AgriScope
Monthly e-Magazine on Agriculture and Interdisciplinary Sciences
Visit at us: www.agriscope.in
Email at us: agri4scope@gmail.com

PKM-1: A High-Yielding Drumstick (*Moringa oleifera* Lam.) Variety for Sustainable Vegetable Production in Bemetara Region of Chhattisgarh

[1]Shaurya Parganiha, [2]Hem Prakash Verma, [3]Sweta Parganiha and [4]Jitendra Trivedi

[1]Guest Teacher (Vegetable Science), College of Horticulture & Research Station, Saja, MGUVV, Durg (C.G.)

[2]Senior Research Fellow, ICAR-National Institute of Biotic Stress Management, Baronda, Raipur (C.G.)

[3]Guest Teacher (Soil Science), College of Horticulture & Research Station, Arjunda, MGUVV, Durg (C.G.)

[4]Principal Scientist and Head, Department of Vegetable Science, College of Agriculture, IGKV, Raipur (C.G.)

Article ID: 27003

Abstract

Drumstick (*Moringa oleifera* Lam.) is an important perennial vegetable crop valued for its nutritional, medicinal, and economic significance. Among the improved varieties cultivated in India, PKM-1 (Periyakulam-1) is one of the most widely adopted cultivars due to its early flowering, superior pod quality, high yield potential, and adaptability to diverse agro-climatic conditions. The variety was developed by Tamil Nadu Agricultural University and has gained popularity among farmers because of its commercial viability and consumer preference. The agro-climatic conditions of Bemetara district in Chhattisgarh are highly favorable for the cultivation of PKM-1 owing to the presence of fertile soils, suitable temperature regimes, and adequate rainfall. The variety exhibits excellent adaptability under both irrigated and rainfed conditions and provides substantial economic returns through multiple harvests and continuous market demand. This article highlights the origin, morphological characteristics, flowering and fruiting behaviour, yield potential, adaptability, nutritional significance, and economic prospects of PKM-1 with special reference to the Bemetara region of Chhattisgarh.

Keywords: Drumstick, Moringa oleifera, PKM-1, Bemetara, Chhattisgarh, yield potential, vegetable crop, economic importance

Introduction

Drumstick (*Moringa oleifera* Lam.) belongs to the family Moringaceae and is one of the most important vegetable crops cultivated in tropical and subtropical regions of the world. The crop is known for its exceptional nutritional composition and medicinal properties. Almost every

part of the plant, including pods, leaves, flowers, and seeds, is utilized for food, pharmaceutical, and industrial purposes (Fahey, 2005; Leone *et al.,* 2015). India is one of the leading producers and consumers of drumstick, where it forms an integral component of traditional diets and vegetable production systems. The increasing awareness regarding nutritional security and health benefits has enhanced the demand for drumstick in domestic as well as export markets (Fahey, 2005).The development of improved cultivars has significantly contributed to increasing drumstick productivity. Among them, PKM-1 has emerged as one of the most successful and commercially important varieties because of its early bearing habit, superior pod quality, and high yield potential (Rajangam *et al.,* 2001).

Origin and Development of PKM-1

PKM-1 (Periyakulam-1) was developed by Tamil Nadu Agricultural University (TNAU), Periyakulam, Tamil Nadu, through systematic selection and breeding programmes aimed at improving pod yield and quality. The variety was released for commercial cultivation due to its superior agronomic performance and wide adaptability (Rajangam *et al.,* 2001).

Morphological Characteristics

PKM-1 is a medium-sized and fast-growing variety. Plants generally attain a height of 4-6 m under normal growing conditions. The variety exhibits vigorous vegetative growth and produces numerous branches, which contribute significantly to higher pod production. The leaves are dark green, broad, and highly nutritious (Leone *et al.,* 2015). The plant possesses a strong regenerative capacity and responds well to pruning operations. Its well-developed root system enables efficient utilization of soil moisture and nutrients, contributing to drought tolerance and adaptability under varying environmental conditions (Purseglove, 1988).

