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Potential of An Invasive Weed *Alternanthera ficoidea* (L.) P. Beauv As Resource of Antioxidants

***Patil Reshma B.¹ and Kore Basavaraj A.²**

²Associate professor, Department of Botany, Y.C.I.S., Satara, Maharashtra- 415001, India.

Email-basavaraj.kore@rediffmail.com

^{*1}Research student, Department of Botany, Y.C.I.S., Satara, Maharashtra- 415001, India.

Email- reshmagodse09@gmail.com

ABSTRACT –

Natural antioxidants originated from plants are always preferred to synthetic due to less side effects. *A. ficoidea* an exotic weed grows in diverse habitats on land. Estimation of Flavonoids, Phenols and DPPH antiscavenging activity of leaf, stem and root of this weed promotes it as a prominent resource of these constituents. Flavonoids and phenolics are medicinally important phytoconstituents work as antioxidants and protect from various diseases. This invasive weed may be utilized as a cheap, easily available and medicinally important bio-resource.

KEYWORDS- *A. ficoidea*, Flavonoids, Phenols, DPPH antiscavenging activity.

***Corresponding author**

Miss. Patil Reshma Bhagawanrao.

Research student, Department of Botany

Yashvantrao Chavan Institute of Science (Autonomous), Satara,

Maharashtra- 415001, India.

Email- reshmagodse09@gmail.com Mob. No.9404654296

INTRODUCTION-

Plants are considered as elixir of life, due to its effectiveness to cure all ills of life. It houses an enormous source of bioactive components and able to produce chemical defence against predation or infection and work as antioxidants so also known as mother Nature's gift. About 2,65,000 flowering plants on earth have been studied for their medicinal value and effectiveness.

Any plant having its one or more parts carrying substances useful for therapeutic purpose or works as precursors for chemo-pharmaceutical semi synthesis called as medicinal plant according to WHO. Such plant having its parts like leaves, roots, rhizomes, stems, barks, flowers, fruits, grains or seeds, engaged in control or treatment of disease condition and therefore may contain medically active chemical components. From thousands of years medicinal plants used in traditional treatments for numerous human diseases, and continue to be an important therapeutic aid for alleviating the ailments of humankind. These active constituents of the plant specifically traced to the therapeutic benefits.

Phytoconstituents are responsible for protecting plant against microbial infections due to pests and are correlated with plant's bioactivity. These are non-nutritive plant chemicals and important source of antioxidants because they work for defence, cell survival and terminate the chain reaction of free radicals which are highly reactive molecules results due to oxidative reaction. These constituents also protect from coronary heart disease, cancer, reduce oxidative stress.

Free radicals produced during oxidative process in body of human being have certain adverse effects on its immune system and responsible for many disorders. The depleted immune system may be improved by consumption of natural antioxidants which are reported in plant materials. Use of synthetic antioxidants such as butyl hydroksianisol (BHA) and butyl hydroxyl toluene (BHT) cause some side effects which is cytotoxic for the lungs and liver and also carcinogenic¹. Many studies have been conducted on antioxidant compounds derived from plant sources which have more benefits than the synthetic².

Crude extracts of herbs, spices and other plant materials rich in phenolics and flavonoids are of increasing interest in the food industry because they retard oxidative degradation of lipids and thereby improve the quality and nutritional value of food³. Phenolic compounds are responsible for oxidative degradation of lipids and improve nutritional value and quality of food so they are in demand and there is an upsurge of plant materials having phenolic compounds. Flavonoids acted as waste and excretory products and played an important role to enrich nutrients, prevent or cure many diseases and are most abundant polyphenols and had chemo-preventive role in cancer through their effects on signal transduction in cell proliferation and angiogenesis⁴.

Alternanthera, is a medicinally important genus of family Amaranthaceae, reported to contain phytochemicals like volatile constituents, essential amino acids, flavonoids, glycosides and steroids⁵. *A. ficoidea* (synonym *A. tenella*)⁶ an exotic weed is one of the prominent species of the genus that grows in diverse habitats. Patil and Kore^{7,8} reported moderate amount of minerals and pigments in leaves of this weed. According to Ramani and Poongazali⁹ consumption of leaves of this weed may reduce risk of various diseases such as heart and cancers, so can be consumed as greens to enrich nutrients and prevent or cure many diseases. Qualitative physiochemical screening and G.C.M.S of plant parts of *A.ficoidea* revealed presence of numerous chemicals, including alkaloids, flavonoids, steroids, phenols, glycosides, and saponins⁸.

