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PRODUCTIVITY OF SOME GEMMEIZA WHEAT CULTIVARS UNDER DIFFERENT SOWING DATES AND N FIRTILIZATION LEVELS

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ABSTRACT

Two field experiments were carried out in Belcas, Dakhalia Governorate, Northern Delta, Egypt, during to winter seasons 2002/2003 and 2003/2004. The study included three factors, viz., Gemmeiza (Gmz) cultivars (Gmz 3, Gmz 7 and Gmz 9), three sowing dates (November 5th, 15th and 25th) and three N levels (80, 100 and 120 kg N/fed). The results were as follows:

1- The CV Gmz 7, early sowing and highest N rate significantly surpassed the other two treatments within each factor, with most studied traits.
2- The cultivar Gmz 9 was the best one for producing straw yield/fed. Meanwhile, Gmz 3 successeded in the production of heaviest grains.
3- The combinations which included Gmz 7, early sowing and higher N rate gave the greatest values in the first as second order interaction, in most cases. The Gmz 9 replaced Gmz 7 in the combination of producing sounded straw yield/fed.
4- Simple correlation within each pair of the studied traits was positive and significant in most cases.

Keywords : wheat, (*Tritium eastivum L*), cultivars sowing date, N rate, Correlation.

INTRODUCTION

Wheat, historically, is the most important grain crop all over the world. In Egypt, the total production of wheat hardly satisfies 65% of consumption. Therefore attempts should be devoted to narrow this gap. This could be achieved through the use of high yielding cultivars and the adoption of agricultural practices

Gemmeiza (Gmz) wheat cultivars are relatively new for Egyptian farmers. Such cultivars are known with their high productivity compared with the old ones. Mosaad et. al. (2000) reported that Gmz 9 is one of the new cultivars having high yielding potentiality and simultaneously exhibiting high resistance to the three rusts. The cultivar is highly recommended to replace Sakha 8 and Sakha 69 cultivars in Delta region. Moreover, Shehab et. al. (2000) declared that Gmz 7 was released as a cultivar with high yielding potentiality, good tillering ability, long spike and rust resistant. Hamada and Moussa (2003) tested three Gmz culitivars, viz. Gmz 3, Gmz 7 and Gmz 9. They concluded that these cultivars out yielded the old one, Sakha 61. They added that both Gmz 7 and Gmz 9 significantly out yielded Gmz 3. Meanwhile, no significant difference between Gmz 7 and Gmz 9 was detected on grain yield per fed. and some attributes.

The superiority of the three cultivars, regarding yield and some its contributors were studied by some authors. However, the superiority of Gmz 7 was reported by Sharshar et. al. (2000) regarding grain weight/spike and Dearwish (1994) regarding No. of spikes/m^2. Moreover, the superiority of Gmz 9 regarding straw yield/fed was detected by both El-Karamity (1998)

and Sharshr (2000). Moussa (2001) reported the superiority of Gmz 3 regarding the heaviest grains (1000 grain weight).

Sowing date has a noticeable encouragement role on wheat yield and yield aspects. Most of the researchers declared that early sowings (longer growing season), but not earlier than November 10th were favourable for high grains yield (Mosalem et. al. 1999) and Hamada and Mossua (2003). Also, Tewari and Mahendra (1993), estimated the reduction in grain yield by 12.3 and 7.34 Kg/ha/day for delaying. sowing beyond. November 15th and December 2nd, respectively.

It is well known that the Egyptian soils are characterized as poor regarding their content from organic matter and hence nitrogen. Therefore, the positive effect of N addition to wheat is indispensable. El-Karamity (1998) observed such effect on plant height, spike length, No. of grains/spike, No. of spikes/m^2, straw yield and grain yield. Ayoub et. al. (1994) reported that such increased features could be obtained by N use at ascending rates up to 18o Kg N/ha.

Seham M. Ahmed (2002), reported that wheat grain yield/fed was significantly increased by any further N addition up to 120 Kg N/fed. similar excess was obtained regarding straw yield/fed, but up to 90 Kg N/fed. She added that the interactions among cultivars and N levels were insignificant.

Since, Gemmieza wheat cultivars are of high productivity, they might need higher N fertilization levels than old ones. The date of sowing might, also play in this respect. Therefore, the present study aimed to study these three factors at three different levels to find out the best combination to raise up wheat production in Belcas location and similar sites in Northern Delta.

