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CONTROL OF ASHY STEM BLIGHT DISEASE OF VEGETABLE COWPEA IN THE LOW COUNTRY WET ZONE OF SRI LANKA

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ABSTRACT

The Ashy Stem Blight (ASB) disease is the most important disease in vegetable cowpea (*Vigna unguiculata* (L.) Walp) cultivation in the low country wet zone and is caused by the fungus *Macrophomina* sp. This disease caused heavy yield losses and application of fungicides was required to control the disease.Four fungicides were tested and the most effective fungicide was found to be tebuconazol (Folicur) to control the fungus *in-vitro*. Two fungicides, Tebuconazol (Folicur) and Pomasol Forte (Thiram) were tested in the field. Application of tebuconazol was the effective fungicide in the field to control the disease and gave the highest yield. Application of tebuconazol, 4 weeks after planting is adequate and economical to control the ashy stem blight disease. Varietal screening tests showed promising results with the variety 'Panduru Mae' and was found to be tolerant to this disease.

KEYWORDS: Ashy stem blight, Effective fungicide, *Macrophomina*

INTRODUCTION

Bush type vegetable cowpea, is commonly grown in the low country wet zone. It is a short-term crop. This crop is liable to be affected by soil borne diseases especially when the crop is established in the wet zone.

Ashy stem blight (ASB) is the most important disease of vegetable cowpea which was identified recently by Regional Agricultural Research and Development Centre (RARDC), Bombuwela and crop yields were drastically reduced by the disease (According to author's observations). It was first reported in France and the United States in 1905 and then in Europe, Asia, Canada and South America (Sherf and Macnab, 1986). This is an economically important and soil borne fungal disease with a wide host range and prevails in many parts of the world. It is also known by various synonyms, when the pathogen attacks different host plants (Vyas, 1995).

The fungus causing ASB in legumes has been given different nomenclature such as *Macrophomina phaseoli* (Maubl), *Rhizoctonia bataticola* and *Sclerotium bataticola* in the United States. Ashby has cleared the synonym with *Macrophomina phaseoli* (Ashby). *Macrophomina phaseolina* (Tassi) is another synonym for the organism (Sherf and Macneb, 1986). All these names

have been clarified and confirmed as being the same organism refered to as *Macrophomina phaseoli* by him.

In Sri Lanka, this disease was first observed in *yala* 1996 at RARDC, Bombuwela. The disease symptom is grayish, brown, sunken, elongated, dry lesions at the collar region of the cowpea plant. These lesions rapidly grow upwards to the tip of the plants and the whole plant may wilt and die subsequently.

Use of resistant cultivars, chemotherapy and use of sanitary practices are common methods of disease control (Hall, 1991). In this study, varietal and fungicide screening were conducted at the RARDC, Bombuwela to find out possible measures to control the disease. This paper reports the results of these investigations.

MATERIALS AND METHODS

Each trial was laid out in a randomized complete block design. Vegetable cowpea seeds were planted in 40cm x 20cm spacing. Fertilizers recommended by Department of Agriculture were applied and pest control measures were taken. Hand weeding was done at three weeks intervals. Disease evaluation was done under natural infection.

Fungicidal screening against ashy stem blight (ASB) disease.

Four fungicides namely, Benomyl, Pencycuron, Thiram and Tebuconazol were tested in the laboratory using the filter paper disc method at the concentrations ranging from 10 -100ppm (Weerakoon, 1998). Non-effective chemicals were eliminated. Two effective chemicals *viz.*, tebuconazol (Folicur, 50% EW, Bayer) and Thiram (Pormarsole Forte, 80% WP, Bayer) were selected for field evaluation. Two spray applications were done at (a) 4^{th} weeks after planting and (b) 4th and 5th weeks after planting (table 1). Unsprayed plot was used as control.

The plot size was 2m x 3.5m. The treatments replicated 4 times were tested in randomized complete block design. Variety BS-1 seeds obtained from Department of Agriculture were used for this experiment. Disease evaluation was done at eight week after planting. This was computed as follows (Hicky, 1986).

$$\text{Disease incidence} = \frac{1(H) + 2(L) + 3(M) + 4(S)}{\text{Total number of plants}}$$

Where, H = No. of healthy plants

L = No. of lightly infected plants where the lesions on less than half of the stem.

M = No. of moderately infected plants where the lesions on the stem and petiole.

S = No. of severely infected plants where plants wilt and died.

This experiment was conducted in three consecutive seasons from 1998/1999 *maha*. The data of disease incidence and yields were recorded and analyzed statistically using Randomized Complete Block design. If treatments were found to be significant, they were further compared by Least Significant Difference (LSD) test.

Screening of vegetable cowpea cultivars against ashy stem blight (ASB) disease.

