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Physiochemical analysis of leaves of *Datura stramonium* & stem of *Musa paradisiaca* plants

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Abstract
Medicinal plants are used as raw materials in herbalism, contemporary medication production, and other medical commodities. Modern pharmaceuticals and treatments are made from around 1,748 different species of plants that have been discovered in the Indian Himalayan Region (IHR). Specifically, we obtained the stem of *M. paradisiaca* from the medicinal garden of B. R. Nahata College of Pharmacy in Mandsaur, M.P., India, and the leaves of *D. stramonium* (Linn.) from the Jhalawar area in Rajasthan, India. Anatomical research has shown that *D. stramonium* leaves are elongated, thin, fragile, and non-basal. Their short petiole, irregular base, pointed tip, pinnate venation, teeth that separate the sinuses, and four to five lobes give them an oval form. The leaves were greyish green in colour and ranged in breadth and length from 8 to 25 cm. They had a harsh flavour and looked unhealthy. It follows that both plant materials are safe to use to terminate a pregnancy. This is why the *M. paradisiaca* stem has an estrogenic action. Anatomical research has shown that *D. stramonium* leaves are elongated, thin, fragile, and non-basal. Their short petiole, irregular base, pointed tip, pinnate venation, teeth that separate the sinuses, and four to five lobes give them an oval form. The leaves were greyish green in colour and ranged in breadth and length from 8 to 25 cm. They had a harsh flavour and looked unhealthy.

Keywords: Modern drugs, flavonoids, Physiochemical Parameters, yield

Introduction
Herbal medicines from different parts of the world often use plants as medicine to treat different diseases. In many regions of the globe, these ancient truths have been handed down from generation to generation. It has played a significant role in the development of several systems of traditional medicine. It has also aided research into several medicinal plants, allowing scientists to better understand their efficacy in practical settings. A significant component of discovering novel chemical entities (NCEs) has been the study of naturally occurring substances with biological activity. For instance, according to Newman *et al*. (2003), about 28% of NCEs from 1981 to 2002 were either natural items or products manufactured from natural materials. This research focuses on these two popular varieties of bananas, both as a food item and a vegetable. The scientific data on the long-term use of *M. paradisiaca* and *M. sapientum* as treatments for various ailments is included in this review. It details their applications, chemical separation, and medicinal research.

Bananas are a popular tropical fruit. It was around 600 BC when the banana plant travelled from its native southern Pacific to its current home in India. It then went on to infect every tropical nation on Earth. Some say it's the first crop ever cultivated for human consumption.

The Pacific islands and the western coast of Africa were among its first destinations, somewhere between 200 and 300 BC. *Musa paradisiaca* is a tall, verdant shrub. As much as 9 metres in length is possible. Its sturdy faux stem gives it the appearance of a tree. Huge, oval-shaped leaves that are dark green in colour and may reach lengths of 365 cm and widths of 61 cm make up its crown. In Figure 1, the midrib is clearly visible. A single flower spike droops from every plant, and the large sepals unfold in sequence. Dark crimson, somewhat thick, depressed, oval, 15-20 cm long bracts. The fruit's centre is juicy, and it's long and oval. They may grow to be 7-10 centimetres in length in a garden, but in nature they are shorter. An annual plant, *Musa sapientum* may reach a height of 5 to 9 metres and resembles a tree. A robust, tuberous pseudostem extends from the base of this plant. Bracts, which resemble leaves and are reddish-brown in colour, are edible and encase the large flower head. Ripe fruits are full with seeds and have a delicious, juicy flesh. This banana's skin is denser than the average banana's.

