

## Studies on bio-efficacy of herbicides against *Sclerotium rolfsii* Sacc. causing stem rot of groundnut (*Arachis hypogaea* L.) under *in vitro* condition

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*In vitro* experiment was carried out to know the bio-efficacy of four herbicides namely Glyphosate, 2,4-D, Ozadiazone and Paraquat against the soil borne fungi *Sclerotium rolfsii* Sacc. using Poisoned Food Technique. Results of the study revealed that herbicides namely Glyphosate, 2,4-D, Ozadiazone and Paraquat were significantly effective against the test fungus with ED<sub>50</sub> value of 3900 ppm, 100 ppm, 2000 ppm, 1000 ppm and ED<sub>90</sub> value of 6600 ppm, 700 ppm, 74000 ppm, 30700 ppm respectively.

**Key words:** Bio-efficacy, herbicides, *Sclerotium rolfsii*

Herbicides are used to kill weeds but scientific studies have revealed that these chemicals also have direct or indirect effect on other microorganisms (Rodriguez-Kabana *et al.*, 1967a, 1967b, 1968 and 1969, Chowdhury, 1992; Hait and Sinha, 1986). In this paper bio-efficacy upto the level of ED<sub>90</sub> has been determined using Poisoned Food Technique with some commonly used herbicides against *Sclerotium rolfsii* Sacc. isolated from plant part affected with stem rot of groundnut.

Herbicides namely, 2,4-D, Glyphosate, Paraquat and Oxadiazone in different concentrations were analyzed through Poisoned Food Technique to evaluate ED<sub>50</sub> and ED<sub>90</sub> values against *S. rolfsii*. Procedure involved in poisoned food technique was to poison the nutrient medium (Potato Dextrose Agar) with a test chemical and then allowed the fungus to grow on it. In this experiment solid agar was used and the herbicidal suspension was prepared on the basis of active ingredient and ED<sub>50</sub> and ED<sub>90</sub> values were determined. Requisite quantity of herbicides were added after sterilization, so, as to get desired final concentration. Sterilized PDA medium containing herbicides were vigorously shaken for the purpose of mixing and 20 ml of medium was poured aseptically in to each 9 cm diameter sterilized Petri plates and allowed to solidify. After solidification the plates were inoculated

aseptically with 5 mm mycelial disc using disc cutter from 7 day's old actively growing culture of test fungus. The discs were kept in an inverted position so, that the fungus comes in direct contact with poisoned medium. The replications were kept for each treatment along with control where no chemical was added. The Petri plates were inverted and incubated at 28±1°C. The colony diameter was measured at every 24 hrs interval till a full plate growth was obtained in the control. The inhibition of the colony growth in each concentration was taken as the measured herbicidal activity by using formulae :

$$\text{Per cent growth inhibition} = \frac{\text{Growth in treatment}}{\text{Growth in control}} \times 100$$

ED<sub>50</sub> and ED<sub>90</sub> values of different herbicides towards inhibition of hyphal growth was determined by log probit analysis (Log of Concentration of fungicide and probit value of hyphal growth inhibition)

The colony diameter was measured at every 24 hrs interval till a full plate growth was obtained in the control plate. ED<sub>50</sub> value of Glyphosate, 2,4-D, Ozadiazone and Paraquat were found to be at 3900 ppm, 100 ppm, 2000 ppm and 1000 ppm

respectively while ED<sub>90</sub> value of above herbicides were at 6600 ppm, 700 ppm, 74000 ppm and 30700 ppm respectively. (Table 1).

Table 1 : ED<sub>50</sub> and ED<sub>90</sub> of *S. rolfsii* grown on PDA medium

Herbicides	ED <sub>50</sub> value in ppm	ED <sub>90</sub> value in ppm
Glyphosate	3900	6600
2,4-D	100	700
Oxadiazone	2000	74000
Paraquat	1000	30700

The results of the present study revealed that herbicides had inhibitory effect on growth of *S. rolfsii* *in vitro* condition which was already established by many workers. Rodriguez Kabana *et al.* (1969) reported that Trifluralin inhibits growth of *S. rolfsii*. They also reported during 1967 and 1968 that Atrazine and Paraquat had inhibitory effect on *S. rolfsii* similarly Sinha and Giri (1979) reported that seed treatment of 2,4-D control brown spot disease of rice while Chowdhury (1992) reported that 2,4-D, 2,4,5-T and Cylcolcel provided effective protection against stem rot of groundnut. Thus from the above results it might be concluded that herbicides namely Glyphosate, 2,4-D.

Oxadiazone and Paraquat were found to be significantly effective against *S. rolfsii* under *in vitro* condition and these herbicides might be used in field for the control of weeds as well as for control of one of the most destructive disease of groundnut.

## REFERENCES

- Chowdhury, A.K. 1992. *Management of selected fungal diseases of groundnut and chickpea by the use of unconventional chemicals*. Ph.D. Thesis submitted to Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal.
- Hait, G.N. and Sinha, A.K. 1986. Protection of wheat seedling from *Helminthosporium* infection by seed treatment with chemicals. *J. Phytopath.* **115** : 97-107
- Rodriguez-Kabana, R. Curl, E.A. and Funderburk, H.H. Jr. 1967a. Effect of paraquat on growth of *Sclerotium rolfsii* in liquid culture and soil. *Phytopathology*. **57** : 911-915.
- Rodriguez-Kabana, R. Curl, E.A. and Funderburk, H.H. Jr. 1967b. Effect of atrazine on growth response of *Sclerotium rolfsii* and *Trichoderma virid.* *Can. J. Microbiol.* **13** : 1343-1349.
- Rodriguez-Kabana, R. Curl, E.A. and Funderburk, H.H. Jr. 1968. Effect of atrazine on growth response of *Sclerotium rolfsii* and *Trichoderma viride* in soil *Can. J. Microbiol.* **14** : 1283-1288.
- Rodriguez-Kabana, R. Curl, E.A. and Funderburk, H.H. Jr. 1969. Effect of trifluranil on growth of *Sclerotium rolfsii* in liquid culture and soil. *Phytopathology*. **59** : 228-232.
- Sinha, A.K. and Giri, D.N. 1979. An approach to control brown spot of rice with chemicals know as phytoalexin inducers. *Curr. Sci.* **48** : 782-784.