

EFFECT OF PARTHENIUM EXTRACT AS HERBICIDE ON SOME ORNAMENTAL AND MEDICINAL PLANTS

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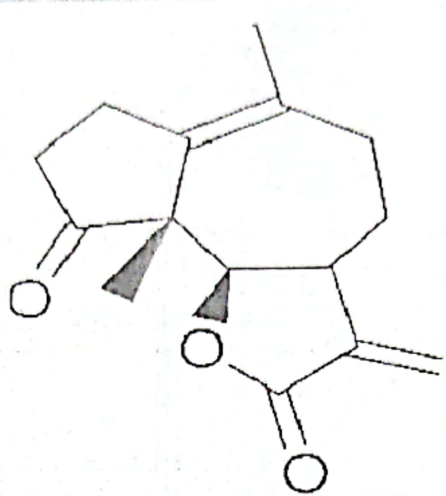
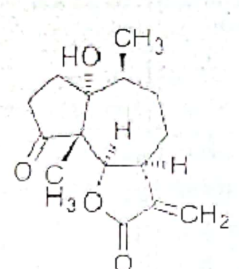
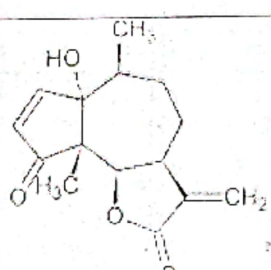
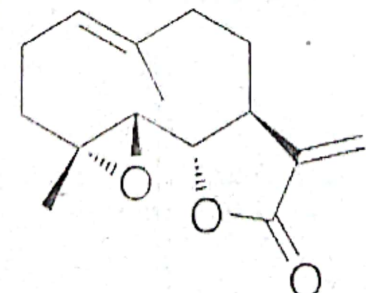
Abstract

Parthenium hysterophorus, members of the Asteraceae family. It is a noxious weed native of America. This weed is spread all over Asia, Africa and Australia. It is considered to be a cause of a spectrum of clinical patterns: allergic respiratory problems, contact dermatitis, mutagenicity in human and livestock. Its allelopathic nature can drastically reduce the crop production and aggressive dominance of this weed threatens biodiversity. In India most of the medicinal plants are badly affected by Parthenium. Attempts to control spread of the plant have so far not been successful. First occurrence of parthenium in India is believed to be in 1956. However some reports trace its history of occurrence about one and half century older than as reported. Among the allelopathic weeds, Parthenium hysterophorus Linn. is now recognized as a cause of serious agricultural problems due to its invasion of croplands and subsequent lowering of crop yield. Chemical control, biological control, mechanical controls are tried to eradicate this weed. But the success of eradication is very limited.

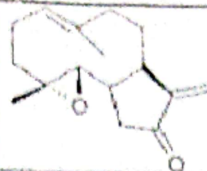
Key words:- Parthenium, sesquiterpenelactone, parthenin, allelochemicals.

Introduction: Parthenium hysterophorus L. is an aromatic annual and obnoxious invasive herb under Asteraceae family, now commonly known as feverfew, Tanacetum parthenium, Chrysanthemum parthenium (Parsons and Cuthbertson, 2001; Bhatt et al., 2012). The normal height of this erect plant is up to 1 m but under favorable conditions the height may reach up to 2 m having deeply penetrating taproot with many finely branched feeding roots and an angular, longitudinally grooved and profusely branched hairy stem (Parsons and Cuthbertson, 2001; Bhatt et al., 2012). Allergen containing 8-20 cm long and 4-5 cm wide shortly hairy pale green leaves are alternate and rosette that resemble to carrot leaves during initial growth (Parsons and Cuthbertson, 2001; Bhatt et al., 2012). Rising from the stem nodes and terminating at about the same height, each head (4-10 mm diameter) of clustered flowers bears about 40 tubular male and 5 ligulate female white florets and produces 2 mm long flattened black seeds (Parsons and Cuthbertson, 2001). Seeds germinate any time of the year under wide range of environmental condition. High humidity, high moisture content and temperature around 25°C are the standard factors for seed germination (Bhatt et al., 2012). A native of tropical America P. hysterophorus was introduced during the 1950s into Africa, Asia and Oceania (Labrada et al., 1994). Now this species is frequently found on roadsides, railway reserves, stock yards, cultivated fields, rundown pastures and vacant lots in China, Taiwan, Pakistan, Nepal, Sri Lanka, Bangladesh, Vietnam, Pacific islands, Ethiopia, Kenya, Madagascar, South Africa, Somalia, Mozambique, Zimbabwe and several countries of South and Central America (Parsons and Cuthbertson, 2001; Bhatt et al., 2012). It is included in the Global Invasive Species database of IUCN due to the invasive nature (Bhatt et al., 2012). Not only this weed is well thought-out to be a factor of allergic respiratory problems, contact dermatitis and mutagenicity in human and livestock but also considered as a severely crop production reducing agent due to the allelopathic nature (Patel, 2011). Thus P. hysterophorus is a threat for the biodiversity.

