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CONTROL OF MANGO ANTHRACNOSE WITH FOLIAR SPRAYS

R. T. McMillan, Jr.
University of Florida, IFAS,
Tropical Research and Education Center,
18905 S.W. 280 St.,
Homestead, FL 33031

Abstract. **Benomyl and thiophanate methyl at 1.8 g/liter were significantly more effective than captafol, mancozeb, and vinclozolin at 1.8 g/liter and tribasic copper sulfate at 3.6 g/liter as foliar sprays for the control of anthracnose** (Colletotrichum gloeosporioides **Penz.) on mango** (Mangifera indica **L.). Captafol, mancozeb and vinclozolin were significantly better than tribasic copper sulfate and the control. Percentage of disease-free fruit for the benomyl and thiophanate methyl treatments was greater than 85. The % disease-free fruit for captafol, mancozeb, and vinclozolin treatments was greater than 70 with tribasic copper sulfate yielding only 18% disease-free fruit. No toxicity was noted on the leaves, flowers or fruit for any of the chemicals tested.**

The mango is a highly prized fruit in Florida and the tropical countries throughout the world. Dade county Florida is the major production area in the state with about 87% of the total mango acreage. The commercial mango acreage increased from 1,746 in 1980 to 2,228 in 1982 (4).

Mango anthracnose caused by *Colletotrichum gloeosporioides* Penz. is a very serious problem, more so than any other disease that affects tropical fruit crops in Florida. To produce commercial market quality fruit, chemicals such as benomyl, copper and mancozeb have been sprayed weekly on the flowers and at 2 to 3 week intervals on fruit until harvest (3, 7, 8, 12, 13, 14, 15).

The purpose of this research was to evaluate thiophanate methyl (Topsin), vinclozolin (Ronilan) and captafol (Difolatan 80 Sprills) for the control of mango anthracnose.

Materials and Methods

The spray test was carried out with 'Irwin' mango which is highly susceptible to anthracnose. Single tree plots were replicated 5 times.

The fungicides tested were benomyl (Benlate) at 1.8 g/liter, thiophanate methyl (Topsin) at 1.8 g/liter, Captafol (Difolatan 80 Sprills) at 1.8 g/liter, mancozeb (Dithane M45) at 1.8 g/liter, vinclozolin (Ronilan) at 1.8 g/liter, and tribasic copper sulfate at 3.6 g/liter. All fungicides were used in combination with the sticker-extender di-1-p-menthene (Nu-Film-17) at 0.3 ml/liter. The chemicals were applied as a dilute spray at 3800 liters/ha. The sprays were applied with a Meyer speed sprayer operated at 21.09 kg/cm^2. Applications were started in February when panicles were 25 mm long and applied weekly until fruit set after which benomyl and thiophanate methyl were applied to fruit every 14 days until 14 days prior to harvest. Mancozeb, captafol, vinclozolin, and tribasic copper sulfate were also applied weekly until 14 days before harvest. Fruits were harvested in June and rated as anthracnose free, with mild, or with severe infection. Commercial production practices were followed throughout the experiment.

Results

All fungicides on fruit reduced the incidence of anthracnose significantly compared with the control (Table 1). Benomyl and thiophanate methyl gave 89% disease-free fruit while captafol, mancozeb, vinclozolin, tribasic copper and the control gave 73, 76, 76, 18, and 0% disease free fruit, respectively (Table 1). Captafol, vinclozolin, and mancozeb-treated fruit had significantly less disease than tribasic copper and control for % disease-free fruit (Table 1). Benomyl, thiophanate methyl and the control had 6.8, 7.4 and 5.0% fruit with mild anthracnose, respectively, whereas all other treatments had significantly higher percentages of fruit with mild anthracnose. Tribasic copper and the control had a significantly higher percentage of fruit with severe anthracnose, 58 and 97% respectively, than any of the other fungicides. Benomyl and thiophanate methyl provided significantly less fruit with severe anthracnose than captafol, mancozeb or vinclozolin.

Table 1. Effect of fungicides on incidence of anthracnose on fruit of 'Irwin' mango.

