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Moth bean (*Vigna aconitifolia* L.) as a source of protein rich food for the marginalized population in the State of Jharkhand

Anita Chakraborty* & Sanjay Kumar Sinha

University Department of Botany, S. K. M. University, Dumka, Jharkhand, India

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Abstract- Moth bean (*Vigna aconitifolia*) is an underused but highly nutritious legume with strong potential to support food and nutritional security in India. Although it is widely cultivated in the arid regions of western India, its presence in the diets and agricultural systems of eastern states such as Jharkhand remains limited. This article highlights the nutritional profile, agronomic characteristics, and socioeconomic relevance of moth bean, with a focus on its suitability for marginalized communities in Jharkhand. The crop's drought tolerance, low input requirements, and high protein, vitamin, and mineral content make it a promising option for improving dietary diversity and reducing protein deficiency. The review also discusses policy gaps, limited research support, lack of improved varieties, and weak market linkages that restrict its wider adoption. Strengthening extension services, promoting cultivation through government schemes, and integrating moth bean into public food distribution programs can help address malnutrition while providing income opportunities for small and marginal farmers. Overall, the study emphasizes the need to reposition moth bean as a viable crop for sustainable nutrition and livelihood enhancement in resource-poor regions.

Keywords: Moth bean, Protein, Jharkhand, India, Cuisines, Drought-resistant crop, National Food Security Mission

INTRODUCTION

Moth Beans (*Vigna aconitifolia*) is the most underrated plant-based rich protein sources, mostly predominant in the dietary platter of the Western parts of India. It is commonly used in vegetarian and vegan diets, but it is not a regular part of staple meals in most regions. Also popular as matki bean, mat bean, dew bean, or Turkish gram, is small, oval-shaped, reddish brown and green in color pulses which is highly nutritious and healthy in protein-packed super food. Moth beans is widely cultivated in western parts of India, parts of the Southwestern States of the United States, China, Malaysia, Africa, Sri Lanka, and Myanmar.[1] In dry and semiarid areas, especially in the west, moth bean is largely farmed. Punjab, Haryana, Gujarat, Jammu and Kashmir, Madhya Pradesh, Uttar Pradesh, Maharashtra, and Rajasthan are the main states that grow moth beans.[2] This is the most popular healthy drought-resistant crop. Rajasthan, India's driest state, contributes mainly to moth bean production at the national level.[2] In India, it is a staple legume and most popular in the Maharashtrian cuisines, mostly consumed either as a sprout or in the cooked form.

This plant is native to India and is an annual herbaceous creeper that grows up to a height of 40 cm. The flower is yellow in color, and the pods are yellow-brown with about 2-3 inches in length. The plant is less demanding and grows on its own or intercropped with cash crops like cotton, etc. The plant requires very little attention with respect to irrigation and is effective in controlling soil erosion.

*Corresponding author :
Phone : 9711981579
E-mail : anitagcenator@gmail.com

METHODOLOGY AND SOURCE OF DATA:

Source of Data:

1. **Primary Data: Field Survey**

a. Observation

b. Random interview (face to face) with in the marginalized section of the society

2. **Secondary Data: Review of Literature**

a. Books b. Journals c. Internets d. Other

RESULT & DISCUSSION

V. aconitifolia is a native crop of India, Pakistan, Sri Lanka, and Myanmar.[3] Vavilov (1926)[4] claims that this species, both wild and cultivated varieties, are originated in India. It belongs to the family Fabaceae and the Subfamily Papilionoideae. The Plant is distinct with short internodes and densely packed branches that grow up to 150 cm tall, with small white deflexed hairs found on both stem and branches. The inflorescence is an axillary raceme with a fairly long peduncle of 5-6 cm long. The flowers are bisexual and are yellow in color. Fruits are pods, pale grey and brown in colour. Seeds are 6-8 in number and are brown in color.

V. aconitifolia are adapted to dry and semi-arid environments, because they can withstand high temperatures and adverse climatic uncertainties without affecting the physiology and the reproductive structure of the plants. It can withstand the temperature ranges between 25-37°C and rainfall in the range of 250-500mm. It can adapt to a wide variety of soil, but sandy loam soil is the most preferred for its luxuriant growth. It required very little organic content for growth.

