Identification and delineation of action mechanism of antifungal agents: Reveromycin E and its new derivative isolated from *Streptomyces* sp. JCK-6141

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Abstract

Streptomyces species have been used as biocontrol agents for the management of fungal postharvest diseases. Reveromycin E (RE) and its new derivative, reveromycin E 1-methyl ester (REME), were isolated from *Streptomyces* sp. JCK-6141. Both compounds displayed broad-spectrum and extensive antifungal activities at acidic condition, but their activities were dramatically reduced at neutral or base conditions. These compounds effectively suppressed the cherry tomato gray mold and mandarin blue mold caused by *Botrytis cinerea* and *Penicillium italicum*, respectively, at 10 and 50 mg L^{-1}. In *in vitro* and *in vivo* assays, RE showed stronger antifungal activity than REME. Reveromycin was known as an isoleucine tRNA synthetase (IleRS) inhibitor. However, there is unconsolidated result in confirming binding site of reveromycin in previous studies. A computational study revealed that RE had a lower binding energy than REME and both compounds tend to bind catalytic domain rather than editing domains of IleRS. Our results indicated that *Streptomyces* sp. JCK-6141 producing reveromycins can be widely used as a new microbial fungicide for the control of postharvest diseases on fruit.