

Preliminary results on salicylic acid treatment on brown rot caused by *Monilinia laxa* on Jumbo Cot fruit, *Prunus armeniaca* L.

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Summary: The effect of salicylic acid on reducing brown rot caused by *Monilinia laxa* infection in postharvest apricot fruit *Prunus armeniaca* L. Freshly harvest Jumbo Cot fruit were treated with water as control treatment and other group treated with salicylic acid 2 Mm as induced resistance treatment. Fruits were infected by *M. laxa* (1×10^3 spores ml⁻¹) and incubated at 25 °C for 2, 4 and 6 days. Treatment fruits with salicylic acid resulted in direct effect on mycelial growth as in the salicylic acid treatment the growth reached to 45% after 6 days of incubation while in the control treatment it reached to 100%.

Key words: apricot fruit, salicylic acid, brown rot, *Monilinia laxa*, disease resistance

Introduction

Brown rot, caused by *Monilinia laxa* (Aderhold & Ruhland) is a devastating disease of apricot (*Prunus armeniaca* L.). The disease is endemic in Europe and causes epidemics in most stone fruit orchards (Wormald, 1954; Byrde & Willets, 1977; Batra, 1991; Holb, 2004). Brown rot has been resulting in blossom blight in rainy springs and in fruit rot in rainy summers in Hungarian apricot orchards. Postharvest fungal pathogens result in major losses of fruits and vegetables and can be controlled effectively by synthetic chemical fungicides

Many reports have shown that induced disease resistance in plants by biotic and abiotic elicitors is a very effective method for restricting the spread of fungal infection (Droby et al., 2002; Qin et al., 2003). Resistance of plants to pathogens is based on both constitutive defense mechanisms such as pre-existing antimicrobial compounds and inducible defense mechanisms. Induced disease resistance in plants by biotic or abiotic treatments is a very attractive strategy for controlling diseases

This experiment aimed to study the effect of salicylic acid on the *in vitro* growth of *M. laxa*.

Materials and methods

Isolation of fungi

M. laxa were isolated from decayed plum fruit. The fungi were maintained on PDA at 4 °C. Spores of *M. laxa* were

obtained from 2-week-old cultures incubated at 25 °C by flooding the cultures with sterile distilled water containing 0.05% (v/v) Tween 80. The suspensions of spores were filtered through four layers of sterilized cheese cloth. The concentrations of spores were adjusted to (1×10^3 spores ml⁻¹) with the aid of a haemocytometer

Mycelial growth

The effects of Salicylic acid on mycelial growth were assayed by the method of Yao & Tian (2005a). Salicylic acid solution mixed with molten PDA-agar to give a total volume of 20mL per petri plate (diameter: 90mm). S.A concentration was 2 Mm in the PDA-agar. After the agar had solidified, 5mm disks of *M. laxa* were placed in the center of each petri plate. Plates were incubated at 20 °C. Colony diameter was determined 24, 48 and 72h after inoculation. Each treatment was replicated three times and the experiment was repeated twice. Mycelial growth of *M. laxa* on PDA was expressed as growth rate, which was calculated according to the following formula. Growth rate (%) = (colony diameter after inoculation – 5mm)/5mm × 100.

Data analysis

Experiments were performed using a completely randomized design. All statically analyzes were performed with SPSS program. The data were analyzed by one-way analysis of variance (ANOVA). Means separation was performed by Duncan's multiple range tests. Differences at $p < 0.05$ were considered as significant.

Results and discussion

Effect of salicylic acid treatment on mycelial growth of *Monilinia laxa* in vitro

Salicylic acid treatment markedly reduced the growth rate of *M. laxa* in vitro figure (1). Growth rate of *M. laxa* in PDA media without salicylic acid rose to around 50% during 2 days after incubation at 25 °C while the rate rose to about 20% in PDA media inoculate with 2mM salicylic acid with significantly differences ($p < 0.05$). The growth rate of *M. laxa* in control treatment increased dramatically after 4 days and 6 days to around 90% and 140%, respectively. In case of salicylic acid treatment, the rate of mycelial growth ranged between approximately 25% to 45% after 4 days and 6 days, respectively with significant difference in comparison to control treatment ($p < 0.05$).

Inducing resistance is another important strategy for reducing the diseases in plant as well as in harvested fruit and vegetables, which is attractive because the induced disease resistance utilizes the plant's own defense mechanisms and is either far less toxic than fungicides or nontoxic (Wilson *et al.*, 1994; Kuć, 2001; Terry and Joyce, 2004; Walters *et al.*, 2005; Elmer and Reglinski, 2006). For example, salicylic acid (SA), a best known elicitor, can induce local and systemic resistance in many plant tissues (Rojo *et al.*, 2003; Garcia-Brugger *et al.*, 2006) including pear fruit (Cao *et al.*, 2006; Tian *et al.*, 2006).

In this study, found that salicylic acid treatment could significantly reduce *M. laxa* growth in vivo as Cao *et al.* (2008) reported in case of MeJA in loquat fruit. It is postulated that the control of the disease is directly because of the inhibitory effect of MeJA on pathogen growth, and indirectly because of the induced disease resistance triggered by enhanced H₂O₂ levels. Also these results were in the same way with Yao *et al.* (2005b), they reported that salicylic acid with a concentration of 2mM showed direct fungitoxicity on *M. fructicola* and significantly inhibited mycelial growth and spore germination of the pathogen in vitro. The results reported that the Salicylic acid has direct effect on reducing the lesion diameter and disease incidence with significantly differences ($p < 0.05$) and this finding is too clear in case of unwounding treatment these results are in the same trend like the finding of Yao *et al.* (2005ab) they reported that pre-harvest treatments with 2mM salicylic acid (SA) and 0.2mM methyl jasmonate (MeJA) significantly reduced lesion diameters on sweet cherry fruit caused by *M. fructicola* compared with control post-harvest treatments.

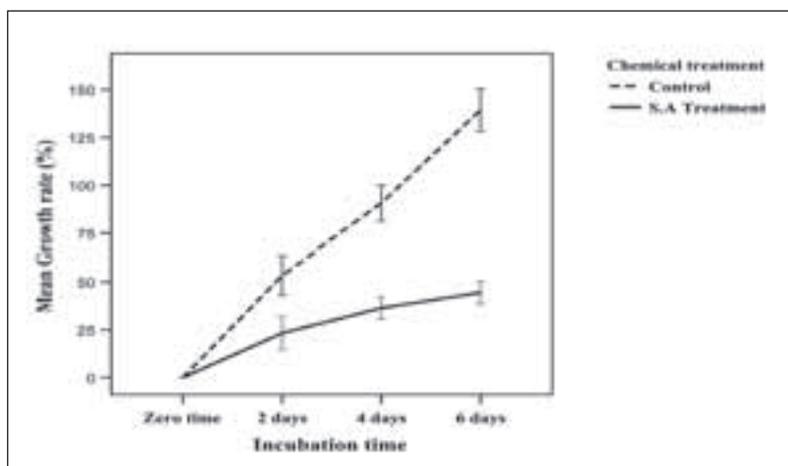


Figure 1. Effect of salicylic acid on mycelial growth of *Monilinia laxa* in vitro.

Data are expressed as the mean of triplicate assays. Vertical bars represent the standard errors of means

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