

Calorific Value Calculation For Herbaceous Parthenium Hysterophorus L.

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Abstract

Parthenium hysterophorus is an aggressive ubiquitous annual herbaceous weed with no economic importance unraveled till now it is commonly known as “altamisa, carrot grass, bitter weed, star weed, white top, wild feverfew, the scourge of India and congress grass. *Parthenium hysterophorus* first imported with PL- 480 hybrid Variety of wheat from America in 1950. Parthenium is a poisonous, pernicious, problematic, allergic and aggressive weed posing a serious threat to human beings and livestock. To escape from the harmful effects of *P. hysterophorus*, this weed should be eradicated carefully or converted as a source of fuel.

Keywords : *Parthenium hysterophorus*, herbaceous, altamisa, pernicious, problematic, allergic and aggressive.

Introduction :

Parthenium hysterophorus L., commonly known as carrot weed, white top or congress grass in India, is an herbaceous, erect and annual plant belonging to the family Asteraceae (compositae). It is most popularly known as gajar ghas due to its appearance like a carrot plant. The origin of parthenium is considered to be from Mexico, America, Trinidad and Argentina. After the noticeable occurrence of parthenium in Pune (Maharashtra) in 1955, it has spread like a wild fire throughout India. At present parthenium has invaded about 35 million hectares of land in India.

It is a nuisance on road sides and railway tracks, vacant lands, wastelands, industrial areas, on the sides of open drainage systems and irrigation canals besides invading agricultural crops, orchards and forest area. It mainly spreads through seeds. A single plant can produce about 5000 – 25000 seeds. The seeds are very small in size and light in weight.



Parthenium is a Fast growing weed. Its general height may be 1/2 meter to 1 1/2 meter. The *Parthenium hysterophorus* plant starts to give Flowers within 6 to 8 weeks of growing. Due to its high Fecundity a Single Plant Can Produce 10,000 to 50,000 Viable Seeds and these seeds Can disperse and germinate to cover large areas Ajmer Valley is much Suitable for growing of this weed due to appropriate soil, climatic and geographical conditions this weed completes its life span in 4 months.

HARMFUL EFFECTS OF P. HYSTEROPHORUS

Parthenium is a poisonous, pernicious, problematic, allergic and aggressive weed posing a serious threat to human beings and livestock. In India and Australia, this weed has been considered as one of the greatest sources of dermatitis, asthma, nasal-dermal and nasal-bronchial types of diseases. Besides ill effects, it also causes several other problems like blockage of common pathways and reduces the aesthetic values of parks, gardens and residential colonies.

- Seeds and Pollen grains of *P. hysterophorus* are the cause of allergic respiratory Problems, contact dermatitis, Mutagenicity in humans and livestock.
- Stem and leaves of this weed contain a chemical “Parthenium” which is responsible for Asthma and depression in humans.
- Milk of animals becomes bitter due to eating of this weed.
- Chemical found in the roots of *Parthenium hysterophorus* weed inhibits the germination of seeds of other vegetation.
- It causes soil erosion also, because it binds the soil and other soil binding plants are not grown due to the allelopathic effect of this weed.

PRECAUTIONS FROM P. HYSTEROPHORUS

- Avoid touching this plant by hand.
- This erect ephemeral herb should be uprooted before flowering
- Grazing of animals should be banned in *P. hysterophorus* rich areas.
- People should be educated about the harmful effects of this weed.
- Keep the Children away from weed affected areas.
- This weed should not be used as an ornamental plant.

ERADICATION OF PARTHENIUM HYSTEROPHORUS L. WEED

To escape from the harmful effects of *P. hysterophorus*, this weed should be eradicated carefully.

- This weed should be uprooted before flowering.
- Biological control by competitive plants ***Cassia tora* commonly called “Chakoda”** and marigold are capable of replacing Parthenium by broadcasting of seeds during February–April in the Parthenium infested area.
- Plenty of seeds of *C. tora* may be collected easily during October-November.
- Many Parthenium infested sites have been managed by use of this technique.



