Pharmacognostical Evaluation of *Argyreia speciosa* (Burm.f.) Bojer.

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ABSTRACT

The Present study deals with the detailed pharmacognostical evaluation of *Argyreia speciosa* (Burm.f.) Bojer. (Convolvulaceae). Morphoanatomy of the root part have been studied with the aim to aid pharmacognostic and taxonomic species identification. The physicochemical, morphological and histological parameters presented in this paper may be proposed as parameters to establish the authenticity of *A. speciosa* and can possibly help to differentiate the drug from its other species.

Keywords: Convolvulaceae, Pharmacognosy, *Argyreia speciosa* (Burm.f.) Bojer.

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INTRODUCTION

Argyreia speciosa (Convolvulaceae), commonly known as Vryddhadaru in Sanskrit is a woody climber and has been used as a 'rasayana' drug in the traditional Ayurvedic system of medicine. The roots of this plant have been regarded as alterative and tonic, and are said to be useful in rheumatism and diseases of the nervous system (1). It is found throughout India, up to an altitude of 300m, viz., Assam, Bengal, Puri district of Orissa, Dehra Dun, cultivated in Rajasthan, Konkan, Deccan, Mysore. Traditionally, the root is useful in anorexia, Loss of appetite, dyspepsia, flatulence, colic, ascites, haemorrhoids, hemiplegia, nervous weakness, neuralgic pains, cerebral disorders, synovitis and general debility (2). The present investigation includes morphological, anatomical evaluation, determination of physicochemical constants and preliminary phytochemical screening of the hydroalcoholic (1:1) extract and its acetone, methanol and chloroform fraction, ethanol, water, petroleum ether and chloroform extracts and TLC fingerprinting of different extracts of *Argyreia speciosa* were also carried out.

MATERIALS AND METHODS

Collection and authentication of plant material

Fresh plant/plant parts were collected randomly from Gujarat region, India and authenticated through Department of Biosciences, Saurashtra University, Rajkot, Gujarat, India (Specimen no. PSN492) and a voucher Specimen has been preserved for further reference. The roots were washed under running tap water; air dried under shade, coarsely powdered and kept in airtight container for further use.

Macroscopic and microscopic analysis

The macroscopy and of the root were studied according to the method of Brain and turner (3). For the microscopical studies, cross sections were prepared and stained as per the procedure of Johansen (4). The micropowder analysis was done according to the method of Brain and Turner (5) and Kokate (6).

Physicochemical analysis

Physicochemical analysis i.e. percentage of ash values and extractive values were performed according to the official methods prescribed in Indian Pharmacopoeia (7). Fluorescence analysis was carried out according to the method of Chase and Pratt (8), Kokoski *et al.*(9) and Evans (10).

Preliminary phytochemical screening

Preliminary phytochemical screening for organic and inorganic elements was carried out by using

standard procedures described by Harborne (11) and Khandelwal (12).

Thin layer chromatography

Thin layer chromatography was performed using standard method of Burger, (13) and Janchen *et al*., (14).

RESULTS AND DISCUSSION:

Macroscopic characters

Thin pieces of roots of *Argyreia speciosa* are usually of 2.4mm in diameter with somewhat smooth brownish exterior, while thicker pieces are 5.25 mm or even more in diameter, tough and woody, light brown in colour, rough, longitudinally striated, lenticellate and with circular root scars; fracture fibrous; rootlets and branches, thin and somewhat fibrous; odour, nil; taste, pungent, bitter and astringent.

Microscopic characters

Transverse section

Structurally the woody climber's root consists of epidermis, cortex, secondary phloem, phloem fibres, medullary rays, cambium, secondary xylem, parenchymatous cells and pith. Epidermis which is a single layer consists of small tangentially elongated rectangular cells with brownish, thick-outer walls. Cortex section comprises of 3 to 6 layers of cortical cells (fig. 1a). These are thin walled tangentially elongated cells, some containing starch grains and crystals of calcium oxalate. Secondary phloem is a wide zone consisting of phloem parenchyma, traversed by narrow medullary rays. Secondary xylem is composed of large xylem vessels. Vessels are drum shaped, short in length but large in diameter, having bordered pits on the walls and large perforation rims (fig. 1b). Medullary rays are narrow towards the pith and become wider towards the cortex region (Fig. 1c). Towards pith, it consists of 2 to 4

