BIOTROPIA NO. 15, 2000 : 1 – 7

CONTROL OF BAGRAS *(Eucalyptus deglupta)* DAMPING-OFF BY FUNGICIDES

EMILIO O. ANINO

Northern Mindanao State Institute of Science and Technology

8600 Ampayon, Butuan City, Philippines

ABSTRACT

Selected fungicides were tested to control damping-off affecting bagras seedlings in the Central Nursery of the Paper Industries Corporation of the Philippines (PICOP), Surigao del Sur, Philippines. The fungicides, at three concentrations each, were applied once before seed sowing to control pre-emergence damping-off and applied again after germination to control post-emergence damping-off. Ajax detergent (2g/l H_2O), Benlate (0.5 g/1 H_2O), Brassicol (1.5 gv'l H_2O), and Fungitox (1.0 g/1 H_2O) provided the best level of control against the disease. Ajax detergent is the most practical among the best chemicals because it is cheap, locally available, not a health hazard, and less polluting.

Key Words : *Eucalyptus deglupta/* Seeds/Nursery/flWzoctoma so/am'/Fungicides/Application

INTRODUCTION

Anino (1983) reported that the fungus causing damping-off in bagras seedlings in the Central Nursery of the Paper Industries Corporation of the Philippines (PICOP), Surigao del Sur, Philippines is *Rhizoctonia solani. R. Solani* is a soil-inhabiting fungus belonging to Class *Deuteromycetes* (fungi imperfecti) under Order *Mycelia sterilia* and genus *Rhizoctonia* (Bernett and Hunter 1972). The pathogen also caused web blight in falcata *(Paraserianthes falcataria),* mangium *(Acacia mangium)* and bagras *(Eucalyptus deglupta).*

The fungus started inciting post-emergence damping-off when bagras germinants were about 3 days old. For about 20 days, thereafter, the pathogen fatally infected 60% of all seedlings in a lightly irrigated sowing bed (Anino 1983).

The objective of this study is to screen for chemicals that can control the damping-off disease.

MATERIALS AND METHODS

Treatments

The chemicals and concentrations tested were as follows :

Chemicals	Treatment Levels (per liter H_2O)
1. Ajax detergent	2 g (A)
	3 g (B)
	4 g (C)
2. Benlate	0.5 g (D)
	1.0 g (E)
	1.5 g (F)
3. Dithane M-45	1.5 g (G)
	2.5 g (H)
	3.0 g (I)
4. Captan	1.5 g (J)
	2.5 g (K)
	3.5 g (L)
5. Plantineb	1.0 g (M)
	2.0 g (N)
	3.0 g (O)
6. Daconil	0.5 g (P)
	1.0 g (Q)
	1.5 g (R)
7. Brassicol	0.5 g (S)
	1.0 g (T)
	1.5 g (U)
8. Fungitox	0.5 g (V)
	1.0 g (W)
	1.5 g (X)
	0 – control (Y) "No soil sterilization and no chemical treatment"
	0 – control (Z) "Soil sterilized but no chemical treatment"

The soil was sterilized by fire-heating for 24 hours.

Experimental Design

The treatments, in three replicates, were arranged in CRD at the shedhouse in the PICOP Experimental Nursery. Evaluation parameters were as follows:

a. Number of emerging seedlings - for determining the effects of the treatments on pre-emergence damping-off.
b. Total number of healthy seedlings - for determining the effects of the treatments on pre-post and post-emergence damping-off. Data in percent were transformed first into arc-sine values before analysis in CRD. All treatment means were compared using Duncan's Multiple Range test.

Seed box preparation

Seventy-eight seed boxes for 26 treatments in 3 replicates were prepared. Seventy-five boxes were filled with unsterilized soil, while three boxes for control B were filled with fire-sterilized soil. The boxes were arranged in CRD, 30 cm apart atop the sowing table in the shedhouse. The table was rid of ants.

The soils in all boxes (except control B) were sprayed with mycelial suspension of *R. solani* and watered daily for 15 days to successfully contaminate the soil with live pathogen.