Efforts of DWSR

The Directorate of Weed Science Research (DWSR) has intensified biological warfare against parthenium involving Krishi Vigyan Kendra, NGOs, local residents and farmers. At many places in M.P. beetles were released in the programme arranged with the collaboration of NGOs, residential societies, clubs, municipalities etc., involving local leaders. DWSR has also supplied nucleus cultures of the beetle to different All India Coordinated Research Programme on Weed Control (AICRPWC) Centres in 14 states apart from supplying to KWKs, farmers, municipalities and interested persons in almost all the states.

DWSR also provides consultancy on Parthenium management to private and government agencies. DWSR released about 60 lakh beetles under consultancy programme in different blocks and circles of Nagpur region. To obtain the beetle culture free of cost, requests may be sent to Director DWSR in June–July.



Release of Beetles by local leaders

Collection for augmentation of the beetles

The Beetles can easily be collected from the established sites during June to September. Collection can be made in ordinary polythene or plastic containers that are perforated with a needle. Upper parthenium twigs without leaves should be placed inside the polythene to avoid the shrinking and to provide a resting place for the insect. If the insects have to be carried over long distances, it is better to avoid leaves to prevent moisture condensation and fungal growth, which can cause insect mortality. Care must be taken to make the initial releases on small and succulent growth of parthenium in undisturbed areas away from human habitations. Initial release should be avoided in cultivated land because plowing of land may disturb the pupation process hence poor survival and subsequent establishment. Low lying areas prone to waterlogging should also be avoided because pupation takes place in soil. The ideal time for carrying out releases will be June to August when plenty of fresh parthenium plants are available in nature. There is no benefit in

undertaking releases between Novembers to May when they normally do not breed. However, during this period, beetle can be released over parthenium near the water sources

- After drying it should be burnt.
- A certain sp. of marigold may be grown to produce an allelopathic effect towards *P. hysterophorus*.
- Growing of this weed can be reduced by adding salt into soil.
- Biological control by leaf feeding beetle, stem galling moth, stem boring weevil and fungi have been carried with variable degrees of success.
- This weed can be controlled by using *zygogramma bycolorita* beetle.
- This weed is a rich source of N,P,K, Ca and Mg so it can be used as bio manure.
- The most important application of *P. hysterophorus* as a biofuel is being carried out in the laboratory by calculating its calorific Value 27.90 KJ/g/ So it is better Bio fuel than wood (17 kJ/g) and dung Cake (7-8 kJ/g)

CALCULATION OF CALORIFIC VALUE OF *P. HYSTEROPHORUS*

The heat liberated in joule on complete combustion of 1 g of fuel is expressed as its calorific value. Its unit is kilojoule/gram, when 500 grams (W_1) dry mass of *P. hysterophorus* is burnt in simple furnace 'sigdi' and 100 ml (m) of water kept on it for heating after complete burning of weed, temperature of water raised from 27 °C(t_1) to 57 °C(t_2). 50 grams (W_2) of ash remains left.

Then calorific Value is calculated through following formulae

$$Q = m \times c \times \Delta t \text{ and CF.}$$

$$\Delta w = \frac{Q}{S}$$

Q = Heat absorbed by water

$$W_1 = 500 \text{ g.}$$

$$t_1 = 27^\circ\text{C}$$

$$W_2 = 50 \text{ g.}$$

$$t_2 = 57^\circ\text{C}$$

$$\Delta W = W_1 - W_2$$

So

$$Q = 100 \times 4.186 \times 30 \quad \Delta W = 500 - 50 \quad \Delta t = t_2 - t_1$$

$$= 12558 \quad = 450 \text{ grams} \quad = 57 - 27$$

$$= 30^\circ\text{C}$$

$$m = 100 \text{ ml (Mass of Water)}$$

S = Specific heat of Water

= 4.186 J/g °C Heat generated by burning 1 g of dry *P. hysterophorus* weed will be

