

Effect of different planting dates on growth attributes, grain yield and protein content of three wheat cultivars in Kerman

I. Hesam Arefi¹, M. Saffari², R. Moradi^{3*}

1. PhD Student, Department of Agronomy, Faculty of Agriculture, Shahid Bahonar University of Kerman, Kerman, Iran
2. Associate Professor, Department of Agronomy, Faculty of Agriculture, Shahid Bahonar University of Kerman, Kerman, Iran
3. Assistant Professor, Department of Plant Productions, Agricultural Faculty of Bardsir, Shahid Bahonar University of Kerman, Kerman, Iran. (Corresponding author)

Received: September 2017 Accepted: December 2018 - DOI: 10.22092/aj.2018.115369.1189

Extended Abstract

Hesam Arefi, I., Saffari, M., Moradi, R., Effect of different planting dates on growth attributes, grain yield and protein content of three wheat cultivars in Kerman
Applied Research in Field Crops Vol 31, No. 4, 2019 10-12: 72-89(in Persian)

Introduction

Winter wheat is one of the most important staple food crops in Iran, with a cultivation area of nearly 6.33 million ha and a production exceeding 14 million tons in 2015. Wheat is a thermo-sensitive crop, and any change in air temperature may alter the length of its growing period and subsequently grain yield (Chattaraj *et al.*, 2014). Wheat reproductive period duration is determined by a combination of planting date and variety. Extreme weather events, such as spring heat stress, can exert substantial impacts on crop growth and grain yield. Therefore, improving the crop tolerance to high temperature stresses during flowering and grain filling stages is of great significance to wheat production. The present study was performed to evaluate the effect of planting date and variety management strategies on winter wheat production in Kerman.

Material and Methods

In order to investigate the response of three common cultivars of wheat to various planting dates in Kerman region, the two-factor experiment was set up in a split-plot layout arranged in a randomized complete block design with three replications to assess the growth, yield and morphological traits of three different varieties of irrigated wheat with different maturity length at different planting dates

Email address of the corresponding author: Roholla18@gmail.com; r.moradi@uk.ac.ir

(October 20th, November 5th and November 20th). These varieties included early maturing (Mihan), medium maturity (Arg) and late maturity (Omid). According to the local soil test recommendations, basal doses of 220 kg ha⁻¹ urea and 100 kg ha⁻¹ triple super phosphate were incorporated into the soil. As soon as the seeds were sown, irrigation was performed at an interval of 10 days. Experimental field soil at the 0-30 cm sampling depth was silty loam with pH 7.2, containing total N (0.071 %), total P (21 ppm), and total K (348 ppm) with an EC of 2.69 ds m⁻¹.

Results and Discussion

The combined analysis of variance showed that planting date had a significant effect on plant height, number of grains per spike, length of growth period, grain and biological yields. 1000-grain weight, leaf area index, harvest index and grain protein contents were not affected by planting date. The greatest plant height (112 cm) and the longest growth period (206 days) were obtained at the first planting date (October 20th). The sowing of wheat on November 15th produced the highest number of grains per spike (32.71), biological (14.45 t ha⁻¹) and grain (5.16 t ha⁻¹) yields. The effect of variety on all the traits except 1000-grain weight was significant. Omid cultivar had the greatest plant height (134 cm) and the longest growth period (209 days). The other studied traits were significantly higher in Mihan variety than Arg and Omid varieties. For example, grain yield in Mihan, Arg and Omid was 6.33, 4.7 and 4.63 t ha⁻¹, respectively. The interaction of planting date and variety showed that the highest grain yield for Omid (4.99 t ha⁻¹) was produced at the first planting date (October 20th) and in Arg (4.3 t ha⁻¹) and Omid (6.27 t ha⁻¹) was achieved at the second planting date (November 5th). The lowest grain yield of all the three varieties was associated with the third planting date (November 20th). The grain protein contents varied from 10.11 to 11.61%, where the highest value was recorded in Omid variety, sown on November 20th. In wheat, anthesis and grain filling period are the most sensitive developmental stages to high temperature (Eyshi Rezaei *et al.*, 2015). The observed sensitivity of wheat yields to high temperatures has been attributed to accelerated development, reduced photosynthesis and the direct impacts of heat on reproductive processes. The negative correlation between high temperature during reproductive stage and reduced grain numbers, with significant negative impacts on grain yield was previously illustrated. A threshold temperature of 31° C for wheat is generally accepted as an upper limit to temperature near flowering without reductions in grain yield (Porter & Gawith, 1999). Planting short maturity variety allows wheat to escape the hot weather, which will lead to non-coincidence between the reproductive stage and high temperature, especially under future climate conditions.

Conclusion

In general, the best planting date for Omid variety was October 30th, and for Arg and Mihan varieties was November 5th.

Keywords: Spike, growth period, early maturity, LAI, phenology

References

- Chattaraj, S., Chakraborty, D., Sehgal, V.K., Paul, R.K., Singh, S.D., Daripa, A. and Pathak, H. 2014. Predicting the impact of climate change on water requirement of wheat in the semi-arid Indo-Gangetic Plains of India. *Agriculture, Ecosystems & Environment*, 197: 174–183.
- Eyshi Rezaei, E., Webber, H., Gaiser, T., Naab, J. and Ewert, F. 2015. Heat stress in cereals: Mechanisms and modeling. *European Journal of Agronomy*, 64: 98-113.
- Porter, J. and Gawith, M. 1999. Temperatures and the growth and development of wheat: a review. *European Journal of Agronomy*, 10: 23–36.