

Chapter 4

Pueraria tuberosa (Willd.) DC.(Fabaceae): an ecologically significant wild medico-food climber of India

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Abstract: Fabaceae family is commonly known as legume, pea or bean family. It is the largest family among the agricultural flowering plants. Along with the cereals, some fruits and roots of Fabaceae family have been used as a staple food since millennia. The family includes a number of plant species that are common in agricultural practices including *Phaseolus* spp., *Cicer arietinum*, *Lens culinaris*, *Pisum sativum*, *Glycine max* and many more. Many under-utilized and unexplored species of the family consumed by many people are not yet documented. *Pueraria tuberosa* is one such plant species that is consumed by some indigenous and tribal communities like Mahalis, Napits, Kumhars, Santhals, Paharias etc. *P. tuberosa* is also known as India kudzu or Tirra Da (Santhals), Patal Kohra (In Khorta, Dumka district, Jharkhand), Handiphuta in Odia and Vidarikand in Sanskrit. It is a perennial woody climber with tuberous root. It is distributed throughout India and other Asian countries. Traditionally tuber and leaves are used to cure many diseases too. Therefore, an attempt has been made to document the food, medicinal and ecological values of *P. tuberosa*. The literature and field survey revealed that its tuber is consumed as a cooling agent. The chapter highlights the ecological, food and medicinal importance of *P. tuberosa*.

Keywords: Medicinal, Ecological, Climber, Traditional knowledge

Introduction: Since time immemorial, humans are learning how to use plants and their parts as food and medicines (Kumar et al. 2012; Kumar 2015). It was noticed that among those vegetable plant species, what we use for our food till today, the legumes belonging to the family Fabaceae always remained the first choice, due to their delicious taste. But still many species are under-utilized and unexplored. *Pueraria tuberosa* is one such under-utilized and unexplored legume species where other plant parts (tubers) including seeds are also consumed as food. It is also very significant in the terms of its ecology, ethnomedicinal, nutrition and pharmacological values. *P. tuberosa* is a large woody climber with tuberous root. It is locally, known as Tirra Da, Patal Kohra, Bhuikakharu, Handiphuta, Bhuikumra, Patakumra, Mardamal etc. In moist deciduous forests and sometime in dry deciduous forests, it can be seen covering the forest floor. It is frequently found in the forests, chiefly along the streams and open forests. Both the habitat of *P. tuberosa* justifies its significant role in providing food and shelter of many wild faunal species including insects which play an important role in maintaining the ecological balance (Present study). During survey work in different tribal areas of Odisha and Jharkhand states, authors found that it is also used for medicinal purposes. Therefore, authors have taken an attempt to get the information about the uses and importance of *P. tuberosa*.

Botanical description of *P. tuberosa*: Large woody climber with tuberous root; tubers sometimes attaining enormous size. Leaves 3-foliate; petiole 9-18 cm long; stipules ovate, to 5mm; leaflets large, 15-30 cm long, roundish or the terminal one rhomboid, longer than broad and the lateral

ones ovate inequilateral. 20x12 cm, acuminate, glabrous or scattered hairy above, finely appressed hairy beneath; lateral petiolules 0.8-10 mm, terminal petiolules to 5cm; stipels minute, subulate. Racemes silky, 15-20 cm long, rachis silky. Flowers bluish, 1.2 cm, ternate on the nodes of racemes; pedicels. 1 mm. Calyx 7mm, silky. Standard orbicular, often white, 1.2 cm long, sides often revolute and apex emarginate; wings 1.2 cm long, with spur above base, obtuse; keel petals free, long-clawed, spurred. Ovary silky, 10 ovuled; style puberulous. Pods 5-7.5 cm long, hairy; young pods densely brown hairy on the sutures and densely appressed hairy on the faces (Plate 1-2; Saxena and Brahmam 1996).

Distribution: India; Himalayan region; Maharashtra; Mayurbhanj, Satkosia, Maliput, Koraput, Daspalla, Puri, Angul, Dhenkanal, Sambalpur, Kalahandi, Sundargarh (Odisha); Bhagalpur (Bihar); Dumka, Deoghar, Dhanbad, JamtaraPakur, Sahebganj, Godda (Jharkhand) and other Asian countries (Saxena and Brahmam 1996; Present study).