Quantitative estimation of Flavonoids, Polyphenols, and DPPH antioxidant activity were carried out in leaf, stem and root of *A. ficoidea* to locate medicinally important constituents present in it.

MATERIAL AND METHODS

Collected and shade dried powdered plant samples were subjected to extraction using methanol. Total Flavonoid content by method of Chang *et al*¹⁰ and Total Phenolic content of extract was estimated using Folin–Ciocalteu method by method of Chun *et al*¹¹. Ability of plant samples to remove DPPH radical (1,1-diphenyl-2-picrylhydrazyl) investigated by method of Blois⁴. Ascorbic acid used as control. All the experiments were carried out in triplicate. All the values were statistically analysed. Mean and Standard Deviation used in interpretation of data

The inhibition activity of free radicals calculated in % inhibition.

$$\% \text{ of Inhibition} = [(A \text{ of control} - A \text{ of Test}) / A \text{ of control}] \times 100.$$

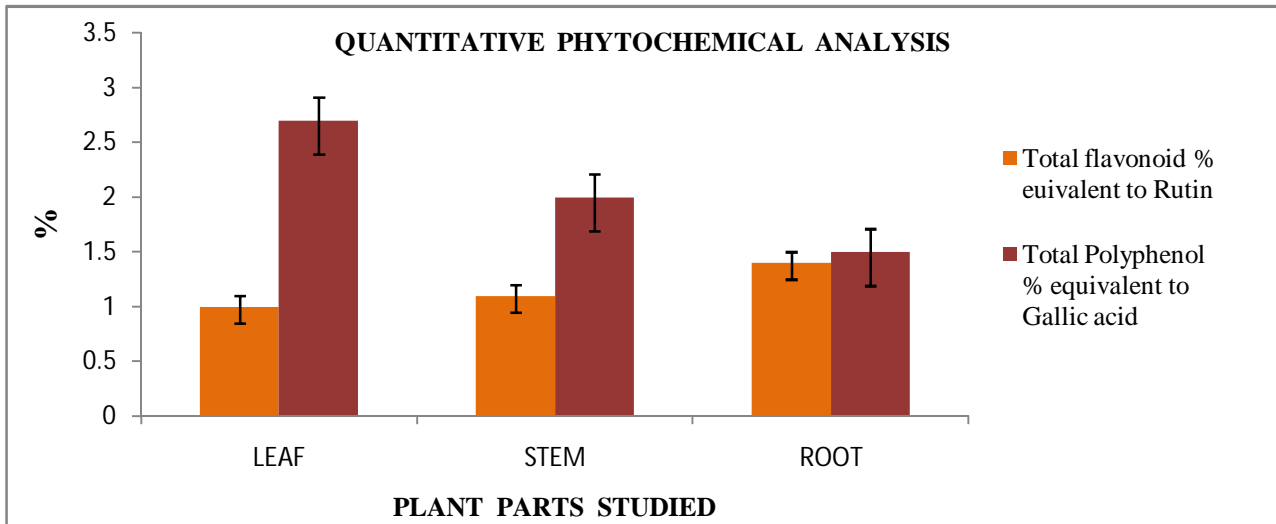
50% inhibitory concentration (IC₅₀) was expressed as the quantity of the extracts to react with half of DPPH radicals.