Four varieties namely, Sena (Select - 107), Bush polon, BS-1 and Bushitao were used. Each plot size was 2m x 3m and was in 3 replicates in randomized complete block design. Variety BS-1 was used as a susceptible check variety. This experiment was conducted for 3 consecutive seasons starting from 1999/2000 *maha*. Disease incidence in each variety was investigated to measure its resistance to ASB disease. Following evaluation system was used to assess the disease incidence.

Rank	Scale
HR	0 - No incidence.
R	1 - small lesions on the stem at the soil level.
MR	3 - lesions on the less than half of the stem.
MS	5 - lesions on the less than 3/4 of the stem.
S	7 - Lesions on the stem and petiole.
HS	9 - plant died.

RESULTS AND DISCUSSION

Fungicidal screening against ashy stem blight (ASB) disease.

Disease incidence and yields were given in table 1 and 2 respectively.

Table 1. Disease incidence in fungicidal screening against Ashy stem blight disease in vegetable cowpea.

Treatment	*Concentration*	*Time of applicatio*	*Disease incidence*		
			1998/1999 maha season	*1999 yala season*	*1999/2000 maha season*
Tebuconazole	150 g a.i./ha	4th wk. after planting	6.92 a	7.57 a	3.62 a
Tebuconazole	Each spray 150 g a.i./ha	4th and 5th wk. after planting	6.15 a	5.78 a	4.00 a
Thiram	160 g a.i./ha	4th wk. after planting	6.80 a	6.73 a	5.32 b
Thiram	Each spray 160 g a.i./ha	4th and 5th wk. after planting	8.00 a	7.10 a	1120 c
Control	Unsprayed		51.42 b	50.0 b	61.62 d
		CV %	3.73	21.75	11.70
		LSD(p= 0.05)	0.29	1.19	0.89

Mean values followed by a common letter are not statistically significant at 5 % probability level by LSD

Table 2. Fungicides against Ashy stem blight disease in vegetable cowpea yield in t/ha.

Treatment	*Concentration*	*Time of application*	*Yield* (t/ha)		
			19998/1999 maha season	*1999 yala season*	*1999/2000 maha season*
Tebuconazole	150 g a.i./ha	4th wk. after planting	12.01a	14.26a	9.06a
Tebuconazole	Each spray 150 g a.i./ha 150 g a.i./ha	4th and 5th wk. after plating	11.40a	12.89b	8.51a
Thiram	160 g a.i./ha	4th wk. after planting	8.96b	10 .66d	3.92b
Thiram	Each spray 160 g a.i./ha	4th and 5th wk. after planting	9.01b	11.60cd	4.09b
Control	Unsprayed		8.07b	10.11e	2.78b
		CV %	5.86	7.4	11.69
LSD		(p= 0.05)	1.26	1.36	2.04

- Mean values followed by a common letter are not statistically significant at 5 % probability level by LSD.

Disease incidence and yields were given in tables 1 and 2 respectively. The unsprayed (control) treatment recorded the highest incidence of disease (table 1) and the lowest crop yield (table 2). No significant differences were found between fungicide spraying after the 4th week and 4th and 5th week after planting. Therefore, 4th week after spraying of fungicide is adequate and economical to control the disease of ASB. However, in 1999/2000 '*maha*' season, two fungicidal sprays of 'Thiram', 4th week after planting and 4th and 5th week after spraying showed significant difference. Continuos rains in this season would be a most favorable climatic factor to spread the disease so that fungicide 'Thiram' did not effectively control the disease. In this season, even in the unsprayed plots were recorded highest incidences of disease. According to this study, application of tebuconazol (150 g a.i./ ha) was found to be more effective to control this disease rather than application of Thiram (160 g a.i./ha).

(b) Varietal screening of vegetable cowpea against ashy stem blight (ASB) disease.

Table 3. Performance of vegetable cowpea varieties in ashy stem blight disease screening under natural infection.

	Disease incidence		
Varieties	*Scale*	*Rank*	*Yield (t/ha)*
Sena	3	MR	11.10a
Bush polon	1	R	17.14b
BS-1	7	S	9.20c
Bushitao	5	MS	8.64c

For yield, CV =10.54 %; LSD(p=0.05) – 0.81 t/ha

As shown in table 3, variety BS -1 which was the most susceptible also showed the highest disease incidence. Variety 'Sena' was moderately resistant. The promising variety 'Panduru Mae' is tolerant to the Ashy stem blight disease. Eventhough, variety Bushitao is moderately susceptible to the disease, it gave the lowest yield due to low yielding ability.

CONCLUSION

The Ashy stem blight disease of vegetable cowpea caused significant yield losses and application of fungicide was required to control the disease. Spraying of the fungicide, Tebuconazol (Folicur) at 4th weeks after planting effectively

controlled the disease. The promising variety 'Panduru Mae' was found to be tolerant to ashy stem blight disease.

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