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Abhinav Tiwari
Department of Plant Pathology, SVPUA&T, Meerut, Uttar Pradesh, India

Prashant Mishra
Professor, Department of Plant Pathology, SVPUA&T, Meerut, Uttar Pradesh, India

Ramji singh
Professor, Department of Plant Pathology, SVPUA&T, Meerut, Uttar Pradesh, India

Ravi Kumar
Ph.D. Scholar, Department of Plant Pathology, SVPUA&T, Meerut, Uttar Pradesh, India

Ankita
Ph.D. Scholar, Department of Plant Pathology, SVPUA&T, Meerut, Uttar Pradesh, India

Corresponding Author:
Abhinav Tiwari
Department of Plant Pathology, SVPUA&T, Meerut, Uttar Pradesh, India

In vitro evaluation of plant extract against *Rhizoctonia solani* Kuhn

Abhinav Tiwari, Prashant Mishra, Ramji Singh, Ravi Kumar and Ankita

Abstract
An *in-vitro* study was conducted to check the antagonistic activities of different plant extract in order to reduce the mycelial growth of *Rhizoctonia solani* Kuhn, which is responsible for causing the disease "Web blight of Blackgram". Which is considered one of the major disease of Blackgram causing yield loss. For the experiment different plant extract such as, Garlic clove, Ocimum leaf, Carom seed, *Calotropis* leaf extract & Neem leaf extract. Plant extract was mixed with PDA at the concentration of 5% and 10% in 90 mm petri plate to check the antagonistic activity and growth of pathogen. The mycelial growth was taken at the interval of 24 hrs, 48 hrs, 72 hrs. In this experiment maximum percent growth inhibition was observed in extract of Carom seeds (100%) @ concentration of 5% and 10% both then Garlic cloves @ 10% (100%), which was further followed by *Calotropis* leaf extract (91.11) @ 10% conc., Neem leaf extract (87.03%) @ 10%, *Ocimum* extract (76.30) @ 10% conc.

Keywords: Botanicals, web blight, carom seeds, antagonistic, calotropis

Introduction
Pulses, also known as legumes, play a vital role in Indian agriculture and are of significant importance to the country. Pulses are a key source of protein, essential minerals, and dietary fibre, making them an important component of the Indian diet. Blackgram (*Vigna mungo* L. Hepper), originated from central Asia and India from where it was domesticated and its progenitor is believed to be *Vigna mungo* var. *silvestris*, which occurs wild in India. It is an important short duration pulse crop and grain legume crop grown in many parts of India. Total production of blackgram in 2020-21 was million tonnes on an area of 4.14 million hectares in India. Blackgram is vulnerable to many disease *viz*. anthracnose (*Glomerella lindemuthianum*), dry root rot (*Macrophomina phaseolina*), leaf spot (*Cercospora canescens*), powdery mildew (*Erysiphe polygoni*), web blight (*Rhizoctonia solani*) etc. Viral disease such as, yellow mosaic (Mung bean yellow mosaic virus), Leaf crinkle (Leaf crinkle virus) and bacterial such as Bacterial Leaf Blight of blackgram (*Xanthomonas phaseoli*). Web blight disease of urdbean caused by *Rhizoctonia solani* Kuhn. Symptoms of Web Blight appears as small circular brown spot on the leaves. These spot enlarge often show concentric banding and surrounded by irregular shaped water soaked areas. The lesions expand and coalease and white fungal growth is observed on lower surface of the infected leaf including petioles and young branches of infected plants. The spot become greenish to reddish brown and later turn brown to black. The coloured, spider web like mycelial growth and white micro sclerotia develop in abundance on the affected plant parts. The mycelium on infected leaves appear as spider web thus suggested the name web blight disease.
Since, the fungus *Rhizoctonia solani* is a typical soil borne, the management through chemicals is highly expensive and not feasible, so looking upon its integrated management through plant extracts following experiments were conducted *in-vitro.*

