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MUSA SAPIENTUM: AN APPROACHES TO PHARMACOGNOSTICAL, PHYSICOCHEMICAL AND PHYTOCHEMICAL STUDY OF IT'S ETHANOLIC EXTRACT OF FLOWER

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ABSTRACT

Background: Medicinal plants have much creative property due to the presence of many complex chemical substances with different chemical composition which are found as secondary plant metabolites in many parts of these plants. So one of the important medicinal plants shows many pharmacologically as well as therapeutically effective for the different purposes for the human beings. **Aim:** The aim of the study is to investigate pharmacognostical, Physico-chemical and Phytochemical screening of the ethanolic extract of *Musa Sapientum* flower and the presence of different secondary metabolites responsible for the therapeutic values of the drug like presence of alkaloids, glycosides, carbohydrate, tannins – phenolic compounds, proteins, amino acids, gums, mucilage, flavours, flavonoids, saponins, steroids & sterols etc. **Result and Conclusion:** The results finding showed the total ash 9.2%, water-soluble ash 6.4%, acid insoluble ash 2.7%, Moisture content of flower showed 11.5%. And extractive value result was found higher in water in comparison with pet ether, ethyl acetate and ethanol. The Fluorescence characteristic of powdered flower produce different colors with different reagents in visible and UV light. Qualitative phytochemical study of *Musa sapientum* flower was identify the presence of different constituents like carbohydrates, glycosides, saponins, tannins, phenolic, flavonoids, steroids, proteins and amino acids, triterpenoids, fixed oils and fats but found to be absence of alkaloids, gum, mucilage and lignins.

KEYWORD: *Musa Sapientum*, Traditional use Pharmacognostical, Physicochemical, phytochemical screening, Fluorescence analysis.

INTRODUCTION

Herbal medicine sometimes referred to as Herbalism or Botanical medicine [1], is the use of herbs for their therapeutic or medicinal value. Herb is a plant or plant part valued for its medicinal, aromatic or savory qualities. Plants produce and contain a variety of chemical substances that act upon the body. Herbalists use the leaves, flowers, stems, berries, and roots of plants to prevent, relieve, and treat illness. From a "scientific" perspective, many herbal treatments are considered experimental. Today, science has isolated the medicinal properties of a large number of botanicals, and their healing components have been extracted and analyzed. Many plant components are now synthesized in large laboratories for use in pharmaceutical preparations. With this the plant *Musa sapientum* was selected on the basis of ethno-botanical information, which reveals its uses against many diseases.

Plant Profile

Musa sapientum is a treelike perennial herbaceous, monoecious plant[2-3] (Figure-1) and up to 5-9 m height with a robust treelike pseudo- stem, a crown of large elongated oval deep-green leaves (up to 365 cm in length and 61 cm in width) with a prominent midrib, with tuberous rhizome, each plant produces a single inflorescence(big with a reddish brown bract ,is eaten as vegetables and has male flowers at the tip (Figure-2), several sterile flowers, and female flowers behind) like drooping spike, and large bracts opening in succession, ovate, 15-20 cm long, concave, dark red in colour and somewhat fleshy. Fruits are oblong, fleshy, 5-7cm long in wild form and longer in the cultivated varieties. The ripe fruits are sweet, juicy and full of seeds and the peel is thicker.

Figure 1: Different parts of the plant *M.sapientum*.

For wild bananas, birds usually pollinate the female flowers, but pollination is unnecessary for fruit set of the cultivated forms, which form sterile fruits automatically without the presence of pollen. This type of fruit development is called parthenocarpy. The ovules that were present in the ovary abort their development, and the pulp subsequently is produced by the enlargement of the internal tissues of the ovary, particularly from the inner face of the skin and the enlargement of the septa and central axis. These cell divisions are stimulated by the presence of high levels of auxin in those tissues, which are not present if the ovules are fertilized. Wild bananas have fairly dry fruits with large seeds and no pulp. Flowers racemes erect patent or drooping, female buds well developed or absent, spike soon decurved, finally drooping, 90cm or more long with very large ovate, flower red or dull purplish colour, more or less pruinose bracts lower bracts with numerous 2-steriate female or hermaphrodite greenish, yellowish flowers about 3.8cm, long about these bracts contain male flowers. Only or the terminal ones empty different seasons. The different macroscopically characters of *Musa sapientum* Linn. The flowers are red or dull purplish in colour. it's odour is slightly aromatic, Taste is astringent, The size of the flower are long .It's shape is oval to conical and it's texture is smooth in nature.

