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A COMPARISON OF HAND GUNS AND MIST BLOWERS FOR THE APPLICATION OF FUNGICIDES

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SUMMARY

The disease incidence on fruit sampled from trees sprayed with handguns and mist blowers was compared. It was found that disease incidence of the anthracnose complex was low on the outside fruit, but high on inside fruit of large trees. While the "Eagle" mist blowers gave good results on the outside fruit, there was insufficient penetration of the spray material to the inside fruit of large trees to give adequate control. Hand guns gave better results on these fruit. Both "Eagles" and hand guns significantly reduced the amount of sooty mould on fruit. Methods are suggested of improving penetration of the spray material to the inside fruit.

OPSOMMING

Die voorkoms van siektes op vrugte van borne wat met handgewere en newelblasers bespuit was, is vergelyk. Die voorkoms van die antraknosekompleks is laer by buitevrugte en hoog by binnevrugte van groot borne. Goeie resultate is verkry met "Eagle" newelblasers by die buitevrugte maar penetraste van die spuitstof na die binnevrugte van groot borne, was onvoldoende om hierdie vrugte te beskerm. Hoé volume handgewere het beter resultate op hierdie vrugtegelewer. "Eagle" newelblasers asook handgewere, het die hoeveelheid roetskimmel op vrugte opvallend verminder. Metodes van verbeterde penetrasie van spuitstof na binnevrugte word voorgestel.

INTRODUCTION

Only in the last 5 years has the spraying of avocado trees against fruit diseases been seriously undertaken in the Nelspruit region. During this time the majority of spraying has been done with hand guns with a few people having used mist blowers. No direct comparison of these methods of spraying on avocados has yet been done.

In the citrus industry, there has been a marked swing away from hand guns to mist blowers. This has happened because hand guns are labour intensive and expensive to operate, and mist blowers tend to give better results. Large scale use of spray machines in the citrus of H.L Hall & Sons (Farms) Ltd. has given the following operating cost comparisons:

Hand guns	2,5c/litre sprayed.
Mist blowers (Eagles)	1,5c/liter sprayed.

Assuming that 6000 litres per hectare of water is required to spray an orchard at Ix concentration, spraying costs/ha are as follows:

Hand gun	R 150-00
Eagle	R 90-00

As up to three sprays are applied each season, total application costs would amount to R450/ha for hand guns and R270/ha for "Eagle" mist blowers. If it were possible to effectively use the mist blowers at 2x concentration, the cost advantage on using mist blowers would be even greater. In addition to application costs there is a tendency to overspray an average of 30% with hand guns. Considerable spray material savings can therefore also be made with mist blowers.

Spraying of avocado trees with mist blowers can produce a problem with sufficient penetration of material to the inside of the tree due to the large size that trees can grow to. This experiment was done, therefore, to compare the efficiency of disease control using mist blowers compared to hand guns.

MATERIALS AND METHODS.

Two methods of spraying were compared:

(a) **Hand guns**. Spraying was done at a rate of + 6000£/ha. Care was taken to ensure that both inside and outside fruit was covered. In the case of large trees the sprayers first stood inside the trees to give an internal spray and then followed up with an outer canopy spray.

(b) **Eagle mist blowers**. This was a Mark 1 version fitted with 28 nozzles and oscillating boom. It was calibrated to deliver 5900l/ha. Tractor speed was 2,25 km/hour.

Spray material used was Captafol. The rates used were 200g/100 litres for hand guns and 200 and 400g/100 litres for the mist blower. Spray dates were 30th November 1984 and 1st February 1985.

The test site was a 28 year old Fuerte orchard. Many of the trees had been replaced during the life of the orchard so a large range of tree sizes occurred within the orchard. Single tree lines were sprayed for each treatment. Fruit was harvested on 13th June 1985 when oil content was 21 %.

Fruit was harvested from small (4,0 - 5,5m diameter), medium (7,0 - 8,0m) and large sized (11,0 - 12,6m) trees. A single sample was taken from the small trees, whereas on the medium and large trees samples were harvested separately from the inside and outsides of the trees. After picking the fruit was stored at 5,0°C for 28 days. On ripening, it was analysed externally for disease symptoms.

RESULTS

Fungal diseases present at the "eat ripe" stage were the anthracnose complex and sooty mould. Fruits were marked on a present/absent basis for each factor. Results of disease incidence on the treatments of hand guns (1 x), "Eagle" (1 x) "Eagle" (2x) and unsprayed control trees, are shown in figures 1 & 2. Although overall disease incidence was low, it can be clearly seen that.

a). For all treatments inside fruit of the large trees had the highest disease incidence.

b). The bigger the tree the greater the disease incidence on inside fruit.

Disease incidence on the outermost fruit was low, even with the unsprayed control trees. While hand guns gave good results on the small trees, the "Eagles" gave a better result on the medium and large trees. With inside fruit, the hand guns gave a better result on small, medium and large sized trees. The "Eagles" were little or no better than the unsprayed controls, even at 2x concentration.

