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

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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, T3 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 13.45 million 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 lower, 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 selected field 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 | Carbandazim | 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 |
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. Mancozeb* 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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