Treatment	Rate (g/liter)	Fruit (%) Disease free	Mild anthracnose	Severe anthracnose
Benomyl	1.8	89.2 a[z]	6.8 a	4.0 a
Thiophanate methyl	1.8	88.9 a	7.4 a	3.6 a
Captafol	1.8	72.7 b	19.3 b	8.1 b
Mancozeb	1.8	75.8 b	18.0 b	7.2 b
Vinclozolin	1.8	75.9 b	17.7 b	7.4 b
Tribasic copper	3.6	18.0 c	23.8 c	58.3 c
Control	—	0.0 d	5.0 a	96.9 d

[z]Mean separation in columns by Duncan's multiple range test, 5% level.

Benomyl, thiophanate methyl, captafol, mancozeb and vinclozolin provided better than 90% marketable fruit while copper and the control only yielded 41.9 and 5.2%, respectively (Table 2).

Toxicity was not noted with any of the fungicides tested on the foliage, flowers, or fruit.

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Table 2. Effect of spray treatments on yield and % marketable 'Irwin' mango fruit.

Treatment	Rate (g/liter)	Fruit (avg. no./plot)	Marketable fruit (%)
Benomyl	1.8	378 a[z]	98.1 a
Thiophanate methyl	1.8	400 a	99.0 a
Captafol	1.8	450 a	97.2 a
Mancozeb	1.8	380 a	95.4 a
Vinc.ozolin	1.8	345 a	98.3 a
Tribasic copper	3.6	433 a	41.9 b
Control	—	391 a	5.2 c

[z]Mean separation in columns by Duncan's multiple range test, 5% level. Single tree plots replicated 5 times.

Discussion

Excellent anthracnose control is provided by benomyl, and there is no indication that there is resistance to the toxicity of benomyl in the anthracnose fungus population. Reports of benomyl control failures with other pathogens are increasingly prevalent in the literature (1, 5, 16, 17). The new compound thiophanate methyl was as effective as benomyl. Both thiophanate methyl and benomyl break down to methyl 2-benzimidazole-carbamate (MBC) the fungitoxic derivative of the 2 chemicals (2, 6, 9, 10) which because of their similarity could result in the loss of both chemicals. The new form of captafol (Difolatan 80 Sprills) and vinclozolin show promise for anthracnose control.

At present the only 2 fungicides available to Florida mango growers are benomyl and copper (11). If benomyl is lost because of resistance in the anthracnose fungus, growers will have to rely on copper compounds that are only 50% as effective as benomyl and the new fungicide thiophanate methyl. The development of new fungicides and approval by the Environmental Protection Agency (EPA) are very much needed.

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THE USE OF MUNICIPAL TREATED EFFLUENT FOR PEACH TREE IRRIGATION

FOUAD M. BASIOUNY[1]
Plant and Soil Sciences,
Tuskegee Institute,
Tuskegee, AL 36088

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Abstract. **An experiment was conducted in Central Alabama using municipal treated effluent for irrigation of peach trees** (Prunus persica **(L.) Batsch 'Harvester') on a sandy loam soil. After 3 yr of applications, treated trees developed no symptoms of mineral element deficiencies or toxicities. Leaves from treated trees were visually greener than leaves from non-treated ones. Application of the treated effluent advanced flowering, fruit set, fruit maturity and ripening. Fruits from treated trees were softer, contained higher soluble solids, lower acidity and produced more ethylene than non-treated fruits. N, P, K, Fe, Mn and B were substantially higher in leaves sampled from treated trees than from the control.**

In recent years, treated municipal wastewater has become an important potential source of irrigation, plant nutrients, and is being used successfully in the production of high yield of marketable quality crops (1, 7, 10, 13). Wastewater has been used to increase yield and improve quality of corn, rye (14, 20), sorghum (9), wheat grains (8), alfalfa and other crops (21, 26). The response of plants and soils to municipal treated effluent is dependent on the quality of the applied effluent and nature and efficiency of the wastewater treatment.

In spite of the successful use of treated municipal wastewater on many agronomic crops, little information is available on its use, or other wastewater, for irrigation of fruit crops (15, 19).

Most of Alabama fruit trees are grown on sandy soils which are low in natural fertility with low cation exchange capacity. Depending on their chemical contents, effluents from non-industrialized communities contain all the essential and functional elements required for normal growth

[1]Professor of Plant and Soil Sciences, Department of Agricultural Sciences. This investigation was supported in part by a grant from the USDA/CSRS.