp treatment with 120 kg N/ fed. These results in agreement with the results obtained by **El - Metwaly (1998).**

Concerning protein yield (kg / fed.) the highest values were obtained from the mixture treatment and Granstar with 90, 120 and 150 kg N / fed .

In the second season the greatest values of protein percentage were obtained by mixture treatment with 90 kg / fed, Grasp treatment with 120 kg N / fed and Granstar with 150 kg N/ fed. These results in agreement with the results obtained by **El-Metwaly (1998).**

On the other hand, the lowest values of all previous yield and yield component were obtained from the unweeded treatment and Grasp treatment with the lowest two nitrogen fertilizer levels i.e., 60 and 90 Kg N/fed. These results in agreement with the results obtained by **Tayebi and Dudhance (1985), Thakur and Singh (1988) , Bhagawati *et al.* (1992) , Sultan *et al.* (1994), Shams El - Din and Abd rabou (1995) and El - Metwaly (1998)**

In general, it could be observed from these results that the mixture treatment and Granstar treatment with 90, 120 and 150 kg N / fed. resulted in the greatest values from yield and yield component of wheat and the lowest values were obtained from the unweeded treatment and Grasp treatment with 60 Kg N / fed.

IV.3. Effect of the Interaction Between Nitrogen Levels and the Two Cultivars :

The effect of interaction between nitrogen levels and two grown wheat varieties on the studied growth characters were not significant at 5% level of significance except number of leaves/ m^2, number of stalks and spikes / m^2, fresh weight of leaves and

stalks / m^2, fresh weight of spikes/m^2 dry weight of leaves and stalks /m^2. Also, dry weight of spikes /m^2 as well as total fresh and dry weight of plant/m^2 at 121 days from sowing in 1997 and 98 season, (Table 27) .

1) Effect of Interaction on Number of Leaves/m^2:

Referring to the results of Table (27), it is clear that there was significant effect of the interaction on number of leaves /m^2. The highest number of leaves / m^2 (950.00) was recorded from Sids 7 fertilized with 120 Kg N / fed. / On the other hand, the lowest one (475.00) was produced by Sakha 69 fertilized with the nitrogen rate (150 Kg N / fed.)

2) Effect of Interaction on Number of Stalks / m^2 :

The results in Table (27) indicated clearly that the highest number stalks / m^2 (337.00) was recorded at 90 Kg N/fed. by Sakha 69, and the lowest value 290.50 / m^2 was obtained by Sakha 69 supplied with 150 Kg N / fed .

3) Number of Spikes / m^2 :

Data presented in Table (27) show the effect of the interaction between wheat varieties and nitrogen levels on number of spikes/m^2. The highest number of spikes/m^2 (377.00) was produced by the application of 90 Kg N / fed. with Sakha 69. On the other hand, Sakha 69 fertilized with 150 Kg N/ fed. produced the lowest value of number of spikes / m^2.

Table (27):The interaction effect of nitrogen levels and the two grown wheat cultivars on some growth characters at 121 days after sowing in 1997/98 season .

Varieties	Sakha 69				Sids 7				L.S.D
Nitrogen levels Kg N / fed / Characters	60	90	120	150	60	90	120	150	5 %
No. of leaves / m^2	657.31	927.75	736.87	475.00	723.87	773.25	950.00	747.37	106.48
No. of stalks / m^2	330.00	377.00	300.00	290.50	299.00	329.00	367.00	343.75	27.03
No. of spikes / m2	330.00	377.00	300.00	290.50	299.00	329.00	367.00	345.87	27.12
Fresh weight of leaves g. / m^2	408.37	591.37	387.56	315.87	435.87	425.62	571.43	419.43	75.18
Fresh weight of stalks g. / m^2	2224.06	2633.31	1973.37	1921.62	2513.31	2519.87	3278.87	2720.95	389.55
Fresh weight of spikes g. / m^2	1379.56	2041.19	1202.25	1246.50	1855.69	1922.25	2301.69	1948.38	403.52
Dry weight of leaves g. / m^2	266.84	367.87	253.59	203.50	235.08	269.40	358.23	244.04	53.01
Dry weight of stalks g. / m^2	1085.01	1294.50	1018.22	867.24	1084.30	1135.17	1376.80	1178.25	147.22
Dry weight of spikes g. / m^2	776.23	1090.36	684.54	650.41	1129.22	1166.81	1280.86	1116.88	170.60
Total fresh weight of plants g./m^2	4531.50	5414.13	3950.56	4222.31	5603.88	5833.31	6534.94	5642.69	683.79
Total dry weight of plants g./m^2	1555.15	1786.95	1176.56	1138.84	1819.39	1826.20	2295.66	1937.04	221.90

