EFFECT OF BORON PRODUCTS ON DEVELOPMENT OF RHIZOPUS ROTS OF PEACHES

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Abstract

Fruit rots are of the most important diseases of peaches. Significant losses can be caused from fungi of the genus Rhizopus, mainly in peaches stored at room temperatures. This study investigated the effect of different boron products on the development of Rhizopus sp. on peaches.
The results showed that boron products reduced significant the percentage of fruit rot caused from Rhizopus sp. Higher concentrations were more effective.
Based on the results of this study, this method could be used supplementary in controlling Rhizopus rots of peaches in an Integrated Fruit Production System.

Key words: Rhizopus, peaches, boron

INTRODUCTION

Fungi of the genus *Rhizopus* can destroy even all production when environmental conditions are favorouble. Disease control is achieved primarily through the use of fungicides (Adaskaveg *et al.* 2005). However, with recent public concerns regarding pesticide residues on fruit, there is a need for alternative disease management practices that will reduce risk to consumers. Previous research works have reported the role of calcium on the resistance of fruits to *Monilinia* spp (Biggs et *al*. 1997; Conway *et al.* 1987a,b, 1992). However, there is no published report for the effect of boron on resistance of peaches on rots.

The aim of this study was to investigate the effect of different boron products on the development of *R. stolonifer* on peaches.

MATERIALS AND METHODS

Symptomless mature peaches (cv. Andross) were collected at harvest time and disinfested by dipping them in 10% vol/vol domestic bleach solution (4.85% NaOCl) for 15 min, washed 3 times with sterile-distilled water and left to dry at room temperature. The peaches were then immersed in solutions of 2 boron products; Clawbor (A.M.C. chemicals S. Ltda, Sevilla Spain, B chelates 4,7 w/v and B_2O_3 15,0 w/v, Great (A.M.C. chemicals S. Ltda, Sevilla Spain, CaO 7% 8,4% p/v and B 2,4 p/v). Fruit were inoculated by dipping in a solution containing spores (15.000 spores /

mL) of the *R. stolonifer*. The inoculated fruit were air-dried at 25±2°C before packing into cardboard boxes in 1 layer (fruit were not in contact each other) and stored at 2-4°C for 2 weeks. The percentage of total surface area infected was determined. The level of flesh B content was determined by tissue analysis (by colorimetry using Azomethine-H)

The treatments were arranged in a randomized design and there were 5 replications of 20 fruit for each treatment. The control treatment included non-inoculated fruits and fruit immersed in sterile distilled water.

RESULTS

The results are presented in table 1 and 2. It was found that boron products reduced significant the percentage of fruit rot caused from *Rhizopus* sp. Higher concentrations were more effective.
In addition, the percentage of boron in flesh of peaches was increased.

Table 1

Effect of differe boron products on the resistance of peaches to *Rhizopus stolonifer*

Treatments	Rates (mg/L)	Percentage of rots (%)
Control	0	82[x] a[y]
Clawbor	3	64.5 b
Great	3	68 b
Clawbor	4.5	62.5 b
Great	4.5	51.5 c
Clawbor	6	38.5 d
Great	6	18 e

[y]Estimates are based on 5 replicates, each of 20 fruit.
[z]Values in the same column followed by different letters are significantly different ($P < 0.05$) according to Duncan's Multiple Range Test

Table 2

Flesh B content in fruit treated with the boron products Geat and Clawbor

Treatments	Rates (mg/L)	Flesh B Concentration (mg/L)
Control	0	18,8
Clawbor	3	29
Great	3	22.6
Clawbor	4.5	31.2
Great	4.5	27.1
Clawbor	6	37.1
Great	6	28.3

DISCUSSION

Both types of boron significantly reduced the development of *R. solonifer* on fruit, higher concentrations being more effective. It could be related with the increased boron level on fruits treated with Clawbor or Great. Clawbor seemed to be more effective than Great. Boron has been found to inhibit the growth and decay of the fungi *Antrodia vaillanti*, *Poria monticola*, *Gloeophyllum trabeum* and *Leucogyphana pinastri* (Humar *et al.* 2005). Sprays with boron after bloom decreased incidence of *Gloeosporium* rot during storage of apples (Wójcik *et al.* 1997).

Based on the results produced, keeping boron in peach trees at optimum levels could be an effective method (friendly with environment) to reduce infections of peaches by *R. stolonifer.* In addition, knowing the concern of consumers regard fungicide residues, apply of postharvet dipping of peaches in boron solution could be an alternative method to reduce the losses brown rot infections.

REFERENCES

1. Adaskaveg J, Holtz B, Michailides T, Gubler D (2005) Efficacy and timing of fungicides, bactericides, and biologicals for deciduous tree fruit, nut crops, and grapevines. http://www.ipm.ucdavis.edu/PDF/PMG/fungicideefficacytiming.pdf Biggs R, El-Kholi M, El-Neshawy S, Nickerson R, (1997) Effects of calcium salts on growth, polygalacturonase activity, and infection of peach fruit by *Monilinia fructicola*. *Plant Disease* **81**, 399-403.
2. Conway WS, Greene GM, Hickey KD (1987a) Effects of preharvest and postharvest calcium treatments of peaches on decay caused by *Monilinia fructicola*. *Plant Disease* **71**, 1084-1086.
3. Conway WS, Gross KC, Sams CE (1987b) Relationship of bound calcium and inoculum concentration to the effect of postharvest calcium treatment on decay of apples caused by *Penicillium expansum*. *Plant Disease* **71**, 78-80.
4. Conway WS, Sams CE, McGuire RG, Kelman A (1992) Calcium treatment of apples and potatoes to reduce postharvest decay. *Plant Diseaese* **76**, 329-334.
5. Humar M, Pohleven F, Martey SA (2004) Influence of boron in CCB formulation on growth and decay capabilities of copper tolerant fungi. *Holz als Roh- und Werkstoff* **62**, 177-180.
6. Wójcik P, Mika A, Cieślinski G (1997) Wpływ nawożenia borem na plonowanie I jakość jabłek odmiany Sampion. *Acta Agrobotamica* **50**, 111-124.