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RESEARCH ARTICLE

Macromorphological, anatomical studies and flavonoid estimation of *Ipomoea aquatica* Forssk. and *Argyreia nervosa* (Burn.f.)

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ABSTRACT

The two plants *Ipomoea aquatica* Forssk. and *Argyreia nervosa* (Burn.f.) were studied anatomically, and also flavonoide estimation. Each and every part of plant was studied anatomically different changes were found amoung both.Due to estimation The plant materials were clearly washed and dried for a few days and then dried completely in an oven at 38 c. The micromorphological studies were done due to cut sections of epidermal layers and stained with safranine and mounted in 50% glycerine. Different tests were carried out for different types of flavonoids. Shinoda test, Flavanonols, Flavonols, Flavones and flavonols, Rao and Sheshardi test.

Keywords: *Ipomoea aquatica* Forssk., *Argyreia nervosa* (Burn.f.) phyto chemistry.

INTRODUCTION

An extensive research work is available on isolation and characterization of flavonoids from plants (Iwashuta *et al*,. 2000). Epidemiological studies have shown that consumption of adequate fruits and vegetables is associated with a lower risk of degenerative diseases such as cancer cardiovascular disease (Ames, 1998). Flavonoids are diphenylpropanes found ubiquitously in plants (Harborne and Grayar, 1994). They are also having the biological effects, including antibacterial, antiviral, anti-inflammation, antiallergic, antithrombotic and vasodilatory (Cook and Sammans, 1996). The medicinal herbs are high amount with bioflavonoid compound and phenolics that have great antioxidant properties (Narayana *et al*., 2001). Phenolics are active in treating stomach and kidney problems as well as helpful as anti-inflammatory in action (Shirwaikar *et al*., 2003). The phytochemicals are structurally diverse, and most of the distributed among a very limited number of species within the plant kingdom. This character allows them to act as biodiagnostic markers in chemotaxonomic studies. Flavonoid compound and phenolic accumulate in relatively rich amounts in plants and appear to have a myriad of supplemental functions in a plant's life cycle. These include structural roles in different protecting or supportive tissues, involvement in defense strategies, as seed-dispersing animal and, attractants for pollinators and, and as allelopathic agents, (UV) ultra violet protect ant and signal molecules in the interaction between plants and their environment.

In current years there is an increase in the areas related to new developments in prevention of disease especially the role of phenolic acid and flavonoids as antioxidants moreover phenolic acid and flavonoids components play important roles in the control of different human diseases. Phenolic acid and flavonoids are the most important groups of bioactive compound in plants and secondary metabolites and good sources of natural antioxidants in human diets (Kim, *et al*., 2003). They are also one of the natural product and antioxidant substance capable of scavenging free superoxide radicals, reducing the risk of cancer and protecting biological systems against the harmful effects of oxidative processes on macromolecules, such as proteins, carbohydrates lipids and DNA (Halliwell *et al*., 1990).

Flavonoids are the most common group of compounds in human diet and are found in plants. Over 6000 naturally occuring flavonoids have been characterized from various plants the number continues to increase (Harborne and Williams, 2000). Flavonoids from food stuffs possesses excellent antioxidant activity. There are varied wild edible plants which contant large number of flavonoid.

Ipomoea aquatica and *Argyreia nervosa* are the known wild edibles plants therefore the aim of present study is to determined flavonoids from the leaves of *Ipomoea equatica* and *Argyreia nervosa.*

MATERIALS AND METHODS

For the present study two plants were selected.
1) *Argyreia nervosa*. (Burm.F.) (Convolvulaceae)
2) *Ipomoea aquatica*. Forssk. (Convolvulaceae)

COLLECTION AND AUTHENTIFICATION

Argyreia nervosa and *Ipomoea aquatica* plants were collected from Amaravti city, during January to Feb, 2014. The plants were identified and authenticated at the botany department of Govt. Vidarbha Institute of Science and Humanities, Amaravti.Fresh plant materials were used to conduct anatomy and micromorphology studies. The plant materials were washed ,shade dried for a few days and then dried completely in an oven at 38 c. It was coarsely powdery mixture and stored in airtight plastic bottles and then used for further studies.

Macromophology

Detailed macromorphology were done by hand sketch with particular measurements.

Micromorphology

The micromorphological studies were done with fresh hand cut sections ,epidermal layers were peeled off using needle and foreceps, stained with safranine and mounted in 50% glycerine and epidermal architect were studied. Microphotographs were taken with the help of a Leica DM (2000) trinocular research microscope connected to a Canon digital camera.

Powder microscopy

Completely dried plant material was finely powdered and sieved through mesh . The fine powder obtained were stained with Safranine and observed under a microscope to locate and identify the characters present. The characters observed were photographed under a Leica DM (2000) trinocular research microscope connected to a Canon digital camera.

Chemical methods

Flavonoids:

Different tests were carried out for different types of flavonoids. leaves were extracted with aqueous ethanol. Chlorophyll was removed with chloroform and chlorophyll free extract was used for flavonoid tests.