MATERAILS AND METHODS

Two field experiments were carried out at a private farm in Belcas, Dakahlia Governorate, Northern Delta, Egypt, During two winter seasons (2002/2003 and 2003/2004). The soil was clay loam containing an average of 2.25% organic matter and 30 ppm available N, in the 0 – 30 cm depth. Three cultivars, viz. Gmz 3, Gmz 7 and Gmz 9, three sowing dates (November 5th, 15th and 25th) and three levels of N (80, 100 and 120 Kg N/fed) were tested in both seasons. A split–split plot design with three replicates was used. Cultivars were distributed in the main plots. Sowing dates were allocated in the sub plots. The sub-sub plots were occupied by the three nitrogen levels. The experimental plot area was 42.0 m^2 (7 x 6 m).

In both seasons, seed were handy broadcasted, at a seeding rate of 60.0 Kg/fed. The used method for seeding was the dry one (Afir). During seed bed preparation, phosphorus as calcium superphosphate (15.5% P_2O_5/fed) at a rate of 100 Kg/fed and potassium as potassium sulphate (48.0% K_2O), at a rate of 50.0 Kg K/fed were added. Nitrogen fertilizer was applied as urea (46.0% N), at the tested levels. Each level was partly added before the first and second irrigations. To promote seeding germination, 10 Kg N/fed was added during seed bed preparation. The preceding crop was rice. Harvest was mead on the 2nd week of may. All other agricultural practices were done as recommended.

At harvest, one square meter from each sub sub plot was chosen at random. Ten plants from each one square meter were taken for studying yield attributes. Yield per plot (either for straw or grains) was weighed and consequently yield/fed. was calculated. The studied traits were as follows:

1) Plant height, PH (cm)
2) Spike length SPKL, (cm)
3) No. of spikes/m^2, SPK/m^2
4) No. of grains/spike, G/SPK
5) Grain weight/spike, GW/SPK (gm)
6) 1000 grain weight, 1000 GWT, (gm)
7) Straw yield/fed. St/Y/fed, (ton)
8) Grain yield/fed. GY/fed, (ardab)*.

* One ardab = 150 Kg.

Statistical Analysis:

Data were statistically analyzed according to Gomez and Gomez (1983). Means comparisons were carried out by LSD test at 0.05 level of significance. Correlation study was conducted, where simple correlation coefficient (r) was calculated for each pair of the studied characteristics, according to Snedcor and Cochran (1982).

REULTS AND DISCUSSION

A- Analysis of variance:

1- Independent factors effect :

Table 1 shows the effect of independent factors, cultivars, CV, sowing date, SD, and N level on wheat yield, and yield attributes 2002/2003 and 2003/2004 seasons.

It is clear that the studied factors had significant effects on all traits in the two seasons except cultivars where insignificant effect on grain yield/fed in the second season and on grains/spike in the two seasons. This indicates that there was a wide range of such factors effect on most of yield attributes.

Regarding cultivar differences, it is evident from Table 1 that Gmz 7 had significantly taller plants with longer spikes and hence larger No. of grains/spike than Gmz 3 or Gmz 9 in the first season. Similar effect was observed in the second season. The cultivar Gmz 3 had the shortest plants with the shortest spikes in both seasons. These differences were, also, observed in the No. of spikes/m^2 and 1000 grain weight, where Gmz 9 had the largest number of grain/spike and Gmz 3 had the heaviest grains in both seasons. The results further, indicate that Gmz 7 recorded the highest grain yield/fed in the first season. Meanwhile Gmz 9 had the highest straw yield/fed in both seasons. Such results could be contributed to the genetic variability among the three studied cultivars. Such variability shows different response to the prevailing environmental conditions. In addition, with grain yield/fed Gmz 7 surpased Gmz 3 by about 12.7 and 3.4 % , Gmz 9 by about 3.6 and 5.8 % in the first and second seasons, respectively.

The superiority of Gmz 7 may be attributed to superiority with respect of spike length and grain weight/spike in the two seasons. Moreover, the superiority of Gmz 9 in straw yield/fed could be attributed to its superiority in the number of spikes/m^2. The superiority of Gmz 7 was reported by some authors, among them, El-Shami et. al. (1995), Sharshar et. al. (2000) regarding plant height, Salem (1999) regarding grain weight/spike and

Darwich (1994) regarding No. of spikes/m^2. The superiority of Gmz 9 regarding No. of spiks/m^2 and straw yield/fed was detected by El-Karamity (1998) and Sharshar (2000). Finally, the finding that Gmz 3 produced the heaviest grain (1000 GW) was also reported by Moussa (2001).

