A Review On Parthenium Hysterophorus

Aurange Prerana[1], Garje Mayur[2], Santosh Waghmare[3], Hemant Kamble[4]
[1, 2] Dept of EEE
[1, 2] Anna University Regional Campus Coimbatore

Abstract- *In the present time we are facing the infestation of Parthenium hysterophorus everywhere. It is available in stocks around the railway tracks, in bare lands, in agriculture fields, in orchards and forests, it invade major portion of Indian continental. We are familiar with the noxious property of the parthenium hysterophourus. We want to control its infestation. This review article presents the utility potential,some properties and morphology of the parthenium hysterophourus.*

Keywords- Infestation,utility potential.

I. INTRODUCTION

Parthenium hysterophorus (Asteraceae) is commonly known as carrot weed, white top, ragweedparthenium, chatak chandani, congress grass and star weed. The taxonomic classification of

Congress grass is as follows (ITIS., 2010):
Division : Tracheophyta
Class : Magnoliopsida
Order : Asterales
Family : Asteraceae

Parthenium hysterophorus (P. hysterophorus) is a prolific seed producer and widely distributedin Asia and Europe. In India, Parthenium weed was first described in 1810 but emerged as aserious problem after 1955, when it was introduced in contaminated cereal grains (Rao, 1956).Since then, it has spread like wildfire throughout India and presently occupies over 5 millionhectare land (Kumar and Kumar, 2010). Parthenium hysterophorus seed germination takes place over a broad range of fluctuating (12/2-35/25°C) temperatures (Tamado et al., 2002). Theweed prefers alkaline to neutral clayey soils for its growth (Mahadevappa, 1997).**Archives**

Geographical Distribution

Parthenium weed is naturally found in tropical and subtropical America, from southern United State of America, through southern Brazil and northern Argentina[9]. The weed was accidentally introduced to Asia, Africa and Australia. It is widely known that the weed in India for the first time was recorded by Rao from Puna, (Maharashtra) and blame goes to the USA PL 480 scheme wheat seeds with which the seeds of the *P. hysterophorus* came to India accidently[10]. Since then the weed spread to most part of the Indian sub-continent, including Pakistan. It has also spread to southern China, Taiwan and Vietnam in Asia[11]. It has invaded several African countries; the weed was first introduced accidentally into Ethiopia in 1970s and further spread to Kenya, Mozambique and South Africa[12,13].

Partheniumhysterophorus retain areas.

MORPHOLOGY

Parthenium hysterophorus is highly branched, short lived (annual), upright (erect) herbaceous plant that form a rosette habitat during the early stage of life. At maturity, but occasionally can reach up to 2m or even more in height.

STEM

Stem is cylindrical, solid, more or less fluted with longitudinal lines corresponding to the extension of the midrib of the leaves. Mature stems are greenish and covered with small soft hairs which are known as hirustle, stems become much harder as reach to maturity.

LEAVES

The leaves are alternately arranged and stalked (petioles) upto 2 cm long founds in two different forms. During the early stages of life it forms rosette habitat. Leaves are alternate, simple and deeply pinnatifid. The blade is 11 to 15 cm long and 6-10 cm wide, the blade of lower leaves are broad and intensely divided in comparison to upper leaves. Abaxial surface of leaves are covered with short, stiff hairs that lie close to the surface.

FLOWERS

Numerous small flower- heads generally known as capitulum are organized in clusters at the top of the branches (in terminal panicles). Each flower-head (capitulum) is borne on a stalk (pedicel). Capitulum (3-5 mm across) are off-white or white in color containing ray florets (0.3-1 mm long). They also have various (15-60) small flowers (tubular florets) in the centre surrounded by two rows of small green bracts (an

involucre). It can flowered at any time of the year, but commonly occur during raining season.

SEED

Five small 'seeds' generally known as achenes are produced in each flower-head . Seeds are black obovoid, 2 mm long and 1.5 mm wide consisting two or three small scales known as pappus about 0.5-1 mm in height, two straw-colored papery structures (actually dead tubular florets), and a flat bract

HOW IT IS SPREADS

Parthenium hysterophorus retain an extraordinary capability to spread grow and established well in wide range of environmental conditions (Monika, 2014). It completes life -cycle 90-120 days which helps in quick spreading (20). Its seeds can be dispersed through various methods such as water current, animals, movement of vehicles, machinery, livestock and the grains or seeds of crops. Further Parthenium has a relatively short life cycle, grows very quickly and survives under different habitats. Generally for long distances it spread through vehicle, agricultural instruments and with water flow. Parthenium produced enormous number of tiny seeds which are light weight and can survive as seed bank in soil for long time (7). These some abilities of Parthenium hysterophorus helps to spread rapidly resulted in infestation of Parthenium everywhere.

