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Biofungicide Activity of *Parthenium hysterophorus* Leaves Extract Against Phytopathogenic, *Phytopthora capsici* fungi

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Abstract:- ***Parthenium hysterophorus*** **leaf extracts were tested in vitro for fungitoxic activity against** ***Phytopthora capsici*** **isolated from** ***Solanum melongena*** **eggplant and** ***Capsicum annuum*** **in various solvents such as acetone, ethanol, methanol, and aqueous. Fungitoxicity was assessed using the food poisoning technique, which involved utilising various extracts at 200mg/ml and recording their activity as radial growth and percentage inhibition. Ethanol and acetone extracts were the only ones to completely stop the fungus from growing. Methanol inhibited the fungus by 50%, whereas the aqueous extract had no effect. The results of this study show that ethanol and acetone extracts of** ***Parthenium hysterophorus*** **can be utilised as a biofungicide to suppress pathogenic fungus.**

Keywords:- *Biofungicide, Phytopthora capsici, Parthenium hysterophorus, Extract, Fungus.*

I. INTRODUCTION

Plant diseases are caused by fungi, which are second only to insects as a cause of substantial loss of plant goods. It has the potential to reduce the productivity of important food and cash crops by roughly 20%.[1] The genus Phytophthora (Pythiaceae, Peronosporales, Oomycota, Chromista) has about 180 species reported to date, however the real number of species in this genus is at least double, if not treble, according to a conservative estimate. Many Phytophthora species, such as *Phytophthora infestans*, *Phytophthora cinnamomi*, and *Phytophthora ramorum*, are plant diseases that cause major crop losses and tree decline all over the world.[2,3]

The most destructive *Phytophthora capsici* causes root rot in Capsicum (*Capsicum annuum*) and Egg plant (*Solanum melongena*).[4] Chemical management strategies are used to prevent plant illnesses as well as to protect crop plants and other plants from infections. Chemicals have proven to be quite effective in managing plant fungal diseases, but some key issues threaten to limit the use of fungicides in the future. To begin with, some fungi have developed chemical resistance. This needs greater dosages as well as the creation of new compounds to replace those that are resistant to fungus. Some fungicides are not easily biodegradable and can stay in the environment for years, polluting soil and water. This leadsto the third issue: the harmful effects of pesticides on creatures other than the target fungi.[5] As a result, natural materials from some plants have been utilised to control plant diseases that produce antifungal substances, avoiding the harmful effects of drugs. Biological screening of plant extracts is conducted all over the world to determine their antifungal activity. Many higher plants and their constituents have proven to be effective in the management of plant diseases while also being safe and non-phytotoxic.[6]

Plant-based fungicides are non-toxic and safe for the environment. Farmers can simply produce extracts from various plant resources. As a result, in recent years, biopesticide development has been prioritised as a potential pest management technique. The main criteria of such biopesticides are that they should be safe for humans and other organisms, degrade quickly, and have a narrow range of activity. If the antifungal property is found in weeds, it will be quite beneficial. As a result, *Parthenium hysterophorus*, a weed, was used in this investigation.[7,8]

The goal of this study was to see how effective different extracts of *Parthenium hysterophorus* leaves were at controlling phytopathogenic fungi like *Phytophthora spp.* that were isolated from the solanaceae family.[9,10,11]

Fig 1:- Parthenium hysterophorus

II. MATERIAL AND METHOD

Collection of Plant Parts:-

Fresh and Healthy leaves of *Parthenium hysterophorus* were collected from different localities of near by LPU University Jalandhar, Punjab. These collected leaves were thoroughly washed , shade & dried than converted into powdered from by the use of grinder mixer.

Preparation of Plant extract:-

For the preparation of Plant extract the concentration which was selected was 400mg/ml and 40 gram leaf powder were mixed with 200ml of solvent (methanol, ethanol, aqueous & acetone). The extraction method was carried out by soxhlet extraction method & followed by filtering using Whatman's filter paper no. 1. After filteration it was evaporated until $1/5^{th}$ of the total volume remained and the final content was stored at $4^{o}C$ for further use in airtight bottles.

Isolation of test fungus:-

Phytopthora capsici were isolated from the infected leaves, roots of Capsicum (*Capsicum annuum*), Eggplant (*Solanum melongena*). The media used was PDA (Potato Dextrose Agar). Pure culture of fungus was maintained on PDA at 27± $2^{o}C$.

