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"Competing pathways for equitable food systems transformation: Trade-offs and synergies"

Decoyinine induced resistance in rice against small brown planthopper *Laodelphax striatellus*

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Abstract

Small brown planthopper (SBPH, *Laodelphax striatellus*) is a serious rice sap sucking insect pest in East Asia, especially in China. It is also a potential vector of rice viral diseases, such as rice stripe virus and rice black streaked dwarf virus, which cause significant yield losses. Induced resistance against SBPH via microbial pesticides is considered as an eco-friendly and promising management approach. In this study, the induced resistance against SBPH in rice seedling by a new potential microbial pesticide, decoyinine (DCY), a secondary metabolite produced by Streptomyces hygroscopicus, was evaluated to investigate the effects of DCY on SBPH's biological and population parameters along with defense-related physiological and biochemical indices in rice against SBPH feeding. We found that DCY has potential to improve rice resistance and significantly reduced the fecundity of SBPH. The results revealed that DCY treated rice significantly changed SBPH's fecundity and population life table parameters. The concentrations of hydrogen peroxide (H_2O_2), soluble sugars and malondialdehyde (MDA) were significantly lower in DCY treated rice plants against SBPH infestation at 24, 48 and 96 hours post infestation (hpi), respectively. The concentrations of antioxidant enzymes, catalase (CAT) was significantly higher at 72 hpi, while super oxidase dismutase (SOD) and peroxidase (POD) concentrations were recorded higher at 96 hpi. The concentrations of synthases enzymes, phenyl alanine ammonia-lyase (PAL) was higher at 48 hpi, whereas polyphenol oxidase (PPO) concentration was maximum at 72 hpi against SBPH infestation. The results imply that DCY has unique properties to enhance rice resistance against SBPH by stimulating plant defensive responses. We conclude that the use of decoyinine in rice will contribute to integrated pest management (IPM) and may potentially provide a new idea for green technology.

Keywords: Antioxidant enzymes, decoyinine, fecundity, induced resistance, small brown planthopper, synthases enzymes

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