



Performance of Some Barley Cultivars Under Delayed Sowing and Different Nitrogen Levels in the New Valley

By

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B.Sc. Agric. Sci. (Agronomy), El-Zagazig Univ., (2003)

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SUMMARY

This study was carried out at Agronomy Department, Faculty of Agriculture, Assiut university, the experiments were carried out at El-Dakhla Oasis in the New Valley Governorate, Egypt, during the two growing seasons of 2013/2014 and 2014/2015 to study the performance of some barley cultivars under delayed sowing and different nitrogen levels in the New Valley. Three experiments were conducted separately for each sowing date (1st Dec., 20th Dec. and 10th Jan. i.e. S₁, S₂ and S₃) in both seasons. The randomized complete block design using split plot with three replications was employed, where the nitrogen fertilizer rates (50, 70 and 90 kg. N/fed. i.e. N₁, N₂ and N₃) were assigned in the main plots, while the cultivars (Giza 123, Giza 129 and Giza 130 i.e. Cv. 1, Cv. 2 and Cv. 3) were allocated in the sub-plots. The plot area was 10.5 m² including 3x3.5 m (1/400 fed.).

The results could be summarized as the following:

1- Growth traits:

1.1- Number of days to 50% heading:

- The sowing dates had a highly significantly effected on days to 50% heading in the both seasons, as well as nitrogen fertilizer and cultivars had significantly effect on this trait in the 2nd season only.
- The best 50% heading were observed with sowing at 10th Jan. (62.59 and 67.34 days) in the 1st and 2nd seasons, respectively, as well as the best 50% heading values were observed with 70 kg. N/fed. (72.11 days) and Giza 129 cultivar (72.41 days) in the 2nd season only.
- The number of days to 50% heading had non-significant affected with the all first and second order interactions in the both seasons.

1.2- Flag leaf area (cm²):

- The sowing dates, nitrogen fertilizer and cultivars had a highly significantly effected on the flag leaf area in the both seasons.
- The highest flag leaf area (14.54 and 6.38 cm²); (13.58 and 5.81 cm²) and (14.48 and 7.51 cm²) were recorded with 20th Dec.; 90 kg. N/fed. and Giza 123 cultivar in the 1st and 2nd seasons, respectively.
- The flag leaf area had a highly significantly affected with the all first and second order interactions in the both seasons.

- The first order interactions i.e. $S_2 \times N_1$ and $S_2 \times N_3$; $S_2 \times Cv_1$ and $N_3 \times Cv_1$ as well as the second order interactions; $S_2 \times N_3 \times Cv_1$ gave the highest flag leaf area values in the 1st and 2nd seasons, respectively.

1.3- Number of days to physiological maturity:

- The sowing dates and cultivars had a significantly effected on number of day to physiological maturity in the both seasons.
- The best physiological maturity values were obtained with (113.1 and 112.7 days) and (102.6 and 105.8 days) were achieved with sowing at 1st Dec. and Giza 129 and Giza 130 cultivars in the 1st and 2nd seasons, respectively.
- Physiological maturity exerted a significantly influenced with $S \times N$ interactions in the 2nd season only and $S \times Cvs$, $N \times Cvs$ and $S \times N \times Cvs$ interactions in the 1st season only.
- The first order interactions i.e. $S_3 \times N_2$ in the 2nd season; $S_3 \times Cv_3$ and $N_2 \times Cv_2$ as well as the second order interactions $S_3 \times N_3 \times Cv_2$ in the 1st season gave the best physiological maturity values.

1.4- Plant height (cm):

- The plant height had a highly significantly affected with sowing dates and nitrogen fertilizer in the both seasons as well as cultivars in the 2nd season only.
- The tallest plants were recorded with sowing at 1st and 20th Dec. (124.3 and 128.2 cm), 90 kg. N/fed. (121.5 and 115.8 cm) and Giza 129 and Giza 123 cultivars (119.5 and 119.0 cm) in the 1st and 2nd seasons, respectively.
- The plant height had significantly affected with $S \times N$ in the 2nd season and a highly significantly affected with the all first and second order interactions in the both seasons.
- The tallest plants were detected with the first and second order interactions i.e. $S_1 \times N_1$ and $S_2 \times N_3$; $S_1 \times Cv_2$ and $S_2 \times Cv_1$; $N_3 \times Cv_2$ and $N_2 \times Cv_1$; as well as the second order interactions i.e. $S_1 \times N_3 \times Cv_2$ and $S_2 \times N_3 \times Cv_3$ in the 1st and 2nd seasons, respectively.

