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Bioprospection of some Medicinal Plants used in the Traditional System Ayurveda, for the Wonder Drug-Ecdysterone

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Abstract*: This work was a bioprospection study to assess the presence of the multipurpose drug Ecdysterone in some plants used in the traditional medicinal system Ayurveda. Fourteen plants namely, Vernonia cinerea, Azadirachta indica, Plectranthus amboinicus, Cardiospermum helicacabum, Ayyappana triplinervis, Phyllanthus amarus, Terminalia chebula, Andrographis paniculata, Coscinium fenestratum, Samadera indica, Justicia adhatoda, Centella asiatica, Mimusops elanji, and Rauvolfia serpentina were selected for the study and .screened for the presence of ecdysterone in their active parts. Presence of ecdysterone was confirmed in the seeds of Coscinium fenestratum for the first time ever.*
Keywords: Ecdysterone- Ayurveda-Medicinal Plants-Kerala.

I. INTRODUCTION

The study of natural products not only provides novel bioactive compounds, but also helps in the understanding of nature's way of tackling environmental problems. These processes, which may be called as the “Natural Technology”, might provide us with totally new means and agents for combating diseases, controlling pests or improving agricultural productivity[1]. Ecdysteroid (EC)s were first recognised as steroidal hormones, controlling the moulting and metamorphosis in insects. Today, it is realised that these steroids are present at all stages of insect development, regulating many biochemical and physiological processes: in newly-laid eggs, during embryonic and postembryonic developments and in adult insects, regulating aspects of development, metamorphosis, reproduction and diapause [2]. ECs are also present in 5–6% of plant species [3], generally at far higher concentrations than those typically found in arthropods. In plants they are regarded as contributing to the deterrence of the invertebrate predators [2].

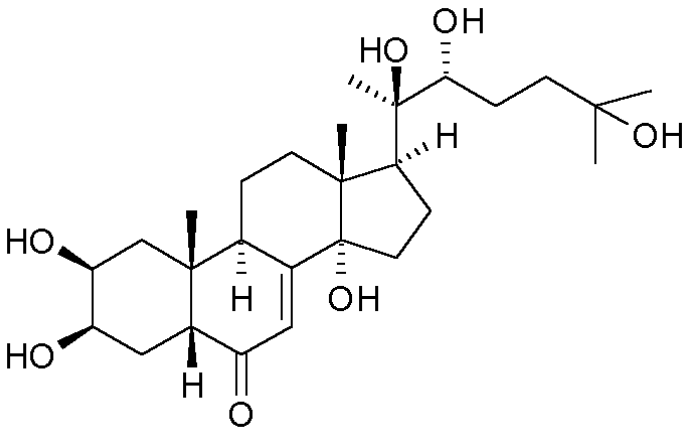


Figure1. Structure of EC.

ECs are apparently non-toxic to mammals and a wide range of beneficial pharmacological (adaptogenic, anabolic, anti-diabetic, hepatoprotective, immunoprotective, wound healing, and perhaps even anti-tumour) activities are claimed for them. In particular, this has led to a large (and unregulated) market for EC-containing preparations for body-builders, sportsmen, and pets, among others. ECs are also being considered as nutraceutical additives to food products. Further, ECs are good candidates as elicitors for gene-switch systems to be used in medical gene therapy and research applications [4]. Indeed the bountiful supply of ECs from plants will greatly stimulate the chemistry and biology of these arthropod hormones.

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II. MATERIAL AND METHODS

A. *Collection of Plants*

After detailed literature survey, fourteen plants were selected from Kerala flora for testing the presence of EC which are used extensively in Ayurveda system of medicine. Plant part such as leaf, stem, root *etc.*, were selected for screening, depending on the species.

B. *Bioprospection Protocol*

The collected plant part (fresh) was accurately weighed (10 g) and was cut into small pieces, and pounded into a medium sized paste in a blender. This was subjected to ultra sonication with 50 ml Methanol (MeOH) in a conical flask for 60 minutes and repeated once again. The extracts were collected and filtered. Solvent was removed under reduced pressure in a rotary evaporator. Thin Layer Chromatography (TLC) of the MeOH extract was done with standard EC on pre-coated silica plates (Merck). The solvent systems used were 7:3 Chloroform ($CHCl_3$): MeOH and 50:2:3:6 Ethyl acetate: MeOH: Formic acid: Water. The plate was developed using acidic Vanillin at 104^0 C in an oven for 2-3 min. The standard EC developed an olive green colour with acidic vanillin spray and was Ultra Violet light (UV) positive. Species which developed an olive green spot with the same resolution front (*Rf)* that of standard EC were considered positive for the presence of EC, and others were considered negative.

