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Spectroscopic determination of total phenol and flavonoid contents of *Ipomoea carnea*

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Abstract: Quantitative determination of phenols and flavonoids in leaves, stem and flowers of *Ipomoea carnea* was carried out using spectrophotometric methods. Catechol and quercetin reagents were used as the standards for calibration for the phenols and flavonoids respectively. The plant material was collected from the river sides of Pune, Maharastra, India and authenticated at Botanical Survey of India, Pune. The flowers contain the maximum and the stem contains the minimum amount of phenols. The flavonoid content of the flowers was quite high compared to that of the leaves and the stem. As per the authors' knowledge, this is the first study determining the phenol and flavonoid contents of *Ipomoea Carnea*.

Key words: *Ipomoea carnea,* Phenols, Flavonoids.

Introduction

Phenols , sometimes called phenolics, are one of the main secondary metabolites present in the plant kingdom. They are commonly found in both edible and non-edible plants, and have been reported to have multiple biological effects, including antioxidant activity[1] (Kähkönen MP *et al* 1999). They are essential for the growth and reproduction of plants, and are produced as a response for defending injured plant against pathogens.

Flavonoids, the most common group of polyphenolic compounds that are found ubiquitously in plants. These are widely distributed in plant fulfilling many functions. Flavonoids and other plant phenolics are especially common in leaves, flowering tissues and woody parts such as stems and bark[1]. They are important in plant for normal growth development and defense against infection and injury[1]. Flavonoids are the most important pigments for flower coloration producing yellow or red/blue pigmentation in petals. Those colors are a mean to attract pollinator animals. They also protect plants from attack by microbes and insects. These plant secondary metabolites also show anti-allergic, anti-inflamatory, anti-microbial and anti-cancer activity[2] . Researchers have become interested in flavonoids and other phenolics for their medicinal properties, especially their potential role in the prevention of cancer and heart diseases[1]. Over 5000 naturally occurring flavonoids have been characterized from various plants[3]. Ipomoea - a class of medicinally important plant species is reported in literature for their antimicrobial, anticancer, anti-inflammatory and for many other medicinal activities[4]. Evaluation of antioxidant activities, total flavonoids, total phenolics from *I. batata* L have been reported[5]. *I. carnea* is reported for wound healing activity[6]. Preliminary pharmacological study on the glycosides from the leaves of *I. carnea* and antimicrobial activities of metal complexes prepared from leaves proteins of *I. carnea* have been reported[7,8] . Preliminary qualitative phytochemical screening of *I. carnea* revealed the presence of phenolic compounds, terpenoids, flavonoids and steroids. Some of them have antioxidant and antimicrobial activities. This study

presents the quantitative estimation of total flavonoid and total phenolic contents from the leaves, stem and flower of *I. carnea* by spectrophotometric method.

Materials and Methods

The plant material was collected from the river sides of Pune, Maharastra, India. The plant was authenticated at Botanical Survey of India, Pune, India. Its authentication number is ELICAI., BSI/WC/ Tech/2009/96.

All the plant materials were air shade dried and taken for experiments. Folin-ciocalteau reagent and all other chemicals used were Merck products. UV-Vis S1700 Pharmaspectrophotometer, Schimadzu was used for absorbance measurements. Accurately weighed powder of sample was ground with a pestle and mortar in the measured volume of solvents (80: 20 ethanol – water). The extract was filtered through Whatman (No 1) filter paper. Each extract was prepared freshly for the analysis to prevent any degradation.

Determination of total phenolics: The total phenolic contents of leaves, stem and flower extracts of *I-carnea* were determined according to the method described by Malik and Singh[9]. Aliquots of the extracts were taken in a 10 ml glass tube and made up to a volume of 3 ml with distilled water. Then 0.5 ml folin ciocalteau reagent (1:1 with water) and 2 ml Na_2CO_3 (20%) were added sequentially in each tube. A blue color was developed in each tube because the phenols undergo a complex redox reaction with phosphomolibdic acid in folin ciocalteau reagent in alkaline medium which resulted in a blue colored complex, molybdenum blue. The test solutions were warmed for 1 minute, cooled and absorbance was measured at 650 nm against the reagent used as a blank. A standard calibration plot was generated (**Figure-1**) at 650 nm using known concentrations of catechol. The concentrations of phenols in the test samples were calculated from the calibration plot and expressed as mg catechol equivalent of phenol/g of sample.

Determination of total flavonoids: The aluminum chloride method was used for the determination of the total flavonoid content of the sample extracts[5]. Aliquots of extract solutions were taken and made up the volume 3ml with methanol. Then 0.1ml $AlCl_3$ (10%), 0.1ml Na-K tartarate and 2.8 ml distilled water were added sequentially. The test solution was vigorously shaken. Absorbance at 415 nm was recorded after 30 minutes of incubation. A standard calibration plot was generated (**Figure-2**) at 415 nm using known concentrations of quercetin. The concentrations of flavonoid in the test samples were calculated from the calibration plot and expressed as mg quercetin equivalent /g of sample.

