Investigation of Zn utilization and acquisition efficiency in different wheat genotypes at greenhouse conditions

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(Received : October 22-2011 ; Accepted : March 20-2012)

Abstract

Recently, great emphasis has been placed on using soilless media in greenhouse culture for evaluation of plant nutritional efficiency. A factorial experiment, in a completely randomized design with three replications, was conducted to categorize wheat genotypes according to their Zn acquisition efficiency (ZACE) and Zn utilization efficiency (ZUTE). To study the Zn acquisition and utilization efficiencies, calculated Zn efficiency (CZE) and shoot Zn efficiency (SZE), 20 wheat genotypes (Darab, Hirmand, Bayat, Kaveh, Navid, Dez, Sholeh, Golestan, Aria, Azadi, Rasoul, Marvdasht, Atrak, Inia, Karaj-1, Karaj-2, Moghan-1, Shiraz, Nik Nezhad and Hamoon) were grown in sand culture that was supplied with nutrient solution including Zn (5 mg/kg) and without Zn (0 mg/kg). The results showed that wheat genotypes were varying in shoot Zn efficiency, root and shoot Zn utilization as well as acquisition efficiency. Hamoon genotype was the most Zn-efficient and Hirmand was the most Zn-inefficient genotype under zinc deficiency condition. Shoot ZUTE showed significant relation with ZE and Hamoon (Zn-efficient) and Hirmand (Zn-inefficient) showed the highest and the lowest shoot ZACE, respectively. Furthermore, Navid (3.67%) and Inia (3.98%) genotypes contained the lowest and Marvdasht (10.58%) the highest shoot ZUTE. Results showed that there was significant relationship (P<0.01) between ZE and CZE. Marvdasht (643%) and Aria (158%) genotypes had the highest and the lowest CZE among other genotypes, respectively. In general, in greenhouse environment, uniform and regular use of nutrient solution can meet factors required for screening and selection of resistant genotypes to Zn-deficiency.

Keywords: Wheat genotype, Calculated zinc efficiency, Nutrient solution.

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