



Studies of allelopathic effect of *Lantana camara* aqueous leaf extract on growth of *Parthenium hysterophorus* in flowering stage.

KEYWORDS

Allelopathy, Leaf extract, *Lantana camara*

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ABSTRACT Aqueous leaves extract of different concentrations of *L.camara* was used to investigation their allelopathic effects on root and shoot length, leaf area and fresh and dry weight of *P.hysterophorus* in flowering stage. The bioassay indicated that the inhibitory effect was much more pronounced at higher concentration.

Allelopathy is an important factor in determining vegetation pattern, species diversity and vegetation dynamics. It plays a significant role in "plant – plant" and "plant – microbe" interactions, which are important in the management of one species by another mainly through biochemical interactions, affecting seed germination and seedling growth of existing species by the intruder species. Any direct or indirect and harmful or beneficial effect by one plant (including microorganisms) on another through production of chemical compounds that escape into the environment is called allelopathy (Rice, 1984).

Weeds are undesirable plants. Plants which interfere human activity in crop and non-crop areas are considered as weed. They compete with the main crops for nutrients and other resources and hamper the healthy growth ultimately.

Parthenium is not only harmful to crop but also causes several diseases to man e.g. asthma, contact dermatitis and hay fever. It was distributed throughout the world along with wheat and belonging to the family Asteraceae.

L. camara is considered a problem weed in many of the countries to which it has been introduced. . The water soluble allelochemicals of *Lantana camara* inhibited the initial growth of both the agricultural (*Oryza sativa*, *Triticum aestivum*, *Vigna sinensis*, *Cucurbita pepo*, *Abelmoschus esculentus*, *Amaranthus tricolor* and forest crops (*Acacia auriculiformis*, *Paraserianthes falcataria*, *Albizia procera*) in the laboratory conditions (Hossain & Alam, 2010).

In the present investigation an effort was made to study the allelopathic effects of different concentrations of *L.camara* leaf extract on shoot and root length, leaf area and fresh and dry weight of *P. hysterophorus* in flowering stage.

MATERIALS AND METHODS

The study area Shakti nagar lies in the Banda district of Ut-

tar Pradesh in between Latitude 24° 53' and 25° 55' N, Longitude 80° 07' and 81° 34' E, the geographical area of the district is 4114.20 sq. km. Leaves of *Lantana camara* were collected from Chitrakoot region of Madhya Pradesh. Collection of raw material and preparation of extract in two days advance for each spray.

The preparation process undertaken for *Lantana camara* leaf aqueous extract is as. 100gm under of leaf chopped in small pieces and crushed in the mixture grinder after grinding the material of leaf paste were soaked in 200 ml of distilled water for 24 hrs then prepare the following concentrations 100%, 50%, 33%, 25% and water as a control treatment. The extract of each specimen was filtered with muslin cloth. The concentration volume of each specimen was maintained by adding distilled water. Foliar treatment of fruiting *Parthenium hysterophorus* with different concentration aqueous leaf extract of *Lantana camara* on alternate days but control quadrates sprayed only distil water .

Plants samples were analyzed for shoot and root length, leaf area. Leaf area was measured with the help of a leaf area meter (Model No. 211 Systonice).

Result & Discussion

1. Effect of *Lantana camara* aqueous leaf extract on shoot and root length of *Parthenium hysterophorus* in flowering stage

Maximum growth of shoot and root were observed 128.17% and 132.51% increased respectively in control. In 25% extract the plant growth were observed 19.76% increased in shoot and 17.14% increased in root over control. In 33% extract the plant growth were observed 12.19% increased in shoot and 8.28% increased in root over control. Minimum percentage increased 6.85% in shoot length and 4.82% in root length were recorded in 50% concentration, but in 100% extract concentration the plant growth was completely suppressed after single spray. Detail result showed in Table.1

Table 1 : Effect of *Lantana camara* leaf extract on growth (cm) of *Parthenium hysterophorus* in flowering stage.

Shoot and root length (cm) at the time of spray												
Number of spray at the alternate days												
Concentration in %	Plant growth (cm)	1	2	3	4	5	6	7	8	Total Days (27)	% Increase 27days Over BT	% Decrease 27days Over BT
Control	Shoot	18.1	20.3	22.7	25.3	28.1	31.1	34.3	37.7	41.3	128.17	
	Root	16.3	18.3	20.5	22.9	23.1	28.3	31.3	34.5	37.9	132.51	

Concentration in %	Plant growth (cm)	1	2	3	4	5	6	7	8	Total Days (27)	% Increase 27days Over BT	% Decrease 27days Over BT
25 %	Shoot	17.2	18.3	19.2	19.9	20.4	20.6	20.6	20.6	-	19.76	108.41
	Root	14	14.9	15.6	16.1	16.3	16.4	16.4	16.4	-	17.14	115.37
33%	Shoot	16.4	17.2	17.8	18.2	18.4	18.4	-	-	-	12.19	115.98
	Root	15.7	16.3	16.7	16.9	17.0	17.0	-	-	-	8.28	124.23
50 %	Shoot	17.5	18.1	18.5	18.7	18.7	-	-	-	-	6.85	121.32
	Root	14.5	14.9	15.1	15.2	15.2	-	-	-	-	4.82	127.69
100 %	Shoot	16	16	16	16	-	-	-	-	-	0	0
	Root	15.3	15.3	15.3	15.3	-	-	-	-	-	0	0

BT = Before treatment ; - = Dead the Parthenium weed.

