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Effect Of*Parthenium Hysterophorus* Linn. *On Seed* Germination, And Studies The Antimicrobial Activities.

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Abstract

Parthenium(*Parthenium hysterophorus* L.) has become an invasive woody plant in recent times in many part of the world affecting the agricultural productivity. Hence we carried out to evaluate the effect of different part of the plant leachate on seed germination and metal tolerating capacity of the seeds against iron, mercury and nickel during germination. The extracts obtained from aerial parts of *P. hysterophorus* was evaluated for antimicrobial activity against bacterial species (*Escherichia coli)* and fungal species (*Aspergillus niger*, *Fusarium oxysporum*). In the present study show the importance of weeds can be used to obtain growth factors easily in aqueous medium and that can be utilized for producing new bioactivity compounds having *antibacterial* and *antifungal activity.*

Keywords: Parthenium, Seed germination, Metal tolerance, Antimicrobial.

INTRODUCTION

Parthenium hysterophorus is an invasive weed plant of family Asteraceae. This erect, short-lived plant known for its flourishy growth and its abundance notably in hot climates. *Parthenium* is known with different names in different countries such as carrot weed, star weed, congress grass, wild feverfew, ragweed, chatak chandani, and bitter weed. The word *Parthenium* is taken from the Latin word parthenice which means for medicinal uses [(1)]. *Parthenium hysterophorus* is

widely distributed as anoxious weed in waste lands, degraded soil, rock crevices, along water canal, bunds, road sides, railway tracks, coalfield areas and recently invaded in cropped areas. The management of this weed is a great problem and different management methods like mechanical, legal, biological and chemical are approached for its eradication. (2). *Parthenium hysterophorus* L. is a weed and causes severe allergies to human being, But these plant also therapeutic applications, such as traditional medicine to treat amoeboitic dysentery and also reported its applications in treating malaria, neurologic disorders, urinary infections, fever, and dysentery(3).Positive and negative, both allelopathic effects of Parthenium have been reported on many agricultural crops and many plant species. Allelopathic effects of these *Parthenium* are often observed on seed germination. *Parthenium is* also used to study theeffect of leachate on metal tolerance capacity during Seed Germination in which we used different seeds and three types of metals (4). The antimicrobial activity of plant and weeds leachates is depends on the phytochemicals that present in it, The study confirmed the methanol and acetone leachates of congress grass shows the antifungal activity and alcohol leachates shows theantibacterial activity.(2)(5)

Materials And Methods:

Collection of sample

Fresh *Partheniumhysterophorus* plant were collected from the open place, jalna, Maharashtra. In practical laboratory, different parts of the plant were separated viz flowers. leaves, and root. The parts were thoroughly washed 2-3 times with sterile distilled water. The parts were airdry and used for further experimentation.(6)(11)

Preparation of plant leachate.

Parthenium hysterophorus plant parts such as flowers, leaves and root, 100 gm each were soaked separately in 200 ml distilled water for 24 hours. After filtration used this leachate for study the activity on seed germination. For antimicrobial activities, plant leaves were soaked separately in ethanol, methanol and acetone.(4)

1) Effect Of*Parthenium* Leachate On Seed Germination.

After the preparation of plant leachate of different part such as flowers, leaves and root are used to treat the different seeds such as ground nut, wheat , jawar, and fenugreek(methi) Each seeds treated with all this three type of leachate . The seeds were purchased from local market. 5-10 each seeds were taken and treated with 10 ml of different leachate for 2 hours, and for the control, seeds were soaked in distilled water. After the leachate treatment the seeds were placed in a petridish on a two layered moistened filter paper and growthwas measured after four days. This leachate treated some seeds shows growth and some seeds inhibited the growth. As per the result observed and noted, parthenium shows positive and negative, both allelopathic effects on seed germination.(4)(8)(10)

2) Effect On Metal Tolerance Capacity During Seed Germination.

A set of 05 different seeds were taken, in that we used ground nut, wheat, jawar, cowpea (chavali), mung(moong), chick pea(chana), and mat bean(mataki). All this seeds were soaked in a solution of 10 ml of different metals (concentration 1mg/ml) such as FeCl3, HgCl2, and Ni (So4)2 solutions. Following this, the seeds were treated with root and leaf leachates, for control seeds were treated with distilled water. After the leachate treatment the seeds were placed in a petridish on a two layered moistened filter paper and growthwas measured after four days. The seeds growth were observed of germination in that root and shoot length was measured after four days. after that we noted the results and every part of the plant leachate shows different activities Some seeds are shows metal tolerance capacity and this capacity also vary as three different metal. and two different leachate (leaf and root).(4)

3) Antimicrobial activity.

