ABSTRACT

This study investigated the effects of root-zone application of nano-iron oxides and salt stress on wheat (*Triticum aestivum* L.) roots using phenotyping techniques to characterize root system architecture (RSA). The effects of different doses of nano-hematite and nano-magnetite (0, 50, 100, 250, and 500 mg/L each) were investigated during the first experiment. During the second experiment, the selected concentrations of nano-hematite and nano-magnetite (0 and 50 mg/L) were supplied to salt-stressed wheat seedlings, and changes in RSA were studied. Likewise, during the third phase, the effects of root zone-supplied nano-iron oxides on salt-stressed wheat seedlings were analysed in a sand culture experiment. Results indicated significant variations in root morphology, including root length, surface area, relative growth rate, leaf area ratio, and net assimilation rate, in response to the treatments. Root-zone application of nano-iron oxides showed significant improvements in growth traits. Under salt stress, the application of nano-iron oxides resulted in considerable changes in root system architecture, particularly in the form of secondary and tertiary roots. Also, improvements in shoot growth rates were recorded in response to nano-hematite. Both nano-hematite and nano-magnetite improved allometric features (RGR and NAR) of wheat seedlings. Above all, the high concentrations of both nano-hematite and nano-magnetite (200 – 500 ppm) were toxic for root growth, and only concentrations below 100 ppm were effective in mitigating salinity.