

## SUMMARY

Field experiments were carried out at Sids Agricultural Research Station, Agric. Res. Cen., Bani- Suef Governorate, during the three successive seasons 1995/ 96, 1996/ 97 and 1997/ 98 .

The experiments aimed to investigate the performance of 6 new long spike wheat varieties under different N levels. The experiments were executed in clay fertile soils.

The evaluated varieties were: Sids 1 (a commercial cultivar grown as a check variety ), and the long spike varieties : Sids 4, Sids 5, Sids 6, Sids 7, Sids 8, and Sids 9. The nitrogen levels were : 0, 30, 60, 90, 120 and 150 kg/ fad. The N carrier was ammonium nitrate (33.5 % N).

A split plot design with four replications was used. N levels were distributed randomly in the main plots and varieties occupied the sub plots. The sub plot area was  $8.4 / m^2$  . Phosphorus fertilizer was applied as calcium superphosphate (15.5 P<sub>2</sub>O<sub>5</sub>) at a rate of 150 kg/ fad. Potassium sulphate (48 % K<sub>2</sub>O) was also applied at 50 kg/ fad.

Sowing date was 26<sup>th</sup>, 20<sup>th</sup> and 17<sup>th</sup> of November in the first, second and third season, respectively. Harvesting was followed on 8<sup>th</sup>, 4<sup>th</sup> and 5<sup>th</sup> of May, respectively. The normal cultural practices as recommended for the region were followed.

The results of the combined analysis of the three seasons average could be summarized as follows:

- 1- Varieties markedly varied in heading date. The commercial cultivar Sids 1 was the latest variety with a flowering date of 103.78 days from sowing. Sids 4 was the earliest in flowering (83.36 days) and the rest long spike varieties reached heading after 92.22 – 95.44 days.

The increase in N level delayed heading date with significant differences. The untreated plants flowered after 92.02 days and those supplied with 150 kg N/ fad reached heading after 96.01 days.

The interaction between varieties and N levels on heading date was significant. The earliest heading was reached by untreated plants of Sids 4, being 80.83 days and the latest heading date was 107.08 days recorded by Sids 1 supplied with 150 kg N / fad.

- 2- Varieties significantly varied in maturity date. The earliest variety was Sids 4 (140.92 days) and the latest one was Sids 1 (149.54 days). The other long spike varieties matured after 145.28 – 146.50 days.

The increase in N level significantly delayed maturity. The check plants matured after 140.12 days and those supplied with 150 kg N/ fad matured after 150.98 days.

A significant variety x N level interaction was detected on maturity date. The earliest maturity was reached after 133.42 days with untreated Sids 4 plants and the latest was attained after 154.00 days with Sids 1 plants supplied with 150 kg N/ fad.

- 3- Plant height significantly varied among the tested varieties. Sids 1 plants were the tallest (117.92 cm) and Sids 9 plants were the shortest plants (98.26 cm). The rest varieties were inbetween with significant differences .

The increase in N level significantly increased plant height. The tallest plants were those supplied with 120 kg N/ fad (109.11 cm) and the shortest were the untreated plants (87.80 cm).

The interaction between variety and N level significantly affected plant height. The tallest plants were those of Sids 1 supplied with 120 kg N/ fad (124.58 cm), and the shortest ones were those of untreated Sids 8 (82.50 cm).

- 4- The tested varieties significantly varied in number of spikelets/ spike. Sids 5 had the greatest spikelets number (23.40) and Sids 4 the lowest number (20.69).

N application significantly increased number of spikelets/ spike. A significant increase of 6.25 % in this trait was induced by increasing N level from zero to 150 kg N/ fad.

No significant interaction effect was detected between variety and N level on number of spikelets/ spike.

- 5- Varieties showed significant differences in number of spikes/ m<sup>2</sup>. Sids 1 produced the greatest number of spikes (291.39) and Sids 5 produced the lowest number (256.06), the other varieties were in-between.

