

Morpho-anatomical Features of *Rhynchosia Rufescens* (Willd) DC. Seeds

Panneerselvam. M, Dr. K. Shanthi, R. Elangovan

Department of Botany, Govt. Arts College, Tiruvannamalai, Tamil Nadu, India

ABSTRACT

The study of morphological and anatomical characters is essential to give exact description and classification of a plant. In this study we analyzed the morpho-anatomical features of the seeds of the plant *Rhynchosia rufescens* of Fabaceae. Morphologically the seeds are black or dark brown in color, transversely elliptic, about 4×3mm, with succulent trophioles. The seed coat is 170µm thick and firmly adheres the cotyledons. The sarcotesta is 50µm thick and made up of palisade like lignified cells. The cotyledons consist of large cells filled with large starch grains of different shapes. Various morphological and anatomical characters observed in this study help in the identification and standardization of the species.

Keywords : Morphology, anatomy, *Rhynchosia rufescens*, Fabaceae, trophioles, cotyledons sarcotesta.

I. INTRODUCTION

Over the last decade there has been a growing interest in drugs of plant origin in contrast to the synthetics that are regarded as unsafe to human and environment [6]. The Fabaceae plants are abundant components of tropical regions and propagate mostly through seeds [9]. Seed biology is the most relevant research topic for tropical forests because which is central to understand community processes such as plant establishment, succession and natural regeneration [7]. This area of study is highly useful in the field of forestry, forest conservation, restoration, and commercial tree production [8].

The study of morphological features of the small fruits and seeds such as shape, color, dimension, microstructure and they may provide valuable contributions to plant taxonomy. However, anatomical features are usually helpful as morphological features in plant diagnostics, are useful in the separation of closely related taxa [15],[16].

About 80% of the fabacean members produce hard seeds [10]. The structure of the seed coats of some legume plants have been studied extensively [11]. The structure of testas varies, from the thin seed coat of groundnuts (*Arachis hypogaea*) to the massive

structures of some lupins [12],[13],[14]. *Rhynchosia rufescens* is a medicinal plant belongs to the family Fabaceae and is used for various ailments by the tribal people. Since there was not found any scientific and anatomical records, the present investigation of morpho – anatomical features of *Rhynchosia rufescens*(Willd)DC., is being reported for the first time and could be very useful criteria for identification of the species.

II. MATERIALS AND METHODS FOR ANATOMICAL STUDIES

Collection of specimens

The plant specimens for the proposed study were collected from hills of Tiruvannamalai, Tamil Nadu, India. Morphological studies and systematic position of the plant were analyzed [2]. The plant was identified and authenticated by the Botanical Survey of India, Coimbatore. Care was taken to select healthy plants and matured seeds.

For anatomical studies the required samples of seeds were collected from the plants and fixed in FAA (Formalin-5ml+ Acetic acid-5ml + 70% Ethyl alcohol-90ml). After 24 hrs of fixing, the specimens were dehydrated with graded series of tertiary –Butyl alcohol

as per the schedule given by Sass, 1940 [5]. Infiltration of the specimens was carried by gradual addition of paraffin wax (melting point 58-60 C) until TBA solution attained super saturation. The specimens were cast into paraffin blocks.

Morphological Studies

seed morphology was characterized from a sample of 50 seeds collected from 20 plants. The length, width and thickness of the seeds were measured by using digital screw guage. The length of the seed was measured from hilar to chalazal end. The width and thickness of the seeds were taken at the mid portion of the seeds. The arithmetic average was calculated for the variables obtained. The description for fruits and seeds was given based on Radford et al. (1974) [17].

Sectioning

The paraffin embedded specimens were sectioned with the help of Rotary **Microtome**. The thickness of the sections was 10-12 μm . Dewaxing of the sections was by customary procedure [3]. The sections were stained with **Toluidine blue** as per the method published by O'Brien et al. (1964) [4]. Since **Toluidine blue** is a polychromatic stain. The staining results were remarkably good; and some **cytochemical** reactions were also obtained. The dye rendered pink colour to the **cellulose** walls, blue to the **lignified** cells, dark green to suberin, violet to the mucilage, blue to the **protein** bodies etc. wherever necessary sections were also stained with **safranin** and **Fast-green** and IKI(for Starch). Different cell component were studied and measured.

Photomicrographs

Microscopic descriptions of tissues are supplemented with micrographs wherever necessary. Photographs of different magnifications were taken with **Nikon labphoto 2** microscopic Unit. For normal observations **bright field** was used. For the study of **crystals**, **starch grains** and **lignified** cells, **polarized** light was employed. Since these structures have **birefringent property**, under polarized light they appear bright against dark background. Magnifications of the figures are indicated by the scale-bars. Descriptive terms of the anatomical features are as given in the standard Anatomy books [1].

III. RESULTS AND DISCUSSION

Morphology of fruits and seeds

As per the literature studies the standardization is an important tool for herbal drugs in their identity, purity, safety and quality. Various macroscopic, microscopic, fluorescence analysis are done on various part parts. Microscopic method is one of the simplest methods to start with establishing the correct identification of the source material [19].

In our studies, the fruits of *Rhynchosia rufescens* are Legume obliquely orbicular, inflated or subequal to calyx, apex slightly curved, acute, pubescent, brown and dehiscent when mature. Seed 1, black or dark brown in color, transversely elliptic, about 3.5 \times 3mm, with succulent traphiole.

Anatomy of the seed

In vertical section, the seed appears elongated, elliptical and smooth. The upper and lower ends of the seed are semicircular (Fig.1). The seed is 4mm long and 1.8mm broad. It consists of two plano convex cotyledons, with their flat sides facing each other and the seed coat is uniformly thick and firmly adheres the cotyledons (Fig.1). the radical appears ovate and is prominent., it is located inside shallow concavity of the cotyledons.

In median longitudinal section of the seed, a thick and massive coruncle is seen on the top of the seed (Fig.2.1). The coruncle is horizontally elongated and measures 420 μm in horizontal plane and 150 μm in vertical plane. The outer part of the coruncle consists of two or three layers of vertically rectangular, thick walled, darkly stained cells. The remaining ground tissue includes polygonal thin walled compact parenchyma cells (Fig.2.2).

Seed Coat

The seed coat is very important in the plant life with controlling the development of the embryo and determining dormancy of the seed and germination [18]. In our study, *th Rhynchosia rufescens* seed coat is uniformly thick all around the seed. It is 170 μm thick. The seed coat consists of outer sclerotesta and inner sarcotesta (Fig.3.1, 2). The sarcotesta includes vertically

elongated, columnar and palisade like thick walled lignified cells. This layer is 50µm thick.

The sarcotesta consists of three layers of horizontally stretched compact, thin walled parenchyma cells. The inner most layer of the sarcotesta has single layer of epidermal cells. The cells are cylindrical, thin walled and darkly stained.

Cotyledons

The cotyledons consists of large polygonal compact and thin walled cells. They are densely filled with large starch-grains (Fig. 4.1,2). The starch grains vary in shape from globoid, ovoid, and ellipsoid. When the starch grains are viewed under polarized light, (+) and (×) shaped polarimarks are visible (Fig.4.2). The starch grains are 20×40 µm in size.

IV. CONCLUSION

Since the plant has various medicinal values and non-availability of anatomical, the present investigation of morpho-anatomical studies of the seeds of the *Rhynchosia rufescens* (willd.)DC., being reported for the first time. As the morphological and anatomical features of the plant parts are essential criteria for the proper identification and plant systematic. The present study could be very useful in the further scientific studies researches in future.

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