RESULT AND DISCUSSION

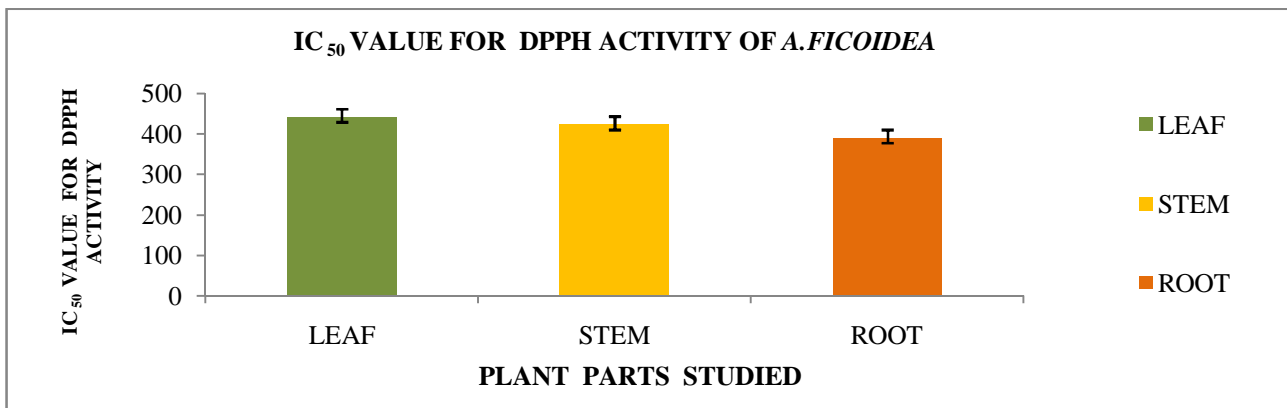
A. ficoidea possess medicinally important properties like antitumor and anti-inflammatory activities due to presence of chemical constituents like flavonoids and triterpenes¹². Presence of various polyphenols signifies the nature and bioactivity of the plant. Antioxidant potential of the plant is evident from the presence of phenolic compounds.

Table.No.1. ‘Quantitative analysis of Flavonoids , Polyphenols and DPPH antis avenging activity of *A. ficoidea* Leaf, Stem and Root’

Sr. No.	Phytochemicals studied	Leaf	Stem	Root
1	Total Flavonoid % equivalent to Rutin	1.0 ± 0.1	1.1 ± 0.1	1.4 ± 0.4
2	Total Polyphenol % equivalent to Gallic acid	2.7 ± 0.2	2 ± 0.3	1.5 ± 0.5
3	IC ₅₀ value for DPPH activity	442.5± 23.1	423.75 ± 19.3	390.66± 23.6



Graph.1. ‘Quantitative Phytochemical Analysis of *A. Ficoidea* Leaf, Stem and Root’



Graph 2. ‘DPPH Antiscavenging activity’

Graph.1. illustrates quantitative estimation of phytochemicals in plant parts. Leaf contains maximum phenols and antioxidant activity while flavonoid content is less. More quantity of phenols in leaf protects plants from herbivores. Stem with moderate amount of flavonoids and phenols. Roots exhibits highest flavonoids and lowest phenols as it has antimicrobial activity against soil microorganisms. Flavonoids and phenols are inversely proportional to each other. A simple, stable and accurate method used to study the radical scavenging activity is the stable DPPH

assay. IC₅₀ value is inversely proportional to antioxidant activity, it is maximum in root than stem and leaf samples as shown in Graph 2.

Total phenol and flavonoid value of *A. sessilis* is more than *Ipomea carnea*¹³ as in *A.ficoidea*. Similarly total phenolic and flavonoid content in *A.sessilis* is 1.4±0.06 and 0.37±0.01mg/g as well as for DPPH scavenging activity IC₅₀ value is 583.09±18.6 µg/ml¹⁴ less than *A.ficoidea*. Total phenol and flavonoid content in *Amaranthus cruentus* belongs to family amaranthaceae is 1611.66±0.06 and 4.95±0.04 mg/g¹⁵ which is more than *A.ficoidea*. Amount of phenols, flavonoids found to be comparatively higher in the leaves of *A. sessilis*¹⁶ than that of our results. While phenols, flavonoids and DPPH antiscavenging activity of *A. brassiliana*¹⁷ are less than that of *A. ficoidea*. Differentiation in the phytochemical contents and antioxidant activity at genus and species levels from the same family may be due to influence of environmental factors at the area of collection.

Leaf, stem and root of *A. ficoidea* illustrates excellent quantity of phytochemicals which ascertain its usefulness for production of supplementary food products enrich in flavonoids, polyphenols and antioxidants.

CONCLUSION

As weeds are cheap and easily available sources of material, developing cost-effective products from weeds may be an effective method to manage them which helps to reduce the disturbance of weeds to other economical crops. Easily availability of phenols, flavonoids which acts as antioxidants in *A.ficoidea* may help for production of health beneficiary products.

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