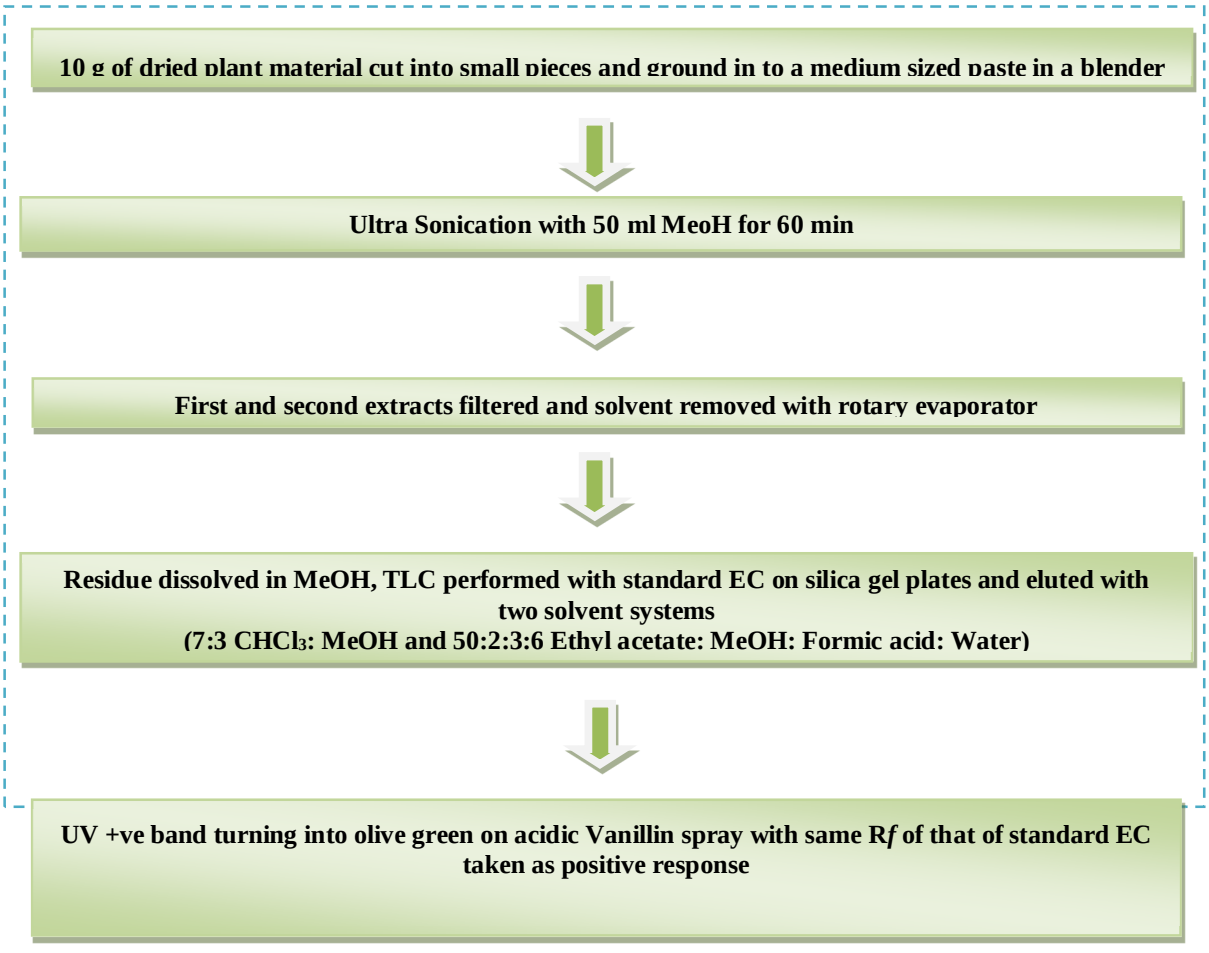


Figure 2. Bioprospection Protocol for EC.

III. RESULTS AND DISCUSSION

Among the 14 species studied, only one species- *Coscinium fenestratum was* identified as positive source for EC from the study area. The results showed that the ecdysterone was present in the seeds of the species belonging to the family Menispermaceae. This is a new report to science as EC has not been reported earlier from seeds which are usually discarded as a useless part except for propagation.

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Table 1. List of plants used in Ayurveda screened from Kerala flora for the presence of Ecdysteroids

Sl no.	Name of the species.	Family	Early reports from (www.ecdybase.org) (+=EC positive,-=EC negative; name of author; year of publication) EC=Ecdysteroid	Part used L=leaf; St=stem, Sh=shoot, B=bark, Rh=Rhizome, I=Inflorescence, F=Fruit, R=Root, S=Seed	EC +=present -=absent
1.	Azadirachta indica A. Juss.	Meliaceae	No early report	L	-
2.	Plectranthus amboinicus (Lour) Spreng.	Lamiaceae	No early report	L	-
3.	Cardiospermum helicacabum L.	Sapindaceae	No early report	L+St+F+R	-
4.	Ayyapana triplinervius (Vahl) King & Rob	Asteraceae	No early report	L+St	-
5.	Phyllanthus amarus Schum.&Thonn.	Phyllanthaceae	No early report	L+St	-
6.	Terminalia chebula Retz.	Combretaceae	No early report	S	-
7.	Andrographis paniculata (Burm.F.)Wall.	Acanthaceae	No early report	L+St	-
8.	Coscinium fenestratum (Gaertn.) Colebr.	Menispermaceae	Sreejit et.al, 2015	S	+
9.	Samadera indica Gaertn.	Simaroubaceae	No early report	B	-
10.	Vernonia cinerea (L.) Cess.	Asteraceae	No early report	L+St	-
11.	Justicia adhatoda L.	Acanthaceae	No early report	L	-
12.	Centella asiatica (L.) Urban	Umbelliferae	No early reports	L+St+R	-
13.	Mimusops elanji Bakula.	Sapotaceae	No early reports	B	-
14.	Rauvolfia serpentina (L.)Benth.	Apocyanaceae	No early reports	L+I	-

