



Suppressive effect of aqueous root extract of *Lantana camara* on growth parameters of *Parthenium hysterophorus* in seedling stage.

KEYWORDS

Allelopathy, root extract, *Lantana camara*

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ABSTRACT *The paper presents the allelopathic effect of different concentrations of aqueous root extract of L.camara on root and shoot length, leaf area and fresh and dry weight of P.hysterophorus in seedling stage. The bioassay indicated that the inhibitory effect was much more pronounced at higher concentration.*

INTRODUCTION

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.

Allelopathy is known to play an important role in natural as well as managed ecosystem. allelopathic interference is one of the important mechanisms for the successful establishment of invasive exotic weeds. Weeds are undesirable plants. Plants which interfere human activity in crop and non crop areas are considered as weed (Anon 1994).

Phytotoxicity is very old component of agriculture but it is described as allelopathy by Molisch (1937). Allelopathic strategies aim at reducing environmental pollution and maintaining ecological balance especially soil fauna and flora through reduced use of chemical herbicides or substituting them with natural products (plant and microbial products). Allelochemicals and phytochemicals are eco-friendly and free from the problems associated with present herbicides. there is a need for weed free maintenance during early crop growth. The chemical method of weed control offers pollution and health hazards. *Lantana camara* L. is an invasive weed that is wide spread in India (Arvind et al., 2010). *Lantana camara* L. is a noxious weed belonging to Verbenaceae family which comprises of about 650 species spread over 60 countries. *Lantana* has allelopathic potential and contains some water soluble phytotoxins (Sahid and Sugau, 1993). *L.camara* has an allelopathic potential because it contains a number of phenolic compounds (Narmal,1994). Allelochemicals of *L.camara* has potential in the development of green herbicides.

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

MATERIALS AND METHODS

The study area Shakti nagar lies in the Banda district of Uttar 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. Roots 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* root aqueous extract is as. 100gm under of leaf chopped in small pieces and crushed in the mixture grinder after grinding the material of root 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 seedling *Parthenium hysterophorus* with different concentration aqueous root 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 Systronice).

RESULTS AND DISCUSSION

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

Both shoot and root lengths were significantly reduced in all treatment compared to control. Plant shoot and root length were control after 6th spray, 5th spray, 4th spray and 3rd spray of 25%, 33%, 50% and 100% concentration of aqueous root extract of *Lantana camara* respectively. Finally plant were dead after 9th, 7th, 6th and 5th spray of 25%, 33%, 50% and 100% concentration of aqueous root extract of *Lantana camara* respectively.

Maximum growth of shoot and root were observed 1680% and 290% increased respectively in control. In 25% extract the plant growth were observed 270% increased in shoot and 55.00% increased in root over control. In 33% concentration treatment 146% and 38.09% increased were observed in shoot and root length respectively over control. In 50% concentration treatment 66.66% and 19.69% increased were observed in shoot and root length respectively over control. Minimum percentage increased 23.52% in shoot length and 8.82% in root

length were recorded in 100% concentration. Detail observation showed in Table 1.

Table 1: Effect of Lantana camara root extract on growth (cm) of Parthenium hysterophorus in seedling stage.

Shoot and root length (cm) at the time of spray the													
Number of spray at the alternate days													
Concentration in %	Plant growth (cm)	1	2	3	4	5	6	7	8	9	Total days (30)	% Increase 30 days Over BT	% Decrease 30 days Over BT
Control	Shoot	1.0	2.3	3.8	5.5	7.4	9.5	11.7	13.8	15.8	17.8	1680	
	Root	6.0	7.4	9.0	10.8	12.8	15	17.2	19.3	21.4	23.4	290	
25 %	Shoot	1.0	2.1	2.9	3.4	3.6	3.7	3.7	3.7	3.7	-	270	1410
	Root	6.0	7.2	8.2	8.8	9.1	9.3	9.3	9.3	9.3	-	55.00	235
33%	Shoot	1.3	2.2	2.8	3.1	3.2	3.2	3.2	-	-	-	146	1534
	Root	6.3	7.3	8.1	8.5	8.7	8.7	8.7	-	-	-	38.09	251.91
50 %	Shoot	1.5	2.1	2.4	2.5	2.5	2.5	-	-	-	-	66.66	1613.34
	Root	6.6	7.3	7.7	7.9	7.9	7.9	-	-	-	-	19.69	270.31
100 %	Shoot	1.7	2.0	2.1	2.1	2.1	-	-	-	-	-	23.52	1656
	Root	6.8	7.2	7.4	7.4	7.4	-	-	-	-	-	8.82	281.18

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

2 Effect of Lantana camara aqueous root extract on leaf area in seedling stage

The different concentration of aqueous root extract of Lantana camara had inhibitory effect on leaf area of seedling Parthenium hysterophorus. The leaf area was decreased after aqueous root extract spray on plant. Maximum leaf area of Parthenium hysterophorus was observed 311.66% increases in control. Plant leaf area was decreased over control with the increasing concentration of extract. In 25% concentration aqueous root extract the leaf area were observed 162.79% increased and in 33% concentration leaf area were observed 122.22% increased over control. In 50% concentration leaf area were observed 44.23% increased over control. Minimum percentage 31.11% increased was recorded in 100% concentration. Percentage increase in leaf area are showed Fig 1.

