

Phytochemical analysis and *in-vitro* anthelmintic activity of *Musa paradisiaca* linn and *Sesbania grandiflora*

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ABSTRACT

The current study was carry out to evaluate anthelmintic activity of ethanol, methanol and ethyl acetate crude extract of flower of *Musa paradisiaca* and *Sesbania grandiflora* leaves on Indian adult earthworms (*Pheretimaposthuma*). All the extracts exhibited concentration dependent activity at tested concentrations of 10-100 mg/ml. higher activities were observed at the higher concentrations. Ethanolic extract of *Musa paradisiaca* and *Sesbania grandiflora* was more active than methanol and ethyl acetate extracts. At concentrations 80mg/ml the aqueous extracts of both plants showed better activity with paralysis time (9.5,13.4 min) and death times (12.4, 23.1 min) respectively when compared to the standard piperazine citrate at 10mg/ml. Our study suggests that these plants as potent anthelmintic.

Keywords: Anthelmintic activity, *Musa paradisiaca*, *Sesbania grandiflora*, *Pheretimaposthuma*.

1. INTRODUCTION

Helminthic infections are among the most common infections in man, affecting a large proportion of population all over the world. In developing countries they pose a large threat to public health and contribute to the prevalence of malnutrition, eosinophilia, anaemia as well as pneumonia. The majority of these infections because of worms are generally restricted mostly to the tropical regions [1]. Parasitoses have been of concern to the medical field for centuries and the helminthes still cause considerable problems for human beings as well as animals. During the past few decades, despite numerous advances made in understanding the mode of transmission as well as the treatment of these parasites, there are still no efficient products to control certain helminthes and the indiscriminate use of some drugs has generated several cases of resistance [2-4]. Furthermore, it has been recognized recently that anthelmintic substances having considerable toxicity to human beings are present in foods derived from livestock, posing a serious threat to human health [5]. Consequently, the discovery and development of new chemical substances for helminthes control is greatly needed and has promoted studies of traditionally used anthelmintic plants, which are generally considered to be very important sources of bioactive substances [6]. Since the time immemorial, our traditional system of medicine and folklore claiming that medicinal plants as a whole or their parts are being used in all types of

diseases successfully including antibacterial and anthelmintic, anti-inflammatory etc. As we know very well, approximately 70-80% of world's population depends on traditional medicinal plants [7]. Now a days the medicinal preparation available in the market from which most of them either not effective up to the mark or has to develop resistance resulting in reoccurrence again. Plant derived drug serve as a prototype to develop more effective and less toxic medicines for many of the diseases.

Anthelmintic from natural sources play a key role in the treatment of these parasitic infections. In view of this, attempts have been made to study the anthelmintic activity of two important medicinal plants *Musa paradisiaca* and *Sesbania grandiflora*.

Musa Paradisiaca Linn (*Musaceae*) is fast developing herbaceous perennials rising from underground rhizomes, native in tropical Asia and cultivated throughout India and surrounding islands. Commonly known as Kela (Hindi) Synonym of *Musa Paradisiaca* that is Rambha it also called in English that is Cooking banana, *Musa Paradisiaca* is distributed throughout the greater parts of India [8].

Flower of *Musa paradisiaca* are inflorescence spike, drug occurs in cut and crumpled pieces, 2.5 to 4 cm long sessile, unisexual, calyx and corolla present, calyx 2.5 to 4 cm long crumpled, tubular spathaceous, dark

brown having ridges and furrows, corolla 1.5 to 2.5 cm long connate, crumpled, boat-shaped creamish yellow, membranous, toothed at apex [9].

Musa paradisiaca, as a vital source of food in the world, traditionally it has used to treat asthma, anthelmintic, diabetes, hypertension, snake bite. The whole plant plus specific parts like leaves, ripe and unripe fruits and stems of plant extract and its include active constituents have been used for the cure of enormous number of human ailments [10]. Different parts of this plant are used in the indigenous system of medicine for treatment of different ailments.

Traditionally *Musa Paradisiaca* has many more presumed beneficial uses, including treatment fungal infections especially ringworm. Sap squeezed from the trunk is drunk to treat cold, cough and influenza. Decoction prepared from flowers is drunk by women to prevent excess blood loss during childbirth or miscarriage, and also in event of ruptured appendix. It's also used in Inflammation, rheumatism, diabetes, antihypertensive. Unripe bananas and plantain fruits of plant are used as astringent, as well as used to treat diarrhoea. The leaves are useful for cough and bronchitis. The roots also able to arrest hemoptosis as well as it possess strongly astringent and anthelmintic properties. Plantain juice is used as an antidote especially for snakebite. Other uses of *Musa Paradisiaca* are burns, dysentery, excessive menstrual flow, fever, gangrene, gout, headache, hemorrhage, insomnia, intestinal parasites, sores, syphilis, tuberculosis, ulcers, and warts. In Suriname's traditional medicine, the red protecting leaves of the bud was used in contrast to heavy menstrual bleeding (menorrhoea). Other therapeutic uses of *Musa Paradisiaca* were are against diarrhoea, dysentery, migraine and jaundice. Green peels show significant antioxidant property. It also possess good Wound healing Activity.

