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STUDY ON ANTIOXIDANT POTENTIAL OF DIFFERENT PARTS OF *Martynia annua* Linn.– A ROAD SIDE WEED

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ABSTRACT

Indian medicinal plant *Martynia annua,* a weed is used in Indian Traditional medicine and in Folklore for many diseases, *Martynia annua* commonly known as "puli nagam" is a small genus of flowering plants. The leaves are useful in treatment of gargle, treat epilepsy, tuberculosis, sore throat and also given local sedative effect. The results of this study revealed that, flavonoid content of the extracts in terms of quercetin equivalent were 0.26 ± 0.1 mg Qt/g to 0.49 ±0.12 mg Qt/g in *Martynia annua*. *Martynia annua* leaf contained the highest amount of tannin (1.78 ± 0.09 mgCE/g), while the endocarp with seed contained the lowest amount of tannin (0.98 ± 0.08 mgCE/g). The results revealed that all the three parts of *M. annua* contained appreciable quantity of ascorbic acid.

INTRODUCTION

Nature has been a good source of medicinal agents for thousands of years and an impressive number of modern drugs have been isolated from natural sources, many based on their use in traditional medicine. Various medicinal plants have been used for years in daily life to treat diseases all over the world. The use of traditional plant extracts as well as other alternative forms of medicinal treatments have been getting momentum since the 2009s (Cowman, 1999). The medicinal use of plant species outnumbered (~10%) its use as food and feed (Moerman,1996). Plant parts like fruits, tubers, flowers, leaves etc are consumed as principal or supplementary food and employed as medicines (Sharma and Singh, 2001). The conservative estimate of 250,000 flowering plants in the world, more than 8000 species are weeds (Subrat, 2002).The weeds grown along with the crop plants (agro ecosystems) and is regarded as nuisance for crops. But are the raw materials to the pharmaceutical industries as they yield chemicals used in formulation of various drugs, Vaidyas for preparing herbal formulations and an important source of medicines for indigenous peoples (Holm *et al.,* 1979).

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There are number of reasons that the rural communities use weeds as medicine. Common health problems like burns, cuts and wounds, cough, fever, headache, poison bites and skin diseases, largest number of medicinally important weeds were used to treat these troubles. Oxidation process is one of the most important routs for producing free radicals in food, drugs and even living systems (Pourmorad, 2008). Free radicals cause many human diseases like cancer, Alzheimer's disease, cardic reperfusion abnormalities, kidney and liver disease, fibrosis, atherosclerosis, arthritis, neurodegenerative disorders and aging (Kumpulainen and Salonen, 1997). Many research studies have demonstrated that medicinal plants, fruits and vegetables contain various components with antioxidant activity, which are responsible for their beneficial health effects. In addition to vitamin C, vitamin E and carotenoids, polyphenols (a wide class of components including phenolic acids, catechins, flavonols and anthocyanins), have shown strong antioxidant capacity . Due to their natural origin, the antioxidants obtained from plants are of greater benefit in comparison to synthetic ones . Most frequently used synthetic antioxidants in food industry at high doses, such as BHA, exhibit genotoxic and carcinogenic effect, while for BHT it is proven to cause hemorrhaging. Indian medicinal plant *Martynia annua,* a weed is used in Indian Traditional medicine and in Folklore for many diseases, *Martynia annua* commonly known as " puli nagam" is a small

genus of flowering plants. The leaves are useful in treatment of gargle, treat epilepsy, tuberculous, sore throat and also given local sedative effect. The whole plant is also used by Santal tribals for fever, hair loss, scabies, sores and carbuncles on the back. The 50% ethanol extract of *Martynia annua* seed have shown hypertensive action in cat and dog and effects on respiration and nictiating membrane. In Ayurvedic literature and in other literature used in snake bite that potentiate immune system and which is interrelate with cellular component of the human circulatory system. It has direct relation to delayed and acute type of humoral responses i.e. inflammation. That is why this drug could successfully used as anti-asthmatic activity, antimicrobial activity and anti-inflammatory and analgesic activity in rats. Antioxidant potential of *M. annua* are not yet fully explored scientifically, so the basic aim of the presented research was to determine the contents of ascorbic acid, flavonoids, tannins and phenols in various parts of *M. annua* using spectrophotometric methods. In addition, we compared the results obtained from extracts of different plant parts such as leaves, stem and endocarp with seed.