## Journal of Medicinal Plants Studies

Name of the compounds	Structure	References
Canin (C <sub>15</sub> H <sub>18</sub> O <sub>5</sub> ; mw = 278.31)		(Zhou et al., 2011b)
Charminarone (C <sub>15</sub> H <sub>18</sub> O <sub>5</sub> ; mw = 278.31)		(Venkataiah et al., 2003)
Coronopilin (C <sub>15</sub> H <sub>20</sub> O <sub>4</sub> ; mw = 264.32)		(Zhou et al., 2011b)
Parthenin (C <sub>15</sub> H <sub>18</sub> O <sub>4</sub> ; mw = 262.31)		(Zhou et al., 2011d)
Parthenolide (C <sub>15</sub> H <sub>20</sub> O <sub>3</sub> ; mw = 248.32)		(Kuhn and Winston, 2007; Zhou et al., 2011d)

Parthenolide  
(C<sub>16</sub>H<sub>22</sub>O<sub>2</sub>;  
mw = 246.35)



(Kuhn and  
Winston, 2007;  
Zhou *et al.*,  
2011d)

### Materials & Methods

#### Aqueous Extract:

- 1) Parthenium plants were collected and washed thoroughly with running water to remove all dust and dirt.
- 2) Leaves and stems were chopped with fine blade on the table to the average size of chopped leaves ranges from 2 to 5 mm and that of stem is 5 to 10 mm.
- 3) 500 ml of distilled water was taken in the round bottom flask of 1000 ml capacity along with 250g of chopped material.
- 4) The round bottom flask was placed on heating mantle and heated at a constant temperature of 80 °C for 1 hour by keeping an air condenser on the mouth of the round bottom flask.
- 5) After getting dark green color extract; it is filtered twice firstly with cotton filler and then with filter paper. Filtrate received was 350 ml.
- 6) The extract was then collected in 500 ml. beaker and evaporated to make it concentrated. Early 100 ml. of extract was collected and kept in a numbered colored bottle.

#### POT TESTS

Instead of field trials activity of Parthenium extract was tested on small scale by using common pot tests on ornamental and medicinal plants. Following procedure was adopted for the pot test.

1. Ten different plants having medicinal properties were grown in 20 earthen pots. Same herbs were grown in pot A and pot B.
2. The series of 20 pots were prepared.
3. The solutions of Parthenium extract having concentration from 10 ppm to 90 ppm.
4. To the first pot (A) regular watering was done.
5. To the second pot (b) besides regular watering, 100 ml of parthenium extract was added.
6. Regular observations were taken for their growth for 15 days

#### Effect of Parthenium extract on the following plants.

Name of the plant	No. of days	Effective conc. in ppm
Achyranthus aspera	25	40
Cassia tora	25	70
Solanum xanthocarpum	25	70
Sphaeranthus indicus	25	50
Mentha arvensis	25	60
Ocimum gratissimum	25	-
Coriander sativum	25	50
Argemone Mexicana	25	60
Trigonella foenum-graecum	25	70
Allium sepa	25	80

The above plants show effect on growth and marginal burning of leaves at different concentrations.

#### Result and discussion

Herbicide :- The chemical used to kill the weed or to suppress weed growth is known as herbicides.

Bio herbicides are the plant extracts containing toxic alkaloids which kill herb effectively or suppress the growth of it. Pure Parthenin as well as extract of different parts of

*P. hysterophorus* shows phytotoxic effects on many aquatic (Pandey 1994,1995,1996) as well as terrestrial weeds (Khosala et al.,1990; Khosala and Sobati 1981., Kumari,1990., Singh et al.) The sesquiterpene lactone Parthenin has received most attention regarding allelopathy or potential herbicidal properties of the plant (Duke et al.,2007).

Parthenium elaborates four C-6 guaianolides such as parthenin and coronopillin and several phenolic acids such as caffeic ; vanillic, ferulic chlorogenic and anisic acids aqueous extract of parthenium with various concentration n ppm were tried against observation were taken for 8 days it is found that each plant is sensitive towards parthenium at different concentration the effective concentration range is from 40 ppm – 90 ppm only *ocimum gratissimum* do not show any effect against parthenium extract.

Almost all the plant has shown suppression in growth and marginal burning of leaves it is observed that when aqueous extract of parthenium was added to the test plant it shows systemic action it is absorbed through the roots and translated in the body of the plants and causes marginal burning of leaves as well as suppression of growth of the plant.

Parthenium extract has shown suppression of plant growth and marginal burning of leaves because of systemic action. From the above tests and observation it concludes that parthenium is an effective herbicide at higher concentration.

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- 6) *American journal of pharmacology - 1969 [ Arny et al]*
- 7) *Chemical abstract registry number [ 508 – 59- 8]*
- 8) *Singh, 1983 and Mahadevappa and Ramaiah 1988*