2- Yield components and yield traits:

2.1- Spike length (cm):

- The spike length had a highly significantly affected with nitrogen fertilizers and cultivars in the 1st season only.

- The sowing at 1st Dec. and Giza 129 cultivar gave the longest spikes (8.19 cm) and (8.33 cm) in the 1st season, respectively.
- The interactions (SxN) and (SxCvs) in the 2nd season and (SxNx Cvs) interactions in the 1st season had a significantly effected on the spike length.
- The longest spikes were realized with S₃xN₁ and S₃xCv₂ interaction in the 2nd season, as well as the longest ones were realized with S₂xN₃xCv₂ interactions in the 1st season only.

2.2- Number of grains/spike:

- The number of grains/spike had a highly significantly affected with the sowing dates and cultivars in the 2nd season only and nitrogen fertilizer in the both seasons.
- The highest number of grains/spike (51.49) and (50.55) were recorded with sowing at 20th Dec. and Giza 123 cultivar in the 2nd season, respectively, as well as the highest ones (55.09 and 47.99) were recorded with 90 and 70 kg. N/fed. in the 1st and 2nd seasons, respectively.
- The number of grains/spike had a significantly affected with the all first and second order interactions in the both seasons, except Nx Cvs interaction had insignificant for this trait in the 1st season only.
- The first order interactions i.e. S₁xN₃ and S₃xN₃; S₁xCv₁ and S₁xCv₁; and N₃xCv₁ as well as the second order interactions i.e. S₁xN₃xCv₁ and S₂xN₁xCv₃ gave the highest grains number/spike in the 1st and 2nd seasons, respectively.

2.3- Weight of grains/spike (g):

- The sowing dates and cultivars had a highly significantly effected on the weight of grains/spike in the both seasons.
- The heaviest grains/spike (3.21 and 2.60 g) and (2.98 and 2.79 g) were obtained with sowing at 1st and 20th Dec. and Giza 123 cultivar in the 1st and 2nd seasons, respectively.
- The grains weight/spike had a significantly affected with SxN interactions in the 1st season only, as well as SxCvs and SxNx Cvs interaction in the 2nd season only.
- The highest grains weight/spike were achieved with the first order interactions i.e. S₁xN₃ in the 1st season and S₂xCv₁ in the 2nd season, as well as the second order interactions S₁xN₂xCv₁ in the 2nd season.

2.4- Number of spikes/m²:

- The number of spikes/m² exerted a highly significantly influenced with sowing dates in the 1st season only and cultivars in the both seasons.

- The highest number of spikes/m² (557.6) were observed with sowing at 10th Jan., as well as the highest ones (542.1 and 456.1) were observed with Giza 123 and Giza 129 cultivars in the 1st and 2nd seasons, respectively.
- The number of spikes/m² had significantly and highly significantly affected with the all first and second order interaction in the both seasons, except SxN interaction had insignificant effected on this trait in the 1st season only.
- The first order interactions i.e. S₃xN₂ and S₂xN₂; S₃xCv₁ and S₂xCv₂; and N₂xCv₁ and N₃xCv₂, as well as the second order interactions i.e. S₂xN₂xCv₁ and S₂xN₁xCv₂ gave the highest number of spikes/m² in the 1st and 2nd seasons, respectively.

2.5- 1000 grain weight (g):

- The sowing dates, nitrogen fertilizer and cultivars had significantly and highly significantly effected on the 1000 grain weigh tin the both seasons.
- The highest 1000 grain weight (66.29 and 67.07 g); (65.06 and 65.15 g) and (70.00 and 69.85 g) were achieved with sowing at 1st Dec., 70 kg. N/fed. and Giza 123 cultivar in the 1st and 2nd seasons, respectively.
- The 1000 grain weight had significantly and highly significantly affected with the all first and second order interactions in the both seasons, except Nx Cv. interaction had insignificant affected on this trait in the 1st season only.
- The highest 1000 grain weight values were detected with the first order interactions i.e. S₂xN₁ and S₁xN₃; S₂xCv₁ and S₂xCv₂; and N₂xCv₁; as well as the second order interaction i.e. S₂xN₃xCv₁ and S₂xN₃xCv₁ in the 1st and 2nd seasons, respectively.