4) Fresh weight of leaves / m^2 :

Data presented in Table (27) show the effect of the interaction between wheat varieties and nitrogen levels on fresh weight of leaves /m^2. The highest value of fresh weight of leaves (591.37 g) was obtained from Sakha 69 with the nitrogen rate of 90 Kg N / fed. while, the lowest value of fresh weight of leaves (315.87 g) was recorded by Sakha 69 with the highest nitrogen level (150 kg N / fed).

5) Effect of Interaction on Fresh Weight Stalks / m^2:

Concerning the effect of this interaction on fresh weight of stalks / m^2, the results in Table (27) indicated that the lowest fresh weight of stalks was obtained from Sakha 69 fertilized with 150 Kg N / fed. whereas, the highest value was 3278.87 g/m^2 which was recorded at 120 kg N / fed. by Sids 7 .

6) Fresh weight of Spikes / m^2 :

Data presented in Table (27) show the effect of the interaction between wheat varieties and nitrogen levels on fresh weight of spikes g./ m^2. The heaviest fresh weight of spikes /m^2 (2301.69 g/m^2) was obtained from Sids 7 fertilized with 120 kg N / fed whereas, Sakha 69 at the nitrogen rate of 120 kg N / fed produced the lowest value of fresh weight of spikes/m^2 (1202.25 g / m^2) .

7) Dry Weight of leaves g / m^2 :

The results in Table (27) indicated clearly the effect of the significant interaction between two wheat variety and nitrogen

levels on dry weight of leaves /m^2. The maximum value of dry weight of leaves (367.87g) was obtained from Sakha 69 at nitrogen level of 90 kg N / fed. On the other hand, the lowest value of dry weight of leaves (203.50 g / m^2) was produced by Sakha 69 under the highest nitrogen rate (150 kg N / fed) .

8) Dry Weight of stalks g / m^2 :

Data presented in Table (27) show the effect of the interaction between the two wheat variety and nitrogen levels on dry weight of stalks / m^2. The highest value of dry weight of stalks g./m^2 (1376.80 g./m^2) was recorded from Sids at nitrogen rate of 120 kg N /fed. Whereas, the lowest value of dry weight of stalks / m^2 (867.24 g ./ m^2) was recorded by Sakha 69 at the highest nitrogen rate (150 kg N / fed.) .

9- Dry Weight of Spikes (g) / m^2 :

Data revealed that there was significant effect of the interaction between wheat varieties and nitrogen levels on dry weight of spikes/ m^2 as shown in Table (27). The heaviest dry weight of spikes / m^2 (1280/86 g./m^2) was obtained from Sids 7 under nitrogen rate of 120 Kg N / fed. On the other hand, the lowest one (650.41g /m^2) was recorded from Sakha 69 under the highest nitrogen level (150 Kg N / fed.)

10) Total fresh weight of plants g / m^2 :

The results in Table (27) indicated clearly that the highest total fresh weight of plants / m^2 (6534.94 g / m^2) was recorded

by Sids 7 fertilized with 120 kg N / fed and the lowest value was 39950.64 g / m^2 which was obtained by Sakha 69 supplied with 120 kg N / fed .

11) Total Dry Weight of plants g. / m^2 :

Concerning the effect of this interacation on total dry weight of plants / m^2, the results in Table (27) indicated that the lowest total dry weight of plants / m^2 was obtained from Sakha 69 fertilized with the highest nittrogen level (150 kg N / fed) . Whereas, the highest value was 2295.66 g./m^2 which was recorded at 120 kg N / fed with Sids 7 variety .

12) Effect of interaction on wheat yield and some its components :

Interaction effect of the applied nitrogen levels and the two grown wheat varieties on some of the studied characters were significant. This was true for the two growing season as it is clear from Table (28).

Results presented in Table (28) reveal that the tallest spikes (13.19 cm) was produced from Sids 7 variety fertilized with the nitrogen rate of 120 Kg N / fed whereas, the shortest spikes (10.06 cm) was obtained from Sakha 69 fertilized with nitrogen rate of 60 kg N / fed .

