

# PIP – SUMMARY OF TRIALS

November 2014

Efficacy field trials on use of fungicides in post-harvest dips to control anthracnose on mango in Côte d'Ivoire





This is a summary of a complex trial and gives only the major findings. It is recommended that interested readers look at the full trial report which can be provided by COLEACP as this contains further information on the trial and its results.



# Abstract

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A control trial against mango anthracnose disease, *Colletotrichum gloeosporioides* on mango fruits was conducted from June to August in 2013 in Côte d'Ivoire. The aim was to assess the biological efficacy of five fungicides: the coded product S0255, Bestcure (citrus extracts & L free amino acids), the coded product NC124, Kobe (*Rheum officinale* & *Rumex crispus* extracts) and Mirage 450 (prochloraz), which is a registered product currently used in the country. The trial was conducted in an orchard in the north of the country which grows the "Brooks" cultivar.

Disease inoculum potential was assessed by scoring infection levels on leaves, and this was typically 25 to 55%, indicating that fruits would be likely to be infected and show symptoms of anthracnose above the 5% tolerated by export markets.

For the experimental dips, the products were diluted as recommended. Harvested fruits without disease symptoms were held in the fungicide solutions for 5 minutes. The fruits were then dried for 30 minutes at ambient temperature (30 degrees Celsius) before being placed in a chilled cold store maintained at 8 degrees Celsius.

The fruits remained in the cold store for 15 days, simulating transportation by ship to Europe. After this period they were removed and held at ambient temperature. The level of infection by anthracnose disease was noted when they were removed from storage, and monitored for 10 days. During the cold storage and subsequent period in which fruits were held at ambient temperature to simulate shelf life, symptoms of the infection increased. However, some treatments performed much better than others in reducing the development of the symptoms.

Mirage 450 (prochloraz) proved to be effective in the trial conditions, by controlling disease development during the ambient conditions. Mirage controlled the disease development to a level that was below the 5% infection level demanded by markets.

Bestcure provided some protection during cold storage, and some reduction of disease development afterwards. Even during storage it did not quite achieve the required 5% (maximum) level. Further work would be needed to confirm how useful this might be.

The trial results indicated that a prochloraz dip such as Mirage 450 does provide sufficient protection of mango fruits up to 10 days after removal from cold storage.

# 1. Experimental Procedure

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A CUECDA/PIP trial was carried out to assess the effectiveness of fungicide dips as a way to reduce the onset of anthracnose symptoms on mango fruits. The disease reduces the quality of fruit and if present at a significant level, precludes their acceptance in export markets.

Mango fruits of the variety 'Brooks' were harvested from an orchard in the north east of Cote d'Ivoire close to a region called Korhogo, and dipped into fungicide solutions, see table\* below.

Active Substance or biological Agent	Commercial name or experimental code	Dosage proposed	Quantity used in 50 litres of water
Water (Control)	-	-	-
Prochloraz (Reference)	Mirage 450	0,25 ml/litre	12,5 ml
Biological origin	SO255	1%	500 ml
Extract of citrus and L-free amino acids	Bestcure	4 ml/litre	200 ml
Biological origin	NC124	5 g/litre	250 g
Extract of <i>Rheum officinale</i> / <i>Rumex crispus</i>	Kobe 1,25 L	400 ml/100 litres	200 ml

\*Table of trial products and dosage

Before the dipping commenced the leaf infection rate on trees was assessed. This indicated that there was a potential inoculum within the canopy that was capable of infecting fruits.

The fungicidal dip treatments given to harvested fruits included an established product based on the fungicide prochloraz (Mirage 450), Bestcure (a botanical fungicide based on citrus and amino acids), Kobe (a botanical product based on *Rheum* and *Rumex* extracts) and two novel products which have only code names.

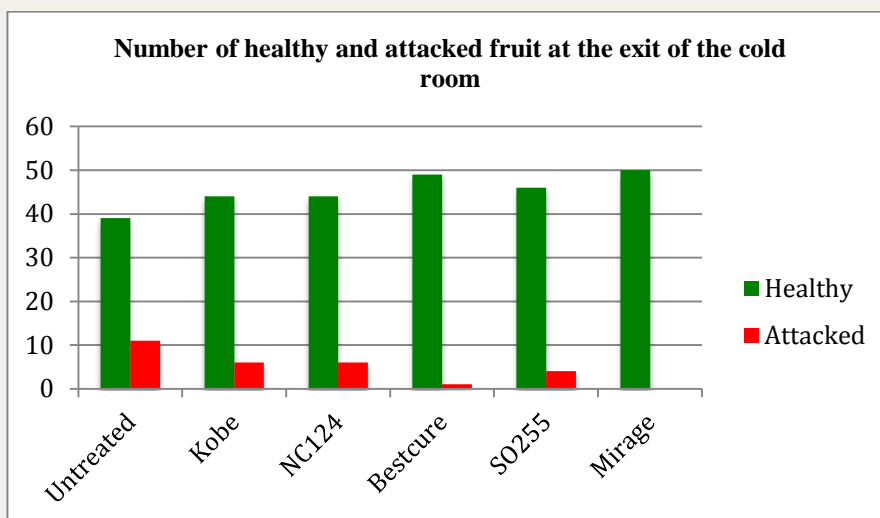
The products were diluted and made up into 50 litres. Each treatment had five replicated of 10 fruits, which were dipped for 5 minutes. There was also a control treatment in which fruits were dipped into water.

