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Review Article

CHLOROPHYTUM COMOSUM (THUNBERG) JACQUES*:* A REVIEW

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ABSTRACT
Chloropyhtum comosum (Thunb.) Jacques is a common ornamental plant known as Spider plant. It is native of Africa. In China, it is traditionally used in treatment of bronchitis, cough, fractures; and burns. The major phytochemical compounds isolated from this plant are steroidal saponins, proteins and carbohydrates. The plant extracts have exhibited potential anti-proliferative effect against HeLa (human cervical adenocarcinoma), CCRF-HSB-2 (human T-cell leukaemia), HL-60 (human promyelocytic leukemia) and U937 (human monocyte tumour) cell lines. The present article is an attempt to present the pharmacognostical profile of a hither-to-lesser known medicinal plant.
Keywords: *Chlorophytum comosum*, Liliaceae, steroidal saponins, proteins, antiproliferative, antitumor.

INTRODUCTION

Chlorophytum comosum (Thunb.) Jacques (Figure 1) is an important plant of the monocot plant family Liliaceae. It grows in South Africa and Asia. This plant has been placed into different taxa by some taxonomists (e.g. Agavaceae/ Anthericaceae etc)[1].

Taxonomical status

The taxonomic status of *C. comosum* is well documented in the literature (Table 1)[2].

Table 1: Taxonomic status of *C. comosum* (Thunberg) Jacques

Kingdom	Plantae
Division	Magnoliophyta
Class	Liliopsida/ Monocot
Subclass	Liliidae
Order	Liliales
Family	Liliaceae
Subfamily	Liliodeae
Genus	*Chlorophytum* Ker Gawler
Species	*Chlorophytum comosum* (Thunberg) Jacques

Common Names

- Spider plant
- Airplane Plant
- Hen-And-Chickens
- Ribbon plant
- Spider-Ivy
- Walking *Anthericum*

Synonyms

- *Anthericum comosum*
- *Anthericum mandaianum*
- *Chlorophytum beniense*
- *Chlorophytum capense*
- *Chlorophytum elatum*
- *Chlorophytum mandaianum*
- *Chlorophytum picturatum*
- *Chlorophytum semlikiense*
- *Chlorophytum sternbergiunum*
- *Chlorophytum vittatum*

Geographical source

It is a native of South Africa. It is commonly cultivated in the tropical regions of the world as an ornamental garden plant. This plant has been reported in China, India and USA.

Growth conditions

This plant has a unique ability to grow in a wide variety of light / temperature conditions. However, it has been observed that it grows particularly well in the regions with increased daylight. Despite its ability to grow in the slightly acidic or alkaline soils, it cannot tolerate extreme water conditions (e.g. drought or flooded soils). Excessive fluoride present in the irrigation water is reported to cause foliar loss and hence, act as growth retardant for *C. comosum*.

Morphological Characteristics

The plant is a small herb which arises from this tuberous rhizome. It reaches up to a height of 2 feet (60 cm). The mound of rosette leaves can spread to form a broad mass.

Roots

Primary roots are fleshy, thickened and fusiform. They are opaque white. Roots are 10-15 cm long and 1-2 cm in diameter.

Stem

Vegetative stem of the plant is short in height. They are; however; very firm and have short – length internodes.

Leaves

It produces glabrous green colored leaves. The leaves have alternate arrangement and they are persistent. The leaves are linear-lanceolate in shape. They are 15-50 cm long and up to 1.8 cm wide. The leaves have characteristic sword like shapes. The leaf lamina can be entire or slightly undulate margined. The leaves of most cultivars have white to yellow variegation.

Flowers

The plant bears flowers in terminal racemes. The flowers are solitary and colorless. Their diameter can range up to 1.8 cm.

The whorl of three ovate petals alternates with a whorl of three lanceolate sepals. Androecium is represented by six stamens. The flowers have a single ovary. The flowers are persistent. They may be sparsely borne on the long raceme reaching up to 36 cm in length.

Fruits

The plant produces small three celled capsules. These fruits have a characteristic leathery texture. Each cell bears 3-5 flat – black seeds[1].