Flowering and Fruiting Behaviour

One of the most important characteristics of PKM-1 is its early flowering and fruiting habit. Flowering generally commences within 90-100 days after sowing, while the first harvest can be obtained within 160-180 days. This early maturity allows farmers to obtain quicker economic returns compared with traditional drumstick cultivars (Rajangam *et al.,* 2001).The variety exhibits profuse flowering and excellent fruit-setting ability, resulting in a greater number of marketable pods per plant (Leone *et al.,* 2015).

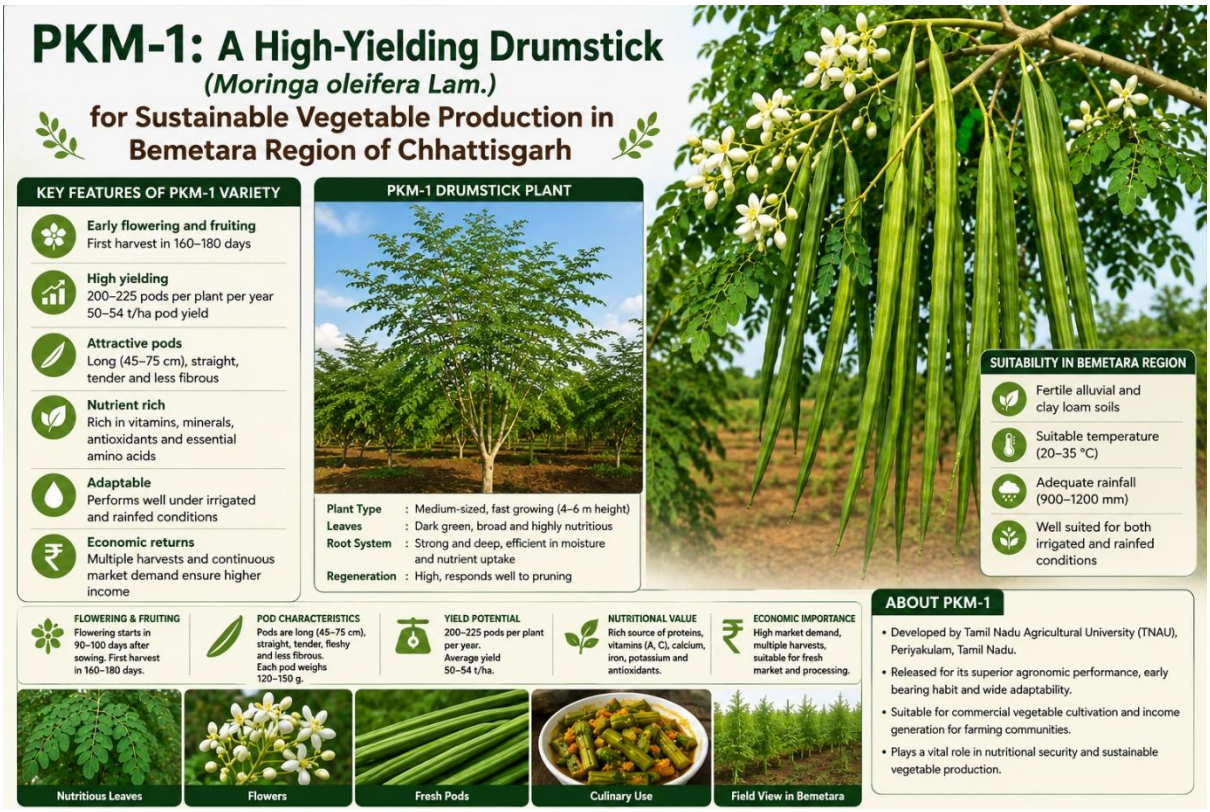

Figure 1. PKM-1 (Periyakulam-1) drumstick variety highlighting its morphological characteristics, yield potential, nutritional importance, adaptability and economic significance for sustainable vegetable production in the Bemetara region of Chhattisgarh.

(Source: Developed by the authors using AI-assisted visualization based on the information presented in this article)

Pod Characteristics

PKM-1 produces long, straight, attractive green pods with excellent consumer preference. The pods generally range from 45-75 cm in length and weigh approximately 120-150 g each. The pods are tender, fleshy, and less fibrous, making them highly suitable for fresh consumption and culinary uses (Rajangam *et al.,* 2001).

