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PHARMACOGNOSTICAL STUDIES ON THE LEAVES OF *VIGNA RADIATE* (L.) R. WILCZEK

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ABSTRACT

The present study deals with the pharmacognostical evaluation of the leaves of the plant *Vigna radiata* (L.) R. wilczek. *Vigna radiata* belonging to the family Fabaceae is an annual herb. It grows up to one meter high, bears small, yellow-colored flowers, and produces small, light yellowish-orange, edible fruit sometimes referred to as Cape gooseberry or cut leaf ground cherry. Even though this plant has gained scientific importance recently, there is a need for the pharmacognostic standardization. Hence, in the present work the leaf a part of the plant were subjected to various microscopical and physical evaluations. In the microscopical studies, the different cell structures and arrangements were studied and in physical evaluation the ash values and extractive values were studied. The various pharmacognostical constants were obtained which could help in the development of a suitable monograph for the plant. Morphological and anatomical aspects as well as microscopical characteristics have been worked out to identify the diagnostic features of the plant. Physical constant values involving moisture content, ash and extractives as well as qualitative and quantitative estimation of various phytochemical have been studied. The study confirms that the evaluation showing presence of Saponins, Tannins, Terpenoids, Steroid, Flavonoids and some other chemical constituents.

Key Words:- *Vigna radiata*, Macroscopical, Microscopical, Fabaceae, Leaf Constants, Proximate Analysis, Fluorescence Analysis.

INTRODUCTION

Man and Animals depend on the plants for their very existence. Our environment is characterized by richly diversified plant life. Plant diversity is composed of more than 500,000 botanical species. The green scum and the duckweed on surface of some ponds, the lichens, fungi, liverworts, mosses, ferns, conifers and the flowering plants are the representatives of the plant diversity. Worldwide,

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drugs derived from various sources continue to be significant for the treatment and prevention of diseases. Plants constitute a vital component of the biodiversity as they play a key role in maintaining earth's environmental equilibrium and ecosystem stability. They are also essential for the survival of not only the human beings but also animals at large. Wild plants have enormous endemic, cultural and aesthetic importance, and provide food, medicine, fuel, clothing and shelter to majority of people. With the emerging world wide interest in adopting and studying traditional systems and exploiting their potential based on different health care systems. In this regard one of those heritages is species belonging to vigna genus, Fabaceae family, which is cultivated and used as a neutraceutical in all over world. In the traditional systems of medicine this genus is mainly used in the treatment of liver disorders, ulcers, to decrease the weight, and also used in hormonal balances (Santos A *et al*., 2008). The aim of present review is to highlight the nutritional value, phytochemical and pharmacological investigation so far carried on the few species of this vigna genus (Pepo He *et al*., 2007; Abe F *et al*., 2006; Bastos GN *et al*., 2006; Choi E.M *et al*., 2005; Vieira AT *et al*., 2005; Hwang JK *et al*., 2004). So that further research could be carried out on this genus plants (Ramchandra R *et al*., 1980; Damu AG *et al*., 2007; Nagafuji S *et al*., 2004; Soares MB *et al*., 2006).

MATERIALS AND METHODS

Plant materials

Two plant materials of *Vigna radiata* were selected. The leaves were purchased fresh from a local store of Shivamogga, Karnataka.

Chemicals and reagents

Ethanol, 50% sulphuric acid, 10% sodium hydroxide and dilute hydrochloric acid were purchased from nice chemicals. All the chemicals and reagents used were of laboratory grade.

Microscopical studies (Agarwal A *et al*., 2005; Khandelwal K.R *et al*., 2005)

Transverse section of leaf

Free hand sectioning was done for fresh leaf to obtain a thin section. Fluoroglucinol and hydrochloric acid in the ratio 1:1 was used as a stain and mounted on a glass slide and focused under a microscope.

Powder microscopy

Shade dried leaf and roots were powdered with the help of an electric grinder till a fine powder was obtained. This fine powder of the leaf and root were subjected to powder microscopy, as per standard procedures mentioned.

Determination of leaf constants

The different parameters like stomatal number, stomatal index, vein islet number and vein termination number was determined as per standard procedure.