Every living creature on Earth is under danger from global warming, but the Himalayan species is particularly vulnerable. Plants adapt their structure and function to changing environmental temperatures by producing additional secondary metabolites (Akula and Ravishankar, 2011). Common names for the annual Himalayan plant *Datura stramonium* (L.) include "Apple of Peru," "Jimsonweed," "Thorn apple," and "Devil's Trumpet." The plant is a member of the Nightshade family, or Solanaceae. It is from India, where this plant is revered, that the common term "Datura" originates. Although it is often believed that this plant originated in Mexico, it has adapted to life in a wide variety of habitats and is now most abundant in the North West Himalaya of India.

Fig 1: Photograph of *D. stramonium* plant (leaves & flower)

Literature review

Soni, Pooja & Siddiqui, A.A. & Dwivedi, Jitendra & Soni, Viaan. (2013) [1]. Our objective is to analyse the effects on the estrous cycle and determine the most estrogenic ethanol extract in albino female rats by analysing the effects of petrol ether, chloroform, acetone, water, and stem extracts of *Musa paradisiaca* Linn (Musaceae) at varying temperatures. Two weight groups of female albino rats were tested for their ability to prevent pregnancy using plant extracts: 250 mg/kg and 500 mg/kg. Additional studies were conducted on the estrogenic effects of the powerful ethanol extract in rats. Histological examinations of the uterus proved their estrogenic nature. The research found that either 250 mg or 500 mg/kg of body weight of *M. paradisiaca* Linn extract for five days delayed the diestrous stage of the estrous cycle, which temporarily halted ovulation. According to the results ($p< 0.05$^0.01<0.001), the ethanol extract was the most effective in interrupting the rats' regular cycle. Since of this, ovulation was temporarily halted since the diestrous part of the estrous cycle became longer in subsequent cycles. When the drug was no longer used, the periods ended. The ethanol extract has strong antiestrogenic and estrogenic effects. All of the experiments have shown that the ethanol extract of *M. paradisiaca* Linn. May aid persons who are experiencing problems becoming pregnant.

Dewal, Sandeep, Sharma, Rachna, and Gupta, R. (2018) [2] The geographical and ecological landscapes of the Indian subcontinent are quite diverse. Although they thrive in mountainous or riverine regions, medicinal plants in India may be found in a wide range of temperatures. The renowned Chambal riverine flora of India are discussed in this paper for their anti-fertility properties. *Mimosa pudica*, *Acer saccharum*, *Calotropis gigantea*, *Adhatodavasica*, *Nelumbo nucifera*, *Nyctanthes Arbor Tristis*, *Vicoa indica*, *Pergularia Daemia*, and many other medicinal plants may be found in this region. There are a number of phytochemicals in these blossoming trees that may inhibit sperm formation, embryo implantation, ovulation, steroid synthesis, and other infertility-related processes. This paper briefly examines the medicinal plants of the Chambal riverine and demonstrates their efficacy in treating infertility.

Rajkapoor, Balasubramanian, and Azamthulla, Mohammad (2015) [3]. A typical method of family planning is the use of hormonal contraceptives that include both oestrogen and progesterone. Nevertheless, there are a number of significant negative effects associated with synthetic steroidal contraceptives. These include gonad damage, infertility (temporary or permanent), endometriosis, brain development issues, premature puberty, cancer of the testicles, breast or prostate, and many more. The need to develop new, safer compounds has been prompted by these negative effects. The purpose of this research is to highlight previous efforts to combat male, female, and infant infertility. Say hello to Azamthulla *et al*. The location where the World Journal of Pharmacy and Pharmaceutical Sciences' plant started to develop. When contemporary methods of birth control are ineffective, too dangerous, or both, women may turn to herbs as a substitute. Reducing libido is preferable to other forms of birth control. This section might be useful for researchers in identifying the medicinal herbs that have the power to induce abortion.

