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RESEARCH ARTICLE

PHARMACOGNOSTICAL STUDIES ON *COCCINIA GRANDIS* (WT., ARN.,)

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ABSTRACT

Coccinia grandis is a dioecious, perennial, and herbaceous climber, with glabrous stems,tuberous roots, and axillary tendrils. Leaves are alternate and simple. Fruit is a smooth, bright red, ovoid to ellipsoid berry 2.5–6 cm The present investigation was analyzed to evaluate the pharmacognostical studies on selected medicinal plant. The parameters such as anatomical, histochemical colour reactions, and phytochemical studies were done. The values calculated and data collected could be used for the identification of powdered drug of this taxon. Pharmacognostical analysis will help to identify authentically the drug from adulteration, substitution in the herbal market and also for the quality control in pharmaceutical industry.

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INTRODUCTION

Pharmacognostical techniques are the best tools used for identification of crude drugs. Standardisation of phytodrugs and identification of their substitutes and adulterants are done by the use of several parameters namely morphological and anatomical characters, powder analysis, phytochemical studies and chromatographic studies. A vast majority of the population, particularly those living in rural areas depends largely on medicinal plants for treatment of diseases. There are about 7000 plant species found in India. The WHO estimates that about 80% of the population living in the developing countries really almost on traditional medicine for their primary health care needs. Plants have played a significant role in maintaining human health and improving the quality of human life (Tamilselvan *et al.*, 2011). The Cucurbitaceae family is commonly known as gourd, melon and pumpkin family. The family of *Coccinia grandis* is Cucurbitaceous, comprises 960 species. The family is predominantly distributed around the tropics. Most of the plants in Cucurbitaceae family are annual vines (Reddy, 2009). *Coccinia* includes 29 additional species and they are found only in tropical Africa. *Coccinia grandis* is used by humans mostly as a food crop in several countries in Australia, Asia, Caribbean, and the southern United States, Pacific Islands. *Coccinia grandis* hosts several insects such as *Leptoglossus Australis*, *Aphis gossypii* Glover, *Diaphania indica*, *Bactrocera cucurbitae, Liriomyza* spp. *Aulacophora* spp., that attack several commercially important species of the Cucurbitaceous (Bamba *et al.,* 2009). Chemical and mechanical methods of control proved to be unproductive, uneconomical, unacceptable, and unsustainable (Muniappan *et al.,* 2009). Medicinally, leaf\used as Antidiabetic, oxidant, larvicadal, GI disturbances, Cooling effect to the eye, Gonorrhea, hypolipidemic, skin diseases, urinary tract infection. Fruit used as Hypoglycemic, analgesic, antipyretic, Hepatoprotective, tuberculosis, eczema, anti-inflammatory.

Stem used as Expectorant, antispasmodic, asthma, bronchitis, GIT disturbances, urinary tract infection, skin diseases, Root used as Hypoglycemic, antidiabetic, skin diseases, removes pain in joint, urinary tract infection (Pekamwar *et al*., 2013). The plant is used internally in gonorrhoea (Bhakuni *et al.,* 1969). The plant also lowered blood sugar (Chandrasekar *et al*., 1989), hepatoprotective activity (Vadivu *et al*., 2008). After the scrutiny of literatures, so far scanty work has been carried out regarding pharmacognostical study of selected plant. Hence in the present study, the anatomical, quantitative analysis, histochemical and qualitative phytochemical parameters of *Coccinia grandis* were done.

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MATERIALS AND METHODS

(i) Collection of plant meterials

The plant material is collected from the natural environment from Bharathidasan Govt. College for Women, Muthialpet and within Puducherry town. The plant material was botanically identified by using the Flora of Presidency of Madras Gamble (1957). An Excursion Flora of Central Tamil Nadu, Matthew (1991) and the confirmation were engaged at French Institute Herbarium (HIFP), Puducherry. The herbarium specimen was prepared and deposited at the Department of Botany, BGCW, Muthialpet, Puducherry.

