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## Inhibitory Effect of Plant Extracts on Root Rot fungi of Soybean (*Glycine max*)



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### **Introduction :**

The Soybean, *Glycine max* (L) Merrill, Native of Eastern Asia, is an ancient crop with hundreds of food, feed and industrial uses. It is a primary source of vegetable oil and protein concentrates (FAO, 2005). In India, Soybean has been a number one oil seed crop in terms of both area and production since 2005. The feasibility of growing soybean crop with minimum input management leads to the rapid expansion in area and production with the result that India now ranks fourth in terms of global soybean area sown and fifth in terms of soybean production after USA, Brazil, Argentina and China. In India, soybean is

mainly grown in the states of Madhya Pradesh, Maharashtra, Rajasthan, Karnataka, Andhra Pradesh, Chattisgarh, Nagaland and Gujarat as rain-fed crop during the rainy season (Kharif) season. Over the years, cultivation of the crop is instrumental in improving the socio-economic conditions of large numbers of small and marginal farmers in the rain-fed agro-ecosystem of central and peninsular India. The crop has potential of mitigating rampant protein energy malnutrition and functional compounds, initially soybean was free of diseases and insects in India, has received a great deal of attention all over the world as an important source of protein to alleviate the protein deficiency. It is comparatively cheaper than the animal sources of protein. All parts of the soybean plant are susceptible to diseases. 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).

The continuous and indiscriminate use of chemicals to manage the crop disease results in accumulation of harmful chemical residues in the soil, water and grains. Soybean is prone to root rot fungi like *Fusarium solani* and *Rhizoctonia solani*. *Fusarium* root rot appears at the lower taproot and lateral roots of soybean plants may appear brown to black in color and show cortical decay or vascular discoloration. Lateral roots may also die and decompose. *Rhizoctonia* root rot is most prevalent on seedling and young plants, causing a root and stem rot, particularly during prolonged wet periods.

In this study, attempts were made to discover inhibitory effect of plant extracts on root rot fungi which were isolated from infected plants of soybean from various places of Aurangabad District. Plant extracts of *Lantana camara*, *Tridax procumbens*, *Leucas zeylanica* and *Hyptis suaveolens* belonging different families of angiosperms are used for the present work. These plant extracts were tested for their inhibitory effect at various concentrations such as 25, 50, 75, and 100 percent respectively.

### **Materials and Methods:**

Fresh leaves of *Lantana camara*, *Tridax procumbens*, *Leucas zeylanica* and *Hyptis suaveolens* 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 *Fusarium solani* and *Rhizoctonia solani* by the food poisoning technique (Nene and Thapliyal, 1993) at 25, 50, 75 and 100 concentrations. Petri plates containing Czapek Dox agar supplemented with different plant extracts at the four concentrations with three replications were inoculated with 8 mm disc of mycelium, obtained from seven days old culture of fungal pathogen, the pathogen viz. *Fusarium solani* and *Rhizoctonia solani* was isolated from diseased plant part of soybean. The agar plates were kept upside down and inoculated in BOD incubator at  $27^{\circ}\text{C} \pm 2^{\circ}\text{C}$  the plates without leaf extracts were served as control. Radial growth of fungal colonies was measured at different intervals.

### **Result and Discussion:**

*Fusarium solani* and *Rhizoctonia solani* are common soil borne pathogen of economically important crop plant. In this present study, these fungi were isolated from soybean plant. Four plant leaves extract i.e. *Lantana camara*, *Tridax procumbens*, *Leucas zeylanica* and *Hyptis suaveolens* belonging different families of angiosperms. In the present work, attempts were made to discover potential inhibitory activity against *Fusarium solani* and *Rhizoctonia solani*. Four plant extracts tested for their inhibitory activity gave a significant inhibition of *Fusarium solani* and *Rhizoctonia solani* at various concentrations i.e. 25, 50, 75 and 100 percent respectively.

Table 1. Inhibitory effect of plant extracts on root rot fungi of Soybean

Leaf extract	Concentration %	Linear growth of fungus in mm	
		<i>Fusarium solani</i>	<i>Rhizoctonia solani</i>
<i>Lantana camara</i>	25	8.00	8.00
	50	00.00	00.00
	75	00 .00	00.00
	100	00 .00	00.00
<i>Tridax procumbens</i>	25	18.00	22.00
	50	00.00	16.00
	75	00.00	12.00
	100	00.00	8.00
<i>Leucas zeylanica</i>	25	00.00	00.00
	50	00.00	00.00
	75	00.00	00.00
	100	00.00	00.00
<i>Hyptis suaveolens</i>	25	16.00	20.00
	50	00.00	16.00
	75	00.00	8.00
	100	00.00	8.00
	<b>Control</b>	72.00	78.00

\*Radial growth of test fungus is a mean of replication

The result from table 1, leaf extracts of *Leucas zeylanica* and *Lantana camara* inhibited the radial growth of both root rot fungi of soybean at all concentration. *Tridax procumbens* and *Hyptis suaveolens* completely inhibited radial growth of *Fusarium solani* at 100 percent concentrations, are compared with control. *Tridax procumbens* and *Hyptis suaveolens* are less effective against *Rhizoctonia solani* were compared with control. These results were compared with many earlier findings of different workers. Leaf extracts of *Tephrosia purpurea* and *catharanthus roseus* showed maximum efficacy against *Macrophomina*

*phaseolina* and *sclerotium rolfsii* ( Wadikar and Nimbalkar, 2010.) According to Chitra, et. al, (2000) the leaf extract of *Datura inoxia* inhibited spore germination of *colletotrichum capcici*. Biswas and Gupta (1981) described the symptoms induced on gram by isolated of *Macrophomina phaseolina*, *Fusarium oxysporum*, *Fusarium Ciceri* and *Sclerotium rolfsii* inoculated separately or in combination.

The aim of this research work is to identify the best plant extract with a high level of inhibitory activity against *Fusarium solani* and *Rhizoctonia solani* and also is an important step in developing plant based pesticides which are eco-friendly for the management of root rot fungi.

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