***Taxonomical classification*[3]**

The taxonomical classification of *Musa sapientum* Linn as kingdom is plantae, Phylum is angiosperms, Class is monocotyledons, Subclass is zingiberid, Order is zingiberales, Family is musaceae, Genus is Musa L banana and Species is *Musa sapientum* Linn.

Phytochemicals[4-5]

Musa Sapientum contain carbohydrates, Catecholamines such as norepinephrine, serotonin, dopamine, tryptophan, indole compounds. It also contain pectin in the pulp. Several flavonoids and related compounds like Leucocyanidin, quercetin and its 3-O- galactoside, 3-O-glucoside, and 3-O-rhamnosyl glucoside, Serotonin, nor-epinephrine, tryptophan, indole compounds, tannin, starch, iron, crystallisable and non-crystallisable sugars, vitamin C, B-vitamins, albuminoids, fats, mineral salts have been found in the fruit pulp of *Musa Sapientum*. Acyl steryl glycosides such as sitoindoside-I, sitoindoside-II, sitoindoside-III, sitoindoside-IV. Several triterpenes such as cyclomusalenol, cyclomusalenone, 24-methylenecycloartanol, stigmast-7-methylenecycloartanol, stigmast -7-en-3-ol, lanosterol and amyrin are also present. Many antihypertensive active drug as 7, 8-dihydroxy-3-methylisochroman-4-one, was also present in the fruit peel of *Musa Sapientum*. Cycloartane

triterpenes such as 3-epicycloeucalenol, 3-epicyclomusalenol, 24- methylenepollinastanone, 28-norcyclomusalenone, 24-oxo-29- norcycloartanone also present in the fruit peel of *Musa Sapientum* . Many cellulose, hemicelluloses, arginine, aspartic acid, glutamic acid, leucine, valine, phenylalanine and threonine also present in the pulp of *Musa Sapientum.* The plants also contain different chemical components as 5-hydroxytryptamine which is used to treat many allergenic, antiparkinsonian, hypertensive, antidepressant, ulcerogenic. It contains acetic-acid which is used as antibacterial, ulcerogenic. Alanine. It's fruit can be used as Antioxidant, Anticancer purposes. It's flower contain calcium which can be used as antiallergic, antiarrhythmic. It's inflorescence contain cyanidin which can be used as used as allelochemic, it's flower can be used as angiotensin-receptor blocker.

The traditional uses of banana[1,2]

The banana can be used in the treatment of anaemia. Bananas can stimulate the production of haemoglobin in the blood. It can be used to treat blood pressure. It also develop brain Power. It can overcome from constipation. It also useful to overcome from depression. This banana also give quickest ways of curing a hangover is to make a banana milkshake, sweetened with honey. Banana is also used as an antacid and gives a relief from severe heart-burn. Bananas help to keep blood sugar levels up to avoid morning sickness. This banana is also useful for reducing swelling and irritation by rubbing the affected area. Bananas are high content of vitamin B that helps calm the nervous system. This banana also reduces the stress .By eating a banana it can cut the risk of death by strokes by as much as 40 per cent. The banana is used as the dietary food against intestinal disorders. The Juice of the flowers mixed with curds is administered in dysmenorrhoea. The banana flower is good source of vitamin A and vitamin C, Ca, iron, which make strong bones and teeth, and iron make blood healthy. The root and stem- tonic antiscor useful in blood and venereal diseases

In addition to this this plant is *Musa sapientum* is also traditionally used in diarrhoea (unripe),[4] dysentery, intestinal lesions in ulcerative colitis, diabetes (unripe), in sprue, uremia, nephritis, gout, hypertension, cardiac disease. *Musa spaientum* is also used in the treatment of excess menstruation. Banana leaves (ashes) are used in eczema. Flowers are used in dysentery. Stem juice of fruited plant is used for treating diarrhoea, dysentery, cholera, otalgia, haemoptysis and flower is used in dysentery, diabetes and menorrhagia. The root is used as anthelmintic, blood disorders, venereal diseases. The plant is also used in inflammation, pain and snakebite.

