

Title Antifungal activity of TiO₂ photocatalysis against *Penicillium expansum* in vitro and in fruit tests
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Abstract

The antifungal activity of TiO₂ photocatalytic reaction in the form of TiO₂ powder and TiO₂ coated on a plastic film against *Penicillium expansum* was investigated in vitro and in fruit tests. The mixture of *P. expansum* conidial suspension and TiO₂ powder was added to potato dextrose agar (PDA) plates for vitro test. The TiO₂ photocatalytic reaction reduced conidial germination of the fungal pathogen. It was found that the ability of the TiO₂ photocatalytic reaction to suppress *P. expansum* growth correlated to the amount of TiO₂ added. Lower numbers of viable colonies of *P. expansum* were observed with increasing amount of TiO₂. Regardless of the kind of selected fruit inoculated with *P. expansum*, both TiO₂ powder and TiO₂-coated film exhibited antifungal activity to control fruit rot. Development of *Penicillium* rot in apple was significantly ($P = 0.05$) retarded by the TiO₂ photocatalytic reaction. Similarly the TiO₂ photocatalytic reaction was the only treatment where no tomato fruit rot was noticeable after 1 week of storage. TiO₂-coated film also decreased brown lesions and *Penicillium* rot infection in lemons. The mean severity fruit rot scores (browning and softening flesh) were 3.2 and 1.9 for uncoated and TiO₂-coated film, respectively. Our findings suggest that “TiO₂ photocatalytic reaction” shows antifungal activity against *P. expansum* which may have potential for postharvest disease control.