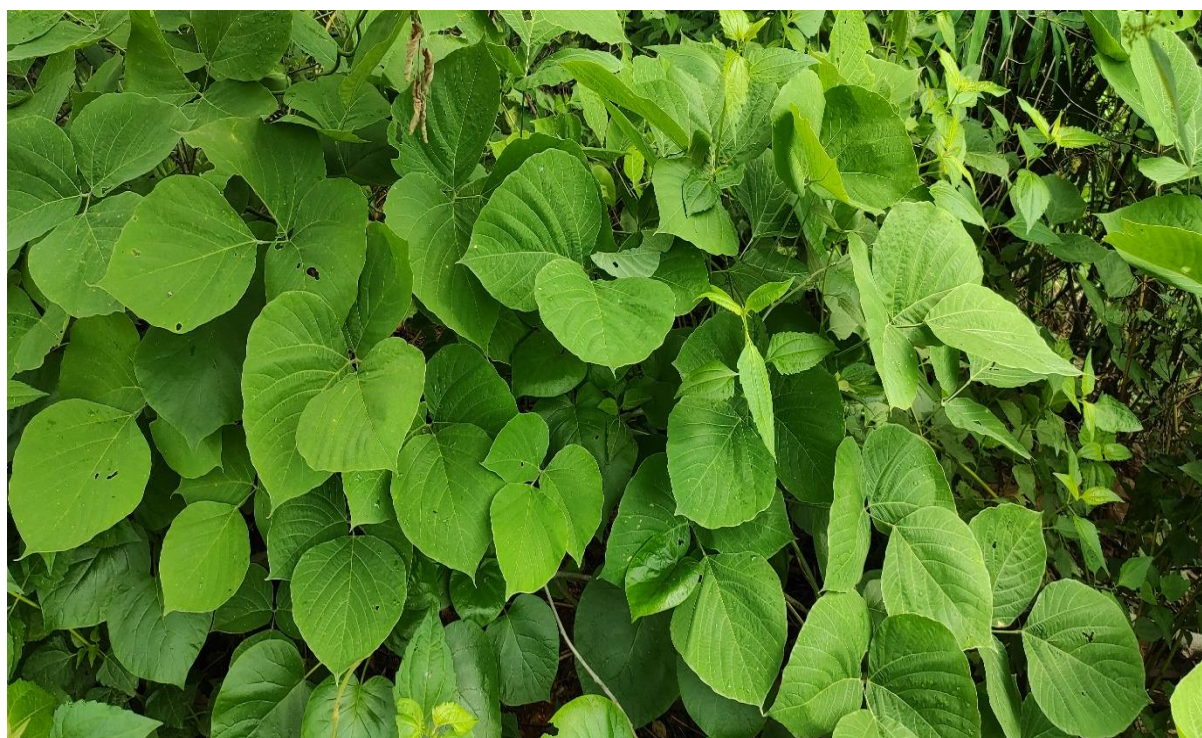


Plate1: *P. tuberosa* in wild habitat

Methodology: An extensive literature and field survey have carried out during the period of 2021-2022 in selected areas of Jharkhand and Odisha states, India. The information is collected through a cross-check interview with local communities (Plate 2). Plant is identified by the authors followed by flora's books (Haines 1921-1925; Saxena and Brahmam 1994-96).

Results and discussion: The result revealed that *P. tuberosa* has many uses including food, medicinal and ecological values. All part of the plant plays a vital role in treating different ailments. The stem, leaf, tuber, and roots are mostly used to treat many diseases. Through literature and field survey it revealed that it has many medicinal and food values. Details are listed in Table 1. In 2015, Sadguna et al. reported the valuable production in many industries like production of cellulose ethanol, and it also used in soaps, lotions etc. In 2016, Sharma and Ramawat reported the medicinal value of *P. tuberosa*. In 2019, Chithra et al. reported the powdered tuber acts as a galactagogue agent and is especially helpful for women when they are

unable to produce milk after childbirth. In 2021, Das reported regular use of tubers in the diet rejuvenates the skin and also increases its fairness and glow.