MATERIALS AND METHODS

The following drugs and chemicals were used for the different experimental study. The Mayer's, Hager's, Barfoed's, Benedict's and millon's reagent were purchased from S.D. Fine Chemical, Mumbai. The solvents petroleum ether, Chloroform was purchased from Hi Media Laboratories Pvt. Ltd., Mumbai. Methanol and Petroleum ether was purchased from Qualigens chemicals. Mumbai. And all others chemicals, solvents and reagents were of analytical grade and procured from authorized dealer.

Plants collection, Identification and processing

The plant was collected from adjoining area of Barpali (Dist-Bargarh, Odissa) in the month of April-2018. And a Special Care was taken to obtain the best condition of the banana flower. The plant was identified by Botanist Prof. (Dr.) Santosh Kumar Dash, Retired Professor and H.O.D., P.G Dept. of Biosciences, C.P.S, Mohuda, Berhampur, Ganjam, Odisha. Vide letter no BRPL/02/2018 on dated 18-04-2018. The flowers (Figure-2) were washed properly with water to remove the mud or dust if any; initially it was dried in sunlight for an hour and shade dried completely. Also all the foreign matters like dead or destructed part were removed precautionary. The dried flower was cut into chips and powdered by means of wood grinder and was sieved through sieve no. 18 to get the coarse powder, which was used for further detailed like powder microscopy, physico-chemical studies and extraction.

Macro and microscopical Studies

The plants parts were subjected for macroscopic study. The leaves, stem, flower, root Transverse Section were processed with glycerine and saffranine for better visualisation and it was observed under compound microscope (Olympus 100MB, Universal Pvt. Ltd., Mumbai) at magnification of 100 X under day light.

PHARMACOGNOSTIC-AL STUDIES

Macroscopical investigation[8-10]

Flowers racemes erect patent or drooping, female buds well developed or absent, spike soon decurved, finally drooping, 90cm or more long with very large ovate, flower red or dull purplish colour, more or less pruinose bracts lower bracts with numerous 2-steriate female or hermaphrodite greenish, yellowish flowers about 3.8cm, long about these bracts contain male flowers. Only or the terminal ones empty different seasons.

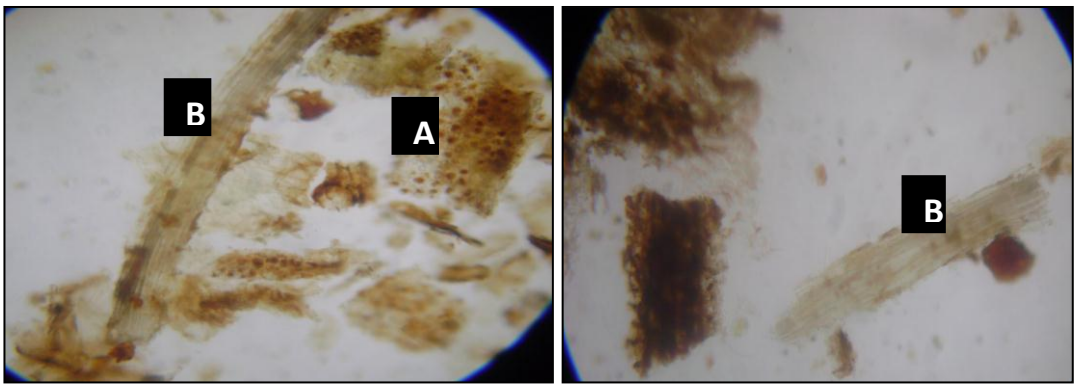
The macroscopical characters of *Musa sapientum* Linn. flower:

