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In vitro evaluation of *Azadirachta indica* Juss leaves extract against *Fusarium solani* causing rhizome rot disease of *Zingiber officinale* Rosc

AA Gade, KA Kapratwar and SS Choudhari

Abstract
The *in vitro* aqueous and methanol leaves extract of *Azadirachta indica* Juss plant at different concentrations from 10 to 40% each was tested by following poisoned food technique. The different concentrations of leaves extract used were as 0.0 (control), 10, 20, 30 and 40%. The *Azadirachta indica* Juss aqueous leaves extract at 40% concentration was found to be most effective in reducing the mycelial growth of the pathogen. Similarly the methanolic leaves extract at 30% and 40% concentration was found to be most effective in reducing the mycelial growth of the pathogen.

Keywords: *Azadirachta indica, Fusarium solani,* rhizome rot, ginger

1. Introduction
Ginger (Zingiber officinale Rosc.) is an important commercial crop cultivated throughout India for its rhizome as spice. It has high medicinal value. Ginger (Zingiber *officinale* Rosc.) is an important commercial crop cultivated throughout India for its rhizome as spice and has high medicinal value. Among the major constraints for growing ginger is the rhizome rot. Even though important foliar diseases do exist, rhizome rot is very important in view of severe crop losses. It occurs in several parts of India wherever these crops are grown. The term rhizome rot is loosely used for all the diseases affecting the rhizome irrespective of pathogens involved, since the ultimate result is the partial or total loss of rhizome. Ginger is affected by several fungal pathogens during storage. Ginger is affected by several fungal pathogens during storage (Dohroo, 1993) [1]. Among which, rhizome rot caused by *Fusarium solani* is most common (Kumar, 1977) [2]. The efficacy of Alcoholic and aqueous extracts of leaves of *Swietenia macrophylla*, *Azadirachta indica*, *Hyptis suaveolens*, *Polyalthia longifolia*, *Boerhavia repens* var. *diffusa*, *Cassia tora*, *Tithonia diversifolia* and *Tridax procumbens* at 10, 25, 50, 75 and 100% was evaluated against *F. solani*, causing rhizome rot of ginger (Ramteke, and Kamble 2011) [5]. Due to the drawback of chemical control of plant diseases, the use of plant extracts in the management of plant diseases is gaining importance. Therefore, to control the rhizome rot disease *Azadirachta indica* plant aqueous and methanol leaves extracts were evaluated *in vitro* against *Fusarium solani*.

2. Materials and Methods
The *in vitro* aqueous and methanol leaves extract of *Azadirachta indica* Juss plant at different concentrations from 10 to 40% each was tested by following poisoned food technique as given by Mishra and Tiwari, (1992) [3]. Fresh and healthy leaves of *Azadirachta indica* Juss were collected locally and the leaves were washed under tap water followed by sterilized water, shade-dried and pulverized to obtain dry powder. The fine powder, and the precisely weighed amount of the powder was extracted with aqueous and 80% methanol solvents and was vacuum dried to obtain the dried aqueous and methanol extracts. One liter of 80% methanol extraction solvent was mixed with 200 g of powdered plant material. The mixtures were kept for 2 days in tightly sealed vessels at room temperature and stirred several times daily with a sterile glass rod. This mixture was filtered through muslin cloth. Further extraction of the residue was repeated 3 times until a clear colorless supernatant extraction liquid was obtained indicating that no more extraction from the plant material was possible.

The extracted liquid was subjected to water bath evaporation at 400 C to remove the solvent. The same procedure was used for the aqueous extract. The semi-solid extract produced was kept under a ceiling fan to dry. The extract was weighed and portion of it used for phytochemical screening (Thakare, 2004) [7].

To study the efficacy of plant extracts, the poisoned food technique was used (Nene and Thapliyal, 1973) [3]. The required amount of stock solution was mixed with sterilized molten PDA medium, respectively so as to get 10, 20, 30, and 40 per cent concentration. The medium was thoroughly shaken for uniform mixing of extract. 20 ml of medium was poured into 90 mm sterilized Petriplates and all plates were inoculated with actively growing 5 mm mycelial disc in the centre of media and incubated at room temperature for 7 days. Control was maintained without adding any plant extract to the medium. Three replications were maintained for each concentration and radial growth was measured in the form of millimeter (mm).