Concerning the number of spikelets / spike in the first season, results in Table (28) show that the highest number of spikelets / spike (22.06) was recorded by Sids 7 with N rate of 120 kg N / fed .

Table (28): The interaction effect of cultivars and Nitrogen fertilizer levels on wheat yield and some yield components in 1997/ 98 season .

Characters		Spike length at harvest	No. of spiketels/ spikes at harvest	No. of grains / spike	Grain weight / spike (g)	Weight of 1000 grains (g)	Straw yield Kg/ fed	Biological yield kg/ fed
Varieties	Nitrogen levels kg / fed							
Sakha 69	60	10.06	19.62	44.69	2.06	44.47	1848.38	3497.69
	90	10.63	20.04	50.00	2.33	45.97	1923.38	3881.94
	120	10.19	20.07	48.63	2.19	44.59	1809.31	3664.81
	150	10.19	19.78	48.06	2.07	44.09	1844.25	3650.63
Sids 7	60	11.81	20.63	59.50	2.93	49.06	1880.50	3816.88
	90	12.25	20.76	58.81	2.96	50.22	1901.25	3906.88
	120	13.19	22.06	63.50	3.28	51.34	2000.56	4150.56
	150	12.44	21.06	61.38	3.11	50.70	1892.44	3948.94
	L.S.D. 5%	0.68	0.47	3.01	0.17	1.51	51.55	228.55

On the other hand, the lowest one (19.62) was produced by Sakha 69 under the lowest nitrogen rate (60 kg N / fed) .

These results are in agreement with the results obtained by **Eissa (1979), Abd El -Gawad *et al.* (1986), Basilious (1992) and Abd El -Ghany (1997) .**

Number of grains / spike in Table (28) indicated that the highest value of No of grains / spike (63.50) was obtained from Sids 7 with 120 kg N/fed . Whereas, the lowest one (44.69) was recorded from Sakha 69 under 60 kg level of nitrogen fertilizer (the lowest dose) .

These results are in agreement with the results obtained by **Basilious (1992), Shalaby *et al.* (1993), Abd El-Ghany (1997)** and these results disagree with the results obtained by **Abo-Warda and Eman Sadek (1998)**

Regarding grain weight of spike, results in Table (28) reveal that the heaviest grain weight of spike (3.28 g) was obtained from Sids 7 under the rate of 120 Kg N/fed. On the other hand, the lowest one (2.06 g) was recorded from Sakha 69 fertilized with 60 Kg N/ fed .

These results are in agreement with the results obtained by **Eissa (1979), Basilious (1992), Abd El-Ghany (1997) and Eman Sadek and Abo Warda (1998).**

Referring to the results in Table (28) it is clear that the highest weight of 1000 - kernels (51.34 g) was obtained from the interaction between Sids 7 and 120 kg N / fed., whereas the lowest one (44.09 g) was recorded from Sakha 69 fertilized with the highest nitrogen level (150 kg N / fed) .

These results are in agreement with the results obtained by **Konov *et al.* (1984)** and these results disagree with the results obtained by and **Abo - Warda and Eman Sadek (1998).**

Straw yield results presented in Table (28) indicated that the highest value of straw yield (2000.65 kg) was obtained from Sids 7 with nitrogen rate of 120 kg N/ fed. Whereas, the lowest one (1809.31 kg / fed) was produced from Sakha 69 with nitrogen rate of 120 kg N / fed .

These results are in agreement with the results obtained by **Abd-El -Alim. (1980), Basilious (1992), Abd El-Ghany (1997), Abo-Warda and Eman Sadek (1998) and Eman Sadek and Abo -Warda (1998 b) .**

Also, the highest value of biological yield (4150.56 kg / fed.) was recorded by Sids 7 under nitrogen rate 120 kg N / fed. While, the lowest one (3497/69 kg / fed) was recorded from Sakha 69 fertilized with 60 kg N / fed, (Table 28) .