Sesbania grandiflora Linn. is one of the most useful traditional medicinal plant in India. *Sesbania grandiflora*, commonly called as "Aghati," which belongs to family fabaceae. It is extensively used in Ayurveda for the treatment of various diseases and for processing of various formulations in "Rasashastra". The parts of the *Sesbania grandiflora* such as roots, bark, leaves, flower and fruit are having different pharmacological properties. *Sesbania* gum is used as pharmaceutical excipients in ophthalmic dosage form [11]. The flowers of *S. grandiflora* are consumed in India as vegetables and flowers, leaves, barks and the roots are also used by tribes. Pods are long about 20-60 cm and thin about 6 - 9 mm with sutures containing 15 - 50 seeds. It is one of the richest natural sources of vitamin A.

Sesbania grandiflora has also been studied for formulation and evaluation of ophthalmic dosage form for the improvement of dim vision [12]. Different parts of the plant have also been reported for anti-microbial [13], anti-ulcer [14], anticancer activity [15], anti-oxidant [16-18] analgesic and CNS depressant activity [19], antihyperglycemic and hypolipidaemic activity [20].

So, the current study was carried out to investigate flower as well as leaves of plants extracts especially for anthelmintic activity.

2. MATERIALS AND METHODS

2.1. Plant collection and preparation of plant extracts

Flowers of *Musa paradisiaca* Linn. Were collected from local region of Nanded and *Sesbania grandiflora* leaves were collected from school of life science, Nanded and identified on the basis of its morphological features with the help of taxonomist. Herbarium of the plant specimen has been given for authentication to Dr. B. D. Gachande, Associate Professor, P. G. Department of Botany, Science College, Nanded. A voucher specimen in deposited in Department of Pharmacognosy.

The flower and leaves of plant was collected, shade dried and powdered. 300gm of powder was subjected to soxhlet extraction by various solvent such as ethanol, methanol, and ethyl acetate. The solvent was then removed under reduced pressure the yield obtained was ethanol (ET) (8.9%), methanol (ME) (8.3 %) and ethyl acetate (EA) (8.0%) w/w with respect to dried powder. which were used for anthelmintic activity.

2.2. Chemicals

Piperazine citrate was obtained from local medical shop. Ethanol, ethyl acetate, methanol is of AR grade purchased from SD-Fine Chemlimited, India.

2.3. Phytochemical analysis

Preliminary screening of the crude extracts was carried out qualitatively for the presence of alkaloids, tannins, carbohydrates, saponins, flavonoids, amino acids, steroids, phenols, anthraquinones by following the standard methods [21].

2.4. Earth Worms

Indian adult earthworms, *Pheretima posthuma* (Annelida, Megescolecidae) were used for to evaluate anthelmintic activity of the plant extracts. The adult earthworms were collected from moist soil of Nanded pharmacy college, Maharashtra, India and washed thrice

with normal saline solution to remove all the faecal matter. The worms of 5-6cm in length and 0.2-0.3cm in width were used for complete experiment.

2.5. Anthelmintic activity assay

As per the method of Ajaiyeoba et al., the anthelmintic assay was carried out [22] on Indian adult earthworms through minor modifications. The anthelmintic assay was carried on Indian earthworms due to its anatomical as well as physiological resemblance with the intestinal roundworm parasites of human beings [23, 24]. The ethanol, methanol, ethyl acetate extracts of flower of *Musa Paradisiaca* and *Sesbania grandiflora* leaves were suspended in normal saline to prepare 20,40,60,80,100 mg/ml concentrations. Piperazine citrate (10 mg/ml) was used as a standard drug. Normal saline was used as a control. The worms were divided in to thirty two groups with each containing three worms (N=3) were placed in 10mL of desired formulation. One group serve as control and one group serves as standard and fifteen sets of two different groups was treated with extracts of desired concentrations. The observations were made for paralysis time as well as death time for each earthworm and mean time was taken for all the extracts of *Musa Paradisiaca* flower and *Sesbania grandiflora* leaves. The paralysis time was said to occur when there is no sort of movement except when shaken vigorously. The time of death was recorded later ascertaining that worms neither moved when given external stimuli nor dipped in warm water about 50°C [25].

2.6. Statistical analysis

The results of that study were analyzed for statistical significance using one way ANOVA followed by student t-test. The P value (<0.001) was considered significant.