Microscopy

The microscopic characters of the plant have been reported in the literature reports. A description of the same is given below[3]:

Root

The transverse section of adventitious roots has following characteristics:

- Rhizodermis with radially elongated cells.
- Cortex with intercellular spaces.
- Endodermis with casparian strips.
- Acicular crystals of calcium oxalate in cortical parenchyma.
- Pericycle composed of sclerenchymatous cells.
- Vascular bundles - exarch.

Shoots

The transverse section of aerial shoot shows the following structures:

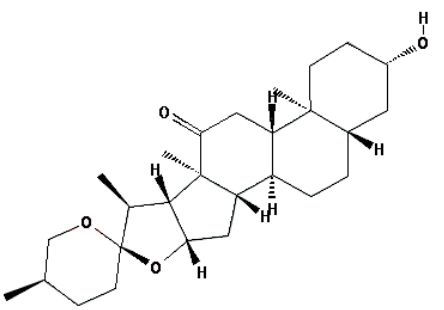
- Single layered epidermis with thick cuticle.
- Cortex composed of collenchymatous cells.
- Sclerenchymatous pericycle.
- Scattered collateral vascular bundles.

Leaf

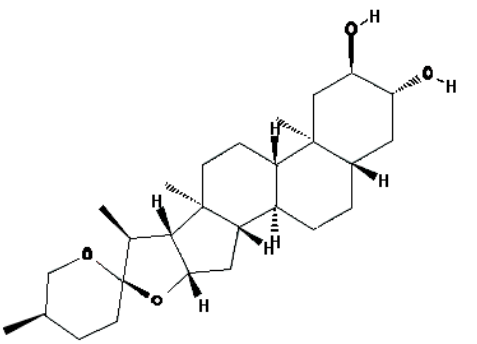
The transverse section of the leaf lamina shows the following microscopic characters:

- Upper and lower epidermises with thin cuticle.
- Anomocytic stomata.
- Spongy mesophyll.
- Spongy parenchyma with abundant chloroplasts.
- Few sclerenchymatous cells.
- Collateral vascular bundles.
- Prismatic and acicular calcium oxalate crystals.

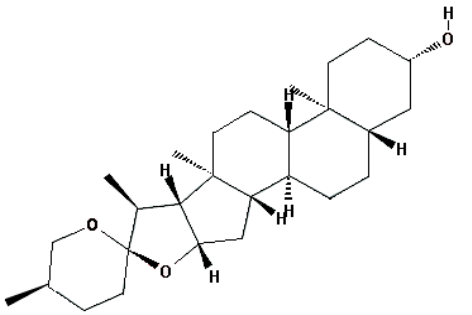
Figure 1: ***Chlorophytum comosum*** **(Thunberg) Jacques**