These results are in agreement with the results obtained by **Konov *et al.* (1984), Kandil (1985), Shalaby *et al.* (1993),**

Freitas *et al.* (1994), Abd El- Ghany (1997) and Abo-Warda and Eman Sadek (1998)

In the second season the significant interactions on some wheat characters were recorded in Table (29). These charcters were, number of leaves and spikes / m^2, fresh weight of leaves and stalks, fresh weight of spike, dry weight of leaves and stalks, dry weight of spikes and spike length Also, total fresh and dry weight of plant/m^2 at 121 days from sowing .

1- Number of Leaves / m^2 :

Concerning the effect of this significant interaction on number of leaves /m^2, the results in Table (29) indicated that the highest number of leaves / m^2 was obtained from Sakha 69 (827.93 / m^2) fertilized with 90 kg N/fed. Whereas the lowest value was 642.06 / m2 which was recorded at 60 kg N / fed by Sakha 69 .

2- Number of Spikes / m^2 :

Data in Table (29) show that number of spike / m^2 at 121 days from planting was significantly affected by the interaction between the two wheat varieties and nitrogen levels. The maximum number of spikes/m^2 (380.75) was produced from Sakha 69 and 90 kg N/ fed. Whereas, the minimum value (304.00) was obtained from Sids 7 fertilized with the low nitrogen level (60 kg N / fed).

Table (29): The interaction effect of nitrogen levels and the two grown wheat cultivars on some growth characters at 121 days after sowing in 1998/99 season .

Varieties	Sakha 69				Sids 7				L.S.D
Nitrogen levels Kg N / fed / Characters	60	90	120	150	60	90	120	150	5 %
No. of leaves / m2	642.06	827.93	730.50	681.56	637.93	636.56	823.37	653.93	106.98
No. of spikes / m2	323.00	380.75	371.00	361.75	304.00	319.00	354.00	345.00	21.12
Fresh weight of leaves g. / m^2	1019.93	1501.93	1229.06	1141.62	920.43	890.50	1526.76	1060.06	75.18
Fresh weight of stalks g. / m^2	2794.50	3820.56	3255.06	2941.12	2898.12	2982.75	3620.81	3035.06	389.52
Fresh weight of spikes g. / m^2	1801.12	2076.81	1925.62	1836.81	1790.00	1841.56	2374.56	2024.06	403.52
Dry weight of leaves g. / m^2	232.63	426.35	279.86	343.13	231.96	213.68	456.81	301.35	53.01
Dry weight of stalks g. / m^2	934.40	1340.55	903.89	889.95	1003.30	1121.71	1323.98	1081.47	147.22
Dry weight of spikes g. / m^2	737.67	932.15	760.69	777.14	1037.33	1001.72	1226.91	1052.54	170.6
Spike length (cm2)	11.94	12.56	12.44	12.75	13.06	14.06	14.81	14.69	0.44
Total fresh weight of plants g./m^2	4158.25	5146.31	3933.69	3926.00	4833.63	5131.81	5735.50	4821.13	405.02
Total dry weight of plants g./m^2	1479.13	2045.62	1385.11	1496.00	1727.01	1841.97	2230.35	1799.16	147.73

These results are in agreement with the results obtained by **El-Helaly (1984), Abd El-Ghany (1997), ABo-Warda and Eman Sadek (1998)..**

3- Fresh Weight of Leaves g. (m^2) :

Data presented in Table (29) showed that the effect of interaction between the two wheat varieties and nitrogen levels on fresh weight of leaves / m^2. The highest value of fresh weight of leaves (1526.75 g/m^2) was obtained from Sids 7 and 120 kg N / fed. While, the lowest vaule of fresh weight of leaves (890.50 g/m^2) was recorded by Sids 7 and 90 kg N/ fed.

4- Fresh Weight of Stalks / m^2 :

Data presented in Table (29) show the effect of the interaction between the two wheat varieties and nitrogen levels on fresh weight of stalks g / m^2. The highest fresh weight of stalks/m^2 (3820.56 g./ m^2) was recorded by Sakha 69 fertilized with N rate of 90 Kg N / fed. On the other hand, the lowest one (2794.50 g./ m^2) was produced by Sakha 69 under the lowest nitrogen rate (60 kg N / fed) .

5- Fresh Weight of Spikes g. / m^2 :

Results recorded in Table (29) show that fresh weight of spikes/m^2 was significantly affected by the interaction between wheat varieties and nitrogen levels. The highest fresh weight of spikes/m^2 (2374.56 g./ m^2) was recorded by Sids 7 under the nitrogen rate of 120 Kg N/fed. Whereas, the lowest value of

fresh weight of spikes/m^2 (1790.00 g/m^2) was produced by Sids 7 with nitrogen rate of 60 Kg N/ fed .