2.6- Grain yield (ard./fed.):

- The sowing dates, nitrogen fertilizer and cultivars had significantly and highly significantly effected on the grain yield in the both seasons, except sowing date had insignificant effected on this trait in the 1st season only.
- The maximum grain yield/fed. values were obtained with sowing date at 20th Dec. (13.27 and 16.28 ard.); 70 kg. N/fed. (12.57 and 14.18 ard.) and Giza 123 cultivar (13.63 and 15.44 ard.) in the 1st and 2nd seasons, respectively.
- The grain yield exerted significantly and highly significantly influenced with the all first and second order interactions in the both seasons, except SxN interaction had non-significant effected on this trait in the 2nd season only.
- The maximum grain yield/fed. values were recorded with the first order interactions i.e. S₂xN₂ and S₂xN₁; S₂xCv₁ and N₂xCv₁ as well as the second order interaction i.e. S₂xN₂xCv₁ and S₂xN₂xCv₂ in the 1st and 2nd seasons, respectively.

2.7- Straw yield (ton/fed.):

- The sowing dates and cultivars had a highly significant effect on the straw yield in the both seasons.
- The highest straw yield/fed. values were achieved with 20th Dec. sowing (4.32 and 3.24 ton) and with Giza 123 cultivar (3.79 and 3.25 ton) in the 1st and 2nd seasons, respectively.
- The straw yield had a highly significantly and significantly affected with the all first and second order interactions in the both seasons, except SxN and NxCvs interactions had insignificant effect on this trait in the 2nd season only.
- The highest straw yield/fed. values were detected with the first order interactions i.e. S₂xN₃ and S₂xN₂; S₂xCv₁ and S₃xCv₁; N₃xCv₁ and N₂xCv₁; as well as the second order interactions, i.e. S₂xN₃xCv₁ and S₃xN₂xCv₁ in the 1st and 2nd seasons, respectively.

2.8- Biological yield (ton/fed.):

- The sowing dates, nitrogen fertilizers and cultivars had a highly significantly effect on the biological yield in the both seasons, except nitrogen fertilizer had non-significant influence on this trait in the 1st season only.
- The highest biological yield/fed. values were observed with sowing at 20th Dec. (5.86 and 5.22 ton); the rate of 90 and 70 kg. N/fed. (5.19 and 4.71 ton) and Giza 123 cultivar (5.47 and 5.11 ton) in the 1st and 2nd seasons, respectively.
- The first order interactions SxN in the 1st season; SxCvs in the both seasons and the second order interactions SxNx Cvs in the 2nd season exerted a highly significantly influence on the biological yield.
- The highest biological yield/fed. values were realized with the first order interactions i.e. S₂xN₃ in the 1st season; S₂xCv₁ and S₃xCv₁ in the 1st and 2nd seasons, respectively, as well as the second order interactions i.e. S₃xN₂xCv₁ in the 2nd season.

3- Quality traits:

1.3- Crude protein percentage (%):

- The grain protein content had a highly significantly affected with the sowing dates, nitrogen fertilizer and cultivars in the both seasons.

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- The highest protein values were obtained with the sowing at 1st Dec. (10.24 and 10.64%); with 90 kg. N/fed. (10.60 and 10.34%) and with Giza 130 cultivar (9.36 and 9.61%) in the 1st and 2nd seasons, respectively.
 - The all first and second order interactions among the all factors had significantly and highly significantly effected on the grain protein % in the both seasons.
 - The highest grain protein % values were achieved with the all first order interactions i.e. $S_1 \times N_3$; $S_1 \times Cv_2$ and $S_1 \times Cv_3$; $N_3 \times Cv_3$ and $N_3 \times Cv_2$; as well as the second order interactions i.e. $S_1 \times N_3 \times Cv_2$ and $S_1 \times N_3 \times Cv_3$ in the 1st and 2nd seasons, respectively.

CONCLUSION

From the obtained results in this work, it could be concluded that applying sowing dates and nitrogen fertilizers for the barley cultivars gave the highest values for the most of growth, yield components and yield traits in the both seasons. So, it was recommended to apply early sowing dates in combined with 70 and/or 90 kg. N/fed. with Giza 123 cultivar and/or Giza 129 cultivar under New Valley condition.