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GCMS Studies of Mimosa pudica

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Abstract: Although about 8000 species of plants[1]are estimated to be used in human and animal health care and over 10,000 herbal drug formulations have been recorded in codified medical texts of Ayurveda, the pharmaceutical industries are largely based on about 400 plant species.

Though accurate and updated data on the requirement of total quantity and quality of crude drug is not available, conservative estimates put the economic value of medicinal plant related trade in India to the order of Rs.1000 crores / year [2]and the world trade over U.S. $ 60 billion.

The only male specific contraceptive methods currently available are withdrawal, condoms and vasectomy. As concerns regarding side effects and convenience of these existing methods prevent their universal acceptance [3-4]**.** The epididymis plays an important role in sperm development and sperm maturation is dependent on the unique luminal environment of the epididymis including specific proteins synthesized and secreted by the epididymal epithelium[5-6]. The research in to the efficacy of herbs used in traditional veterinary practice would be useful in establishing standard dosages for herbal preparations and to investigate their toxicity[7]**.**The studies on the male antifertility effects of various medicinal plants have aroused much interest [8-11].

Key words: Traditional medicine, Mimosa pudica, contraceptive methods, epididymis.

INTRODUCTION

In spite of substantial advances that have been made in synthetic organic chemistry plant products still remain on integral part of modern therapeutics. Even at the present time, substances derived from plants constitute approximately 25 percent of prescribed medicines[12]**.**

The use of the medicinal herbs for curing diseases has been documented in history of all civilizations. With the onset of research, it was concluded that plants contain active principals, which are responsible for active action of the herbs. It is believed that natural products utilized in the correct form and dosages are less harmful than synthetic products, which most often elicit some an amphylactic response on reaction[13]**.**

Mimosa pudica Linn.

Sensitive plant

Title, vernacular names, flowering and fruiting, ecology

Title

Mimosa pudica Linn.

Vernacular names

Hindi- Lajwanti / Chui-mui, **Beng.**- Lajjabati, **Mar**.- Lajalu, **Tel**.- Attapatti / Peddanidkanni, **Tam.**- Tottalvadi / Thottal-chinungi, **Kan**.-Lajja / Nachike / Mudugu- davare, **Mal.**-Tintarmani, **Oriya**-Lajkuri,

Assam- Nilajban /Adoriban, **Khasi**- Kambatsam-thia / Sunteshuh, **Mundari**- Durum-janum.

Flowering and Fruiting
Maximum part of the year.

Ecology
The plant is a native of tropical America, naturalized nearly all through the tropical and sub- tropical parts of India**.**

Classification
Kingdom – Plantae
Subkingdom – Tracheobionta
Division – Magnoliophyta
Class – Magnoliopsida
Subclass – Rosidae
Order – Fabales
Family – Fabaceae
Subfamily – Mimosoideae
Genus –Mimosa
Species – *Mimosa pudica*

Plant identification characters
1. Mimosa pudica is a diffuse undershrub, 50-90 cm. high.
2. The stem and rachis are clothed with prickles.
3. The leaves are bipinnate, pinnae 2-4, digitatively arranged, with 10-20 pairs of leaflets.
4. The flowers in pinkish globose heads.
5. The pods, small, flat, straw-coloured, with many bristles.
6. The seeds, 3-5.

Drug collection
The plants were collected in flowering stages.

Authentication
The plant included in the research work was authenticated from Botanical survey of India, Pune. The certificate of authentification is attached.