Coscinium fenestratum is known to have the active compound berberine in its bark which has been considered as the major active ingredient for its biological activities reported. The presence of ecdysterone has been reported from stem [5] recently, but never has it been reported from seeds. This finding will have significant importance in conserving the species, as seeds are put to value addition. Isolation and chemical characterization of ecdysterone from this new source will be done as future work.

Large amount of ecdysterone isolated will stimulate activity level study of the same. Similar studies may be possible in future once EC is available in plenty inside the country. A massive screening study should be initiated in future for identifying more indigenous potential sources for ecdysterone.

Though the results were negative for most species, the information could be added to the database www.ecdybase.com as new negative reports and duplication can be avoided while exploring the area in future for the same purpose.

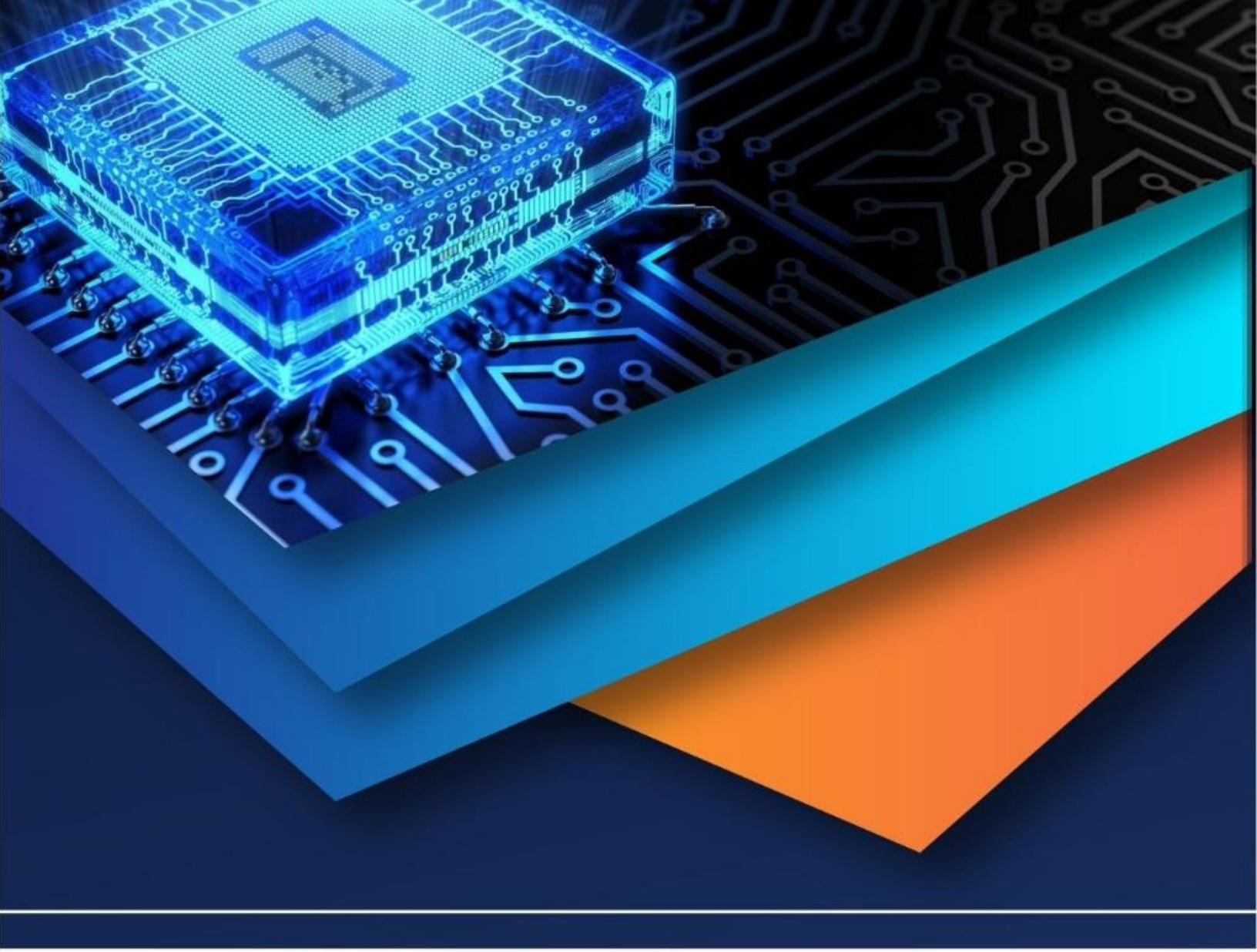
IV. ACKNOWLEDGMENT

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