(A) **Shinoda test**: To the extract a piece of magnesium ribbon and HCl was added. With flavonoids purple, red, pink or orange colour develops.

(B) **Flavanonols**: If with Shinoda test deep colour developed then instead of magnesium ribbon, zinc powder was added to HCl. If flavanonols are present deep magenta colour develops.

(C) **Flavonols**: To the extract a pinch of boric acid and few drops of acetic acid were added. Bright yellow colour with green fluorescence indicates flavonols.

(D) **Flavones and flavonols** dissolve in sulphuric acid to give yellow solution and flavanones produce orange to crimson colours.To the extract few drops of H_2SO_4 were added and colour was noted. This further confirmed the presence of flavones, flavonols and flavanones.

(E) **Rao and Sheshardi test**: To the extract few drops of concentrated nitric acid were added. Brilliant blue colour developed if phlorglucinol derived flavonones were present.

RESULT AND DISCUSSION

Pharmacognostic studies

Macromorphology

Argyreia nervosa, (Burm.F.)

The plant of *Argyreia nervosa (burm.f,)* family convolvulaceae. A much branched herb, with the base hard as wood and the branches erect or creeping to ground with long tap root system.

Stem

Aerial creeping, angular, branched solid, glaberous, green colour. Nodes and internodes measuring in about 0.2mm and inter node 8 to 10 cm, in length, milky juicegreen in colour. Petiole 5 to 15cm long. Leaf blade is fairy larged 20to30cm.

Leaf

Simple, alternate, ex-stipulate, short petiolate, entire, sessile ,serrate, deltoid accumulate, glaberous, parallel, hairy beneath while tomentose. Basal leaves on the main stem are 5 to 7mm in length and 0.2mm widh veins of paire midrip more prominent at the base getting slowely obscure towards the apex, lateral vein arising at an angle. The midrib becoming faint towards the marginal region. Gryish and dry without characteristics odour and taste.

Inflorescence

Racemose, cyme, in 5 to15cm long, forming subglobose clusters bearing numerous flower light green in colour.

Flowers

Flower are subcapitate, larged, showy ,elongated, funnel shaped tinted, purple or pale bluish in colour to deep rose, regular sub capited with short pedicel in axillary bracteates cymes born on stout whitish and tomentose outside corolla 5 to 6.3 cm long. Tubular infudibuliform the band silky pubescent outside tube somewhat inflated. White pubescent outside rose purple and glaberous inside,overy 2 locule in axile placentation.

Fruit

Berry or capsule,glaberous,2.5cm in dia. Without any characteristics odour and taste.

Seed

Many broad ,hard and green 1to10 cm in dia.

Botanical nomenclature-

kingdom - Plantae
Divsion - Magnoliophyta.
.order - Solanales.
Family - Convolvulaceae.
Genus - *Argyreia*
Species - *nervosa.*

Common name-

Marathi - Samundrashokha,
Hindi - Samundar-ka-put.
English - Elephant creeper.
Gujrati - Samundrusokha.
Kannad - Chandrapada.
Malyalum - *Samundrapala.*
Tamil - Samunddirapacchai.
Telgu - Chandrapada.
Bot.name - *Argyreia nervosa* ,
Synonyms - *A. Speciosa*

Micromorphology

Argyreia nervosa.

Stem

The stem is circular in outline. The epidermal cells are generally small, compactly arranged and thick walled. They are usually rounded. Trichomes occur in some species interacting the epidermis. The epidermis is followed by hypodermis. It is usually chlorenchymatous. It is either one layered. It is followed by few layered cortex. The cells are parenchymatous, rounded or polygonal, which is continuous and surrounded by sclerenchyma. The pith is wide.

Table -1: *Ipomoea equatica* L. (Whole plant)

Sr. No.	Test	Response	Intensity	Inference
1.	**Flavanoids**			
	a) Shinoda test	Reddish orange	+++	Present
	b) Flavanonol test	Yellow colouration	-	Absent
	c) Flavanol test	Brown colouration	-	Absent
	d) Flavone, Flavonol & Flavanone test	Brown colouration	-	Absent
	e) Rao & Sheshadri test (Flavanone)	Red Colouration	-	Absent

Petiole

The petiole are circular in outline .The epidermal cell are generally small and thick walled. Moderately thick to thick cuticle I preset on outer side. The epidermis s generally followed by hypodermis and usually two layered throughout. The hypodermis is also chlorenchymatous. The vascular tissue is generally resolved n to prominent or medium sized arc in the center and to larger boundless usually adaxial to the arc. They are generally bicolateral.

Leaf

The leaves are dorsiventral and amphistomatic. The midrib showed ridges above. the epidermis is single layered and consist of barrel shaped, compactly arranged cells are single layered and its cells contain large number of chloroplast. The palisade layered below, spongy tissue is present and occupies major portion in between the two epidermis. The entire midrib region is delimited by single layered epidermis. The cells are barrel shaped and moderate in size. It is followed by single chlorenchymatous layer, except in the ridge. The vascular tissue is present in the form of a crescent shaped arc.

