International Journal of Research in Pharmacy and Pharmaceutical Sciences
ISSN: 2455-698X; Impact Factor: RJIF 5.22
www.pharmacyjournal.in
Volume 2; Issue 1; January 2017; Page No. 14-16

Studies on effect of *Ocimum sanctum* L. leaves extract agaisnt *Fusarium solani* causing rhizome rot of ginger

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Abstract
The *in vitro* aqueous and methanol leaves extract of *Ocimum sanctum* L. 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 *Ocimum sanctum* L. aqueous leaves extract at 40 % and methanolic leaves extractat 30 % concentration was found to be most effective in reducing the mycelial growth of the *Fusarium solani*. 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: ocimum sanctum, fusarium solani, rhizome rot, ginger

1. Introduction
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 (Spices Board, 2005). 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 (Dohroo, 1993) [5]. Among which, rhizome rot caused by *Fusariumsolani* is most common (Kumar, 1977) [7].

The use of *Ocimum sanctum* L. (Tulsi) as an aromatic plant has been well documented in Ayuveda. It belongs to the family Labiateae. It is grown in tropical and sub-tropical including India (Banerjee *et al*., 1996). The leaves contain an essential oil, which contains eugenol, eugenal, carvacrol, methylchavicol, limatrol and caryophylline. The seeds contain oil composed of fatty acids and sitosterol. The roots contain sitosterol and three triterpenes A, B, and C. The leaves also contain ursolic acid and n-triacontanol. Eugenol, its methyl ether, nerol, caryophyllene, terpinen 4-decylaldehyde, selinene, pinenes, camphene and a-pinene have been identified in essential oil. Additionally, it also contains rosmarinic acid, thymol, linalool and methyl chavicol and citral etc (Dhar *et al*., 1968) [4]. Essential oil present in most of the *Ocimum* species is responsible for its antifungal, antibacterial and antiviral properties. Microoraganisms develop resistance against various antibiotics and due to this an immense clinical problem develops in treatment of infectious diseases. Medicinal plants can be used to overcome this problem. *Ocimum sanctum* leaves have been reported to show strong antifungal activities against the *Aspergillus niger*, A. fumigates (Bansod and Rai, 2008) [3] and against *Fusarium moniliforme* were also reported (Amadi *et al*., 2010) [1]. The use of botanicals or non chemical methods however, has a long history in the control of diseases (Pradhanang *et al*., 2003) [10].

2. Materials and Methods
The *in vitro* aqueous and methanol leaves extract of *Ocimum sanctum* L. plant at different concentrations from 10 to 40% each was tested by following poisoned food technique as given by Mishra and Tiwari, (1992) [8]. Fresh and healthy leaves of *Ocimum sanctum* L. 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) [12]. To study the efficacy of plant extracts, the poisoned food technique was used (Nene and Thapliyal, 1973). 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 Petri plates 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 *Oscimum sanctum* L. 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 *Ocimum sanctum* L. aqueous leaves extract at 10 % shows 73.66 mm growth, at 20% shows 53.66 mm growth, at 30% shows 39.66 mm growth, and at 40% shows 31.66 mm growth on 7th day of incubation period. 40 % aqueous concentration was found to be effective in reducing the mycelial growth of the pathogen. Similarly the methanolic leaves extract at 10 % shows 41.66 mm growth, at 20% shows 23.66 mm growth, at 30% shows 5 mm growth, and at 40% shows 5 mm growth on 7th day of incubation period. 30 % methanolic 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 *Ocimum sanctum* L. reduces the growth over control as mentioned in Table 1, Fig. 1 & 2.

Results were in favor to the findings of earlier workers Joseph *et al*., (2008) [6] who studied that *Ocimum sanctum* was effective against *Fusarium solani* f. sp. melongenae causing brinjal wilt. These results of the present investigation are clear indication for the potential of plant extracts to control fungal pathogens.

Table 1: Effect of *Ocimum sanctum* L. 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	12.00	9.00	7.00	14.00	12.00	7.00	5.00	5.00
3	25.00	24.66	17.66	12.66	10.66	21.33	17.66	9.66	5.00	5.00
4	35.66	37.66	25.66	18.66	15.66	33.66	22.66	12.66	5.00	5.00
5	52.33	51.66	37.66	23.66	20.66	48.00	27.66	15.66	5.00	5.00
6	75.00	64.66	45.66	31.33	25.66	64.66	34.66	18.66	5.00	5.00
7	90.00	73.66	53.66	39.66	31.66	79.33	41.66	23.66	5.00	5.00
SE ±	1.257	1.242	1.154	1.146	1.135	1.942	1.429	1.347	0	0
CD @ 5%	3.869	3.913	3.826	3.528	3.423	3.913	3.912	3.828	0	0

