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An evaluation of spray programs for the control of *Colletotrichum* spots of Hass and Pinkerton avocado

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ABSTRACT

Pepper and Tar Spots of Hass and Pinkerton, both caused by Colletotrichum, have become increasing problems over the past five years. The trials reported on were field evaluations of the standard sprays as also fungicides from the strobin and triazole groups which may be registered on avocados in the future. A QAC sanitiser and the addition of ferric ions to copper sprays were also tested. Spray timings were based on previous findings. None of the newer fungicide programs were better than the current standard copper or copper alternated with Benlate programs. Newer fungicides are also considerably more expensive.

INTRODUCTION

Pepper and Tar Spots of Hass and Pinkerton, both caused by *Colletotrichum*, have become increasing problems over the past five years, the different names being applied to different symptoms of the same disease.

Pepper Spot consists of minute, superficial, shiny black spots the size of ground pepper particles, which tend to start on the fruit pedicel and then appear on the fruit, generally the shoulders. Tear staining in severe cases is common. This is consistent with the normal pattern of *Colletotrichum* spread, spores being carried by water. The lesions appear on the green fruit in January and February, midway through the summer rainfall period. The spots occur on both peaks and valleys of the bumpy skin, tending to be larger if on the peaks.

Tar spots are larger, irregular with entire margins, also superficial, but 1 mm to 5 mm in diameter. These are randomly distributed over the fruit and more commonly associated with peaks of the skin. In neither case does there appear to be a correlation with lenticels. Both symptoms are found on Hass and Pinkerton but Hass more commonly shows Pepper Spot and vice versa.

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MATERIALS AND METHODS

Hass

A 9 year old Hass orchard with a history of Pepper Spot was selected in the Burgershall area and a randomised block design with eight treatments and five replications was used (Table 1).

All treatments were applied with 0.25% Wenfinex oil. Sprays were applied by high volume lance to runoff.

In addition to the trial, samples were taken from the adjoining rows subject to the grower's program.

Pinkerton

A 9 year old Pinkerton orchard, in which Pepper Spot and Tar Spot symptoms were observed last season, was chosen on the same farm and a randomised block design with five replications was used (Table 2).

All treatments were applied with 0.25% Wenfinex oil. Sprays were applied by high volume lance application.

Pinkerton was harvested on 16 May and Hass on 29 May 2001 and fruit were evaluated for disease, Pinkerton for Tar spot and

Table 1. Treatments, application dates and program cost of fungicides evaluated for the control of *Colletotrichum* on Hass. All dosages are per hectolitre (100 L).

Treatment	6 Dec	12 Jan	Chemical cost/hL/yr
Control			
Cu *	Cu	Cu	R 8.86
Ort	Ortiva 40ml	Ortiva 40ml	R 38.40
Flint	Flint 15g	Flint 15g	R 25.80
Cu+ **	Cu+	Cu+	R 4.56
Cu/Ben	Cu+	Benlate 50g	R 6.66
Cu/Tilt	Cu+	Tilt 10ml	R 3.84
Prasin/Cu ***	Prasin/Cu	Prasin/Cu	R 36.66

*** = copper oxychloride at 300 g/hL**
**** = copper oxychloride at 150 g/hL plus $FeCl_3.6H_2O$ at 5 g/hL**
*****= Prasin (a QAC) at 200 ml was first applied, followed by Cu @300 g when leaves had dried (not very practical).**

Table 2. Treatments, application dates and program cost of fungicides evaluated for the control of *Colletotrichum* on Pinkerton avocado. All dosages are per hectolitre.

Treatment	6 Nov	7 Dec	11 Jan	Chemical cost/hL/yr
Control	-	-	-	
Cu/Ben	Cu *	Benlate 50g	Cu	R 13.24
Cu/Ort	Cu	Ortiva 40ml	Ortiva 40ml	R 42.83
Ort	-	Ortiva 40ml	Ortiva 40ml	R 38.40
Cu/Man	Cu	Mancozeb 200g	Cu	R 12.56
Cu/Ben/ Ort	Cu 300g	Benlate 50g	Ortiva 40ml	R 28.00
Cu+ **	Cu+	Cu+	Cu+	R 6.84

