EFFECT OF TWO SYSTEMIC FUNGICIDES, ALIETTE AND RIDOMIL ON *PHYTOPHTHORA PALMIVORA* ISOLATE OF *PIPER NIGRUM*

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ABSTRACT

The sensitivity of two systemic fungicides, Ridomil and Aliette to *Phytophthora palmivora* was tested by poison bait technique. Ridomil at 100 and 200 ppm showed 80% and 86% inhibition respectively, in the radial growth of the fungus and complete inhibition at 300 ppm. Aliette showed 22% and 50 % inhibition of the fungus at 500 and 1000 ppm respectively and growth was absent at 1500 ppm. The systemic acivity of the fungicides was evaluated by measuring the lesion diameter on the inoculated leaves of black pepper pretreated with fungicides. Ridomil-treated leaves showed no lesion at 500 and 1000 ppm whereas Aliette-treated leaves showed inhibition of the lesion development to the extent of 57% and 71% at 500 and 1000 ppm respectively.

INTRODUCTION

Systemic fungicides are becoming increasingly prominent in the field of plant disease control. Though a large number of chemicals were reported to have shown systemic activity against many fungi, chemicals with systemic activity against pythiaceous fungi have been identified only in recent times. (Schwinn *et al.*, 1977; Frossard, 1978; Gullino *et al.*, 1979; Papavizas *et al*; 1979, Benson, 1980).

Systemic activity of DL methyl N (2, 6 dimethyl phenyl) N (2-methoxy acetyl alaninate (Ridomil) and Aluminium tris (3-ethyl phosphonate) (Aliette) against *Phytophthora* diseases has been reported recently (Frossard, 1978; Benson, 1980). The primary object of the present study is to study the efficiancy of these compounds in controlling foot rot and leaf rot of black pepper caused by *P. palmivora*. Detached leaf technique has been employed for studying systemic activity of these chemicals.

MATERIALS AND METHODS

For the poison bait technique, required amounts of fungicides were dissolved/suspended in 2 ml of sterile water and this was later added to 98 ml molten carrot agar. The medium was poured @ 20 ml per plate. The poured plates were seeded with 4 mm discs of 72-hour-old culture of *Papalmivora* and incubated at laboratory temperature (23-25°C). Five replicates were maintained for each treatment. Colony diameters were recorded after 72 hours of incubation. Ridomil was used at 100-300 ppm concentrations (weight/

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volume) at 100 ppm intervals and Aliette at 500-1500 ppm (weight/volume) with an interval of 500 ppm. Inhibition percentage was calculated over the control.

In another experiment, mature leaves of Panniyur-I black pepper were detached, and the petioles were dipped in water and fungicidal solution taken in 250 ml beakers for the control and treatments respectively. After keeping the leaves for 24 hours, they were washed, blotted and transferred to humid petri plates. These leaves were inoculated by placing a 4 mm culture disc in the centre of the lower surface after making a gentle pin-prick injury. After 48 hours of incubation at 25°C, the lesion diameters were measured and inhibtion percentage calculated in comparison with control.

The fungicide-treated and control leaves were extracted separately with 80% ethyl alcohol and the extracts evaporated to dryness. The respective residues were extracted with fresh 80% ethyl alcohol. One ml of the extract (equivalent to 5 g fresh leaf material) was added to 99 ml of carrot agar. Alcohol alone added to carrot agar similarly served as absolute control. The radial growth of the fungus was recorded as mentioned earlier.

The effect of the fungicides on sporulation was tested by placing 72-hour-old culture discs in the respective fungicide solutions for 5 days.

Results and Discussiog

The results given in Table 5.8 indicate that both Ridomil and Aliette are capable of inhibiting the growth of *P. palmivora in vitro*. Ridomil showed 80% and 86% inhibition at 100 and 200 ppm respectively. Aliette showed 22 and 50% inhibition at 500 and 1000 ppm respectively. Thus, Ridomil was more efficient in inhibiting the growth of the fungus than Aliette. Sporulation of the fungus was also inhibited at the above concentrations tested. Lack of *in vitro* inhibitory effect of Ridomil on *P. infestans* was reported although it reduced lesion development and sporulation in treated leaves (Bruck *et al.*, 1980). Ridomil was reported to inhibit the growth and sporulation of *P. cinnamomi* (Benson, 1979) and *P. parasitica* (Staub and Young, 1980).

Table 5.8. Effect of Ridomil and Aliette on growth of *P. palmivora in vitro* and lesion development in inoculated leaves

	Concentration in ppm. (wt./vol.)	Colony diameter mm	Growth inhibiton %	Sporulation	Effect on lesion Lesion diameter mm	development Inhibiton %
Ridomil	100	10	80	0	0	100
	200	7	86	0	0	100
	300	0	100	0	—	—
Aliette	500	39	22	0	13.6	57.5
	1000	25	50	0	9.3	71.5
	1500	0	100	0	—	—
Control		50		+	32.0	

0 = Absent + = Present.

There was a complete inhibition of lesion development in the leaves treated with Ridomil at 100 and 200 ppm. In Aliette-treated leaves, the lesion development was inhibited by 57% and 71% at 500 and 1000 ppm respectively. Die back of Rhododendron caused by *P. heveae* was effectively controlled when Ridomil and Aliette of 0.96 g/l(a.i.) were used as soil drenches prior to inoculation (Benson, 1980). However Aliette was ineffective in controlling soybean infection caused by *P. megasperma* var. *sojae* race 6. (Lazarovits *et al.*, 1980). In the present study although there was a lesion development in the Aliette treated leaves, further development was arrested after 72 hours indicating the slow action of the fungicide. Lack of growth inhibition of the fungus on the medium incorporated with alcoholic extracts of Aliette-treated leaves in contrast to the total growth inhibition with extracts of Ridomil-treated leaves indicates the efficacy of the latter (Table 5.9). However the time lag in the case of Aliette before it becomes effective in plant

Table 5.9. Effect of fungicide treated and untreated leaf extracts of black pepper on growth of *P. palmivora*.

Medium		Colony diameter (mm)
1. Carrot Agar		49
2. Carrot Agar + Alcohol		46
3. Carrot Agar + alcoholic extracts of untreated leaves		24
4. Carrot Agar + alcoholic extracts of leaves treated with	Ridomil at 500 ppm	0
	1000 ppm	0
	Aliette at 500 ppm	24
	1000 ppm	23

systems is yet to be studied in detail. Further studies both in pot culture and field control trials are in progress to test the efficacy of these compounds in controlling foot and root rot of black pepper.

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DISCUSSIONS

F. J. Newhook : Screening of the fungicides under laboratory condition by using detached leaf could be good if the fungicides are translocated upwards. Seedlings should have been used for this study.

Answer : Our idea was to test the systemic effect of the fungicide. The studies with rooted cuttings in pot culture are in progress.

S. K. Bhattacharyya : In the poison bait techniques it has been reported that Ridomil 300 ppm and Aliette 1500 ppm inhibited the growth; but in the detached leaf technique why Aliette was not tested at 1500 ppm?

Answer : We tested only arbitray levels to start with. Different doses even below 300 ppm in the case of Ridomil and above 1500 ppm in the case of Aliette are being tried and studies are in progress in pot-culture experiments.