Pharmacognostical evaluation of the wild and cultivated variety of Eranda (*Ricinus communis* Linn.) root

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ABSTRACT

Introduction: *Ricinus communis* (Linn), belonging to family Euphorbiaceae, known as Eranda, is used in Ayurvedic system of medicine and its root is recommended for the management of pain, inflammation and infertility, etc. It is available both in wild as well as cultivated conditions. Due to high demand, the cultivated variety is mainly used instead of the other. Hence, to ensure botanical identification and authentication of both varieties harmacognostical evaluation of both the variety was undertaken. **Method:** The present investigation includes macroscopical and microscopical evaluation of both the wild and cultivated root including its powder characteristics following standard procedures. **Result:** Both the roots vary in colour. Roots of both varieties show similar microscopic characters like cork, parenchyma, xylum, phloem and cambium. **Conclusion:** The wild root differs from the cultivated one by being dark greyish-brown and greyish brown in colour, respectively. Both the varieties have same pharmacognostical characters except the presence of tyloses in the wild variety.

Keywords: *Ricinuus communis*, inflammation, infertility, Eranda, root.

INTRODUCTION

Pharmacognosy has become one of the pillars in areas like pharmacy, medicine, natural product chemistry and many others allowing scientists to recognize the importance of plants as sources of medicines. This approach has initiated active research programmes either to isolate new lead compounds or to produce standardized extracts.[1] For this it is very necessary to evaluate various qualitative and quantitative parameters, which may be helpful in setting standards for particular medicinal plant/parts of the plant. With the help of these standards one can easily identify and characterize an individual drug, which may play a major role in maintaining quality and purity of that particular drug and its formulation and prevent it from being adulterated by drug of same or other genius having low potency.[2]

The present study deals with the standardization of one such medicinal plant *Ricinus communis* Linn. (Euphorbiaceae), a soft-wooded small tree widespread throughout the tropics and warm-temperature regions of the world. In the Ayurvedic system of medicine, the leaf, root and seed oil of this plant have been used for the treatment of inflammation and liver disorders.[3] Its root has been highlighted as one of the best drugs having Virshya (androgenic) and vatahara (anlagesic and anti-inflammatory) activities.[4] It is reported that this plant possesses hepatoprotective,[5,6] antidiabetic,[7] laxative[8] and antifertility[9] activities. Methanol extract of root shows anti-inflammatory and free radical scavenging activity.[10]

R. communis is available both in wild as well as cultivated conditions. Due to the high consumption of its root as an Ayurvedic raw drug, the roots of the cultivated variety are utilised mainly instead of the naturally available wild one. In this paper, a study of the transverse section of the root, along with the powder microscopy of both varieties of *R. communis* Linn. was carried out.

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MATERIAL AND METHODS

Collection of drug

Fresh roots of wild (more than six months) and cultivated variety (six months old) were collected after proper identification of the plant as *Ricinus communis* Linn. (Euphorbiaceae), from the adjacent area of Jamnagar town of Gujarat, India, with the help of a taxonomist and a specimen (no. 1491) of the same was preserved in the department, for further reference. The obtained roots were shade dried and made into coarse powder with the help of a mechanical grinder.

Macroscopical evaluation/organoleptic evaluation

Various parameters of the plant material, such as size, shape, colour, odour and taste of the roots were recorded.[11,13]

Microscopic evaluation

Thin free-hand sections of the roots were made and washed with chloral hydrate solution. The stain was made with phloroglucinol and conc. HCl solution. The oil globule was observed by adding sudan III.[12,13] Diagnostic characters in TS and powder of roots of both wild and cultivated varieties were studied with and without staining. Microphotographs were taken using Carl Zeiss binocular microscope.

RESULTS

Macroscopic/organoleptic characters

Wild root: The secondary roots are deeply wavy, dark greyish-brown in colour, 4–12 cm long, and 1–2 cm thick.

Cultivated root: Fresh root are minutely wavy, having secondary roots, greyish-brown to light brown in colour, cut surface brownish-cream, cylindrical, 5–16 cm long, 1–3 cm thick (Figure 1).

Microscopic characters

Transverse section of wild fresh root

Diagrammatic section: The diagrammatic sketch shows outer cork, reduced cortex and wide stealer region composed of compactly arranged xylem vessels with xylem parenchyma and fibers separated by uniserriate to biserriate medullary rays.

Cork: Mature root shows 4–5 or more layers of tangentially elongated, radially arranged cork cells.

Cortex: Composed of oval to polygonal, parenchymatous cells; in which starch grains, rosette crystals, schlerenchymatous cells are observed.

Phloem: Composed of sieve tubes, parenchyma, fibers and groups of fibers traversed by 2–8 cells wide medullary rays.

Cambium: Consists of 2–4 layer of rectangular shaped cells situated just under the phloem.

Xylem: Consists of usual elements, xylem vessels of various sizes, occur in singles and groups of 2–5 cells arranged radially having reticulate thickening; xylem medullary rays 2–4 cells wide, tyloses are observed.