Proximate analysis (Kokate CK *et al*., 2003)

The various physicochemical parameters like ash values, and extractive values were performed as per the standard procedures.

Qualitative phytochemical analysis

The preliminary qualitative phytochemical studies were performed for testing the different chemical groups present in methanol extracts of two different seeds and their sprouts (Reddy KN *et al*., 2007; Sachchidananda Prasad *et al*., 1996; Bastos GN *et al*., 2006).

Fluorescence analysis (Kokate CK *et al*., 1994)

Powdered leaf and leaf parts were subjected to analysis under ultra violet light after treatment with various chemical and organic reagents like ethanol, 50% sulphuric acid, 10% sodium hydroxide and dilute hydrochloric acid.

RESULTS AND DISCUSSION

Transverse section of leaf

Thin TS of the leaf showed dorsiventral nature, the TS was shown in fig 1.

Lamina

Upper epidermis - single layered, rectangular epidermal cells with distinct cuticle, abundant covering and glandular trichomes were observed. Covering trichomes were uniseriate, multi-cellular, 3-4 celled with pointed tips slightly bent at the apex. Glandular trichomes were of unicellular or multicellular head with multicellular stalk.

Mesophyll - Differentiated into palisade and spongy parenchyma. Palisade - Single layered, long compactly arranged cells. Spongy Parenchyma – Consisted of loosely arranged parenchymatous cells of 4-5 layers with calcium oxlate crystals. Lower epidermis - was identical to that of upper epidermis. The number of trichomes found in this layer was less.

Midrib

The dorsal surface was strongly convex and epidermal layer of lamina continued along midrib below the upper epidermis and above the lower epidermis. Thin

strips of collenchyma were present. Rest of the midrib was filled with cortical parenchyma. Arch shaped vascular bundle was found. Distinct phloem was towards dorsal surface and well developed xylem was seen on the ventral surface of midrib. Anisocytic or Cruciferous types of stomata were observed in epidermal layer.

Tissue of Diagnostic Importance (TDI)

The TDI of *Vigna radiate* leaf was found to be covering trichomes which are uniseriate, multicellular, 3-4 celled with pointed tips slightly bent at apex along with the presence of glandular trichomes which consists of unicellular or multicellular head with multicellular stalk and it was shown in fig 2.

Powder microscopy of leaf

The powder microscopy of leaf was done and the data shows stomata: Anisocytic type of stomata was seen with three subsidiary cell around it, trichomes: Many types are seen but predominantly it is covering type, with blunt and fine warty are uniseriate, multi-cellular, 3-4 celled with pointed tips slightly bent at apex along with the presence of glandular trichomes which consists of unicellular or multicultural head with multicultural stalk, fibres: are seen in large numbers, calcium oxalate crystals: are of prism type and starch grains are seen.

Qualitative phytochemical analysis

The methanolic extracts of the sprouts and seeds of *Vigna radiata* and macrotyloma uniflorum showed the presence of carbohydrates, proteins, amino acids, steroids, triterpenoids, glycosides, flavonoids, polyphenols and tannins alkaloids. Analysis also revealed that none of the extracts under study gave positive results for saponins.

Determination of leaf constants

The results obtained in leaf constants were shown in table 1.

Proximate analysis

The results obtained for the leaf and root were shown in table 2. *Vigna radiata* is used for the treatment of various physiological conditions. But so far the plant has not been standardized Pharmacognostically. The detailed pharmacognostic studies like microscopical studies, determination of leaf constants, fluorescence analysis and proximate analysis would be a useful for compilation of a suitable monograph for its proper identification and will help in establishing some biological indices. For easier identification of powdered crude drugs UV estimation for both leaf and root powder will be helpful. The Pharmacognostic constants for the leaves and root of this plant, the diagnostic microscopic features and the numerical standards reported in this work could be useful for the compilation of a suitable monograph for its proper identification.

Fluorescence analysis

The coloured flurescence obtained for the leaf and root powder were shown in table 3.

