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EFFECTS OF SOME SELECTED FUNGICIDES IN THE CONTROL OF FUNGAL PATHOGENS ASSOCIATED WITH COWPEA SEEDS PRODUCED IN THE EASTERN REGION OF SRI LANKA

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ABSTRACT

Seed borne pathogens may give rise to progressive disease development in the field and reduce the commercial value of the crop. Seeds of common local variety of cowpea from the eastern region of Sri Lanka were tested for the seed borne fungal pathogens and for the control of these pathogens with some selected fungicides as seed treatments.

Cowpea seeds were surface sterilized with 3% sodium hypochlorite and inoculated into PDA (Potato Dextrose Agar) plates. All plates were incubated at room temperature (30°C) and observations were made daily for the growth of the fungal pathogens. Each fungal species was identified under the light microscope (mag X 40). Three fungicides Captaf 50 W [Captan 50%WP], Benlate [Benomyl] and Pomasolporte WP.80% [Thiram 80% WP] were tested at four different concentrations as seed treatment (Recommended, half the recommended, 1½ the recommended and the double the recommended concentration) in PDA plates against the fungal pathogens associated with cowpea seeds. Each treatment was replicated three times in a Completely Randomized Design (CRD). A control was maintained with surface sterilized seeds without adding any fungicides.

Aspergillus flavus, Aspergillus niger, and *Rhizophus* sp. were observed from all the PDA plates on the fourth day of incubation

at room temperature. The growth of *Alternaria* sp. was initiated only after the fourth day of incubation. Among the fungicides tested, none of them suppressed the fungal growth at the recommended concentration. However, Benomyl and Captan apparently suppressed the fungal growth at the concentration of 1½ times the recommended level and above. Thiram did not suppress any of the above fungal pathogens at any concentration tested in this study.

It appears that the fungicides Benlate and Captan at higher concentrations (more than the recommended level) have an effect on fungal pathogens associated with seeds of cowpea. However, further investigation in the laboratory and in the field is required before any recommendation is made, since this is a preliminary experiment in the management of fungal pathogens associated with seeds in cowpea.

INTRODUCTION

Cowpea (*Vigna Unguiculata*) is a grain legume grown in savanna region of the tropic and subtropics. It is a nutritionally important crop and the use of cowpea seeds as a seeds vegetable provides an inexpensive source of protein in the diet. The dry seed of cowpea contains 9.6% moisture, 23.9% crude protein, 1.6% crude fat, 4.1% crude fibre, 3.3% ash and 57.7% of non-fibre carbohydrates (Ackpanum and Marlcakis,1979). In Eastern region of Sri Lanka, cowpea is grown in large extent of cultivating area. These cowpea varieties are susceptible to wide range of pest and pathogens that attack the growth of plant. In cowpea, for instance the vast majority of losses from disease are due to seed-borne pathogens. These seed borne pathogens may give rise progressive disease development in the field and reduce the commercial value of the crop. Therefore, control of these pathogens before planting is an important agronomic practice. Therefore an attempt was made to examine the seed borne fungal pathogens associated with cowpea seeds and to assess the efficacy of some selected fungicides as seed treatment to control these pathogens.

MATERIALS AND METHODS

This experiment was conducted in Microbiology Laboratory, Faculty of Agriculture Eastern University, Sri Lanka during the period of May to July 2002.

Seed and treatments

Cowpea *cv.* Dawala, produced in agronomy farm of Eastern University was selected for the examination of seed borne pathogens and for the seed treatment. The selected cowpea seeds were subjected to three fungicides treatment such as Captan, Benomyl and Thiram. These fungicides were tested at four different concentrations as seed treatment (Recommended, half the recommended, one and a half the recommended, and double the recommended concentration) in PDA (Potato Dextrose Agar) plates against the fungal pathogens associated with cowpea seeds. A control was maintained with surface sterilized seeds with 3% sodium hypochloride without adding any fungicides. Each treatment was replicated three times in completely randomized design.

Preparation of PDA (Potato Dextrose Agar) plate

500 mg of streptomycin antibiotic was added into the sterilized PDA media at nail heat and stirred well. Then 30 ml of PDA media was poured in each sterilized petri dishes under the lamia flow and allowed to cool.

Preparation of fungicides for seed treatment

Table 1: Four different concentrations of fungicides

Concentrations	Fungicides (g)		
	Captan	Benomyl	Thiram
½	0.01	0.0015	0.025
1	0.02	0.003	0.05
1½	0.03	0.0045	0.075
2	0.04	0.006	0.10

(1- Recommended concentration, ½-half the recommended concentration, 1½-one and a half the recommended concentration, and 2-double the recommended concentration)

To prepare the four levels of concentration of each fungicide, above mentioned amount of fungicide powder were taken in beakers and dissolved in 10 ml of distilled water.