With respect to sowing date effect, data in Table 1 indicate significant gradual decrease in all studied traits in the two season, from the early to medium and then to late sowing. These results indicate the positive effect of early sowing for Gmz wheat cultivars. Thereafter, yield components as well as yield tended to increase as sowing was earlier. Similar findings were obtained by Mosalem (1999) in plant height and spike length. In addition, Salem (1999) also found that early sowing increased No. of grains/spike because of favorable conditions which in turn increased metabolites available for fruit set. Said (1998) found similar results.

Hamada and Moussa (2003) discussed the superiority of early sowing for producing heaviest grains, they stated that delaying sowing date beyond mid of November decreased spike length, number of grains/spike and consequently grain weight/spike. They added that delay sowing might have had subjected wheat plants to higher temperature during grain development stage. They added that the favorable environmental conditions during longer growing season enforced growth which was reflected in move metabolites synthesis and consequently yield components and ultimately more grain yield/fed. The present results are in full agreement with these results regarding straw and grain yield/fed, Hamada and Moussa (2003).

For the third independent factor, N level, it could be seen from Table 1 that application N at the highest level significantly exceeded the medium 1 and hence the lowest level in all respects. Such results give more than one evidence for the value of increasing N level up to 120 kg/fed, when growing Gmz cultivars. Tallest plants with highest N level may be contributed the increase in internodes length as a result of increases in meristematic activity of the plant. Hamada and Moussa (2003) found similar results.

The positive effect of N on spike length, introduced it as a good indicator for the promoting role of N on this trait which is considered as one of the most important yield attributes, for its close relationship with both No. of grains/spike and grains weight/spike, the main makers of grain yield. Then, number spikes/m^2 increments by additional N may be attributed to its stimulating effect on No. of tillers/plant which directly was reflected on No. of spikes/m^2. Sharshar et. al. (2000) came to the same finding. No doubt, the positive response of No. of grains/spike to applied N is surely due to its effect on spike length. Sorour et. al. (1998) results are in accordance with the present ones. The 1000 grain weight response seemed to be different than those reported by Hamada and Moussa (2003), who reported that 1000 grain weight was decreased as N level was increased. This indicates, in the present case, that high N application level increased No. of grains/spike without a negative effect on grain filling. The sounded straw and grain yield was clearly reported by many authors among them Hamada and Moussa (2003). Thereafter, it may be concluded that among independent studied factors, the best main effect levels were Gmz 7, sowing on November 5th and addition of 120 kg N/fed.

Table 1 : Means of the studied traits as affected by cultivar, sowing date and N level in 2002/2003 and 2003/2004 seasons.

Traits / Season / Indp. Factors	PH (cm)		SPKL (cm)		No. SPK/m²		No. G/SPK		GW/SPK (gm)		1000 GW (gm)		StY/fed (ton)		GY/fed (Ardab)	
	1st season	2nd season	1st season	2nd season	1st season	2nd season	1st season	2nd season	1st season	2nd season	1st season	2nd season	1st season	2nd season	1st season	2nd season
Cultivars (CV)																
Gmz 3	119.4	122.4	11.9	12.0	323.1	319.1	48.3	50.7	2.5	2.7	49.8	54.1	3.5	3.4	16.1	17.8
Gmz 7	120.7	123.4	13.4	13.6	331.0	327.3	47.0	50.0	2.7	2.9	47.7	50.7	3.7	3.6	18.2	19.5
Gmz 9	113.8	117.1	10.3	10.4	357.0	352.7	50.3	53.2	2.3	2.6	48.2	52.5	4.1	3.9	16.7	18.4
LSD at α 0.05	0.47	2.4	0.17	0.22	1.2	1.9	ns	ns	0.08	0.20	0.76	0.42	0.10	0.15	0.60	ns
Sowing Dates (SD)																
5 Nov. (SD_1)	121.1	124.1	13.2	13.3	351.2	347.2	53.5	56.2	2.7	2.9	50.9	54.7	4.0	3.9	20.3	21.9
15 Nov. (SD_2)	117.9	120.9	11.5	11.6	339.4	335.4	47.7	50.5	2.5	2.7	48.8	52.7	3.8	3.6	19.2	20.8
25 Nov. (SD_3)	114.9	117.9	10.9	11.0	320.6	316.6	44.3	47.1	2.3	2.6	46.0	49.9	3.5	3.5	11.4	13.0
LSD at α 0.05	0.63	2.20	0.15	0.22	1.07	3.11	1.68	2.50	0.01	0.17	0.46	0.50	0.03	0.90	0.32	0.25
N level (Kg/fed)																
N 80 (N_1)	116.8	119.8	11.6	11.7	331.7	327.7	44.9	47.6	2.4	2.7	46.9	50.8	3.7	3.5	16.0	17.6
N100 (N_2)	117.9	120.9	12.1	12.2	336.4	332.4	48.7	51.5	2.5	2.8	48.5	52.4	3.8	3.6	17.1	18.7
N 120 (N_3)	119.2	122.2	12.0	12.1	343.0	339.0	52.0	54.7	2.6	2.8	50.3	54.2	3.9	3.7	17.9	19.4
LSD at α 0.05	1.10	0.473	0.35	0.40	1.29	3.00	0.96	2.30	0.01	0.18	0.48	1.40	0.04	0.10	0.25	0.79