After dipping, fruits were dried then placed in cold store held at 8 °C for 15 days. On removal the disease level was assessed and noted. The fruits were then held at ambient temperature (24 °C) for a further 10 days. During this period, development of the disease was noted every two days.

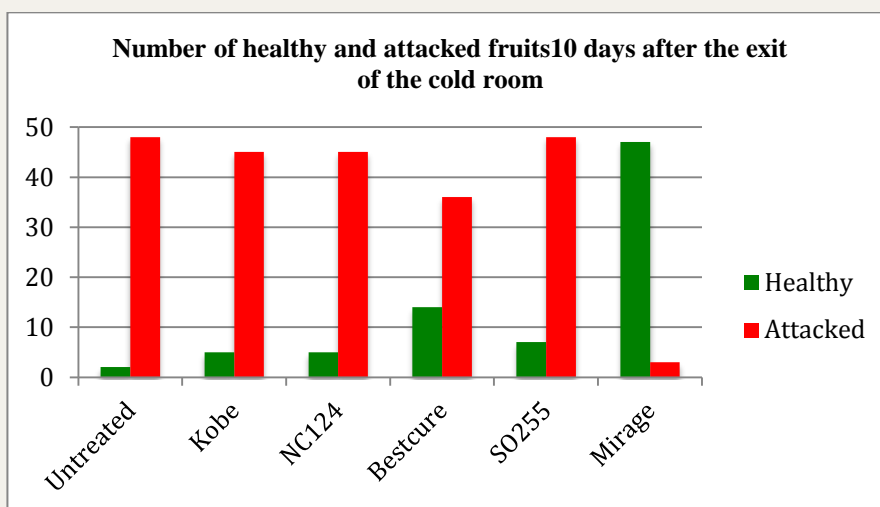
## 2. Results and discussion

### Reduction of development of the disease during cold storage

The product Mirage 450 (prochloraz), already registered in the country and proved to be the most effective in the trial conditions, and gave almost 100% control within the cold store. Another product, Bestcure, based on citrus extracts and amino acids, good control in the cold store, and the other test products provided very limited protection against the post-harvest development of the disease during the 15 days in the cold store, as illustrated by the graph below.



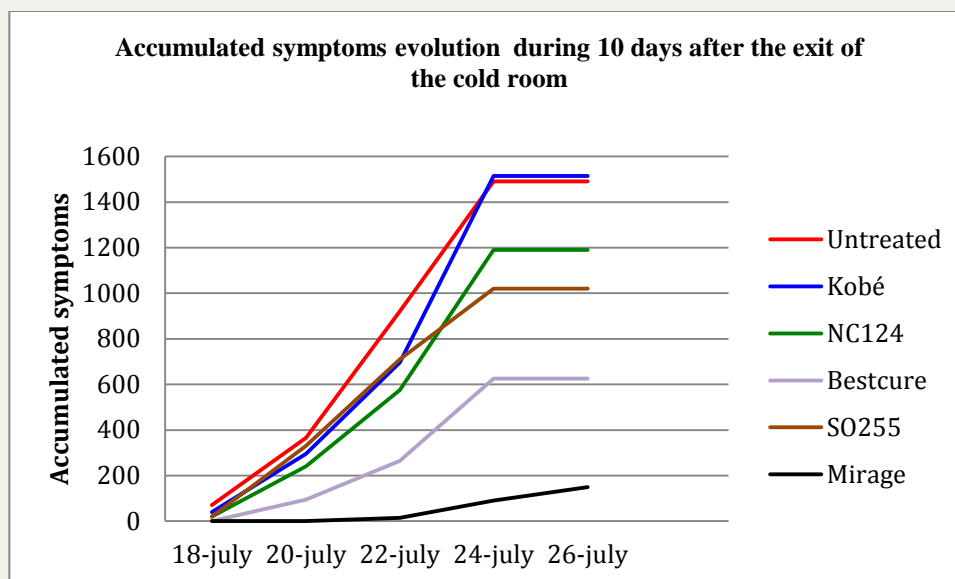
Graph showing the degree of infection on fruits when they were removed from the chilled store



Graph showing the degree of infection on fruits after 10 days storage in ambient conditions

### Reduction of development of the disease after removal from the cold store

On removal from the store when the fruits were held at 24 degrees, the disease developed significantly in all but fruits treated with Mirage 450, see the graph below.



Graph showing accumulated number of anthracnose symptoms from the different treatments on removal from cold storage

## 3. Conclusion

Untreated fruits dipped only in water developed anthracnose symptoms that would preclude exportation.

Bestcure provided some control during cold storage, but it is not clear how useful this would be in practice.

It must be concluded that to provide low levels of infection after fruits leave the cold store, of the products used in the trial, only Mirage (prochloraz) used in post-harvest dips is capable of slowing the development of the disease. By slowing down the onset of anthracnose symptoms on mango fruits in ambient conditions they would be expected to have a reasonable shelf life.



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