

## Inhibitory effects of aqueous leaf extracts of *Lantana camara* on the growth of *P.hysterophorus* in fruiting stage.



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**Abstract :** *Lantana camara* is notorious weed and a popular ornamental garden plant belonging to the family verbenaceae. *L.camara* is native to tropical and subtropical America. An experiment was conducted to understand inhibitory effects of aqueous leaf extracts derived from *L.camara* on growth of *P.hysterophorus* in fruiting stage. Bioassay also indicated that the inhibitory effect was proportional to the concentrations of the extracts and higher concentration had the stronger inhibitory effect.

**Keywords :** Allelochemicals, Leaf extract, Fruiting stage

### Introduction

The term allelopathy is derived from two Greek words Allelon means each other and Pathos means to suffer, the term refers to effects that are both detrimental and beneficial among the interacting organisms (Rice, 1984). These effects have been observed in all classes of plants and also extend to microorganisms. Plants produce chemicals that directly or indirectly influence the environment. These chemicals are called allelochemicals. The origin of *Parthenium* weed dates back to 4<sup>th</sup> century BC in the Greek city of Parthenia. This weed has been named so according to the name of Greek city. It was distributed throughout the world along with wheat and belonging to the family Asteraceae. *Parthenium* is not only harmful to crop but also causes several diseases to man e.g. asthma, contact dermatitis and hay fever. *Lantana camara* is a most common weed belonging to the family Verbenaceae. *L.camara* has an allelopathic potential because it contains a number of phenolic compounds (Narwal, 1994). The weed is aggressively growing in forest, agriculture, tea garden and wastelands of all over the country (Ahmed, 1997). Allelochemicals of *L.camara* has potential in the development of green herbicides.

The present work was undertaken to study the effect of *L.camara* on growth and metabolism of *Parthenium* and to evaluate the allelopathic potential of the former.

### 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. 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 distilled 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 leaf extract on shoot and root length of *Parthenium hysterophorus* in fruiting stage

The different concentration of aqueous leaf extract of *Lantana camara* had significant effect on shoot and root length of *Parthenium hysterophorus* fruiting plant. The plant growth inhibit after aqueous leaf extract spray on *Parthenium hysterophorus*. Plant shoot and root length were decreased over control with the increasing concentration of extract. Plant shoot and root length were control after 5<sup>th</sup> spray, 4<sup>th</sup> spray, 3<sup>rd</sup> spray and 1<sup>st</sup> spray of 25%, 33%, 50% and 100% concentration of aqueous leaf extract of *Lantana camara* respectively. Finally plant were dead after 7<sup>th</sup>, 5<sup>th</sup>, 4<sup>th</sup> and 3<sup>rd</sup> spray of 25%, 33%, 50% and 100% concentration of aqueous leaf extract of *Lantana camara* respectively.

Maximum growth of shoot and root were observed 54.13% and 54.4% increased respectively in control. Plant shoot and root length were decreased over control with the increasing concentration of extract. The

plant growth inhibit after aqueous leaf extract spray on *Parthenium hysterophorus* fruiting plant. In 25% extract the plant growth were observed 8.27% increased in shoot and 6.4% increased in root over control. In 33% extract the plant growth were observed 4.78% increased in shoot and 33% increased in root over control.

**Table-1: Effect of *Lantana camara* leaf extract on growth (cm) of *Parthenium hysterophorus* in fruiting 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	Total Days (24)	% Increase 24 days Over BT	% Decrease 24 days Over BT
Control	Shoot	29.0	30.9	32.7	34.7	36.9	39.3	41.9	44.7	54.13	
	Root	25.0	26.7	28.2	29.9	31.8	33.9	36.2	38.6	54.4	
25 %	Shoot	29.0	29.9	30.6	31.1	31.4	31.4	31.4	-	8.27	45.86
	Root	25.0	25.7	26.2	26.5	26.6	26.6	26.6	-	6.4	48
33 %	Shoot	23.0	23.6	24.0	24.2	24.2	-	-	-	4.78	49.35
	Root	21.0	21.4	21.6	21.7	21.7	-	-	-	3.33	51.07
50 %	Shoot	28.0	28.4	28.6	28.6	-	-	-	-	2.14	51.99
	Root	24.0	24.2	24.3	24.3	-	-	-	-	1.25	53.15
100 %	Shoot	29.4	29.4	29.4	-	-	-	-	-	0	0
	Root	25.3	25.3	25.3	-	-	-	-	-	0	0

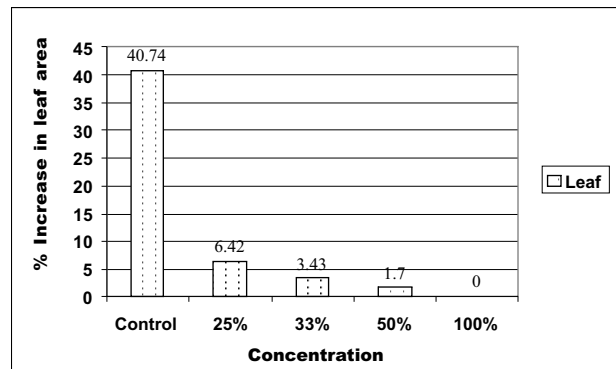
BT = Before treatment; - = Dead the *Parthenium* weed.

Minimum percentage increased 2.14% in shoot length and 1.25% 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.

**2. Effect of *Lantana camara* aqueous leaf extract on leaf area of *Parthenium hysterophorus* in fruiting stage**

The different concentration of aqueous leaf extract of *Lantana camara* had inhibitory effect on leaf area of *Parthenium hysterophorus* fruiting plant. 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 40.74% increased in control. In 25% concentration aqueous leaf extract the leaf area were observed 6.42% increased and in 33% concentration leaf area were observed 3.43% increased over control. Minimum percentage 1.70% increased was recorded in 50% concentration, but in 100% extract concentration, the leaf area was found constant as first spray. observation showed in fig1.

The effect of different concentration of *Lantana camara* leaf aqueous extracts were recorded and compared with control (i.e., distil water). Result showed, different concentration of aqueous leaf caused inhibitory effect on shoot and root elongation, leaf area of *Parthenium hysterophorus* fruiting 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 reason of inhibition may be the



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

presence of allelochemicals. The *L. camara* leaves contain allelochemicals like phenolic compounds, mono- and sesquiterpenes, triterpenes, triterpenoids, quinines, essential oils, flavonoids, biocides etc (Raghavan, 1976).

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). The phenolic compounds extracted from the leaves of *Lantana camara* were found to be phytotoxic to rice, wheat and three grass seedlings. The extracts of leaf, stem, flower and

fruit of *Lantana camara* inhibited the seed germination of *Parthenium hysterophorus* (Mishra & Singh, 2010). The extracts of *Lantana camara* leaves and their fractions reduced the biomass of *Eichhornia crassipes* and *Microcystis aeruginosa* within 7 days under laboratory conditions (Kong *et al.*, 2006). Leaf extract showed pronounced inhibition of shoot length, root length, leaf area, fresh and dry weight of the seedling *Parthenium* (Mishra & Singh, 2012). Thus, the phytotoxicity of *L.camara* can be considered as a source of potent green herbicide to control *P. hysterophorus* fruiting stage.

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