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EFFECT OF HERBICIDES ON GROWTH OF *SCLEROTIUM ROLFSII* CAUSING STEM ROT OF GROUNDNUT

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ABSTRACT

Sclerotium rolfsii cause stem rot of groundnut and reported considerable yield loss. Stem rot become a major constraint and potential threat to successful cultivation of groundnut. Application of herbicides is an important input in groundnut for weed control. Hence, screenings of six herbicides were tested in *vitro* for find out effective herbicides for the control of *S. rolfsii*. Among herbicides, quizalofop-ethyl and metasulfuron exhibited cent per cent growth inhibition at all the concentrations. While fluchloralin and pendimethalin were found cent per cent inhibition at 2000 ppm, oxyfluorfen (92.22 %) and glyphosate (75.74%) were also effective growth inhibited at 2000 ppm.

KEYWORDS: *Sclerotium rolfsii*, quizalofop-ethyl and metasulfuron exhibited, herbicides.

INTRODUCTION

Sclerotium rolfsii Sacc. Teleomorph: *Athelia rolfsii* (Curzi) Tu & Kimbrought is a soil borne plant pathogenic fungus with a wide host range and worldwide distribution (Punja, 1988). The fungus spreads by mycelial content with healthy plants and overwinters as sclerotia in soil. Consequently, the disease occurrence is typically endemic and the spatial distribution of the disease is clustered. Application of herbicides was recommended practiced adopted by farmers for the weed control in groundnut. Pre and post emergence application of herbicides often affects on target organisms. Hence, present *in vitro* bioassay of selected herbicides was taken up to ascertain their relative effect on growth of *Sclerotium rolfsii.*

MATERIALS AND METHODS

Relative efficacy of six herbicides was tested at 500, 1000, 1500 and 2000 ppm concentrations using poisoned food technique. Per cent growth inhibition recorded for various herbicidal concentrations Growth of *Sclerotium rolfsii.*

The poisoned food technique was employed for evaluating the efficacy of different fungicide. The bioassay experiment was carried out on PDA using poisoned food technique (Dhingra and Sinclair, 1985). Efficacy of six herbicides in inhibiting the growth of the *S. rolfsii* was evaluated. Pre emergence weedicides *viz.* pendimethalin and fluchloralin are prevent weed seeds germination. Along with these, the post emergence weedicides viz. quizalofop-ethyl, metasulfuron and glyphosate were also tested for efficacy against *S. rolfsii.* The required quantity of respective chemical was incorporated in 100 ml of PDA in 250 ml flasks. The medium was shaken well to give uniform dispersal of the herbicides. Twenty ml medium was poured separately into each sterilized Petri plates, replicated three times and centrally inoculated with 4mm mycelial disc of the pathogen and incubated at 27 $\pm$ 1ºC for seven days. A suitable control was maintained by growing the pathogen on herbicide free PDA medium. Herbicides *viz.* Fluchloralin (Basalin 48 EC), Pendimethalin (Stomp 30 EC), Oxyfluorfen (Oxy gold 23.5 EC), Metsulfuran-Methyl (Algrip 20 WP), Quizalofop-Ethyl (Targa super 5 EC) and Glyphosate (Glycel 41 SL) were tested at 500, 1000, 1500 and 2000ppm concentrations. Observations of growth were recorded at seven days after inoculation, where as sclerotial observation was recorded 15 days after inoculation. Per cent growth inhibition of the fungus in each treatment was calculated by using fallowing formula (Vincent, 1947).

$$I = \frac{C - T}{C} \times 100$$

Where, I = Per cent inhibition

C =Colony diameter (mm) of control
T=Colony diameter (mm) of treatment

RESULT AND DISCUSSION

Relative efficacy of six herbicides was tested at 500, 1000, 1500 and 2000 ppm concentrations using poisoned food technique. Per cent growth inhibition and sclerotial formation recorded for various herbicidal concentrations are presented in table-1.

All herbicides were found to reduce the growth of *S. rolfsii* as compared to control. Among various herbicides, quizalofop-ethyl and metasulfuron exhibited cent per cent growth inhibition at all the concentrations. Their toxicity indices were 400. While, fluchloralin and pendimethalin reported cent per cent growth inhibition at 2000 ppm and their toxicity indices were 323.20 and 293.24, respectively. Oxyfluorfen and glyphosate were inhibited 92.22% and 75.74% growth at 2000 ppm, respectively. Their toxicity indices were 330.20 and 160.62, respectively. Kanzaria (1993) in his *in vitro* study found that pendimethalin and fluchloralin were showed 92.52 and 70.00 per cent inhibition at 1000 ppm. *Sclerotium rolfsii* survive in soil in the form of dormant sclerotia for long time. Hence observed effect of prevention of sclerotial formation of herbicides was important aspect for management of stem rot of groundnut. Effect of herbicides on sclerotial production, maximum sclerotial production (130) was found in oxyfluorfen at 500 ppm. At 500 and 1000 ppm concentrations of fluchloralin 51 and 27 sclerotia, respectively, were produced while at 1500 and 2000 ppm concentration no sclerotial production was observed. Pendimethalin at 500, 1000, and 1500 ppm produced 88, 41, and 28 sclerotia, respectively while, at 2000 ppm sclerotia were not produced. Glyphosate at 1500 and 2000 ppm recorded little growth without sclerotial formation although gave rise to 102 and 71 sclerotia at 500 and 1000 ppm concentrations, respectively. Rathod and Patel (2003) tested the efficacy of alachlor, atrazine, butachlor, diuron, fluchloralin, oxadiazon, oxyfluorfen, pendimethalin and trifluralin in inhibiting the growth and sclerotial formation of *S. rolfsii* causing collar rot of chickpea *in vitro*. All herbicides were found significantly superior to inhibit colony diameter as well as sclerotial formation. Among them diuron @800µg/ml inhibited mycelial growth completely, hence there was no sclerotial formation. Alachlor and pendimethalin were also highly effective for growth inhibition and reduced sclerotial formation.

Table 1: Effect of herbicides on growth and sclerotial production of *S. rolfsii*.

Sr. No.	Herbicides		Concentration a.i. (ppm)*				Mean	Toxicity index #
			500	1000	1500	2000		
1.	Quizalofop-ethyl 5 EC	A	100	100	100	100	100	400
		B	00.00	00.00	00.00	00.00	00	-
2.	Metasulfuron 20 wp	A	100	100	100	100	100	400
		B	00.00	00.00	00.00	00.00	00.	-
3.	Oxyfluorfan 23.6 EC	A	66.67	81.85	89.63	92.22	82.55	330.20
		B	130	50	39	30	62.25	-
4.	Fluchloralin 48 EC	A	66.67	70.74	86.24	100	80.92	323.68
		B	51	27	00.00	00.00	19.50	-
5.	Pendimethalin 30 EC	A	52.40	61.11	79.72	100	73.31	293.24
		B	88	41	28	00.00	45.75	-
6.	Glyphosate 41 SL	A	00.00	25.74	59.07	75.74	40.13	160.52
		B	102	71	00.00	00.00	43.25	
7.	Control	A	00.00	00.00	00.00	00.00	00.00	- -
		B	235 238		233 234		235	
			(W)		Concentration(C)		W x C	
	S.Em.±	A	0.32		0.26		0.64	
	C.D. at 5%	A	0.91		0.74		1.82	

A = Per cent growth inhibition (after 8 days inoculations), B =No. of sclerotia (after 15 days inoculations)
* Each figure is mean of three replications, # Maximum toxicity index is 400

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