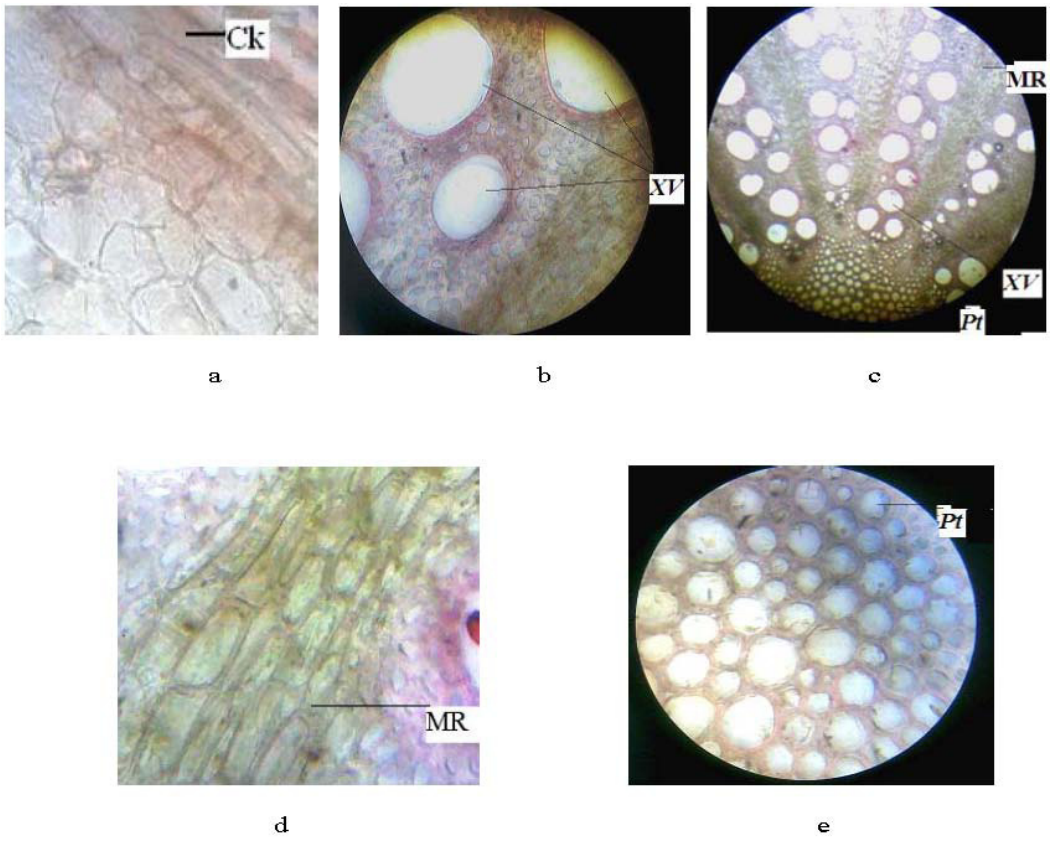

Figure 1. *"Microscopy of root of A. speciosa"*
a; Transverse section consists of Cortex (100x)
b; Transverse section contains xylem vessel (100x)
c; Transverse section consists of pith, xylem vessel and medullary rays (100x)
d; Transverse section consists of medullary rays (100x)
e; Transverse section consists of Pith (100x)
Abbreviations: Ck-Cortex, MR-Medullary rays, Pt-Pith, XV-Primary xylem.

