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ALLELOPATHIC POTENTIAL OF VARIOUS LEAF EXTRACTS ON *PARTHENIUM HYSTEROPHORUS*

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ABSTRACT:

During the present work, allelopathic effect of leaf extracts of eleven plants viz., *Alstonia scholaris*, *Amaranthus spinosa*, *Cassia tora*, *Chenopodium album*, *Chromolaena odorata*, *Croton bonplandianum*, *Cyperus rotundus*, *Imperata cylindrica*, *Lantana camara*, *Panicum colonum*, *Prosopis juliflora* were studied against the seeds and seedlings of *Parthenium hysterophorus*. The results showed that reduction in seed germination as well as seedling growth was highest with the extracts obtained from *A. scholaris* followed by *C. tora* and *L. camara* respectively.

KEY WORD: Allelopathic effect, Leaf extracts, *Parthenium hysterophorus*, Seed germination, Seedling growth.

INTRODUCTION:

P. hysterophorus weed is an aggressive exotic herbaceous plant and has been regarded as the serious everlasting problem worldwide. It is responsible for the enormous loss to agriculture, biodiversity and is highly hazardous to humans as well as livestock ([Banerjee and Pandey, 2012](#); [Shukla and Pandey, 2008](#)). Management of this dangerous weed by physical or chemical techniques cannot be considered safe from the health and environmental point of views. Therefore, plant products with allelopathic properties can be used as a possible alternative.

Allelopathy may be regarded as the inhibitory or stimulatory effect of one plant on the growth of the other plant. A number of allelopathic compounds can be produced by plants which may vary in their physical as well as

chemical properties. They may be present in various parts of plants such as leaves, stems, roots, flower and fruits ([Rizvi et al., 1986](#); [Alam and Islam, 2002](#); [Tinnin and Muller, 2006](#)).

In this context, the present study was undertaken to evaluate the allelopathic effects of leaves of some selected plants on germination and growth of *P. hysterophorus*.

MATERIALS AND METHODS:

1) Preparation of aqueous extracts

Fresh and healthy leaves from all the selected plants were collected, shade dried and ground separately. 5 gm of each of the obtained powder was immersed in 100 ml. of distilled water for 24 hrs. at room temperature and then filtered through Whatman no. 1 filter paper as adopted by [Sisodia and Siddiqui, 2010](#); [Tanveer et al., 2010](#) and [Maomeri et al., 2011](#).

After filtration, the leaf extracts thus obtained were tested against the targeted weed for the assessment of their allelopathic nature by employing seed germination and foliar spray bioassay.

2) Screening of the leaf extracts:

(i) Seed germination bioassay

Seeds of the targeted weed were sterilized by dipping in the solution of 0.1% HgCl₂ for 1 min. followed by thorough washing under running tap water and after drying placed on Petri-dishes containing Whatman no. 1 filter paper, 10 seeds/ plate with 10 ml. of each of the leaf extracts respectively at room temperature on 25°C±5°C ([Sisodia and Siddiqui, 2010](#); [Tanveer et al., 2010](#)). Distilled water served as control and the experiment was performed in triplicates. Seed germination inhibition was calculated by using the following formula-

$$\% \text{ Seed germination inhibition} = \frac{\text{No. of non-germinated seeds}}{\text{Total no. of seeds planted}} \times 100$$

(ii) Foliar spray bioassay

Seedlings of the targeted weed were raised in plastic pots filled with sterilized soil, sand and peat in the ratio of 1:1:1 and then sprayed with different leaf extracts obtained from selected plants, also distilled water served as control (Fig. 1). The pots in triplicate were then incubated in growth chambers under defined conditions (100% humidity for 24, 48 and 72 hrs. at 27±2°C). Results were recorded on the basis of development of disease symptoms and seedling mortality to the seedlings.

RESULTS AND DISCUSSION:

For the assessment of allelopathic potential of all the resulted leaf extracts from the selected plants on the targeted weed, seed germination and foliar spray bioassay was performed. And it was recorded that

maximum inhibition in seed germination as well as mortality in seedlings was found with the leaf extracts of *A. scholaris* followed by *C. tora* and *L. camara* respectively while minimum was obtained with *P. colonum* and *C. bonpladianum*. Also, *A. spinosa*, *C. odorata*, *C. album*, *C. rotundus*, *I. cylindrical* and *P. juliflora* showed average allelopathic effects to the targeted weed. Controls remain unaffected in each case. During the present work, the effect of allelochemicals in seed germination inhibition was determined by using the prescribed formula and in the case of seedling mortality it was recognized by the symptoms of severe chlorosis, wilting and slight necrosis developed on them. On the basis of above findings it can be concluded that the extract obtained from the leaves of *A. scholaris* possesses significant allelopathic effect to the seeds and seedlings of targeted weed, thus can be used as a natural biocontrol agent for the effective management of *P. hystrophorus*.

Similarly, allelopathic effect of black mustard against wild oat was studied by [Turk and Tawaha](#) (2003). *Croton bonpladianum* was also found allelopathic to some crops and weeds by [Sisodia and Siddiqui](#), (2010). Toxic effects of allelochemical extracted from the leaf leachates of *Lantana camara* on water hyacinth plants were recorded by [Motwani et al.](#), (2013). [Anjum and Bajwa](#), (2007) also reported potential allelopathic effect of sunflower leaf extract against *Rumex dentatus*.

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Fig. 1: Effect of various leaf extracts on seeds and seedlings of *P. hysterophorus*