Causes of rapid spread

- High reproductive potential
- Fast growth rate
- Allelopathic potential
- Unpalatable to animals

High reproductive potential:

Parthenium hysterophorus produce a huge quantity of seeds with up to 15-25,000 seeds per plant (30) with an tremendous seed bank, estimated about 2,00,000 seeds/m2 in bare lands and agriculture field (15). Seeds of Parthenium can survive under harsh conditions and remain viable for a long time period. These qualities of this weed help in its fast spreading. Seeds of Parthenium can germinate any time of the year, when suitable moisture is available (46).

Fast growth rate:

It is vigorously growing annual herbaceous weed. Generally, Parthenium flowered when it is only 4-8 week old and can flower for several months. Under unfavorable conditions like salt and drought stress, the weed can completes its life cycle within 4-5 weeks.

Allelopathic potential:

This noxious weed suppress the development of nearby plants by allelopathy. Leachate and extract of leaves and inflorescence prevent the germination and growth of associated economically important crops. Kumari et al. (2014) observed that physiological and biochemical parameters remarkably reduced when aquous extract of Parthenium were directly sprayed on the crop plants. Parthenium has strong allelopathic effects on other plants even it can cause 40-80% yield loss in agricultural crops.

Unpalatable to animals:

Parthenium hysterophorus is unpalatable to the animals. Generally animals do not eat Parthenium hysterophorus because of its bitter taste and intense odour (14). Earlier investigations in India had revealed its serious health hazards to the livestock in Parthenium hysterophorus invaded areas. Being unpalatable,it can not use as animal fodder and its population is increasing day by day unless mechanically removed.

Chemical analysis of **P. hysterophorus**

Isolation and structural elucidation of the active principles of **P. hysterophorus** is required to determine their chemical properties. Chemical analysis of **P. hysterophorus** has indicated that all its parts including trichomes and pollen contain toxins called sesquiterpene lactones (SQL). Maishi et al. (1998) reported that **P. hysterophorus** contains a bitter glycoside parthenin, a major sesquiterpene lactone. Other phytotoxic compounds or allelochemicals are hysterin, ambrosin, flavonoids such as quercelagetin 3,7-dimethylether, 6-hydroxyl kaempferol 3-0 arabinoglucoside, fumaric acid. P-hydroxy benzoin and vanillic acid, caffeic acid, p courmaric, anisic acid, p-anisic acid, chlorogenic acid, ferulic acid, sitosterol and some unidentified alcohols (Fig. 2). Parthenin, hymenin and ambrosin are found to be the culprits behind the menacing role of this weed in provoking health hazards (Lata et al. 2008). **Parthenium hysterophorus** from different geographical regions exhibited parthenin, hymenin, coronopilin, dihydroisoparthenin, hysterin, hysterophorin and tetraneurin A as the principal constituents of their sesquiterpene lactones (De La Fuente et al. 1997). Gupta et al. (1996) identified a novel hydroxyproline-rich glycoprotein as the major allergen in **P. hysterophorus** pollen. Das et al. (2007) examined the flowers of **P. hysterophorus** and isolated

four acetylated pseudoguaianolides along with several known constituents. A novel sesquiterpenoid, charminarone, the first seco-pseudoguaianolide, has been isolated along with several known compounds from the whole plant by Venkataiah et al. (2003). Chhabra et al. (1999) discovered three ambrosanolides from the chloroform extract of this weed.

Health hazards to humans and livestock

This weed is known to cause many health hazards which have now reached epidemic proportions. Agriculturists are concerned about **P. hysterophorus** affecting food and fodder crops, since the pollen and dust of this weed elicit allergic contact dermatitis in humans (Gunaseelan 1987; Morin et al. 2009). Dermatitis is a T cell-mediated immune injury and the disease manifests as itchy erythematous papules and papulovesicular lesions on exposed areas of the body (Akhtar et al. 2010). These effects have been related to cytotoxicity of the sesquiterpene lactone parthenin (Narasimban et al. 1984). Persons exposed to this plant for prolonged period manifest the symptoms of skin inflammation, eczema, asthma, allergic rhinitis, hay fever, black spots, burning and blisters around eyes. **Parthenium hysterophorus** also causes diarrhoea, severe papular erythematous eruptions, breathlessness and choking (Maishi et al. 1998). Exposure to **P. hysterophorus** pollens causes allergic bronchitis (Towers and Subba Rao 1992). Ramos et al. (2001) assessed the mutagenic potential of a crude extract of **P. hysterophorus** in the **Salmonella**/microsome (Ames) assay and the mouse bone marrow micronucleus test. However, it did not show genotoxic potential. Sharma et al. (2005) observed that the clinical pattern of Parthenium dermatitis progresses from airborne contact dermatitis to mixed pattern or chronic actinic dermatitis pattern. Eczema herpeticum is reported to complicate parthenium dermatitis. Sriramarao et al. (1993) worked on the use of murine polyclonal anti-idiotypic antibodies as surrogate allergens in the diagnosis of **P. hysterophorus** hypersensitivity. **Parthenium**-sensitive patients with rhinitis who had positive results on skin prick tests to **P. hysterophorus** pollen extracts responded with a positive skin reaction to **m**Ab-2. Akhtar et al. (2010) studied the involvement of T_H type cytokines in Parthenium dermatitis.

