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Characterizing soybean growth and yield attributes under the influence of neem oil and fungicide

Anoop Kumar[1*], Sunil Zacharia[1], Mukul Kumar[2], Puskar Shukla[2] and Mukesh Kumar[2]

[1*] & [1]Department of Plant Protection, Sam Higginbottom University of Agriculture Technology and Sciences, Prayagraj 211 007, U.P., India
[2]Department of Plant Pathology, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur 208 002, U.P., India

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ABSTRACT

The present investigation entitled "Characterizing soybean growth and yield attributes under the influence of neem oil and fungicide" was undertaken at the Department of plant protection, Sam Higginbottom Institute of Agriculture, Technology and Sciences, Allahabad, Prayagraj, during the year 2012 with the following findings in Randomized Block Design (RBD) having 6 treatments and 3 replications. Among the fungicides, T_3 Carbendazim recorded the highest mean plant height (38.66cm), number of branches (9.80), root length (9.6), no. of nodules / plant (19.21, pods / plant (74.59), seeds / pod (2.85) and test weight (g) (113.48 g) of Soybean (*Glycine max* L.).

Key words*: Fungicide, Neem oil, Growth, Yield, Soybean*

Introduction

Soybean being rich in protein (40%) and moderate in oil (20%); it is suitable for animal and human consumption (Golbitz, 2003; Olguin *et al*., 2003; Belewu and Belewu, 2007). Soybean seeds, when carrying pathogens, become a primary source of inoculums for damaging seeds and plants with varying degrees (Maude, 1996). Soybean is one of the most important oil seed crop in the world. Oil and protein rich soybean has now been recognized all over the world as a potential supplementary source of edible oil and nutrition (Kaul and Das, 1986). The oil of soybean contains 85% unsaturated fatty acid and is cholesterol free. Soybean seeds contain 43.2% protein, 19. 5% fat, 20.9% Carbohydrate and a good amount of other nutrients like calcium, phosphorus, Iron and vitamins (Guptha *et al*., 2003). The soybean yields are remarkably low due to various factors of biotic and abiotic nature which take a heavy toll on the crop which diseases account for estimated yield loss of 12 percent. Among various diseases on soybean anthracnose causes estimated yield losses of 26 percent (Backman *et al*., 1982). In India, it is grown in an area of 10.96 million hectares with a production of 13. 45million tonnes and productivity of 1228 Kg / ha. (Anonymous, 2018- 19). *Rhizoctonia solani* is a fungal pathogen that affects many agricultural plants. It is a soil borne fungus. It causes various plant diseases like collar-rot, root-rot and damping-off. *Rhizoctonia bataticola* (Pycnidial stage – *Macrophomina phaseolina*) is the important soil-born pathogen causes root rot / charcoal rot disease in soybean. Several studies have pointed out the potential of neem tree (*A. indica*) to control plant pathogenic fungi that could be listed it a stop fungicide and harmless bio-control agent (Abbasi *et al*., 2003; Akhtar and Mahmood, 1995; Amadioha, 2000;

Dubey *et al*., 2009). It has many uses; the most important use of neem products is to fight against crop pests and diseases without any harmful effects on environment. Neem and its products have been widely reported to control insect pests (Ascher, 1993; Schmutterer and Ascher, 1995), plant bacterial diseases (Abbasi *et al*., 2003), plant parasitic nematodes (Muller and Gooch, 1982; Akhtar and Mahmood, 1995), plant fungal diseases (Vir and Sharma, 1985; Amadioha, 2000; Dubey *et al*., 2009) as well as a potential agricultural fertilizer (Gajalakshmi and Abbasi, 2004).

Materials and Methods

The materials and methods adopted the proposed study entitled "Effect of fungicides and neem oil on growth and yield attributes of Soybean (*Glycine max* L.)" was carried out during the Kharif season of the year 2012 at the Department of plant protection, Sam Higginbottom Institute of Agriculture, Technology and Sciences, Allahabad. Allahabad is located in typically climatic zone which experience hot summer and fairly cold winter. During the winter months, especially December and January the temperature falls as low as 2-5 °C or even low, while during the summer months (May-June) it reaches as high as 49 °C. Hot scorching winds are a regular feature during the summers, whereas there may be an occasional spell of frost during the winters. These lected filed was dogged up, weeded, channeled and the soil was pulverized and total area was divided into 21 plots post planting operations were carried out for raising the crop. The experiment was laid out under Randomized Block Design with seven treatments with three replications. The experiment consist of seven treatments viz., T_0 Control, T_1 Mancozeb, T_2 Propiconazole, T_3 Carbandazim, T_4 Thiophanate methyl, T_5 Neem oil and T_6 Vitavax. The biometrical observations were recorded on five selected plants of each treatment to assess the effect of treatments on growth and yield parameters of Soybean (*Glycine max* L.). The experimental data were subjected to 'F' test as per procedure of Randomized Block Design (RBD) as described by Panse and Sukhatme (1985). The critical difference (C.D.) for each parameter was calculated to compare treatment means at 5 percent level of significance.