MATERIALS AND METHODS

Estimation of ascorbic acid (Anwar *et al.*, 2009)

Reagent

Accurately weighed 0.198g ($1.0x10^{-3}$ mol) of 1, 10-phenanthroline monohydrate and mixed with 1ml of 1N hydrochloric acid in a 100ml flask. Then 0.16g of iron (II) ammonium sulphate was added and the contents were dissolved in a few ml of water and made up to 100ml.

Procedure

1 g of the sample was homogenized in 10ml of distilled water. The homogenate was filtered and the filtrate was centrifuged at 6000 rpm for 5 minutes to sediment the cell debris. The pellet was discarded and the supernatant was adjusted to the volume of 10ml. To 2ml of supernatant, 2mlof Iron (II) – Phenanthroline was added and shaken well. After 7 minutes red colour appeard, the absorbance of the solution was measured at 515nm using spectrophotometer. The amount of free ascorbic acid was calculated using ascorbic acid as standard.

Determination of total phenol (Duan *et al.*, 2006)

100 mg of sample was homogenized with 10ml of distilled water and filtered through a muslin cloth. 1 ml of the filtrate was added to 1.5 ml of deionized water and 0.5 ml of 50% Folin Ciocalteau reagent, and the contents were mixed thoroughly. After one minute, 1 ml of 20% sodium carbonate solution was added and mixed. After 30 min of incubation at 37^0C, the absorbance was measured at 750 nm using UV visible spectrophotometer (Model No: UV 2371). Total phenolics were estimated as gallic acid equivalent (GAE) per gram tissue.

Determination of flavonoid (Zhishen *et al.*, 1999)

100 mg of sample was homogenized with 10 ml of distilled water and filtered through a muslin cloth. 250 µl aliquot of extract was mixed with 1.25 ml of distilled water and 75µl of 5% sodium nitrite solution. After 6 min, 150 µl of 10% aluminium chloride solution was added. After 5 min, 0.5ml of 1M sodium hydroxide solution was added and then the total volume was made up to 2.5 ml with distilled water. Following thorough mixing of the solution, the absorbance against blank was determined at 510 nm using UV visible spectrophotometer. Quercetin was used as standard and the results were expressed as mg quercetin equivalents (QE)/g tissue.

Estimation of tannin (Julkunen _ Titto, 1985)

100 mg of sample was homogenized with 10 ml of distilled water and filtered through a muslin cloth.50µl aliquot of aqueous extract was mixed with 1.5 ml of 4% vanillin (prepared with methanol) and 750µl of concentrated HCl was added. The solution was shaken vigorously and left to stand at room temperature for 20min in darknes. The absorbance against blank was read at 500nmusing UV visible spectrophotometer. Results were expressed as mg catechin equivalent (CE)/g tissue.

RESULTS AND DISCUSSION

Plants have provided a source of inspiration for novel drug compounds as plants derived medicines have made significant contribution towards human health. Phytomedicine can be used for the treatment of diseases as is done in case of Unani and Ayurvedic system of medicines or it can be the base for the development of a medicine, a natural blueprint for the development of a drug (Jigna Parekh and Sumitra Chanda, 2007) In recent years, secondary plant metabolites (phytochemicals), previously with unknown pharmacological activities, have been extensively investigated as a source of medicinal agents. Plant derived natural products such as flavonoids, phenols, tannins, and ascorbic acids have diverse pharmacological properties including antioxidant activity. It has been recognized that flavonoid show antioxidant activity and their effects on human nutrition and health are considerable. The mechanisms of action of flavonoids are through scavenging or chelating process (Kessler *et al*., 2003). Phenolic compounds are a class of antioxidant agents which act as free radical terminators (Shahidi and Wanasundara, 1992). The flavonoid contents of the extracts in terms of quercetin equivalent were 0.26 ± 0.1 mg Qt/g to 0.49 ±0.12 mg Qt/g in *Martynia annua*.

