

## Parthenium Menace

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**Introduction:** Parthenium hysterophorus is an invasive and annual herbaceous flowering plant growing to a height of 0.5 to 1.5 m belonging to family Asteraceae. It is native to the American tropics with common names like Santa-Maria, Santa Maria feverfew, whitetop weed and famine weed. In India, it is locally called carrot grass, congress grass or gajarghas or dhanura. It is also called as gajarghas as it appears like carrot plant

It entered India along with wheat imports from USA in the early 1950s in Pune, Maharashtra. This weed is one of the most degenerative and toxic, destroying all other vegetation around it. A simple wave of wind spreads its poisonous seeds to other areas. From then, it spread alarmingly both in urban and rural areas throughout the country, now becoming a menace. They are commonly observed in edible field crops like rice, jowar, maize, bajra, peanuts, green gram and red gram, thereby reducing their output and increasing the cost of cultivation. It spread in non-crop areas like railway tracks, roadside, waste lands, gardens and so on. It is an annual herbaceous weed species known for its vast geographical distribution in non-native biomass across five continents, invading disturbed land. It infested pastures and farmland, causing often catastrophic loss of yield as reflected in common names like famine weed or carrot grass weed. In some areas, heavy outbreaks have been omnipresent, affecting livestock and crop production and human health.

The plant produces allelopathic chemicals that suppress crop and pasture plants as well as allergens that affect humans and livestock. It also frequently causes pollen allergies.

**Toxicity:** The contact with these plants can cause dermatitis and respiratory problems in humans, dermatitis in cattle and domestic animals. It is also responsible for bitter milk disease in livestock when their fodder is contaminated with these leaves. The side effects after ingestion of any part of plants that encumber the trichomes and pollen are eczema, skin inflammation, hay fever, asthma, burning and blisters, breathlessness and choking, allergic rhinitis, black spots, diarrhoea and severe erythematous eruptions. The presence of parthenium pollen grains hindered fruit set in tomato, brinjal, beans, and several other crop plants, among other allelopathic effects of these species.

The invasive capacity and allelopathic properties have rendered parthenium with the potential to disrupt the natural ecosystems in very sparse or sometimes no other dominated areas. According to reports, it completely altered the original Australian grasslands, open forests, riverbanks, and flood plains. These weeds spread quickly into new areas, frequently displacing native species and presenting a severe threat to biodiversity in India as well. The more vigorous mode of reproduction and possess secondary metabolites that give the weed the status of destructive and invasive alien species.

**Uses of parthenium:** Parthenium offers certain health benefits like remedy for skin inflammation, rheumatic pain, diarrhoea, urinary tract infections, dysentery, malaria and neuralgia. Its prospect in nano-medicine is being carried out with some preliminary success so far. Other potential uses include the elimination of heavy metals and dye from the environment, the removal of aquatic weeds, the use of cattle dung as a substrate for commercial enzyme production, the use of cattle manure as a biopesticide, the manufacturing of compost, and green manure.

Tribal people utilize it as a treatment for rheumatic pain, colds, gynecological conditions, rashes, eczema, inflammation, and herpes. It was discovered to have pharmacological activity as a vermifuge, a treatment for neuralgia, and an analgesic in cases of muscular rheumatism. Parthenin is the major component extracted from this plant exhibiting medicinal benefits like anticancer property. The methanol extract of flowers showed significant antitumour activity and parthenin exhibited cytotoxic properties with reduced tumour size

reduction and overall survival of cell lines. The aqueous extract of parthenium showed hypoglycaemic activity against alloxan-induced diabetic rats.

Environmental pollution with heavy metals has become a universal phenomenon. Nickel in higher concentrations can cause cancer of lungs, nose and bone. The sulphuric acid-treated carbonized Parthenium (SWC) could be an effective, easily available and low-cost adsorbent for the removal of nickel from contaminated water.

Cadmium used in electroplating, plastic manufacturing, metallurgical processes and industries of pigments and Cd/Ni batteries can be removed from contaminated waste water using dried parthenium powder as an adsorbent through batch process.

Cresol is a phenol derivative from effluents of petrochemical, oil and metal refineries, chemical and glass fibre manufacturing, ceramic and steel plants, phenolic resin manufacturing industries causes stomach tumours, corrode the eyes, skin and respiratory tracts and affect the central nervous system, cardiovascular system, lungs, kidney and liver can be removed from industrial wastewater by using activated carbon prepared from parthenium powder activated using concentrated sulphuric acid as an effective adsorbent material.

**Methods of weed control:** The various methods followed in India include removal of weeds by pulling out with the hand or use of trowel and burning or by ploughing burning, spraying weedicides like chlorimuron ethyl, glyphosate, atrazine, ametryn, bromoxynil and metsulfuron or crop rotation or intercropping. In many Indian states, beetles have establishment and contributed to control several hundred hectares of land fully infested with parthenium. At many places, beetles even controlled parthenium in the crop fields where insets searched the parthenium amidst the crop and devoured it. Beetles usually are off white or light reddish in colour with dark brown longitudinal markings on the elytra measuring about 6 mm in length.

When there are light infestations of parthenium in cultivated fields, it may be hoed or weeded by hand if labour is available at acceptable cost. Usually, the application of herbicides is expensive and often harmful with use of paraquat sprays being effective while the weeds are young.

The most effective and promising means of practical and long-term control are biological with best-established control organism so far being a beetle native to Mexico, *Zygogramma bicolorata* (Mexican beetle) which was first used in India during 1984. It since has become widespread and well-established on the subcontinent. It defoliates and often kills the weed, and its damage to the young flowering tops reduces seed production.

In different countries like Australia and South Africa, several other biocontrol agents have been released or are under evaluation. These include at least two more species of beetles that have been released in South Africa, a stem boring weevil *Listronotus setosipennis* and seed weevil *Smicronyx lutulentus* along with rust fungi that have been of some use.

In Australia, yet other biocontrol agent was employed on parthenium totalling to 11 species since 1980. Of those eleven beetles, nine appear to have established in various regions of Australia. The two with the greatest effect are parthenium beetle *Zygogramma bicolorata* and stem-galling moth *Epiblemastrenuana*. However, other species that appear to have established usefully include a leaf-mining moth like *Bucculatrix parthenica*, the stem-galling weevil like *Conotrachelus albocinereus* and root-boring moth like *Carmenta ithacae*.

In view of the seriousness and magnitude of the threat posed by this weed, every year during 3rd week of August is celebrated through awareness programmes and cleaning activities on large scale taken by ICAR institutes from 2004.