Exposure to **P. hysterophorus** also causes systemic toxicity in livestock (Gunaseelan 1987). Alopecia, loss of skin pigmentation, dermatitis and diarrhoea has been reported in animals feeding on **P. hysterophorus**. Degenerative changes in both the liver and kidneys and inhibition of liver dehydrogenases have been reported in buffalo and sheep (Rajkumar et al. 1988). The milk and meat quality of cattle, buffalo and sheep deteriorate on consumption of this weed (Lakshmi and Srinivas 2007). Significant reduction in rat WBC count after oral treatment of Parthenium extract signifies its immune system weakening ability (Yadav et al. 2010).

Biodiversity loss due to **P. hysterophorus**

The invasive capacity and alleolopathic properties have rendered **P. hysterophorus** with the potential to disrupt the natural ecosystems. Very sparse or sometimes no other vegetation can be seen in **P. hysterophorus**-dominated areas. It has been reported to be causing a total habitat change in native Australian grasslands, open woodlands, river banks and flood plains (Lakshmi and Srinivas 2007). These weeds rapidly invade new surroundings often replace the indigenous species and pose a serious threat to biodiversity in India. Akter and Zuberi (2009) conducted an extensive survey on invasive alien species (IAS) and their impact on different land use types viz. road side, low land, fallow land, homestead and railway track in Bangladesh. Among others, **P. hysterophorus** exhibited the ability to invade and adapt to new habitats, thereby reducing the number of indigenous plants. The more vigorous mode of reproduction and the possession of an array of secondary metabolites give the weed the status of invasive alien species.

Health benefits of **P. hysterophorus**

The decoction of **P. hysterophorus** has been used in traditional medicine to treat fever, diarrhoea, neurologic disorders, urinary tract infections, dysentery, malaria and as emmenagogue (Surib-Fakim et al. 1996). Ethnobotanically, it is used by some tribes as remedy for inflammation, eczema, skin rashes, herpes, rheumatic pain, cold, heart trouble and gynaecological ailments. **Parthenium hysterophorus** has been found to be pharmacologically active as analgesic in muscular rheumatism, therapeutic for neuralgia and as vermifuge (Maishi et al. 1998). This weed is also reported as promising remedy against hepatic amoebiasis. Parthenin, the major constituent of the plant, exhibits significant medicinal attributes including anticancer property (Venkataiah et al. 2003). The methanol extract of the flowers showed significant antitumour activity and parthenin exhibited cytotoxic properties against T cell leukaemia, HL-60 and Hela cancer cell lines (Das et al. 2007). Previously, Ramos et al. (2002) had established the antitumour potential of **P. hysterophorus** extracts in vitro and in vivo with positive results in terms of tumour size reduction and overall survival of cell lines. Aqueous extract of **P. hysterophorus** has hypoglycaemic activity against alloxan-induced diabetic rats

(Patel et al. 2008). So, flower extract of this weed can be used for developing drug for diabetes mellitus.

Parashar et al. (2009) reported the synthesis of silver nanoparticles by reducing silver ions present in the aqueous solution of silver nitrate complex using the extract of **P. hysterophorus.** This discovery can promote this noxious plant into a valuable weed for nanotechnology-based industries in future. Applications of such eco-friendly nanoparticles in bactericidal, wound healing and other medical and electronic applications makes this method potentially exciting for the large-scale synthesis of other nanomaterials.

Antihemolytic Activity

Antihemolytic activity of the extracts was assessed by the method of Naim et al. [25]. The erythrocytes from rat blood were separated by centrifugation and washed with phosphate buffer (0.2 M, pH 7.4). The erythrocytes suspension (4%) was prepared in phosphate buffered saline. 50 µL extract solution in DMSO (containing 100 µg extract) was taken and volume was raised to 1.5 mL with saline buffer. It was added to 2 mL of the erythrocyte suspension. The mixture was incubated for 5 min at room temperature and then 0.5 mL of H_2O_2 solution in saline buffer was added to induce the oxidative degradation of the membrane lipids. The concentration of H_2O_2 in the reaction mixture was adjusted to produce about 90% hemolysis of blood cells after 225 min. After incubation the reaction mixture was centrifuged at 1500 rpm for 10 min and the extent of hemolysis was determined by measuring the absorbance at 540 nm corresponding to hemoglobin liberation.

II. CONCLUSION

The study reveled that The phytochemical presents in the weed that exhibit the biological properties. Compound present in the p.hysterophorous shows the antihemolytic activity. There are the many health benefits are observed in parthenium hysterophorus.

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