Materials and Methods
Plant extracts of 5 different plants *viz.* Garlic, Tulsi, Ajwain, Madar, Neem were evaluated against *Rhizoctonia solani.* by food poisoned technique. Leaves, seeds and cloves of fresh and healthy plants were collected as shown in table 1. The plants parts were washed thoroughly in running water and then in 10% sodium hypochlorite solution for 1 min. the plant parts were again washed with distilled water to rinse out the sodium hypochlorite solution from plant surface. Leaves, seeds and cloves of 100 gm were grinded separately with 100 ml of distilled

water. Now the extract was filtered through a double layered muslin cloth into a beaker. The collected liquid extract can now be labelled as 100% concentration of that extract. Now the liquid extract was poured into vials of 15 ml and were centrifuged in cooling centrifuge at 5000 rpm for 10 min. Later on the supernatant liquid was collected and further used for experiment. These plant extracts were diluted in PDA for the food poison technique at 5% and 10% concentration and the PDA was poured in different petri plates (90 mm). Next day from the 7 days old pure culture of *Rhizoctonia solani* (5mm) circular bits were cut out with the help of cork borer and were put on the centre of the poured petriplates. Now the plates were incubated in BOD at temperature (28 ± 2 °C) for 3 days. The mycelial growth of fungus was recorded at the interval of 24, 48, 72 hours after inoculation, and was compared with the plate without plant extract which is used as control. The Percent Growth Inhibition (PGI) was calculated by using the formula suggested by Vincent (1947) [8].

$$PGI = \frac{DC - DT}{DC} \times 100$$

Where,
PGI = Percent growth inhibition
DC = Average diameter of mycelial colony of control plate
DT = Average diameter of mycelial colony of treated plate

Table 1: List of botanicals and their concentration used in experiments

S. No	Common name	Scientific name	Plant parts used	Concentrations	
1.	Garlic	*Allium sativum*	Cloves	5%	10%
2.	Ajwain	*Trachyspermum ammi* L.	Seeds	5%	10%
3.	Tulsi	*Ocimum* spp.	Leaves	5%	10%
4.	Madar	*Calotropis gigantean*	Leaves	5%	10%
5.	Neem	*Azadirachta indica*	Leaves	5%	10%

Results and Discussion

In above experiment plant extracts effected the mycelial growth of pathogen significantly in *In vitro.* The results obtained are presented in (table 2 and Fig. 1). and plates in (Plate No. 1 and 2)

