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ALLEVIATING EFFECT OF COPPER NANOPARTICLE ON DNA METHYLATION INDUCED BY SALINITY STRESS IN WHEAT

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Abstract

Wheat is one of the cereals that have the highest cultivation area in the world and is of great importance in human nutrition. Salt stress is one of the important abiotic stress factors that threaten plant yield by affecting morphological, biochemical, and molecular levels. Copper nanoparticles (Cu_2ONPs), affect the production and yield in plants under various stresses and affect the plant positively. In this study, the effect of epigenetic and genetic changes on various concentrations of Cu_2ONPs (0, 10, 20, and 40 mg/L) under NaCl (0, and 200 mM) salt stress in sensitive Bezostaja-1 genotype in wheat was investigated. For determined changes in cytosine methylation were used to by Coupled Restriction Enzyme Digestion-iPBS (CRED-iPBS) technique Moreover long terminal repeats (LTR) retrotransposon polymorphism and genotoxic influences and genomic instability was analyzed with the aid of inter-primer binding site (iPBS) primers. Salt stress; induction of genomic DNA stability, LTR retrotransposons polymorphism, and caused changes in DNA methylation levels. It was observed that the methylation and full methylation ratios were higher in the 200 mM salt application compared to other treatments. DNA modifications increased as a result of salt stress and Cu_2ONPs application reduced it by declining the level of polymorphism. Cu_2ONPs have mitigated the negative effect of salinity stress by reducing LTR retrotransposon polymorphism rate and DNA damage by improving the molecular levels of GTS in the genotype Bezostaja-1. Although several methods of Cu_2ONPs seed priming on plants have been studied, little is yet known about how Cu_2ONPs affect induced DNA methylation, genomic instability, and LTR retrotransposon polymorphism in wheat. Our aim was to answer how copper nanoparticles cause direct and indirect effects on stresses. The findings have led that Cu_2ONPs have a positive effect on epigenetic and genotoxic effects resulting from salt stress.

Key words: copper nanoparticles, CRED-iBPS, salt stress

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