N-vanillyl-octanamide represses growth of fungal phytopathogens in vitro and confers postharvest protection in tomato and avocado fruits against fungal-induced decay

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Abstract

Plant diseases caused by pathogenic fungi result in considerable losses in agriculture. The use of fungicides is an important alternative to combat these pathogens, but may affect both the environment and human health. Plants produce many bioactive compounds to defend themselves from biotic challenges and an increasing number of secondary metabolites have been identified, which may be used to control fungal infections. Here, the bioactivity of a synthetic capsaicinoid, *N*-vanillyl-octanamide, also termed ABX-I, in the growth of five phytopathogenic fungi was assessed in vitro. The compound inhibited growth of *Colletotrichum gloeosporioides*, *Botrytis cinerea*, *Colletotrichum acutatum*, *Fusarium* sp., and *Rhizoctonia solani* AG2, while the magnitude of this effect differed from capsaicin. To investigate if ABX-I could effectively protect crops against phytopathogens, fungal challenges were performed in tomato leaves and fruits, as well as avocado fruits co-infiltrated with *Botrytis cinerea* or *Colletotrichum gloeosporioides*, respectively. In both tomato leaves and fruits and avocado fruits, ABX-I decreased the fungal damage not only in vegetative but also in edible tissues, and diminished decay symptoms compared with untreated fruits, which were highly sensitive to the pathogens. Furthermore, ABX-I spray application to tomato or avocado plants did not compromise growth and development, whereas it repressed spore germination and growth of *C. gloeosporioides*, which suggests its potential as an affordable and promising resource to control fungal diseases in the agronomic sector.