Transverse section of cultivated root

Diagrammatic section: The transverse section of the cultivated root shows outer cork, reduced cortex and wide stealer region composed of compactly arranged xylem vessels with xylem parenchyma and fibers separated by uniserriate to biserriate medullary rays.

Cork: Root of the cultivated variety shows 3–4 layers of cork which is tangentially elongated and it is arranged in radial form.

Cortex: It is composed of parecnchymatous cells which are polygonal in shape, in which starch grains, rosette crystals, stone cells are observed.

Phloem: Composed of sieve tubes, parenchyamatous cells, fibres and layers of medullary layers are present transversally.

Root of wild variety | Root of cultivated variety | Powder of wild variety | Powder of cultivated variety

Figure 1. Morphology of Eranda root wild and cultivated.

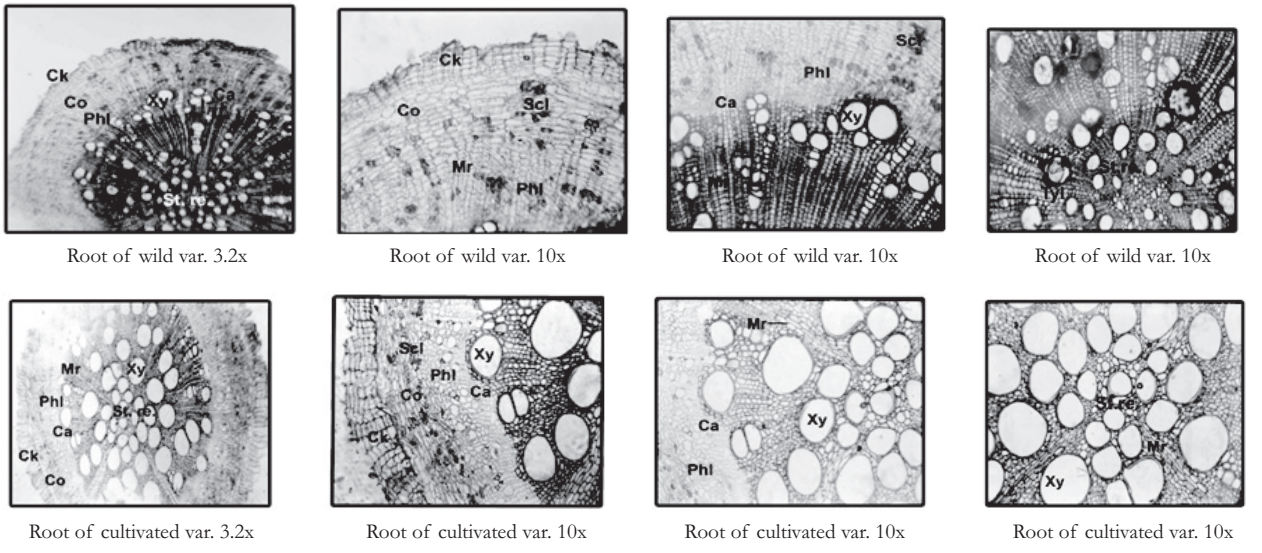

Figure 2. Microphotograph of transverse section of Eranda root wild and cultivated.
Ck – Cork, Co – Cortex, Phl – Phloem, Xy – Xylem, St.re – Stele region, Mr – Medulary Rays, Ca – Cambium, Scl- Sclerenchyma, Ty – Tyloses.

Cambium: Consists of 2–3 layers of rectangular shaped cells situated under the phloem.

Xylem: It consists of xylem vessels of pentarch to hexarch, oil globules, medullary rays 2–3 cells wide with plenty of starch grains in it (Figure 2).

DRIED POWDER MICROSCOPIC CHARACTERS

Wild root

Brownish-cream to darkish in colour, The diagnostic characters are cork in surface view from cork, starch grains, rosette crystals from cortex zone, border pitted vessel and fibers from vascular bundles, yellow colour content are seen from cortex zone, prismatic crystals are from cortical region (Figure 3).

Cultivated root

Powder microscopy of cultivated variety shows plenty of starch grains and rosette crystals from cortical region, pitted vessels from vascular bundles, cork cells in surface as well as in tangential view from cork, prismatic crystals from cortex, fibers from phloem (Figure 4).

DISCUSSION

Each and every species has its own pharmacognostical features, which determine the authenticity of the particular