Ethnomedicinal uses
1. The plant possess anti-microbial, anti-convulsant, hyperglycemic, anti-oxidant, anti-venom, diuretic, anti-cancer, antidiabetic, anti-fertility and anti-histaminic activity.
2. The leaves extract showed presence of various constituents like alkaloids, glycosides, flavonoids and carbohydrates [14]**.**
3. Decoction of leaves is given orally in urinary complaints.
4. Juice of Mimosa-pudica leaves used in sinus, sores, piles and fistula: paste applied to glandular swellings and hydrocele.
5. The root is bitter and acrid: cooling, Vulnerary, alexipharmic; cures kapha, biliousness, leprosy, dysentery, vaginal and uterine complaints, inflammations, burning sensation, fatigue, asthma, leucoderma, and diseases of the blood**.**
6. A decoction of the root of the plant is considered useful in gravel and other urinary complaints.
7. A paste of the leaves is applied to glandular swellings; the juice of the leaves is used in dressings for sinus and also as an application for sores and piles[15]**.**
8. The whole plant is crushed and used against itching; it also relieves scabies patches. A decoction of the root is taken to relieve asthma and diarrhea[16-18]**.**
9. It has been observed that in rats with experimental injury of the sciatic nerve, the process of regeneration of the nerve was 30-40 per cent higher in rats treated with *M.pudica* extract, as compared to hydrocortisone treated group. The extract was given parenterally (1.6mg/100g) every 4th day up to 120 days [19]**.**

Chemical composition
M.pudica contains a toxic alkaloid, mimosine identical with leucenine from *Leucaena glauca* (q.v.). The leaves, stems and roots give positive tests for alkaloids, but the total quantity present is small. An adrenaline-like substance has been identified in the extracts of leaves; a perfusion of mimosa ground in Ringer`s solution showed adrenaline action on isolated frog heart. Crocetin dimethyl ester is present in the plant. The roots contain tannin (c. 10%) [20].The seeds of the plant contain mucilage composed of d -xylose and d -glucuronic acid. They yield 17% of greenish yellow fatty oil [21, 22].

The plant contains tubulin which shows the ability to bind colchicine with its sulfhydryl groups. A new class of phytohormones-turgorines are active in the plant. These periodic leaf movement factors are derivatives of 4-O-(ß-D- glucopyranosyl- 6-sulphate) gallic acid [23].

Herbal drugs have been used as medicines for treatment of for a range of diseases since ancient time. Inspite of great advances observed in modern medicine in recent decades, plants still make an important contribution to health care[24]**.**

The objective of the present work was to investigate the spermiostatic effect of the oil extract of the seeds of all three plants is an attempt to establish the traditional use. There are some active components

are present in these three herbal drugs, due to which these plants shows the spermiostatic property.

METHOD

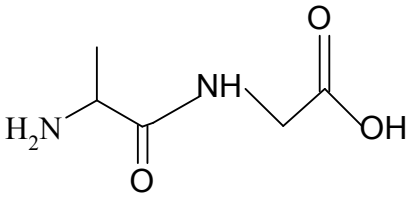
Gas Chromatography Mass Spectrometry Analysis
Gas Chromatography electron ionization mass spectrometry (GC-MS) was performed on Shimadzu QP 2010 system.GC parameters were as follows: initial temperature was set at 50ºC, temperature ramp was 15ºC/Min to 250ºC (25 min hold) inlet was split (1:40 ml / min).Separation was carried out using R_{xi}^{TM}-5 $_{ms}$ capillary column (30 meter, 0.25mm ID, 0.25µm df) with helium as a carrier gas. Spectra were obtained over m/z 100-800. Oil extract was injected. System Control and data evaluation was done on the Lab solutions software package.
Esterification of oil extract is done with the help of methanol and potassium hydroxide for the GCMS analysis.

RESULT AND DISCUSSIONS

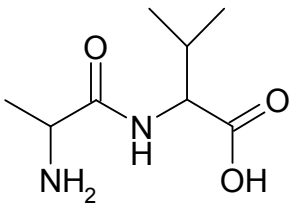
***Mimosa pudica*-**

In the GCMS of oil extract of *Mimosa pudica*, we got 35 peaks.
According to general group category, some of the amino acids which are present in the GCMS chromatogram of oil extract of Mimosa pudica are on following mass peaks with their molecular structures-

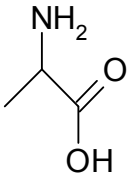
Amino acids and derivatives of amino acids-
Mass peak-17,Compound name-**N-dl-Alanylglycine**, ($C_5H_{10}N_2O_3$).