2- First order interactions effect.

a- cultivar x sowing date interaction (CV x SD):

Table 2 presents the means of studied traits as affected by the interaction (CV x SD), in 2002/2003 and 2003/2004 seasons.

a- Cultivar x sowing date interaction (CV x SD):

Table 2 indicates significant effect due to CV x SD interaction on all studied traits except with respect to No. of grains/spike and 1000 grain weight in the two seasons. Such clear results show that traits responded differently to the interaction between cultivars and seeding date. In addition, both No. of grains/spikes and 1000 grain weight seemed to somewhat hard or stable when facing the effect of such interaction .

The interaction Gmz 7 x SD_1 produced significant exceeds over the other eight interactions with respect to plant height, spike length, grain weight/spike and grain yield/fed. The products of the latter traits were 21.4 and 22.8 ardab/fed in 1st and 2nd season, respectively. Such superiority may be attributed to the additive positive independent effects of Gmz 7 and early seeding, (Table 1). In addition, grain yield/fed was benefited from the high positive products of plant height, spike length and grain weight/spike. Hamada and Moussa (2003) found similar results with respect to grain weight/spike and grain yield/fed. In spite of the superiorly of such combination, it occupied the third position for No. of spikes/m^2, because of the moderate product of Gmz 7 on that trait, (Table 1). Moreover, the previous superior combination gave a noticeable straw yield/fed. Next the best combination, Gmz 9 x SD_1 gave higher yield viz., 4.3 and 4.1 ton/fed in 1st and 2nd season, respectively. The present finding with respect straw yield/fed is in harmony with those reported by Hamada and Moussa (2003). The previous results illustrated the importance of early sowing for more than one cultivar of Gmz group. An evidence of the previous statement comes from the lowest values of the combinations which included the mid or late sowing regardless the participator cultivar. It may be concluded that sowing date plays a considerable role in its interaction with cultivars, however the same cultivar gave the highest and lowest products with early and late sowing, respectively. The highest straw yields/fed were 4.3 and 4.1 ton meanwhile those of grain were 19.0 and 20.3 ardab in 1st and 2nd season, respectively.

3- Cultivar x N level interaction (CV x N):

Table 3 includes the obtained means of the studied traits as affected by CVxN interaction in the two seasons. Obviously, the significant effects were only detected on grain weight/spike, 1000 grain weight and straw yield/fed in the two seasons. This means that, in most cases, all Gmz cultivars failed to interact successfully with varying N level. It was observed that the use of highest N level (120 kg/fed) produced the sounded values regardless the cultivar. For example, in both seasons, Gmz 3, Gmz 7 and Gmz 9 produced the pronounced values of grain weight/spike as wells as grain yield/fed and straw yield/fed, respectively. Contrarily the lowest N level did the opposite with all cultivars. These findings approved that N level may be most important factor in the combinations with Gmz wheat varities.

Table 2 : Means of the studied traits as affected by cultivars x sowing date interaction (CV x SD) in 2002/2003 and 2003/2004 seasons.

