

## Parthenium hysterophorus : A noxious weed for plant diversity



### Botany

**KEYWORDS :** Diversity, Parthenium, Lantana camara,

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### ABSTRACT

*Parthenium hysterophorus* L. (here after referred as *Parthenium*) is a herbaceous weed species native of Mexico. *Parthenium hysterophorus* has negative allelopathic influence to its neighboring plant species. The allelochemicals released directly from the weed or from seed leaching inhibit germination of other plants and the growth of pasture grasses, legumes, cereals, vegetables, other weeds, and even trees. *Parthenium* have allelopathic effect on neighbouring flora by which it is capable to replace most of the associated herbaceous species.

### INTRODUCTION

*Parthenium hysterophorus* L. is an invasive alien species. Invasive species are recognized as one of the major threats to native species and ecosystems around the world (Kathiresan, 2004; Kathiresan *et al.*, 2005). Invasive species are concern because of their capability of spreading fast, their high competitiveness and ability to colonize new areas within short periods. The nature and severity of the impacts of these species on society, economic life, health and national heritage are of global concern (Mc Neely *et al.*, 2001).

*Parthenium* is native to subtropical areas in South and North America, but currently widely distributed in other tropical and subtropical countries such as Australia, India, China, Kenya West Indies, Australia, Ethiopia, Israel, Taiwan, Nepal and belonging to the family Asteraceae. *Parthenium hysterophorus* commonly called congress grass or carrot weed. A single plant can produce 10,000 to 15,000 viable seeds that occupy roadsides, tank bunds, wastelands, agricultural field and forestlands.

*Parthenium hysterophorus* can affect crop production, animal production, human health and biodiversity in its area of infestation (Mc Fadyen, 1992 and Navie *et al.*, 1996). The allelopathic potential of *P. hysterophorus* is believed to play an important role in the ability of the plant to displace natural vegetation and interrupt natural succession.

The present study reports the effect of *P. hysterophorus* on the local biodiversity of plant in forest, wastelands and agriculture field.

### 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. The average rainfall 902 mm. The maximum temperature 44.4°C and minimum temperature 5.2°C was observed .

The study sites were selected based on the local importance of *P. hysterophorus* and the severity of the threats by the weed on the local diversities and accessibility of the study site. 50 quadrates of 1×1m size were laid out in site. Frequency and density of *P. hysterophorus* and other plant species was estimation applying the following formulas:

#### Absolute frequency (AF) (%) =

Number of quadrates in which species occurs × 100

Total number of quadrates

#### Relative frequency (RF) (%) =

Absolute frequency value for a species × 100

Total Absolute frequency values for all species

#### Absolute density (AD) =

Total number of individuals of a species in all quadrates

Total number of quadrates

#### Relative density (RD) (%) =

Absolute density for a species × 100

Total absolute density for all species

### RESULTS AND DISCUSSION

There was a very high infestation of *P. hysterophorus* in herb zone. Data collected from various localities in district Banda that this weed was dominating the local flora at these sites with highest frequency (AF) of 98%. The rest of the weed species showed 10-64% frequency. *Eclipta alba* (24%), *Achyranthes aspera* (36%), *Cynodon dactylon* (56%) and *Apluda mutica* were found more frequent with 24%-64% AF, than rest of the weed species with 10-20% AF. The highest frequency (RF) of 29% was exhibited by *P. hysterophorus* followed by *Apluda mutica* (19.16%), *Cynodon dactylon* (16.76%), *Achyranthes aspera* (10.77%), *Eclipta alba* (7.18%) respectively. The rest of the weed species exhibited less than 6RF.

**Table-1 Frequency and density of *P. hysterophorus* and other plant species.**

SN	Plant species	AF	RF	AD	RD
1	Parthenium hysterophorus	98	29.34	52	47.97
2	Apluda mutica	64	19.16	38	35.05
3	Cynodon dactylon	56	16.76	7.2	6.64
4	Achyranthes aspera	36	10.77	5.9	5.44
5	Eclipta alba	24	7.18	3.4	3.13
6	Naja germinea	20	5.98	1	0.92
7	Ageratum conyzoides	16	4.79	0.5	0.46
8	Avena fatua	10	2.99	0.3	0.27
9	Bidens pilosa	10	2.99	0.1	0.09

AF: Absolute frequency , RF: Relative frequency, AD: Absolute density, RD: Relative density

The highest absolute density (AD) of 52 was exhibited by *P. hysterophorus* followed by *Apluda mutica* (38), *Cynodon dactylon* (7.2) and *Achyranthes aspera* (5.9). The rest of the weed species (*Eclipta alba* (3.4), *Naja germinea* (1), *Ageratum conyzoides* (0.5), *Avena fatua* (0.3) and *Bidens pilosa* (0.1) showed an AD of less than 4. The highest relative density (RD) of 47.97% was exhibited by *P. hysterophorus* followed by *Apluda mutica* (35.05%), *Cynodon dactylon* (6.64%) and *Achyranthes aspera* (5.44%). The rest of the weed species exhibited less than 4RD.

*Parthenium* have allelopathic effect on neighbouring flora by which it is capable to replace most of the associated herbaceous species (Yadav & Chauhan, 1998; Bhowmik *et al.*, 2007).

The chemical analysis has indicated that all the plants parts including trichomes and pollen contain toxins called parthenin of sesquiterpene lactones group. Other compounds include phenolics such as caffeic acid, vanilic acid, p-cumaric acid, anisic acid, p-anisic acid, ferulic acid and chlorogenic acids (Rajan, 1973; Mersie & Singh, 1988). The allelochemicals released from

*Parthenium* inhibit the growth of pasture grasses, legumes, cereals, vegetables, other weeds, and even trees (Anonymous, 2000). *Parthenium* suppress the associated species through the release of allelochemicals from decomposing biomass and root exudates (Pandey *et al.*, 1993).

A number of studies found negative allelopathic effects of *Parthenium* on neighbouring wild species such as *Echinochloa crus-galli*, *Eragrostis curvula*, *Eragrostis tef*, *Lactuca sativa* (Belz *et al.*, 2007); *Artemisia dubia* and *Ageratina adenophora* (Maharjan *et al.*, 2007); and *Raphanus sativus* (Paudel, 2007).

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