6- Dry Weight of leaves g./ m^2 :

Data revealed that there was significant effect of the interaction between wheat varieties and nitrogen levels on dry weight of leaves / m^2. Table (29). This character took the same trend that was obtained on fresh weight of leaves . The heaviest dry weight of leaves / m2 (456.81 g./m^2) was obtained from Sids 7 under the nitrogen rate of 120 kg N / fed . On the other hand, the lowest one (213.68 g./ m^2) was recorded from Sids 7 fertilized with nitrogen level (90 kg N / fed) .

7- Dry Weight of Stalks g . / m^2 :

The results in Table (29) indicated clearly that the highest dry weight of stalks/m2 (1340.55 g. /m^2) was recorded by Sakha 69 at nitrogen rate of 90 kg N/ fed . While, the lowest value was 889.95 g./m^2 which was obtained by Sakha 69 fertilized with the highest nitrogen rate (150 kg N/fed) .

8- Dry Weight of Spikes g. / m2 :

Results recorded in Table (29) indicate clearly that the heaviest dry weight of spikes/m^2 (1226.91 g./ m^2) was obtained from Sids 7 under nitrogen rate of 120 Kg N / fed. On the other hand, the lowest one (737. 67 g./ m^2) was obtained from Sakha 69 fertilized with (60 kg N / fed) .

9- Spike length (cm) :

The results in Table (29) indicated that spike length was significantly affected by the interaction between wheat varieties and nitrogen levels. The tallest wheat spikes (14.69 cm) were produced from Sids 7 variety with the nitrogen rate of 150 kg N/ fed. Whereas, the shortest spikes (11.94 cm) were obtained from Sakha 69 fertilized with nitrogen rate of 60 kg N / fed . These results in agreement with the results oblained by **Abd El-Aleem (1980), Abd El - Ghany (1997) and Eman Sadek and Abo Warda (1998b) .**

10- Totat Fresh Weight of Plants g./ m^2 :

Data presented in Table (29) show the effect of interation between two wheat varieties and nitrogen levels on total fresh weight of plants g/ m^2. The highest total fresh weight of plants (5735.5 g. /m^2) was recorded by Sids 7 under nitrogen rate of 120 kg N / fed. Whereas , the lowest value (3926.00 g. m^2) was produced by Sakha 69 with the highest nitrogen level (150 kg N/fed) .

11- Total dry Weight of Plants g./ m^2 :

Data revealed that there was significant effect of the interaction between the two grown wheat varieties and nitrogen levels on total dry weight of plants /m^2 (Table 29). The maximum total dry weight of plants (2230.35 g./m^2) was produced from Sids 7 fertilized with 120 kg N / fed . While, the

lowest value (1385.11 g./ m^2) was recorded by Sakha 69 under the nitrogen rate of 120 Kg N / fed .

The results in Table (30) indicated clearly the effect of significant interaction between the two wheat varieties and nitrogen levels on some of the studied characters in the second growing season .

Concerning the number of spikes / m^2 of the second season, results in Table (30) show that the highest number of spikes / m^2 (360.25) was recorded by Sakha 69 at nitrogen level of 90 kg N / fed . On the other hand , the lowest value (264.13) was produced by Sids 7 under the lowest nitrogen rate (60 kg N/ fed).

These results in agreement with the results obtained by **El - Helaly (1984), Abd El - Ghany (1997) and Abo-Warda and Eman Sadek (1998).**

Number of grains / spike presented in Table (30) indicated that the highest value of number of grains / spike (62.38) was recorded by Sids 7 fertilized with nitrogen rate (120 kg N / fed.) . While, the lowest value of number of grains / spike (43.56) was recorded by Sakha 69 under 120 kg N / fed .

These results in agreement with the results obtained by Abd El - Gawad *et al.* (1986), Abd El-Ghany (1997) and these results disagree with the results obtained by **Abo-Warda and Eman Sadek (1998) .**

Table (30): The interaction effect of two grown wheat cultivars and the nitrogen levels on wheat yield and some its components in 1998/99 season .