I) *Antibacterial activity*:

Antibacterial activity of solvent extracts; ethanol, was determined by disc diffusion method on nutrient agar medium: Peptic digest of animal tissue, 5.0 g; NaCl, 8.0 g; Beef extract, 3.00 g; Agar, 15.0 g; Distilled water, 1 lt. Media was sterilized by autoclaving at 15 lb. pressure for 15

minutes and plates were prepared. Inoculums containing solution of bacteria *Escherichia coli* were spread on the solid nutrient agar plates with a sterile swab. Sterile Whatmann filter discs (5 mm diameter) were made and impregnated in 20 µL of plant leaves leachate were placed nutrient agar plates pre-inoculated with test *Escherichia coli* culture. The treatments also included 20 µl of solvents such as ethanol served as control and plates were incubated for 24 h at 37ºC and zone of inhibition were measured in mm(millimeter).[3][7]

II) Antifungal activity:

Antifungal activity of solvent extracts; Methanol, and acetone was determined by disc diffusion method on Czapek-dox agar medium: sucrose, 5.0 g; $NaNo_3$, 0.3 g; KH_2PO_4, 0.1 g; KCL,0.05 g; MgSO4.7H_2O,0.05 g; FeSO4.7H_2O,0.05 g; Agar,1.5 g ; Distilled water, 100ml. Media was sterilized by autoclaving at 15 lb. pressure for 15 minutes and plates were prepared. Inoculums containing solution of fungal species (*Aspergillus niger*, *Fusarium oxysporum*). were spread on the solid Czapek-dox agar plates with a sterile swab. Sterile Whatmann filter discs (5 mm diameter) were made and impregnated in 20 µL of plant leaves leachate were placed Czapek-dox agar plates pre-inoculated with test *Aspergillus niger* culture, and other plate for *Fusarium oxysporum* The treatments also included 20 µl of solvents such as methanol and acetone served as control and plates were incubated at room temperature and zone of inhibition were measured in mm(millimeter).[5][9]

RESULTS :

A] Effect of *Parthenium* Leachate on Seed Germination:

The different types of seeds were treatment with the flowers, leaves and root leachate of *Parthenium, all* shows different type result. Result are noted in observation table no 1.

In that we wright the shoot and root length of wheat, jawar and fenugreek and seedling growth of groundnut. As per comparison of all seeds with sterile distilled water(control) the result is,1) for jawar, shoot shows better growth after root leachate, and root growth better after leaves leachate,

and flowers leachate treatment. 2)For fenugreek, shoot growth and root growth better in leaves leachate treatment. 3)For wheat, plant leachate shows both positive and negative type of effect such as, for shoot growth better in distilled water treatment means all type of leachate shows negative effect on shoot, but root growth better in leaves leachate and flowers leachate treatment, means it is the positive effect. 4) For groundnut, seedling growth better in leaves leachate and root leachate treatment.

Observation Table 1):Effect of *parthenium* leachate on seed germination:

In that, shoot, root and seedling growth measured in *cm* unit, of all type of leachate treatment.

Sr. no.	Seeds	Effect ongermination	Leaves leachate	Flowers leachate	Root leachate	Distilled Water
1.	Jawar	shoot	1.9cm	2.0cm	4.0cm	2.0cm
		root	11cm	15cm	3.5cm	3cm
2.	Fenugreek	shoot	6.0cm	No growth	2.0cm	4.5cm
		root	7.0cm	No growth	5.5cm	6.0cm
3.	Wheat	shoot	2.6cm	2.5cm	2cm	6.0cm
		root	6.4cm	13cm	No growth	5.5cm
4.	Groundnut	seedling	2.7cm	2.1cm	2.7cm	2.4cm

B] Effect on metal tolerance capacity during seed germination:

Effect on metal tolerance during seed germination was observed, and results of metals tolerance capacity of this seed due to plant leachate treatment. Result was noted in *observation table no.2.* When the seeds were treated with as FeCl3, HgCl2, and $Ni(SO_4)2$ solutions solution and a subsequent treatment with leachates of *parthenium* (root and leaf leachates), in that all this seeds

shows different type of tolerance. As per results, 1)For jawar, leaf leachate shows more tolerance. 2)For wheat, leaf leachate shows more tolerance, root not shows better tolerance. 3) Cowpea (chavali), root leachate shows tolerance. 4)For Groundnut, root leachate shows tolerance again $Fecl_3$ and , leaf leachate shows tolerance again $HgCl_2$.5)For Chickpea(chana), root leachate shows tolerance again $Fecl_3$ and , leaf leachate shows tolerance again $HgCl_2$. 6)For Mungbean, leaf leachate shows tolerance again Ni (So4)2 and $HgCl_2$ metal. 7)For Matbean (matki), , leaf leachate shows tolerance again $Fecl_3$ and $HgCl_2$.

