

A Study of Commercially Important Plants of the Family Papilionaceae from the Parbhani Region of Marathwada (M.S.)

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ABSTRACT

This paper presents a study of commercially important plants belonging to the family Papilionaceae found in the Parbhani region of Marathwada, Maharashtra. Many plants of this family are commonly grown in the region and are important for agriculture and other purposes. Based on their uses, these plants were grouped into major food and pulse crops, oil-yielding crops, and plants used for fodder, fibre, and green manure. The paper also describes the commercial importance and common uses of some selected plants of the family *Papilionaceae*.

Keywords: pulse crops; Papilionaceae; oil-yielding crops

FULL PAPER

Introduction

Parbhani is situated in the semi-arid Marathwada region of Maharashtra, India, and has a largely agriculture-based landscape. Many plants belonging to the pea and bean family, Papilionaceae (Fabaceae), are commonly grown in this region. These plants play an important role in local agriculture, the environment, and food security. Important pulse and oilseed crops such as pigeon pea (tur), chickpea (gram), and soybean are widely cultivated by farmers across the Parbhani region.

The family *Papilionaceae* ranks second after *Poaceae* in terms of its commercial and economic importance. Many members of this family provide

protein-rich seeds that are widely used as food. They are also important sources of nutritious fodder, timber, fuelwood, tannins, resins, pulp, dyes, medicines, and ornamental plants (Singh *et al.*, 2007; Sharma, 2013; Ahmad *et al.*, 2016; Grygier *et al.*, 2023). Plants of the family *Papilionaceae* can be easily recognized by their characteristic butterfly-shaped flowers. A typical flower consists of a large upper petal known as the standard, two lateral petals called wings, and two lower petals that form the keel, which encloses the reproductive organs. The fruit is generally a pod.

Papilionaceae is considered a subfamily of *Leguminosae* and represents one of the most economically important groups of plants. It includes several important pulses, food crops, oilseeds, fodder and forage plants, timber-producing species, and medicinal plants. These plants contribute greatly to human nutrition and livestock feed and also provide vegetable oils, natural fibres, and other useful products. In addition, many members of this family help improve soil fertility, making them valuable in agriculture as well as in natural ecosystems. The present paper deals with the study of commercially important plants of *Papilionaceae* belonging to the Parbhani region of Marathwada.

Materials and Methods:

1. Study Area: Parbhani, formerly known as “Prabhavatinagar,” is one of the eight districts of the Marathwada region of Maharashtra State. The district is located between 18.45° and 20.10° N latitude and 76.13° and 77.39° E longitude. It is surrounded by Hingoli district in the north, Nanded district in the east, Latur district in the south, and Beed and Jalna districts in the west. Parbhani and the surrounding areas of Marathwada have diverse vegetation, including many plant species belonging to the family *Papilionaceae*.

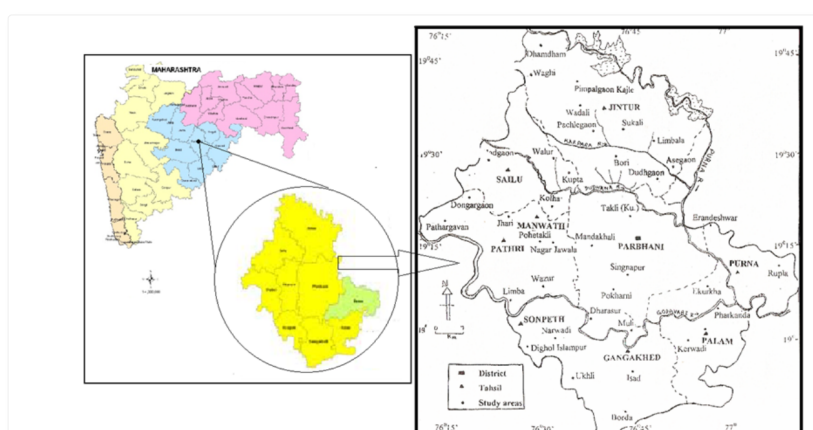


Figure 1: Parbhani district

(Source: Md. Babar, Muley R.B. *American Journal of Water Resources*. 2018, 6(3), 123-136 doi:10.12691/ajwr-6-3-3)

2. Field Survey and Collection: Several field visits and botanical surveys were carried out in different parts of the study area for the collection of plant specimens. During these visits, representative plant specimens were collected from their natural habitats and agricultural fields. After collection, the specimens were carefully placed between sheets of newspaper and pressed using wooden plant presses for proper drying and preservation (KifayatUllah *et al.*, 2022).

3. Plant Processing: The collected plant specimens were dried following the standard herbarium procedure described by Bridson and Forman (1999). After drying, the plant materials were treated to protect against damage and deterioration. The preserved specimens were then carefully mounted on standard herbarium sheets for further study and documentation.