(ii) Description

The plant is an annual or perennial, scandent or prostrate and much branched climbing herb. Stems are grooved and with slender tendrils. Roots sometimes tuberous; tendrils simple. Leaves are petiolate, deltoid or subround, angled or lobed, 5-8 cm long; Ovate, deeply cordate at base, 5-angular partite, with entire to pinnatipartite or lobes or segments. The petioles are 2.0-3.0 cm long. Flowers are mostly white in colour and dioecious, male solitary or subcymose, female solitary calyx-tube campanulats short. Male flowers are in one flowered peduncles which is 2.0-3.5 cm long and female flowers show 1.3-2.5 cm long peduncles. The fruits are ellipsoid, oblong, cylindrical and with rounded ends and about 5.0 cm long. Seeds are obavoid, rounded at the apex and yellow to grey in colour (Fig.1).

Fig. 1. Habit of *Coccinia grandis*

Fig. 2. T.S of Leaf

Fig. 3. T.S. of Stem

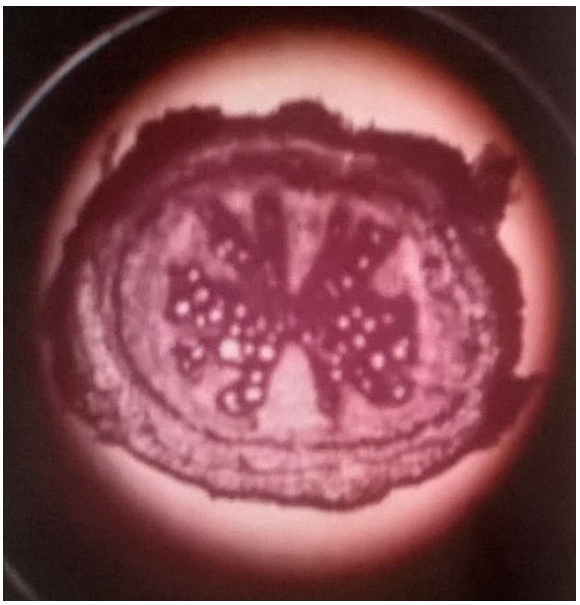

Fig. 4. T.S of Root

(iii) Anatomical Studies

The collected leaves were fixed in FAA (95% ethyl alcohol 50 parts+ glacial aceticacid 5 parts + Formalin 10 parts + Distilled water 35 parts) in the field itself. Free hand sections were employed wherever necessary. Photomicrographs were taken using laitzorthoplan microscope. The quantitative features of the plant vice: Epidermal cell number and size, stomatal number and size, Evans (2006), Stomatal index, Salisbury (1927), Palisade ratio, histochemical analysis, Krishnamurthy (1988), organoleptic characters, were studied.

(iv) Phytochemical Studies

Qualitative phytochemical analysis was done, using the standard procedure (Kokate *et al.,* 1994).

RESULTS AND DISCUSSION

(i) Anatomical studies Leaves

Upper and lower epidermis is single layered. Both epidermis are covered with a thin cuticle. Most of the upper epidermis stomata are not found. Stomata is anamocytic and silicified trichomes present. Anomocytic stomata already reported in many plants for example *Saxifraga adscendens*; *Vernonia amygdalina* (Paraschivoiu and Andrei, 2009; Rahman and Oladale 2003).The mesophyll tissue lies at the upper and lower epidermis with parenchymatous cells. Cortex is differentiated in to palisade and spongy tissue. Palisade parenchyma is generally composed of elongated and more or less cylindrical cells, were as spongy parenchyma is generally composed of loose, irregular, thin-walled cells having big intercellular spaces. Both the parenchyma contain discoid chloroplast arrange in parallel rows in the cells. Vascular bundle sheath is commonly parenchymatous. Vascular bundle is endarch. Individual cells contain crystals (Fig.2).

