



Wheat yield as influenced by urea applied with nitrification inhibitor and gibberellic acid

Rayehe Mirkhani, Mehdi Shorafa, and Mohammad Zaman

Among the essential plant nutrients, nitrogen (N) is the most needed. Farmer apply N fertilizer, predominantly urea to meet crop N demand. However, a greater proportion of the applied urea-N is not being used by plants and lost to the atmosphere as ammonia or greenhouse gases. Therefore, it is necessary to enhance N use efficiency (NUE) of applied urea by minimizing such losses, which has environmental and economic implications. Nitrification inhibitor, such as nitrapyrin (NP), has the most potential to minimise N losses and enhance crop yield. Similarly, plant hormones, such as GA3, has the potential to reduce abiotic stress and improve plant growth and yield.

A field experiment was established on an arable site at University of Tehran, Karaj to determine the effect of urea applied with Nitrapyrin and GA3 on wheat yield in 2018-2019. Karaj has a Mediterranean climate with annual precipitation of 265 mm. A randomized complete block design in five replications was used in this study. Treatments were: T1 (control treatment - without urea), T2 (farmers practice - 138 kg N/ha), and T3 (best practice - 138 kg N/ha+NP+GA3). Urea was applied in three split applications (46 kg N/ha) at growth stage (GS 21) or tillering, (GS 32) or stem elongation, and (GS 40) or booting. GA3 in T3 treatment, was applied only at stem elongation stage.

The crop yield data showed that, urea applied with NP and GA3 had a significant ($p \leq 0.01$) effect on grain yield, biological yield, number of grains, 1000-grain weight and % Harvest Index (%HI) compared to other treatments. Urea applied with NP and GA3 increased grain yield (10.30 t ha⁻¹) by 13.9% and 46.1% compared to farmer practices (9.04 t ha⁻¹) and control treatment (7.05 t ha⁻¹). These results suggest that co-application of urea with NP and GA3 has the potential to enhance wheat yield in semi-arid area of Iran.