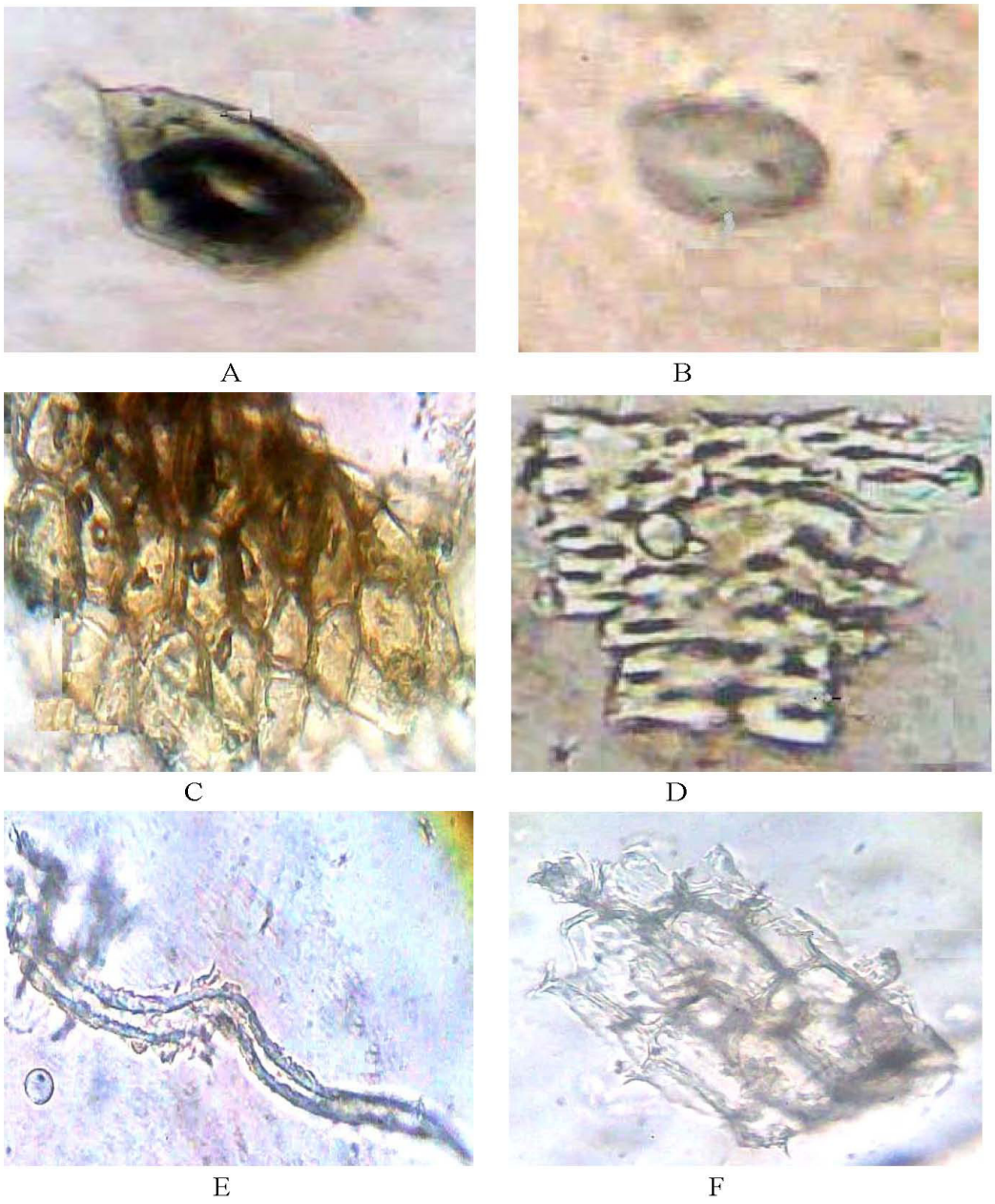

Figure 2. *"Powder microscopy of A. speciosa"*
A: Prismatic Calcium Oxalate, B: Circular Starch Grain, C: Cork Cells, D: Reticulate Vessel, E: Fibre having pointed ends, F: Xylem Vessel.

layers of cells and towards cortex region; it consists of 4 to 6 layers of cells (Fig. 1d). Cambium consists of 2 to 3 rows of small irregular thin-walled cells. Pith consists of few round to oval thin walled parenchymatous cells (fig. 1e).

Powder characteristic

The presence of prismatic crystals of calcium oxalate, starch grain, Cork cell, reticulate vessel, fibres and xylem vessel were observed (Fig. 2).

Preliminary phytochemical screening

Preliminary phytochemical screening for organic and inorganic elements was carried out by using standard procedures. The result of organic elements revealed the presence of alkaloids, carbohydrates, saponin, amino acid, steroids, flavonoids and tannins (Table 1) and the result of inorganic elements shows the presence of iron, phosphate, sulphate, and chloride (Table 2).

