Control of Alternaria rot disease of pear fruits using essential oil of Viola odorata

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Abstract:

The economic losses of fruits due to the post-harvest diseases exceeded 50% of the total production. Although control of post-harvest pathogens still relies mainly on fungicides, but the emergence of fungicide-resistant strains and environmental problems stimulated the search for ecofriendly alternatives. In this study, three isolates of Alternaria alternata were isolated from pear fruits, naturally have symptoms of Alternaria rot disease. The pathogenicity test confirmed that A. alternata AUMC11410 was the most aggressive isolate causing the highest rotted area on the pear fruits. Herein, four tested essential oils of Ocimum basilicum, Eucalyptus globulus, Rosmarinus officinalis and Viola odorata exhibited antifungal impacts against A. alternata AUMC11410. Viola odorata had the highest fungicidal effect on the mycelia growth of the pathogen producing reduction up to 92.50%. By evaluation of the minimum inhibitory concentration (MIC), V. odorata oil showed MIC value at 0.4 µl/ml. Subsequently, application of V. odorata oil (0.4 µl/ml) reduced the percentage of Alternaria rot disease by 75.0 and 62.5% both before and after the pathogen inoculation. The GC-MS analysis of the V. odorata oil revealed that, it was rich in bioactive ingredients such as benzyl benzoate (8.0% of total ingredients), β-ionone (5.04%), α-hexyl cinnamaldehyde (2.93%), 6-methyl β-ionone (2.29%) and β-linalool (1.16%). Furthermore, it had some monoterpenoids and their derivatives, namely; p-cymene, dihydro-α-terpineol, p-menth-3-en-9-ol, 1,4-cineole, p-menth-6-en-2-one, citronellyl formate, β-citronellol, linalyl acetate and isobornyl acetate that collectively amounted 5.53% of the total ingredients. In conclusion, V. odorata oil included bioactive compounds that may be responsible for this fungicidal effect against the pathogen. Therefore, application of V. odorata oil may be considered as a promising ecofriendly precautionary measure for controlling the post-harvest diseases of pear fruits.

Keywords:

Alternaria alternata, essential oils, pear fruits, postharvest diseases, Viola odorata.

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