

신진-06

Pest Induced Salicylic Acid, Lignin, and Antioxidants in Response Enhance Tolerance to Herbivory in Rice Plants

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[Introduction]

The whitebacked plant hopper (WBPH) is feeding on the cell sap of rice plants and causes substantial yield loss. It causes direct damage by sucking phloem sap and reduces phloem nutrients, which results in reduced growth biomass and yield loss. Rice responds to WBPH through the activation of oxidative and phenylpropanoid pathway enzymes, such as chorismate mutase (CM), phenylalanine ammonia lyase (PAL), chalcone synthase (CHS), superoxide dismutase (SOD), and catalase (CAT), which enhance lignification in cell walls and increase toughness of the cell wall.

[Materials and Methods]

We selected three groups, the first group was selected as the control group, the second group was infected with WBPH (Wt-t) and the third group was also infected with WBPH (OxCM-t). After the 3rd to 4th leaf stage, each Wt-t and OxCM-t plant was infested with 100 (40 male, 60 female) WBPHs, which were starved two hours before infestation. Further, data were collecting according to each section of the experiment.

[Results and Discussion]

The WBPH population decreased by 67%, and the plant infection rate increased by 352% in wild plants compared with transgenic plants after 15 days of infestation. A substantial increase in lignin was found in the transgenic line (742%) and wild type (417%) plants after 24 h of infestation. Additionally, CM, PAL, CHS, and CHI showed significant increases in their relative expression level in the transgenic line. Salicylic acid was significantly enhanced in the transgenic line against WBPH infestation, which can activate PR1, PR2, antioxidants, and the expression of their related genes: SOD and CAT. WBPH infestation inhibited the chlorophyll contents of both transgenic and wild type plants, but the inhibition rate was higher in wild type than transgenic plants. Phenylalanine, proline, aspartic acid, and total amino acids were increased in the transgenic line and reduced in the wild type plants.

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