SUMMARY

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Two field experiments were carried out at Ras-Sudr Agricultural Research Station, South Sinai Governorate, Desert Res. Cent. during the three successive seasons 1996/97, 1997/98 and 1998/99. The experiments aimed to investigate the performance of three new long spike wheat varieties under different N levels, irrigation intervals and plant antitranspirants. The experiments were executed in sandy soil having an alkaline reaction (pH 7.9), organic matter 0.46%, 8.3 dS/m EC, 58.5% $CaCO_3$ and the available NPK were 16.10, 10.10 and 56.75 mg/kg soil, respectively.

Experimental treatments:

Two experiments under taken in each two (1996/1997 & 1997/1998 and 1997/1998 & 1998/1999). The first one was devoted for three wheat varieties and seven N levels. Experiments were layed out and statistically analyzed as split-plot design in four replications . The three wheat varieties were randomly distributed in the main plots and 7 nitrogen levels in the split-plots. The 2nd experiment was designed for the some 3 wheat varieties under 4 irrigation intervals and 3 plant antitranspirant treatments. A split-split plot design with four replications was used in two seasons of experimentation. Irrigation intervals were randomly distributed in the main plots and the 3 wheat varieties were randomly distributed in the sub plots. The three plant antitranspirants were randomly distributed in the sub-sub plots. The evaluated long spike varieties were. Sids 6, Sids 7 and Sids 8. The nitrogen levels were:

1. zero N as a control.
2. 60 kg N/fed. (soil application).
3. 60 kg N/fed. + 4% spray solution of urea (46% N).
4. 80 kg N/fed. (soil application).

5. 80 kg N/fed. + 4% spray solution of urea.
6. 100 kg N/fed. (soil application).
7. 100 kg N/fed. + 4% spray solution of urea.

The N soil application carrier was ammonium nitrate (33.5% N).

The irrigation intervals were: weekly irrigated (at 7-day interval), Bi-weekly irrigated (at 14-day interval), Tri-weekly irrigated (at 20-day interval) and the common irrigation system in the farm. Irrigation water contain 5.90 dS/m EC (3773 ppm) and pH value was 7.9. Plant antitranspirant treatments were: zero (tap water), 0.4 Litre/fed.. Vapor gard and 0.5 L. Nu-film/fed. These treatments were sprayed at 75 days from planting in 200 L. water solution/fed.

The sub plot area was $5m^2$ (2m x 2.5m) and contained 10 rows, 2.5 m in length and 20 cm apart. The preceding crop was fallow throughout three seasons. Nitrogen was applied in two doses, at 3 and 6 weeks from planting. Nitrogen soil application in the 2nd experiment was applied at a rate of 100 kg N/fed.

Seeding rate was 120 kg/fed. Grains were soaked in tap water for 12 hours before planting and drilled hand 20 cm apart. Sowing data was 6th, 8th and 10th of November in the 1st, 2nd and 3rd seasons, respectively. Harvesting was followed on 8th, 6th, 4th of May, respectively ($5m^2$ in the Middle rows). The normal cultural practices as recommended for the region were followed.

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

A- The 1st experiment: (1996/97 and 1997/98)

"The performance of three new long spike wheat varieties under seven N levels"

Effect of N-levels on growth characters at 90 days from planting, growth analysis, total chlorophyll and proline contents, grain growth parameters, grain yield, yield components, chemical

contents and some technological properties of three wheat varieties.

I. Growth characters:

1. Varieties markedly varied in plant height, number of leaves/plant, dry weight of shoots and total weight/plant, LAI as well as RGR, and NAR at 90-100, 100-110 periods. Sids 7 plants were the tallest (99.6 cm) and it produced the highest values of the same respective characters. Sids 8 plants were the shortest plants (94.1 cm.) and it gave the lowest values of the same respective traits. However, the difference between Sids 8 and Sids 6 plants in most cases was insignificant.

