PIP – SUMMARY OF TRIALS

November 2014

Field trials on pre-harvest use of fungicides to prevent post-harvest symptoms of anthracnose in Côte d'Ivoire

This is a summary of field trials sponsored by PIP that were carried out during 2013 in Cote d'Ivoire by Cellule Universitaire d'Expertises et de Conseils pour le Développement Agricole. The research took place in a commercial mango orchard belonging to Nembel at a trial site around 20 kilometres from Sud de Ferké. The full report in both French and English can be obtained from COLEACP.

1. Procedure

The aim was to assess the efficacy of two pre-harvest sprays applied to the mango tree canopy three weeks and one week before fruits were harvested. The test products are listed in the table* below, which also gives the dose rates applied. There was also a control treatment on which water alone was sprayed.

Active Substance or biological Agent	Commercial name	Recommended dose
Citrus extract and L-free amino acids	Bestcure	1,5 l/ha
Biologically derived	SO255	2 l/ha
Azoxystrobine	Azox	1 l/ha
Copper sulphate	Golden Blue	3 kg/ha
Chemical	LS350	60 ml/100L
Prochloraz	Oraz 450 EC	1 l/ha

Table 1: Treatment products and dosage

Pre-harvest assessments in the orchard demonstrated the presence of anthracnose on both leaves and fruits of the variety 'Kent', meaning that there was a potential for the symptoms to manifest on fruits after harvest. As the maximum level of disease tolerated by European markets is 5%, it is important to have control methods capable of reducing the development of anthracnose on fruits while they are being transported and marketed.

Spray application of the test products was carried out with a Solo motorised mist-blower at a volume rate of 1 litre per tree. There were four replicates, and guard rows prevented spray drift between treatments. During the trial the site experienced 126 mm of rain and temperature was 30° ± 2 °C.

After harvesting fruits, to simulate the conditions typically experienced by fruits during the post-harvest supply chain, en route to Europe, harvested fruits showing no anthracnose symptoms were kept in a cold store at 8 degrees Celsius for 15 days (conditions they would experience during sea freight). Fruits were then removed from the cold store and disease levels noted.

Fruits were then maintained in ambient conditions (26 degrees Celsius) for a further 10 days. During this period they were assessed every two days, and disease symptoms noted.

2. Results and discussion

The spray treatments reduced the development of the disease on trees, see graph below and although this was not the main focus of the experiment, this is an interesting and significant effect on disease inoculum.