Traits	PH (cm)		SPKL (Cm)		No. SPK/m^2		No. G/SPK		GW/SPK (gm)		1000 GW (gm)		StY/fed (ton)		GY/fed (ardab)	
Interactions	1st season	2nd season	1st season	2nd season	1st season	2nd season	1st season	2nd season	1th season	2nd season	1st season	2nd season	1st season	2nd season	1st season	2nd season
CV x SD																
Gmz 3 x SD_1	122.4	125.4	12.9	13.0	337.7	333.7	53.3	55.7	2.7	3.0	51.9	56.2	3.8	3.6	19.6	21.2
Gmz 3 x SD_2	119.2	122.2	11.9	12	327	323.0	47.8	50.1	2.4	2.7	50.4	54.8	3.5	3.3	17.9	19.6
Gmz 3 x SD_3	116.4	119.4	10.8	10.9	304.7	300.7	43.9	46.2	2.2	2.5	47.0	51.3	3.3	3.1	10.9	12.6
Gmz 7 x SD_1	123.9	126.6	15.0	15.2	345.9	342.2	50.4	53.4	2.9	3.1	50.2	53.2	4.1	3.9	21.4	22.8
Gmz 7 x SD_2	120.0	122.7	13.2	13.4	331.8	328.1	46.7	49.7	2.7	2.9	47.8	50.8	3.7	3.6	20.8	22.1
Gmz 7 x SD_3	118.2	120.9	12.1	12.2	315.2	311.6	43.7	46.9	2.5	2.7	45.2	48.2	3.4	3.3	12.2	13.6
Gmz 9 x SD_1	117.0	120.3	11.7	11.8	369.9	365.6	56.8	59.6	2.4	2.7	50.4	54.8	4.3	4.1	20.0	21.7b
Gmz 9 x SD_2	114.3	117.7	9.3	9.5	359.3	355.0	48.8	51.8	2.3	2.5	48.2	52.6	4.1	3.9	19.0	20.7
Gmz 9 x SD_3	110.0	113.3	9.8	10.0	341.9	337.6	45.2	48.2	2.3	2.5	45.8	50.1	3.8	3.7	11.2	12.9
LSD at α 0.05	1.09	0.63	0.26	0.30	1.85	2.10	ns	ns	0.01	0.02	ns	ns	0.05	0.10	0.55	0.97

Table 3 : Means of the studied traits as affected by cultivar x nitrogen interaction (CV x N) in 2002/2003 and 2003/2004 seasons.

Traits / Interactions	PH (cm)		SPKL (cm)		No. SPK/m^2		No. G/SPK		GW/SPK (gm)		1000 GW (gm)		StY/fed (ton)		GY/fed (ardab)	
	1st season	2nd season	1st season	2nd season	1st season	2nd season	1st season	2nd season	1st season	2nd season	1st season	2nd season	1st season	2nd season	1st season	2nd season
CV x N																
Gmz 3 x N_1	118.2	121.2	11.3	11.4	317.3	313.3	44.7	47.0	2.4	2.7	47.4	51.8	3.4	3.2	15.1	16.8
Gmz 3 x N_2	119.3	122.3	12.3	12.4	322.0	318.0	48.8	51.1	2.5	2.8	49.9	54.2	3.5	3.4	16.1	17.8
Gmz 3 x N_3	120.6	123.6	12.0	12.1	330.0	326.0	51.6	53.9	2.5	2.8	52.0	56.3	3.6	3.4	17.1	18.8
Gmz 7 x N_1	119.4	122.1	13.1	13.2	325.3	321.7	42.6	45.6	2.6	2.8	46.1	49.1	3.6	3.5	17.0	18.3
Gmz 7 x N_2	121.0	123.7	13.4	13.6	330.1	326.4	47.2	50.2	2.7	2.9	48.0	51.0	3.8	3.6	18.4	19.8
Gmz 7 x N_3	121.7	124.3	13.8	13.9	337.4	333.8	51.2	54.2	2.8	3.0	49.1	52.1	3.8	3.7	19.0	20.3
Gmz 9 x N_1	112.8	116.1	10.3	10.5	352.3	348.0	47.4	50.2	2.2	2.5	47.1	51.4c	3.9	3.7	15.9	17.6
Gmz 9 x N_2	113.2	116.6	10.4	10.6	357.2	352.9	50.2	53.2	2.3	2.6	47.6	51.9	4.1	3.9	16.9	18.6
Gmz 9 x N_3	115.3	118.7	10.1	10.2	361.6	357.2	53.1	56.1	2.4	2.7	49.8	54.1	4.3	4.1	17.4	19.1
LSD at α 0.05	ns	ns	ns	ns	ns	ns	ns	ns	0.02	0.03	0.83	0.89	0.07	0.10	ns	ns

The present results are in good constitution with those of Hamada and Moussa (2003). They declared that Gmz 7 with the highest N level (120 kg/fed) produced the maximums grain yield/fed.