2. The increase in N level significantly increased plant height, number of leaves/plant, dry weight of different plant organs, LAI, RGR and NAR at the two growth periods as well as SLW. The tallest plants (114.1 cm) were there supplied with 100 kg N+4% urea spray treatment and the shortest were the unfertilized plants (83.6 cm). The same trend was obtained in the other growth characters. However, the difference between 100 kg N/fed and 100 kg N/fed. +4% urea spray treatments were insignificantion number of leaves/plant, dry weight of leaves/plant and SLW

3. The interaction between varieties and N level significantly affected plant height and relative growth rate in the 1st season and specific leaf weight in both seasons. Generally, Sids 7 supplied 100 kg N/fed. +4% urea treatment produced the highest values, whereas, the unfertilized plants of the three Sids varieties gave the lowest values.

II. Total chlorophyll and proline content:

1. The tested three varieties significantly varied in total chlorophyll units and praline content. Sids 7 had the highest values at booting and milk ripe stages and Sids 8 gave the lowest ones.
2. Nitrogen application significantly increased the same respective characters. Significant increases of 43.28 and 47.06% in chlorophyll unit at booting and milk ripe stage were induced by increasing N level from zero to 100 kg N + 4% urea spray treatment. Opposite trend was obtained in protein content at both stages of growth.
3. No significant interaction effect was detected between varieties and N level on total chlorophyll units. Whereas, a significant interaction effect between varieties and N level was detected on protein content at booting stage only in the 1st season, Sids 7 supplied zero N produced the highest, praline content and the three wheat varieties with 100 kg N+ 4% urea had the lowest protein content.

III- Grain filling rate and effective grain filling period:

1. The evaluated varieties significantly varied in grain filling rate and effective grain filling period. The highest values were 866.2 mg/spike/day and 39.25 days recorded with Sids 7 and the lowest values (832.9, 8.10) were recorded of Sids 8 variety.
2. Increasing N level significantly increased the same respective traits. Raising N level from zero to 100 kg N/fed.+4% urea solution as spray/fed increased G.F.R. and effective grain filling period by 21.72 and 10.30 %, respectively. However, the differences among 60 kg N/fed.

and 100 kg N/fed. + 4% urea treatments in grain filling rate were insignificant.

3. The interaction between varieties and N level significantly affected effective grain filling period in both seasons. The highest period were reached by 100 kg N+4% urea treated plants of Sids 7, being 41.7 days and lowest period (37.3 days) recorded by the unfertilized plants of the three tested varieties in the 1st season. The same trend was obtained in the 2nd season.

IV. Grain yield and yield components:

1. Varieties significantly varied in grain yield, yield components, straw and biological yield. Sids 7 produced the highest values of number of spikes/m2, spike length, number of spikelets/spike, number of grains/spike, grain weight of spike and 1000-grains weight. Sids 7 produced the highest grain, straw and biological yields/fed. Sids 8 and Sids 6 had the lowest values in traits.

2. The increase in N level significantly increased the same respective characters and harvest index. Raising N level from zero to 100 kg N/fed. + 4% urea treatment significantly increased grain, straw and biological yields by 212.4, 180.5 and 180.5 %, respectively.

3. Significantly interaction effect between the applied factors was obtained on plant height at harvest, spike length, grain yield and biological yield in both seasons and number of spike/m^2, number of spikelets/spike, spike grain weight, straw yield in the 2nd season only. The highest grain yield (3.14 and 3.18 Ton/fed.) were recorded with Sids 7 at 1st and 2nd seasons respectively supplied with 100 kg N/fed. + 4%

urea. On the reverse, the lowest yield was 1.35 and 1.25 Ton/fed. with unfertilized Sids 8 and Sids 6 at 1st and 2nd seasons, respectively. The same trend was obtained in the other respective characters.

V. Chemical content and some technological properties:

1. The tested varieties significantly differed in their NPK and Na percentages in grain and straw as well as total carbohydrate content in grain, wheat flour wet and dry glutein. Sids 7 had the highest content of their NPK and Na%, total carbohydrate %, and flour wet and dry glutein. Whereas, Sids 8 and Sids 6 (in most cases) gave the lowest contents. However, the difference among the tested three varieties in P and Na% in grain and straw, flour wet and dry glutein were not significant.
2. Application of 100 kg N+4% urea treatment significantly increased NPK% in both grain and straw, total carbohydrate % in grain and wheat flour wet and dry glutein. On the other hand, the unfertilized treatment produced the highest percentages of Na in both grain and straw of wheat. However, the difference between 100 kg and 100 kg N+4% urea/fed treatments in N% in grain was insignificant.
3. The interaction between varieties and N levels significantly affected PK%, total carbohydrate % in grain and wheat flour wet glutein % in one season only and Na% in straw in both seasons. It could be recommended that Sids 7 supplied 100 kg N+4% urea/fed treatment produced the maximum grain and straw yield and their quality under the experimental conditions.