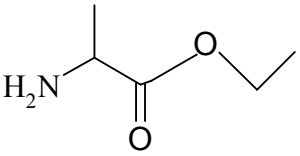
Mass peak-10, Compound name - **dl-Alanyl-dl-Valine**, ($C_8H_{16}N_2O_3$)



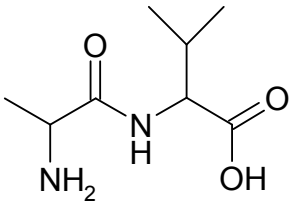
Mass peak-10, Compound name-**d-Alanin,** ($C_3H_7NO_2$)



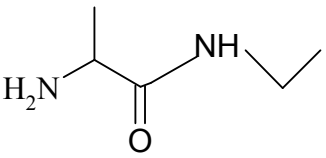
Mass peak-7, Compound name-**dl-Alanin ethyl ester**, ($C_5H_{11}NO_2$)



This is the ethyl ester derivative of amino acid alanin.
Mass peak-7, Compound name- **dl-Alanyl-dl-Valine**, ($C_8H_{16}N_2O_3$)

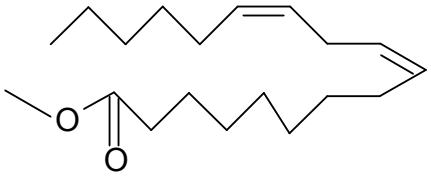


On mass peak 8, same type of compound is present as above.
On mass peak 9, **1-Alanine ethyl amide** ($C_5H_{12}N_2O$) is present. Same type of compound is present on mass peak 6 also.

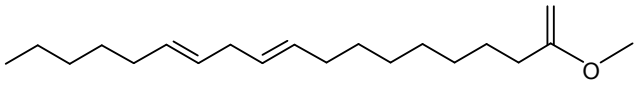


In this way two same types of groups are found as a derivative of amino acids on the mass peaks 6 and 9.So these all groups are found as an Amino acid or derivative of amino acid in the chromatogram of oil extract of *Mimosa pudica*.

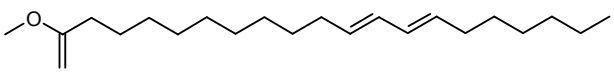
Derivatives of fatty acid-
Three different type of derivative of fatty acids are also present in this chromatogram.
On mass peak 31, **9, 12-Octadecadienoic acid (Z, Z), methyl ester**, ($C_{19}H_{34}O_2$)



Compound name - **9, 12-Octadecadienoic acid, methyl ester**, (C_{19}H34O2)



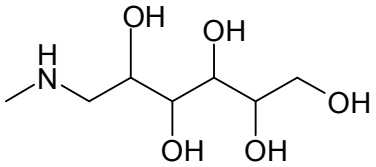
Compound name-**11, 13-Eicosadienoic acid, methyl ester** ($C_{21}H_{38}O_2$).



Carbohydrates-

Same type of derivatives of carbohydrates is also present in the chromatogram of oil extract of *Mimosa pudica* on mass peak 10 and 7.

Compound name-**Meglumine,** ($C_7H_{17}NO_5$)

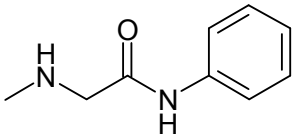


In this way different type of compounds having different constituents are also present in this chromatogram like-Heterocyclic compound, amine, acetamide etc.

According to the similarity with **nonoxynol-9**, **octoxynol-9, sodium docusate, chlorhexidine, menfegol, benzalkonium chlorides, Propranolol, chlorpromazine, phenoxybenzamin** - in this chromatogram primary alcohol ,secondary alcohol,nitrogen,sulphar,chlorine,amino,carbonyl,ether etc. are present.