Unsprayed control trees had high levels of sooty mould with the incidence increasing the greater the size of the tree. All spraying treatments resulted in a marked reduction on the sooty mould incidence. On the outside fruit the "Eagle" gave a better result than the hand guns, and with the inside fruit on the large trees, the "Eagle" at 1 x concentration gave the worst result, but the "Eagle" performed similarly to or better than hand guns with medium and small trees.

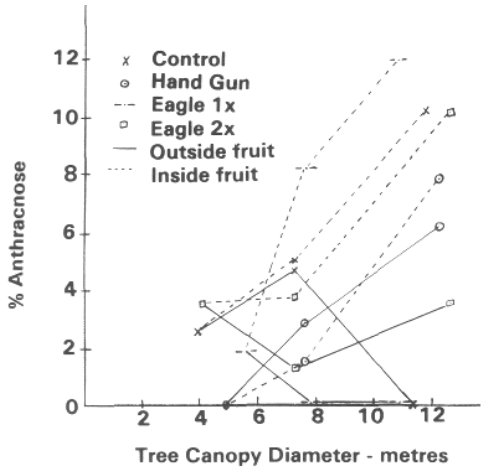

Fig. 1. Anthracnose incidence on inner and outer canopy fruit sampled from unsprayed trees sprayed by hand guns and Eagles.

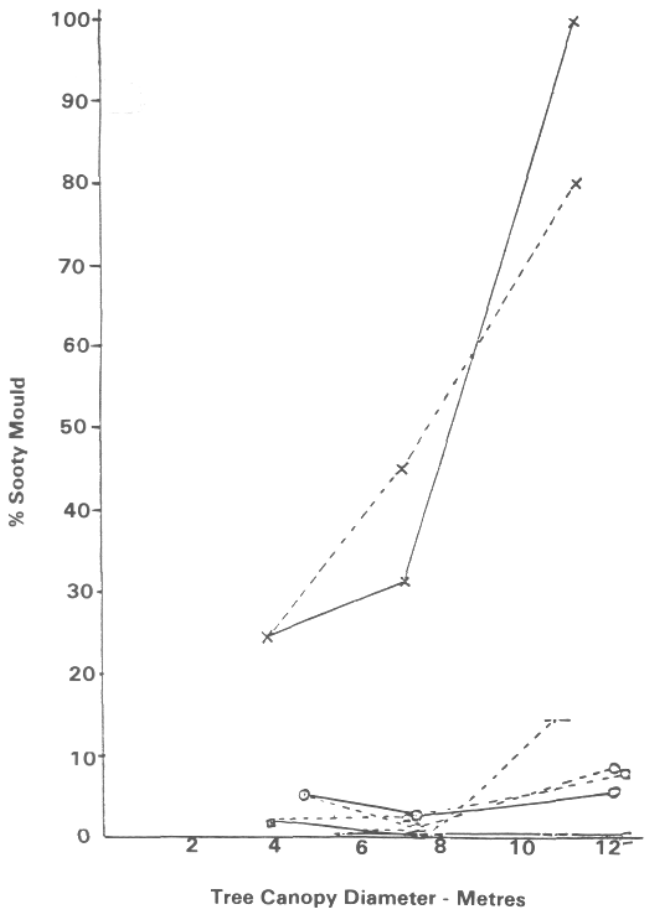

Fig. 2. Sooty mould incidence on inner and outer canopy fruit sampled from unsprayed trees and trees sprayed by hand guns and Eagles.

TABLE 1

Volume of air emitted from an "Eagle" spray machine with an air capacity of 736m³ minute when passing trees of various sizes and travelling at 2,25 km/hour.

Tree diameter m	Tree volume	Vol. air emitted by Eagle m³
5	32,8	196
6	56,5	235
7	90,0	274
8	134	314
9	191	353
10	282	392
11	349	431
12	453	470
13	575	510
14	719	549

DISCUSSION

The high disease incidence on the inside fruit of large trees emphasises the importance of good penetration of spray material to the inside of the tree. Hand guns gave better results than the "Eagles" in controlling diseases of the anthracnose complex on the inside fruit, which indicates that with the Eagles there was insufficient penetration of the spray material to the inside fruit. On the outside fruit, "Eagles" gave better control of this disease.

A look at the amount of air emitted by the "Eagle" spray machine when passing trees of different sizes (Table 1) shows that with trees up to 12 metres in diameter sufficient air was being emitted to displace the air volume within the tree. However, a closer look at the operations of the "Eagle" showed that with the oscillating boom, a good coverage was being obtained on the outside of the tree but the oscillation was hindering the movement of air to the interior of the tree. A better result could therefore be had by having a fixed boom.

In addition most of the inside fruit sampled was at the top of the tree. Better penetration could be achieved to this area by having bigger nozzles and hence greater output on the upper part of the boom. Further, the combination of 56 whirl plates to give good penetration and 23 whirl plates to create a good mist effect could also be considered.

The better results obtained for the control of sooty mould on inside fruit with "Eagles" could mean that sooty mould requires less material to control it.

In addition one could consider testing machines with a greater air output as well as machines which operate under a different principle, to get better penetration of spray material.

REFERENCES

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