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Passiflora foetida L: An Exotic Ethnomedicinal Plant of Odisha, India

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Abstract

Passiflora foetida (Passifloraceae), known as Stinking Passion Flower, is an herbaceous climber that is found throughout the Odisha state of India. It has been widely used in traditional medicine of the state for the treatment of different types of diseases and disorders. It has rich pharmacological values particularly in mental disorder and possesses numerous bioactive compounds such as vitexin, luteolin, apigenin, etc., which may be responsible for its bacteriocidal, antidysentric, antilithicand other effects. Keeping its richness in the state of Odisha and reported pharmacological values, an attempt has been made to document some common uses of this vine among the rural and tribal communities of the state through the field survey for collection of ethnobotanical values. In addition, extensive literature survey was carried out to highlights the sound pharmacological values of *P. foetida* L.

Keywords: *Passiflora foetida*, Ethno-botany, Pharmacology, Bio-assay.

Introduction

Odisha state of India represents a unique biodiversity and a treasure house of a number of medicinal plants. In recent decades, there has been growing concern of the increasing acceptance of biological diversity as an important focus for human wellbeing. At international level, this has perhaps been most clearly expressed by the entry into force and continuing implementation of the Convention on Biological Diversity. Thus, biodiversity has become the subject of various national and international policies and regulations. One result of this is a growing perception of the need for reliable ways to assess the state of biodiversity. Ever increasing dependency on the natural resources and their over exploitation has resulted in the loss of biodiversity on which wellbeing of rural people greatly depends. Conservation of natural resources in order to maintain the structure and functions of the eco-system and to ensure tangible benefits in term of fuel, fodder and other resource base needs is also a matter of much concern to the whole world today [1]. Plants constitute a vital component of the biodiversity as they play a key role in maintaining earth's environmental equilibrium and ecosystem stability. They are also essential for the survival of not only the human beings, but also animals at large. Wild plants have enormous endemic, cultural and aesthetic importance, and provide food, medicine, fuel, clothing and shelter to the majority of people. However, a large number of plant species are under threat because of habitat modification, over exploitation, pollution, desertification, invasive alien species and climate change. The present trend of loss of plant diversity is one of the greatest challenges of the conservationists, the biodiversity managers and the governments throughout the world [2]. Anthropogenic activities may directly result into either loss of biological diversity or alteration in the natural flora and fauna. Keeping this in view, the present study was undertaken to highlight the importance of a common medicinal plant, *Passiflora foetida*, found throughout the State. We documented the medicinal, ethnobotanical and pharmacological values of this plant. *P. foetida* (Passifloraceae) is an herbaceous vine (Figure 1) with the auxiliary tendrils and yellowish white hairy stems [3-5]. Palmately-3-lobed leaves, ciliate and denticulate with gland-tipped setaceous hairs. Flowers greenish, mostly solitary, axillary, with involucres of finely pinnatifid bracteoles with capillary glandular segments. *P. foetida* also a weed of upland rice and other field crops. It occurs

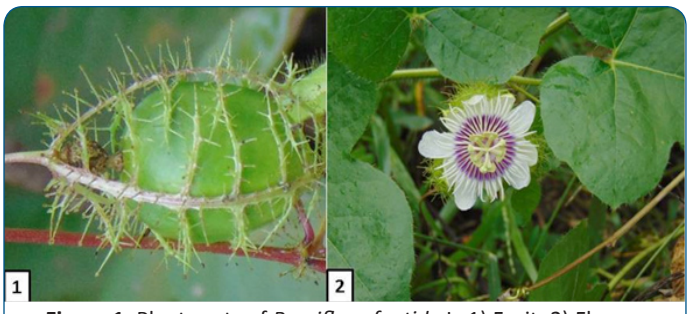

Figure 1: Plant parts of *Passiflora foetida* L. 1) Fruit; 2) Flower

in wet areas or those where there is a pronounced wet season. It is common in the plantations, rough pastures, roadsides and wasteland in throughout the state. This plant is native to the West Indies, North South America and naturalized weed in Taiwan and China [6]. It is also widely distributed in Thailand [7]. In the present study, we attempted to document the ethnomedicinal potential of the plant from different locations of the Odisha state in India along with its sound pharmacological values.

Methods

A literature survey was carried out for gathering the information on the medicinal, ethnobotanical and pharmacological values of the *P. foetida*. In addition, ethnomedicinal information was noted out during (2012-2016) visits of different forest patches and rural-tribal areas of the state under different research works.

Results and discussion

The results revealed that the plant has sound ethnomedicinal values due to the presence of different bioactive compounds. It is frequently used among the rural and tribal communities of the Odisha state of India.