Ph.D., G. Priya, *et al*. (2012). Ancient Indian medicine recognised the dual use of herbs as an abortion inducer and a method to avoid unwanted pregnancies. Researchers have examined the potential of many medicinal plant extracts to alleviate infertility in animal models, including both male and female animals. A survey of literature covering the characteristics of non-reproducible plant species published between 1994 and 2010 is presented here. You may discover the whole name, family, antifertility activity quantity, and active medications in the details. This research discusses fifty different species. Infertility sufferers may find relief from a wide variety of medicinal herbs, some of which have the ability to halt fertilization, induce miscarriage, alter metabolism, produce oestrogen, and destroy sperm. Having said that, a few of these plants are quite toxic as well. This research aims to compile all the material discovered in Medline (Pub med) between 1994 and 2010 on plants that might aid in infertility. This is all the data we have on plants that reduce fertility.

Rajkapoor, Balasubramanian, and Kavimani, S. (2015) [5] and Azamthulla, Mohammad. A typical method of family planning is the use of hormonal contraceptives that include both oestrogen and progesterone. Nevertheless, there are a number of significant negative effects associated with synthetic steroidal contraceptives. These include endometrial damage, premature puberty, issues with brain development, male germ cell cancer, infertility (both temporary and permanent), and many more. The goal of these research is to highlight previous efforts to reduce the likelihood of pregnancy among women, men, and children. Say hello to Azamthulla *et al*. The location where the World Journal of Pharmacy and Pharmaceutical Sciences' plant started to develop. Alternative methods of birth control including herbs might be considered by women who are unable to utilise contemporary techniques due to adverse effects or other

reasons. The most effective kind of birth control would be encouraging individuals to have fewer children. This article could be useful in identifying the medicinal herbs that have the capacity to induce abortion.

Physiochemical Parameters: The actual constant evaluation of the drugs is a key part of finding drugs that have been tampered with or not handled properly.

Foreign Matter
The amount of foreign matter in *D. stramonium* leaves was 1.4%, and the amount in *M. paradisiaca* stems was 0.67%.

Moisture Content
7% of the leaves of *D. stramonium* were found to be wet, and 9% of the stems of *M. paradisiaca* were wet. The stem of *M. paradisiaca* was more likely to wilt when it got wet.

Ash Values
Table 1 shows that the ash value was higher in *D. stramonium* than in *M. paradisiaca* in terms of physical factors.

Table 1: Ash values in percentage

Ash Values	Leaf of *D. stramonium*	Stem of *M. paradisiaca*
T.A	Nmt 4.23	Nmt 5.45
A.I. A.	Nmt 0.87	Nmt 1.32
W.S.A	Nmt 2.44	Nmt 1.98
S.A	Nmt 1.34	Nmt 1.15

Table 2: Extractive Values

Extractive Value	Leaf of *D. stramonium*	Stem of *M. paradisiaca*
Pet. Ether (60-80 ºC)	Nlt 0.35	Nlt 0.46
Chloroform	Nlt 0.37	Nlt 0. 39
Acetone	Nlt 0.97	Nlt 0.88
Ethanol	Nlt 2.67	Nlt 3.24
Water	Nlt 3.68	Nlt 4.23

Percent Yield
Around 7.5% (w/w) of the *D. stramonium* leaves were found in the ethanol extract, which was the best. After this came the water first the petroleum ether extract and then the first one. The percent extractability of *M. paradisiaca* was found to go from water to ethanol to petroleum ether to chloroform to acetone. Table 3 shows how the extracts look and how much they can be extracted.

Table 3: Percentage yield of extracts of D. stramonium leaves & *M. paradisiaca* stem % (w/w)

Plant Extracts	Parameters		
	Color	Consistency	Yield (%w/w)
Ds. L-P	Brown	Semisolid	3.7
Ds. L- E	Dark brown	Semisolid	**7.5**
Ds. L-W	Brown	Powder form	5.6
Mp. S-P	Yellow brown	Semi solid	2.9
Mp. S-C	Brownish green	Solid	2.8
Mp. S-A	Brown	Solid	2.3
Mp. S-E	Green brown	Powder form	8.6
Mp. S-W	Green brown	Powder form	**10.2**

Phytochemical investigation
A qualitative phytochemical a test was done to see if the plant had any steroids, glycosides, flavonoids, alkaloids, carbs, proteins, amino acids, or saponins. The first phytochemical tests on all the extracts of *D. stramonium* leaves and *M. paradisiaca* stems showed that they contained a number of different phytoconstituents, which can be seen in Table 1. The results of the phytochemical screening show that the products have different active ingredients. It has been shown that flavonoids, phenolics, and saponins can help prevent infertility.