Fungicide treatment and incubation of seed

In each prepared solution 5g of cowpea seeds were soaked for a half an hour then four seed from each concentration of fungicides were taken embedded in plates. These PDA plates were incubated in room temperature (30°c) for a week. Daily observation was made for growth of fungal pathogens and these pathogens were identified using light microscopes.

RESULTS AND DISCUSSION

During the experimental period 4 fungus species *viz Aspergillus niger, Aspergillus flavus, Rizophus sp, and Alternaria sp* were identified as seed borne pathogens of cowpea seeds. Control plates showed the growth of all these fungal species. In which *Aspergillus niger, Aspergillus flavus, Rizophus sp* were observed from 4th day of inoculation. whereas *Alternaria sp* from 5th day of inoculation.

Effect of Captan treatment on seed borne fungal species

In half the recommended concentration of Captan treatment *Aspergillus niger, Aspergillus flavus, Rizophus sp* were observed. The recommended concentration of captan suppressed the growth of observed fungal species except *Aspergillus flavus.* But all the concentrations Captan tested in this study effectively controlled the growth of *Alternaria sp.* From the different concentration of Captan, one and a half time recommended, and double the recommended concentration of Captan effectively controlled the seed borne fungal species (See Table 2).

Effect of Benomyl treatment on seed borne fungal species

In half the recommended concentration of Benomyl, *Aspergillus flavus, Aspergillus niger and Rhizopus sp* were observed. Recommended concentration of Benomyl treatment showed growth of *Aspergillus flavus, Aspergillus niger* and *Alternaria sp* whereas growth of *Rizophus sp* was effectively controlled by the recommended concentration of Benomyl. All the fungal species identified as seed born pathogen of tested cowpea seed were also controlled by one and a half and double the concentration of Benomyl (See Table 3).

Effect of Thiram treatment on seed borne fungal species

Any concentration of Thiram used as seed treatment did not suppress the growth of all the fungus. Therefore it shows that any level of concentration of Thiram used is not enough to suppress the growth of identified seed born pathogens at all (See Table 4).

CONCLUSIONS

Among the fungicides tested, none of them suppressed the fungal growth at the recommended concentration. Thiram did not suppress any of the above fungal pathogens at any concentration tested in this study. Benomyl and Captan at higher concentrations (more than recommended level) have an effect on fungal pathogens associated with seeds of cowpea. However, further investigation in the laboratory and in the field is required before any recommendation is made, since this is a preliminary experiment in the management of fungal pathogens associated with seeds in cowpea.

REFERENCES

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Table 2: Growth of fungal species at different concentration of Captan treatment

Concentration	4th day			5th Day		
	R_1	R_2	R_3	R_1	R_2	R_3
$C_{½}$	*Af,An &R*	*An&R*	*An*	*Af,An&R*	*An&R*	*An*
C_1	*Af*	*Af*	*Af*	*Af*	*Af*	*Af*
$C_{1½}$	-	-	-	-	-	-
C_2	-	-	-	-	-	-

($C_{½}$- half the recommended concentration, C_1 recommended concentration $C1_{½}$- one and a half the recommended concentration, and C_2-double the recommended concentration, R-Replicate, *Af- Aspergillus flavus, An-Aspergillus niger R-Rhizopus sp and* - Absent of fungal *sp*)

Table 3: Growth of fungal species at different concentration of Benomyl treatment

Concentration	4th day			5th Day		
	R_1	R_2	R_3	R_1	R_2	R_3
$B_{½}$	*Af&An*	*Af&R*	*Af&An*	*Af &An*	*Af &R*	*Af &An*
B_1	*Af*	*An*	*Af*	*Af*	*An&Al*	*Af*
$B1_{½}$	-	-	-	-	-	-
B_2	-	-	-	-	-	-

($B_{½}$- half the recommended concentration, B_1 recommended concentration $B1_{½}$- one and a half the recommended concentration, and B_2-double the recommended concentration, R-Replicate, *Af-Aspergillus flavus, An-Aspergillus niger R-Rhizopus sp Al-Altenria sp* and - Absent of fungal sp)

Table 4: Growth of fungal species at different concentration of Thiram treatment

Concentration	4th day			5th Day		
	R_1	R_2	R_3	R_1	R_2	R_3
$T_{½}$	*Af&R*	*Af&An*	*Af&An*	*Af&R*	*Af,An&Al*	*Af&An*
T_1	*Af&An*	Af&R	*Af&An*	*Af&An*	*Af&R*	*Af&An*
$T1_{½}$	*Af&An*	*Af&An*	*Af&An*	*Af&An*	*Af&An*	*Af,An&R*
T_2	*Af&An*	*Af&An*	*Af,An&R*	*Af&An*	*Af,An&Al*	*Af,An&R*

($T_{½}$- half the recommended concentration, T_1- recommended concentration $T1_{½}$- one and a half the recommended concentration, and T_2-double the recommended concentration, R-Replicate, *Af- Aspergillus flavus, An-Aspergillus niger R-Rhizopus sp* and *Al-Altenria sp*)