Characters		No. of spikes/m2 at harvest	No. of grains / spike	Grain yield Kg/fed	Straw yield Kg/ fed	Biological yield kg/ fed	Harvest index %
Varieties	Nitrogen levels kg / fed						
Sakha 69	60	339.25	44.56	1768.81	1872.13	3641.00	45.84
	90	360.25	55.53	2186.56	1945.88	4132.44	51.16
	120	332.25	43.56	1712.63	1814.56	3527.19	44.40
	150	332.38	52.81	1747.25	1848.75	3596.00	46.64
Sids 7	60	264.13	60.25	2055.31	1862.75	3918.06	51.18
	90	268.50	60.38	2041.75	1872.38	3914.13	50.23
	120	309.38	62.38	2527.00	1986.88	4513.88	55.09
	150	283.88	61.38	2229.88	1858.19	4084.31	53.26
	L.S.D. 5	37.57	6.39	411.02	58.20	442.83	4.91

Referring to the results presented in Table (30), it is clear that the highest grain yield (2527.00kg/ fed) was obtained from Sids 7 fertilized with 120 kg N/fed. Whereas, Sakha 69 at the same N level (120 kg N/fed.) produced the lowest value of grain yield (1712.63 kg / fed) .

These results in agreement with the results obtained by **Kandil (1985), Eissa *et al.* (1990), Freitas *et al.* (1994) and Abo-Warda and Eman Sadek (1998).**

Regarding straw yield, results presented in Table (30) reveal that the highest straw yield (1986. 88 kg / fed.) was produced from Sids 7 fertilized with 120 kg N/fed. While, the lowest one (1814.56 kg / fed.) was recorded by Sakha 69 at the same nitrogen level (120 kg N / fed.). These results in agreement with the results obtained by **Bailious (1992)** and these results disagree with the results obtained by **Shalaby *et al.* (1993), Abd El - Ghany (1997) and Abo -Warda and Eman Sadek (1998).**

Also, the highest value of biological yield (4513.88 kg / fed.) was recorded by Sids 7 under nitrogen rate of 120 kg N / fed. While, the lowest one (3527.19 kg / fed) was recorded from Sakha 69 fertilized with the same level of nitrogen (120 kg N/ fed).

Results presented in Table (30) show that the highest harvest index percentage (55.09%) was recorded from Sids 7 at nitrogen rate of 120 kg N / fed. whereas, the lowest value of harvest index percentage (44.40%) was recorded by Sakha 69

fertilized with 120 kg N / fed. These results were dis agree with the results obtained by **Abd El - Ghany (1997)**.

It was generally noticed that appling 120 kg N/fed. was responsible for the highest values of most of the studied characters in the first season and second season respectively. Moreover such values were higher for Sids 7 as compared with Sakha 69 .

IV. Effect of the Interaction Between Chemical Weed control , Cultivars and Nitrogen Rates :

a) Wheat Growth Characters :

Total fresh and dry weight of plants (g / m^2) after 80 days from sowing in the second season, number and dry weight of leaves/m^2 after 121 days from sowing in the first season , plant hight, spike length and dry weight of leaves / m^2 in the second season were a significantly affected by the interaction between chemical weed control , wheat varieties and different nitrogen rates (Table 31) .

Total fresh and dry weight of wheat plants (g / m^2) after 80 days from sowing in the second season was significantly affected by the second order interaction. The highest values were recorded by Sakha 69 or Sids 7 variety with Granstar or mixture treatment and 120 kg N / fed (Table 31).

Concerning the number and dry weight of leaves / m^2 after 121 days from sowing in the first season as affected significantly

by previous second order interaction, the greatest values were obtained by Granstar treatment and Sakha 69 variety and 90 kg N/fed. (Table 31) .

The highest plants were recorded by Sakha 69 variety and weed Control with Granstar or mixture treatment and 120 or 150 kg N/fed. The longest spikes (cm) were obtained by Sids 7 variety with the higher levels of nitrogen rates and all weed control treatments. However, the difference between herbicide-wheat-nitrogen combination was in magnitude not in direction .

With regard to dry weight of leaves/m^2 after 121 days from sowing in the second season, the greatest values were obtained by Sakha 69 or Sids 7 varities with Granstar or mixture treatment and 120 or 150 kg N/fed .