Table 1: Food, ethnomedicinal and pharmacological values of *P. tuberosa*

Food values			
Parts used	Food value	Places	Sources
Tuber	Used as a supplementary food	Botha forest area of Buldana district, Maharashtra, India	Theng and Korpenwar (2012)
Tuber	Eaten raw or boiled as a vegetable	Himalayan regions	Egan (2020)
Tuber	Eaten raw or after cooking as a vegetable	Santhal Paragana division of Jharkhand, India	Das (2021)
Ethnomedicinal values			
Parts used	Mode of uses	Medicinal uses	Sources
Tuber	Powder	The powder of tuber with honey is used against menstruation problem	Bharti et al. (2021)
Tuber	Decoction	Jaundice	Present study
Root	Decoction	Root is crushed and rubbed on the body in the treatment of fever	Present study
Leaf	Decoction	Leaf extract is used against fungal infection	Sadguna et al. (2015)
Tuber	Consumed raw and also after cooking	rejuvenates the skin and increases fairness and glow	Das (2021)
Tuber	Decoction	Cough	Present study
Tuber	Decoction	Rheumatism	Present study
Tuber	Consume raw	Due to cooling nature, it helps from burning sensation in the body and also for immunity booster.	Present study
Tuber	Cooked	Tuber is cooked with ghee and milk and taken to cure dysuria	Present study
Pharmacological values			
Parts used	Medicinal uses	Sources	
Tuber	Nootropic activity	Rao et al. (2008)	
Tuber	Anxiolytic activities	Pramanik et al. (2010)	
Leaf and root	Anti- tuberculosis activity	Adaikaruppan et al. (2012)	
Tuber	Blood pressure	Verma et al. (2012)	
Tuber	Antifertility activity	Chauhan et al. (2013)	
Leaf, stem, tuber	Antimicrobial activity, antitumor	Sadguna et al. (2015)	
Tuber	Hypersensitivity	Patel et al. (2016)	
Tuber	Antidiabetic activity	Shukla et al. (2018)	
Tuber	Lactogenic activity	Chithra et al. (2019)	
Root and tuber	Anti-ageing	Rawtal et al. (2019)	



Plate 2: Plant parts of *P. tuberosa*, a) Leaves, b-c) Tuber, d) A man holding the whole plant

Future aspects: Distinctly, the tuber and leaves have been used since ancient times in the traditional therapeutic practices in India as well as other Asian countries. In the well-known Fabaceae family, *P. tuberosa* is one of the under-utilized plants which is consumed by the indigenous and tribal population suggesting that it can also be used as an alternative to our urban culinary dishes. Due to its starchy and mild taste, it has high nutrient potential which can boost the body immunity of humans and can also ensure our future nutrition security. It is also consumed by many wild animals like Asian elephant, Sloth bear, Barking deer etc showing their dependency on this plant proving its ecological significance too. The literatures suggest that these bioactive compounds like puerarin, irisolidone, genistein, daidzein, isoorientin and mangiferin holds immense potential of eliminating diseases. Previous literature, have been studied for pharmacological activities like antioxidant, antidiabetic, anti-inflammatory and so on. Therefore, survey on its ecological, food, ethnomedicinal aspect is highly required (Figure 1; Figure 2).

Conclusion: The literature and survey revealed that *P. tuberosa* have many culinary values, ethnomedicinal values, pharmacological values and ecological values. The exploration of other bioactive constituents which can be beneficial to evaluate the drug formulation to use against many diseases. Therefore, there is a need of its scientific study to create a new path for the exploration of alternative nutrition and medicine in near future.