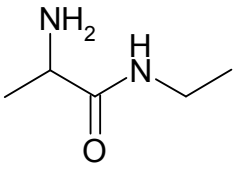
On the mass peak 5,

Compound- 2-methylamino-N- phenyl-acetamide, ($C_9H_{12}N_2O$)

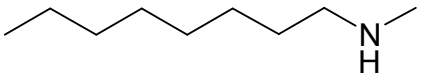


On the mass peak 6,

Compound- 1-Alanine ethylamide, ($C_5H_{12}N_2O$)

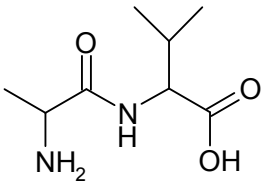


Compound- 1-Octanamine, N-methyl, ($C_9H_{21}N$)

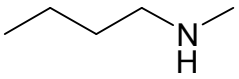


On the mass peak 7,

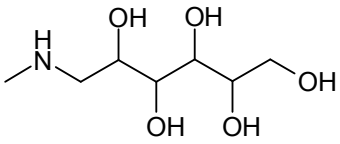
Compound – dl-Alanyl-dl-Valine, ($C_8H_{16}N_2O_3$)



Compound – 1-Butanamine, N-methyl, (C_5H_9)

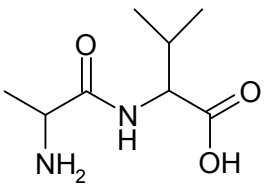


Compound- Meglumine, ($C_7H_{17}NO_5$)



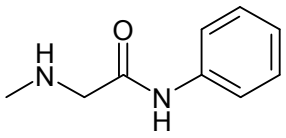
On the mass peak 8,

Compound- dl-Alanyl-dl-Valine, ($C_8H_{16}N_2O_3$)

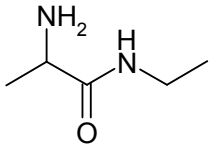


On the mass peak 9,

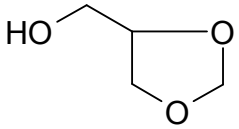
Compound – 2-methylamino-n-phenyl acetamide, ($C_5H_{12}N_2O$)



Compound – 1-Alanine ethylamide (S), ($C_{15}H_{12}N_2$)

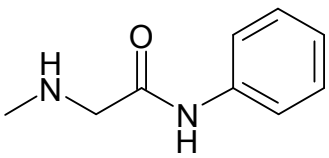


On the mass peak 10,

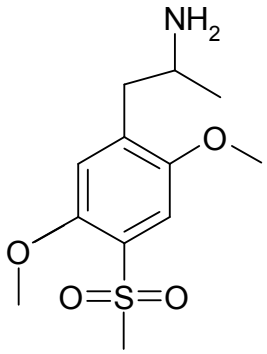


Compound - 1, 3-Dioxolane-4-methanol, ($C_4H_8O_3$)

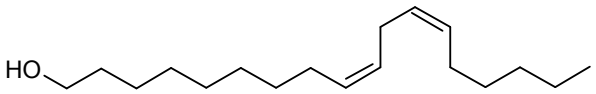
On the mass peak 12,
Compound-2-Methylamino-N-phenyl-acetamide, ($C_9H_{12}N_2O$)



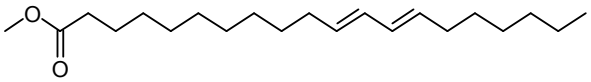
Compound- 2, 5-Dimethoxy-4-(methylsulphonyl) amphetamines, ($C_{12}H_{19}NO_4S$)



On the mass peak - 31,
Compound - 9.12-Octadecadien-1-ol (Z, Z), ($C_{18}H_{34}O$)



Compound- 11, 13-Eicosadienoic acid, methyl ester, ($C_{21}H_{38}O_2$)



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