The lowest values of the previous characters were obtained by unweeded or Grasp treatment, Sids 7 variety and lowest levels of nitrogen fertilizer with few exception .

b) Chlorophyll and Carotenoids Content :

Carotenoids conetnt after 80 days from sowing in the second season, chlorophyll A, carotenoids after 101 days from sowing in the first season and carotenoids content after 101 days from sowing in the second season were significantly affected by the second order interaction (Table 32) .

The greatest values from previous chlorophyll and caroteniodes content were obtained by unweeded treatment with

Sids 7 or Sakha 69 variety with the highest two N - levels (120 or 150 kg N/fed). On the other hand, the lowest values means average from chlorophyll and caroteniods content was obtained from mixture or Granstar treatment with Sakha 69 variety and 60 Kg N / fed .

C) Yield Component :

Number of spikelets / spike and grain weight / spike (g) in the first season were significantly affected by the interection between chemical weed control, wheat varieties and nitrogen application levels (Table 33) .

The highest number of spikelets / spike and the heaviest grains weight/ spike were recorded by Granstar or mixture treatments with Sids 7 variety and 120 kg N / fed. whereas , the lowest values of both characters were obtained from the unweeded or Granstar treatment, Sakha 69, variety and lowest nitrogen level (60 kg N/fed). These results in agreement with the results obtained by **Christensen and Rasmussen (1996).**

Table (31): Effect of interaction of weed control treatments, cultivars and nitrogen rates on some wheat growth characters at 121 days from sowing in 1997/98 and at 80, 121 days from sowing in 1998 / 99 season .

Characters	Varieties	Sakha 69				Sids 7			
	N. levels / Weed control treatment	60 kg/fed	90 kg/fed	120 kg/fed	150 kg/fed	60 kg/fed	90 kg/fed	120 kg/fed	150 kg/fed
		80 days from sowing in 1998 / 99							
Total fresh weight of plants g. /m^2	Grasp	2012	2434	1781	2228	2326	2408	2915	2483
	Granstar	2202	2645	2478	2348	3023	2794	3417	2787
	Mixture	2281	2548	2248	1901	2628	2908	3308	3185
	Control	1771	2861	2275	2332	2649	2288	3277	2795
	L.S.D 5%	33.7							
		80 days from sowing in 1998 / 99							
Total dry weight of plants g./m^2	Grasp	301.8	345.2	236.6	308.9	295.5	366.2	446.3	327.8
	Granstar	296.9	339.8	327.9	296.3	404.6	386.7	515.6	419.9
	Mixture	280.0	342.2	309.8	213.3	405.6	392.3	499.6	424.8
	Control	224.2	369.9	277.5	287.5	375.9	351.9	462.8	420.1
	L.S.D 5%	69.79							
		121 days from sowing in 1998 / 99							
No. of leaves / m^2	Grasp	627	792	574	478	733	711	985	547
	Granstar	581	1387	1114	505	784	1212	1216	1044
	Mixture	841	945	767	382	873	613	885	752
	Control	580	587	492	535	506	556	715	647
	L.S.D 5%	212.9							
		121 days from sowing in 1997/98							
Dry weight of leaves g./m^2	Grasp	227.8	296.2	173.5	216.6	138.8	225.6	291.6	190.3
	Granstar	287.2	474.5	310.5	187.9	274.1	314.9	395.2	384.4
	Mixture	313.9	438.7	306.4	197.2	388.2	360.9	403.8	346.4
	Control	238.5	262.1	223.9	212.3	139.2	176.3	342.2	155.1
	L.S.D 5%	106.0							
		121 days from sowing in 1998/99							
Plant height (cm)	Grasp	92.0	94.3	99.3	99.8	91.3	96.3	98.5	101.3
	Granstar	99.0	100.0	102.5	103.8	89.8	99.8	100.8	101.8
	Mixture	93.5	101.0	102.3	102.8	91.8	94.0	95.0	99.8
	Control	89.5	99.3	100.5	101.5	94.0	95.8	98.0	99.5
	L.S.D 5%	3.44							
		121 days from sowing in 1998/99							
Spike length (cm)	Grasp	11.80	12.50	12.00	11.80	12.30	15.25	15.75	14.50
	Granstar	12.75	13.00	12.75	13.00	13.25	13.75	14.00	13.75
	Mixture	11.75	13.00	12.00	12.25	13.50	13.25	15.00	14.75
	Control	11.50	11.75	14.00	14.00	13.25	14.00	14.50	15.75
	L.S.D 5%	0.89							
		121 days from sowing in 1998/99							
Dry weight of leaves g. /m^2	Grasp	222.6	368.1	324.3	346.9	144.8	249.8	465.0	325.6
	Granstar	238.2	419.6	207.9	335.9	233.0	226.1	475.1	315.8
	Mixture	330.1	380.2	373.3	476.9	399.7	256.5	529.5	349.2
	Control	139.7	537.5	213.9	212.7	150.4	122.4	357.6	214.8
	L.S.D 5%	132.5							