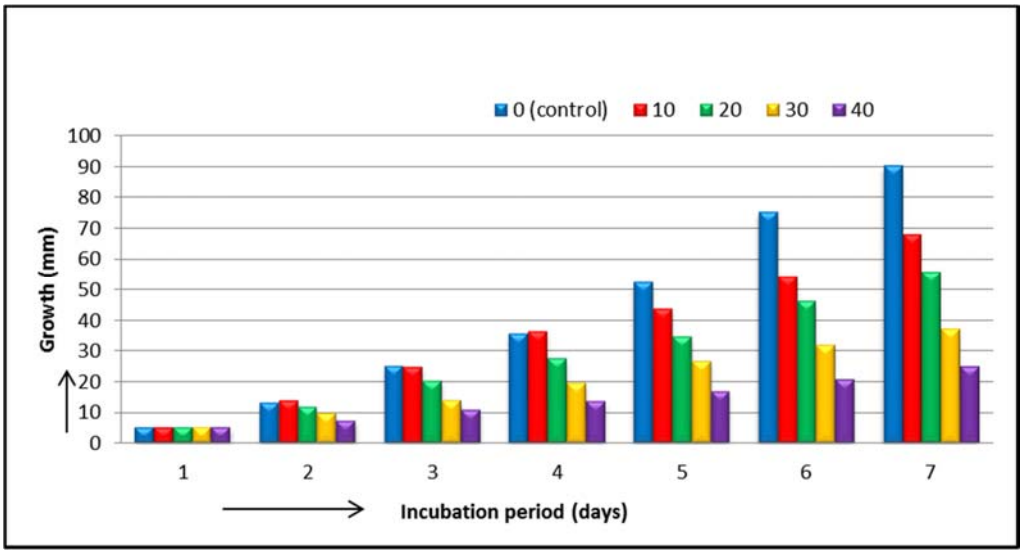
3. Results & Discussion

The aqueous and methanolic leaves extract of *Azadirachta indica* Juss plant was used to study its effect on growth of *Fusarium solani* causing rhizome rot of ginger. The different concentrations of leaves extract used were as 0.0 (control), 10, 20, 30 and 40%. The *Azadirachta indica* Juss aqueous leaves extract at 10% shows 67.66 mm growth, at 20% shows 55.66 mm growth, at 30% shows 37 mm growth, and at 40% shows 24.66 mm growth on 7th day of incubation period. 40% concentration was found to be most effective in reducing the mycelial growth of the pathogen. Similarly the methanolic leaves extract at 10% shows 32.66 mm growth, at 20% shows 13.66 mm growth, at 30% shows 5 mm growth, and at 40% shows 5 mm growth on 7th day of incubation period. 30% and 40% concentration was found to be most effective in reducing the mycelial growth of the pathogen. The observations indicated that, aqueous and methanolic leaves extract of *Azadirachta indica* Juss reduces the growth over control. The above data is shown in Table 1, Fig. 1. The above results are also in agreement with the other researcher as Sharma (1998) [6] observed that *Azadirachta indica* and *Agave americana* were most effective in reducing mycelial growth of *Fusarium oxysporum* f.sp. *zingiberi.*

Table 1: Effect of *Azadirachta indica* leaves extract against growth of *Fusarium solani*

Incubation period (Days)	Growth (mm)									
	Conc. of plant extract (%)									
	Aqueous					Methanol				
	0 (control)	10	20	30	40	0 (control)	10	20	30	40
1	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
2	13.33	14.00	11.66	9.66	7.33	14.00	9.66	5.00	5.00	5.00
3	25.00	24.66	20.33	14.00	10.66	21.33	14.33	5.00	5.00	5.00
4	35.66	36.33	27.66	19.66	13.66	33.66	18.66	7.00	5.00	5.00
5	52.33	43.66	34.66	26.33	16.66	48.00	23.33	8.66	5.00	5.00
6	75.00	54.00	46.00	31.66	20.66	64.66	26.00	10.00	5.00	5.00
7	90.00	67.66	55.66	37.00	24.66	79.33	32.66	13.66	5.00	5.00
SE ±	1.257	1.46	1.393	1.318	1.111	1.942	1.418	1.069	0	0
CD @ 5%	3.869	4.57	4.287	4.056	3.419	3.913	4.365	3.289	0	0

Fig 26: Effect of aqueous leaves extract of *Azadirachta indica* against growth of *Fusarium solani*



4. Conclusion

The present work is concentrated on finding out the effect of Aqueous and Methanolic extract of *Azadirachta indica* for controlling the rhizome rot disease caused by the pathogen *Fusarium solani* under *in vitro* condition. Methanolic extract of *Azadirachta indica* extract was most effective against this pathogen Aqueous plant extracts was not significantly effective in controlling the pathogen.

5. References

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