

CONTROL OF PARTHENIUM WEED UNDER USING INTEGRATED MANAGEMENT PRACTICES

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Introduction:

Parthenium hysterophorus commonly called as carrot grass, bitter weed, star weed, white top, wild feverfew, and congress grass, etc. in India, is an herbaceous, erect type and annual plant belonging to the family Asteraceae (Compositae). Until there is some doubt about the origin of *Parthenium histophorus* in the world, regarded by Bajwa *et al.* (2016) it is originated from America and it was spread to all over countries. But, the National Commission of Biodiversity of Mexico (CONABIO), reported that the species is listed as originating in the East of Mexico and the Antilles, with a secondary native distribution from the Southern USA to South America (CONABIO, 2018). The concept of 'One year seeding, seven years weeding' is true for *Parthenium* because it produces about 5000-10000 seeds per plant, which are viable even at the immature stage, it is a prolific seed producer with seeds having long storage life and can quickly disperse through the wind, its vegetative generation occurs from the crown. *Parthenium* is a noxious weed and in dry summer months appears in a rosette form but, during the rainy season it grows up to 90 cm. height, with profuse flowering and green foliage. The toxin responsible for effect *parthenium* weed is "Parthenin. The characteristics of *Parthenium histophorus* is wide adaptability, photo-thermo-insensitivity, drought tolerance, strong competition and allelopathy, high seed production ability, the longevity of seeds in soil seed banks and small and light seeds. It can move or spread via wind, water, farm machinery, industrial machinery, feral animals, humans, vehicles, stock fodder, movement of stock, grain and seed.

Important host plant

Oryza sativa (rice), *Saccharum officinarum* (sugarcane), *Sorghum bicolor* (sorghum), *Triticum aestivum* (wheat), *Zea mays* (maize) *Coffea arabica* (coffee) *Citrus* sps.,

Solanum lycopersicum (tomato) *Solanum melongena* (aubergine) *Solanum tuberosum* (potato) etc.,

Impact mechanisms

The allopathic effect causes allergic responses, competition – shading, induces hypersensitivity pest and disease transmission, poisoning, pollen swamping, rapid growth

Impact outcomes

The conflict between crops, damaged ecosystem services, ecosystem change/ habitat alteration, host damage, reduced native biodiversity, affect the agriculture operation and productivity, negative impacts animal and human health and affect the livelihoods.

Uses

Environmental: Agroforestry and Soil improvement

Materials: Green manure, mulches, pesticide and poisonous to mammals

Management of Parthenium

An integrated approach is essential for effective control. Following are the practices that can be adapted to control *Parthenium hysterophorus*.

A. Cultural method:

- Hand pulling: This practice is recommended once the weed emerges from the soil. If, area of spread is high a serious hand pulling campaign is needed to control.
- Crop rotation: In infested cultivated land, a normal crop is rotated with marigold during rains.
- Allelopathic effect: The weed can be suppressed by *Cassia sericea*. Its plant leachates have kaolines, which accumulate in the soil and interfere with the weed.
- Composting *Parthenium*: The weed reaches 50 per cent of seed setting during flowering. The weed left as such in the same area acts as a seed bank because of its higher seed production capacity and extended dormancy period. Therefore composting is recommended, as the seeds lose their viability due to the higher temperature during composting.

- Cut the *Parthenium weed* into small pieces by using a knife or chaff cutter and spread the material on the ground to a thickness of 10 cm layer. Over this spread *Tricoderma viridi* and spray urea at 0.5 per cent solution (Generally 5kg urea/ ton of weed material).
- This sequence of layers is repeated up to a meter high and finally plastering should be done with mud/ clay soil. Keep the moisture level at 50-60 per cent. After two weeks, a thorough mixing has to be given.
- The compost will be ready for field application after 40-45 days. It is a good source of nutrients and helps to maintain soil properties through the aggregate formation. The 'Parthenin' content acts as a growth regulator and so the next crop comes up well.
- Mulching: Mulching has a smothering effect on weeds by restricting photosynthesis. It also, conserve moisture, lower surface temperature, fertilize the soil, protect from the rainy season and improve the soil quality.

B. Biological method:

Zygogramma bicolorata, a leaf eating beetle, was identified as a bio control agent which controls *Parthenium* weed by feeding on the foliage. Recently a rust pathogen *Puccinnia abrupta* var *parthenicola* was identified, which is capable of controlling this weed.

C. Chemical method:

Non-cropped areas: This weed infestation is generally severe in the open wasteland, non-cropped areas along railways and roadsides. In such areas spraying of common cooking salt solution at 15-20 per cent concentration at an active growth stage will effectively control the weed. Application of 2,4-D esters at 2-5 kg a.i/ ha along with wetting agent will also control the weed.

Cropped areas: Herbicide plays a vital role in cropped area weed management, otherwise crop injury will occur. Pre emergence herbicides such as Simazine, Atrazine for maize, sorghum and sugarcane; Alachlor and Butachlor for pulses and cotton respectively are the selective herbicides for *Parthenium* control.



Cultural method



Biological method



Chemical method

Conclusion

Parthenium is a noxious weed, control will be the biggest challenge in the agriculture sector due to wide ecological amplitude, profuse growth, rapid growth and spread fast multiplication and health hazards several methods have been recommended for control its growth and development. But no methods have to perform satisfactorily as each method having one or more limitations such as prohibitive cost, inefficiency, impracticability and polluting the environment, *etc.* However, the integrated parthenium management approach recommended recently seems to be promising.

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