Powder studies

The powder of *Argyreia nervosa* showed the quite interesting presence of multicellular, uniceriate, worty trichomes.Theyere found to be the most abundant character to be observed. This trichome can be consider as an important botanical marker for the plant. The plant powder also showed the presence of stomata, arenchyma,and epidermal cells.

Macromorphology

Ipomoea aquatica

The plant of *Ipomoea aquatica* forssk. family convolvulaceae. A much branched herb, with the base hard and the branches erect or creeping to ground with long tap root system.

Stem

Ipomoea aquatica is a semi-aquatic, tropical plant grown as a vegetable for its tender shoot. Aerial creeping, angular, branched solid, glaberous. Stems hollow, rooting at nodes, floating in equatic situations. Its stems are 2-3m(7-8 ft.) are more long, rooting at the nodes and they are hollow and can float

Leaves

Alternate, simple ,with glabrous petioles 3-14 cm (1-6 in) long; blades generally arrowhead shaped but variable, glabrous or rarely poise, to 17 cm (7 in) long, with tips pointed; blades held above water when stems floating. The leaves vary from typically sagittate (arrow head shaped) tolanceolate, 5-15 cm (2-6 in.) long and 2-8 cm (0.8-3 in.) broad.

Flowers

Showy funnelform; like morning glory bloom; solitary or in few-flowered clusters at leaf axils; petals white or pink-lilac. The flowers are trumpet shaped, 3-5 cm (1-2 in.) in diameter and usually white in colour with a mauve centre.\

Fruit

An oval or spherical capsule, wood at maturity, about 1 cm (0.5 in) wide; holding 1-4 grayish seeds, these often short, hairy.

Seeds

The seeds from flowers that produce seed pods.

Botanical Nomenclature

Kingdom - Plantae
Order - Solananes
Family - Convolvulaceae
Genus - *Ipomoea*
Species - *I.aquatica*

Common names

njabi - Nali bel
Russian - Ipomeia vodianaia
Sanskrit - Kalamba
Tamil - Concong
English - Water Spinach,

Table -2: *Argyreia nervosa.* (Burm. F.) (Whole plant)

Sr. No.	Test	Response	Intensity	Inference
1.	**Flavanoids**			
	a) Shinoda test	Orange colour	+++	Present
	b) Flavanonol test	Yellow colouration	-	Absent
	c) Flavanol test	Orange colouration	-	Absent
	d) Flavone, Flavonol & Flavanone test	Reddish Orange colour	-	Absent
	e) Rao & Sheshadri test (Flavanone)	Orange colouration	-	Absent

Micromorphology

Ipomoea aquatica

Stem

The stem circular in outline. The epidermal cells are generally small, compactly arranged and thik walled. Stomata are present on adjacent epidermal cells. The epidermis is followed by hypodermis. It is usually chlorenchymatous. It is either one layered. The cells are parenchymatous, rounded or polygonal, which is continuous and surrounded by sclerenchyma. Within the cortex the latex canals are present pericycle has 1-3 layers of parenchymatous cells.

Leaf

The epidermis is single layered and consist of barrel shaped, compactly arranged cells are single layered and its cells contain large number of chloroplast. Palisade tissue consist of 1-3 layers of parenchymatous cells. The spongy tissue is present beneath the palisade layered and occupies major portion in between the two epidermises, possess fewer chloroplasts. These are abundant intercellular spaces present in spongy cells.

Powder studies

The powder of *Ipomoea aquatica* showed the quite interesting characters presence of multicellular, uniceriate, worty trichomes. It shows the vital role in the field of botany. This trichome can be consider as an important botanical marker for the plant. The plant powder also showed the presence of stomata, parenchyma, and epidermal cells.

Table 3: Observation

Sr. No.	Concentration (ml)	*Absorbance at wavelength 500*
1.	0.1ml	0.017
2.	0.2ml	0.020
3.	0.3ml	0.021
4.	0.4ml	0.023
5.	0.5ml	0.035
6.	0.6ml	0.032
7.	0.7ml	0.030
8.	0.8ml	0.038
9.	0.9ml	0.028
10.	1ml	0.025

Table 4: Absorbance of two plant sample

Sr.No.	Sample	*Absorbance at wavelength 500*
1.	*Ipomoea aquatica*	360mg
2.	*Argyreia nervosa*	410mg

CONCLUSION

From the present study, it can be concluded1 that *Argyreia nurvosa* and *Ipomoea equatica* showed higher values of total flavonoids. The substantial amount of flavonoids present in the plant. Therefore it could be used as valuable dietary components. As the plant extracts are quite safe and can use of synthetic antioxidant has been limited because of their toxicity,therefore the wild plants *Argyreia nurvosa* and *Ipomoea equatica* could be exploited as antioxidant additives or as nutritional supplements.

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