

EFFICACY OF SOME BOTANICALS AGAINST SEED - BORNE FUNGI OF GREEN GRAM (*PHASEOLUS AUREUS* ROXB.)

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ABSTRACT

Green gram (*Phaseolus aureus* Roxb.) is one of the most important legume crops grown in Marathwada region. The seeds of green gram are found to be heavily infested with variety of fungi. These associated fungi are known to deteriorate the seeds and seed contents. The efficacy of aqueous extracts of some plants was tested against the growth of the fungi isolated from the seeds of green gram. Poisoned food technique was employed. The plant extracts were found to be inhibitory for the growth of the test fungi.

Key words: Antifungal activity, botanicals, green gram, poisoned food technique, seed - borne fungi.

INTRODUCTION

Legumes constitute a very important daily diet. The seeds of legumes are found to be heavily infested with variety of fungi. These associated fungi are known to deteriorate the seeds and seed contents. Neergaard (1977) stated that, the leguminous crops carry seed-borne diseases so commonly. The pulse seeds are reported to carry many moulds in field and during storage (Rangaswami, 1966). The fungi associated with the seeds bring about several undesirable changes making them unfit for consumption (Bhikane, 1988). The seeds of green gram are found to be heavily infested with variety of fungi (Ramnath *et al.*, 1970; Agarwal *et al.*, 1973; Mali *et al.*, 2007).

Traditionally the fungal diseases of plants are controlled by using synthetic fungicides. The use of the fungicides is not only expensive, but also hazardous to the environment. On the other hand, the indiscriminate use of pesticides may result into development of resistance in the pathogens. To overcome these problems, some alternative control methods must be employed. The antifungal action of plant extracts has gained much attention. Now days, plants are being used against many plant pathogenic fungi. The plants serve as ecofriendly and economic biocontrol agents.

Keeping this in view, the present report aims to study the efficacy of some plant extracts against the fungi isolated from the seeds of green gram.

MATERIALS AND METHODS

Locally available plants were taken to study their antifungal effect on the growth of fungi isolated from the seeds of green gram. Efficacy of leaf extracts of *Annona squamosa*, *Azadirachta indica*, *Adhatoda vasica*, *Ocimum sanctum*, *Polyalthia longifolia*, *Tridax procumbens*, rhizome extracts of *Curcuma longa* and *Zingiber officinale*, bulb extract of *Allium cepa* and clove extract of *Allium sativum* was studied by poisoned food technique (Nene and Thapliyal, 1979). Ten grams of the plant part was ground with 100 ml sterile water. It was filtered through two layers of muslin cloth. The extract was heated to 55^o C in water bath for 15 minutes. This extract was added to Potato Dextrose Agar (PDA) medium to obtain 1:1 final concentration and was autoclaved. The medium was then poured into Petri plates. A small disc (0.7 cm) of the actively growing fungus culture grown on Potato Dextrose Agar for seven days was cut with a sterile cork borer and transferred aseptically in the centre of the Petri plate containing agar medium and plant extract. Suitable checks were kept where the culture discs were grown under the same condition on Potato Dextrose Agar medium without plant extract. The fungus colony diameter compared with the check, was taken as a measure of the fungitoxicity. Per cent inhibition was calculated by using the formula:

$$\text{Percent inhibition} = \frac{\text{Control} - \text{Treatment}}{\text{Control}} \times 100$$

RESULTS AND DISCUSSION

From Table-1, it becomes clear that, all the plant extracts inhibited the mycelial growth of the fungi on culture medium. The leaf extract of *Annona squamosa* caused maximum inhibition of mycelial growth of *Curvularia lunata* (59.6%), *Phytophthora* sp. (55.2%) and *Alternaria alternata* (50.7%). *Azadirachta indica* effectively inhibited the growth of *Fusarium oxysporum* (58.5%), *Asperillus niger* (58.1%), *Rhizoctonia solani* (55.0%) and *Curvularia lunata* (54.8%). *Adhatoda vasica* was found to be inhibitory to *Rhizoctonia solani* (62.5%), *Asperillus niger* (60.8%) and *Phytophthora* sp. (52.2%), *Ocimum santum* caused maximum inhibition of growth of *Rhizoctonia solani* (60.0%), *Curvularia lunata* (53.2%) and *Alternaria alternata* (50.7%). *Polyalthia longifolia* proved highly inhibitory to *Phytophthora* sp. (59.7%), *Asperillus*