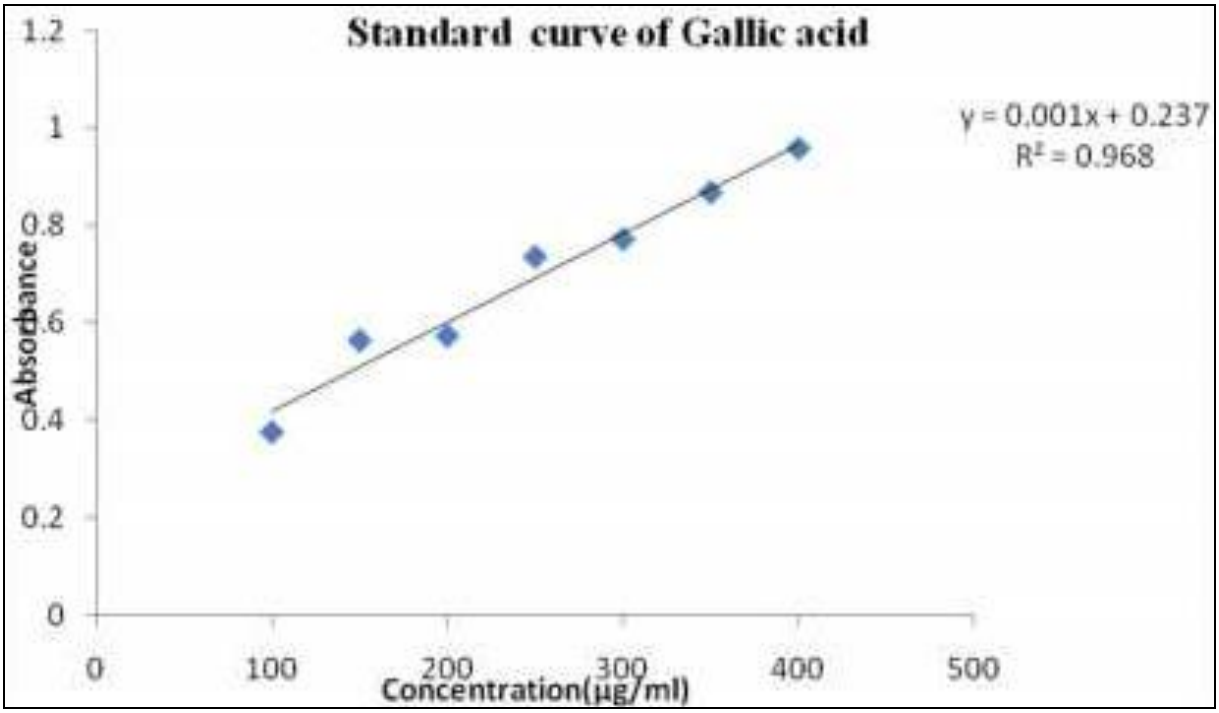
Table 4: Preliminary phytochemical studies of various extracts of both the plants

Extracts	Chemical constituents
Ds. L –P	Fats, steroids
Ds. L-E	Carbohydrates, alkaloids, tannins, glycosides, phenolics, saponin
Ds. L-W	Carbohydrates, alkaloids, proteins, saponin, tannins
Mp. S-P	Fats, steroids
Mp. S-C	Steroids, glycosides
Mp. S-A	Tannins, triterpenoids, flavonoid
Mp. S-E	Carbohydrates, glycosides, tannins, glycosides, flavonoid, saponin
Mp. S-W	Carbohydrates, glycosides, tannins, flavonoid, saponin

