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SUMMARY

The present investigation was undertaken at Sids Agricultural Research Station, Agricultural Research Center, Egypt, during two seasons of 2004/2005 and 2005/2006. The objectives of the present investigation were to study the following aspects:

- 1-Mean performance of six parents and their F₁-hybrids under two planting dates.
- 2- Estimate heterosis under two sowing date.
- 3-Estimate the general combining ability and specific combining ability effects.

The studied characters included:

Days to heading, days, days to anthesis, days to maturity, plant height, grain filling period, grain filling rate, number of spikes per plant, number of kernels per spike, 1000-kernel weight and grain yield per plant,.

Six of durum wheat genotypes were used in this study. These genotypes differed widely in their genetic make up namely; (1) Kaus/star, (2) Atilla, (3) Sids 1, (4) Giza 168, (5) Line 101, (6) Line 11.

In 2004/2005 season these genotypes were crossed in all possible combinations excluding reciprocals.

Both parents and F₁-hybrids were sown in season 2005/2006 in two experiments the first on 23th November (recommended date) and the second on 23th December (late date) in a randomized complete block design with three replicates. Data were recorded on fifteen individual plants for studied characters.

Heterosis was estimated as the deviation of F₁'s mean from mid-parent and better parent values.

The analysis of variance was computed and partitioned into general and specific combining ability . Statistical and genetic analysis were performed as follows:

-**Griffing (1956)** to estimate general and specific combining ability effects.

-**Bahatt (1971)** to calculate heterosis over mid-parent and better parent.

Analysis of Variance:

1-Mean squares of genotypes (Parents and F₁'s) were highly significant for all traits except days to maturity under recommended date.

Mean performance:

Analysis of variance revealed highly significant differences among genotypes, parents and F₁ crosses for all the characters studied under both planting dates.

1- Days to heading: Line 11 and Line 101 were the earliest in the recommended and late planting dates, while Kauz/Star was the latest under both planting dates. Cross Line 11 x Line 101 was the earliest under both planting dates.

2- Days to anthesis: Line 11 and Line 101 were the earliest in the recommended and late planting dates, while Kauz/Star was the latest under both planting dates. Cross Line 11 x Line 101 was the earliest under both planting dates.

3- Days to maturity: Overall averages decreased as the planting date was delayed. Line 11 was the earliest and Kauz/Star was the latest under both planting dates. The cross Line 11 x Line 101 was the earliest in the recommended and late planting dates, respectively, while the cross Atilla x Giza 168 was the latest in the recommended planting date.

4- Grain filling period: Late planting reduced grain filling period for parents and F₁-crosses, as compared to the recommended planting date.

- 5- Plant height:** A wide range of plant height was found between different parental lines. For parents Line 101 was the tallest and Line 11 was the shortest under both planting dates. The cross Sids 1x Line 101 recorded the tallest plants under recommended planting date, while cross Atilla x Line 11 recorded the shortest plants under recommended planting date. The cross Kauz/Star x Line 101 recorded the tallest plants under late planting date, while the cross Kauz/Star x Atilla recorded the shortest plants under late planting date.
- 6- Number of spikes per plant:** A wide range of number of spikes per plant was found between different parental lines. Sids 1 was the highest in number of spikes per plant under both planting dates. Similarly crosses differed widely in number of spikes per plant.
- 7- Number of kernels per spike:** Generally, number of kernels per spike was low in the late planting date compared to the recommended planting date. Line 101 recorded the highest value in number of kernels per spike under recommended planting date. Line 11 recorded the highest value in number of kernels per spike under late planting date. Similarly, the crosses varied widely in number of kernels per spike.
- 8- 1000-kernel weight:** For parents Line 101 was the highest in 1000-kernel weight under both planting dates. The cross Kauz/Star x Line 11 was the highest in 1000-kernel weight in the recommended planting date and the cross Giza 168 x Line 101 was the highest in 1000-kernel weight in the late planting date.
- 9- Grain yield per plant:** Line 101 showed the highest value in grain yield per plant under recommended planting date, and Line 11 under late planting date. Crosses Line 11 x Line 101 and Sids 1 x Line 101 were the highest in grain yield per plant in recommended and late planting dates.