niger (55.4%), *Rhizoctonia solani* (53.7%) and *Alternaria alternata* (52.3%). *Tridax procumbens* inhibited the growth of *Fusarium oxysporum* (55.7%) and *Alternaria alternata* (53.8%). The rhizome extract of *Curcuma longa* inhibited the mycelial growth of *Rhizoctonia solani* (61.2%), *Curvularia lunata* (61.2%), *Asperillus niger* (60.8%), *Alternaria alternata* (58.4%) and *Cladosporium* sp. (53.8%). The rhizome extract of *Zingiber officinale* was inhibitory to *Fusarium oxysporum* (61.4%), *Cladosporium* sp. (57.6%) and *Alternaria alternata* (52.3%). The bulb extract of *Allium cepa* inhibited the growth of *Alternaria alternata* (55.3%) and *Rhizoctonia solani* (52.5%). The clove extract of *Allium sativum* was most effective for inhibition of mycelial growth of *Fusarium oxysporum* (62.8%), *Asperillus niger* (62.1%) and *Rhizoctonia solani* (61.2%).

Table 1 :Effect of plant extracts on mycelial growth of seed-borne fungi of green gram.

Plants	Diameter of fungal growth (mm)						
	Aal	Fox	Rso	Clu	Phy	Ani	Clu
<i>Annona squamosa</i>	32 (50.7)	42 (40.0)	53 (33.7)	29 (44.2)	30 (55.2)	40 (45.9)	25 (59.6)
<i>Azadirachta indica</i>	30 (53.8)	29 (58.5)	36 (55.0)	27 (48.0)	38 (43.2)	31 (58.1)	28 (54.8)
<i>Adhatoda vasica</i>	34 (47.6)	46 (34.2)	30 (62.5)	25 (51.9)	32 (52.2)	29 (60.8)	31 (50.0)
<i>Ocimum sanctum</i>	32 (50.7)	51 (27.1)	32 (60.0)	28 (46.1)	38 (43.2)	48 (35.1)	29 (53.2)
<i>Polyalthia longifolia</i>	31 (52.3)	43 (38.5)	37 (53.7)	25 (51.9)	27 (59.7)	33 (55.4)	35 (43.5)
<i>Tridax procumbens</i>	30 (53.8)	31 (55.7)	62 (22.5)	29 (44.2)	52 (22.3)	45 (39.1)	36 (41.9)
<i>Curcuma longa</i>	27 (58.4)	38 (45.7)	31 (61.2)	24 (53.8)	50 (25.3)	29 (60.8)	24 (61.2)
<i>Zingiber Officinale</i>	31 (52.3)	27 (61.4)	42 (47.5)	22 (57.6)	55 (17.9)	58 (21.6)	38 (38.7)
<i>Allium cepa</i>	29 (55.3)	50 (28.5)	38 (52.5)	30 (42.3)	43 (35.8)	60 (18.9)	37 (40.3)
<i>Allium sativum</i>	37 (43.0)	26 (62.8)	31 (61.2)	26 (50.0)	39 (41.7)	28 (62.1)	33 (46.7)
Control	65	70	80	52	67	74	62

Figures in parentheses indicate per cent inhibition of mycelial growth over control. Aal – *Alternaria alternata*, Phy – *Phytophthora* sp., Fox – *Fusarium oxysporum*, Ani – *Asperillus niger*, Rso – *Rhizoctonia solani*, Clu – *Curvularia lunata*, Cla – *Cladosporium* sp.