4. Plant Identification: The mounted plant specimens were identified mainly based on their morphological characteristics. Identification was carried out with the help of relevant taxonomic literature, particularly the *Flora of Marathwada* (Naik, 1998), and by comparing the collected specimens with authenticated plant materials available in the herbarium. After proper identification, voucher specimens were prepared and deposited in the Herbarium of the Department of Botany for future reference.

5. Study of Commercial Importance: The commercial importance of plants belonging to the family *Papilionaceae* was studied using information from different aspects, including taxonomy, ethnobotany, phytochemistry, agricultural importance, and market value. This approach helped in understanding the different uses and economic importance of the selected plant species found in the study area.

Results and Discussion:

Commercially important plants of the family *Papilionaceae* found in the Parbhani region of Maharashtra include major crops. They were categorised into Major Food and Pulse Crops, Oil-Yielding Crops and Fodder, Fiber, and Green Manure.

I. Major Food and Pulse Crops: It includes

a) Pigeon Pea (Arhar/Tur) (*Cajanus cajan*):

Pigeon pea (*Cajanus cajan*) is an important Kharif pulse crop widely cultivated in the Parbhani region. Its seeds contain about 20–22% protein and form an important part of the regular diet. The seeds are commonly processed in dal mills to produce split pigeon pea, popularly known as toor dal, which has a high demand in local as well as commercial markets. Pigeon pea is also an important agricultural commodity traded in different parts of Asia and Africa.

Apart from its food value, *Cajanus cajan* is useful in maintaining soil fertility because of its ability to fix atmospheric nitrogen. This helps improve the nutrient status of the soil and may reduce the need for nitrogen fertilizers. Fallen leaves and

crop residues also add organic matter to the soil and help improve its moisture-holding capacity.

The leaves and pods can be used as nutritious feed for livestock. After harvesting, the dried stems are commonly used as fuelwood in rural areas and may also be used for making baskets, small stakes, and other household or agricultural items.

b) Mung Bean (Green Gram / Moong) (*Vigna radiata*): Mung bean or green gram (*Vigna radiata*) is an important short-duration pulse crop with considerable agricultural and commercial value. It is widely cultivated in Asia and some parts of Africa because of its food value, market demand, and ability to grow under relatively dry conditions.

The seeds contain about 24% easily digestible protein, making green gram an important source of protein, particularly in vegetarian diets. It is commonly consumed as whole grain or processed into split dal, flour, and sprouts. Green gram is also valued for its nutritional qualities, as it provides vitamins, iron, folate, and other beneficial nutrients. The presence of polyphenols and antioxidants further adds to its nutritional and health-related importance.

Apart from its food and commercial value, *Vigna radiata* also contributes to soil improvement. Being a leguminous crop, it helps fix atmospheric nitrogen and improves soil fertility. It can also be grown as a cover crop or green manure crop, which helps maintain soil health and can benefit cereal and other crops grown in the following season.

c) Chickpea (Bengal Gram / Chana) (*Cicer arietinum*): Chickpea or gram (*Cicer arietinum*) is one of the major pulse crops and has considerable agricultural and commercial importance. It is widely consumed as a nutritious food and is an important source of plant-based protein. Chickpea is also an important commodity in agricultural markets and plays a useful role in crop rotation.

The seeds are a good and affordable source of protein, complex carbohydrates, and dietary fibre. Commercially, chickpea is mainly classified into two types: *desi* and *kabuli*. The *desi* type has smaller and darker seeds and is commonly processed into split gram (dal) or ground into flour, popularly known as besan. The *kabuli* type has larger, light-coloured seeds and is generally consumed whole or used in salads and various processed food products.

As a leguminous crop, *Cicer arietinum* helps improve soil fertility through atmospheric nitrogen fixation. Its cultivation in crop rotation can reduce the requirement for nitrogen fertilizers and benefit crops grown in the following season. Seed residues and by-products obtained during processing can also be used as supplementary feed for livestock, including cattle, sheep, and poultry.

d) Black Gram (Urad) (*Vigna mungo*): Black gram or urd bean (*Vigna mungo*) is an important pulse crop with considerable nutritional, agricultural, and

commercial value, particularly in South Asian countries. It is widely cultivated for its protein-rich seeds and is used in several traditional and processed food products.

Black gram contains about 24–26 g of protein per 100 g and is therefore an important source of plant-based protein. It is commonly used for preparing popular foods such as *idli*, *dosa*, *papad*, *dal*, and *dal makhani*. The seeds are also commercially processed into split dal, roasted products, flour, and different snack foods, which increases the economic importance of this crop.