The second experiment: (1997/98 and 1998/99).

Effect of irrigation intervals and plant antitranspirants on the yield and quality of three wheat varieties.

I. Growth characters:

1. Increasing irrigation interval from 7-day to 14-day or 21-day caused a significant effect in plant height and dry weight different plant organs of wheat and leaf area index (LAI) at 90 days from planting, relative growth rate (RGR) and net assimilation rate (NAR) at both periods (90-100, 100-110 days) as well as specific leaf weight (SLW). Bi-weekly irrigated interval (every 14-day) had the highest values of the same respective characters and Tri-weekly irrigated interval (every 21-day) had the lowest ones.

2. Varieties significantly varied in all the studied growth characters at 90 days from planting, LAI, RGR, NAR and SLW. Sids 7 produced the highest values and Sids 8 or Sids 6 had the lowest ones.

3. Plant antitranspirants caused a significant effect in the same respective growth characters and growth analysis. Vapor gard had the highest values and the control treatment gave the lowest ones.

4. Irrigation intervals x varieties significantly affected dry weight of leaves, shoots and total dry weight in the 2nd season and RGR at 90-100 days from planting and SLW in both seasons.

   In general, Sids 7 plants irrigated interval (every 14-day) recorded the highest values and Sids 8 or Sids 6 irrigated interval (every 21-day) gave the lowest ones.

5. The interaction between irrigation intervals and plant antitranspirants significantly affected shoots and total dry weight in 1998/1999 season only.

6. Varieties x plant antitranspirant significantly affected leaves, shoots and total dry weights as well as SLW in 1997/1998 season only.

7. Shoots and plant dry weight as well as SLW in the 2nd season and RGR after 90-100 day in both seasons were effected by irrigation intervals x varieties x plant antitranspirants.

II- Total chlorophyll and proline contents:

1. Bi-weekly irrigated (at 14-day interval) significantly produced the highest total chlorophyll units at booting and milk ripe stages and tri-weekly irrigated gave the lowest units. On the other hand, tri-weekly irrigated significantly increased proline content and weekly irrigated (every 7-day interval) gave the lowest content. This was true in both booting and milk ripe stages.

2. The evaluated varieties varied in total chlorophyll units and proline content. Sids 7 gave the highest values at booting and milk ripe stages and Sids 8 had the lowest values.

3. A Vapor gard spraying produced the highest values of the same respective characters and tap water application had the lowest ones.

4. Proline content at milk ripe stage in the first season significantly affected by the interaction between irrigation intervals x varieties.

5. The results indicated that irrigation intervals x plant

antitranspirants interaction had significant effect on total chlorophyll content at milk ripe stage in the second season and proline content at booting stage in both seasons as affected by the interaction between irrigation intervals and plant antitranspirants.

6. SLW in 1997/1998 season was affected by the interaction between plant antitranspirants and varieties.

III- Stomata characters:

1. Prolonging the time elapsed between the irrigations caused a significant effect in stomata air chamber area and size in both upper and lower leaf surface. The highest values were noticed at the medium irrigation interval of 14-day as compared with the longer interval of 21-day, with significant differences in upper and lower leaf surface.

2. Sids 7 significantly increased the same respective characters. Sids 7 gave the highest values and Sids 8 produced the lowest ones.

3. Foliar application with Vapor gard had the highest values of stomata air chamber area and size in upper or lower leaf surface and the control treatment gave the lowest area or size.

4. Stomata air chamber area of upper leaf surface in both seasons stomata air chamber size of upper leaf surface in the first season and stomata area and size of lower leaf surface in the second season were affected by the interaction between irrigation intervals and varieties.

5. Significant interaction between irrigation intervals and plant antitranspirants on stomata air chamber area of upper leaf

surface in both seasons, stomata area and size of lower leaf surface in 1998/1999 season and stomata size of upper leaf surface in the first season.

