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Report to SymAGRO

Objective: Evaluate the adequacy and efficacy of Aviv, Cinnerate and ProbladV in comparison to conventional and organic standard materials for control of postharvest decays

Methods

Field trials were conducted on Fuji trees during the 2019 growing season at Washington State University's "Sunrise Orchard" in Douglas County, WA. Replicates of four individual trees per treatment were set in a randomized complete block design (RCBD) within four rows. In addition to the control, nine treatments were tested in this trial (Table 1). The objective was to verify the efficacy of Aviv, Cinnerate and ProblabV applied pre and postharvest. Treatments were applied, at the date shown in Table 1, using a backpack sprayer delivering an equivalent of 2 to 3 L/tree at ~200 psi. At commercial maturity (October 17, 2019), 35 fruit were harvested from each replicate tree for a total of 140 fruit/treatment. For the two postharvest treatments Cinnerate 30 fl oz and PAA (20 fl oz), fruit untreated in the orchard were harvested and transported to TFREC where they were treated by dipping in the respective fungicide suspensions for 2 min. Fruit from each treatment were placed in a separate box and all boxes were stored at 34F in a regular atmosphere.

Analysis

Student's *t*-test was used to look for statistically significant differences in incidence between the treatments vs. untreated control and standard conventional treatments. Mean separation analysis was used to group treatments with similar efficacy against those with significant differences. Data were compiled in Microsoft Excel and analyzed using SAS.

Results

Overall decay incidence

After 3 months of storage, all treatments significantly reduced the overall decay incidence compared to the untreated control which showed 3% decays (Table 1). After 4 months of storage, the decay incidence in the control was 9% and was significantly higher than all treatments except Aviv and ProbladV (30 fl oz). After 5 months, all treatment reduced the overall decay incidence compared to the control except ProbladV at 30 fl oz. At this date, Merivon, PAA and Cinnerate alone or rotated with Aviv were the most effective with decay incidences of 1, 3, 4 and 4%, respectively. After 7 months of storage, 59% of the fruit in the control were decayed versus 8 in

Merivon and 23% and 24% in fruit treated with Cinnerate post and preharvest, respectively (Table 1).

Table 1. Rates, spray dates and overall decay frequency of the treatments evaluated in this study

Treatment	Rate /ac or 100 gal	Spray or treatment date	Overal decay incidence (%) after months (m) in cold storage			
			3 m	4 m	5 m	7 m
Control	-	-	3 a*	9 a	18 a	59 a
Merivon	5.5 fl oz	10/10/2019	0 b	0 c	1 d	8 e
Serenade Opti	20 fl oz	10/10/2019	1 b	4 bc	7 bc	41 b
Aviv	20 fl oz	10/10/2019	0 b	6 ab	9 b	41 b
Cinnerate Preharvest	30 fl oz	10/10/2019	1 b	1 c	4 bcd	24 d
Cinnerate 30 DPH & Aviv 7 DPH	30 & 20 fl oz	10/10/2019	0 b	1 c	4 bcd	31 bcd
ProbladV-Pre 30	30 fl oz	10/10/2019	0 b	7 ab	19 a	58 a
ProbladV-Pre 40	40 fl oz	10/10/2019	0 b	4 bc	8 bc	39 bc
Cinnerate Postharvest	30 fl oz	10/17/2019	1 b	4 bc	5 bcd	23 d
PAA-Postharvest	20 fl oz	10/17/2019	0 b	1 c	3 cd	31 cd

* Values within the same column (evaluation date) followed by the same letters are not significantly different based on Student' *t* test at $P<0.05$.

Efficacy of treatments by major diseases

Several disease including blue mold, gray mold, bull's eye rot, speck rot, Alternaria rot and Mucor rot were detected in this trial, however, the most frequent ones were blue mold, gray mold and bull's eye rot (Table 2).

Blue mold (Penicillium): Beside the control, blue mold was less reduced by Serenade Opti, ProbladV and Cinnerate preharvest whereas is was absent in Merivon treated fruit and low in fruits treated with Cinnerate postharvest, AVIV and the alternation of AVIV with Cinnerate preharvest.

Gray mold (Botrytis): Gray mold was controlled the least by Problad 30 fl oz and PAA postharvest, whereas Broblad 40 fl oz, AVIV, and Cinnerate pre and postharvest were effective.

Bull's eye rot (Neofabraea): Bull's eye rot was the most frequent among the 3 major pathogens and the most effective treatments were Merivon, PAA and Cinnerate Preharvest. In many treatments, the incidence of bull's eye rot was higher than in the untreated fruit.

Table 2. Number of fruits infected by *Penicillium* (blue mold), *Botrytis* (Gray mold) and *Neofabraea* (bull's eye rot) at each inspection period

Treatment	Number of fruit infegcted by *Penicillium*				Number of fruit infegcted by *Botrytis*				Number of fruit infegcted by *Neofabraea*			
	3m	4m	5m	7m	3m	4m	5m	7m	3m	4m	5m	7m
Control	0	1	1	12	2	7	14	34	0	0	0	13
Merivon	0	0	0	0	0	0	0	4	0	0	0	4
Serenade opti	1	2	3	14	0	0	0	1	0	1	4	24
AVIV	0	0	0	4	0	1	1	4	0	5	8	34
Cinnerate Pre	0	0	0	6	1	1	1	4	0	0	1	9
Cinnerate/AVIV	0	0	0	4	0	0	0	1	0	1	4	26
Problad 30	0	0	1	9	0	3	4	22	0	4	12	31
Problad 40	0	1	1	9	0	1	1	0	0	3	6	30
Cinnerate Post 30	0	0	0	2	1	1	1	1	0	4	4	20
PAA Post 20	0	0	0	6	0	1	3	19	0	0	0	4