Result and discussion

Figure-1 and **Figure-2** present the calibration plot for the determination of phenols and flavonoids, respectively.

Figure-1: Calibration plot for phenolic determination

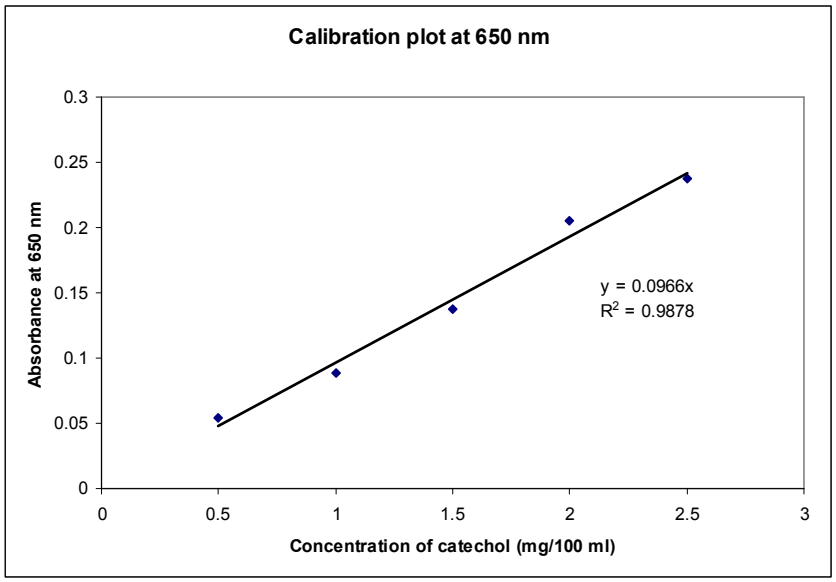

Figure-2: Calibration plot for flavonoid determination

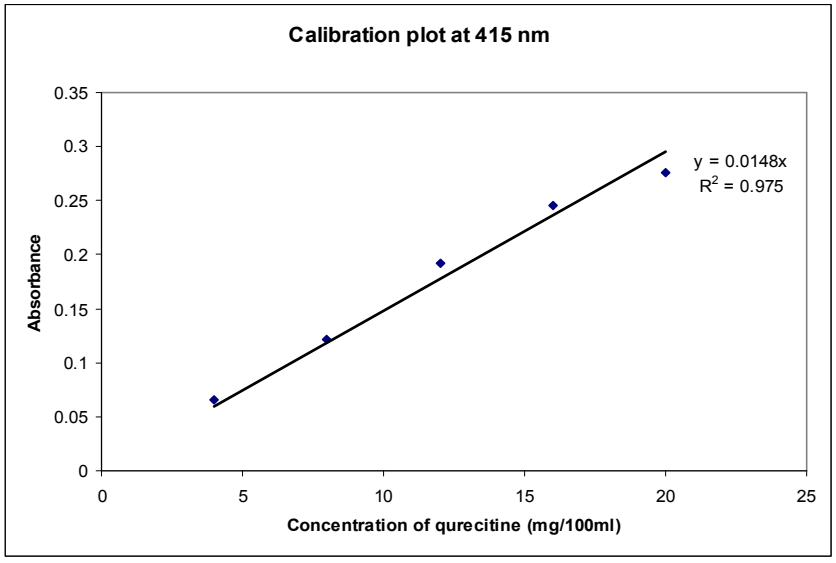

Table-1 and **Table-2** summarize the phenol and flavonoid contents of leaves, stem and flower of *I.carnea* .

Table-1: Phenol content

Plant part	Phenol content (mg catechol equivalent/g dry material)
Leaves	45
Stem	30
Flower	73

Table-2: Flavonoid content

Plant part	Flavonoid content (mg quercetin equivalent /g dry material)
Leaves	84
Stem	168
Flower	422

The present study revealed the phenol contents of the leaves, stem and flower of *I. carnea* in terms of mg catechol equivalent/g of dry sample (standard plot: y =0.0966x, R^2=0.9878). The values were found between 45 to 73 mg catechol equivalent /g. The flowers contain the maximum and the stem contains the minimum amount of phenolic compounds. Phenolics present in the leaves, stem and flowers have received considerable attention because of their potential biological activities.

Flavonoids as one of the most diverse and widespread group of natural compounds are probably the most important natural phenols. These compounds possess a broad spectrum of chemical and biological activities including radical scavenging properties. Using the standard plot of quercetin (y = 0.0148x, R2 =0.975) , the flavonoid contents of *I. carnea* leaves , stem and flower were found ranging from 84 to 422 mg quercetin equivalent/g of dry sample.The flavonoid content of the flowers was quite high compared to that of the leaves and the stem.

Conclusion

The present investigation revealed that the leaves, stem and flowers of *I. carnea* contain significant amount of phenols and flavonoids. The objective of this study was to get information of the amount of phenolics and flavonoids in defferent parts of *I. carnea*. Further intention of this study is to correlate relationship of these secondary metabolites to possible biological activities and evaluate *I. carnea* as a potential source of natural bioactive chemicals.

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