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Abstract

Heritability and expression of Fe and Zn and their bioavailability in South African maize under low N stress conditions

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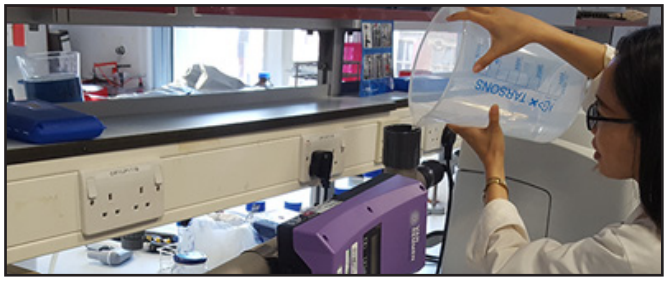
Abstract:

TIron (Fe) deficiency affects 4-5 billion people in the world while zinc (Zn) deficiency affects 49% of the world population, especially in low-income countries. Therefore, the objective of the present study was to assess heritability and expression of Fe and Zn and their bioavailability in maize under abiotic stress and optimal conditions. Maize germplasm provided by the GCI-ARC Potchefstroom was screened for Fe and Zn content and nine parents (three males and six females) were selected for low, medium and high Fe and Zn concentration. These parents were grown at Makhathini Research Station and crossed in a line × tester (6 × 3) design, and 18 hybrids were generated. These hybrids along with parents were planted in Potchefstroom, Vaalharts and Cedara under optimum and low N conditions using an alpha lattice design with three replications. Combined analysis of variance revealed that genotype and location significantly affected the expression of Zn under low N conditions and expression of Fe under optimal conditions. Genotype by location interaction was significant for phytic acid contents under both abiotic stress and optimum conditions. The range of Fe, Zn and phytic acid contents under low N conditions was 11.25-19.25 mg/kg; 12.88 -24.39 mg/kg; 4.49 -6.74 µmol/ml, and under optimum conditions 11.87-16.77 mg/kg; 17.02-21.63 mg/kg; and 4.29 -5.78 µmol/ml, respectively. SMH1 maize hybrid had high Fe (18.38 mg/kg) and Zn (15.73 mg/kg) and low phytic acid (4.82 µmol/ml), indicating high bioavailability in humans, under low N conditions. SMH18 maize hybrid had high Fe (15.63 mg/kg), Zn (20.38 mg/kg) and low phytic acid (4.29 µmol/ml) under optimum conditions. The heritability of Fe and Zn under low N conditions was 47% and 21% and under optimal conditions it was 52% and 44%, respectively, indicating that low N conditions significantly reduced heritability of zinc.



Biography:

Sajjad Akhtar is a Plant Breeder by profession and works with one of the private College as lecturer in life sciences in Pakistan. He holds a MSc (Hons) in Plant Breeding and Genetics and currently pursuing a Doctor of Philosophy degree in Plant Breeding at Department of Plant Sciences (Plant Breeding), university of the Free State, Bloemfontein, South Africa. Sajjad has 1-year experience of research at public research institute in Pakistan. He has presented an abstract on heritability of Fe and Zn in plant breeding symposium of South African Plant Breeders association in Durban, South Africa. Sajjad grew up in one of the remote villages of Pakistan and is passionate to conduct research on biofortification in future.

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