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Ripe indexes, hot water treatments, and biocontrol agents as synergistic combination to control apple bull's eye rot

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Pages 1016-1026 | Received 07 Feb 2022, Accepted 13 May 2022, Published online: 24 May 2022

Download citation

<https://doi.org/10.1080/09583157.2022.2078791>

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References

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<https://www.tandfonline.com/doi/full/10.1080/09583157.2022.2078791>

ABSTRACT

DA-meter hand-held instrument, hot water treatment (HWT) and biocontrol agents (BCAs) represent an alternative solution to synthetic fungicides. In the present study, the three strategies were combined to reduce *Neofabraea vagabunda* virulence on apple fruit cv 'Cripps Pink'. *In vitro* assays were conducted by testing different heat treatment timing (10, 5, and 3 min at 45°C) influence on pathogen mycelial growth together with BCAs (*Aureobasidium pullulans* L1 and L8, and *Trichoderma harzianum* Th1). The combined activities of HWT 45°C × 5 min and both BCAs volatile and no-volatile compounds displayed the complete control of the pathogen. *In vivo*, DA-meter was used to measure the index of absorbance difference (IAD) of chlorophyll- α content on apple and to separate fruit into two different ripening classes, immediately wound inoculated with *N. vagabunda* conidial suspension, and treated with HW and BCAs. *In vivo* results showed how the combined action of HW and BCAs completely inhibited the pathogen. Also, the less ripe apple class showed a decrease of fungal incidence by 16.2% with respect to the riper class. At harvest and after four months of storage at 0°C, quality parameters of both apple classes heat treated and untreated, such as firmness (FF), soluble solid contents (SSC), and pH were measured without showing any substantial differences. Obtained results open new perspectives on organic apple productions.

Acknowledgment

The study was performed in the ambit of the Rural Development Program of the Emilia-Romagna Region, Project number: 5111526-S4Post.Frut.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Additional information

Funding

This work was supported by Regione Emilia-Romagna [Project number: 5111526-S4Post.Frut.].