International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
IJCS 2019; 7(1): 972-974

Received: 06-11-2018
Accepted: 09-12-2018

Jagdish Kumar Patidar
Department of Plant Pathology,
R.A.K. College of Agriculture,
RVSKVV, Sehore,
Madhya Pradesh, India

Moly Saxena
Department of Plant Pathology,
R.A.K. College of Agriculture,
RVSKVV, Sehore,
Madhya Pradesh, India

DR Saxena
Department of Plant Pathology,
R.A.K. College of Agriculture,
RVSKVV, Sehore,
Madhya Pradesh, India

Correspondence
Jagdish Kumar Patidar
Department of Plant Pathology,
R.A.K. College of Agriculture,
RVSKVV, Sehore,
Madhya Pradesh, India

Evaluation of fungicides and chemicals against *Rhizoctonia bataticola* caused charcoal rot of soybean (*Glycine max* (L.) Merrill)

Jagdish Kumar Patidar, Moly Saxena and DR Saxena

Abstract
A laboratory experiment conducted to evaluated five fungicides (Carbendazim, Thirum, Carboxin, Thiophanate-methyl and Pyroclostrobin), two chemicals (Salicylic acid and ammonium molybdate) and their combination on mycelium growth of *Rhizoctonia bataticola* at 100, 200 and 500ppm during year 2012-13 at R.A.K. College of Agriculture, RVSKVV, Sehore (M.P.). All five fungicides significantly reduced the growth of *Rhizoctonia bataticola*. Fungicides thiophanate methyl + pyroclosrobin could check the growth of fungus completely at all concentration, while the carbendazim, carboxin and salicylic acid did so at 200ppm and 500ppm while the pyroclostrobin and thirum were effective at 500ppm only. Ammonium molybdate was found less effective against *Rhizoctonia bataticola* in *in-vitro*.

Keywords: Fungicides, *Rhizoctonia bataticola*, mycelial growth, concentrations

Introduction
Soybean (*Glycine max* (L.) Merrill) is an important cash crop in India. It is considered as one of the main oil crops all over the world. Soybean (*Glycine max* L. Merrill) is one of the world's most important sources of oil and protein. It contains 20 per cent oil of dry seed weight and is an important source of protein, which reaches 40 per cent of dry weight seed weight along with calcium, carotene, iron, carotene, thiamine and ascorbic acid (El- Abady *et al*., 2008)[2]. Soybean is subjected to many diseases caused by fungi, bacteria, viruses, mycoplasma and nematodes (Sweets, 2008)[9]. Disease caused by fungi are charcoal rot (*Macrophomina phaseolina* (Tassi) Goid), collar rot (*Sclerotium rolfsii* Sacc.), *Rhizoctonia* aerial blight (*Thanatephorus cucumeris* (Frank) Donk.), and purple strain (*Cercospora kikuchi* (T. Matsu. and Tomoyasu)). Among the fungal disease charcoal rot of soybean has been reported to cause epiphytotic in U.S.A, China, Argentina, Brazil (Wrather *et al.*, 1997)[10] and also in India 70% loss caused by charcoal rot has been reported (Wyllie, 1993)[11]. The most successful control strategy used for charcoal rot in soybean has been seed treatment with fungicides (Hewidy *et al.*, 2003) [3].

Materials and Methods
Five fungicides *viz.*, Carbendazim, Thirum, Carboxin, Thiophanate-methyl and Pyroclostrobin and two chemicals viz., Salicylic acid and ammonium molybdate were evaluated in laboratory against *Rhizoctonia bataticola* by poisoned food techniques (Nene and Thapliyal, 1979)[6]. Three concentrations i.e. 100, 200 and 500 of each fungicide and chemicals were used. Three replications were kept for each concentration. Required quantity of the fungicide was added in PDA and thoroughly mixed at the time of pouring. Twenty ml of medium was poured in each pre-sterilized 9.0 cm diameter petri plate. A five mm disc of eight days old culture of *R. bataticola* was placed on the medium in upside down position to maintain a continuous contact of fungus with poisoned medium. The medium without fungicide served as control. The radial growth of the colony was measured after seven days growth under different fungicides, chemicals and control was calculated.

Result
The growth of *R. bataticola* was recorded by poison food technique using five fungicides and two chemical at three concentrations. The data are presented in Table-1. It is clear from the data the all five fungicides, concentrations and their interaction significantly reduced the

growth of *Rhizoctonia bataticola*. Among fungicides, minimum mycelium growth (0.00mm) was obtained under thiophanate methyl + pyroclosrobin followed by carboxin (4.11mm), carbendazim (5.22 mm), pyroclostrobin (10.44mm) and thirum (18.67mm) as compared to control (87.17mm). Salicylic acid (15.67mm) also significantly reduced the mycelium growth of *Rhizoctonia bataticola* as compared to other treatments differed significantly from each other. The growth reduction was less in ammonium molybdate (68.44mm). As regards the concentration minimum growth (16.27mm) was obtained at 500ppm and maximum (37.19mm) at 100ppm. The fungicides followed the same pattern. Fungicides thiophanate methyl + pyroclosrobin could check the growth of fungus completely at all concentration (Table-1) while the carbendazim, carboxin and salicylic acid did so at 200ppm and 500ppm, whereas the pyroclostrobin and thirum were effective at 500ppm only.