"Table 1: Preliminary phytochemical screening of different extracts of A. speciosa root (organic elements)"

Phytoconstituents	Hydro-alcoholic extract	Chloroform extract	Acetone extract	Alcoholic extract	Pet. Ether extract	Water extract	Acetone Fraction	Chloroform Fraction	Methanol Fraction
Alkaloids									
Mayer's test	+	–	–	+	–	+	+	–	–
Dragendroff's Test	+	–	–	+	–	–	+	–	–
Wagner's test	+	–	–	+	–	–	–	–	–
Hager's test	–	–	–	–	–	–	–	–	–
Carbohydrates	+	+	–	+	–	+	–	–	+
Amino acid	+	–	–	+	–	+	–	–	+
Protein									
Biuret test	–	–	–	–	–	–	–	–	–
Xanthoprotein test	–	–	–	–	–	–	–	–	–
Million's test	–	–	–	–	–	–	–	–	–
Saponin	–	–	–	–	–	+	–	–	–
Tannin									
Ferric chloride test	+	–	–	+	–	–	–	+	–
Lead acetate test	+	–	–	+	–	–	–	+	–
Steroid									
Liebermann-Burchard test	+	+	–	+	–	–	–	+	–
Salkowski's test	+	+	–	+	–	–	–	+	–
Flavonoids	+	–	–	+	–	–	–	–	+

(+) Sign indicates presence, (–) Sign indicates absence.

"Table 2: Inorganic constituents of root powder of A. speciosa"

Elements	Results
Calcium	–
Magnesium	–
Sodium	–
Potassium	–
Iron	+
Sulphate	+
Phosphate	+
Chloride	+
Carbonate	–
Nitrates	–

(–) Not present, (+) present

"Table 3: Physicochemical parameters of A. speciosa"

Parameters	Values (%w/w)
Alcohol soluble extractive	11.12%
Water soluble extractive	22%
Chloroform soluble extractive	0.72%
Petroleum ether soluble extractive	0.4%
Acetone soluble extractive	1.44%
Moisture content (LOD)	10.67%
Total ash	4.4%
Acid insoluble ash	0.76%
Water soluble ash	4.03%

"Table 4: TLC of different extracts of root of A. speciosa"

Extracts	Solvent system	Number of spots and their Rf values
Alcoholic Extract	Toluene: Acetone: Methanol (2:1:1)	Three (0.13, 0.58, 0.93)
Chloroform Extract	Toluene: Cyclohexane: Acetic Acid (2:2:2)	Three (0.19, 0.55, 0.82)
Hydroalcoholic Extract	Toluene: Acetone: Methanol (2:1.5:1.5)	Three (0.11, 0.50, 0.64)

"Table 5: Fluorescence analysis of the root powder of Argyreia speciosa"

Treatment		UV light	
	Day light	(254 nm)	(365 nm)
Powder as such	Light Brown	Greenish Brown	Dark Brown
Powder + (50%) HNO_3	Reddish Brown	Green	Black
Powder + 1N HCl	Brown	Green	Brown
Powder + Conc.H_2So_4	Black	Black	Dark Black
Powder + Ammonia	Dark Brown	Light Green	Black
Powder + Iodine	Brown	Green	Brown
Powder + (10%) $BaCl_2$	Creamish Brown	Light Green	Brown
Powder + (40%) NaOH	Brown	Light Green	Dark Brown
Powder + (10%)$AgNO_3$	Light Brown	Light Green	Violet
Powder + (5%) $FeCl_3$	Greenish Brown	Dark Green	Black
Powder + (10%)$MgSo_4$	Light Brown	Light Green	Brown
Powder + (10%)$FeSO_4$	Green	Green	Black
Powder + (5%) $CaCl_2$	Brown	Light Green	Brown
Powder+(40%)$Pb(CH_3COO)_2$	Yellowish Brown	Light Green	Brown
Powder + (5%) $CuSO_4$	Greenish	Green	Black
Powder+Bromine H_2o	Reddish Brown	Green	Black

Physicochemical studies

Ash values of a drug give an idea of the earthy matter or the inorganic composition and other impurities present along with the drug. The percentage of total ash, acid insoluble ash and water soluble ash are carried out in (Table 3). Extractive values are primarily useful for the determination of exhausted or adulterated drugs. The water soluble, alcohol soluble, acetone soluble, chloroform soluble and petroleum ether soluble extractive values have been tabulated in (Table 3). The results of fluorescence analysis of the root powder are presented in (Table 5).

Thin layer chromatography

The TLC of hydroalcoholic, alcoholic and chloroform extracts of *Argyreia specios* root was performed and the solvent systems were developed by running the plate on trial basis in different solvent systems in different ratio. The number of spots and their R_f values has been tabulated in (Table 4).

CONCLUSION

The present study on pharmacognostical evaluation of *A. speciosa* will provide useful information for its identification. Macro, micro and physiochemical standards discussed here can be considered as the identifying parameters to substantiate and authenticate the drug.

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