Rising Temperature, Falling Immunity: Plant Stomatal Defense Relies on Heat Sensitive Protease

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Global warming poses a significant threat to plants by weakening their defense, exacerbating disease outbreaks and threatening global food security. However, limited attention is given to the effect of temperature under pathogen attack on the closure of stomata, critical portals for pathogen entry. Recent research has revealed that XCP1 is a heat-sensitive protease in charge of processing PR1 into the immune cytokine AtCAPE9. In this study, I hypothesize that stomatal immunity hinges on the heat-sensitivity of XCP1. Using Arabidopsis as a model system, I have developed a precise plant microclimate setup. The study demonstrates that even brief heat stress episodes can obstruct XCP1 activity, persistently compromising stomatal immunity even after temperatures return to normal. Our findings highlight the crucial role of XCP1-mediated production of AtCAPE9 in heat-compromised stomatal immunity. Additionally, the exogenous application of AtCAPE9 effectively restores heat-compromised immunity. This discovery presents promising opportunities for developing transgenic and non-transgenic strategies to improve plant defense against pathogen invasion and reduce yield losses in a warming climate.

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