The flavonoid contents (Table -1, Fig-1) of endocarp with seed (0.49 ± 0.12 mg Qt/g) and leaf (0.34 ± 0.12 mg Qt/g) were higher than that in stem, Table-1 also shows the contents of total phenols that were measured by folin ciocalteu reagent in terms of gallic acid equivalent. The total phenol content varied from 0.28 ± 1.5 mg GAE Equ/g to 0.43 + 2.6 mg GAE Equ/g in the different parts of *M. annua,* stem with 0.43 ± 2.6 mg GAE Equ/g had the highest amount among the plant parts in this study. Phenolics are the largest group of phytochemicals and have been said to account for most of the antioxidant activity of plant extracts (Thabrew et al., 1998). The phytochemical screening and quantitative estimation of chemical constituents of plants studied showed that the leaves and stems were rich in flavonoids, phenols and tannins. The compounds such as flavonoids which contain hydroxyls, are responsible for the radical scavanging effect in the plants (Das and Perecia, 2009). They were known to show medicinal activity as well as exhibiting physiological activity (Sofowara, 2010). *Martynia annua* leaf contained the highest amount of

Table 1. Antioxidant compounds in *Martynia annua*

S. No.	Plant parts	Flavonoid mg Qt/g	Phenol mg GAE Equ/g	Tannin mgCE/g	Ascorbic acid (mg/g/Dw)
1	Leaf	0.34±0.12	39.1±1.2	1.78±0.09	2.6±0.7
2	Stem	0.26±0.1	43±2.6	0.50±0.06	2.5±0.9
3	Endocarp with seed	0.49±0.12	28±1.5	0.98±0.8	1.8±0.7

Values are the mean of replicates ±SD

tannin (1.78 ± 0.09 mgCE/g), while the endocarp with seed contained the lowest amount of tannin (0.98 ± 0.08 mgCE/g). Tannins are present primarily in the leaves of trees growing in stress conditions. They are accumulated in the vacuoles, especially those of the upper epidermal layer and the palisade mesophyll; at a later stage they appear to be solubilized in the cytoplasm and retranslocated, eventually impregnating the outer wall of the epidermal cells amidst the cellulose fibrils, where they cluster together and form an electron-opaque layer between the wall and the cuticle (Bussotti *et al.,* 1998). The results revealed that all the three parts of *M. annua* contained appreciable quantity of ascorbic acid. Ascorbic acid content in leaves and stem were found to be 2.6 mg/g and 2.5 mg/g respectively. Aronn and his co-workers (1954) suggested that ascorbic acid acts as an electron carrier in oxidative chain in photosynthetic phosphorylation. The photo – oxidative of ascorbic acid by isolated chloroplasts has been reported by a number of investigators (Mehler, 1989: Vernon & Kamen 1999; Wessels 2000). Ascorbic acid aids in the metabolism of folic acid, regulates the uptakes of Iron, and is required for the conversion of amino acids: L-phenylalanine into noradrenaline, the conversion of tryptophan into seratonin, the neurohormone responsible for sleep, pain control and well being also requires adequate supplies of vitamin C (Smart and Crawford, 1991).

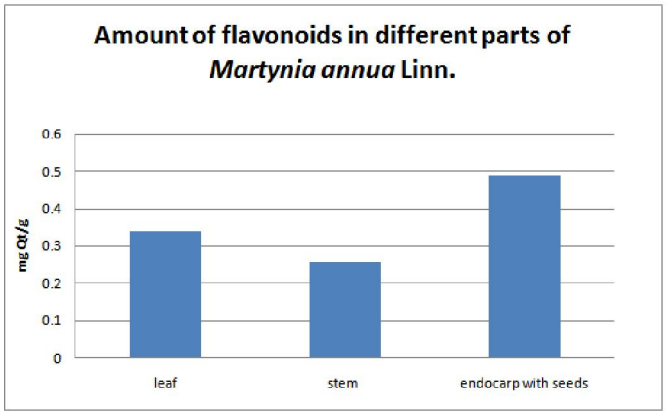

Fig. 1.