6. Stomata area and size of lower leaf surface in the second season and stomata size of upper leaf surface in the first season were affected by varieties and plant antitranspirants.
7. Significant interaction effect between the applied factors was obtained on stomata air chamber area of upper leaf surface in 1998/1999.

IV- Grain filling rate and effective grain filling period:

1. The highest grain filling rate and effect grain filling period were obtained as a result of irrigation 14-day interval and the longest interval at 21-day gave the lowest values.
2. Sids 7 significantly increased these characters compared with the other tested wheat varieties. Sids 8 or Sids 6 had the lowest values.
3. Foliar application with Vapor gard significantly increased the same respective characters and the control treatment gave the lowest values.
4. Significant interaction effect was detected between irrigation interval and varieties on grain filling rate and effective grain filling period in both seasons.
5. Irrigation intervals and plant antitranspirants interaction significantly affected grain filling rate and effective grain filling period in both seasons.
6. Varieties x plant antitranspirants significantly affected grain filling rate and effective grain filling period in both seasons.
7. Grain filling rate and effective grain filling period were affected by the interaction between the three factor studied.

V- Grain yield and yield components:

1. Prolinging the time elapsed between the irrigations caused a significant continuous effect in plant height at harvest, number of spikes/m^2, number of spikelets/spike, number of grains/spike, spike grain weight, grain index, grain, straw and biological yields/fed as well as harvest index. The highest values of the same respective characters were obtained at the medium irrigation interval of 14-day as compared with the longer interval of 21-day or the shorter interval of 7-day.
2. Sids 7 was the highest in grain yield and its components as well as straw and biological yield/fed. Whereas, Sids 8 (or Sids 6 in some cases) was the lowest values in the same respective characters.
3. Foliar application with Vapor gard had the highest values and the untreated gave the lowest grain yield and yield components.
4. The highest plant height at harvest, number of grains/spike, spike grain weight, grain yield and harvest index in both seasons, biological yield in the first season only, and straw yield in the second season, were noticed for Sids 7 and irrigated at 14-day interval.
5. Significant interaction effect between irrigation intervals and plant antitranspirant treatments on plant height at harvest, spike length, 1000-grain weight and straw yield in the first season. In general, the highest values of number of spikelets/spike, grain yield, biological yield and harvest index in the both seasons behaviour were detected at the medium irrigation intervals of 14-day and Vapor gard

sprayed.

6. Plant height at harvest in the both seasons, number of spikes/m^2 in the first season, and grain yield in the second season were affected by the interaction between varieties and plant antitranspirants.

7. The highest values of number of spikes/m^2 and spike grain weight in the first season, plant height at harvest and spike length in the second season were produced from Sids 7 with irrigated at 14-day interval and Vapor gard sprayed with significant difference.

VI- Chemical content and some technological properties:

1. Irrigation intervals had the slight increases in nitrogen, phosphorus, potassium and sodium percentages in both grain and straw as well as total carbohydrate content in grain. However, the differences among 4 irrigation intervals in wheat flour wet and dry glutein percentages were significant. Irrigated wheat plants at 14-day interval significantly produced the highest values compared with the other irrigation systems.

2. Sids 7 significantly produced the highest values of the same respective characters except wheat flour dry glutein content, whereas, the lowest values were obtained with Sids 8. However, the difference between Sids 8 and Sids 6 as well as the difference between Sids 7 and Sids 6 in some cases were insignificant.

3. Foliar application with Vapor gard treatment significantly increased the same different chemical characters in both wheat grain and straw and the untreated had the lowest

values.

4. A significant interaction effect between irrigated interval and varieties was detected on straw nitrogen content in both seasons, straw potassium content in the first season and total carbohydrate content in grain in the second season.
5. The interaction between irrigation intervals and plant antitranspirants significantly affected by straw nitrogen and potassium percentages in the first season and wheat flour dry glutein content in the second season.
6. Grain phosphorus content in the first season and straw sodium content in both seasons were affected by the interaction between varieties and plant antitranspirants.
7. Chemical content and some technological properties characters were not afferted by the interation between the three studied factors.

Under the experimental conditions, it could be recommended that, the highest grain and straw yield as well as their quality was detected for Sids 7 and irrigated at 14-day interval and sprayed with Vapor gard antitranspirant.