4.2.7.2 Effect of *Lantana camara* aqueous leaf extract on leaf area of *Parthenium hysterophorus* in flowering stage

The different concentration of aqueous leaf extract of *Lantana camara* had inhibitory effect on leaf area of *Parthenium hysterophorus* flowering plants. Plant leaf area was decreased over control with the increasing concentration of extract. The leaf area was decreased after aqueous leaf extract spray on plant.

Maximum leaf area of *Parthenium hysterophorus* was observed 54.28% increased in control. In 25% concentration aqueous stem extract the leaf area were observed 15.86% increased and in 33% concentration leaf area were observed 9.20% increased over control.

and dry weight of *Parthenium hysterophorus* in flowering stage

The different concentration of aqueous leaf extract of *Lantana camara* had allelopathic effect on fresh and dry weight of *Parthenium hysterophorus*. Plant fresh and dry weight was decreased over control with the increasing concentration of extract. Fresh and dry weight were decreased after aqueous leaf extract spray on plant.

Maximum fresh weight of *Parthenium hysterophorus* was observed 240.29% increased in control. In 25% concentration aqueous leaf extract the fresh weight were observed 56.69% increased and in 33% concentration fresh weight were observed 26.11% increased over control. In 50% concentration fresh weight were observed 15.69% increased over control. In 100% extract concentration, the fresh weight was found constant as first spray. In the all concentration of extract, the dry weight of *Parthenium hysterophorus* were decreased accordingly fresh weight. Detail observation showed in Table 2.

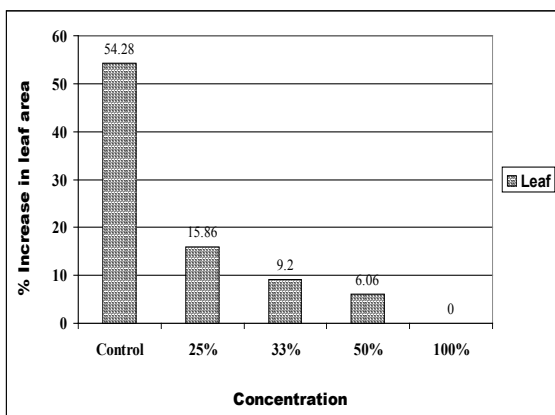


Fig.1 :Effect of different concentration of *Lantana camara* leaf extract on leaf area of *Parthenium hysterophorus* in flowering stage.

3. Effect of *Lantana camara* aqueous leaf extract on fresh

Table 2 : Effect of *Lantana camara* leaf extract on whole plant fresh and dry weight (g/plant) of *Parthenium hysterophorus* in flowering stage.

Whole plant fresh and dry weight (g/plant) at the time of spray												
Number of spray at the alternate days												
Concentration in %	Fresh and dry weight (g/plant)	1	2	3	4	5	6	7	8	Total Days (27)	% In-crease 27 days Over BT	% De-crease 27 days Over BT
Control	FW	8.115	9.815	11.715	13.815	16.115	18.615	21.315	24.315	27.615	240.29	
	DW	1.614	1.953	2.331	2.749	3.206	3.704	4.241	4.838	5.495	•	
25 %	FW	8.209	9.102	9.921	11.895	12.489	12.863	12.863	12.863	-	56.693	183.59
	DW	1.631	1.811	1.832	2.367	2.485	2.559	2.559	2.559	-	•	••
33 %	FW	7.107	7.746	8.288	8.702	8.963	8.963	-	-	-	26.115	214.176
	DW	1.414	1.541	1.649	1.731	1.783	1.783	-	-	-	•	••
50 %	FW	8.240	8.816	9.256	9.533	9.533	-	-	-	-	15.691	224.59
	DW	1.639	1.754	1.842	1.897	1.897	-	-	-	-	•	••
100 %	FW	6.63	6.63	6.63	6.63	-	-	-	-	-	0	0
	DW	1.319	1.319	1.319	1.319	-	-	-	-	-	0	0

**FW = Fresh weight ; DW= Dry weight ; BT = Before treatment ; - = Dead the *Parthenium* weed ;
 • = The percentage increases of dry weight were observed according weight increase;
 •• = The percentage decreases of dry weight were observed according fresh weight decrease fresh**

Result showed, different concentration of aqueous leaf extract caused reduced on shoot and root elongation, leaf area and fresh and dry weight of *Parthenium hysterophorus* flowering plant. The harmful effect of different concentration of aqueous leaf extract pointed out that allelochemicals (betulic acid, caffeic acid, vanillic acid, ferulic acid, p-hydroxybenzoic acid, lantadene A, lantadene B, camarinic acid) present in *L.camara*. Leaf extracts showed inhibitory effect of *L.camara* on the growth of *P. hysterophorus* in fruiting stage (Mishra, 2013). The aqueous extracts of leaf, flower and fruit of *L. camara* has allelopathic effects on seedling growth and dry matter production of radish and lettuce (Qiaoying et al., 2009). The extracts of leaf, stem, flower and fruit of *L.camara* inhibited the seed germination of *P. hysterophorus* (Mishra & Singh, 2010). Use of allelopathy is one of the safe alternatives to overcome these problems and to achieve sustainability in agriculture and maintenance of clean environment for our future generations.

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