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Impact of *Dactyloctenium aegyptium* Weed Extracts on Soil Borne Fungal Phytopathogens and Legume Crop-Vigna

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ABSTRACT

Background: As it is well known that intensive and indiscriminate use of chemicals in agriculture has caused very serious problems to the environment and as well as the human beings as it has poisoned our food also contaminated for soil and water. Aim to make light of the adverse effect of these chemical pesticides the extract of *Dactyloctenium aegyptium* was used against the soil borne plant pathogens *i.e., Fusarium oxysporium, Rhizoctonia solani, Sclerotinia sclerotiorum* and *Sclerotium rolfsi.*

Methods: In this field-laboratory investigation during 2018-19, different part of *Dactyloctenium aegyptium* extracts show the antifungal activity against soil born fungal phyto-pathogen and also show the effect on vigna (Moong) at different parameters. The antifungal activity was resolute by well diffusion method. It is very effortless and usual method to resolve the inhibition zone.

Result: Our investigation in which the heptane extract of the *Dactyloctenium* weed both part s was found to be most effective against the fungal plant pathogens *i.e.* 0.00 over the control which was 6.3 and 5.8 in *Fusarium oxysporium* and *Rhizoctonia solani* respectively and extract in ethyl acetate and butyl alcohol was show lowest effectiveness against *Rhizoctonia solani, Sclerotium rolfsi i.e* 5.3 and 6.4. In case of green gram germination, *Dactyloctenium aegyptium* in different solvent at 25% concentration, butylalcohol was the highest in increasing the germination percentage (100) show effectiveness. The leaves, root and stem length show highest effectiveness respectively methanol, heptane and water. The overall effectiveness of the different extract against the fungal plant pathogens were found significantly effective.

Key words: Antifungal activity, *Dactyloctenium aegyptium,* Moong, Phytopathogens.

INTRODUCTION

Direct - indirect or stimulatory - inhibitory effects of one plant on another through release of chemical compounds into the environment are referred to as allelopathy. Root exudation, leaching by dews and rains and volatilization or decaying plant tissue from allelopathic plants outcome in discharge of compounds into the atmosphere which can favorable and adverse to the other plant (Rice 1984). Allelopathic efficacy of weeds on germination and seedling rise of crops vary from weed to weed (Hamsyun 2005). The allelopathic effects of various parts of same weed also differ for their effects on germination and initial growth of plants (Aziz 2008, Economous 2002). *Dactyloctenium aegyptium* L. is a weed of the tropics and among the 20 most globally widespread weeds (Simpsom 1990).

Crowfoot Grass is a slender to moderately robust; scattering once a year herb, with unbending stems, that bend and root at the lower nodes, with tips that may rise to about 2 ft in height. It is a very familiar weed of open spaces and wasteland. Leaves are typically grass-like 2-30 cm long 2-9 mm wide, with blades and sheaths that are without hair. Leaf margins have long, stiff hairs. Flowers arise in 1-7 spikes, 1-6.2 cm long, 3-7 mm wide, at the tip of stems. Seed head resembles a crow's foot, hence the common name. Crowfoot Grass is native to Africa, but naturalized world-wide. The phytochemical analysis of *Dactyloctenium aegyptium* showed that the plant contained carbohydrates, proteins, amino acids, terpenoids, alkaloids, saponins, tannins, flavonoids, steroids, fixed oils and phenols. The pharmacological investigations revealed that *Dactyloctenium aegyptium* infatuated antimicrobial, antioxidant, reproductive, cytooxic, antidiabetic and gastointestinal effects. (U.S.), *D. aegyptium* has folkloric repute as astringent, bitter tonic, anti-anthelmintic and used to treat gastrointes- tinal, biliary and urinary ailments, polyurea. (Khare 2007), fevers (Choudhary 2010), small pox (Sanglakpam 2012), heart burn, immuno-deficiency (Kipkore 2014), urinary lithiasis, spasm of maternity and renal infections (Kipkore 2014,

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Gupta 1996, Choudhary 2010), gastric ulcers and wounds healing (Simpsom 1990 Choudhary 2010 Sanglakpam 2012, Kipkore 2014, Choudhary 2010, U.S.).

The seeds are used by tribesmen to prepare liquor as well as famine food with unpleasant taste (Kirtikar1987, Sahal 2014). The n-hexane, ethyl acetate and n-butanol fractions of *Dactyloctenium aegyptium* was evaluated against human hepato cellular carcinoma cells (HepG-2), colon carcinoma cells (HCT-116) and breast carcinoma cells (MCF-7). The ethyl acetate and nhexane extracts were the most active extracts as cytotoxic agents against the tested cell lines with IC50 values from 6.1 to 9.6 µg/ml compared to that of nbutanol (Esmail- Snafi 2017).

