

ATR NOTES

EFFECT OF ADHESIVES ON THE RETENTION OF BORDEAUX MIXTURE ON ARECANUT BUNCHES

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ABSTRACT

Bordeaux mixture is a copper compound which is extensively used to prevent fruit rot in arecanut (*Areca catechu* Linn.) caused by the fungus *Phytophthora arecae* (Coleman) Pethybridge. It is usually mixed with adhesives to improve its retention.

The quantity of copper retained on areca fruit surface sprayed with 1% Bordeaux mixture added with 0.1% of one of the three adhesives, viz., Triton AE, Navacol and Carboxymethyl cellulose was estimated colorimetrically. No significant difference in copper retention was observed regardless of whether adhesives were added or not.

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KEY WORDS: Betel nut (*Areca catechu*). Bordeaux mixture. Spray adhesives.

INTRODUCTION

Arecanut or betel nut (*Areca catechu* Linn.) is a perennial palm cultivated for its fruits. Its endosperm whether raw or in the processed form is used for mastication. In 1981, arecanut cultivation in India covered an area of 184,000 ha and produced 191,400 tons of nuts valued at Rs. 2,500 million (Rao Mohan, 1982).

Fruit rot in areca palm is a serious disease caused by the fungus

Phytophthora arecae (Coleman) Pethybridge which occurs in epidemic form during the southwest monsoon months from June to September. If no preventive measures are taken, losses may reach 90% (Kotireddy and Anandaraj, 1980). As a prophylactic measure, Venkatarayan (1943) recommended two rounds of spraying with 1% Bordeaux mixture: one at the onset of monsoon and the other 45-60 days later. Addition of casein (Narasimhan, 1923), resin paste or

potash soap (Venkatarayan, 1943) to Bordeaux mixture has been reported to improve its retention. However, Marudarajan and Subramanyan (1948) claimed that 1% Bordeaux mixture was as effective as 2% Bordeaux mixture with or without adhesives. Rao (1962) estimated the quantity of copper present in the pericarp of areca fruits sprayed with different copper compounds and reported that Blitox (1%) caused maximum copper injury and that the disease incidence was less in Bordeaux mixture-treated plots. Other than this, no further information on the retention of copper on the sprayed surface when mixed with adhesives is available. This study thus investigates the quantity of copper retained on the areca fruit surface after spraying with 1% Bordeaux mixture with and without adhesives, through colorimetric analysis and verifies whether addition of adhesives really improves the retention of Bordeaux mixture.

MATERIALS AND METHODS

Field Trial

The experiment was carried out at the Central Plantation Crops Research Institute (CPCRI) Regional Station Farm at Vittal during the 1982 monsoon period. The field experiment was laid out in completely randomized block design with the following treatments at planting:

1. 1% Bordeaux mixture

2. 1% Bordeaux mixture + 0.1% Triton AE
3. 1% Bordeaux mixture + 0.1% Navacol
4. 1% Bordeaux mixture + 0.1% Carboxymethyl cellulose.

Each treatment plot consisted of eight palms and the whole experiment was replicated six times. All border rows were sprayed with 1% Bordeaux mixture. The treatment was repeated after 60 days. The copper deposit was analyzed at 1 day and 60 days after the first spraying and also at the end of monsoon (60 days after the second spraying).

Preparation and Analysis of Materials

Five areca fruits were collected at random from among the eight palms in each replication and the Bordeaux mixture deposit on the fruit surface was washed in 90 ml of double distilled water with the help of a wet toothbrush. The washings were filtered through a coarse filter paper and made up to 100 ml in a volumetric flask. Determination of copper deposits was carried out following the Fiskell's carbon tetrachloride method (Fiskell, 1965). The surface area of the areca fruits was calculated using the prediction equation based on the weights of the fruits (Anandaraj and Bhagavan, 1983) and the quantity of copper retained was expressed as $\mu\text{g}/\text{cm}^2$ of the fruit surface.

RESULTS AND DISCUSSION

The quantities of copper present on the fruit surface at 1 day and 60 days after the first spraying and 60 days after the second spraying are given in Table 1. One day after the first spraying, the highest copper deposit ($2.39 \mu\text{g}/\text{cm}^2$) was found in the treatment with Triton AE followed by 1% plain Bordeaux mixture ($1.91 \mu\text{g}/\text{cm}^2$). The highest copper retention ($0.93 \mu\text{g}/\text{cm}^2$) was again obtained in the treatment with Triton AE at 60 days after the first spraying followed by Bordeaux mixture + Navacol treatment ($0.88 \mu\text{g}/\text{cm}^2$). At the end of the monsoon, i.e., 60 days after the second spraying, copper retention was highest in the treatment with Navacol ($1.20 \mu\text{g}/\text{cm}^2$) followed by 1% plain Bordeaux mixture ($1.05 \mu\text{g}/\text{cm}^2$). Although Bordeaux mixture + Triton AE treatment gave the highest initial copper deposit of

$2.39 \mu\text{g}/\text{cm}^2$, the final deposit after subsequent leaching by rain was almost equal in all treatments, thus the treatment differences were non-significant.

Several adhesives have been reported to improve the retention of Bordeaux mixture and to prevent the loss of sprayed fluid due to leaching by monsoon rain (Narasimhan, 1923; Marudarajan and Subramanyam, 1948). However, results of this study show no significant differences in copper retention and in leaching of the sprayed Bordeaux mixture among the treatments regardless of whether adhesives were added or not (Table 1). There was also no incidence of fruit rot in any of the treatments despite the prevalence of the disease during the experimental year (unpublished data). Since there were no significant differences in copper retention among the treatments and since all

Table 1. Amount of copper retained on arecanut fruit surface.

Treatment	$\mu\text{g Cu}/\text{cm}^2$ of Fruit Surface		
	1 day after first spray	60 days after first spray	60 days after second spray ¹
1% Bordeaux Mixture (B.M.)	1.91	0.87	1.05
1% B.M. + 0.1% Navacol	1.12	0.88	1.20
1% B.M. + 0.1% Triton AE	2.39	0.93	1.04
1% B.M. + 0.1% CMC	1.66	0.67	0.87

¹Values are means of 6 replications. Treatment differences are not significant.

the treatments were apparently effective in preventing the disease, the addition of adhesives to Bordeaux mixture could thus be said to have little effect on its retention on sprayed areca fruit surface and does not seem to be necessary in prophylactic spraying against fruit rot.

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