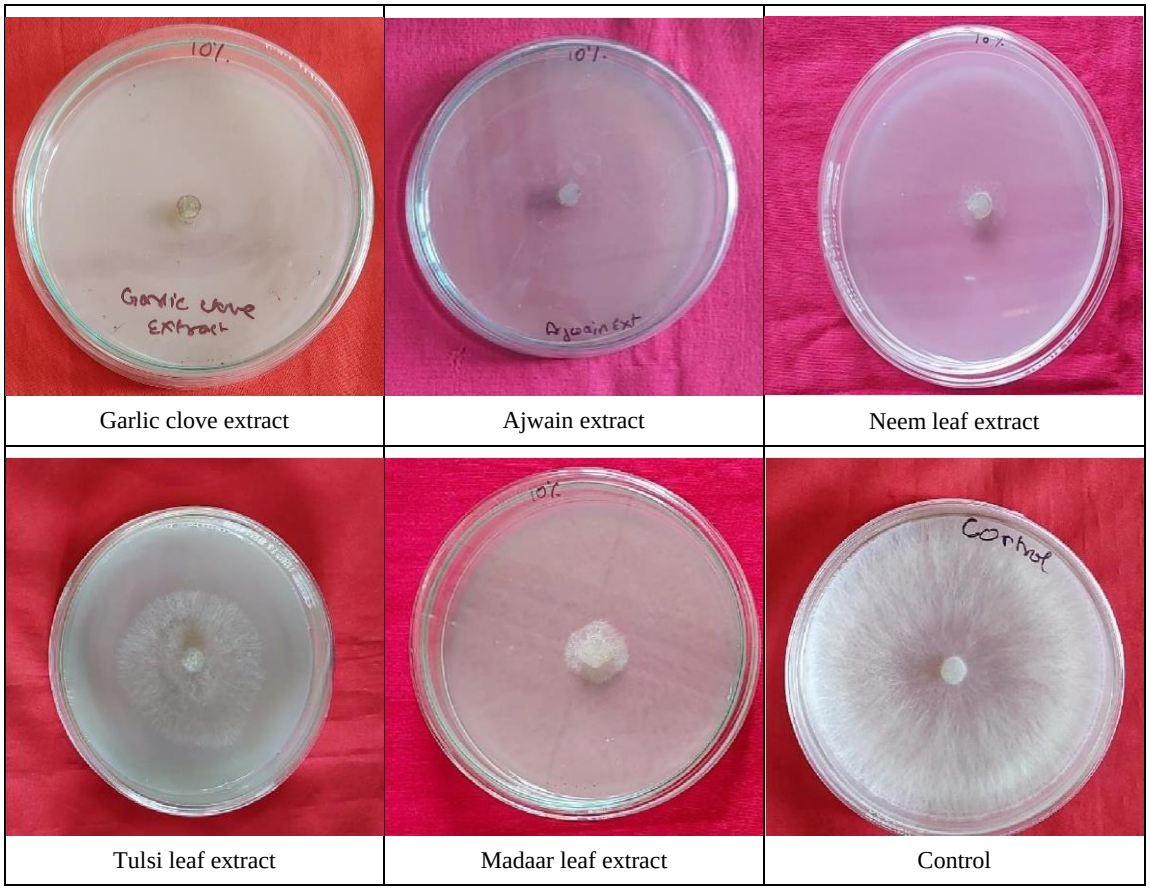
Among all phyto-extracts Ajwain seeds exhibited complete mycelial inhibition both @ 5% and 10% concentration. Garlic clove extract at 10% concentration also exhibited complete mycelial inhibition. *Calotropis* leaf extract exhibited (91.11%) inhibition at 10% concentration and neem leaf extract exhibited (87.03%) inhibition @ 10% concentration as well. *Ocimum* showed least mycelial inhibition *i.e.* (76.30%) at 5% concentration and (66.60%) at 10% concentration after 72 hours of inoculation.

Similarly, San Aye *et al.* (2011) [9] tested fungal growths were suppressed 100% by using garlic clove extract. Neem leaf, rosemary and pelargonium extracts were found to give the second best suppression against the tested fungi. Neem leaf extract inhibited the mycelial growth of *R. solani* by 87.5%. Chakrapani *et al.* (2020) [1] An attempt was made to investigate *In vitro* antifungal efficacy of botanicals *viz*., Garlic (*Allium sativum*), Marigold (*Tagetes* spp.), Eucalyptus (*Eucalyptus globules*), Turmeric (*Curcuma longa*), Ginger (*Zingiber officinale*), Onion (*Allium cepa*), and Tulsi (*Ocmium* spp.) by the technique of food poisoning. The pathogen *Rhizoctonia solani* was allowed to grow on Potato Dextrose Agar amended with various botanical extract of concentrations 2.5, 5.0 and 10 percent respectively. The effect of botanical extracts on mycelial growth inhibition was recorded after 72 hours of incubation. Among the botanicals used garlic showed cent of mycelial inhibition followed by Ginger (80.00%), Turmeric (78.51%), (Marigold (76.29%), and Eucalyptus (75.55%). The least mycelial growth inhibition was showed by Onion and Tulsi with (37.77%) respectively. Vikash Kumar Yadav *et al.* (2021) [10] An attempt was made to investigate the antifungal efficacy of botanicals *viz*., neem (*Azadirachta indica*), tulsi (*Ocimum sanctum*), garlic (*Allium sativum*), onion (*Allium cepa*) and ginger (*Zingiber officinale*) *In vitro* by poison food technique at 5 and10 percent concentrations. The bulb extract of garlic and ginger rhizome extract of ginger suppressed the mycelial growth (68.70 and 67.77 respectively) at 10% concentration followed by neem leaf extract (64.63%), bulb extract of onion (63.52%) and tulsi leaf extract (61.52%) at 8 days after inoculation.