Antifungal Assay:-

Antifungal Activity of Plants was determined by food poison technique.(1,17) 3ml of Standard extracts was mixed with 50ml of Potato Dextrose Agar (PDA) and autoclaved. Aseptically transferred autoclaved medium into petriplates.[12,13] They were inoculated with a 3 mm inoculum plug of the 7-day-old culture of test fungus and incubated at 272°C for 7 days after the media had solidified. The radial diameter was measured in millimetres after the incubation period. Petriplates without the test extracts but with identical quantity of sterilised water served as negative control whereas the petriplate together with antifungal griseofulvin (5 mg/ml) served as positive control. The following formula was used to convert radial mycelium growth on various extracts into inhibition percentage.[14]

Inhibition percentage = (Gr – Gd / Gr) x 100
Gr= Radial diameter of control - diameter of inoculums plug, Gd = Radial diameter of plate with extract- diameter of inoculum plug.[15]

III. RESULT AND DISCUSSION

Various extracts of *Parthenium hysterophorus* yielded different outcomes in studies. The antifungal activity of *Parthenium hysterophorus* against the test fungus is shown in Table A& B. The aqueous extract of the leaves of *Parthenium hysterophorus* found to be almost inactive against test fungus. The percentage inhibition given by aqueous extract was 0.88% in capsicum with radial diameter of 56 mm and 0% in eggplant with radial diameter of 55 mm. The methanol extract showed approximately 50% inhibition i.e. 53.99% in capsicum and 56.18% in eggplant, while inhibition percentage with ethanolic and acetonic extract was found to be 100%. The petriplates showing negative control gave the radial diameter of 56.5 mm in capsicum while 55 mm in eggplant.

The antifungal activities of ethanolic and acetonic extracts of leaf powder of *Parthenium hysterophorus* were significantly active against the tested organism, while methanolic extract had lower antifungal activity and aqueous extract had no activity against the tested organism, according to the above experimental results.

RADIAL GROWTH (mm)		
EXTRACTS	*Capsicum. annuum*	*Solanum. melongena*
Aqueous	56 ± 0.3	55 ± 0.1
Methanol	26 ± 0.15	24 ± 0.12
Ethanol	0 ± 0.0	0 ± 0.0
Acetone	0 ± 0.0	0 ± 0.0
Control	56.5 ± 0.1	55 ± 0.15

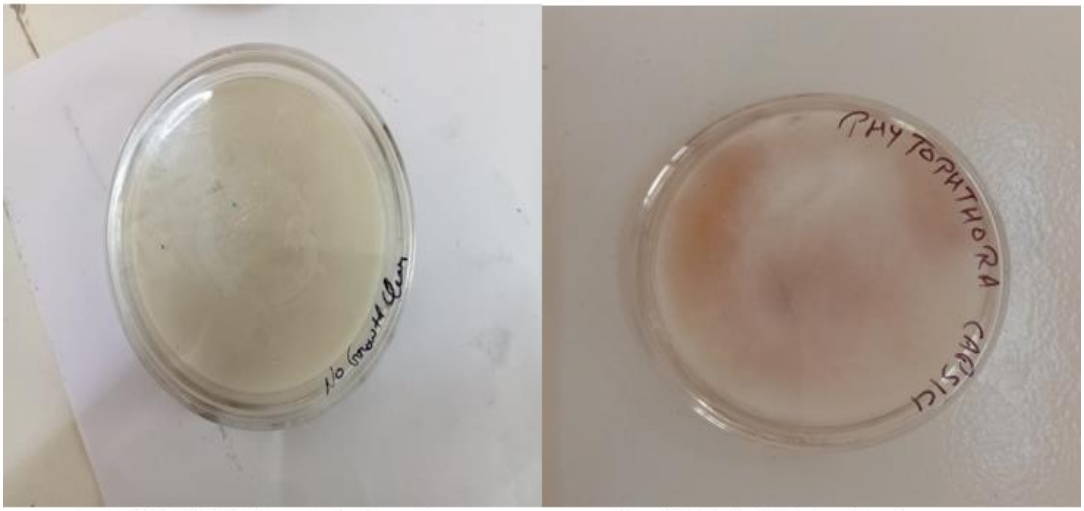
Table:-A.

PERCENTAGE INHIBITION (%)		
EXTRACTS	*C. annuum*	*S. melongena*
Aqueous	0.88	0%
Methanol	53.99	56.18
Ethanol	100	100
Acetone	100	100
Control	———	———

Table:-B

- Antifungal Activity of *Parthenium hysterophorus* Against *Phytopthora spp.*

A. B.



A. 100% Inhibition in Ethanol B. 100% Inhibition in Acetone

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