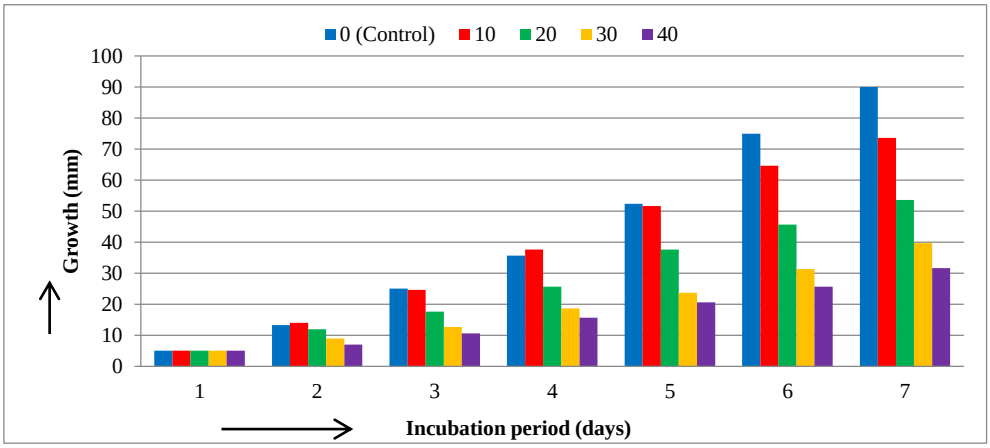

Fig. 1: Effect of aqueous leaves extract of *Ocimum sanctum* against *Fusarium solani*

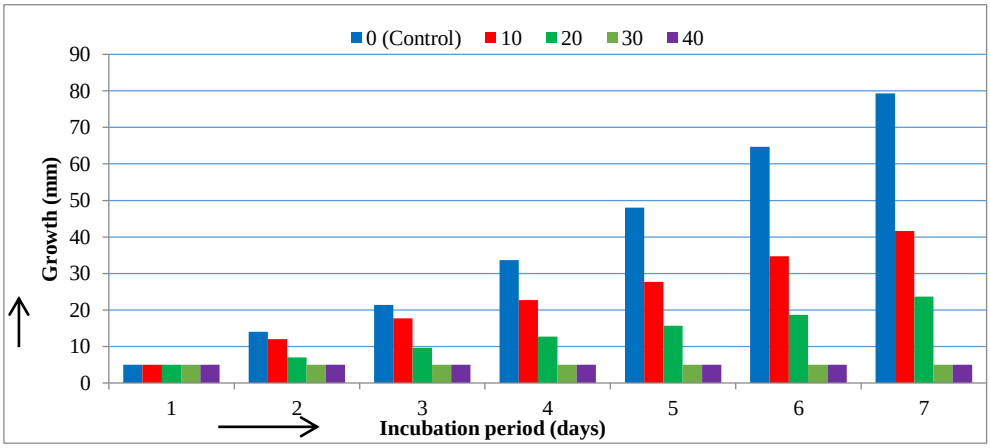

Fig. 2: Effect of Methanolic leaves extract of *Oscimum sanctum* against *Fusarium solani*

4. Conclusion

The present investigation showed that the active bioactive compounds from *Ocimum sancutum* can inhibit the growth of *Fusarium solani* for the control of rhizome disease of ginger. It is economical and easily available and could be used as a biocontrol agent control of rhizome rot disease of ginger. . It is suggested the farmers can use plant extracts along with minimum fungicides to increase yield of rhizome plants and reduce the environmental concerns regarding negative impact of fungicides.

5. References

1. Amadi JE, Salami SO, Eze CS. Antifungal properties and phytochemical screening of extracts of African Basil (Ocimum gratissimum L.). Agriculture and Biology Journal of North America. 2010; 1(2):163-166.
2. Banerjee S, Parashar R, Kumar A, Rao AR. Modulatory influence of alcoholic extract of Ocimum leaves on carcinogen-metabolizing enzyme activities and reduced glutathione levels in mouse. Nutr Cancer. 1996; 25(2): 205-217.
3. Bansod S and Ray M. Antifungal Activity if Essential Oils from Indian Medicinal Plants against Human pathogenic Aspergillus fumigates and A. niger. World Journal of Medicinal Sciences. 2008; 3(2): 81-88.
4. Dhar ML, Dhar MM, Dhawan BN, Mehrotra BN, Roy C. Screening of Indian plants for biological activity, Part I. Indian Journal of Experimental Biology. 1968; 6: 232-247.
5. Dohroo NP. ICAR report on Multilocational project on rhizome rot of ginger. Dr. Y.S. Parmar University of Horticulture and Forestry, Nauni- Solan. 1993; 38.
6. Joseph B, Muzafar AD, Kumar V. Bioefficacy of plant extracts to control *Fusarium solani* f. sp. melongenae incitant of brinjal wilt. Global Journal of Biotechnology & Biochemistry. 2008; 3(2): 56-59.
7. Kumar SNS. Ginger rot by *Fusarium solani*. Journal of Plant Crops. 1977; 5:122.
8. Mishra Tiwari. Toxicity of Polyalthia longifolia against fungal pathogens of rice. Indian Phytopath. 1992; 45(1):192-198.
9. Nene YL, Thapliyal PN. Fungicides in plant disease control, 3rd edition, Oxford and I B H Publishing Co., Pvt. Ltd., New Delhi, 1993.
10. Pradhanang PM, Momol MT, Olson SM, Jones JB. Effects of plant essential oils on Ralstonia solanacearum population density and bacterial wilt incidence in tomato. Plant Dis. 2003; 87:423-427.
11. Spices Board. Annual Report (2004-2005). Spices Board, Ministry of Commerce, Govt. of India, Cochin, 2005, 22.
12. Thakare M. Pharmacological screening of some medicinal plants as antimicrobial and feed additive. Masters' Thesis. Department of Animal and Poultry Science, Virginia Polytechnic Institute and State University, Blackburg, Virginia, USA, 2004.