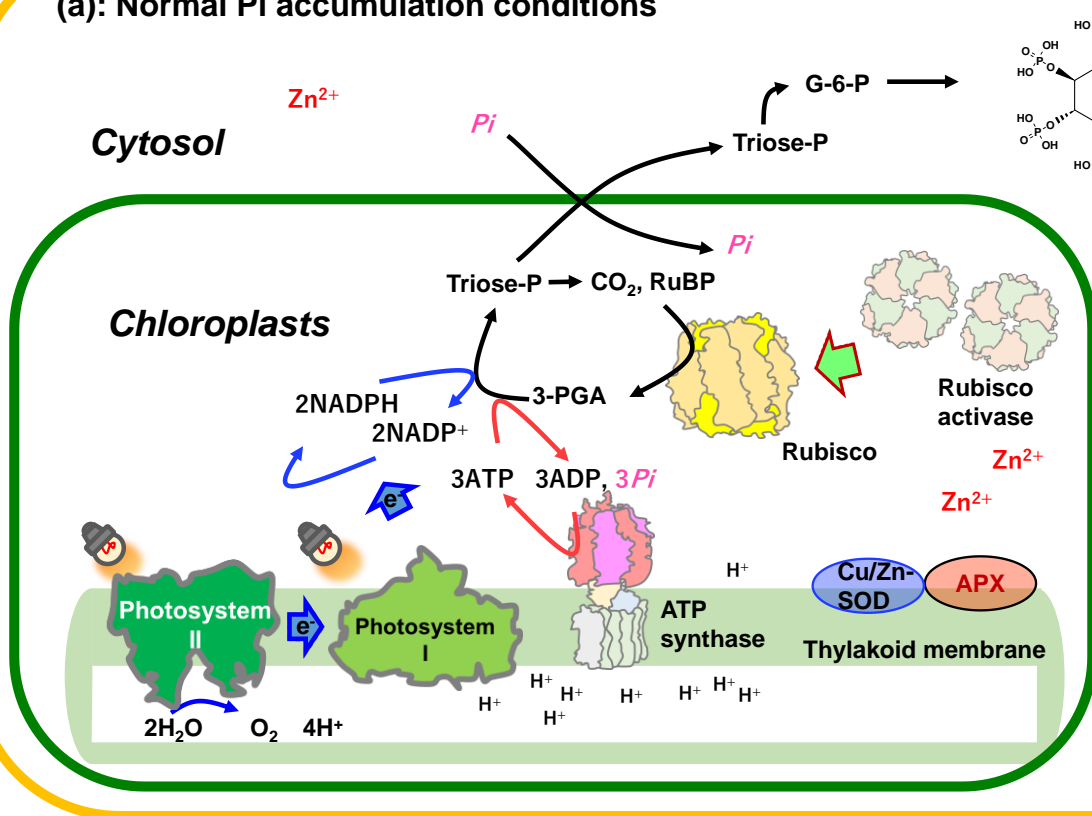


(a): Normal Pi accumulation conditions



(b): Excess Pi accumulation conditions

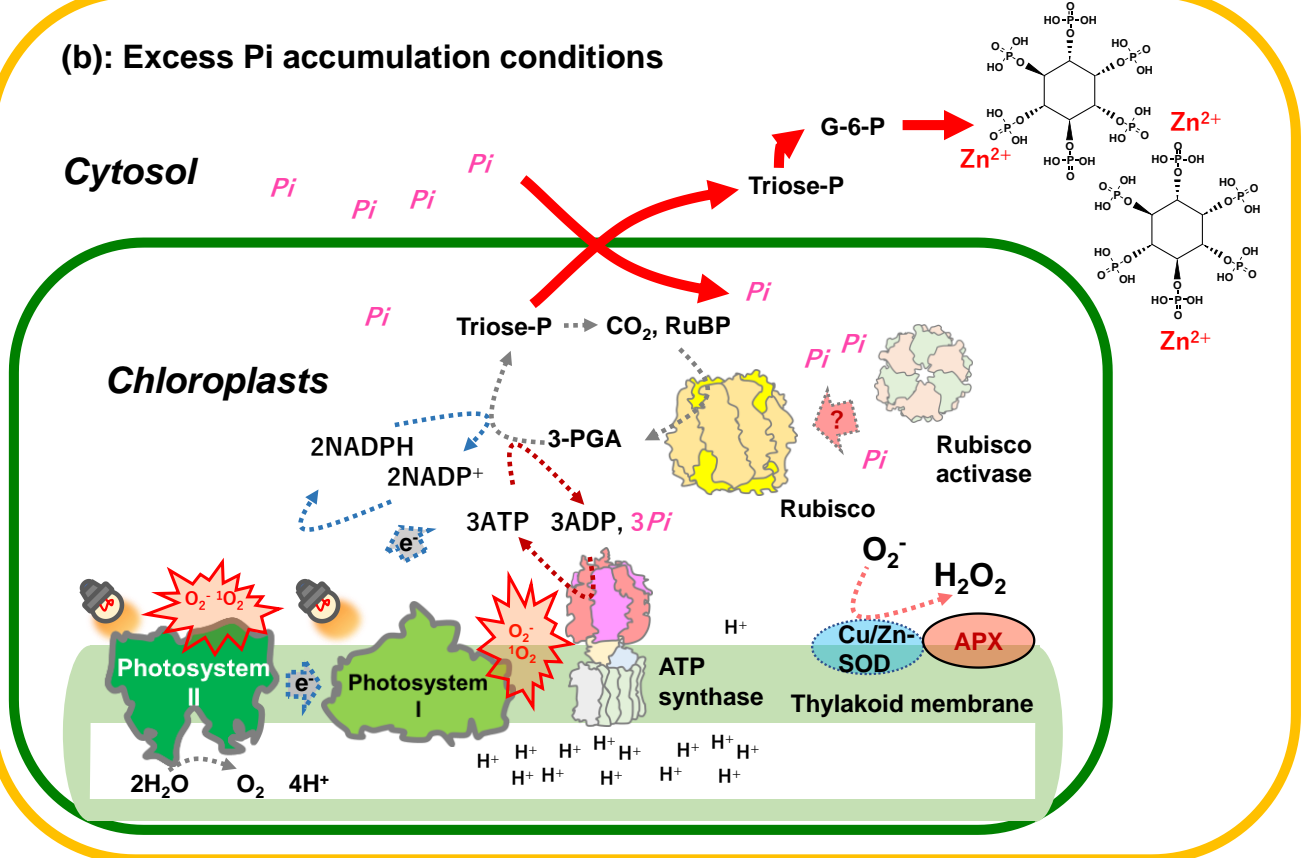


Figure 9

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 the plant cell. Under excessive Pi accumulation (b), an increase in the cytosolic sugar phosphate concentration activates phytic acid synthesis, and an increase in the phytic acid concentration causes Zn precipitation, which, in turn, decreases Cu/Zn-SOD activities. Simultaneously, RCA concentration decreases depending on the excessive accumulation of Pi, and photosynthesis is limited by the decrease in electron sink activities, because of the decrease in Rubisco activation. The decrease in electron sink activities leads to a decrease in ATP and NADPH consumptions. Subsequently, electrons accumulate in the PET chain, stimulating reactive oxygen species (ROS) production. ROS accumulation is further intensified by a decrease in Cu/Zn-SOD activities. As a result, higher ROS accumulation triggers leaf necrosis in land plants.