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## *In vitro* evaluation of plant part extract on root rot fungi of soybean

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### Abstract

In the present investigation an attempt has been made to evaluate the bio-efficacy of different Plant extract against pathogenic fungi of soybean causing root rot disease. The plant which are used in present study, *Catharanthus roseus* leaf extract, *Ocimum tenuiflorum* leaf extract, *Azadirachta indica* leaf extract, *Withania somnifera* leaf extract, *Allium sativum* bulb and *Curcuma* rhizome extract were used, all the plant extracts show significant activity against all root rot fungi at 15% concentration. Maximum inhibition of *Macrophomina phaseolina* was observed in *Azadirachta indica* leaf extract where as that of *Sclerotium rolfsii* was inhibited significantly by *Curcuma* rhizome extract.

**Keywords:** Plant extract, root rot fungi of soybean, bio-efficacy

### 1. Introduction

Soybean (*Glycine max* (L.) merr.) is known as the golden bean of the 20<sup>th</sup> century. It belongs to family Fabaceae. It is the native of East Asia, it has a great potential as an exceptionally nutritive and very rich protein food. It provides much needed protein to human diets, because it contains more than forty percent protein of superior quality and all essential amino acids particularly glycine, tryptophan and lysine, similar to cow's milk and animal proteins. It also contains about twenty percent oil with an important fatty acid, lecithin and vitamin A and D. More than 100 pathogens are known to affect soybean, of which 35 are of economically important. Soybean diseases reduce yield, on an average of 10 to 30% in most production area (Sinclair 1994) [3]. Root rot disease of soybean is most destructive and causes severe damage. The traditional farmers use the chemical fertilizers and pesticides but it is very cost effective harmful having hazardous effects to human and cattle. Under such a paradoxical situation, it becomes imperative for the scientific community to evolve a novel strategy to increase the crop productivity without compromising the safety of the ecosystem which encompasses diversified flora and fauna. Application of one such novel strategy is the usage of biological methods for the disease management.

### 2. Materials and Methods

Fresh leaves of *Ocimum tenuiflorum*, *Azadirachta indica*, *Catharanthus roseus*, *Withania somnifera*, *Allium sativum* bulb, *Curcuma* rhizome were collected, washed, dried under shed and pulverized to obtain dry powder. For each plant extract 100 gm powder was taken. Extract of each plant was prepared with water and condensed to serve as stock extract or mother extract. The inhibitory action of stock extract was determined against *Rhizoctonia solani*, *Macrophomina phaseolina*, *Phytophthora sojae*, *Sclerotium rolfsii*, *Fusarium solani*, *Fusarium roseum*, *Fusarium oxysporum*, and *Fusarium moniliforme* by the food poisoning technique (Nene and Thapliyal, 1993) [2]. Petri plates containing PDA agar supplemented with different plant extracts with three replications were inoculated with 8 mm disc of mycelium, obtained from seven days old culture of fungal pathogen, the pathogen was isolated from diseased plant part of soybean. The agar plates were kept upside down and inoculated in BOD incubator at 27 °C ± 2 °C. The plates without plant part extracts were served as controlled. Radial growth of fungal colonies was measured at different intervals. Disease severity percentage was calculated and data was statistically analysed.

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### 3. Results and discussion

Effects of *Catharanthus roseus* leaf extract, *Ocimum tenuiflorum* leaf extract, *Azadirachta indica* leaf extract, *Withania somnifera* leaf extract, *Allium sativum* bulb and *Curcuma* rhizome extracts on root rot causing fungi of Soybean were studied and results are recorded in table no.1 *Ocimum tenuiflorum* leaf extract, *Allium sativum* bulb and *Curcuma* rhizome extract at 15% were significantly retarded the disease development of all root rot causing fungi of

soybean *Catharanthus roseus* leaf extract at 15 % was significantly hampered the disease development of *Rhizoctonia solani*, *Phytophthora sojae*, *Sclerotium rolfsii*, *Fusarium solani*, *Fusarium roseum* and *Fusarium oxysporum* where as *Withania* leaf at 15% was significantly reduced the same of *Rhizoctonia solani*, *Phytophthora sojae*, *Sclerotium rolfsii*, *Fusarium solani*, *Fusarium roseum* and *Fusarium oxysporum*.

**Table 1:** Effect of Plant part extract on root rot causing fungi of soybean

Sr. No.	Plant part extract	Disease Severity%							
		<i>Rhizoctonia solani</i>	<i>Macrophomina phaseolina</i>	<i>Phytophthora sojae</i>	<i>Sclerotium rolfsii</i>	<i>Fusarium solani</i>	<i>Fusarium roseum</i>	<i>Fusarium oxysporum</i>	<i>Fusarium moniliforme</i>
1	<i>Ocimum</i> leaf	41	44	29	39	26	43	29	31
2	<i>Azadirachta</i> leaf	38	32	37	42	34	32	33	41
3	<i>Catharanthus</i> leaf	52	59	49	51	48	51	38	45
4	<i>Withania</i> leaf	61	47	64	46	45	48	43	39
5	<i>Allium</i> bulb	49	39	43	41	41	30	25	27
6	<i>Curcuma</i> rhizome	46	49	41	34	39	34	43	33
7	Control	78	65	69	61	63	68	65	46
	S.D.	13.6	11.2	14.4	8.9	11.6	13.4	13.1	7.2
	S.E.	5.1	4.2	5.4	3.3	4.4	5	4.9	2.7
	C.D.(p=0.05)	13.2	10.9	14	8.6	11.3	13	12.7	7

*Ocimum tenuiflorum* leaf extract was most effective against diseases severity of *Rhizoctonia solani*, *Phytophthora sojae* root rot and *Fusarium solani* root rot.

Maximum inhibition of *Macrophomina phaseolina* root rot severity was caused by *Azadirachta indica* leaf extract whereas that of *Sclerotium rolfsii* root rot was caused by *Curcuma* rhizome extract. M. S. Wadikar and R. K. Nimbalkar (2015) [4] studied inhibitory activity of four different leaf extract against *Fusarium solani* and *Rhizoctonia solani*, and showed significant inhibition of *Fusarium solani* and *Rhizoctonia solani* at various concentrations i.e. 25, 50, 75 and 100 percent respectively. According to Chitra, *et al.* (2000) [1] the leaf extract of *Datura innoxia* inhibited spore germination of *Colletotrichum capsici*.

The main objective of this research work is to identify the best plant extract with a high level of inhibitory activity against root rot fungi of Soybean and also is an important step in developing plant based fungicides which are eco-friendly for the management of root rot fungi.

### 4. References

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