Progress Report and Proposal - Pear Research Review, 2000

TITLE: SOPP drenching for postharvest decay of Anjou pear fruit

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JUSTIFICATION

Blue and gray molds are the most common postharvest diseases of pears and apples. Gray mold, caused by *Botrytis cinerea* Pers.: Fr., is the most frequently encountered disease in untreated fruit stored in bins. Because *B. cinerea* frequently spreads from fruit to fruit (nests), losses from initial infection foci can be large. Furthermore, fruits with undetected nascent infections often are packed and can lead to situations in which boxes of fruit must be repacked before shipping. Preliminary studies have shown that both primary and secondary gray mold infections can be prevented by treating fruit with fungicides immediately after harvest and before it is put away in storage.

Currently, fungicide drenches are not used commonly on winter pears because outbreaks of blue mold and Mucor rot (caused by *Penicillium expansum* Link and *Mucor piriformis* Fischer, respectively) have occurred in the past and been attributed to their use. Drench mixtures are typically applied directly to fruit in field bins upon receipt at the warehouse and the mixture is collected and recirculated. Postharvest drench mixtures can be a source of inocula for postharvest diseases.

OBJECTIVES

Determine if postharvest drench applications of SOPP can be used to control gray mold caused by *Botrytis cinerea* in Anjou pear fruit.

PROGRESS

1996. Anjou fruit were treated with either 0, 400, 500, or 600 ppm SOPP (Steri-seal D). Some reduction of gray mold was observed in bins of fruit treated with 600 ppm. Bosc pear fruit were treated with either 0 ppm, 250 ppm, or 500 ppm SOPP or 4000 ppm SOPP followed by a fresh water rinse. Fruit damage was observed in all treatments on Bosc.

1997. Anjou fruit from 2 packinghouses were treated with either 0 ppm (untreated check), 600 ppm, 800 ppm, or 1000 ppm SOPP. Fruit were stored in CA for about 17 wk after which fruit from packinghouse 1 was assessed for decay and fruit from packinghouse 2 was stored for an additional 10 wk in RA. Considerably more decay developed in fruit from packinghouse 2 than in fruit from packer 1. All SOPP treatments reduced the total incidence of decay and other rots (bull's-eye, etc.) over that in the untreated check (Table 1). In fruit from both packinghouses, most of the decay present was caused by gray mold. Significant differences

in gray mold incidence among treatments was observed in fruit from packer 2, but not packer 1, although the trend was similar in fruit from both packers.

No phytotoxicity was visible at 1000 ppm in fruit from either packer. However, the trend toward slightly higher numbers of fruit decayed at 1000 ppm over that at 800 ppm may be an indication that a slight amount of damage was present that increased the susceptibility of fruit to infection.

1998. This test was to determine if SOPP interacted with TBZ when applied together as a drench. Single replicate bins of Anjou pear fruit from were drenched with a mixture of SOPP (Steri-seal D @ 800 ppm) and TBZ (Mertect 340-F @ 16 oz/100 gal). Three replicate bins of field run, uncooled fruit, one from each of three grower lots, were treated with SOPP + TBZ. Similar bins of fruit from the same grower lots were left untreated as controls. Fruit were held in CA storage for about 150 days at which time disease incidence was assessed.

Incidence of gray mold was significantly lower in bins of fruit treated with the SOPP + TBZ mixture than in untreated bins (P=0.008) (Table 2). Other rots were not affected. Phytotoxicity was insignificant. No negative interaction between SOPP and TBZ was evident in this trial. These results indicate that the materials can be mixed with good results.

PROPOSAL

Purpose

The purpose of this study is to determine if SOPP drenches provide protection against blue mold (caused by *Penicillium expansum*) resulting from infections by inocula that accumulate in recycled drench systems.

Procedures

Four single bin replicates of Anjou pear fruit each will be treated with drench mixtures at harvest and before cold storage. Treatments will be either plain water, SOPP (800 ppm), Mertect 340-F (528 ppm) or a mixture of SOPP + Mertect 340-F. Drench mixtures each will be amended with about 3000 conidia/ml of *P. expansum*. Two isolates of *P. expansum*, one TBZ sensitive and one TBZ resistant (250 ppm) will be used in about a 3:1 ratio. Inocula will be added to the fungicide and mixed thoroughly before fruit are treated. Fruit will be treated within 15 min of the addition of inoculum to the drench mixtures. The order in which bins are treated will be noted.

After treatment, all fruit will be placed in CA storage at the Stemilt Research CA facility under standard CA conditions. Fruit will be assessed for decay after 3 months of storage. All decayed fruit will be removed from each bin and the cause of decay will be determined. Any symptoms of phytotoxicity will also be noted.

ANTICIPATED BENEFITS

If an effective, low cost fungicide treatment can be developed that will control gray mold without incurring losses from blue mold or Mucor rot, it would aid in giving packers flexibility to store fruit in bins for extended periods. This would increase the ability to custom pack fruit in response to market demands.

Table 1. Effect of SOPP drench treatments on decay of Anjou pear fruit.

SOPP (ppm)	Blue mold	Gray mold	Other rots	Total decay
Packinghouse 1[x]				
0	6.0 b[y]	27.3	19.3 b	52.7 b
600	0.7 a	10.3	3.3 a	14.3 a
800	0.7 a	5.3	3.7 a	9.7 a
1000	1.7 a	9..0	4.0 a	14.7 a
	($P = 0.009$)[z]	($P = 0.122$)	($P = 0.001$)	($P = 0.022$)
Packinghouse 2				
0	5.7	657.3 b	168.7 b	928.7 b
600	7.3	193.0 a	27.7 a	268.0 a
800	6.3	132.7 a	66.0 a	264.3 a
1000	11.0	155.0 a	50.3 a	252.7 a
	($P = 0.528$)	($P \leq 0.001$)	($P = 0.020$)	($P \leq 0.001$)

[x] Fruit from both packinghouses were stored in CA for about 17 wk at which time fruit from packinghouse 1 was assessed and fruit from packinghouse 2 was stored for an additional 10 wk in RA.

[y] Means in each column for each packinghouse are not significantly different when followed by a common letter according to Fisher's LSD ($P = 0.05$).

[z] Significance of F statistic from one-way ANOVA.

Table 2. Effect of SOPP in combination with thiabendazole applied as a postharvest drench on postharvest decay and burn of Anjou pear fruit after 150 days CA storage.

	SOPP/TBZ*	Untreated	Value of *P***
Gray mold	6.2	55.3	0.008
Blue mold	6.3	8.0	0.417
Mucor rot	0.8	0.5	0.545
Bull's-eye rot	1.0	1.7	0.599
Other rots	1.0	2.2	0.495
Total decay	15.3	67.7	0.008
Burn	2.2	0.3	0.677

*800 ppm SOPP + 16 oz/100gal Mertect 340-F
**Level of significance of *F* - statistic