



**Figure 9**

Scheme of P toxicity in plant cells. Under normal P concentration (a), phytic acid synthesis is maintained to produce its proper concentration in the cytosol, preventing any negative effects of phytic acid on physiological functions within a plant cell. Under excessive Pi accumulation (b), an increase in the cytosolic sugar-phosphate content activates phytic acid synthesis, and an increase in the phytic acid concentration causes Zn insolubilization, which, in turn, decreases Cu/Zn-SOD activities. Simultaneously, RCA content decreases depending on the excessive accumulation of Pi, and photosynthesis is limited by a decrease in electron sink activities, partly because of the decrease in Rubisco activation. The decrease in electron sink activities leads to a decrease in ATP and NADPH consumptions. Subsequently, electrons are accumulated in PET chain, stimulating reactive oxygen species (ROS) production. ROS accumulation is further intensified by a decrease in Cu/Zn-SOD activity. As a result, higher ROS accumulation triggers leaf necrosis in land plants.