14 Phosphatidic Acid-induced Necrosis in *Arabidopsis thaliana* and the Role of Rop-GTPase therein

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When plants are in stress environments such as pathogen attack, wounding and water deficit, intracellular levels of phosphatidic acid (PA) and reactive oxygen species (ROS) increase. To investigate the relationship between stress-induced PA level elevation and ROS production in plants, we treated epidermal layers and whole leaves of Arabidopsis with PA. PA treatments activated ROS production in guard cells and induced leaf-necrosis in Arabidopsis leaves. These phenomena were specifically induced by PA and not by metabolic products of PA or other lipids. Based on the previous reports of the involvement of NADPH oxidase complex in ROS generation in plants and the regulation of NADPH oxidase by Rac and Rop small G proteins, we hypothesized that Rop may be involved in PA-induced ROS formation and necrosis. To test this hypothesis, we examined PA responses of several Arabidopsis plants transformed with mutated *rop2At* genes. Upon PA treatment, dominant positive *rop2At* transgenic Arabidopsis showed more rapid leaf-necrosis and produced more ROS in guard cells than wild type or dominant negative ones. These results suggest that Rop2At may participate in PA-induced ROS generation and leaf-necrosis. Further studies are in progress to test if PA and Rop indeed mediate stress-induced ROS formation and necrosis in Arabidopsis.

Keywords: phosphatidic acid, reactive oxygen species, NADPH oxidase complex, Rop small G proteins