Novel Target Identified for Plant Resistance to Pathogens and Insects

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Plants can’t swat a bug or run away from one, but that doesn’t mean that plants can’t fight back. Plants have evolved unique and sophisticated immune systems to defend themselves against insects and pathogens. Plant hormones called jasmonates play an important role in this defense. Jasmonate and its derivatives are lipid-based hormone signals that regulate a wide range of processes in plants, ranging from growth and photosynthesis to reproductive development. In particular, JAs are critical for plant defense against herbivory and plant responses to poor environmental conditions and other kinds of abiotic and biotic challenges. Some JAs can also be released as volatile organic compounds (VOCs) to permit communication between plants in anticipation of mutual dangers. JA biosynthesis is rapidly activated, leading to expression of the appropriate response genes. Researchers reporting in the May 23 issue of the Cell Press journal Molecular Cell have discovered a gene in the jasmonate pathway that controls plant defenses but does not play a detectable role in plant development. These findings could be applied to improve crop resistance in agriculture. Senior author Dr. Daoxin Xie of Tsinghua University in Beijing, China said, their findings may be used to develop a novel strategy to engineer dual plant resistances against both insects and pathogens in the agricultural industry by manipulating the jasmonate signaling pathway without negatively affecting plant growth. Dr. Xie and his colleagues performed genetic screening tests in plants to silence different genes in the jasmonate pathway. The experiments revealed that silencing the JAV1 gene significantly enhanced jasmonate-regulated defense responses against pathogens and insects but did not severely alter jasmonate-mediated developmental processes. The researchers also found that in normal plants, jasmonates accumulate following an attack by insects or pathogens, trigger the degradation of the protein encoded by the JAV1 gene. Without the JAV1 protein to keep them in check, other regulators are free to turn on immune response genes that rev up the immune system. These findings have provided an insight into the molecular mechanism by which plants integrate jasmonate signals to protect themselves from insect attack and pathogen infection.

REFERENCE