The species that are both cultivated and grow in the wild requires very little attention. Well-defined cultivation practices can significantly improve its yield, contributing to both revenue generation and stakeholder engagement. It can also serve the purpose of the "India Protein Day, 27.02.2020" (A national public-health initiative has been launched by India on the health benefits of protein) and the National Food Security Mission (NFSM), committed to the National Food Security Act (NFSA).[5]

Rajasthan accounts for 85% of the total area under the cultivation practices of Moth bean and 55% of the total production contributing to the GDP of the country.[6] In States like Haryana, Madhya Pradesh, Uttar Pradesh, and Punjab, and some other states, moth beans are cultivated on a very small scale and in marginal lands. India stands first in production, registered at 6.12 million tons of this bean as compared to Brazil, China, and the United States. In Australia and the United States, new hybrid varieties were also introduced and cultivated.

In the arid and semi-arid regions, this bean represents the most preferred source of protein and carbohydrate-rich food for the marginalized group in society. When compared with other available legumes, this bean has a better digestible carbohydrate and fewer non-digestible carbohydrates (37.1%). The protein content is as high as 20 to 30%. The beans are rich in two amino acids like lysine (5.77%) and tryptophan (3.23%), which are usually reported to be low in the other available common cereals in India. Moth bean is acknowledged as a suitable source of energy, protein, and carbohydrates for human consumption.[7]

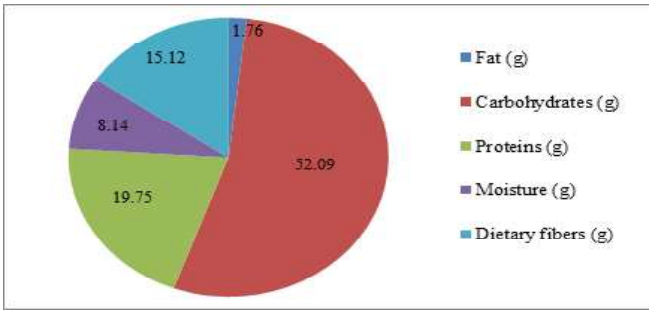


Fig 1. Dietary composition of macronutrients in Moth bean (Source: Rani, *et al.*, 2023)[8]

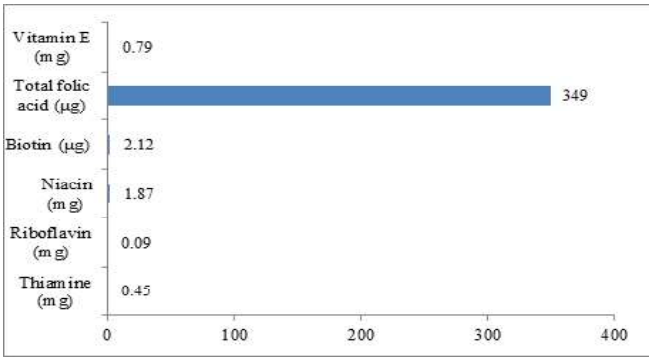


Fig 2. Dietary composition of Vitamin in Moth bean (Source: Rani, *et al.*, 2023)[8]

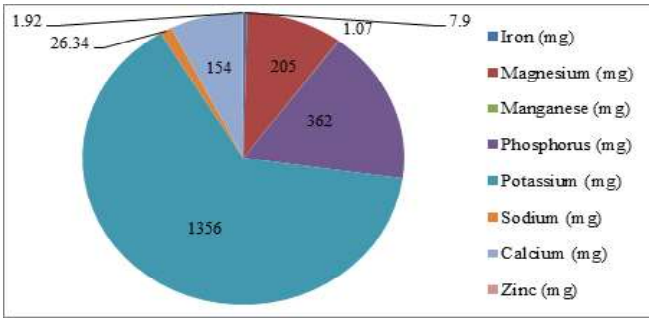


Fig 3. Dietary composition of Micro nutrients in Moth bean (Source: Rani, *et al.*, 2023)[8]

Once the crop is harvested, the seeds are either consumed raw or cooked. The unripe seeds are cooked as a common vegetable, while the ripe ones are fried, boiled, or cooked before consuming. The namkeen (salty, sour munchies) prepared from the dry seeds are the common delicacies amongst the local people. Furthermore Namkeen (a salty and soury snacks) commonly called "Dalmoth" in Hindi, is mainly prepared from this moth bean, here the "Dal" means Pulses and "Moth" means Moth beans. The whole plant after harvest is used to feed the cattle or to prepare the organic manure for the cultivation practices. They are outstanding pastures, and thus are preferred plants to grow in the hot and arid regions of India. They constitute high-quality fodder for livestock. Green forage yield of moth beans is more than 60 tonnes/hectare. Its feeding value is approximately the same as that of hay made from *Medicago sativa.*[8]

