ABSTRACT

Salinity stress is a significant environmental factor limiting wheat (*Triticum aestivum* L.) production. This study examined the effects of nano-magnetite and its aspartic acid conjugate (50 and 100 mg/L) on wheat (Cv. Subhani-21) grain production and its physiological and biochemical response under salinity. The crystallinity and morphology of iron nanoparticles (Fe-NPs) were analysed by SEM-EDX. We found that salinity negatively affected the agronomic and biochemical traits of wheat plants including biomass, photosynthetic pigments, and grain yield attributes. Salinity also caused an increase in root and shoot Na^+ concentration at toxic levels. By contrast, we found that aspartic acid nano-magnetite significantly improved biomass accumulation and grain yield attributes of both control and salt-stressed wheat plants. Moreover, improvements in chlorophyll contents were also recorded in response to aspartic acid nano-magnetite conjugate. After a comprehensive evaluation, the plants treated with AA-NM nanoparticles exhibited increased production, absorption of nutrients, and chlorophyll levels, leading to improvements in salt tolerance and grain yield. This study highlighted the potential of AA-NM to enhance crop resilience and productivity under salt stress.