Stem

Epidermis is single layer consist of compact barrel-shaped cells No intercellular space on the epidermis. It is coverred with a thin cuticle. Multicelluar epidermal hairs are present. The multicellular hairs also reported in *Vernonia amygdalina,* Eltahir and AbuEReish (2011). The cortex region consists of collenchyma, chlorenchyma and endodermis. Endodermis is the innermost layer of the cortex and it is single layered. Pericycle is present just beneath the endodermis; multilayered zone of sclerechymatous pericyle is present. Vascular bundle is bicollateral, xylem and phloem is two strands, and in-between the cambium is present. Xylem occupies the central portion of the vascular bundle; it consists of very wide narrow pitted vessels towards the periphery of the metaxylem and on the inner side narrow vessels which form the protoxylem. Fasicular cambium are thin walled, rectangular and arranged in radial rows. Phloem occurs in two patches; inner towards the pith and outer towards the periphery (Fig.3).

Table 1. Quantitative microscopical analysis of leaves

S. No.	Various parameters of leaves	Size (µm) and Number (mm^2)	
		Upper surface	Lower surface
1	Stomatal frequency	98.3-110.1-121.3	83.3-92.0-102.1
2	Stomatal index	60-73-82	86.7-96.8-108.7
3	Palisade Ratio	16.8-17.1-19.2	

Root

The epidermis consists of closely packed, elongated cells with single layer. Cuticle is present on the epidermis. Unicellular epidermal hairs are present. The root epidermis is also known as epiblemma. Cortex is made up of parenchymatous cells. The cells are polygonal in shape. Cortex is thin walled, massive and inter-cellular spaces. Endodermis uniseriate, pericylce is thin walled parenchyma. Xylem and phloem is alternately arranged in the vascular bundle, cambium is absent and pith is scanty at the centre (Fig.4).

(ii) Quantitative microscopical values like stomatal frequency, stomatal index and palisade ratio were given in the (Table 1).

Table 2. Histochemical analysis of leaves

S. No.	Test	Expected colour change	Observations
1	Lignin	Deep red	+
2	Tannins	Blue	+
3	Mucilage	Blue	+
4	Protein	Blue	+
5	Starch	Yellow	+

(++ = Marked present; + = Moderate present; - = Absent)

(iii) Histochemical Studies

In leaves Lignin, Tannins, Mucilage, starch and Proteins are present moderately (Table 2). In stem Lignins, Tannins, Starch and Proteins are present moderately were as Mucilage is absent (Table 3). In roots Mucilage is present markedly, lignin, tannin, starch and proteins were present moderately (Table 4).

Table 3. Histochemical analysis of stem.

S. No.	Test	Expected colour change	Observations
1	Lignin	Deep red	+
2	Tannins	Blue	+
3	Mucilage	Blue	+
4	Protein	Blue	+
5	Starch	Yellow	+

(++ = Marked present; + = Moderate present; - = Absent)

Table 4. Histochemical analysis of root

S. No.	Test	Expected colour change	Observations
1	Lignin	Deep red	+
2	Tannins	Blue	+
3	Mucilage	Blue	++
4	Protein	Blue	+
5	Starch	Yellow	+

(++ = Marked present; + = Moderate present; - = Absent)

(iv) Phytochemical analysis

Aqueousextract of plant showed carbohydrates, saponins and gums and mucilages are moderately presents were as glycosieds, steroids, tannins, phenols, saponins, fat's and oil, proteins and flavonoids are absent. Alcoholic extracts showed marked presents of carbohydrates, glycosides, tannins, phenols, fat's and oil, gums and mucilages and proteins were as saponins and flavonoids are moderately presents (Table 5).

Conclusion

The present pharmacognostical studies on the plant *Coccinia grandis* generated many parameters which aid to detect the adulteration, substitution and authentically identification of crude drugs.

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