



## ESTIMATION OF TOTAL PHENOLS AND FLAVONOIDS CONTENT IN *PARTHENIUM HYSTEROPHORUS* AERIAL PARTS

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### Abstract

Traditionally, *Parthenium hysterophorus* (common name – ragweed, star weed; family – Asteraceae) has been used in various diseases such as fever, ulcers, anaemia, liver and heart complications, fungal diseases, skin problems, migraine and rheumatoid arthritis. The present studies were designed to estimate total phenols and flavonoids content in *P. hysterophorus* aerial parts because no literature regarding investigation is available till now. The hydroalcoholic extracts of *P. hysterophorus* aerial parts collected from different regions were prepared separately as per standard procedure. Further, the hydroalcoholic extracts were screened for presence of bioactive phytoconstituents using general chemical tests. The estimation of total phenols and flavonoids content was carried out using standard procedures named Folin Ciocalteu's assay and aluminium chloride assay respectively. The total phenols content of Tamil Nadu, Rajasthan and Himachal Pradesh varieties *P. hysterophorus* aerial parts were found to be 12.95, 11.90 and 11.65% w/w respectively, whereas the total flavonoids content of Tamil Nadu, Rajasthan and Himachal Pradesh varieties *P. hysterophorus* aerial parts were found to be 5.25, 4.58 and 4.36% w/w respectively. Finally, it can be concluded that, Tamil Nadu variety of *P. hysterophorus* aerial parts contained higher content of total phenols and flavonoids than Rajasthan and Himachal Pradesh. Further, it can be concluded that most of the pharmacological activities of the plant may be due to the presence of these flavonoids and phenolic compounds.

**Key words :** Aluminium chloride assay, Flavonoid, Folin Ciocalteu's assay, Phenol.

### Introduction

*Parthenium hysterophorus* (common name – ragweed, star weed; family – Asteraceae) has been distributed around 20 countries throughout the world such as West Indies, America, Mexico, China and India (Bagchi *et al.*, 2016; Lalita and Kumar, 2018). Traditionally, the weed has been used in various diseases such as fever, wounds, ulcers, anaemia, liver and heart complications, fungal diseases, skin problems (Fazal *et al.*, 2011), migraine, rheumatoid arthritis, insect bite infections, stomachaches and infertility (Sharma and Gupta, 2012). The various classes of phytoconstituents have been scientifically reported from this weed such as terpenoids – sesquiterpene lactones such as guaianolides, germacranolides, eudesmanolides, cornopolin, parthenin, balchanin, artecamin, costunolide, epoxyartemorin;  $\alpha$ -unsaturated  $\gamma$ -lactones: 3- $\beta$ -hydroxy-parthenolide, 3- $\beta$ -hydroxycostunolide, costunolide, 8- $\alpha$ -hydroxystafiatin,

artecamin, 1- $\beta$ -hydroxyarbusculin, 5- $\beta$ -hydroxyreynosin and flavonoids – luteolin, apigenin, kaempferol, quercetin, chrysoeriol, santin, jaceidin, centaureidin; (Bagchi *et al.*, 2016). The plant has been scientifically reported the various pharmacological activities such as anticancer and cytotoxic, wound healing, pesticidal, hypoglycaemic, thrombolytic, antifungal, antiamoebic, antioxidant, anti-inflammatory and antimicrobial (Bagchi *et al.*, 2016).

The exhaustive survey of available literature about the plant material reveals that estimation of total phenols and flavonoids in plant material has not been performed on the plant. Thus, it was designed to estimate total phenols and flavonoids content in *P. hysterophorus* aerial parts.

### Materials and Methods

#### Collection of plant materials

The dried aerial parts of *P. hysterophorus* were collected from wild regions of different states such as

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Himachal Pradesh, Rajasthan and Tamil Nadu. The identity of collected dried aerial parts of *P. hysterophorus* were also confirmed from National Institute of Science Communication and Information Resources (NISCAIR), New Delhi by Dr. Sunita Garg, Emeritus Scientist, CSIR-NISCAIR with reference no. – NISCAIR/RHMD/Consult/2018/3203-04, dated 27/04/2018).

### Chemicals, reagents and solvents

The various chemicals, reagents and solvents of analytical grade, used in present research work were procured from authentic sources such as E Merck, Delhi, India and S.D. Fine Chemicals, Mumbai, India.

### Preparation of various extracts

The hydroalcoholic extracts of *P. hysterophorus* aerial parts collected from different regions were prepared separately as per standard procedure described in literature (Richa *et al.*, 2017). Further, the hydroalcoholic extracts were screened for presence of bioactive phytoconstituents using general chemical tests (Farnsworth, 1966).

### Estimation of total phenols and flavonoids content

The various hydroalcoholic extracts of aerial parts of plant obtained from different regions was subjected to estimation of total phenols and flavonoids content using standard procedures named Folin Ciocalteu's assay and aluminium chloride assay respectively (Kumar *et al.*, 2014). The absorbance in the experimental protocol was measured using UV/VIS spectrophotometer (Schimadzu, Japan). The results obtained from the experimental protocol were presented in the form of mean  $\pm$  standard deviation (S.D). The reading were taking in triplicate.

