

Parthenium hysterophorus: A Notorious Weed of Global Significance

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INTRODUCTION

Parthenium weed (*Parthenium hysterophorus* L.) is a flowering plant belonging to family Asteraceae. It is ubiquitous in nature growing luxuriantly in wastelands, forest areas, agricultural lands, roadsides, railway tracks and overgrazed pastures. Parthenium weed is capable of growing in various types of soil but it is dominantly found in alkaline or clay loam soils. The weed was first found in Pune (Maharashtra) by Prof. Paranjape in 1951 but was reported as a new species in India by Rao. Roxburgh, the father of Indian Botany, gave the earliest record of this species in his book *Hortus Bengalensis* in 1814. It has been introduced in India from North America and spread like wild blaze in almost all states of India. The weed played havoc around the globe; efforts have been made to control the spread of parthenium by employing different approaches of management, say, Physical, Chemical, Allelopathy and Biological control.



BIOLOGY OF PARTHENIUM WEED

P. hysterophorus is an erect, branched annual or ephermal herb, known for its notorious behavior in ecosystem. It bears creamy white coloured flowers arising from the leaf forks. Parthenium completes its life cycle within 180-240 days. It has two stages in its life: juvenile (rosette or the vegetative stage) and adult (mature or the reproductive

stage). It produces large number of pollen grains, approximately 624 millions/plant and is also a prolific seed producer, producing upto 25,000 seeds per plant. The seeds are dispersed mainly by water, moving vehicles, animals, machinery and by wind. The dispersal of seeds to long distance and viability of seeds for longer duration are basic reasons for complex problem of weed control.



Figure: Tap roots and seeds of *P. hysterophorus*

NEGATIVE IMPACTS OF PARTHENIUM WEED

Parthenium is considered to be the dangerous terrestrial weed having harmful effects on ecosystem, crops, animals and human beings. Parthenium contains chemicals such as parthenin, hysterin, ambrosin and hymenin which play role in allelopathic effect of parthenium on different crops. These chemicals effect germination of various crops. The pollens carried away in clusters may settle on stigmatic surface and inhibit fruit setting in crops such as tomato, brinjal, maize and capsicum. The weed is toxic to animals causing dermatitis with skin lesions particularly on horses and cattle. It is also responsible for mouth ulcers when consumed by animals. If cows, buffaloes or goats are fed on grass mixed with parthenium, it can cause illness in animals leading to production of bittermilk and tainted meat. The allergens in parthenium also have ill effects on human health causing dermatitis, hay fever, bronchitis and asthma.



INTEGRATED WEED MANAGEMENT (IWM) FOR PARTHENIUM

No single method alone is effective for control of parthenium. Various methods, like, physical, chemical, allelopathic and biological control are being practiced for management of weed around the globe.

Physical control- Uprooting the weed plants before flowering and seed setting is the most effective method. This method is not effective after seed setting because it will increase the area of infestation. Physical control is time consuming and unpleasant job, exposing the workers to health hazards. Burning is another strategy for managing weed. But, this strategy proved to be inadequate since it requires large quantity of fuel and may destroy other plants in its vicinity.

Chemical control- Use of chemical herbicides, such as chlorimuron, glyphosate, atrazine and metsulfuron, are effective in controlling Parthenium weed. Application of 2, 4-D (0.2%) and metribuzin (0.25 and 0.50%) were found to be effective for suppressing parthenium at 15DAS (days after spraying) by Gaikwad *et al* (2008). Glyphosate and metribuzin cause higher mortality of weed plants at rosette stage. Pendimethalin was found to be least effective.

S. No.	Herbicide	Percentage mortality at rosette stage
1.	Glyphosate	96
2.	Metribuzin	87

3.	2,4-D	71-80
4.	Atrazine	56.5
5.	Pendimethalin	42.5

Allelopathic control- Allelopathy is the phenomenon of detrimental effect of one plant species on growth and development of another plant species. Allelopathy is also known as competitive replacement of parthenium. Various plants in India have been reported to have allelopathic effect on *Parthenium hysterophorus* such as *Cassia sericea* and *Amaranthus spinosus*. Root and shoot extracts of *Sorghum halepense*, *Cenchrus pennisetiformis* reduce seed germination and seedling growth of parthenium.

Biological control- It is the most environment friendly approach for the control of weed. Parthenium can be effectively controlled by various bioagents like microbial pathogens, botanicals and insects. The biological approach is gaining attention these days. The leaf eating beetle (*Zygogramma bicolorata*) has good potential to control parthenium weed. In field trials, it has been observed that buffel grass can suppress parthenium growth by 50%. Thus, biological approach is the key element in Integrated Weed Management (IWM).



CONCLUSION

The noxious parthenium weed causes undesirable changes in the ecosystem. Adoption of appropriate methods for management of *P. hysterophorus* are crucial for avoiding threats to biodiversity and economy. Integrated weed management focusing on biological

control can effectively manage the weed. Two insect species and two rust fungi have shown a great potential to control the weed. More approaches and alternatives are yet to be discovered by the scientists until the weed gets completely checked and stop creating nuisance in various parts of the world.