Colour	:	Red or dull purplish colour
Odour	:	Slightly Aromatic
Taste	:	Astringent
Size	:	90cm or more long
Shape	:	Oval to conical
Texture	:	Smooth

Figure 2: Flower of *M. sapientum.*

Microscopical investigation

This study allows more detailed examination of a drug and it can be used to identify the organized drug by their known histological characters. It is mostly used for qualitative evaluation of organized crude drug in entire and powder form. Microscopic evaluation also covers study of the constituents by application of chemical methods to small quantities of drug in powdered form or to histological section of the drug is called Microchemistry or Chemo-microscopy.



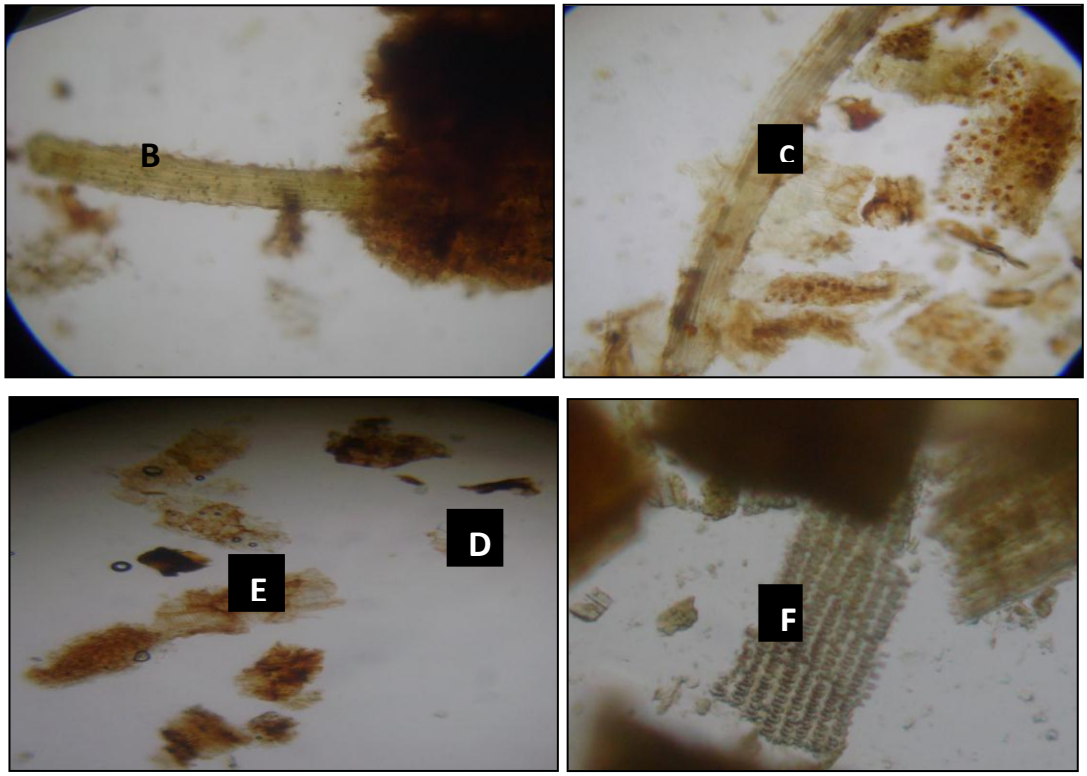


Figure 3: Powder microscopy of M. sapientum flower. A: Calcium Oxalate crystals, B: Fibre, C: Trichomes, D: Epidermis, E: Wood elements, F: Xylem Vessels or anther (fibrous layer of anther).

PHYSIOCHEMICAL EVALUATION[11-12]

Ash Values

Ash values (Table-1) are helpful in determining the qualities and purities of a crude drug. Washing is done to remove all traces of organic matter from the vegetable drugs which otherwise interfere in analytical determination on incineration, crude drug normally leave an ash usually contain carbonates, phosphate and silicate of potassium, sodium, calcium and magnesium.