In antidiarrheal activity test, the extract exhibited 48.54% and 72.92% inhibition of defecation at the doses of 250-500 mg/kg bw, respectively whereas the standard loperamide (3 mg/kg bw) displayed 70.24% inhibition of defecation (Hoque *et al.,* 2019). The screening for anticancer potential of *D. aegyptium* revealed apoptotic inducing capability of plant extract on human lung and cervical cancer cell lines (Bor 1960). 15% extract concentration of *Dactyloctenium aegyptium* reduce the growth of *Fusarium oxysporium, Rhizoctonia solani, Sclerotium rolfsi* soil borne fungal phytopathogens. (Sahrawat *et al* 2021) The current research will highlight on the effects of *Dactyloctenium aegyptium* extract on fungal phytopathogens and also on different parameter of moong.

MATERIALS AND METHODS

Different part of *Dactyloctenium aegyptium* as leaves and seed was taken from the Meerut region near Dulheda (U.P.). The samples were shade dry for 24 to 48 hours and then grind in the powder form. The extracts were prepared by using soxhlet apparatus. The extract was prepared in different organic solvent as Methanol, Ethyl acetate, Butyl alcohol, Heptane and Benzene at 1:10 ratio. The fungal phytopathogens were isolated from the infected Bengal gram crop. The four soils borne fungus infected the Bengal gram and cause many diseases. The fungus was isolated on PDA medium and incubates at 27°C for 24 hours. The isolated funguses were *Fusarium oxysporium, Rhizoctonia solani, Sclerotinia sclerotiorum and Sclerotium rolfsi*. The antifungal activity was resolute by well diffusion method. Agar well diffusion method is widely used to evaluate the antimicrobial activity of plants or microbial extracts. (Magaldi 2004 and Valgas 2007) It is very effortless and usual method to resolve the inhibition zone. The weed extracts was used beside the fungal phytopathogens *Fusarium oxysporium, Rhizoctonia solani, Sclerotinia sclerotiorum* and *Sclerotium rolfsi*.

$$\text{Antifungal activity (\%)} = \frac{\text{Dc-Ds}}{\text{Dc}} \times 100$$

Set up the PDA media plate and seize 1ml of fungal suspension on plate shell and construct a well using cork-borer in the mid of the plate and fill up with 1ml weed extracts of different organic solvent as methanol, ethyl acetate, butyl alcohol, benzene and heptane, except control. After that incubate at 27°C for 24 to 48 hours and evaluate the inhibition zone and compare with control (Table 1 and 2). Moong seeds were treated with different (methanol, ethyl acetate, butyl alcohol, benzene and heptane) extracts of weed leaves and seed in 25% concentration (75% water + 25% extract). Among 10 seed of moong were sited on whatman filter paper No 1 in 9 cm petriplates. Treat all seeds with each extract in a particular ratio (3:7 ml) except control. 11 plates were allowed for germination for 48 hours. After 48 hours trace the germination percentage in each petriplates as well as control. Germinated seeds were sowing in to sterile soil placed in a small pot. Allocate the seeds for germination for 1 week and after that observed the effect of weed extracts on root, shoot and leaves length (RL, SL and LL) of moong after 12 days. (Table 3 and 4).

RESULTS AND DISCUSSION

The observation revealed that the different extracts in the various solvent shows that all the extracts inhibit the growth of the soil borne plant pathogens in case of *Fusarium oxysporium, D. aegyptium*in of heptane leaves extract inhibit maximum growth (0.0 cm) in the petriplates followed by methanolic (3.25 cm) and benzene (4.65 cm) extract over the control (6.3 cm) respectively. As well as the heptane leaves extract of weed was found to be effective against *Rhizoctonia solani* too. The growth of the *Sclerotium rolfsi* was inhibited maximum by benzene (3.6 cm) followed by heptane (3.85 cm) and butyl alcohol (3.9 cm) over the control (4.4 cm) consistently. The effect of the *D. aegyptium* leaves extract in the different solvents shows good performance in controlling the growth of *Sclerotinia sclerotiorum* as it was inhibited by the highest by the ethyl acetate (3.6 cm) followed by benzene (3.7 cm) methanol and heptane (4.1cm) and butyl alcohol (4.0 cm) respectively in comparison to control (4.5 cm) in well diffusion test show in Table 1 Whereas in

Table 1: Antifungal activity of *Dactyloctenium aegyptium* leaves extract against fungal phytopathogens by well diffusion method at 1 ml concentration.

Fungus	Well diffusion method at 1 ml concentration					
	Benzene	Methanol	Heptane	Butyl alcohol	Ethyl acetate	Control
Fusarium oxysporium	4.65	3.25	0.0	5.10	5.25	6.30
Rhizoctonia solani	3.30	3.30	0.0	5.50	4.70	5.80
Sclerotium rolfsi	3.60	4.30	3.85	3.90	4.10	4.40
Sclerotinia sclerotiorum	3.70	4.10	4.10	4.00	3.60	4.50

Table 2: Antifungal activity of *Dactyloctenium aegyptium* seed extract against fungal phytopathogens by well diffusion method at 1 ml concentration.