The increase in N level significantly increased number of spikes/m<sup>2</sup>. Raising N level from zero to 120 kg N /fad significantly increased spikes / m<sup>2</sup> , combined over the three seasons, by 20.92 %

A significant interaction effect between variety and N level was detected on spikes / m<sup>2</sup>. The maximum number of spikes / m<sup>2</sup> was 312.92 which was recorded by Sids 1 supplied with 120 kg N/ fad and the lowest spikes/ m<sup>2</sup> was produced by untreated Sids 6 plants, being 219.17 spikes/ / m<sup>2</sup> .

- 6- Significant differences were detected among the tested varieties in spike length. All the long spike varieties significantly surpassed the commercial cultivar Sids 1 which recorded 11.93 cm as the shortest length compared with 14.55 cm for Sids 6 as the longest spikes. Spike length of the other varieties ranged between 13.88 and 14.49 cm.

The increase in N level significantly increased spike length. Applying 150 kg N/ fad increased spike length by 10.93 % compared with the untreated plants.

The interaction between variety and N level significantly affected spike length. The tallest spikes were those of Sids 4 supplied with 150 kg N/ fad recording an average of 15.72 cm, and the minimum length was 11.34 cm of untreated Sids 1 plants.

- 7- The tested varieties significantly varied in number of grains/ spike. The highest number was 78.41 grains recorded with

Sids 5 and the lowest number was 65.47 of the commercial variety Sids 1.

Increasing N level significantly increased grains/ spike. Raising N level from zero to 60 kg N/ fad increased grains/ spike by 9.06 %.

The interaction between variety and N level had no significant effect on grains/ spike.

- 8- The evaluated varieties significantly varied in 1000- kernel weight. The highest grain index was 60.67 g, which was recorded with Sids 4 and the lowest grain index was 51.78 g, of Sids 1. The other five long spike varieties recorded 1000- kernel weight between 55.13 and 59.32 g with significant differences.

The increase in N level had no significant effect on grain index. Also, no significant interaction was detected between variety and N level on this trait.

- 9- The varieties significantly differed in biological yield. The commercial cultivar Sids 1 was at the top with a yield of 8.520 t/ fad, and Sids 7 recorded the lowest biological yield, being 7.36 t/ fad. The other varieties yielded between 8.135 (Sids 5) and 7.401 t/ fad (Sids 4) with some significant differences.

The increase in N level significantly increased biological yield. Raising N level from zero to 150 kg/ fad increased biological yield by 101.75%.

Variety x nitrogen level significantly affected biological yield. The highest biological yield was recorded with Sids 6 supplied with 90 kg N/ fad, being 10.298 t/ fad., and the lowest yield was 3.460 t/ fad which was obtained by unfertilized Sids 7 plants.

- 10- The tested varieties significantly differed in their grain yield potentiality. The combined analysis of the three seasons average showed that three varieties were the highest yielders, i.e., Sids 9 (17.33 ardab/ fad), Sids 5 (17.21 ardab/ fad) and Sids 1 (17.00 ardab/ fad), without significant differences among them.

These 3 varieties were followed by Sids 8 (16.57 ardab/ fad), Sids 6 (15.77 ardab/ fad), and Sids 7 (15.47 ardab/ fad).

The lowest grain yield was obtained by Sids 4 (12.62 ardab/ fad) which was significantly inferior compared with the other 6 varieties.

The results indicated the good yield potentiality of the commercial cultivar Sids 1 where it was statistically similar with Sids 5 and Sids 9 and better than Sids 4, Sids 6 and Sids 7. Also, this commercial cultivar has lower N requirements and higher straw yield.

The application of N significantly increased grain yield. Applying N at 30, 60, 90, 120, and 150 kg N/ fad increased grain yield over the control by 55.67, 74.21, 84.80, 85.30 and 91.01 %, respectively. The increases in grain yield due to 120

and 150 kg N/ fad levels were not significant compared with 90 kg N.