This study reveals that, these plant extracts showed antifungal activity and can be used in control of the fungi associated with green gram. Much work has been done on the use of plant

extracts against the plant-pathogenic fungi. Extract of *Allium cepa* was effective against *Alternaria tenuis* and *Curvularia lunata* (Misra and Dixit, 1976).

Leaf, flower and stem extracts of *Vinca rosea* were effective against *Fusarium oxysporum* (Advash Narain and Satapathy, 1977). *Cinamomum camphora*, *Catharanthus roseus* and *Azadirachta indica* were inhibitory against *Curvularia lunata* (Bhowmick and Vardhan, 1981). The leaf extract of *Clerodendrum aculeatum* was effective against *Alternaria alternata* on tomato (Sharma, 1992). *Allium cepa*, *Allium sativum*, *Azadirachta indica*, *Calotropis procera*, *Datura stramonium*, *Ocimum sanctum*, *Tagetes erecta*, *Vinca rosea* and *Withania somnifera* showed fungicidal property against *Fusarium oxysporum* and *Rhizoctonia solani* (Shivpuri et al., 1997). The extracts of *Azadirachta indica*, *Ocimum sanctum* and *Vitex negundo var. purpurescens* were effective against *Geotrichum candidum* and *Cladosporium oxysporum* (Abraham and Prakasan, 2001). Leaf, stem and bark extracts of *Azadirachta indica* were found to be effective against some bacteria (Arora et al., 2005). The extracts of *Allamanda cathartica*, *Cassia tora*, *Bixa orellana*, *Clerodendron inerme* and *Terminalia chebula* showed antifungal activity against *Alternaria brassicola* (Das and Das, 2005). The extracts of *Polyalthia longifolia*, *Annona squamosa*, *Curcuma longa* and *Azadirachta indica* were found to inhibit *Alternaria solani*, *Curvularia lunata* *Fusarium oxysporum* (Swami and Mukadam, 2006). *Catharanthus roseus*, *Ocimum sanctum* and *Euphorbia pulcherrima* were effective against *Colletorichum gloeosporioides*, *C. dematium*, *Aspergillus flavus* and *Fusarium oxysporum* (Sreelatha and Bagyanarayana, 2008). The extracts

of *Adhatoda vasica*, *Allium cepa*, *A. sativum*, and *Azadirachta indica* caused inhibition of *Curvularia penneaseti* (Singh, 2008). The extracts of *Polyalthia longifolia*, *Annona squamosa* and *Tridax procumbens* were found to be inhibitory for the growth of *Alternaria porri*, *Aspergillus niger*, *Fusarium oxysporum* and *Cladosporium allii* (Ghangaonkar, 2007). The extracts of onion bulbs and garlic cloves were effective against *Drechslera oryzae* (Sunder et al., 2010). The extracts of *Allium sativum*, *A. cepa* and *Azadirachta indica* showed antifungal activity against white rust and blight of mustard (Yadav, 2009). *Azadirachta indica* was effective against *Fusarium udum* (Pradeep Kumar Singh et al., 2010). *Abrus precatorius*, *Andrographis Paniculata* and *Asparagus racemosus* showed fungicidal property against *Rhizoctonia solani* (Tiwari and Kuntal Das, 2011). Garlic clove extract inhibited growth of for *Sclerotinia sclerotiorum* (Yadav et al., 2011). *Azadirachta indica*, *Allium cepa* and *A. sativum* showed antifungal property against *Alternaria alternata* (Lakshman Prasad Balai and Ahir, 2011). The extracts of *Eucalyptus* sp., *Datura stramonium* and *Calotropis procera* inhibited the growth of *Fusarium oxysporum* f.sp. *chrysenthemii* (Singh et al., 2011).

ACKNOWLEDGEMENT

The first author is grateful to University Grants Commission, West Regional Office (WRO), Pune for the financial support. The authors are also thankful to Principal, Dayanand Science College, Latur for laboratory facilities.

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How to Cite this Article:

C S Swami and S K Alane, 2013. Efficacy of some botanicals against seed – borne fungi of green gram (*Phaseolus aureus* Roxb.). *Biosci. Disc.*, **4**(1):107-110.