Evaluation of wheat varieties for water use and yield under staggered sowing and variable irrigation regimes in timely and late sown conditions

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With the rise in temperature and moisture stress during reproductive phase, winter wheat yields are likely to decrease because of limited plant growth, higher rate of night respiration, higher spikelet sterility or number of grains per spike and restricted embryo development thereby reducing grain number. Crop management practices play a pivotal role in minimizing adverse effects of terminal heat stress on wheat production. Amongst various agronomic management practices, adjusting sowing date, crop cultivars and irrigation scheduling have been realized to be simple yet powerful, implementable and eco-friendly mitigation strategies to sustain yields under elevated temperature conditions. Taking into account, large variability in wheat production in space and time, a study was conducted to identify the suitable wheat varieties under both early and late planting with suitable irrigation schedule for minimizing terminal heat stress effect and thereby improving wheat production. Experiments for the two consecutive years i.e. 2017-18 to 2018-19 were conducted at research farms of Indian Agricultural Research Institute, New Delhi, India, separately for timely and late sown conditions with suitable varieties with staggering dates of sowing from 1st November to 30th November in case of timely sown and from 1st December to 31st December for late sown condition. The irrigation schedule followed for both the experiments were 100% of ETc (evapotranspiration of crop), 80% of ETc and 60% of ETc. Results of the timely sown experiment indicated that 1st November sowing resulted in higher grain yield followed by 10th November. However, delay in sowing thereafter resulted in gradual decrease in yield and the maximum reduction was noticed under 30th November sowing. Amongst the varieties, HD3086 produced higher grain yield compared to other varieties. Irrigation applied based on 100% of ETc gave higher yield comparable to 80% of ETc but both were significantly higher than 60% of ETc. It was further observed that even irrigations under 100% of ETc could not compensate the yield under delayed sowing suggesting that rise in temperature beyond January adversely affected the growth and development of crop as well as forced maturity resulting in significant reduction of yield attributing characters due to terminal heat stress. Similar observations were recorded under late sown experiment too. Planting on 1st December along with 100% ETc of irrigation schedule resulted in significantly higher grain yield as compared to other dates and irrigation regimes. Further, it was observed that reduction in yield under late sown conditions was significantly larger than the timely sown conditions irrespective of the variety grown and irrigation schedule followed. Delayed sowing resulted in reducing crop growth period and forced maturity in turn led to significant deterioration in all the yield attributing characters and there by reduction in yield suggesting that terminal heat stress had greater impact on yield under late sown crop than timely sown due to temperature rise coinciding with reproductive phase of the crop.

Biography

Vaibhav Baliyan is a Senior Research Fellow at Water Technology Centre, Indian Agricultural Research Institute, New Delhi, India. His area of expertise is Agricultural Agronomy and Environmental Science. He is a recipient of several academic awards in agriculture.