EFFECTS OF FOUR FUNGICIDES ON THE GROWTH OF *PHYTOPHTHORA COLOCASIAE*

D. Clarkson* and D.J. Moles†

ABSTRACT

The efficiency of four fungicides in controlling Phytophthora colocasiae *Raciborski was investigated* in vitro *and* in vivo. *Du-ter and Ridomil were found to effect excellent control of fungal development but the phytotoxicity of Du-ter rendered it unsuitable for use on taro. Cuprox and Aliette were found to be less effective.*

INTRODUCTION

Phytophthora colocasiae Raciborski, the causal organism of Taro Blight affecting *Colocasia esculenta* (L.) Schott, is a common and frequently serious pathogen of this food crop plant throughout Southeast Asia. The spread of the disease from its probable centre of origin in Java (Raciborski 1900) is described in detail by Trujillo (1967).

Infection by *P. colocasiae* results in the formation of small water-soaked lesions which subsequently enlarge and coalesce to cover much of the surface of the leaf. Severely infected plants suffer premature defoliation. Full accounts of the life cycle of the fungus are provided by Trujillo (1967), Sickey (1973) and Jackson (1977).

Control of Taro Blight is attempted traditionally by the use of cultural methods. These may include the removal and destruction of infected leaves and stems and the use of disease free planting material. The use of resistant taro varieties has been suggested as a possible means of disease control (Parris 1941; Deshmukh and Chhibber 1960; Hicks 1967; Plucknett *et al.* 1970), but so far success has been limited. Hicks (1967) concluded that only one of the clones he tested should be considered as moderately resistant. All other clones used in the trial were classed as weakly resistant. *P. colocasiae* can be controlled by the use of chemicals. In Hawaii yield increases of up to 50 per cent were recorded when young plants were treated with copper based fungicides (Trujillo and Aragaki 1964). Jackson (1977) also reported good control of the disease in the Solomon islands using copper oxychloride.

This paper describes a laboratory investigation in which the effectiveness of copper oxychloride in inhibiting *P. colocasiae* development was compared with that of three more recently developed fungicides.

METHODS

Fungicides used in the investigation were Aliette 80 WP (aluminium tris [ethylphosphonate]), Cuprox 50 WP (copper oxychloride), Du-ter Extra 47.5 WP (tripheny!-tin-hydroxide) and Ridomil 25 WP (metalaxyl).

Two experimental methods were employed during the course of the investigation:

1) Each fungicide was suspended in distilled water and incorporated into potato dextrose agar (P.D.A.), after sterilising, to provide concentrations of 100, 200, 500 and 1000 p. p. m. a.i.

* Formerly Plant Pathologist, Department of Primary Industry, Konedobu. Present address: 67 Turnpike Road, Aughton, Lancs. England.
† Biometrician, Department of Primary Industry, P.O. Box 417, Konedobu, Papua New Guinea.

For each treatment 6 replicate plates were prepared and inoculated with a 5 mm plug of *P. colocasiae* mycelium taken from the margin of a colony growing on P.D.A. Control plates contained no fungicide. Inoculated plates were incubated at 23°C and colony radii measured after 3 and 7 days.

2) Leaf segments of taro (local variety) replicated five times, were sprayed to run-off with each of the fungicides suspended in distilled water to give concentrations of 100, 200, 500 and 1000 p. p. m. a.i. . Leaf segments to be used as controls were sprayed with distilled water. After spraying they were allowed to air-dry for 1 minute and then placed on moist filter paper in individual incubation chambers maintained at 23°C.

   Four drops of freshly prepared *P. colocasiae* zoospore suspension (1000 spores per ml) in distilled water were applied to each of the leaf segments. Lesion size was measured 7 days after incubation.

RESULTS AND DISCUSSION

The fungicidal effects on growth of *P. colocasiae* in both experiments are displayed in *Table 1*.

From these results it is apparent that the fungicides Du-ter and Ridomil gave excellent control of *P. colocasiae* on both agar and leaf. Mycelial growth was exhibited at only the lowest rate of application after 7 days on agar and the area of the colony was negligible in comparison with the control and less effective fungicides. However, Du-ter did exhibit extreme phytotoxicity. This was confirmed subsequently by spraying glasshouse grown taro plants, at the lowest rate of application (100 p. p. m. a.i.), . Over a period of seven days all treated plants developed symptoms of severe leaf necrosis and premature defoliation occurred.

Cuprox provided good control at rates of application in excess of 500 p. p. m. a.i. on both leaf and agar, whilst Aliette effected very poor control of *P. colocasiae* on agar and only partial control on

Table 1. — **Fungicidal effect of *Phytophthora colocasiae* Mean mycelial and lesion areas, cm²**

Treatment	(p. p. m. a.i.)	Agar Mycelial area Day 3	Agar Mycelial area Day 7	Leaf Lesion area
Du-ter	100	0	0.08	0
	200	0	0	0
	500	0	0	0
	1000	0	0	0
Ridomil	100	0	0.58	0
	200	0	0	0
	500	0	0	0
	1000	0	0	0
Cuprox	100	1.10	9.91	6.61
	200	1.20	7.39	5.94
	500	0	0.49	0
	1000	0	0	0
Aliette	100	4.24	13.43	8.64
	200	5.05	14.96	6.91
	500	4.23	15.25	5.31
	1000	2.33	12.34	0
Control		5.0	33.34	42.67

the leaves relative to the other fungicides.

It is suggested, in view of the above results and the possible development of resistance by *P. colocasiae* to Ridomil, that where chemical control is necessary, Ridomil and Cuprox be used alternately throughout the period of susceptibility. In an attempt to overcome this problem of resistance recent formulations of Ridomil have been modified by the inclusion of a copper component although these are not available locally.

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