Table 1: Ash value for flower.

S. No.	Type of Ash	Plant part (Flower)
I.	Total ash	9.2%
II.	Water soluble ash	6.4%
III.	Acid insoluble ash	2.7%

Moisture Content (Loss on Drying): This procedure is used for determination of amount of volatile matter (i.e. water drying off from the drug). (Table -2).

Table 2: Moisture content of flower.

Sl. No.	Parameter	Flower
I.	Moisture content	11.5%

Table 3: Extractive Value of flower.

S. No.	Type of Extractive value	Flower		
I.	Water Soluble	9%		
II.	Alcohol Soluble	4.2% (pet ether)	4% (ethyl acetate)	8% (Ethanol)

Fluorescence characteristics of Powder drug & Extracts

Fluorescence characteristic of powdered flower and of all extracts was determined by adding different reagents. The observation of colour reaction in visible and UV light was given below.

Table 4: Fluorescence Characteristics of banana flower.

Flower + Reagent	Day Light	Short Wave Length	Long Wave Length
UNTRETED POWDER	Light white	Light black	Black
Dist. water	Brownish black	Greenish	Black
HCl	Light brown	Greenish black	Black
HNO_3	Yellowish brown	Greenish brown	Black
H_2SO_4	Yellow brown	Green black	Black
CH_3OH	Pinkish blue	Yellow brown	Black
NaOH	Yellow brown	Yellow brown	Black
$NaOH+CH_3OH$	Yellowish blue	Slightly yellow brown	Black

Table 5: Fluorescence Characteristics of different flower extract.

Sl. No.	Types of Extract	Day Light	UV Light Short	UV Light Long
1	Pet. Ether Extract(60– 80ºC)	Light Brown	Light Green	Dark Green
2	Chloroform Extract	Light yellow	Yellowish Green	Green
3	Ethyl acetate Extract	Deep Brown	Green	Deep Green
4	Methanolic Extract	Brown	Green	Deep Brown
5	Alcoholic Extract(Hot Process)	Deep Brown	Green	Brown to Black

Extraction of Flower

The Musa sapientum flower was subjected for extraction with ethanol to perform chromatographical and pharmacological studied.

Ethanol Extract

The shade dried course powder of flower (300gm) was packed well in soxhlet apparatus and was subjected to continuous hot extraction with 90% ethanol for 18 hours. The extract was filtered while hot and the resultant extract was distilled in vacuum under reduced pressure in order to remove the solvent completely. It was dried and kept in a desiccators till

experimentation. Obtained extract was weighed and % yield was calculated in terms of air-dried powdered crude material.

Table 6: Percentage yield of flower of *Musa sapientum* Linn.

Sl. No.	Extracts	Yield (gms.)	% Yield (W/W)
1.	Ethanolic Extract	16	5.3%

QUALITATIVE CHEMICAL EXAMINATION

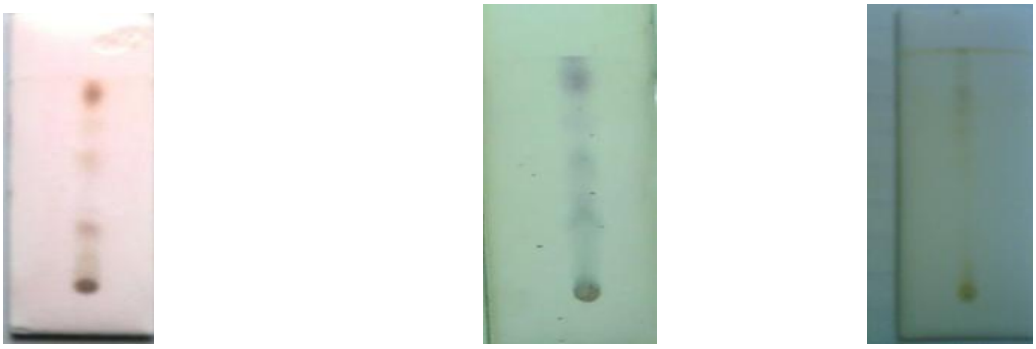
The preliminary phytochemical screening [13-15] of flower extract was carried out as per the method. These extracts were subjected to qualitative test for the identification of various plant constituents.