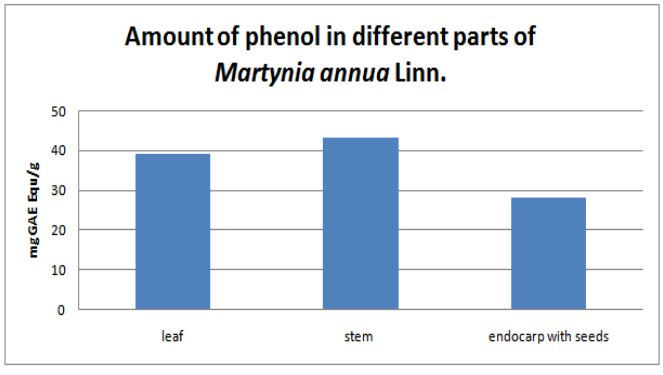

Fig. 2.

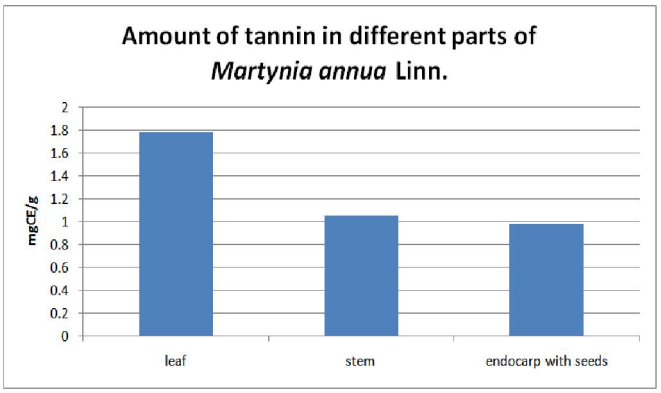

Fig. 3.

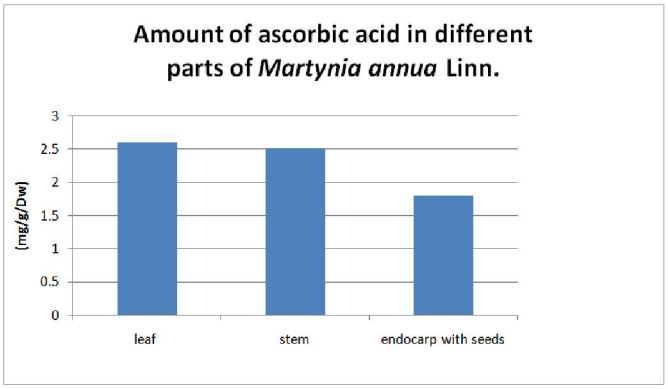

Fig. 4.

Leaf

Stem

Endocarp with seed

Plate 1. *Matynia annua* Linn.

Summary and Conlusion

A weed is commonly defined as a plant that grows out Of place and is competitive, persistent and pernicious. Weeds are also found to be resistant to most of the microbial disease when compared to the crops that shows disease symptoms. Weeds are home to many types of phytochemicals, which are the reason for the protective property of weeds against pests. *Martynia annua*- a road side weed, is used in Indian Traditional medicine and in Folklore for many diseases. In this study, we were determined ascorbic acid, flavonoid, tannin and phenol content of different parts of *M. annua* using spectrophotometric methods. The result of this study showed that the leaf and stem of *M. annua* have significant amount of flavonoids, phenols, tannins and ascorbic acids compared to endocarp with seed. On the basis of the results, it is concluded that *M. annua* is a potential source of natural antioxidants. Therefore, it is suggested that further work to be performed on the isolation and identification of the antioxidant components of weeds.

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