



Cadmium tolerance of *Lolium multiflorum* Lam. with different ploidy levels

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Abstract

The cadmium (Cd) tolerance of 41 populations of *Lolium multiflorum* Lam. from all over the world was evaluated during germination by treating the seeds with Cd. Under different concentrations of Cd (0, 50, 100, 250, 500, and 1000 μmolL^{-1}), the growth of *L. multiflorum* was significantly inhibited, especially root growth. The tetraploid populations showed significant ($P<0.05$) root and shoot tolerance to Cd concentrations than diploid populations. According to the relative values of root length, shoot length, germination rate, germination energy, germination index and vigour index, the effect of Cd treatment was studied. The Cd tolerance of different ploidy populations of *L. multiflorum* was systematically characterized. Among the diploid populations, PI 636508 and PI 577241 were the most tolerated and sensitive ones, while in the tetraploid population, Chuansi No.1 and PI 611145 were identified as the most tolerated and sensitive ones. The IC_{50} (the concentration when root length and shoot length were inhibited to half of the size of control) of root and shoot of 'Chuansi No.1' (tetraploid) was the maximum (Root- IC_{50} =241.57 μmolL^{-1} , Shoot- IC_{50} =976.74 μmolL^{-1}), while the IC_{50} of root and shoot of PI 577241 (diploid) was the minimum (Root- IC_{50} =15.99 μmolL^{-1} , Shoot- IC_{50} = 107.01 μmolL^{-1}). The results provided essential information for cultivating *Lolium multiflorum* as a bioenergy crop under Cd pollution environments.

Keywords: Heavy metal tolerance; Polyploidization; Ryegrass, Screening populations