Observation Table No.2.:Effect on metal tolerance capacity during seed germination:

Sr no.	Seeds	Metal ion	Effect ongerminatio n	Leaves leachate	Root leachate	Distilled Water
1.	Jawar.	$FeCl_3$	Seed 1	3.0cm	2.0cm	2.5cm
			Seed 2	2.6cm	1.5cm	2.7cm
		$HgCl_2$	Seed 1	1.9cm	0.4cm	No growth
			Seed 2	1.8cm	0.3cm	No growth
2.	Wheat.	$Ni(SO_4)2$	Seed 1	4.0cm	1.4 cm	3.8cm
			Seed 2	3.8cm	1.3cm	3.1cm
		$FeCl_3$	Seed 1	4.7cm	3.0cm	4.1cm
			Seed 2	3.9cm	2.7cm	3.9cm
		$HgCl_2$	Seed 1	No growth	No growth	1.0cm
			Seed 2	No growth	No growth	1.0cm

3.	Cowpea(chavali).	$Ni(SO_4)2$	Seed 1	4.5cm	2.5cm	3.6cm
			Seed 2	3.1cm	1.9cm	2.8cm
		$FeCl_3$	Seed 1	No growth	No growth	No growth
			Seed 2	No growth	No growth	No growth
		$HgCl_2$	Seed 1	No growth	No growth	No growth
			Seed 2	No growth	No growth	No growth
		$Ni(SO_4)2$	Seed 1	No growth	1.2cm	No growth
			Seed 2	No growth	0.9cm	No growth
4.	Groundnut.	$FeCl_3$	Seed 1	0.5cm	1.5cm	No growth
			Seed 2	0.4cm	1.3cm	No growth
		$HgCl_2$	Seed 1	0.8cm	No growth	No growth
			Seed 2	0.7cm	No growth	No growth
		$Ni(SO_4)2$	Seed 1	0.2cm	0.4cm	0.6cm
			Seed 2	0.3cm	0.3cm	0.8cm
		$FeCl_3$	Seed 1	No growth	2.0cm	No growth
			Seed 2	No growth	1.7cm	No growth
5.	Chickpea(chana).	$HgCl_2$	Seed 1	0.3cm	No growth	No growth
			Seed 2	0.2cm	No growth	No growth

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		$Ni(SO_4)2$	Seed 1	No growth	0.4cm	2.6cm
			Seed 2	No growth	0.3cm	1.9cm
6.	Mungbean (moong)	$FeCl_3$	Seed 1	3.5cm	0.2cm	4.5cm
			Seed 2	2.6cm	0.3cm	3.8cm
		$HgCl_2$	Seed 1	2.3cm	0.2cm	2.3cm
			Seed 2	2.8cm	0.2cm	1.4cm
7.	Matbean (matki)	$Ni(SO_4)2$	Seed 1	3.3cm	No growth	2.3cm
			Seed 2	2.9cm	No growth	1.9cm
		$FeCl_3$	Seed 1	0.7cm	No growth	No growth
			Seed 2	0.6cm	No growth	No growth
7.	Matbean (matki)	$HgCl_2$	Seed 1	1.3cm	No growth	0.5cm
			Seed 2	0.2cm	No growth	0.1cm
		$Ni(SO_4)2$	Seed 1	2.5cm	No growth	2.3cm
			Seed 2	1.9cm	No growth	2.5cm

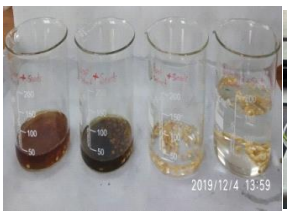



Fig no.1.:seed germination results, Plant leachate treatment on different seeds.

C] Antimicrobial activity:

I) *Antibacterial activity*:

The ethanolic leachate obtained from aerial parts of *P. hysterophorus,* successfully shows theinhibition(6mm) of *Escherichia coli* on agar plate. hence leaves extract shows antibacterial activity, are shown in fig no.2.

II) *Antifungal activity:*

The methanol, and acetone containing leaves leachate successfully shows the inhibition against *Aspergillus niger*,(3mm) and *Fusarium oxysporum*(3mm) species, are shown in fig no,2.

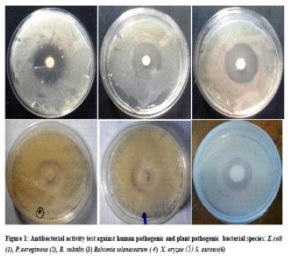
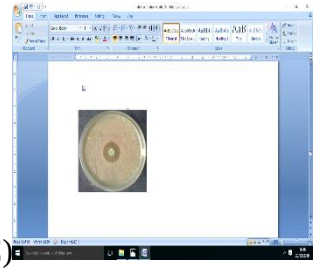
A)  B)  C) 

Fig no.2.: Results of antimicrobial activity of plant leaves leachate.agains the ,

A) *Escherichia coli.* *B)Aspergillus niger*, and C) *Fusarium oxysporum.*

Conclusion:

Thus. From the present study the *P. hysterophorus* plant are used to prepared the leachate, and this leachate successfully used in seed germination, metal tolerance and antimicrobial activity. Hence we conclude that, *P. hysterophorus* are the important weeds that can be used to obtain growth factors in aqueous medium and can be used to produce new bioactive compounds for *antibacterial*and *antifungal activity.*

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