*** = copper oxychloride at 300 g/hL**
**** = copper oxychloride at 150 g/hL plus $FeCl_3.6H_2O$ at 5 g/hL**

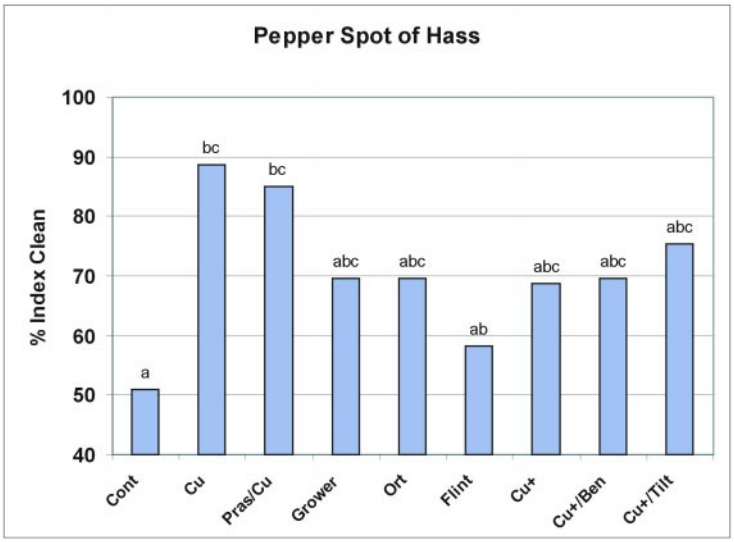

Figure 1. Pepper Spot of Hass. Rating percentage of clean fruit by spray program (see Table 1). Values with the same letter do not differ significantly by protected Fisher test at P = 0.05.

Hass for Pepper spot. A rating scale of 0-2 was used with 0 = clean, 1 = mildly infected, 2 = moderate to severely infected. Rating 1 would be exportable in most seasons. Results are expressed as percentages according to Wheeler (1969).

RESULTS AND DISCUSSION

Results are best seen from the accompanying graphs.

For Hass (Fig. 1) there was considerable disease pressure. The minimum two standard copper spray program was most effective. Ortiva and Flint, both members of the Strobin group of fungicides, were disappointing. Although not significantly so, Flint was inferior to Ortiva. This appears to be characteristic of this group of fungicides in that slight changes in chemistry make one more effective than another on a particular disease / host combination.

Copper plus ferric chloride was also unsatisfactory. The copper component is at half dose but experience in mangoes led us to expect that this and the standard copper would be similar in effect.

Alternating copper and benzimadazole or triazole fungicides did not offer any improvement but was also no worse than copper alone. The grower used a SuperBird high vol. (~30 L/ tree) blower for applications which appeared to be less effective than the high volume lance used in the trial, although liquid quantities applied were similar.

The trial was not designed to test the efficacy of oil as a sticker.

Prasin followed by copper had no increased effect over copper alone. In mangoes there is often an improvement in disease control where the trees are "disinfected" with chlorine or a QAC before applying copper for residual control, but such was

not the case here.

Similar results were found for Tar Spot of Pinkerton (Fig. 2). A three copper program was not included, this being substituted by the copper / benomyl / copper which is also commonly used. This also proved to be the most efficacious. Mancozeb in place of benomyl was as effective. Substitution of Ortiva (strobin group) was not statistically inferior, although this was the tendency, and cost was approximately three times higher. Copper plus ferric chloride again disappointed.

All in all, the current standards remain in place with additional sprays where the disease is known to be severe and it is cost justified.

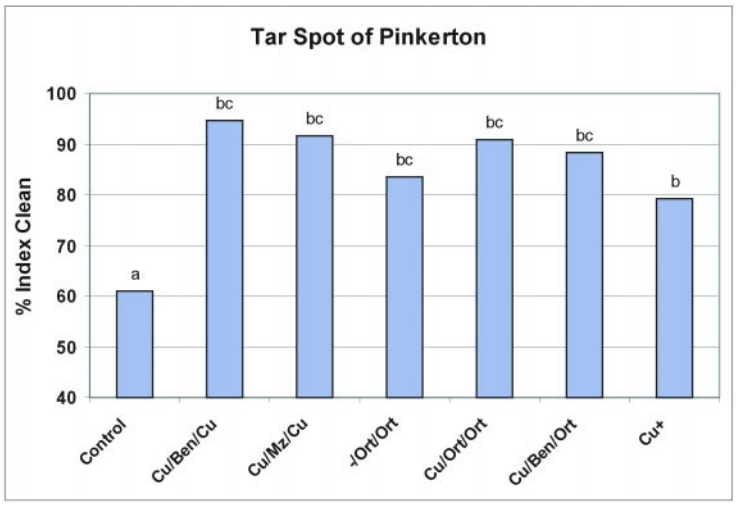

Figure 2. Tar Spot of Pinkerton. Rating percentage of clean fruit by spray program (see Table 2). Values with the same letter do not differ significantly by protected Fisher test at P = 0.05.

LITERATURE CITED

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