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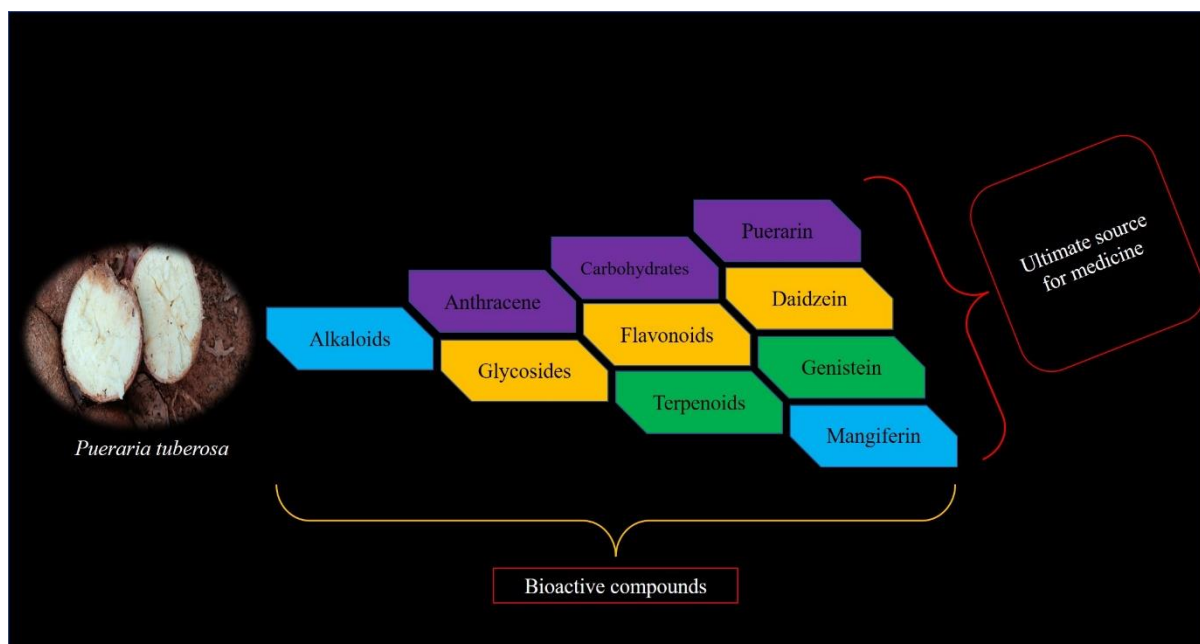


Figure 1: Future aspects as a medicinal agent

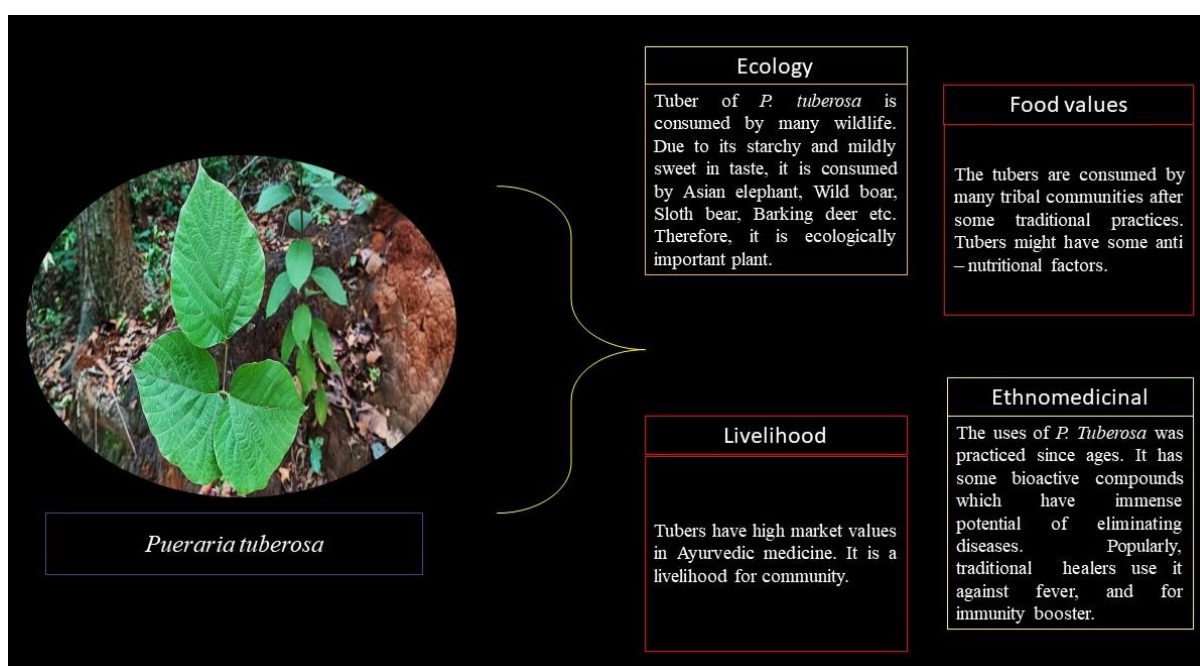


Figure 2: The significance of *P. tuberosa* in different aspects

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