4- Sowing date x N level interaction (SD x N):

The combination indicates its effects on the means of the studied traits during the two seasons (Table 4). Significant effects were detected on all respects except with No. of grains/spike in 1st and grain yield/fed in both seasons. This means that a particular combination of sowing date and N level may make a wide environments and hence different responses for each features of wheat Gmz plants. Clearly, the combination $SD_1 \times N_3$ significantly surpassed the other combinations in all respects except No. of grains/spike in 2nd and grain yield/fed, where the superiority was insignificant. The maximum straw yield/fed were 4.1 and 4.0 ton as well as 21.3, 22.9 ardab for grain yield in 1st and 2nd, respectively. Such positive effects may be contributed by the independent effects of early sowing and highest N level. In logic, the combination of late sowing and lowest N level gave the minimum values of all studied traits. Hamada and Mousssa (2003) found insignificant effects on most of the studied traits in difference to the present study. But they agreed for the significant effect of the combination on straw yield/fed. and the insignificant effect of SD x N on grain yield/fed.

3- Second order interaction, cultivar x sowing date x N level (CVxSDxN):

Table 5 gives the obtained means of the studied traits as affected by the second order interaction CV x SD x N, in the two successive seasons. The significant effects of the combination were only shown on No. of spikes/m^2, grain weight/spike, straw yield/fed. and grain yield/fed, in the two seasons. It is easy to observe that Gmz 7 x SD_1 x N_3 combination produced the highest values of grain weight/spike, and grain yields/fed, viz. 22.2 and 23.7 ardab in 1st and 2nd, respectively. These results drew the attention that grain weight/spike as a main contributor to grain yield/fed. In addition Gmz 9 showed superiority in straw yield/fed, when, early sown (SD_1 and N_3) which produced 4.4 and 4.3 ton in 1st and 2nd, respectively. The comparison among means declared that the combinations (Gmz 7 x SD_2 x N_2) and (Gmz 9 x SD_1 x N_3) gave sounded grain yield/fed. Hamada and Moussa (2003) found insignificant effects due the second order interaction with all these respects.

B- Correlation.

Table 6 represents the obtained simple correlation coefficients (r) among each trait pair. Its quite evident that all (r) values were significant, except the correlation of plant height with each of No. of spikes/m^2 and straw yield/fed. In addition, correlation coefficients were insignificant between spikes/m^2 and straw yield/fed and between spike length and each of No. of spikes/m^2 (- 0.046) and straw yield/fed (0.043) as well between No. of spikes/m^2 and grain weight spike (0.151). No surprise herein that all correlation coefficients of grain yield/fed with all studied traits were significant. This indicates the direct effect of such contributors to grain yield/fed. In a factor analysis it could be relatively greater. Such results could be helpful with Gmz cultivars in breeding programs as well as in prediction of grain yield depending upon data available of the studied attributors.

Table 4 : Means of the studied traits as affected by sowing date x nitrogen level interaction (CV x N) in 2002/2003 and 2003/2004 seasons.

Traits	PH (cm)		SPKL (cm)		No. Spk/m^2		No. G/Spk		GW/Spk (gm)		1000 GW (gm)		StY/fed (ton)		GY/fed (ardab)	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd
Interactions	season	season	season	season	season	season	season	season	season	season	season	season	season	season	season	season
SD x N																
$SD_1 \times N_1$	119.3	122.3	12.4	12.5	344.1	340.1	50.6	53.1	2.6	2.9	49.1	53.0	3.9	3.7	19.1	20.7
$SD_1 \times N_2$	121.0	124.0	13.6	13.7	350.9	3469	53.2	56.0	2.7	3.0	51.0	54.9	4.1	4.0	20.6	22.1
$SD_1 \times N_3$	123.0	126.0	13.6	13.8	358.4	354.4	56.8	59.6	2.8	3.0	52.4	56.3	4.1	4.0	21.3	22.9
$SD_2 \times N_1$	117.2	120.2	11.5	11.6	332.0	328.0	44.7	47.4	2.4	2.6	46.6	50.4	3.7	3.5	18.2	19.8
$SD_2 \times N_2$	117.6	120.6	11.5	11.6	338.6	334.6	47.7	50.4	2.5	2.7	49.1	53.0	3.8	3.6	19.4	21.0
$SD_2 \times N_3$	118.8	121.8	11.4	11.6	347.6	343.6	50.9	53.7	2.5	2.8	50.8	54.7	3.9	3.7	20.0	21.6
$SD_3 \times N_1$	113.9	116.9	10.8	10.9	318.9	314.9	39.4	42.2	2.2	2.5	45.0	48.9	3.4	3.3	10.7	12.2
$SD_3 \times N_2$	115.0	118.0	11.1	11.3	319.9	315.9	45.3	48.1	2.4	2.6	45.3	49.2	3.5	3.3	11.4	13.0
$SD_3 \times N_3$	115.8	118.8	10.8	10.9	323.0	319.0	48.2	51.0	2.4	2.7	47.7	51.6	3.7	3.5	12.2	13.8
LDS at α 0.05	0.74	0.97	0.61	0.83	2.22	3.11	1.67	ns	0.02	0.5	0.84	0.09	0.07	0.21	ns	ns