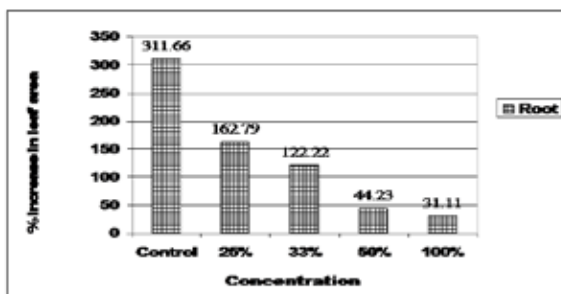


Fig.1: Effect of different concentration of Lantana camara aqueous root extract on leaf area of Parthenium hysterophorus in seedling stage.

3. Effect of Lantana camara aqueous root extract on fresh and dry weight of Parthenium hysterophorus in seedling stage

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

Maximum fresh weight of Parthenium hysterophorus was observed 1779.06% increased in control. In 25% concentration aqueous root extract the fresh weight were observed 42.29% increased and in 33% concentration fresh weight were observed 24.60% increased over control. In 50% concentration fresh weight were observed 12.33% increased over control. Minimum percentage 3.09% increased fresh weight was recorded in 100% extract concentration. In the all concentration of extract, the dry weight of Parthenium hysterophorus were decreased accordingly fresh weight. Detail observation showed in Table 3.

The effect of different concentration of Lantana camara root aqueous extracts were recorded and compared with control (i.e., distilled water). Result showed, different concentration of aqueous root extracts caused significant inhibitory effect on shoot and root elongation, fresh and dry weight and leaf area of seedling stage of Parthenium hysterophorus plant. Bioassays also indicated that the inhibitory effect was proportional to the concentration of the extracts and higher concentration had the stronger inhibitory effect. The harmful effect of different concentration of aqueous leaf extract pointed out The probable reason of inhibition may be the presence of allelochemicals. Many allelochemicals are present such as betulinic acid, caffeic acid, vanillic acid, ferulic acid, p-hydroxybenzoic acid, lantadene A, lantadene B, camarinic acid etc found in Lantana camara. The extracts of leaf, stem, flower and fruit of L.camara inhibited the seed germination of P. hysterophorus (Mishra & Singh,2010).

Table 3: Effect of Lantana camara root extract on whole plant fresh and dry weight (g/plant) of Parthenium hysterophorus in seedling 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	9	Total days (30)	% Increase 30 days Over BT	% Decrease 30 days Over BT
Control	FW	0.86	2.06	3.36	4.76	6.26	7.86	9.56	11.56	13.76	16.16	1779.07	
	DW	0.110	0.263	0.430	0.60	0.80	1.00	1.22	1.47	1.76	2.06	•	
25 %	FW	0.87	0.965	1.061	1.145	1.202	1.232	1.238	1.238	1.238	-	42.29	1736.77
	DW	0.111	0.123	0.135	0.146	0.153	0.158	0.158	0.158	0.158	-	•	••
33 %	FW	0.89	0.970	1.037	1.088	1.109	1.109	1.109	-	-	-	24.60	1754.46
	DW	0.113	0.124	0.226	0.139	0.142	0.142	0.142	-	-	-	•	••
50 %	FW	0.90	0.954	0.992	1.011	1.011	1.011	-	-	-	-	12.33	1766.73
	DW	0.155	0.122	0.216	0.129	0.129	0.129	-	-	-	-	•	••
100 %	FW	0.97	0.999	1.00	1.00	1.00	-	-	-	-	-	3.092	1775.97
	DW	0.124	0.127	0.128	0.128	0.128	-	-	-	-	-	•	••

FW = Fresh weight; DW= Dry weight; BT = Before treatment; - = Dead the Parthenium weed;

• = The percentage increases of dry weight were observed according to fresh weight increase;

•• = The percentage decreases of dry weight were observed according to fresh weight decrease.

Zheng Hui-Qiong et. al. (2006) explained the mechanism of phytotoxicity of Lantana to water hyacinth. Achhireddy et. al. (1985) reported that the allelopathic compounds identified in Lantana leaf extract exhibited allelopathic action, insecticidal and juvenile hormonal activity.

In the present investigation, thus concludes that all the concentrations of root aqueous extract of L. camara reduced growth of P. hysterophorus.

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