The interaction between varieties and N levels significantly affected grain yield. The highest yield was recorded with Sids 8 supplied with 150 kg N/ fad, being 20.03 ardab/ fad and the lowest grain yield was 7.81 ardab/ fad of untreated Sids 4.

- 11- Straw yield/ fad markedly varied among the evaluated varieties. The highest straw yield was obtained by the commercial cultivar Sids 1, being 5.97 t/ fad which significantly surpassed the long spike varieties .

Sids 7 produced the lowest straw yield, being 5.04 t/ fad., and the other varieties were in-between with straw yield between 5.15 and 5.55 t/ fad.

The increase in N level significantly increased straw yield. The maximum yield was obtained by applying 90 kg N/ fad which was 2.2 times that of the check treatment .

Varieties x N levels significantly affected straw yield. The maximum yield was 7.58 t/ fad which was obtained by Sids 7 supplied with 90 kg N/ fad. The minimum straw yield was 2.32 t/ fad which was produced by untreated Sids 7 plants.

- 12- The evaluated varieties showed significant differences in the N % in grain. Sids 4 and Sids 8 were at the top with 1.82 % N in grain and the commercial cultivar Sids 1 contained the lowest N%, being 1.62 %. The other four varieties contained between 1.65 and 1.75 % N in grain and were in- between.

Neither N level nor variety x N interaction had significant effect on N% in wheat grain as indicated in the combined analysis of the three seasons average.

- 13- N uptake in grain markedly varied among the seven varieties. Sids 4 recorded the lowest N uptake and Sids 8 showed the highest N uptake. Varieties could be arranged in a descending order in N uptake on the average of the 6 N levels as follows :

Sids 8 (45.01 kg), Sids 9 (43.18 kg), Sids 5 (42.40 kg), Sids 6 (41.46 kg), Sids 1 (41.03 kg), Sids 7 (40.02 kg), and Sids 4 (34.72 kg).

N uptake increased as the N level increased but this increase was diminished with each increment in N rate. The increase in N uptake was 58.96, 16.03, 0.25, 1.45, and 9.00% when N rate was raised from 0 to 30, from 30 to 60, from 60 to 90, from 90 to 120 and from 120 to 150 kg N/ fad, respectively.

- 14- Nitrogen use efficiency varied among the different varieties. Sids 7 (19.82 kg grain/ kg N) and Sids 5 (19.38 kg grain/ kg N) were at the top on the average of the 5 N rates, whereas Sids 1 was the worst variety with a value of 9.28 kg grain/ kg N.

The tested varieties recorded the following values of N use efficiency averaged over the 5 N rates and combined over the 3 seasons : Sids 7 (19.82), Sids 5 (19.38), Sids 6 (18.60), Sids 8 (17.62), Sids 9 (12.61), Sids 4 (11.51) and Sids 1 (9.28).

The increase in N level reduced markedly N use efficiency. Applying N at 30, 60, 90, 120 and 150 kg/ fad resulted in N use efficiency of 26.95, 17.97, 13.68, 10.32 and 8.81 kg, respectively.



- 15- Nitrogen recovery % markedly varied among the tested varieties. Sids 7 recorded the highest value on the average of the 5 application rates and Sids 1 showed the lowest recovery %. Varieties could be arranged in the following descending order in regard to apparent N recovery %:

Sids 7, Sids 8, Sids 6, Sids 5, Sids 4, Sids 9 and Sids 1 with values of : 41.97, 34.99, 32.41, 31.62, 23.39, 18.83 and 11.52%, respectively.

The increase in N level reduced N recovery .Applying N at 30, 60, 90, 120 and 150 kg N/ fad produced N recovery values of: 47.60, 34.09, 22.85, 17.85, and 16.91, respectively.

The maximum recovery was 75.37 % produced by Sids 7 at 30 kg N/ fad and the lowest recovery was 6.89 % recorded by Sids 1 at 120 kg N/ fad.