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On Review – Brief Cryptostegia Grandiflora Linn Roxb

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ABSTRACT

Medicinal plants have been in use since 5000 years. Oldest known herbal is Pen- t'sao written by emperor Shen-Nung around 3000 years. It contains 365 drugs, one for each day of the year. Indians worked meticulously to examine and classify the herbs. Charaka made 50 groups of 10 herbs, each of which would suffice an ordinary physician's need. Cryptostegia grandiflora Linn Roxb. (Apocynaceae), commonly known as "Vilayti vakundi" is found all in dry area in India. The study includes preparation of different extracts by successive solvent extraction for detail analysis. Fluorescence analysis of different successive extract and powder were noted under UV light and normal ordinary light, which signifies there characteristics. Preliminary qualitative chemical test for different extracts showed presence of glycosides, flavonoids, fixed oil and fats, phenolic compounds, protein and amino acids, tannins, gum and mucilage and carbohydrates. Qualitative phytochemical analysis of methanol extracts of leaves of Cryptostegia grandiflora Linn Roxb showed the presence of cardiac and saponins glycosides, tannins, flavonoids, proteins.

Keywords: Cryptostegia grandiflora Linn Roxb, qualitative analysis, methanolic extract, flavonoids

I. INTRODUCTION

Cryptostegia grandiflora, commonly known as rubber vine, is a woody-perennial vine that is native to south-west Madagascar. It has also been introduced to most other tropical and subtropical regions by man, because of its attractive flowers and the fact that its latex contains commercial quality rubber (hence the name).1 It is very similar to the purple rubber vine (C. madagascariensis), which is also native to Madagascar..2 Nature always stands as golden mark to amplify the outstanding phenomenon of symbiosis.3 The Lord created medicines out of the earth and a wise man will not abhor them. Medicinal plants existing even before human being made their appearance on the earth. Men's existence on the earth has been made possible only because of the vital role played by the plant kingdom in sustaining life. It is therefore often said that wherever we are born we have around us useful herbs, shrubs and plants.4 Seeds germinate after the first rains of the wet season, but growth does not become rapid until well after the wet

season begins. However, if enough water is available, rubber vine can grow as much as five metres in one month. Flowering usually occurs after the wet season ends, along with fruit set. In the West Kimberley, plant growth accelerates before the first rains come, stimulated by higher pre-wet season humidity and flowering occurs early and during the wet season. It is usual to find both mature and immature fruit on rubber vine at any one time. Rubber vine seeds are dispersed by winds and flooding. This is particularly important in Australia where very large river floods can occur.[5]

Figure 1. ***Cryptostegia grandiflora*** **Roxb. ex R. Br**

Cryptostegia grandiflora is a stout, woody vine. Leaves are oblong-ovate to elliptic-ovate, 6 to 10 centimeters long, pointed at the tip, rounded at the base. Cymes are short. Sepals are green, about 8 millimeters long. Corolla is pale purple, about 4 centimeters long, and often wider than it is long. Woody follicles are 10 to 12 centimeters long.

Figure 2. Shubby bush & milky latex

Distribution

Recent introduction to the Philippines.

- Planted for ornamental purposes.
- Now, pantropic.
- Native of India.

-In some countries, it has escaped cultivation and has become invasive, capable of smothering trees and reducing biodiversity and degrading habitat. It can form dense, impenetrable thickets that can impede stock movements and access to water.[6]

Constituents

Phytochemical studies of flowers yielded two cardenolides, oleandrigenin and gitoxigenin, as well as, two flavonoid glycosides, hyperoside and astragalin, and their aglycones, quercetin and kaempferol.[7] Latex of fresh unripe fruits yielded b-amyrin, lupeol, a-amyrin, b-sitosterol and b-sitosterol–3-O-b-D-glucoside, in addition to a phenolic glucoside 2,4,6-trihydroxy benzophenone-2-O-b-D-glucopyranoside. Hexane and ethyl acetate extracts yielded a mixture of phytosterols and triterpenoids, lanosterol, B-sitosterol, stigmasterol, campesterol, friedelin, lupeol, ursolic acid, and B-amyrin. Oil fraction yields both saturated and unsaturated fatty acids, including palmitic acid (25.90%), linoleic acid (24.76%), arachidic acid (22.28%), myristic acid (15.24%), oleic acid (8.0%), stearic acid (3.8%), and traces of lauric acid. (see study below).[8] Preliminary phytochemical screening of various extracts yielded glycosides, flavonoids, fixed oils and fats, phenolic compounds, protein and amino acids, tannins, gum and mucilage and carbohydrates. Methanol extract of leaves yielded cardiac and saponin glycosides, tannins, flavonoids, proteins.[9]

Properties

a. Plant considered an irritant and poisonous.
b. Leaves have reported toxicity. (see study below)[10] In some countries, the plant has escaped cultivation and has become invasive, threatening biodiversity in some places. It is poisonous to stock, 10 gms of leaves can reportedly kill a 400 kg horse in six days. While unpalatable, animals eat it under drought conditions.[11]
c. The vine exudes a milky latex which can be made

into natural rubber. However, it is difficult to tap for commercial purposes.

d. Studies have suggested antimicrobial, antiviral, analgesic, molluscicidal, anti-inflammatory, antioxidative, proteolytic properties.

Parts used

Leaves, roots.