Yield Potential

PKM-1 is recognized for its outstanding yield performance. Under favourable growing conditions, a single plant may produce approximately 200-225 pods annually. Research reports indicate that the variety can achieve pod yields of 50-54 t ha^{-1}, which is considerably higher than many local cultivars (Rajangam *et al.,* 2001). Its high productivity makes PKM-1 particularly suitable for commercial vegetable cultivation and income generation among farming communities.

Nutritional Importance

Drumstick is regarded as a highly nutritious vegetable crop. The pods and leaves contain significant quantities of proteins, vitamins, minerals, antioxidants, and essential amino acids. The leaves are especially rich in vitamin A, vitamin C, calcium, iron, and potassium (Fahey, 2005; Saini *et al.,* 2016). Regular consumption of drumstick contributes to improved nutrition and health, particularly in rural populations where micronutrient deficiencies are prevalent (Fahey, 2005).

Adaptability and Suitability in Bemetara Region

Bemetara district of Chhattisgarh is characterized by a tropical sub-humid climate, fertile alluvial and clay loam soils, moderate rainfall, and favorable temperature conditions. These agro-climatic factors create an ideal environment for the cultivation of drumstick (Government of Chhattisgarh, 2024). PKM-1 has demonstrated excellent adaptability under the conditions prevailing in the Chhattisgarh plains. The variety performs well under both irrigated and rainfed situations and exhibits tolerance to short periods of moisture stress (Leone *et al.,* 2015). The fertile soils of Bemetara support vigorous vegetative growth, flowering, and pod development, thereby enabling farmers to realize the full yield potential of the variety.

Economic Importance

PKM-1 offers considerable economic benefits to farmers owing to its high productivity, multiple harvesting opportunities, and strong market demand. Compared with many seasonal vegetable crops, drumstick provides a longer productive period and relatively stable returns (Rajangam *et al.,* 2001). The increasing consumer preference for nutritious vegetables has further strengthened market demand, making drumstick cultivation a profitable enterprise. In addition, opportunities for value addition through leaf powder, dehydrated pods, and nutraceutical products are emerging, thereby increasing the economic potential of the crop (Leone *et al.,* 2015; Saini *et al.,* 2016).

Conclusion

PKM-1 is a superior drumstick variety characterised by early flowering, high yield potential, excellent pod quality, and wide adaptability. Its ability to perform well under both irrigated and rainfed conditions makes it particularly suitable for the agro-climatic conditions of Bemetara district in Chhattisgarh. The variety not only contributes to enhanced vegetable production but also supports nutritional security through its rich content of vitamins, minerals, and antioxidants. Furthermore, its high productivity, prolonged harvesting period, and strong market demand provide significant economic benefits to farmers. Therefore, the promotion and adoption

of PKM-1 can play an important role in sustainable vegetable cultivation, livelihood enhancement and agricultural diversification in the region.

References

Fahey, J.W. (2005). Moringa oleifera: A review of the medical evidence for its nutritional, therapeutic and prophylactic properties. *Trees for Life Journal*, 1(5), 1-15.

Government of Chhattisgarh. (2024). *District Statistical Handbook: Bemetara District*. Directorate of Economics and Statistics, Government of Chhattisgarh.

Leone, A., Spada, A., Battezzati, A., Schiraldi, A., Aristil, J., & Bertoli, S. (2015). Cultivation, genetic, ethnopharmacology, phytochemistry and pharmacology of *Moringa oleifera*. *International Journal of Molecular Sciences*, 16(6), 12791-12835.

Purseglove, J.W. (1988). *Tropical Crops: Dicotyledons*. Longman Scientific and Technical, London.

Rajangam, J., Azahakiamanavalan, R.S., Thangaraj, T., Vijayakumar, M., & Muthukrishnan, N. (2001). Status of production and utilization of moringa in southern India. In *Development Potential for Moringa Products*. Tanzania.

Saini, R.K., Sivanesan, I., & Keum, Y.S. (2016). Phytochemicals of *Moringa oleifera*: A review of their nutritional, therapeutic and industrial significance. *3 Biotech*, 6(2), 203.

Anwar, F., Latif, S., Ashraf, M., & Gilani, A.H. (2007). *Moringa oleifera*: A food plant with multiple medicinal uses. *Phytotherapy Research*, 21(1), 17-25.