Garlic clove extract | Ajwain extract | Neem leaf extract

Tulsi leaf extract	Madar leaf extract	Control

Plate 1: *In-vitro* evaluation of Plant Extract @ 5%



Garlic clove extract	Ajwain extract	Neem leaf extract
Tulsi leaf extract	Madaar leaf extract	Control

Plate 2: *In-vitro* evaluation of Plant Extract @ 10%

Table 2: Effect of different plant extract against the growth of *Rhizoctonia solani*

Plant name	Part used	% Inhibition after 72 hours of inoculation	
		5%	10%
Garlic (*Allium sativum*)	Cloves	88.5	100
Ajwain (*Trachyspermum ammi* L.)	Seeds	100	100
Tulsi (*Ocimum* spp.)	Leaves	76.30	66.01
Madar (*Calotropis gigantean*)	Leaves	88.14	91.11
Neem (*Azadirachta indica*)	Leaves	75.55	87.03
	S.E (m)	1.185	
	CD (5%)	3.498	

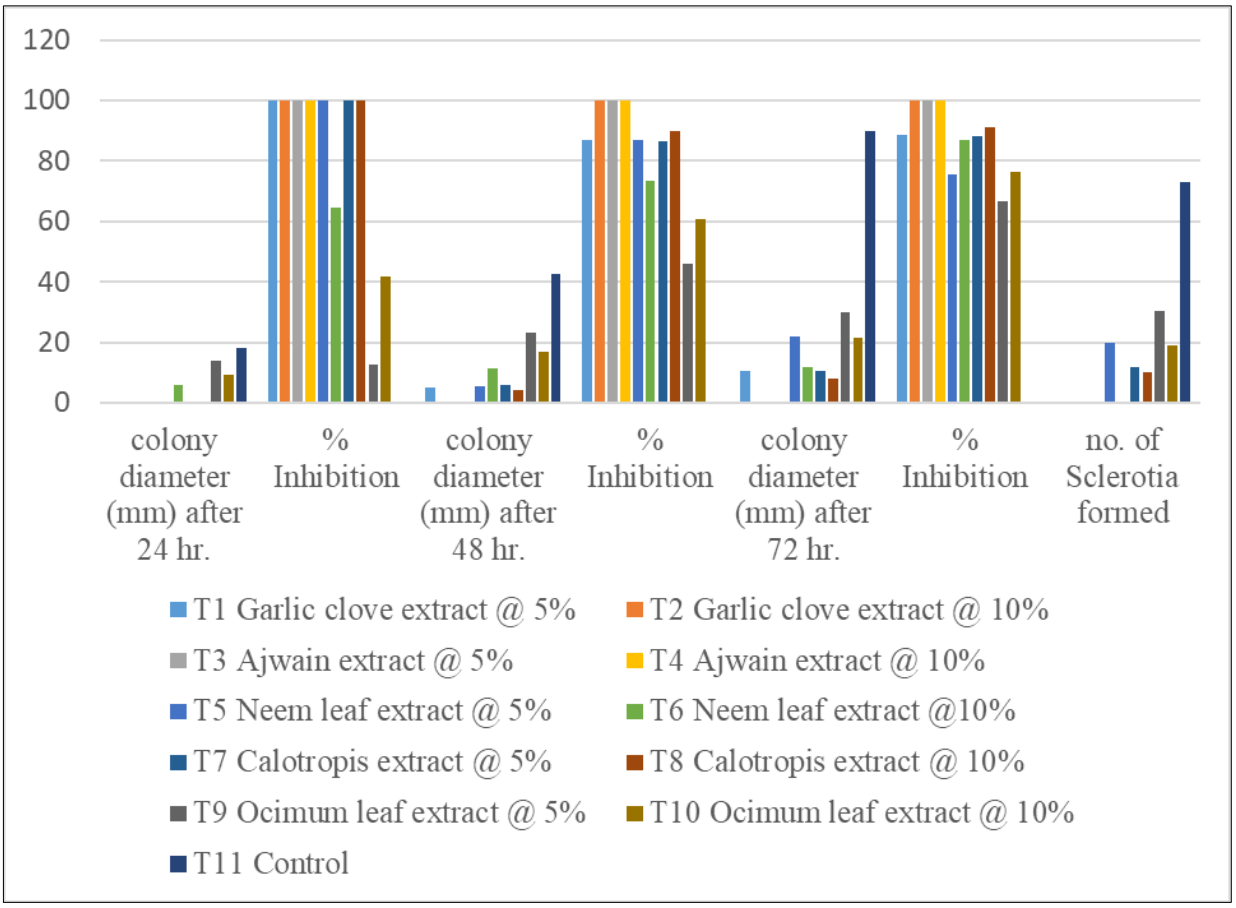


Fig 1: Effect of different plant extract against the growth of *Rhizoctonia solani*

Conclusion

From the above experiment we found that that among all the plant extracts Ajwain seed extract exhibited complete mycelial inhibition of *Rhizoctonia solani* at both 5% and 10% concentration. Whereas, garlic clove extract exhibited complete mycelilal inhibition at 10% concentration. So we can conclude that Ajwain seed extract are found best to inhibit mycelial growth of *Rhizoctonia solani* over other plant extracts.

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References

1. Chakrapani, Bireswar, Tampakleima, Chakma, Siram. Assessing *In vitro* antifungal activity of plant extracts against *Rhizoctonia solani* causing sheath blight of rice (*Oryza sativa*. L). Journal of Pharmacognosy and Phytochemistry. 2020;9(1):1497-1501.