## Results and Discussion

The percentage yields of hydroalcoholic extracts of *P. hysterophorus* aerial parts obtained from wild areas of different states Tamil Nadu, Rajasthan and Himachal Pradesh were found to be 20.25, 19.58 and 20.01% w/w. The results of preliminary phytochemical profiling of various hydroalcoholic extracts of *P. hysterophorus* aerial parts showed presence of phenolic and flavonoids as major classes of phytoconstituents.

The results of determination of total phenols and flavonoids content of hydroalcoholic extract of *P. hysterophorus* aerial parts obtained from wild areas of different states Tamil Nadu, Rajasthan and Himachal Pradesh are presented in table 1, Fig. 1 and Fig. 2. The total phenols content was quantitatively determined on the basis of standard curve between different concentrations of gallic acid against absorbance (linearity: 20 to 120 mg/ml;  $r^2 = 0.9977$ ; fig. 1). Similarly, the total

flavonoids content was quantitatively determined on the basis of standard curve between different concentrations of quercetin against absorbance (linearity: 40 to 140 mg/ml;  $r^2 = 0.9977$ ; fig. 2) respectively. Amongst hydroalcoholic extracts of *P. hysterophorus* aerial parts, Tamil Nadu variety contained higher content of total phenols and flavonoids followed by Rajasthan variety and

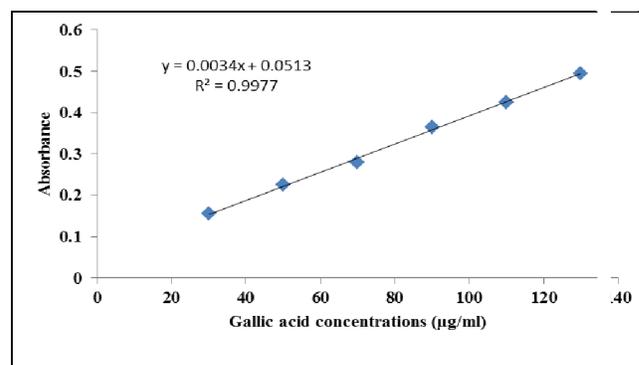


Fig. 1: Standard curve between different concentrations of gallic acid against absorbance.

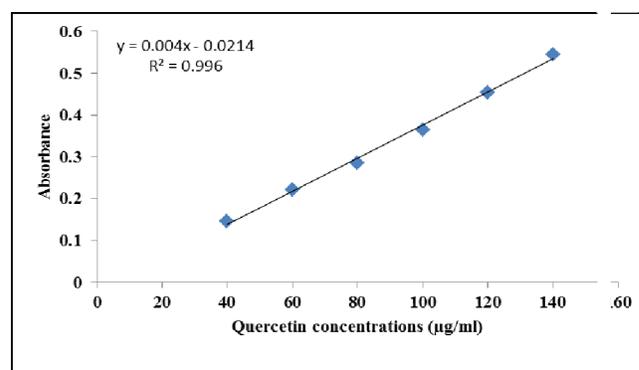


Fig. 2: Standard curve between different concentrations of quercetin against absorbance.

Table 1: Total phenols and flavonoids content in *P. hysterophorus* aerial parts.

Test sample	Total phenols content <sup>a</sup>	Total flavonoids content <sup>a</sup>
Tamil Nadu	12.95 $\pm$ 0.45	5.25 $\pm$ 0.11
Rajasthan	11.90 $\pm$ 0.69	4.58 $\pm$ 0.25
Himachal Pradesh	11.65 $\pm$ 0.54	4.36 $\pm$ 0.30

<sup>a</sup>The data is expressed in (% w/w); Mean  $\pm$  S.D.

Himachal Pradesh variety.

Phenolic constituents acts as potential characteristic agent for cancer prevention and generally dispersed in plant drugs (Thaipong *et al.*, 2006; Pourreza, 2013). Flavonoids and other phenolic mixes display different pharmacological exercises, e.g., calming, antiatherosclerotic, antitumor, antiviral, antifungal, antimicrobial, cell reinforcement, hepatoprotective, antiulcer, antidiabetic and cardioprotective (Tapas *et al.*,

2008). Free radicals show critical job in pathogenesis of diabetes and diabetes related inconveniences (Oberley, 1988). A broad research work has been completed on polyphenols which display promising antidiabetic properties (Mohan and Nandhakumar, 2014).

### Conclusion

Finally, it can be concluded that, Tamil Nadu variety of *P. hysterophorus* aerial parts contained higher content of total phenols and flavonoids than Rajasthan and Himachal Pradesh. Further, it can be concluded that most of the pharmacological activities of the plant may be due to the presence of these flavonoids and phenolic compounds.

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