Ethno-medicinal values

P. foetida(Figure 1) is used to treat vomiting, eczema and chronic ulcer in the locals of south Odisha. The fruits of *P. foetida* are used as blood purifier and leaves are used to cure asthma (Present Study) and hysteria. Root decoction is used in hysteria and other mental disorders.Leaves ash is mixed with vegetable oil to make paste and is applied externally to cure scabies among the tribal communities of Sundargarh, Odisha. The plant is said to be used to cure itches among the tribal communities of Keonjhar district of Odisha, India (Present study).

The plant parts are also have sound ethnobotanical values and used throughout its distributional areas. Decoction of leaves and fruits are also used to treat asthma and biliousness, leaves and root decoction is emmenagogue, used in hysteria [8] and leaf paste is applied on the head for giddiness and headache [9]. In Brazil, the herb is used in the form of lotions or poultices for erysipelas and skin diseases with inflammation [10]. Young leaves are used in Surinam and Java as a vegetable. Stems and leaves are suspected of poisoning livestock. The leaves of this plant have been widely used as traditional therapeutics for insomnia, hysteria, emmenagogue, biliousness, asthma and skin inflammation in some countries such as India, Nigeria, Brazil and also in La Reunion [11].

Pharmacological values

The plant parts have unique pharmacological values. Many researchers have reported the pharmacological activities of this plant. Satish et al. [12] have reported the antiulcer activity and anti-oxidant activity of the plant parts whereas Rahman et al. [13] have documented its bioactive compounds, bioassay and anti-diarrhoeal activity. The major phytochemical constituents of *Passifloa foetida* leaves are C-glycosyl flavonoids such as chrysoeriol, apigenin, luteolin, kaempferol, isoschaftoside, 2”-xylosylvitexin, isovitexin and vitexin [14]. There are many reports indicating biological benefits of these flavonoids and crude extracts of *P. Foetida* leaves. Vitexin exhibited potent hypotensive, anti-inflammatory and anti-spasmodic properties [15]. Recently vitexin and isovitexin have been shown to effectively inhibit the formation of advanced glycationend products (AGEs) which are found to be implicated in diabetic complications [16]. Kaempferol, apigenin and luteolin were demonstrated to possess anti-allergic effect by inhibition of histamine release [17]. Regarding the crude extract of the leaf, the ethanolic extract of *P. foetida* displayed antiproliferativeactivity on human breast adenocarcinoma in the potential range of IC_{50} values [18] while Chan et al. [19] reported the analgesic activity of the hydro-alcoholic extract in mice. Furthermore, the extract from the callus of *P. Foetida* leaf has been demonstrated to exert promising hepatoprotecive effect in CCl_4 induced hepatic injury rats [20]. Even though *P. foetida*is abundant in Thailand and it has been extensively used in the folklore medicine of some countries, there has been no report on the long-term toxicity of *P. foetida*.

Chemistry of *P. foetida*

The major phytoconstituents of this plant contain alkaloids, phenols, glycoside flavonoids and cyanogenic compounds [21] and passifloricins, polyketides and alpha-pyrones in *P. Foeida* [22]. Other chemical constituents in *P. foetida* include hydrocyanic acid, groups of flavonoids and Harman alkaloids (Figure 2). Some reports have pointed out the Harman alkaloids as the bioactive constituents of *Passiflora incarnata* Linn, one of the species of *Passiflora* that have been extensively studied chemically and biologically. Harman, important alkaloid was found to be present in *P. foetida*[21,23,24].

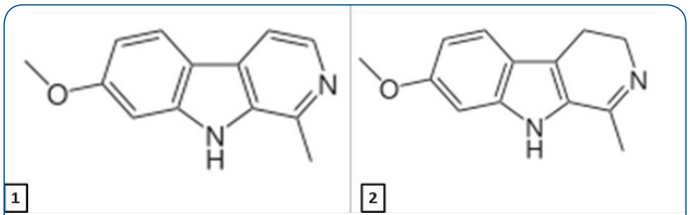

Figure 2: The bioactive compounds present in *Passiflora* L. 1) Harmine: $C_{13}H_{12}N_2O$; 2) Harmaline: $C_{13}H_{14}N_1O$

Unique features

The plant is able to trap insect on its bracts, which exude a sticky substance that also contain digestive enzymes. Heliconii butterflies of the family Nymphalidae, their larvae develop only on the plants of family Passifloraceae.

Conclusion

The present study reveals the importance of *P. foetida* as medicinal plant found throughout the state of Odisha, India. The presence of bioactive compounds such as steroids, tannins, alkaloids etc. indicate its sound pharmacological potential. The plant parts of *P. foetida* show anti-microbial, anti-diarrhoeal, anti-oxidant, anti-ulcer activity. Further studies are needed to cover more on the morphological variability, ecological diversity, pharmacological activity and bioassay to isolate new bioactive compounds for drug development and need to pay attention to conserve such medicinally important plant for next generation.

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