EFFECT OF ZINC AND IRON APPLICATION ON GROWTH, YIELD AND NUTRIENT UPTAKE BY WHEAT IN CALCAROYUS SOIL OF SAURASHTRA REGION

Key words: wheat, rabi, ZnSO₄, FeSO₄, chelated Zn, Chelated Fe, yield, uptake

A field experiment was conducted at the Instructional Farm, College of Agriculture, Junagadh Agricultural University, Junagadh to assess the “Effect of zinc and iron application on growth, yield and nutrient uptake by wheat in calcareous soil of saurashtra region” during the rabi season of 2016-17.

The experiment was comprised of twelve treatments viz., T₁ – Control (N-P-K:120-60-60 kg ha⁻¹) RDF, T₂ – RDF + Spraying of chelated Zn @ 0.5%, T₃ – RDF + Spraying of chelated Zn @ 1.0%, T₄ – RDF + Spraying of chelated Zn @ 1.5%, T₅ – RDF + Spraying of chelated Fe @ 1.0%, T₆ – RDF + Spraying of chelated Fe @ 1.5%, T₇ – RDF + Spraying of chelated Fe @ 2.0%, T₈ – RDF + Soil application of ZnSO₄ @ 10 kg ha⁻¹, T₉ – RDF + Soil application of ZnSO₄ @ 20 kg ha⁻¹, T₁₀ – RDF + Soil application of FeSO₄ @ 20 kg ha⁻¹, T₁₁ – RDF + Soil application of FeSO₄ @ 30 kg ha⁻¹ and T₁₂ – RDF + Soil application of ZnSO₄ @ 10 kg ha⁻¹ + FeSO₄ @ 20 kg ha⁻¹ evaluated in Randomized Block Design replicated three times.

The experimental soil was medium black calcareous, clayey in nature which was slightly alkaline in reaction, pH₂₅ (8.19) and EC₂₅ (0.34 dS m⁻¹), low in available nitrogen (244.20 kg ha⁻¹), medium in available phosphorus (28.63 kg ha⁻¹), medium in available potassium (247 kg ha⁻¹), medium in available sulphur (10.14 ppm), high in iron (15.90 ppm), medium in zinc (0.62 ppm), high in manganese (31.68 ppm) and high in copper (2.8 ppm).
Results of experiment indicated that significantly highest grain and straw yield of wheat was recorded under the application of RDF + soil application of ZnSO₄ @ 10 kg ha⁻¹ + FeSO₄ @ 20 kg ha⁻¹ (T₁₂). Similarly, the yield attributes viz., plant height at harvest (67.40 cm) and at 70 DAS (62.13 cm), numbers of tillers (6.82) at 45 DAS and (8.06) at harvest, numbers of effective tillers (5.15), numbers of effective tillers per meter row length (52.04), spike length (8.57 cm), spikelets spike⁻¹ (42.1), grains spike⁻¹ (38.3) and 1000 grain weight (51.0 gm) at harvest of wheat crop were recorded significantly highest under treatment T₁₂. The quality parameters like protein (13.14 %) and gluten content (12.47 %) were also recorded higher with treatment T₁₂.

The Fe, Zn and S content in grain and straw were significantly influenced by various treatments of Zn and Fe. The highest S content in grain and straw as well as its uptake by grain and straw were observed in the treatment of application RDF + Soil application of ZnSO₄ @ 10 kg ha⁻¹ + FeSO₄ @ 20 kg ha⁻¹ (T₁₂). Highest Fe content in grain and straw as well as uptake by straw and grain was observed in treatment of RDF + Spraying of chelated Fe @ 2.0% (T₇). Whereas, the highest Zn content in grain and straw as well as uptake by straw and grain were observed in treatment RDF + Spraying of chelated Zn @ 1.5% (T₄). Higher nutrient uptake was observed in chelated Fe and Zn spray as compared to soil application of FeSO₄ and ZnSO₄. Application of chelated Fe and Zn spray increased the efficiency of fertilizers and improved wheat nutrient content including grain Zn and Fe.

The concentration of chlorophyll and carotenoid content in wheat were significantly influenced by various treatments of Zn and Fe applied through soil application or foliar spray. Soil application of FeSO₄ and ZnSO₄ also improved the soil fertility status including Zn, Fe and S status of calcareous soil.

Overall, Fe and Zn applications, either as soil or foliar application improved the different yield attributes as well as quality parameters suggested its efficacy of application. Soil application of FeSO₄ and ZnSO₄ also improved the soil fertility status including Zn and Fe status of calcareous soil of saurashtra region.