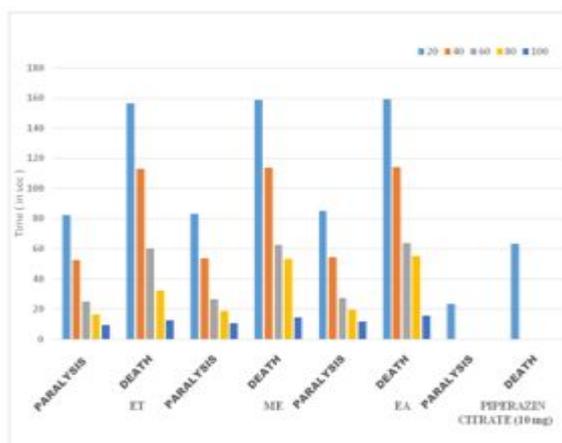


Figure - 1: Paralysis and death time for different extracts of *Musa paradisiaca*

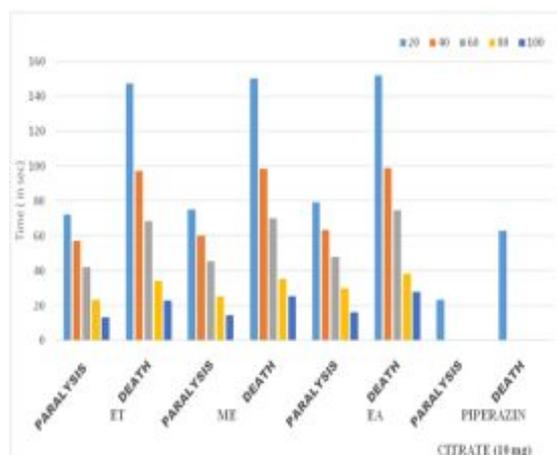


Figure - 2: Paralysis and death time for different extracts of *sesbaniagrandidiflora*

Each value represents mean ± SEM (N=3). P<0.001 significantly different compared with reference compound, Piperazine citrate.

3. RESULTS AND DISCUSSION

Preliminary phytochemical analyses of *Musa paradisiaca* revealed the presence of steroids, triterpenes alkaloids, flavonoids, tannins, diterpenes, glycosides and saponins flavonoids, carbohydrate and proteins in all the extracts. Whereas, *Sesbania grandiflora* revealed the presence of saponins, proteins, amino acids, flavonoids, alkaloids, tannins and glycosides, in all the extracts, alkaloids in petroleum ether and aqueous extracts, while flavonoids and carbohydrates in methanol and aqueous extracts, steroids in petroleum ether and ethyl acetate extracts. The ethanolic extract of *Musa Paradisiaca* and *Sesbania grandiflora* exhibited a dose dependent manner of anthelmintic activity as shown in Graphs 1 and 2. It is observed that the Indian adult earthworms were more sensitive to the extracts and it is evident that ethanolic extracts of *Musa Paradisiaca* exhibited paralysis as well as death in less time and showed significant anthelmintic activity when compared to all the extracts of *Sesbania grandiflora*, which took long time for death of worms.

The ethanol extracts of *Musa Paradisiaca* and *Sesbania grandiflora* caused paralysis at 82.4, 72.32 sec (at 20 mg/ml); 52.52, 57.4sec (at 40 mg/ml); 24.8, 42.3sec (at 60 mg/ml); 16.4, 23.2 sec (at 80 mg/ml); 9.5, 13.4 sec (at 100mg/ml) respectively.

Whereas the paralysis time for methanol and ethyl acetate extracts were high when compared to ethanolic extracts. These ethanol extracts of *Musa Paradisiaca* and *Sesbania grandiflora* caused death at 156.4, 147.5 sec (at 20 mg/ml); 112.7, 97.4 sec (at 40 mg/ml); 60.3, 68.5 sec (at 60 mg/ml); 32.2, 34.2 sec (at 80

Table - 1: Comparative observation of ethanolic extract of *Musa paradisiaca*, *Sesbania grandiflora* and Piperizin citrate

Concentration	Time of paralysis (in sec)		Time of death (in sec)	
	<i>Musa paradisiaca</i>	<i>Sesbania grandiflora</i>	<i>Musa paradisiaca</i>	<i>Sesbania grandiflora</i>
20 mg/mL	82.4	72.32	156.4	147.5
40 mg/mL	52.52	57.4	112.7	97.4
60 mg/mL	24.8	42.3	60.3	68.5
80 mg/mL	9.5	13.4	32.2	34.2
Piperazin citrate (10 mg/mL)	12.4		23.1	

mg/ml); 12.4, 23.1 respectively when compared to the standard reference drug piperazine citrate (10 mg/ml) which showed paralysis time of 23.4 min and death time of 63.2 min. This activity may be due to the presence of phenolic and alkaloid group of compounds. Both the plants ethanolic extracts were more effective in causing the paralysis and mortality of the worms compared with the piperazine citrate. These findings suggest that the two plants possess potent anthelmintic activity and can be used as an alternate to the use of synthetic drugs.

4. CONCLUSION

From results, it is concluded that Ethanolic extracts of plant material of *Musa Paradisiaca* and *Sesbaniagrandiflora* showed significant anthelmintic activity. It validates their uses in ethno medical importance as well as the experimental evidence obtained in the laboratory model could provide a rationale for the traditional use of this plant as anthelmintic. The plant may be further discovered for separation of the active constituent accountable for anthelmintic activity.

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