$$= Q / \Delta w. \quad \text{Which is calorific Value (CF.)}$$

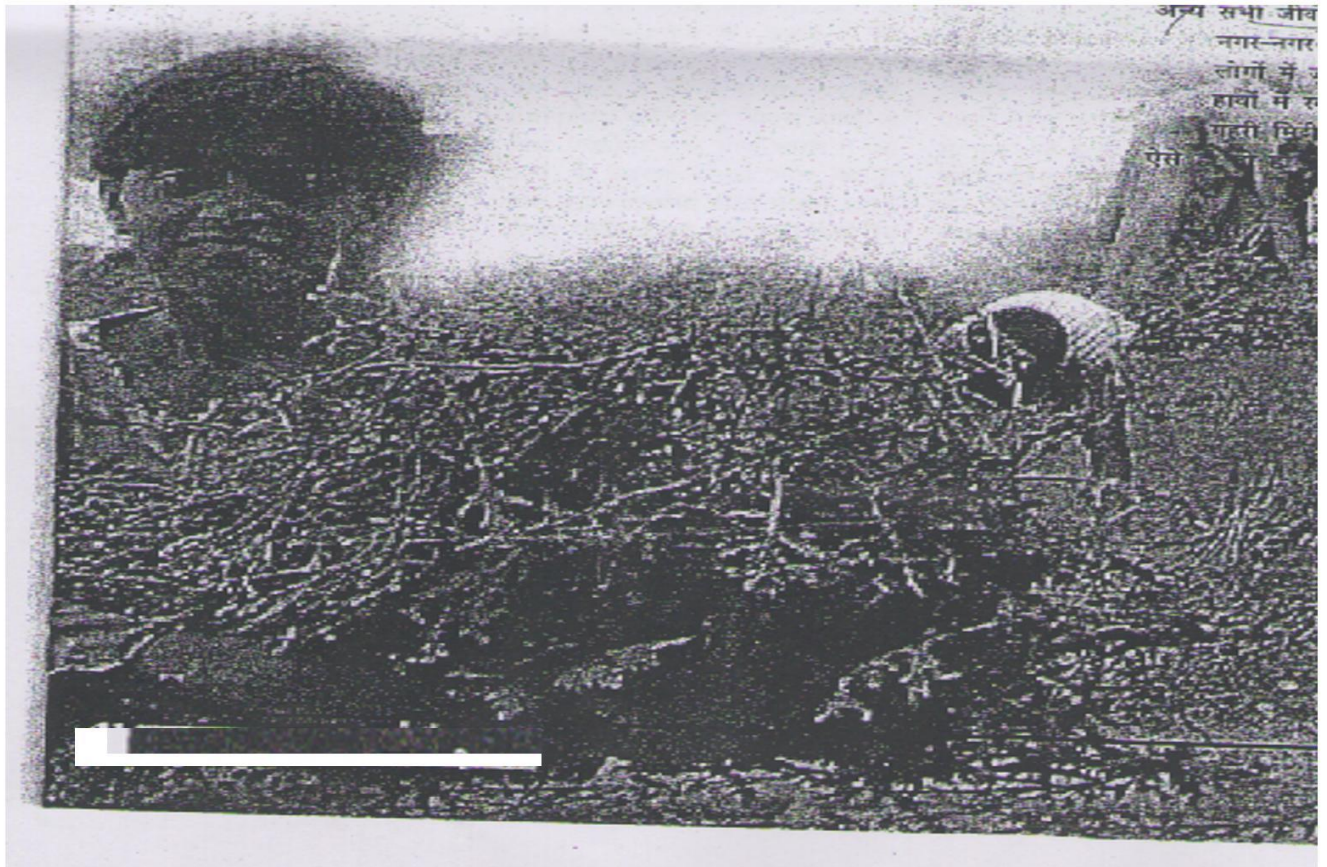
$$\Delta w.$$

$$\text{CF.} = Q / \Delta w = \frac{12558}{450} = 27.90 \text{ KJ/g}$$

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Eradication of Parthenium
by a farmer