

## Natural Occurrence of Citrinin in Rice Grains and Its Biocontrol by *Trichoderma hamatum*

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Paddy rice was sampled from El-Sharkia, El-Gharbia, El-Dakahlia and Kafr El-Shekh governorates, Egypt. Of the 30 samples taken, ten were contaminated with the mycotoxin citrinin. An average of  $6.79 \times 10^4$  fungal spores per gram rice was found. The isolated fungi represented 47 species and 28 genera. The predominant genera were *Aspergillus*, *Cladosporium* and *Penicillium*. *Aspergilli* were represented by 22 species; *Aspergillus niger* and *A. flavus* had the highest occurrence. *Penicillium viridicatum* produced the highest amount of citrinin on glucose ammonium nitrate salts broth and rice grains, and hence this isolate was selected as a good producer of citrinin in this study. The presence of *Trichoderma hamatum* reduced the amount of citrinin produced by *P. viridicatum* compared with its respective control. The excessive growth of *T. hamatum* on *P. viridicatum* was increased with time. Viability of *P. viridicatum* conidia decreased by *T. hamatum* with an increase in the incubation period. Chitinases and 1,3- $\beta$ -glucanase enzyme activity of *T. hamatum* increased with extending the incubation period on *P. viridicatum* mycelia up to maximum values at 72 and 84 h, respectively. *T. hamatum* led to a decrease in the production of citrinin by *P. viridicatum* on rice grains compared with the respective control values.

**KEY WORDS:** *Trichoderma hamatum*; *Penicillium viridicatum*; biocontrol; citrinin; rice; mycotoxin.

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