Chemical application

Fifteen days after inoculation, the soils in test boxes (except controls) were drenched with one liter of their prescribed treatments. The treated boxes were not watered for 5 days. Thereafter, about 1100 bagras seeds taken from seedlots stored at 0°C with germination capacity of 90% were sown into each box. The approximate viable number of seeds was 1056. The boxes were then watered once daily. The amount of water was just enough to wet the seeds and the soil medium at about 2-cm deep to avoid leaching of the chemicals.

Determining treatment effects on pre-emergence damping-off

Five days after sowing, the number of emerging seedlings on each box was determined by:

a) establishing three 5-cm wide sampling strips;
b) making 100% tally of seedlings in each strip;
c) taking the area (cm^2) of the strip and converting the average number of seedlings to per cm^2, and
d) taking the inner area of the box and multiplying it with seedlings/cm^2 to get the total number of seedlings on the box.

The percentage of healthy seedlings on each box was used as indicator of the effects of the chemicals on the pathogen and was based on the 1056 viable seeds, which were equivalent to 90% germination capacity.

Determining treatment effects on post-emergence damping-off

The same seedlings on the boxes were used as samples for testing the effects of the treatments on post-emergence damping-off.

When most of the treated boxes showed one or more infected seedlings, the boxes were rid of the diseased seedlings and re-sprayed with 130 ml of their assigned chemicals. Re-spraying was conducted 13 days after the first spraying.

For 20 days, the infected seedlings per box per treatment were counted and subtracted from the number of emerging seedlings to get the total number of plants protected by the treatments after two spraying schedules.

RESULT AND DISCUSSION

Protection on pre-emerging seedlings

Table 1 shows the treatments and their effects on damping-off

Table 1. Effects of test chemicals on damping-off

CHEMICAL	AMOUNT (g/l)	PRE-EMERGENCE DAMPING-OFF (%)		POST-EMERGENCE DAMPING-OFF (%)
		1st Spraying	2nd Spraying	
AJAX DETERGENT	2.0	87.52 a	85.52 a	2.00
	3.0	64.85 abcd	64.83 abcd	0.02
	4.0	70.64 abc	70.61 abcd	0.03
BENLATE	0.5	88.97 a	88.51 a	0.46
	1.0	85.94 a	84.03 ab	1.91
	1.5	74.80 ab	74.16 abc	0.64
DITHANE M-45	1.5	31.87 def	31.75 ef	0.12
	2.5	8.53 f	8.53 f	0
	3.0	10.11 ef	9.73 f	0.38
CAPTAN	1.5	55.86 abcd	55.56 abcde	0.30
	2.5	42.17 bcde	42.01 cdef	0.16
	3.5	56.01 abcd	56.01 abcde	0
PLANTINEB	1.0	62.26 abcd	62.26 abcde	0
	2.0	56.19 abcd	55.19 abcde	0
	3.0	71.98 ab	70.62 abcd	1.36
DACONIL	0.5	35.21 cdef	35.06 def	0.15
	1.0	57.71 abcd	57.62 abcde	0.09
	1.5	35.52 cdef	35.52 def	0
BRASSICOL	0.5	61.20 abcd	60.56 abcde	0.64
	1.0	56.19 abcd	52.03 abcde	4.16
	1.5	83.91 a	83.76 ab	0.15
FUNGITOX	0.5	70.34 abc	67.82 abcde	2.52
	1.0	83.88 a	79.49 abc	4.39
	1.5	77.17 ab	68.97 abcde	8.20
CONTROL A	0	57.14 abcd	47.90 bcde	9.24
CONTROL B	0	74.71 ab	74.16 abc	0.56
		CV = 30%	CV = 32 %	

NOTE : 1. Control A-soil not sterilized and not chemically treated but inoculated with *R. solani.*
2. Control B-soil was sterilized but not chemically treated and inoculated with *R. solani.*
3. Means followed had by the same latter(s) are not significantly different at the 5 % confidence level.

The seedlings, which had successfully amerged from below or had grown at the soil surface, were considered to have been protected from the pre-emergence damping-off pathogen (*R. solani*) by the test chemicals. The numbr of healthy

seedlings per box per treatment concentration was, therefore, indicative of the fungicidal effectiveness of the test chemicals. Table 1 shows that among 8 chemicals, 4 were effective as shown below:

Chemicals	% Healthy Seedlings
Ajax detergent (2 g/l H_2O)	87.52 a
Benlate (1.5 g/l H_2O)	88.97 a
Fungitox (1.0 g/l H_2O)	83.88 a
Brassicol (1.5 g/l H_2O)	83.91 a

The number of seedlings protected by the above treatments was about equal because they were not significantly different at 5% confidence level. The above results suggest that the four chemical treatments were highly effective in sterilizing the *R. solani* infested soils, thus allowing a high percentage of seeds to germinate without infection.