Ds.L -*D. stramonium* Leaves, Mp.S - *M. paradisiaca* Stem, Petroleum ether extract (P), chloroform extract (C), acetone extract (A), ethanol extract (E), and water extract (W)

Determination of total phenolic content

Approximately how many phenolics are present in different extracts of *D. stramonium* and *M. paradisiaca* was found. The most phenolic compounds are found in the ethanolic extracts of both plants compared to other extracts. Because they combine with different proteins, phenolic substances change how enzymes work.



Standard curve for gallic acid and its linear equation y = 0.001 x +0.237

Fig 2: Standard curve of Gallic acid

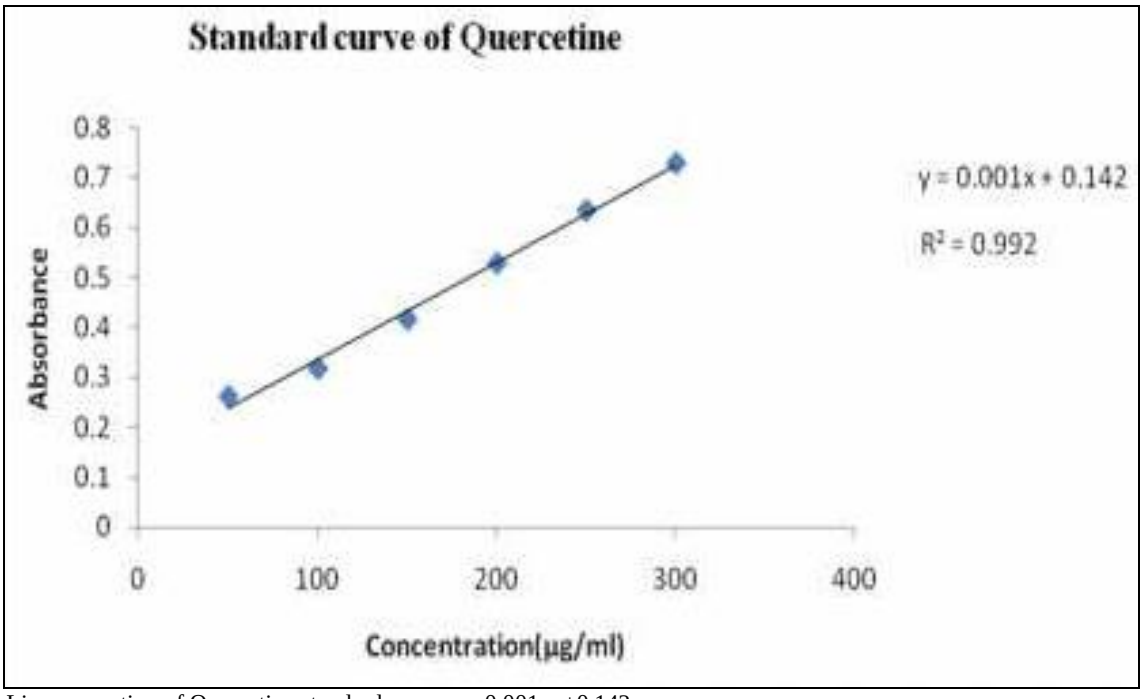
Table 5: Total phenolic content of *D. stramonium* & *M. paradisiaca* extracts

Plant extracts	Total phenolic content (mg/100g)	Total flavonoid content (mg/100g)
Ds. L -P	0.14 ± 0.01	0.33 ± 0.45
Ds. L-E	0.34 ± 1.2	0.42 ± 0.34
Ds. L-W	0.31 ± 0.87	0.41 ± 1.22
Mp. S-P	0.24 ± 0.85	0.54 ± 0. 34
Mp.S-C	0.43 ± 0.88	1.12 ± 0.66
Mp.S-A	0.32 ± 0.1	1.45 ± 0.33
Mp.S-E	0.50 ± 1.1	2.34.± 0.55
Mp.S-W	0.46 ± 0.85	1.89 ± 0.65

