PROJECT NO.: 10034

TITLE: Impact of methyl jasmonate treatments on incidence of 'Bing' sweet cherry decay.

YEAR INITIATED: 1999 **CURRENT YEAR:** 1999 **TERMINATING YEAR:** 1999

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JUSTIFICATION:

Jasmonates are naturally occurring plant growth regulators. These compounds have been demonstrated to be effective for manipulation of ripening and senescence of some fruits including development of decay. The efficacy of postharvest methyl jasmonate (MJ) treatments to reduce postharvest decay of sweet cherry fruit was evaluated using 'Bing' and 'Lappins' cherries. Experiments were conducted during July and August, 1999 using fruit obtained from commercial orchards in the Wenatchee area. Fruit were treated by dipping in solutions containing various MJ concentrations or fruit were exposed to MJ vapor.

OBJECTIVES:

1. Evaluate MJ dip and vapor treatments for reduction of sweet cherry decay.

2. Determine effects of MJ treatments on sweet cherry fruit quality.

PROGRESS:

Experiment 1. 'Bing' cherries were obtained from two commercial orchards. Fruit were segregated according to size and color, then subjected to one of 8 treatments. For MJ dips, fruit were immersed for 2 minutes in water containing 0.1% Tween 20 (surfactant) with 0, 0.01, 0.1 or 1 mM MJ. After dipping, fruit were air dried then stored in plastic trays inside a box liner to prevent excessive moisture loss. Vapor treatments were applied to fruit placed into gallon glass jars. Prior to sealing, a glass vial containing 0, 2.4, 22.4 or 224 μL MJ was placed into each jar. Jars were sealed at room temperature for 12 hours, then fruit were removed.

Fruit from both dip and vapor treatments were stored at 40 ^{o}F for 1, 2 or 4 weeks, or at 68 ^{o}F for 1 or 2 weeks. At the end of each storage period, fruit were evaluated for decay incidence and fruit quality (weight, color, stem browning, firmness, soluble solids content, titratable acidity, pitting).

Experiment 2. 'Lappins' cherries were obtained from a commercial orchard. Fruit were segregated according to size and color, then dipped into a solution containing 0.1% Tween 20 alone or with 10^4 spores ml^{-1} of *Botrytis cinerea* obtained from Dr. Rodney Roberts, USDA, ARS, Wenatchee. Fruit were then placed on trays which were stored inside cherry box liners. MJ was applied as vapor by placing glass vials containing 0, 10, or 100 μL MJ inside each liner. Fruit stored at 40 ^oF were evaluated after 1,2 or 4 weeks while fruit stored at 68 ^oF were held for 1 or 2 weeks after treatment.

Results

Experiment 1. Development of decay was minimal in both lots of fruit stored at 40 ^oF for up to 4 weeks (Tables 1,2). No decay was observed through 2 weeks storage at 40 ^oF, and treatment effects on decay reduction were not evident after 4 weeks.

Decay developed rapidly in fruit stored at 68 ^oF (Tables 3,4). Again, no consistent effects were evident for decay reduction from either dip or vapor treatments.

Experiment 2. Decay development was minimal in inoculated fruit through 4 weeks post-treatment at 40 ^oF (Table 5). Not enough decay developed even after 4 weeks storage to determine MJ effects. The incidence of decay in inoculated fruit increased in fruit stored at 68 ^oF, however, no reduction in decay related to MJ treatment was evident (Table 6).
In both experiments, no significant MJ effects on fruit quality were observed.

CONCLUSIONS

MJ treatments have been shown to effectively reduce development of decay in various fruits and vegetables. Our results indicate that for sweet cherry fruit, either field run or inoculated with a known cherry fruit pathogen, MJ treatments were ineffective in reducing the incidence of decay. MJ responses between plant species and also between different plant tissues are known to vary. Apparently the mechanism(s) induced by MJ that confer decay resistance in some plants either are absent or are not sufficient to reduce decay in sweet cherry fruit. The lack of other fruit quality responses in our experiments may indicate the general lack of sensitivity to MJ in sweet cherry fruit after harvest.

Table 1. Incidence (%) of decay in 'Bing' sweet cherry fruit, lot 1, treated with MJ then stored at 40 °F.

Treatment	Week 1	Week 2	Week 4
Vapor check	0	0	9 ± 5
2.4 μL	0	0	2 ± 4
22.4 μL	0	0	3 ± 4
224 μL	0	0	0
Dip check	0	0	0
0.01 mM	0	0	0
0.1 mM	0	0	0
1 mM	0	0	0

Table 2. Incidence (%) of decay in 'Bing' sweet cherry fruit, lot 2, treated with MJ then stored at 40 °F.

Treatment	Week 1	Week 2	Week 3
Vapor check	0	0	3 ± 2
2.4 μL	0	0	3 ± 1
22.4 μL	0	0	18 ± 4
224 μL	0	0	2 ± 2
Dip check	0	0	13 ± 6
0.01 mM	0	0	4 ± 1
0.1 mM	0	0	12 ± 7
1 mM	0	0	13 ± 11

Table 3. Incidence (%) of decay in 'Bing' sweet cherry fruit, lot 1, treated with MJ then stored at 68 °F.

Treatment	Week 1	Week 2
Vapor check	4 ± 3	16 ± 10
2.4 μL	20 ± 3	62 ± 28
22.4 μL	17 ± 5	42 ± 28
224 μL	8 ± 4	35 ± 10
Dip check	5 ± 2	21 ± 9
0.01 mM	9 ± 6	16 ± 16
0.1 mM	9 ± 8	30 ± 10
1 mM	8 ± 7	

29 ± 5

Table 4. Incidence (%) of decay in 'Bing' sweet cherry fruit, lot 2, treated with MJ then stored at 68 °F.

Treatment	Week 1	Week 2
Vapor check	25 ± 4	66 ± 14
2.4 μL	14 ± 3	65 ± 10
22.4 μL	11 ± 2	28 ± 2
224 μL	6 ± 3	38 ± 12
Dip check	37 ± 17	71 ± 21
0.01 mM	35 ± 15	87 ± 14
0.1 mM	21 ± 6	64 ± 17
1 mM	29 ± 1	76 ± 23

Table 5. Incidence (%) of decay in 'Bing' sweet cherry fruit, lot 1, inoculated with *Botrytis cinerea*, then treated with MJ during storage at 40 °F.

Treatment	Week 1	Week 2	Week 4
Non-inoculated control	0	0	0
Inoculated control	0	0	0
Inoculated + 10mM MJ	0	0	2 ± 2
Inoculated +100mM MJ	0	0	3 ± 3

Table 6. Incidence (%) of decay in 'Bing' sweet cherry fruit, lot 1, inoculated with *Botrytis cinerea*, then treated with MJ during storage at 68 °F.

Treatment	Week 1	Week 2
Non-inoculated control	2 ± 2	4 ± 5
Inoculated control	9 ± 2	72 ± 7
Inoculated +10mM MJ	12 ± 4	71 ± 13
Inoculated +100mM MJ	9 ± 5	70 ± 4