Fungus	Well diffusion method at 1 ml concentration					
	Benzene	Methanol	Heptane	Butyl alcohol	Ethyl acetate	Control
Fusarium oxysporium	6.10	2.10	0.00	4.60	6.10	6.30
Rhizoctonia solani	3.80	2.85	4.30	4.00	3.20	6.00
Sclerotium rolfsi.	2.80	3.20	2.95	2.20	2.80	5.40
Sclerotinia sclerotiorum	3.40	5.00	4.80	3.00	3.10	5.10

the extract of *D. aegyptium* in seed shows the maximum inhibition in the heptane solvent against *Fusarium oxysporium* (0.0 cm) followed by methanol (2.1 cm) and in case of *R. Solani* methanolic extract showed the maximum inhibition of the fungus (2.85 cm) The effect of different extracts on the *Sclerotium rolfsi* showed that extract with the benzene solvent affect the maximum growth of the fungus (2.8 cm) over the control (5.4 cm). The butyl alcohol solvent with the extract of seeds of weed found to be the most effective against *Sclerotinia sclerotiorum* (3.0 cm) over the control (5.1 cm) show in Table 2.

Beside of checking the antifungal property of seed and leaf extract of *D. aegyptium* the various extracts were also subjected to test their effect on plant growth too. For that purpose the moong (*Vigna radiata*) was chosen. As the results shows in the Table 3 and 4. The effect of the different extracts of *Dactyloctenium aegyptium* weed part as leaves and seed on the growth of moong plant *i.e.* also known as allelopathic effect were also tested. In which 25% concentration of each extract were used in this leaves extract with ethyl acetate was showing the adverse effect on the plant growth as it decrease the germination up to 10% while in case of water it was 80% followed by butyl alcohol and heptane which was 80% respectively. The root length was found highest in butyl alcohol [6 cm and ethyl alcohol (5.0 cm) in centimeters. While in case of shoot length heptane solvent works highest as it increase the length up to (14 cm) of the shoot followed by ethyl alcohol (12 cm) and butyl alcohol (11 cm) in case of extract of leaves of *Dactyloctenium aegyptium* as shown in Table 4. The seed extract of *Dactyloctenium aegyptium* in different solvent at 25% concentration, butyl alcohol was the highest in increasing the germination percentage (100 cm) followed by methanolic (90 cm) heptane (90 cm) and in water (70 cm). The seed extract in different solvents showed the maximum root length in heptane solvent (13.5 cm) and minimum in butyl alcohol (5 cm) While shoot length was found to be highest in methanolic and water (12 cm) followed by benzene (11.7 cm) and heptane (11.0 cm)

The data shows that heptane extract of *Dactyloctenium aegyptium* seeds and leaves have maximum antifungal activity against *Fusarium Rhizoctonia sonali, Sclerotiom* and *Sclerotinia* and have minimum activity against *Sclerotinia sclerotiorum.* Heptane extract also increase the germination percentage of vigna, their root length, stem length and leaves length at 25 per cent extract concentration of both leaves and seeds alomg with that other extract also show beneficial effects on fungal phytopathogen and on the growth of vigna crop.

Table 3: Effects of *Dactyloctenium aegyptium* seed extract at 25% concentration on the germination of moong.

WE	G %	Plant length		
		RL [in cm.]	SL [in cm.]	LL [in cm.]
EA	10	2.1	8.5	1.3
M	90	2.1	12.0	2.0
H	90	13.4	11.0	2.2
W	70	7.0	12.0	2.5
B	60	15.0	11.7	2.0
BA	100	5.0	10.0	1.7

WE=weed extract, EA=Ethyl acetate, M= Methanol, H= Heptanes, W= Water, B=Benzene, BA= Butyl alcohol, G= Germination.

Table 4: Effect of *Dactyloctenium aegyptium* leaves extract at 25% concentration on the germination of moong.

WE	G %	Plant length		
		RL [in cm.]	SL [in cm.]	LL [in cm.]
EA	10	5.0	12.0	2.0
M	50	3.0	10.0	1.5
H	70	4.0	14.0	2.0
W	80	2.0	7.0	2.0
B	50	3.0	7.0	2.0
BA	70	6.0	11.0	1.5

WE= Weed extract, EA= Ethyl acetate, M= Methanol, H= Heptane, W= Water, B= Benzene, BA= Butyl alcohol, G= Germination.

CONCLUSION

On the behalf of overall result and discussion we conclude that The effect of *Dactyloctenium aegyptium* seed sand leaves solvent show better result so on the place of fertilizer we can use weed. It is so cheap and easy available in most of the legume crop.

Conflict of interest: None.

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