Ds.L -*D. stramonium* Leaves, Mp.S - *M. paradisiaca* Stem
P- Petroleum ether extract, C- Chloroform extract, A-Acetone extract, E- Ethanol extract, W-Aqueous extract

Determination of total favanoid content

It was also found how many flavonoids were in the *D. stramonium* and *M. paradisiaca* extracts as a whole. The ethanol extract had the most flavonoids compared to the others. Flavonoids are powerful antioxidants that can get rid of free radicals.



Linear equation of Quercetine standard curve y = 0.001 x +0.142

Fig 3: Standard curve of Quercetine

Table 6: Total flavonoid content of *D. stramonium* & *M. paradisiaca* extracts

Plant extracts	Total flavonoid content (mg/100g)
Ds. L -P	0.33 ± 0.45
Ds. L-E	0.42 ± 0.34
Ds. L-W	0.41 ± 1.22
Mp. S-P	0.54 ± 0. 34
Mp.S-C	1.12 ± 0.66
Mp.S-A	1.45 ± 0.33
Mp.S-E	2.34.± 0.55
Mp.S-W	1.89 ± 0.65

Ds.L -*D. stramonium* Leaves, Mp.S - *M. paradisiaca* Stem, P- Petroleum ether extract, C-Chloroform extract, A-Acetone extract, E- Ethanol extract, W- Aqueous extract

Pharmacological investigation

Acute Toxicity Studies: During a study on severe poisoning, the stem and leaf extracts of *M. paradisiaca* were found to be safe, as there were no deaths or serious changes in behavior. Based on Tables 7 and 8, the death rate was found to be 0.

Table 7: Mortality in acute toxicity study the Leaves of *D. stramonium* extracts

S. No.	Treatment	Dose (mg/kg)	Number of animals	Mortality			Toxicity profile
				Till 24 h.	Till 7th day	Till 14th day	
1.	Ds. L-P	2000	5	0	0	0	Safe
2.	Ds. L-E	2000	5	0	0	0	Safe
3.	Ds. L-W	2000	5	0	0	0	Safe

Table 8: Mortality in acute toxicity study of *M.paradisiaca* stem take out

S. No.	Treatment	Dose (mg/kg)	Number of animals	Mortality			Toxicity Profile
				Till 24 hr.	Till 7th day	Till 14th day	
1.	Mp. S-P	2000	5	0	0	0	Safe
2.	Mp. S-C	2000	5	0	0	0	Safe
3.	Mp. S-A	2000	5	0	0	0	Safe
4.	Mp. S-E	2000	5	0	0	0	Safe
5.	Mp. S-W	2000	5	0	0	0	Safe

MP. S - *M. paradisiaca* Stem, DS- Datura
P- Petroleum ether extract, C- Chloroform extract, A-Acetone extract, E- Ethanol extract, W-Aqueous extract

Conclusion

Separate chemicals had potent antifertility effects, according to the chemical investigation. They have the potential to be a form of contraception for rural Indian women and perhaps to induce abortions if they are refined further. The chemicals and helpful medical information discussed in this paper include Paradisiaca and sapientum are the two species of Musa. Research into the plant's medicinal properties has confirmed its long-standing usage in treating a variety of conditions, including diabetes, ulcers, dysentery, high blood pressure, and heart issues. However, scientific trials involving people are still lacking, which would prove the plant's efficacy. Whatever the case may be, the plant's current applications provide enough opportunity to investigate its latent potential. The promises and potential for new ideas to aid in medication development can only be supported by isolating the bioactive

ingredient(s) and conducting further studies in live creatures.

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