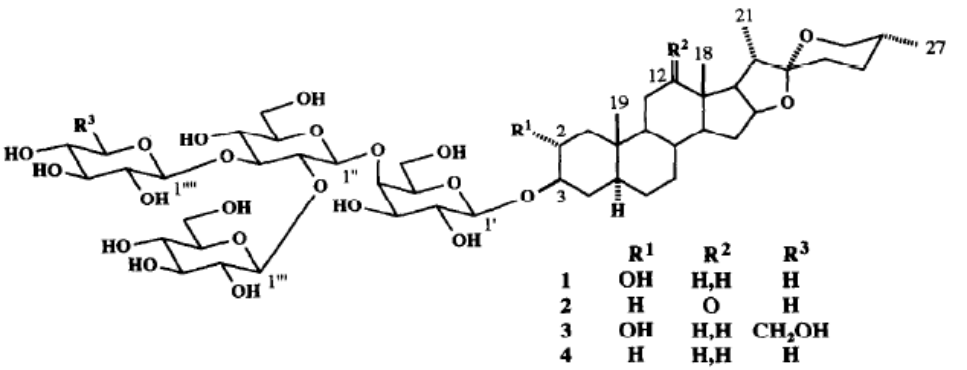
HECOGENIN



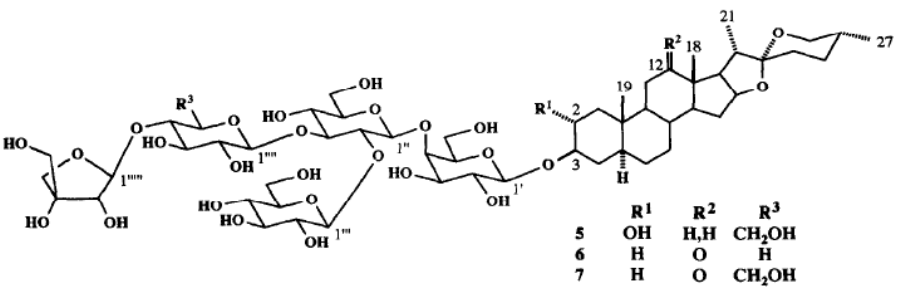
GITOGENIN



TIGOGENIN



1. (25R)-5α-spirostane-2α,3β-diol (gitogenin) 3-O-{O-β-D-glucopyranosyl-(12)-O- [β-D-xylopyranosyl-(13)]-O-β-D-glucopyranosyl-(14)-β-D-galactopyranoside}
2. (25R)-3β-hydroxy-5α-spirostan-12-one (hecogenin) 3-O-[O-β-D-glucopyranosyl-(12)-O-[β-D-xylopyranosyl-(13)]-O-β-D-glucopyranosyl-(14)-β-D-galactopyranoside]
3. gitogenin 3-O-{O-β-D-glucopyranosyl-(12)-O-[β-D-glucopyranosyl-(13)]-O-β-D-glucopyranosyl-(14)-β-D-galactopyranoside}
4. (25R)-5α-spirostane-3β-ol (tigogenin) 3-O-{O-β-D-glucopyranosyl-(12)-O-[β-D-xylopyranosyl-(13)]-O-β-D-glucopyranosyl-(14)-β-D-galactopyranoside}



5. (25R)-5α-spirostane-2α, 3β-diol 3-O-{O-β-D-glucopyranosyl-(12)-O-[O-β-D-apiofuranosyl-(14)-β-D-glucopyranosyl-(13)]-O- β-D-glucopyranosyl-(14)-β-D-galactopyranoside}
6. (25R)-3β-hydroxy-5α-spirostan-12-one (hecogenin) 3-O-[O-β-D-glucopyranosyl-(12)-O-[O-β-D-apiofuranosyl-(14) - β-D-xylopyranosyl-(13)]-O-β-D-glucopyranosyl-(14)-β-D- galactopyranoside}
7. Hecogenin-3-O-{O-β-D-glucopyranosyl-(12)-O-[O-β-D- apiofuranosyl-(14)-β-D-glucopyranosyl-(13)]-O-β-D-glucopyranosyl-(14)-β-D-galactopyranoside}

Figure 2: Chemical Constituents of *C. comosum* root tubers

Phytochemistry

The root tubers of *C. comosum* have been chemically analyzed by atomic absorption spectroscopy. Calcium, potassium, sodium, zinc and iron content of tubers has been quantified. The nutritional value of tubers has been estimated to be between 281.4 to 303.9 kcal/ 100 g[4]. Three sapogenins have been identified in *C. comosum* tubers – gitogenin, hecogenin and tigogenin[5]. The saponins of *C. comosum* tubers include gitonin and desgalactotigonin. The phenolic content of the tubers has been estimated to be 1.36 %[6-8]. Apiose, glucose and galactose have been reported in the tubers in free as well as glycosylated form[9]. The important chemical constituents of the root tubers have been shown in Figure 2.

Pharmacology

The roots of *C. comosum* were tested against the four human cell lines:

1. HeLa (Human cervical adeno carcinoma)
2. CCRF-HSB-2 (Human T-cell leukemia)
3. HL-60 (Human promyelocytic leukemia)
4. U937 (Human monocyte tumor).

The butanol extract of the tubers was able to induce apoptosis in all four cell lines when analysed by terminal deoxynucleotidyl transferase mediated biotin dUTP-Nick End-Labelling method (TUNEL)[10].

Traditional uses

Roots are used for treating bronchitis, bone fractures and burns in Traditional Chinese Medicine[10].

CONCLUSION

Chlorophytum comosum (Thunb.) Jacques is a member of Liliaceae. It produces a number of steroidal compounds. There is a need to explore the hidden medicinal potential of this plant. It necessitates the detailed studies on phytochemistry and pharmacology of the plant.

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