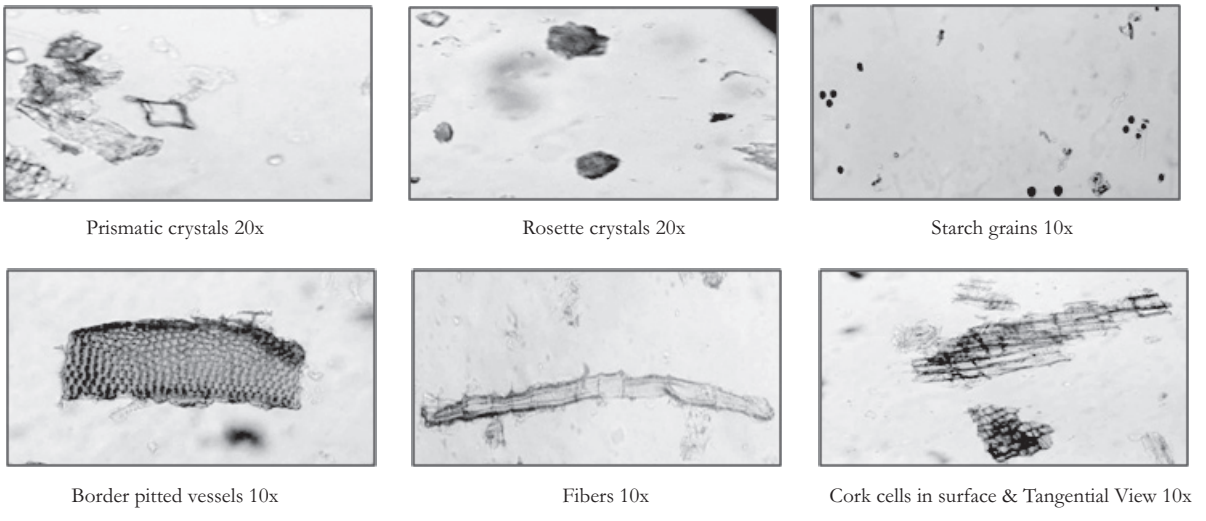

Figure 3. Microphotograph-wild variety of Eranda root powder.

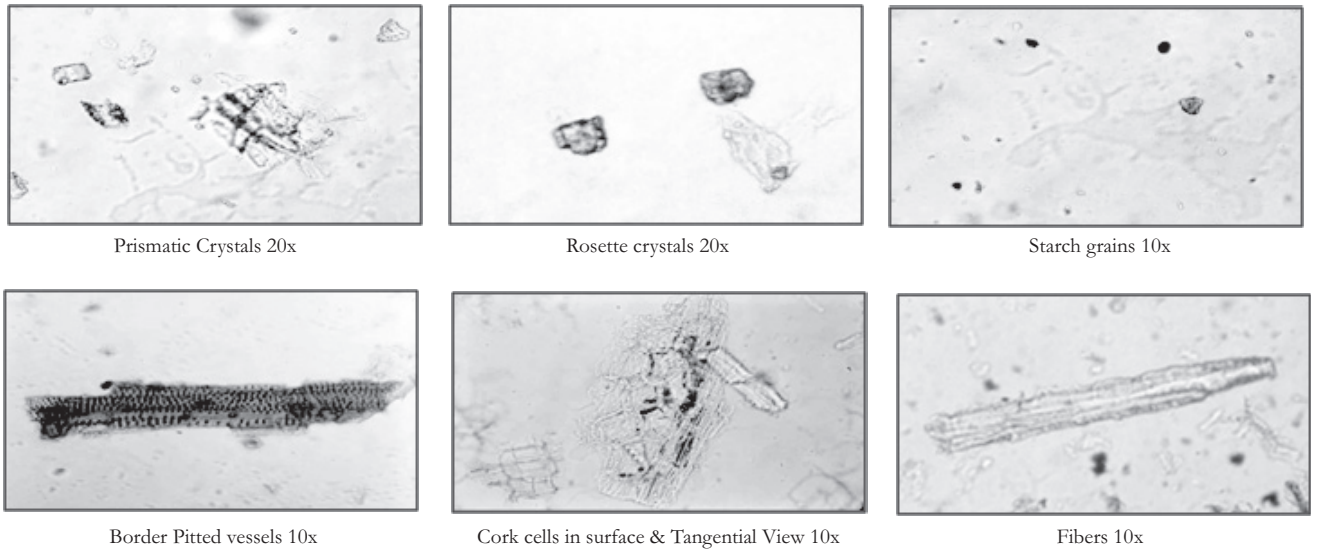

Figure 4. Microphotograph-cultivated variety of Eranda root powder.

Table 1. Pharmacognostical comparison of wild and cultivated varieties of *R. Communis* root.

	Characteristic	Wild variety	Cultivated variety
Macroscopical characteristic	Color	Dark grayish brown	Grayish brown
	Odor	Odorless	Odorless
	Texture	Rough	Rough
	Taste	Tasteless	Tasteless
Microscopical characteristic	Cork	+	+
	Parenchyma	+	+
	Phloem	+	+
	Cambium	+	+
	Xylem	+	+
	Tyloses	+	-
Powder characteristic	Prismatic crystals	+	+
	Rosette crystals	+	+
	Starch grains	+	+
	Border pitted Vessels	+	+
	Cork cells	+	+
	Fibers	+	+

drug. It helps in the identification and determination of the quality and purity of the raw drug. The microscopical study reveals that the most of the characters are the same in the wild and cultivated varieties of Eranda root (like cork, cortex, cambium, xylem, and phloem). The powder microscopy shows that the characters like cork cells, prismatic crystals, rosette crystals, starch grains, border pitted vessels and fibers are the same in both varieties Eranda root (Table 1).

CONCLUSION

The wild roots of *R. communis* are more wavier and also darker in colour than the cultivated one. Both the varieties have the same pharmacognostical characters except the presence of tyloses in the wild variety. However, this inference should be made along with phytochemical, pharmacological and clinical trials.

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