Table 7: Qualitative Phytochemical result of flower of *M. sapientum*.

Plant constituents	Ethanolic extract
Alkaloids	-
Carbohydrates	+
Glycosides	+
Saponins	+
Tannins and Phenolic Compounds	+
Flavonoids	+
Steroids	+
Proteins and Amino acids	+
Triterpenoids	+
Fixed Oils and Fats	+
Gums and Mucilage	-
Lignins	-

Thin Layer Chromatography[16]

Chromatography is essentially a group of techniques for the separation of the compounds of mixtures by their continuous distribution between two phases, one of which is moving past the other. The main principle of the separation may be either partition or adsorption. The aqueous, hexane and ethanolic extracts of various individual plants and its formulation were subjected to Thin Layer Chromatographic studies for the separation and identification of their components. This layer chromatography is an important analytical tool in the separation, identification and estimation of different components. When a mixture of components is spotted on a TLC plates, the compounds which are readily soluble but not strongly adsorbed moves up along with the solvent and those not so soluble but more strongly adsorbed move up less readily leading to separation of compounds.



Ethyl acetate: Water **Ethylacetate: Methanol: Water** **Methanol: Water**

Fig 4: TLC of ethanolic extract Of *Musa sapientum* flower.

By trail and error method, ethanolic, extracts showed isolation and resolution of spots with following solvent systems:

1- Ethyl acetate : H_2O (5:5)

2- Methanol : H_2O (6:4)

3- Ethyl acetate: Methanol : H_2O (4:2:4)

The different spots developed in each solvent system were identified under iodine chamber and visible light and the Rf value are correspondingly calculated and tabulated on table no.

Table 8: Results of Chromatographic Analysis.

Solvent system	Sample	Detecting agent	Visualization	Number of spot	R.F Value
Ethyle acetate: water (5:5)	Ethanolic extract	Iodine	Visible light	Five	0.081,0.180,0.324, 0.409, 0.819
Methanol: Water (6:4)	Ethanolic extract	Iodine	Visible light	Four	0.066,0.266,0.416,0.833
Ethyle acetate: methanol: water (4:2:4)	Ethanolic extract	Iodine	Visible light	five	0.071,0.089,0.107,0.142, 0.196,

RESULTS AND DISCUSSIONS

Ash value results were given in (Table-1). The finding showed total ash 9.2%, water-soluble ash 6.4%, acid insoluble ash 2.7%. Moisture content (Table-2) of flower showed 11.5%. And extractive value result was found higher in water in comparison with pet ether, ethyl acetate and ethanol. The Physical constant finding showed flower have some earthy matter because of acid insoluble ash was found 2.7%. Extractive values (Table-3) showed equivalent in water and ethanol, however, pet ether and ethyl acetate showed just half of this extractive

value. These data showed presence of polar constituent like carbohydrate, glycosides, flavonoids etc. The fluorescence Characteristics (Table-5) of flower extract produces different colors under day light and short and long wave length. It produces only black under long wave length. The Percentage yield (Table-6) of flower of *Musa sapientum* of ethanolic extract was 5.3%. The phytochemical (Table-7) of *Musa sapientum* flower was studied by using different reagent for identification of different constituents like Carbohydrates, Glycosides, Saponins, Tannins ,Phenolic, Flavonoids , Steroids, Proteins and Amino acids, Triterpenoids, Fixed Oils and Fats,. Finding showed the absence of Alkaloids, Gum and Mucilage and lignins out of all tested phytoconstituents. Thin layer chromatography (Table-8) fingerprint was analyzed by heat and trial method, the spot was occurred in the combination of Ethyl acetate: Water (5:5), Methanol: Water (6:4) and Ethyl acetate: Methanol: Water (4:2:4). All the spot was found visible in Iodine chamber.

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