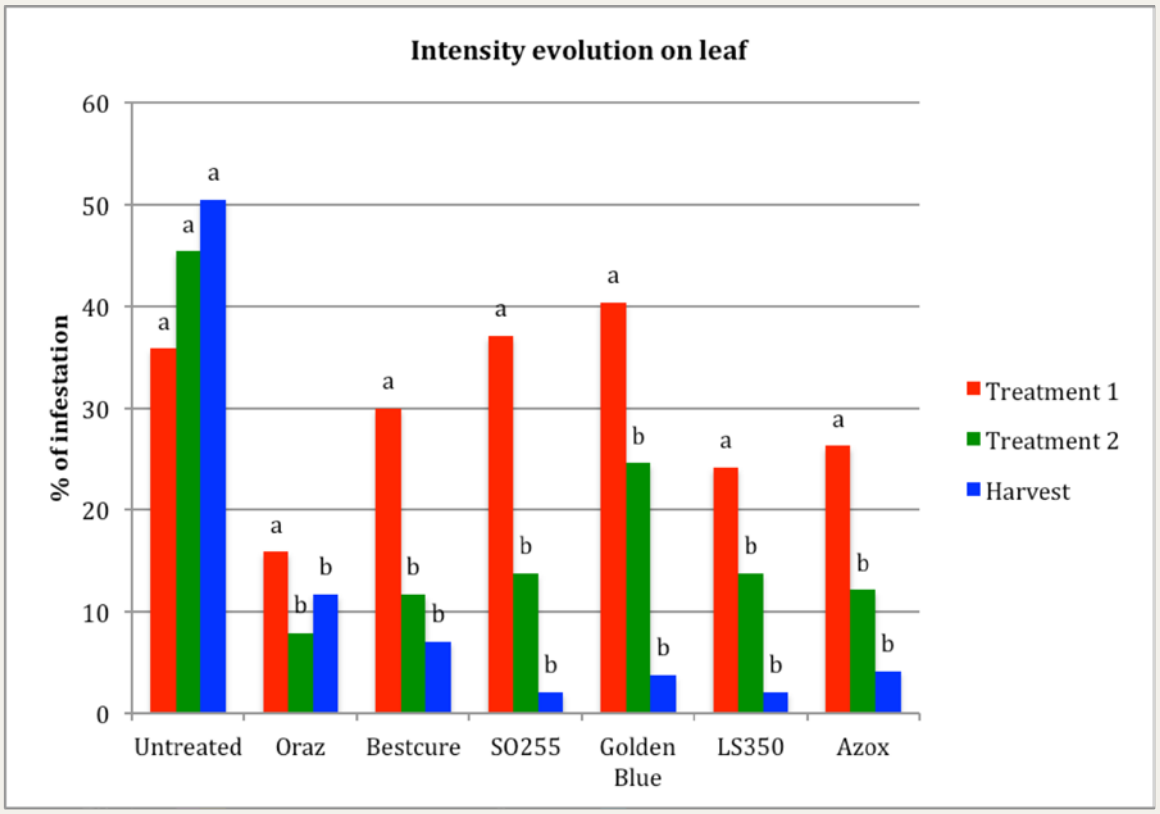

Figure 1: Density of anthracnose symptoms on leaves based on assessments made just before treatments 1 and 2, on the day of harvest.

The main objective was to determine the effect of treatment on fruits after they were harvested, and specifically, the potential of the pre-harvest sprays to reduce the development of anthracnose disease symptoms during a period of cold storage and then during a period at ambient temperature. The chart below shows the development of symptoms after 15 days of cold storage for the different experimental treatments.

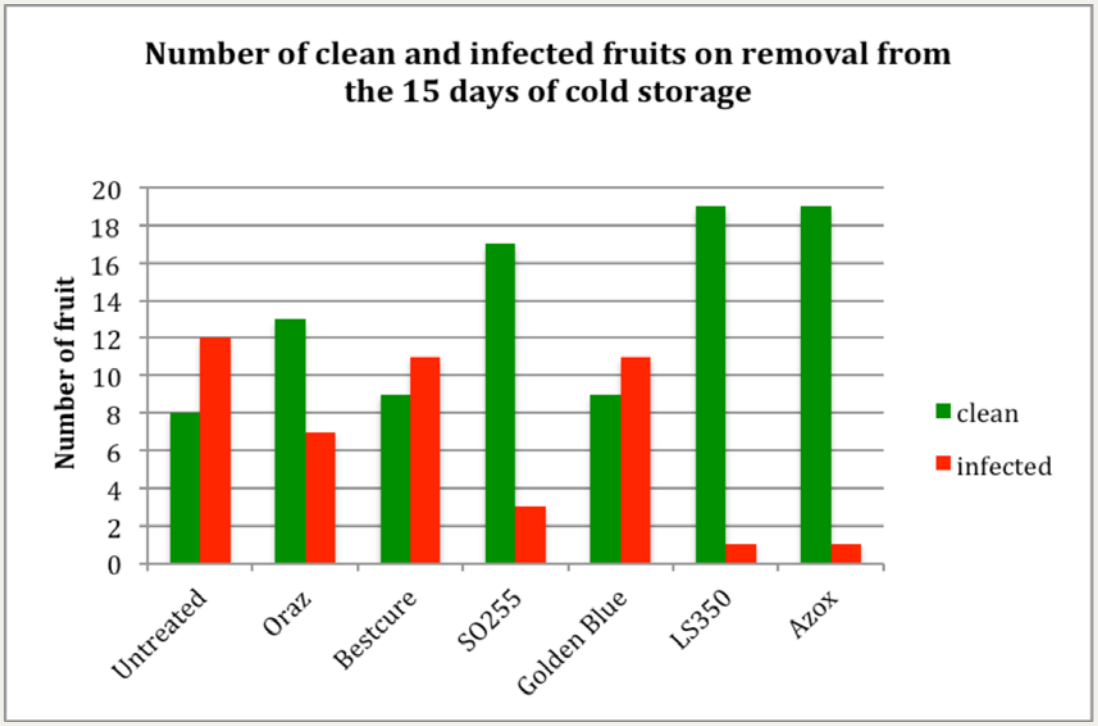

Figure 2: Number of clean and infected fruits on removal from the 15 days of cold storage

After removal from the cold store the fruits were studied every two days as they experienced the ambient temperatures (as they would in wholesale and retail markets in Europe). The different pre-harvest treatments showed different effectiveness in reducing development of anthracnose symptoms on fruits, as the chart below shows.

