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Eco-friendly management of antracnose disease of groundnut *in vivo* condition

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Abstract

A study was carried out in *in vivo* condition in Central field of SHUATS, Prayagraj to control the antracnose disease caused by *Colletotrichum dematium*. Groundnut is most important oilseed crop and it is mostly affected by many diseases. Among all diseases antracnose is noticed most destructive for yield loss. In the present study three botanicals viz. Neem oil, Clove oil, Eucalyptus oil and one bio-agent viz. *T. viride*. And three other treatments were taken the combinations of botanicals with the bio-agent viz. Neem oil + *Trichoderma viride*, Eucalyptus oil+ *Trichoderma viride* and Clove oil+ *Trichoderma viride* at the rate of 5% with seed treatment. The complete inhibition was obtained by Clove oil of 60.48% inhibition followed by Neem oil (54.55%) and Clove oil + *Trichoderma viride* (41.30%). *Trichoderma viride* was more effective with the botanicals than the single treatments.

Keywords: Groundnut, Neem oil, eucalyptus oil, clove oil, *T. viride* and *Colletotrichum dematium*

Introduction

Groundnut is called as the “king of oilseed”. It needs 6-6.5 soil pH, widely grown between latitudes 40° N and 40° S. Groundnut (*Arachis hypogaea* L.) is commonly known as peanut, manila nut, pygmy nut, pignut and monkey nut. It belongs to family *Leguminosae* or *Papilionaceae*. It is the valuable source of all the nutrients, known as poor men’s cashew nut. It is also a major source of edible oil and the kernel contains 44 to 50 per cent oil and 25 to 30 per cent protein. Groundnut being a nitrogen-fixing crop through the root nodule bacteria is considered as an important crop to be cultivated in crop rotations all over the country (Desai *et al.*, 1980) [2]. From the groundnut seed many food products are prepared like peanut oil, peanut butter etc. It contains carbohydrates, fat, protein, vitamins and minerals. Large number of fungal diseases caused by fungi such as *Cercospora*, *Alternaria*, *Helminthosporium*, *Gloeosporium*, *Colletotrichum*, *Septoria*, *Sphaceloma* and many more, which create more loss of yield due to damage of leaves, stem, root and pods. Antracnose of groundnut caused by *Colletotrichum dematium*, which was first reported by Subramanyum *et al.* The symptom shows black lesions, usually sunken spots. The imperfect fungi produce conidia in acervuli which are hyaline, one celled (A. Jha and S. Tiwari., 2012). *Colletotrichum dematium* was originally collected from a stem of *Eryngium* in France as well as solanaceous hosts and has been more recently recorded from numerous hosts such as a pathogen of chilli (Than *et al.*, 2018).

The morphological characteristics, the fungus cultures produced cottony white mycelial growth and slimy, dull-white acervuli that producing 15-27 × 2-5 µm falcate conidia with slightly tapered ends. Brown setae within the acervuli were aseptate and measured 50-468 × 2-7 µm (Vinay *et al.*, 2008).

Materials and Methods

The experiment was carried out in kharif season using Randomized Block Design having 8 treatments including a control, 3 replications each at central field of SHUATS, Prayagraj, Uttar Pradesh, India. Plot size was 2×1.5m. Of the taken 8 treatments, three types of plant oils were used viz., Neem oil, Clove oil, Eucalyptus oil and one bio-agent viz. *T. viride*. They were tested in 5% concentrations in seed treatment and three combination treatments (i.e., Neem oil + *T. viride*, Eucalyptus oil+ *T. viride* and Clove oil+ *T. viride*) were used in the study. Percent disease incidence was recorded at 30, 45 and 60 DAS.

Preparation tillage

Before sowing the field was thoroughly ploughed and pulverized with tractor drawn cultivar to cultivar to attain desirable tilt. Leveling and formation of plots were done manually. The field was then cleaned by picking the stubble of previous crop etc. one harrowing was applied to field before sowing.

Seed treatment

Before sowing, the seeds were soaked in respective oils. Control was maintained by soaking the seeds in sterile water. Botanical oils were measured 5 ml each with the help of measuring cylinder, were then mixed thoroughly with 100 gm of seeds for each treatment. It adhered to the seeds due to sticky nature and sown in the furrow 2 seeds at each point keeping the spacing at 30 cm in between. For each treatment three replications were maintained. Standard agronomical practices were followed as per recommendations.

Treatment details

- T₀: Control
- T₁: Neem oil @ 5% Concentration (ST)
- T₂: Eucalyptus oil @ 5% Concentration (ST)
- T₃: Clove oil @ 5% Concentration (ST)
- T₄: *T. viride* @ 5% Concentration (ST)

- T₅: Neem oil + *T. viride* @ 5% Concentration (ST)
- T₆: Clove oil + *T. viride* @ 5% Concentration (ST)
- T₇: Eucalyptus oil + *T. viride* @ 5% Concentration (ST)
- *ST-Seed Treatment
- *DAS-days after showing

Disease intensity (%) was calculated by using the following formula

$$\text{Infection Index (\%)} = \frac{\text{Sum of all disease rating}}{\text{Total No. of rating} \times \text{max. disease grade}} \times 100$$

(James 1971)

Result and Discussion

The botanical and bio-agents which were found most effective in single applications experiment, further; they were tested in combination in Random Block designed in the field. The result reveals (Table: 1, Figure: 1) that in T₃ treatment disease incidence was 15.65%, which is most effective treatment among all the treatments. The next effective treatment was T₁ (18.01%) followed by T₆ (23.26%), T₇ (27.34%), T₅(27.78%), T₄ (29.82%), T₂ (32.67%) and lastly control (45.63%). In the present study Clove oil was best effective treatment compared to other.



Fig 1: Symptom of Anthracnose disease in groundnut leaf

Table 1: Disease incidence

Sl. No	Tretments	30 DAS	45 DAS	60 DAS
1	T0(Control)	27.90%	33.17%	45.63%
2	T1(Neem oil)	9.01%	17.86%	18.01%
3	T2(Eucalyptus oil)	21.59%	27.70%	32.67%
4	T3(clove oil)	7.58%	11.97%	15.65%
5	T4(<i>T.viride</i>)	19.28%	25.64%	29.82%
6	T5(Neem oil+ <i>T.viride</i>)	15.86%	23.88%	27.78%
7	T6(clove oil + <i>T.viride</i>)	15.59%	22.23%	23.26%
8	T7(Eucalyptus oil + <i>T.viride</i>)	15.65%	23.74%	27.34%
F Test		S	S	S
CD		8.141	5.974	5.015
S.E. (m)		1.35	1.13	1.09

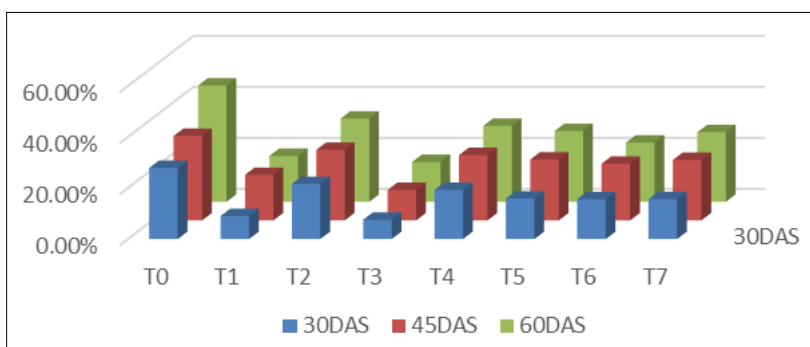


Fig 2: Anthracnose disease incidence in groundnut

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