Table (32): Effect of interaction of weed control treatments, cultivars and nitrogen rates on Chlorophyll A and Carotenoids at 101 days from sowing in 1997/98 and on carotenoids at 80, 101 days from sowing in 1998 / 99 season .

Characters	Varieties	Sakha 69				Sids 7			
	N. levels / Weed control treatment	60 kg/fed	90 kg/fed	120 kg/fed	150 kg/fed	60 kg/fed	90 kg/fed	120 kg/fed	150 kg/fed
		80 days from sowing in 1998 / 99							
Carotenoids mg / g.	Grasp	1.260	1.140	1.360	1.918	1.242	1.621	1.860	2.290
	Granstar	1.075	1.351	1.409	1.736	1.389	1.421	1.522	2.140
	Mixture	0.981	1.067	1.533	1.708	1.376	1.682	1.819	1.860
	Control	1.173	1.917	1.809	2.364	1.464	1.738	2.045	2.177
	L.S.D 5%	0.322							
		101 days from sowing in 1997.98							
Chlorophyll . A mg / g	Grasp	1.918	1.948	2.625	3.397	2.117	3.151	3.601	3.707
	Granstar	1.653	2.128	2.787	3.083	2.076	2.720	3.047	3.447
	Mixture	1.520	2.041	2.307	2.969	1.847	2.254	2.558	3.161
	Control	1.887	2.874	3.104	3.335	1.937	2.001	2.904	3.656
	L.S.D 5%	0.559							
		101 days from sowing in 1997.98							
Carotenoids mg / g	Grasp	1.112	1.203	1.956	2.423	1.439	1.748	2.126	2.334
	Granstar	1.135	1.484	1.693	2.072	1.496	1.383	1.685	1.887
	Mixture	1.411	1.434	1.517	1.680	1.110	1.353	1.933	2.827
	Control	1.107	1.358	1.769	2.154	1.298	1.758	2.233	2.350
	L.S.D 5%	0.337							
		101 days from sowing in 1998.99							
Carotenoids mg / g	Grasp	1.415	1.241	2.055	2.348	1.464	1.850	2.136	2.467
	Granstar	1.140	1.575	1.629	2.043	1.479	1.347	1.672	1.938
	Mixture	1.343	1.343	1.544	1.651	1.074	1.355	1.941	2.838
	Control	1.106	1.397	1.731	2.147	1.316	1.825	2.268	2.458
	L.S.D 5%	0.428							

Table (33): Effect of interaction of weed control treatments, cultivars and nitrogen rates on No. of spikelets/ spike and grains weight/spike in 1997/98 season.

Characters	Varieties	Sakha 69				Sids 7			
	N. levels / Weed control treatment	60 kg/fed	90 kg/fed	120 kg/fed	150 kg/fed	60 kg/fed	90 kg/fed	120 kg/fed	150 kg/fed
No. of spikelets / spike	Grasp	19.07	19.20	19.71	19.52	19.62	20.27	21.31	21.01
	Granstar	20.72	21.24	20.68	19.96	22.07	21.16	23.13	20.53
	Mixture	19.67	20.34	20.11	19.66	20.87	21.34	23.10	20.77
	Control	19.03	19.37	19.77	19.97	19.97	20.28	20.67	21.93
	L.S.D 5%	0.59							
Grains weight / spike (g)	Grasp	1.55	2.07	1.80	1.74	2.81	2.95	3.30	3.14
	Granstar	2.45	2.62	2.29	2.22	3.36	3.09	3.53	2.97
	Mixture	2.50	2.90	2.59	2.30	3.24	3.25	3.70	3.14
	Control	1.58	1.73	2.07	2.00	2.32	2.53	2.58	3.20
	L.S.D 5%	0.34							