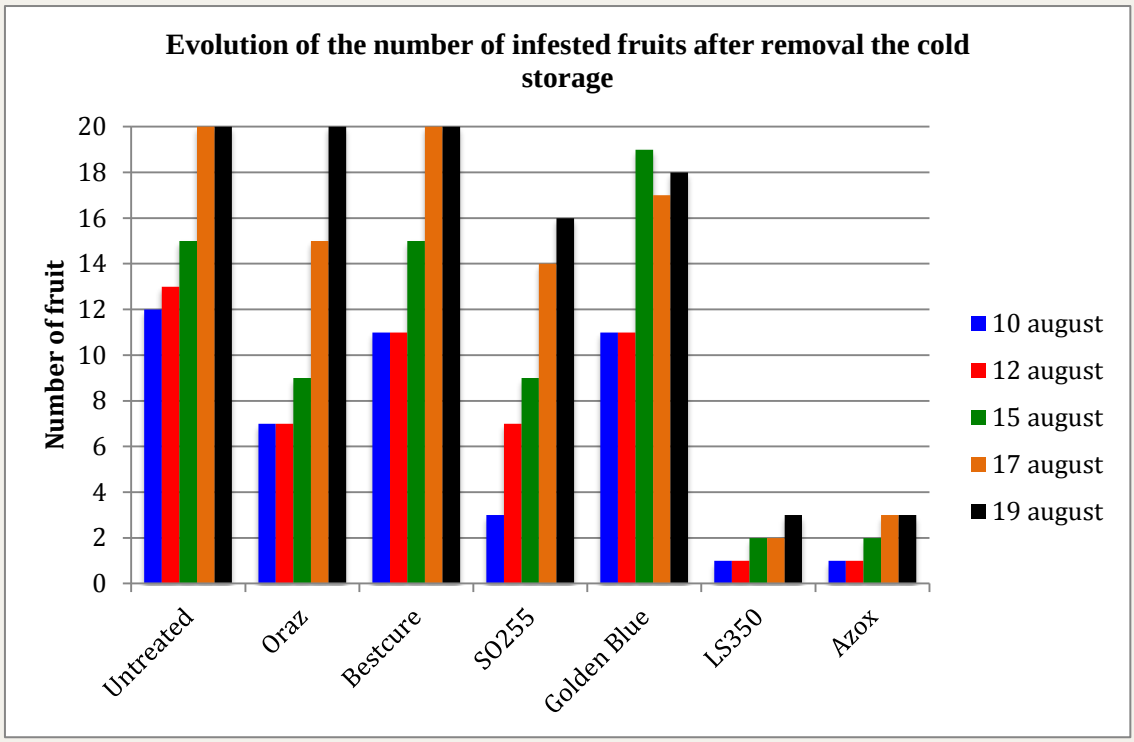

Figure 3: Evolution of the number of infected fruits over the ten-day period in August after removal.

Two pre-harvest treatments stood out as reducing the development of the disease symptoms during the post-storage period at ambient temperature (LS350, Azox).

Product	Number of days after removal from the cold store				
	0	2	5	7	9
LS350	5	5	10	10	15
Azox	5	5	10	15	15
Control	60	65	75	100	100

Table 2 : Number of infected fruits after removal from the cold store

The table (above) shows the same data as a percentage for the two best treatments, LS350, Azox and the control, during the 10 days of observations at ambient temperature, after fruits had been removed from the cold store.