10- Biomass yield per plant: Sids 1 showed the highest value in biomass yield per plant under recommended and late planting dates. The crosses Giza 168 x Line 101 and Sids 1 x Line 101 were the highest in grain yield per plant in recommended and late planting dates.

11- Grain filling rate: Late planting reduced grain production rate when compared with recommended planting date. The cross Atilla x Line 101 recorded the highest value in grain filling rate under both planting dates.

Heterosis:-

1- The cross P2xP5 expressed a highly negative significant mid-parent heterosis for days to heading under recommended and late planting dates. Cross P2xP3 and P1xP5 for anthesis under recommended and late dates. At both planting dates all crosses did not show significant heterosis for days to maturity. The cross P1xP6 under recommended and late planting dates showed mid-parent heterosis for 1000-kernel weight. Mid-parent heterosis was found for the cross P1xP6 In the recommended date and cross P4xP5 under late planting date for number of spike per plant, the cross P1xP5 under late dates for number of kernel in main spike, the cross P1xP6 under recommended dates and P4xP5 under late dates for grain yield per plant and the cross P1xP6 expressed a highly negative significant value for biomass yield under recommended and late planting dates. Also, mid-parent heterosis was found for the cross P3xP5 under recommended dates and P1xP6 under late dates for grain filling period, and the cross P1xP6 under recommended dates and P4XP5 under late dates for grain filling rate. In the recommended and late dates all crosses did not show significant heterosis for Plant height.

2-Respect to better-parent heterosis, the cross P2xP3 expressed a highly negative significant value for heading under recommended dates and cross (P3xP4) under late and dates. Cross P2xP3 and P3XP4 for anthesis

under recommended and late dates. In the recommended and late dates all crosses did not show significant heterosis for days to maturity. Heterosis was found for the crosses P1xP6 and P2xP3 under recommended and late planting dates for 1000-kernel weight, and for the cross P1xP6 In the recommended dates for number of spike per plant. A both planting dates all crosses did not show significant heterosis for number of kernels in the main spike. The cross P1xP2 under recommended dates and P4xP5 under late dates showed heterosis for grain yield per plant. In the recommended and late dates all crosses did not show significant heterosis for biomass yield. The cross P2xP5 under recommended dates and P1xP6 under late dates showed heterosis for grain filling period and the cross P2xP5 under recommended dates and P4xP5 under late dates for grain filling rate. While P2xP3 and P5xP6 under recommended and late dates were the best for plant height.

Combining ability :-

G.C.A

1- The results showed that the parents Kauz/Star and Atilla were the best general combiner parents for the character of plant height under recommended and late planting dates. The parents Sids 1 was good general combiner for the characters of grain filling rate, grain yield per plant and biomass yield under recommended planting date and number of spike per plant and biomass yield in late planting date. The best combiner for the characters of grain filling rate, grain filling period, grain yield per plant and plant height under recommended planting date and number of spike per plant, grain filling period, days to anthesis and plant height under late planting date was the parent Giza 168. Results showed that the parents Line 101 and Line 11 were the best general combiner parents for the characters of days to heading, days to anthesis, days to maturity, 1000- kernel weight

and number of kernel in main spike. Also the parent Line 11 was the best general combiner parent for plant height and grain filling period under recommended and late dates.

S.C.A

2- The cross Kauz/Star x Line 101 showed the most desirable specific combining ability effects for number of spike per plant under the recommended date, the cross Kauz/Star x Line 11 for 1000- kernel weight in the recommended date and number of kernel in main spike in the late date, Atilla x Sids 1 showed the best specific combining ability for days to heading, days to anthesis and plant height in the recommended date and days to maturity under late date. The cross Atilla x Line 101 showed the most desirable specific combining ability effects for grain yield and grain filling rate under recommended date, while Sids 1 x Giza 168 for days to heading, days to anthesis under late date. The cross Giza 168 x Line 101 for grain yield, grain filling period, grain filling rate and 1000- kernel weight in the late date, Sids1 x Line 101 showed the best specific combining ability for grain filling period in the recommended date and number of kernel in main spike under late dates, while Giza 168 x Line 11 for biomass yield in the recommended date and cross Line 101 x Line 11 for plant height under late dates.