Results and Discussion

Observations regarding the response of fungicides and neem oil on growth and yield attributes on plant height (cm), number of branches, root length, no. of nodules / plant, pods / plant, seeds / pod and test eight(g) of Soybean (*Glycine max* L.) are given in table.1 and fig.1. Similar result was found by Choudhary and Ashraf (2019), Gnanaprakash *et al*., (2015), Sangeetha and Jahagirdar (2013) where they showed that *Trichoderma viride* and neem can be recommended as an effective approach for the management of dry root rot. The Results revealed that there was significant difference between the treatments and maximum plant height (38.66cm), number of branches (9.80), root length (9.6), no. of nodules / plant (19.21, pods / plant (74.59), seeds / pod (2.85) and test weight (g) (113.48g) was observed by the treatment Carbandazim whereas the lowest value plant height (31.00cm), number of branches (7.86), root length (7.51), no. Of nodules / plant (10.58), pods/plant (47.86), seeds / pod (1.73) and test weight (75.65g) was observed in treatment Control. However, treatment, T_1 Mancozeb and T_6 Vitavax was found statistically at par with T_3 Carbandazim on number of branches, root length and No. of nodules/plant of Soybean (*Glycine max*

Table 1

Treatment No.	Treatments details	Plant height (cm)	Number of branches	Root length	No. of nodules/ plant	Pods/ plant	Seeds/ pods	Test weight (g)
T_0	Control	31.00	7.86	7.51	10.58	47.86	1.73	75.65
T_1	Mancozeb	36.00	4.94	9.40	17.94	70.12	2.52	111.70
T_2	Propiconazole	33.33	8.80	8.8	15.57	67.50	2.30	103.67
T_3	Carbendazim	38.66	9.80	9.6	19.21	74.59	2.85	113.48
T_4	Thiophanate methyl	32.00	8.53	8.66	14.23	60.97	2.30	106.38
T_5	Neem oil	32.66	8.33	8.53	16.01	63.19	2.32	100.52
T_6	Vitavax	34.66	9.20	9.20	13.47	64.28	2.35	101.24
	F-Test	S	S	S	S	S	S	S

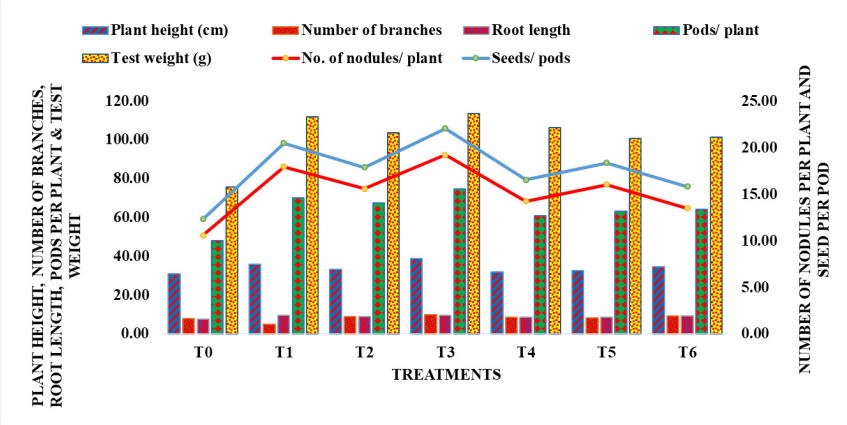

Fig. 1. Effect of fungicide and neem oil on growth and yield attributes of Soybean (*Glycine max* L.)

L.). Also results reported by Kaurav *et al*., (2019) showed that neem inhibited the growth of *Rhizoctonia bataticola*. Results were also in agreement with findings of Lakhran *et al*., (2020), Brahmbhatt and Aravind (2018) who showed that *T. viride* was found the most effective against the fungus and neem was most effective in reducing the root rot. Manjunatha *et al*., (2013) reported that seed treatment using *T. viride* can be used under field conditions to control dry root rot of chickpea.

Conclusion

From the present investigation it is concluded that the soil application of Fungicides and neem oil with the different treatment levels is best suited and beneficial for the plant growth and yield attributes of Soybean (*Glycine max* L.). Treatment of T_1Mancozeb was found best in respect of plant height (cm), number of branches, root length, no. of nodules/ plant, pods/ plant, seeds/ pod and test weight (g) of Soybean (*Glycine max* L.).

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Conflict of Interest: NA

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