Protection on 5-to 20-day-old seedlings

Table 1 also shows the effects of the chemicals on post-emergence damping-off after re-spraying 130 ml of each of the said chemicals onto the 5-day-old seedlings. As expected, the treatments effective in controlling pre-emergence damping-off had consistently protected significant number of growing seedlings. For 20 days, the infection incidence in treated seedlings ranged from 0 to 8.20%, while the incidence in the untreated ones (Control-A) reached as high as 9.24%.

Based on the number of seedlings protected after two spraying schedules, the best fungicides were as follows:

Chemicals	% Healthy Seedlings
Benlate (1.5 g/l H_2O)	88.51 a
Ajax detergent (2 g/l H_2O)	85.52 a
Brassicol (1.5 g/l H_2O)	83.76 a
Fungitox (1.0 g/l H_2O)	79.49 a

Note : Values followed by the same letters are not significantly different at 5% confidence level.

In the fire-sterilized but not chemically-treated soil (Control B), the number of emerging and healthy seedlings was 74.16% only or 11.36% lower than the 85.52% in the non-sterilized but pathogen-inoculated soil and subsequently treated with 2 g/l/H_2O of Ajax detergent. The sterilized soil was apparently contaminated later with *R. solani* because of the relatively lower number of emerging seedlings and subsequent infection of 0.56% of the plants (Table 1). Moreover, the current practice of sterilizing soil with fire will not always protect the seedlings from severe infection if greater amount of pathogen propagules were inadvertently introduced into the soil during routine watering. In fact, the incidence of damping-off, which occurred at a seed box in the Greenhouse, reached as high as 95%.

CONCLUSION

Beniate (0.5 g/I H_2O), Ajax detergent (2 g/1 H_2O),'Brassicol (1.5 g/1 H_2O), and Fungitox (1.0 g/1 H_2O), in that order, are effective fungicides against damping-off pathogen *(R. solani)* infecting bagras seedlings. Spraying 130 ml of Ajax detergent and Beniate solutions onto a sowing box with slight infection incidence can protect 85.52% and 88.51% of the seedlings, respectively, for 20 or more days. Being very cheap, less polluting, and locally available, Ajax detergent is the practical fungicide for nursery use. It is recommended that Ajax detergent (2 g/1 H_2O) can be used for sterilizing soil medium for seed sowing. Methods of application are as follows: Spray evenly 1 liter of water mixed with completely melted 2 g Ajax detergent onto the soil inside a sowing box up to dripping point. Let the treated soil stand for 3 days before seed sowing. After sowing, water the seed boxes once a day and just enough to wet about 2 cm deep of the soil. Irrigate only when absolutely necessary and allow soils to partially dry before re-irrigating. Inspect daily all sowing boxes for any symptom of damping-off. If 1 or 2 seedlings were infected, spray 130 ml of Ajax solution (about 4 passes of a plastic mist sprayer) onto all seedlings in the box. Do not wait for the disease to spread because the seedlings could not be saved any more once infected. Seedlings affected by damping-off fall into the soil. Their stems and leaves are rotten, watery and "melting". Do not water the seedlings on the day treatment is applied. Water on the next day when absolutely necessary. If infection recurred, spray again the detergent solution.

The same techniques, as enumerated, shall be followed if Beniate, Bassicol, and Fungitox at their prescribed concentrations were applied instead of Ajax detergent.

ACKNOWLEDGEMENTS

The author is grateful to the Paper Industries Corporation of the Philippines for giving him the chance to conduct this experiment.

REFERENCES

Anino, E. O. 1983. Control of Bagras Damping-off by Fungicides. Progress report of FRD-PICOP Study Number 303-04-04 (unpublished).

Bernett, H. L. and B. B. Hunter, 1972. Illustrated Genera of Imperfect Fungi. 3rd ed.Burgess Publishing Company, Minneapolis, Minnesota. 241 p.