Effects of Heavy Metal: Copper on the Ultrastructure of Wheat

Z. Su*1, C. Liang2, Y. Bao3, X. Liu2, Y. Sun4, C. Song4, J. Chen4, Q. Guo2, J. Zhang2

1College of chemical engineering, Qingdao University of Science & Technology, China
2College of Chemical engineering, Qingdao University of Science & Technology, China
3Qingdao University of Science & Technology, China
4Qingdao Academy of Agriculture Science, China

Abstract

Copper was one of common soil contaminants in China. In order to research the stress mechanism of copper to wheat, the structure of subcellular in mesophyll cell were studied at different copper concentration and growth stage in natural conditions. The results showed that 1) at the tillering stage, under the level of L4 (900 mg/kg), comparing to the control, the cell structures were not intact. The number of chloroplast increased. The volume of chloroplast was enlarged. The arrangement of the thylakoids was disorder. 2) At the jointing stage, the membrane of chloroplast under concentrations of copper (L4) ruptured, and thylakoid spilled from chloroplast. 3) At the booting stage, the membrane of chloroplast under concentrations of L4 (900 mg/kg) broke and thylakoid spilled. The number of mitochondrion increased. 4) At the mature stage, some chloroplast disappeared under the concentration of L1 (100 mg/kg). The volume of chloroplast of became lager than it in control. The number of mitochondrion increased. Most chloroplasts under the level of L3 (600 mg/kg) disappeared, the number of mitochondrion increased and the cell wall was damaged. At the level of L4 (900 mg/kg), most organelles disappeared. In a word, the chloroplast in mesophyll cells of wheat was the most sensitive organelle under the condition of copper stress. The copper concentration and the developmental stage of wheat affected the damaged degree of subcellular structure of mesophyll cells. The organelle rupture in mesophyll cells caused by heavy metal was a key factor that led to the death of wheat.