2. Cherkupally R, Reddy SK, Hindumathi A, Reddy BN. *In vitro* antifungal potential of plant extracts against *Fusarium oxysporum*, *Rhizoctonia solani* and *Macrophomina phaseolina*, Annals of Plant science. 2017;6(9):1676-1680.
3. Kota Chakrapani, Bireswar Sinha, Chanu WT, Tusi C, Tokmem S. Assessing *In vitro* antifungal activity of plant extracts against *Rhizoctonia solani* causing sheath blight of rice (*Oryza sativa*. L), Journal of Pharmacognosy and Phytochemistry. 2020;9(1):1497-1501.
4. Yadav SL, Ghasolia RP. Management of root rot of fenugreek caused by *Rhizoctonia solani* using plant extracts and bio-agents, Arcc journals. 2022;45(3):391-395.
5. Kumar S, Kumar A, Tripathi HS., Urdbean web blight and its management strategies- A review, arcc journals. 2018;39(3).
6. Kumar Santosh, Tripathi HS. Evaluation of plant extracts against *Rhizoctonia solani* Kuhn, the incitant of web blight of urdbean, Plant disease Research. 2013;27:190-193.
7. Stangarlin, Kuhn OJ, Rondon M. Control of plant diseases using extracts from medicinal plants and fungi, Formatex; c2011. p. 1035.
8. Vincent JM. Distortion of fungal hyphae in the presence of certain inhibitors. Nature. 1974;159:239-241.
9. San Aye S, Matsumoto M. Effect of some plant extracts on *Rhizoctonia* spp. and *Sclerotium hydrophilum*. J. Med. Plants Res. 2011 Aug 18;5(16):3751-3757.
10. Yadav VK, Santos-González J, Köhler C. INT-Hi-C reveals distinct chromatin architecture in endosperm and leaf tissues of Arabidopsis. Nucleic Acids Research. 2021 May 7;49(8):4371-4385.