Table 5 : Means of the significantly affected traits by the second order interaction; cultivar x sowing date x N level (CV x SD x N) in 2002/2003 and 2003/2004 seasons.

Traits	No. Spk/m^2		No. G/SPK		StY/fed (ton)		GY/fed (ardab)	
Season / Interactions	1st	2nd	1st	2nd	1st	2nd	1st	2nd
Gmz 3 x SD_1 x N_1	330.3	326.3	2.7	2.9	3.6	3.4	18.0	19.7
Gmz 3 x SD_1 x N_2	336.0	332.0	2.8	3.0	3.8	3.6	20.0	21.7
Gmz 3 x SD_1 x N_3	346.7	342.7	2.8	3.0	3.9	3.7	20.7	22.3
Gmz 3 x SD_2 x N_1	320.0	316.0	2.4	2.6	3.4	3.2	17.0	18.7
Gmz 3 x SD_2 x N_2	325.3	321.3	2.4	2.7	3.5	3.3	17.7	19.3
Gmz 3 x SD_2 x N_3	335.7	331.7	2.5	2.7	3.6	3.4	19.	20.7
Gmz 3 x SD_3 x N_1	301.7	297.7	2.2	2.4	3.2	3.1	10.3	12.0
Gmz 3 x SD_3 x N_2	304.7	300.7	2.2	2.5	3.3	3.1	10.7	12.3
Gmz 3 x SD_3 x N_3	307.7	303.7	2.3	2.6	3.4	3.2	11.7	13.3
Gmz 7 x SD_1 x N_1	339.0	335.3	2.8	3.1	3.9	3.8	20.3	21.7
Gmz 7 x SD_1 x N_2	344.3	340.7	2.9	3.2	4.2	4.1	21.7	23.0
Gmz 7 x SD_1 x N_3	354.3	350.7	3.0	3.2	4.1	4.0	22.3	23.7
Gmz 7 x SD_2 x N_1	326.7	323.0	2.6	2.8	3.6	3.5	19.3	20.7
Gmz 7 x SD_2 x N_2	331.0	327.3	2.7	2.9	3.7	3.6	21.7	23.0
Gmz 7 x SD_2 x N_3	337.7	334.0	2.7	2.9	3.8	3.6	21.3	22.7
Gmz 7 x SD_3 x N_1	310.3	306.7	2.4	2.7	3.4	3.3	11.3	12.7
Gmz 7 x SD_3 x N_2	315.0	311.3	2.5	2.8	3.4	3.3	12.0	13.3
Gmz 7 x SD_3 x N_3	320.3	316.7	2.6	2.8	3.5	3.4	13.3	14.7
Gmz 9 x SD_1 x N_1	363.0	358.7	2.3	2.6	4.2	4.0	19.0	20.7
Gmz 9 x SD_1 x N_2	372.3	368.0	2.4	2.7	4.3	4.2	20.0	21.7
Gmz 9 x SD_1 x N_3	374.3	370.0	2.6	2.8	4.4	4.3	21.0	22.7
Gmz 9 x SD_2 x N_1	349.3	345.0	2.2	2.5	4.0	3.8	18.3	20.0
Gmz 9 x SD_2 x N_2	359.3	355.0	2.3	2.5	4.1	3.9	19.0	20.7
Gmz 9 x SD_2 x N_3	369.3	365.0	2.3	2.6	4.3	4.1	19.7	21.3
Gmz 9 x SD_3 x N_1	344.7	340.3	2.1	2.3	3.6	3.4	10.3	12.0
Gmz 9 x SD_3 x N_2	340.0	335.7	2.3	2.5	3.8	4.6	11.7	13.3
Gmz 9 x SD_3 x N_3	341.0	336.7	2.4	2.6	4.1	4.0	11.7	13.3
LSD at α 0.05	3.86	4.11	0.04	0.04	0.12	0.13	0.74	0.9

Table 6 : Simple correlation coefficients (r) among each pair of traits of wheat (combined data).