Pharmacologically, the crop has disease-curing ability. Used for common cough, obesity, liver ailments, paralysis, rheumatism, and liver disease.[9] The good amount of antioxidants, consisting of phenols and flavonoids, is responsible for providing the curative and preventive activity against many kinds of common diseases. Presence of bioactive substances like anti-oxidants and phytochemicals present in the moth bean is exploited for the treatment of various types of human Neurological and Immunological diseases like Parkinson's disease, lymphoma, MBL2 cell, etc.[10,11]

The widespread non-adoption of this species can be attributed to its adaptation to the climatic conditions, as well as the low yield of the produce. The non-involvement of advanced agricultural technologies, as well as poor policy-level backup and weak marketing linkages, also helps in failing interest, acceptance, and practices for its cultivation. Furthermore, the cultivated varieties are low-yielding types, and only 2% of the marginalized farmers are into practicing their cultivation. The fruiting and harvest time of these local and low-yielding varieties falls in the monsoon season, which further aggravates their losses at an alarming rate. Lack of proper research and field-level dissemination, monitoring, and stakeholder-level involvement further intensifies the doomed fate of this bean. The farmers practicing the moth bean cultivation are a highly unskilled, economically weak, and stumpy motivated section of the society who not only require the training and assistance but also financial backups and moral boost to accept and adopt this practice more scientifically.

Lack of proper research and constant work for the development of the new and better adopted varieties also acts as one of the major barriers for its popularization and adoption by the adjacent States with fairly or nearly similar kind of climatic conditions.[12]

Extremely low yield and unorganized marketing practices also limit the bean from entering the other States despite its high protein and nutritional value.

The marginalized populations of Jharkhand are highly dependent on the locally and wild mushrooms growing in the vicinity of their surroundings. Partly, the population is also dependent on soybeans for a wholesome meal as well as a protein supplement. Availability of the diversified and low-cost beans can help such groups to cater to their daily dietary needs without affecting their economy to a large extent.

Moth beans are rich in dietary fiber, nutraceuticals, pharmaceutical components, and vitamins and have a low glycemic index, but it is still an underutilized legume. This crop has the potential to combat malnutrition, protein deficiency, and food security while also providing a wide range of plant-based bioactive compounds and phytochemicals.[8] Some of the major health benefits provided by this bean can be enumerated in Table 1.

Table 1- Health benefits of Moth Beans

Sl. No.	Benefits	Specification
1.	Rich in Plant-Based Protein	An excellent source of plant-based protein for the vegan and vegetarian communities.
2.	Boosts Digestive Health	Presences of dietary fibers help in proper bowl movement and thus avoid constipation. It also promotes the environment of healthy gut bacteria.
3.	Regulates Blood Sugar Levels	It has fairly low glycemic index and thus can be a preferred food for the diabetic patients.
4.	Provides Long-Lasting Energy	High carbohydrate content in the beans provide sustained energy, making them an excellent choice for active individuals or anyone looking for an energy boost throughout the day.
5.	Supports Heart Health	It is rich in potassium and magnesium; which helps to regulate blood pressure and support heart health.
6.	Good for bone health	Presence of high calcium and phosphorus makes them ideal for the bone health contributing in the strengthening the mineralization processes of bones and bone density.

7.	Supports gut health	High dietary fiber content of moth beans makes them good for the digestive system. It strengthens the gut, regularizes bowel movement, alleviates constipation, keeps blood glucose and lipid profile in check.
8.	Rich in nutrients	Nutrients like proteins, folate, calcium, magnesium, iron, copper, potassium, phosphorus, zinc, sodium and vitamin -B1, B3, B5, C are abundant in the sprouts and ensure the high amount of bioavailability when consumed raw and uncooked.
9.	Promotes weight loss	It provides fullness after consumption, prevent food cravings and boost metabolic rate for the longer period of time. Its high dietary fiber and protein content makes them good option for people aiming to lose some extra kilos as well.
10.	Boosts immune health	High presence of zinc makes them powerful antioxidants. It helps to fight against many disease-causing bacteria, viruses, fungi and other foreign bodies.

India holds a rank of 102 with a score of 30.3 on the Global Hunger Index in 2019. The proportion of undernourished in the population is at 14.5%, the prevalence of wasting in children under five years is at 20.8%, the Prevalence of stunting in children under five years is at 37.9% and under five mortality rate is at 3.9%.[13]

Despite being the richest state with its mineral resources and lush forest reserve, the State of Jharkhand is still registered as the least developed and poorest state in the Country. According to the Census 2011[14], the population of the state is 3.3 crores, of which 24.05% represents the urban population. The decadal population growth is noted at 22.42%.