Table 1. Leaf constants of *Vigna radiata*

S.No	Parameters	Range
1	Stomatal index (up.epidermis) (low.epidermis)	9-10-11 6-7-7.5
2	Vien islet number	8-13 (avg 10.5)
3	Vienlet termination	10-16 (avg 13)

Table 2. Proximate analysis of *Vigna radiata*

S.No	Parameters	Results
1	Moisture content	(LOD) 4.5%
2	Total ash	2.2%
3	Acid insoluble ash	1.5%
4	Water soluble ash	1.9%
5	Alcohol-soluble extractive	18%
6	Water-soluble extractive	15%

Fig 1. T.S of leaf of *Vigna radiata*

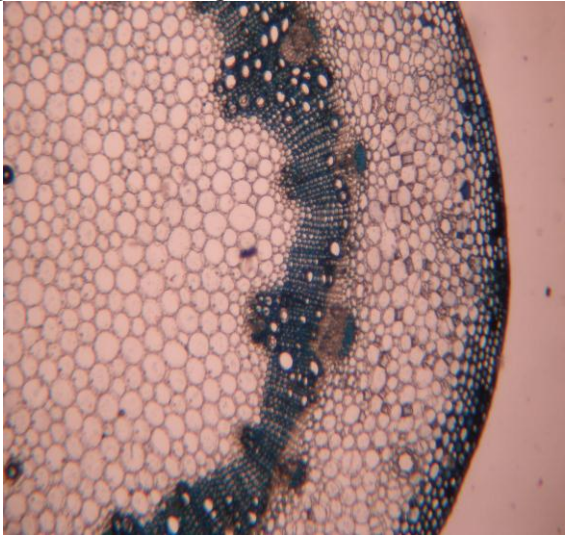

Fig 2. T.S of whole plant of *Vigna radiata*

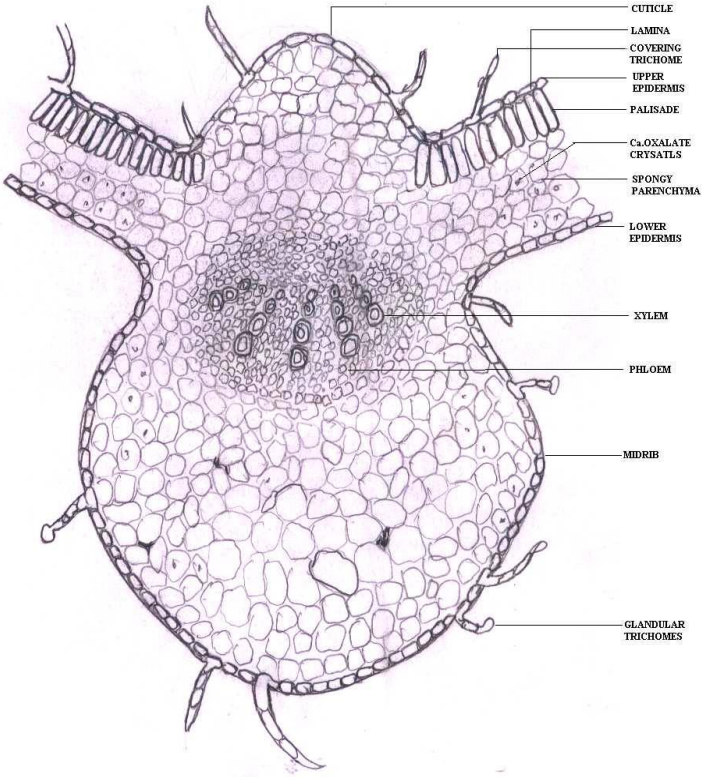

Table 3. Fluorescence analysis of leaf powder

S.No	Reagents	Day Light	UV Light
1	Whole Plant Powder	Green	Yellow
2	Powder + 1 N NaoH (aq)	Yellowish green	Brown
3	Powder +50% HNO_3	Brown	Yellowish green
4	Powder + 50 % H_2SO_4	Reddish brown	Pale green
5	Powder + Methanol	Dark brown	Light green
6	Powder + NH_3 soln	Yellowish green	Grayish yellow
7	Powder + 1_2 solution	Reddish brown	Dark green
8	Powder + Picricacid solution	Yellow	Greenish yellow
9	Powder + $Fecl_3$	Yellowish green	Pale green
10	Powder + Glacial acetic acid	Pale green	Green

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