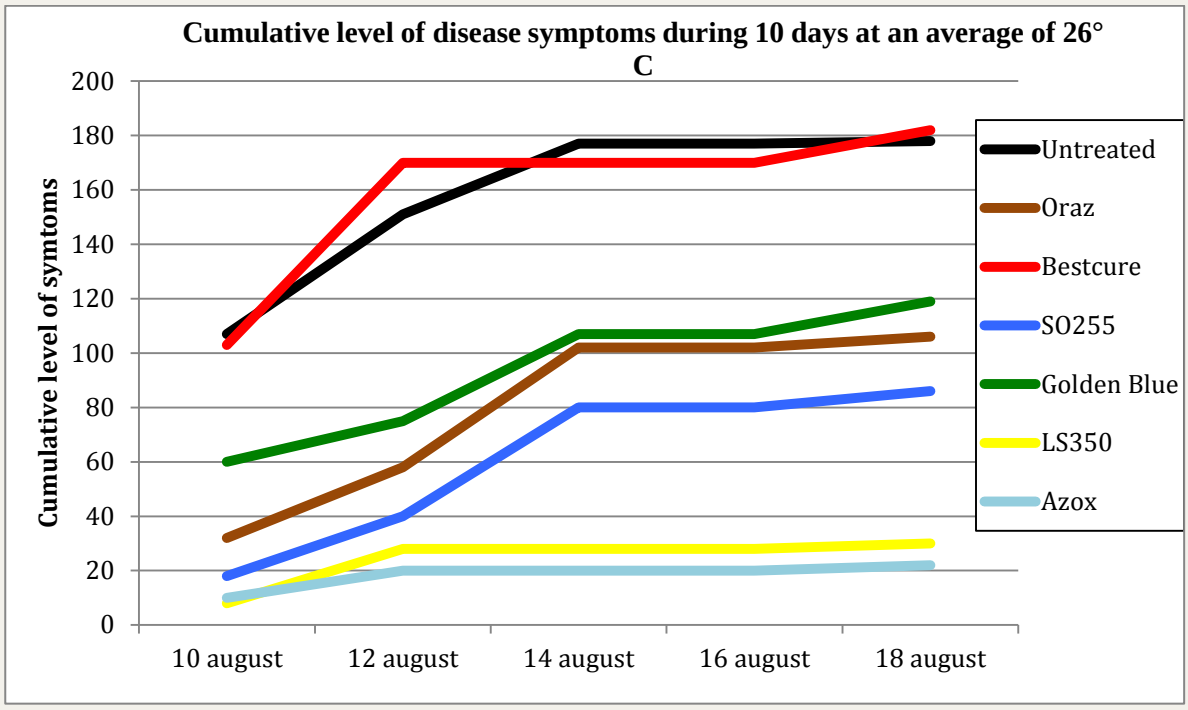

Figure 3 : Cumulative level of disease symptoms during 10 days after they were held at an average of 26 · C on removal from the cold store.

The graph above shows the progression of disease symptoms over the ten days at ambient temperature after fruits came out of cold storage.

3. Discussion and Conclusion

Only fruits without anthracnose symptoms were used in the storage comparison. These are the type of fruit that would be exported, under cold storage conditions en route to Europe.

The trial demonstrated that certain spray treatments applied to foliage in the mango orchard, are capable of making significant reductions in the post-harvest development of disease symptoms on fruits, compared to trees sprayed with water alone.

Trees that had been treated with LS350, Azox (prochloraz and azoxystrobine) gave the best control.

The ambient temperature after removal from the store (26° C) was higher than would normally be experienced in Europe. Temperature in Europe would be less favourable for the development of anthracnose symptoms, so the test conditions in Cote d'Ivoire very likely exaggerated the rate of development of the disease on fruits. It would be interesting to do the test under conditions more typically found in Europe, and determine whether the percentage of infection remained below that demanded by markets.

Under the test conditions of the trial, pre-harvest foliar applications of LS350 (prochloraz) and Azox (azoxystrobine) successfully achieved fruits with less than 5% of anthracnose symptoms. In other words, fruits would be acceptable in European markets.

The other products tested (Oraz, Bestcure, SO255 and Golden Blue) were less effective under the trial conditions, with a level of infection of between 35 and 55 %.

PIP
FOR SUSTAINABLE DEVELOPMENT OF
THE ACP HORTICULTURAL INDUSTRY

PIP
c/o COLEACP
Rue du Trône, 130
B-1050 Brussels Belgium

Tel : +32 (0)2 508 10 90
Fax : +32 (0)2 514 06 32
E-mail : pip@coleacp.org

www.coleacp.org/pip

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