	1-PH	2-SPKL	3-No. SPK/m^2	4-GW/SPK	5-No. G./SPK	6-1000 GW	7-StY/fed	8-GY/fed
1	1.000							
2	0.846*	1.000						
3	-0.051 ns	-0.460 ns	1.000					
4	0.848*	0.845*	0.151 ns	1.000				
5	0.359*	0.239 ns	0.633*	0.379*	1.000			
6	0.561*	0.384*	0.403*	0.457*	0.718*	1.000		
7	0.064 ns	0.430 ns	0.856*	0.248*	0.620*	0.460*	1.000	
8	0.625*	0.521*	0.588*	0.645*	0.606*	0.682*	0.617*	1.000

ns = insignificant correlation

*** = significant correlation at α 0.05**

From all the above mentioned results it may be concluded that:

- The factor Gmz 7, early sowing and high N level could be considered as the most important ones, independently or when forming first or second

order interactions. Therefore, their combination could be recommended for maximizing grain yield/fed.

- The Gmz 9 with SD_1 and N_3 combination is the best for producing high straw yield/fed.
- Correlation between each trait and other was positive and significant in most cases.

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إنتاجية بعض أصناف قمح الجميزة تحت تأثير ميعاد الزراعة ومعدلات من التسميد الآزوتى

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أجريت تجربتان حقليتان فى مركز بلقاس محافظة الدقهلية (شمال الدلتا) لاختبار إنتاجية ثلاثة أصناف من القمح (جميزة ٣ ، جميزة ٧، جميزة ٩)، تحت ثلاثة مواعيد للزراعة (٥ نوفمبر – ١٥ نوفمبر – ٢٥ نوفمبر) وثلاثة مستويات من التسميد الآزوتى (٨٠ و ١٠٠ و ١٢٠ كجم أزوت/فدان) وذلك خلال الموسمين ٢٠٠٢/٢٠٠٣، ٢٠٠٣/٢٠٠٤، حيث استخدم تصميم القطع المنشقة مرتين فى ثلاثة مكررات، وحيث وزعت الأصناف على القطع الرئيسية ومواعيد الزراعة بالقطع الشقية الاولى ومستويات التسميد الآزوتى القطع الشقية الثانية وكانت مساحة القطعة التجريبية ٤٢,٠ م^2 .

وتتلخص أهم النتائج فيما يلى :

- أظهر صنف الجميزة ٧ تفوقا على الصنفين الأخرين فى محصول الحبوب، وتفوق الصنف جميزة ٩ فى محصول القش وتفوق جميزة ٣ فى وزن الاف حبة .
- كانت جميع المقارنات فى صالح موعد الزراعة المبكر فى حين كانت أقل القياسات مسجلة مع الزراعة المتأخرة
- استجابت الثلاثة أصناف للمعدل الأعلى من التسميد الآزوتى (١٢٠ كجم/فدان) وذلك من حيث محصولى الحبوب والقش للفدان ومؤشراتهما.
- أوضحت النتائج أن المعاملات العاملية سواء بين عاملين أو بين الثلاثة كلها أن جميزة ٧ والموعد المبكر ومعدل التسميد الأعلى قد حققت أعلى القيم والمتفوقة معنويا، ولقد تحقق أعلى محصول حبوب/فدان وقدره ٢٢,٣ و ٢٣,٧ إردب فى الموسمين المتعاقبين عند استخدام المعاملة العاملية (جميزة ٧ × الزراعة فى ٥ نوفمبر × ١٢٠ كجم ازوت/فدان). وعند إحلال جميزة ٩ فى التركيب السابق بدلا من جميزة ٧ اعطى أعلى محصول للقش/فدان وقدره ٤,٥ و ٤,٣ طن فى الموسمين الأول والثانى على التوالى.
- كان معامل الارتباط البسيط معنويا وموجبا عند تقديره بين محصول الحبوب/ فدان وباقى الصفات الأخرى.