Table 1: Influence of fungicides and chemicals on radial growth of *Rhizoctonia bataticola* at three concentrations

Fungicides and chemicals/ concentrations (ppm)	Mean radial growth (mm)*			
	100ppm	200ppm	500ppm	Mean
Thirum	31.33	24.67	0.00	18.67
Carbendazim	15.67	0.00	0.00	5.22
Carboxin	12.33	0.00	0.00	4.11
Pyroclostrobin	17.33	14.00	0.00	10.44
Thiophanate methyl + pyroclosrobin	0.00	0.00	0.00	0.00
Ammonium molybdate	86.67	75.67	43.00	68.44
Salicylic acid	47	0.00	0.00	15.67
Control	87.17	87.17	87.17	87.17
Mean	37.19	25.19	16.27	
	S. Em ±		CD at 5%	
Fungicide (F)	1.05		5.17	
Concentration (C)	1.19		3.39	
Interaction (F×C)	0.69		1.95	

* Average of three replication

Discussion

The basic approach before recommending chemical control against a particular disease is to evaluate the fungicides against pathogen under laboratory conditions. Increase in concentrations of fungicides caused a decrease in mycelial growth of *R. bataticola* thereby resulting in increased inhibition. Among the fungicides and chemicals tested, thiophanate methyl + pyroclosrobin (at 100, 200 and 500ppm) were best in checking the growth of *R. bataticola* followed by carbendazim, carboxin and salicylic acid (200 and 500ppm) (Table-1). Thirum and pyraclostrobin (500ppm) completely inhabited growth. Konde *et al.,* (2008) [4] also reported carbendazim + thiram (0.1+0.2%), penconazole (0.1%), thiophanate-M (0.1%) completely inhibit (100%) the growth of the pathogen. Ammajamma and Hegde (2009) [1] also reported carboxin (0.05 and 0.1%) completely (100%) inhibited the growth of *R. bataticola.* Prashanthi (2000) [7] found complete inhibition of mycelial growth by carbendazim at 250, 500 and 1000 ppm concentrations. Salunke *et al.* (2008) [8] carried an experiment to see the efficacy of seven fungicides *viz.,* Campanion (0.2%), Zineb (0.2%), Tricyclazole (02%), Curzate M8TM (02%), Copper oxychloride (0.3%), Carbendazim (0.1%) and Thiram (0.3%) against *R. bataticola* by poisoned food technique. Campanion and Zineb each at 0.2% concentration showed complete growth inhibition of all isolates. All isolates showed tolerance to Copper oxychloride, thereby showing its least efficacy. Maruti *et al.* (2017) [5] evaluated *In vitro* efficacy of non-systemic, systemic and combi fungicides are against *R. bataticola*. Among contact fungicides tested, ziram recorded 100 per cent inhibition at all the concentrations (i.e., 0.1, 0.2 and 0.3%) with the mean inhibition, which was significantly superior over all the treatments whereas, mancozeb and thiram showed 100 per cent inhibition at 0.3 per cent concentration. Among systemic fungicides tested, tebuconazole showed complete inhibition at all the concentration (i.e., 0.05, 0.10 and 0.15), whereas, propiconazole showed 100 per cent inhibition of R. bataticola at 0.10 and 0.15 per cent concentration. Among combi products tested, carbendazim 12% + mancozeb 63% WP, trifloxystrobin 25% + tebuconazole 50% EC and carboxin 37.5% + thiram 37.5% WP showed cent per cent (100%) inhibition at all the concentrations (i.e.,0.10%, 0.20% and 0.30%).

References

1. Ammajamma R, Hegde YR. Efficacy of fungicides against *Rhizoctonia bataticola* causing wilt of *Coleus forskohlii* (Wild) Briq. Int. J Plant Prot. 2009; 2(1):31-32.
2. El-Abady MI, Seadh SE, Attia AN, El-Saidy Aml EA. Impact of foliar fertilization and its time of application on yield and seed quality of soybean. The 2th field crops conference, FCRI, AV, Giza, Egypt, 14-16 Oct. 2008, 357-375.
3. Hewidy MA, Ismail IA, Morsy KM, Mahmoud MA, El-Galaly Ola AM. Effect of seed treatment with some fungicides, biocides and saponin in controlling damping-off on soybean disease. J Agric. Sci. Mansoura Univ. 2003; 28(4):2733-2746.
4. Konde SA, Raut BT, Gade MR. Chemical and biological management of root rot (*Rhizoctonia bataticola*) of soybean. Ann. Plant Physiol. 2008; 22(2):275-277.
5. Maruti Savitha AS, Gururaj Sunkad, Amaresh YS. *In vitro* efficacy of fungicides and bioagents against dry root rot of pigeonpea caused by *Rhizoctonia bataticola* (Taub.) Butler. Inter. J Pure App. Biosci. 2017; 5(6):1341-1347.
6. Nene YL, Thapliyal PN. Fungicides in Plant Disease Control, Oxford and IBH Publishing House, New Delhi, 1979, 163.
7. Prashanthi SK, Kulkarani S, Sangam VS, Kulkarni MS. Chemical control of *Rhizoctonia bataticola* (Taub.) Butler, the causal agent of root rot of safflower. Plant Dis. Res. 2000, 15(2):186-190.
8. Salunke VN, Armarkar S, Ingle RW. Efficacy of fungicides and antagonistic effect of bioagent against

Rhizoctonia bataticola isolates. Ann. Pl. Physiol. 2008; 22(1):134-137.
9. Sweets L. Early season soybean diseases. Integrated Pest Crop Manage. 2008; 18(12):82.
10. Wrather JA, Anderson TR, Arsyad DM, Gai J, Ploper DL, Porta-Puglia A *et al*. Soybean disease loss estimates for the top 10 soybean producing countries in 1994. Plant Dis. 1997; 81:107-110.
11. Wyllie TD. Compendium of Soybean Diseases. 3rd ed. The American Phytopathological Society, St. Paul, MN 1989.