The state stands second after Madhya Pradesh in the performance index with a score of 28.67. Jharkhand is ranked with alarming hunger issues and ensures balanced food availability. The death per 1000 live births, which is the infant mortality rate (IMR), is 44 as compared to the national rate of 41. The rate is even poorer in the rural areas. Under-five mortality rate is as high as 54, and the same in rural areas is 58. The death of children can be linked to poor health of the mother or insufficient food consumption.[13]

Although the National Food Security Act (NFSA)[15], 2013 pressing to provide food and nutritional security in human life cycle approach, by ensuring access to adequate quantity of quality food at affordable prices to people to live a life with dignity and for matters connected therewith or incidental thereto has come up with many flagship schemes to mitigate the alarming issues across the country (Table. 2).

Table 2- Beneficiaries target governmental schemes

Sl. No.	Scheme	Beneficiaries
1	Targeted Public Distribution System	5 kg food grains per person per month to priority House Holds at Rs. 3 per kg for the poor and vulnerable sections of the society, such as- landless laborers, marginal farmers and wage earners contributing to the informal sections of the economy.
2	Anna Antyoday Yojana	35 kg food grains per person per month to House Holds covered under the scheme at Rs. 3 per kg covering below poverty line families headed by widows, terminally ill persons, disabled persons or persons above 60 years with assured means of subsistence or societal support.
3	Non-NFSA	8 kg of rice per person per month at the rate of Rs 15 per kg to the House Holds that are not covered under Priority House Holds or Antyodaya House Holds.
4	Pregnant Women and Lactating mothers	Meal, free of charge, during pregnancy and six months after the child birth, through the local anganwadi Maternity benefit of not less than rupees six thousand, in such installments as may be prescribed by the Central Government
5	Nutritional support for children	Children in the age group of six months to six years, age, appropriate meal, free of charge, through the local anganwadi. Children, up to class VIII or within the age group of six to fourteen years, whichever is applicable, one mid-day meal, free of charge, every day, except on school holidays, in all schools run by local bodies, Government and Government aided schools
6	Child Malnutrition	Local Anganwadis, identify and provide meals, free of charge, to children who suffer from malnutrition.

As a part of the National Food Security Act, 2013, Section 16, the Jharkhand State Government formed JSFC on April 13, 2017. The State launched a beneficiary targeted at four potential schemes, like:

a. Mid-Day Meal Scheme,
b. Public Distribution Scheme,
c. Integrated Child Development Scheme, and
d. Pradhan Mantri Matru Vandana Yojana

(Jharkhand State Food Commission (JSFC, 2025) https://jharkhandsfc.in/[16]

Despite the presence of both the central and state level policy interventions, National Sample Survey Office Data 2011-12, under NFSA, reported that only 86.48% of

the Rural and 60.20% of the urban population of Jharkhand is covered. Incorporation of these protein-rich pulses both at the governmental scheme and household dietary needs can be proven to be one of the beneficial actions, both at the level of nutritional security and also encouraging the cultivation of these matki beans. High demand for these beans can encourage more farmers to adopt and cultivate these moth beans on a larger and marketing-oriented scale. This will not only provide the financial gain but will also boost the morale of the farmers to invest their time, money, and resources required for the commercial cultivation of this species. Technical and scientific support from the government agencies can boost the motivation of the farmers in the arid and associated regions to proactively respond to the cultivation practices.

In this way, situated miles and miles apart, the State of Jharkhand can not only take a proactive step against the maturational status (targeting the protein need in the balanced diet) of the vulnerable communities but can also encourage the marginal farmers involved in the specific agro-climatic zone conducive for the commercial cultivation of this bean in the dry states of India.

Incorporation of this bean can help to reduce the pressure of high demand of the other protein rich component in the dietary components. It will also provide more and diversified option of protein-based meals for the beneficiary. Small in size also make them easy to handle in little space and time. Options to create diversified culinary and amalgamation of new cooking techniques can also be developed.

CONCLUSION

Moth bean is a resilient, nutrient-rich crop with the potential to improve both dietary quality and livelihood security in resource-limited communities. Its high protein content, adaptability to dry conditions, and low cultivation requirements make it a strong fit for regions like Jharkhand, where malnutrition and economic vulnerability remain major concerns. Despite its benefits, the crop is still underused due to limited research support, weak market linkages, and low farmer awareness. Promoting moth bean through targeted extension work, improved varieties, and inclusion in government nutrition and food distribution programs can help expand its adoption. With coordinated efforts, moth bean can serve as an accessible, affordable, and sustainable food resource for marginalized populations while offering new opportunities for small farmers.

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