Being a leguminous crop, *Vigna mungo* helps improve soil fertility through atmospheric nitrogen fixation by root nodules. It can be included in crop rotation to reduce dependence on nitrogen fertilizers. It is also useful as a short-duration cover crop and green manure crop, helping to maintain soil health and reduce soil erosion. Husks and other by-products obtained after processing can be used as livestock feed and forage. Black gram also contains naturally occurring bioactive compounds, including flavonoids, phenolic compounds, and antioxidants. Because of these constituents, it has traditionally been used in different food and medicinal preparations. Its potential health-related properties have also attracted interest for further nutritional and scientific studies.

II. Oil Yielding Crops: It includes-

- a) Soybean (*Glycine max*):** Soybean (*Glycine max*) is one of the most important oilseed and protein crops cultivated worldwide. Its seeds contain approximately 40% protein and 18–20% oil, making soybean an important and relatively economical source of high-quality plant protein and edible vegetable oil.

Soybean is also a good source of dietary fibre, lecithin, and isoflavones. These nutritional components contribute to its importance in a variety of food and health-related products. Lecithin obtained from soybean is widely used as an emulsifying agent in the food, pharmaceutical, and cosmetic industries.

After oil extraction, the remaining soybean meal is rich in protein and is extensively used in animal feed, particularly for poultry, pigs, and dairy cattle. As a leguminous crop, *Glycine max* also contributes to soil fertility through atmospheric nitrogen fixation. Its inclusion in crop rotation can therefore help reduce the requirement for nitrogen fertilizers.

Apart from its food and feed value, soybean has several industrial applications. Refined soybean oil can be used in the production of biodiesel. At the same time, soybean-based materials are also utilized in the manufacture of printing inks, paints, varnishes, soaps, and some bio-based plastic products. These diverse applications make soybean an agriculturally and commercially valuable crop.

- b) Groundnut (Peanut) (*Arachis hypogaea*):** Groundnut or peanut (*Arachis hypogaea*) is an important commercial oilseed crop cultivated in many parts

of the world. It is mainly grown for its oil-rich and protein-rich seeds and has considerable importance in food, agriculture, and various industries.

Groundnut kernels contain nearly 50% oil, making them an important source of edible vegetable oil. The seeds are commonly consumed raw, boiled, or roasted and are widely used as snack foods. They are also processed into several food products, including peanut butter, confectionery products, flour, and energy bars. Different parts and by-products of the groundnut crop also have useful applications. Peanut shells can be used as fuel, organic manure, mulch, and as a raw material for producing industrial products such as furfural. Being a leguminous crop, *Arachis hypogaea* also helps improve soil fertility through atmospheric nitrogen fixation. Its cultivation in crop rotation can therefore benefit crops grown in the following season.

III. Food, Fibre and Green Manure: It includes-

- a) Sunn Hemp (Tag) (*Crotalaria juncea*):** Sunn hemp (*Crotalaria juncea*) is an important tropical leguminous crop with several agricultural and commercial uses. It is mainly cultivated for its strong fibre and is also widely used as a green manure and cover crop. Its rapid growth and ability to fix atmospheric nitrogen make it particularly useful for improving soil health.

The stems of *Crotalaria juncea* provide strong and durable bast fibres. These fibres are traditionally used for making ropes, cordage, fishing nets, twine, canvas, and similar products. The fibre can also be used in the paper industry to produce certain speciality papers, including tissue and cigarette paper. As a green manure crop, sunn hemp produces a large amount of plant biomass within a relatively short period. When incorporated into the soil, this biomass adds organic matter and nutrients and helps improve soil fertility. Its dense growth also helps suppress weeds, protect the soil surface, and reduce soil erosion.

Another important agricultural benefit of *Crotalaria juncea* is its role in the management of certain plant-parasitic nematodes, particularly root-knot nematodes. For this reason, sunn hemp can be included in crop rotation as a useful break crop to help reduce some soil-borne pest problems and support the productivity of subsequent crops.

- b) Sesbania species (*Sesbania sesban*):** This plant is a fast-growing, multipurpose leguminous shrub that has considerable agricultural and commercial importance in tropical and subtropical regions. It is useful in sustainable farming systems, livestock production, and rural livelihoods because it improves soil fertility and provides nutritious fodder, fuelwood, and other useful products.

The plant helps improve soil fertility through atmospheric nitrogen fixation by symbiotic bacteria associated with its roots. Its leaves and other plant materials can be incorporated into the soil as green manure, adding organic matter and nutrients.

It can also be grown in short-term fallow or crop rotation systems to improve soil conditions and support the growth of subsequent crops.

The leaves and young branches are rich in crude protein and can be used as nutritious supplementary fodder for livestock, particularly cattle and goats. The plant can also provide useful feed during the dry season when other sources of green fodder are limited. Its woody parts are commonly used as fuelwood and for charcoal production. The seeds and bark contain various bioactive compounds, including saponins, tannins, and flavonoids, and have been used in traditional medicinal practices. Gum obtained from plant exudates may also have commercial applications.

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