Uses

Folkloric

- No reported folkloric medicinal use in the Philippines.
- In Madagascar, reportedly used for criminal purposes and against vermin.
- Powdered leaves, mixed with water, when swallowed can cause persistent vomiting after half an hour; death in 15 hours.
- In Madhya Pradesh, India, root paste is applied externally on chest to cure asthma.[12] In Andhra Pradesh, whole plant applied to wounds.[13]
- In Nigeria, leaves and latex used for fungal and heart problems.[14]

Studies

Antiviral / HSV1:

Study screened 18 plants with ethnomedical background from different families for antiviral activity against Herpes simplex virus-1 (HSC-1). The extract of Cryptostegia grandiflora showed partial activity at higher concentrations, with CPE (cytopathic effect) ++ at 2 and 10 TCID50, + at 100 TCID50.

Cardiac glycosides:

Study of the leaves of C. grandiflora yielded four news cardiac glycosides: crptostigmin I to IV together with two known cardenolides.

Antibacterial:

Study of the different extracts of Cryptostegia grandiflora was done for antibacterial potential against Pseudomonas cepacia, B megatorium, S aureus, E coli B subtilis. Almost all extracts produced significant antibacterial activity against all the microorganisms, comparable to standard antibiotic tetracycline hydrochloride. The petroleum ether extract showed maximum efficacy.

Latex Pro-Inflammatory Activity:

Study investigating the pro-inflammatory activity of the latex of C grandifolia was investigated. Results showed the soluble proteins of the latx induced strong inflammatory activity, enlarged vascular permeability and increased myeloperoxidase activity locally in rats. It concludes that the latex of CG is a potent inflammatory fluid and implicates actifer proteins in that activity.

Antimicrobial:

Study isolated compound s from hexane and ethyl acetate extracts isolated a mixtures of phytosterols and triterpenoids. Lanosterol, a triterpenoid, was most active against E. coli and campesterol had greater activity against Candida albicans. [15]

Analgesic / Acute Toxicity Study / Leaves:

Study in mice evaluated the analgesic property of a methanol leaf extract of Cryptostegia grandiflora. The extract did not show any toxicity up to 5000 mg/kbw. All three test doses showed significant analgesic activity, although less than standard acetylsalicylic acid in the writhing test.

Molluscicidal / Latex:

Study of latex aqueous solution of C. grandiflora showed a significant increase of snail amoebocytes, a component of the internal defense system, decreasing its compatibility to Schistosoma mansoni. Results suggest Cg may be useful for snail control. [16]

Toxicity Manifesting as Hyerpkalemia, Heart Block and Thrombocytopenia:

Study reports a case of toxicity associated with consumption of extract of leaves of C. grandiflora which led to gastrointestinal, cardiac, electrolyte, and hematological disturbances. Serum potassium level

was 9 mmol/L. Indian rubber vine contains cardiac glycosides responsible for the digitalis-like toxicity on consumption of leaves.

Electrocardigraphic Toxicity: Cryptostegia grandiflora poisoning results in bradycardia. Cardiac glycosides inhibit cellular Na+/K+-ATPase which enhances cardiac inotropy (contractility) and slows down the heart rate.

Anti-Inflammatory / Leaves: Study evaluated the effect of total extract and primary fractions of CG leaves using in vivo and in vitro models of inflammation. Results showed anti-inflammatory activity contributed to by its antioxidant activity and inhibition of MPO (myeloperoxidase) activity, and PGE2 and NO production.

Anti-Oxidative and Proteolytic Activities: Study evaluated the proteolytic, chitinolytic and anti-oxidative activities of proteins extracted from three plants. C. grandiflora latices showed strong anti-oxidative activity of superoxide dismutase and strong proteolytic activity.

Potential Multi-Use Crop: Study evaluated C. grandiflora for its potential as a multi-use crop. The plant yielded 14.0% protein, 6.5% oil, 6.9 polyphenol, and 2.13% hydrocarbon. Gross heat value was 3878.0 cal/g, while the oil fraction was 7350.1 cal/g and the hydrocarbon fraction 9300 cal/g. Oil fraction yields both saturated and unsaturated fatty acids, including palmitic acid (25.90%), linoleic acid (24.76%), arachidic acid (22.28%), myristic acid (15.24%), oleic acid (8.0%), stearic acid (3.8%), and traces of lauric acid. The high proportion of saturated FA and high oil content (<5.0%) suggest a potential source for industrial raw material and alternative for conventional oil.

Anti-Proliferative / Antioxidant / Leaves: Study evaluated the antiproliferative and antioxidant activity of C. grandiflora leaves. Results showed antioxidant activity which may be attributed to the significant amount of catecholamine like phenol molecules in the leaves extract. The extract also showed anti-proliferative activity against colorectal adenocarcinoma (Caco-2) cell line at a concentration of CTC50 750 µg/mL (75.7%).

Schistosomicidal Activity: A study evaluated 346 methanol extracts from 281 Egyptian plant species for in vitro schistosomicidal activity. Forty-two were confirmed to have in vitro antischistosomal activity, and of these 14 plant species, including Cryptostegia grandiflora, showed high antischistosomal activity with LC50 ≤ 15 µg/ml.

Antitumor / Cytotoxic Cardenolides: Study of an alcoholic extract of above ground parts of C. grandiflora and fractionation yielded five cardenolides: oleandrigenin, 16-propionylgitoxigenin, a new natural product, 16-anhy drogitoxigenin, gitoxigenin, and rhodexin B. Results showed inhibitory activity against KB cell culture. Although all five cardenolides showed cytotoxic properties, only 1, 4, and 5, possibly 2, showed significant activity by CCNSC protocol.

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