International Journal of Science Info (IJSI)
ISSN:2455-4367 (Online)
Impact Factor: 2.013

Revitalizing *Momordica dioica* Roxb.: A Nutrient-Rich and Therapeutically Valuable Crop for the Rainy Season

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DOI: https://doi.org/10.5281/zenodo.16732913

Received: 20 July 2025 **Revise:** 25 July 2025 **Accepted:** 30 July 2025 **Published:** 03 Aug 2025

Abstract

Momordica dioica Roxb., often called spiny gourd or teasel gourd, is a nutritionally dense yet underappreciated vegetable that grows well in tropical and subtropical areas during the monsoon season. The spiny gourd, which has historically been grown in Southeast Asia and India, has become more well-known recently because of its high nutritional value, low calorie content, and possible therapeutic uses. This review covers the crop's origin, distribution, botanical characteristics, preferred climate and soil conditions, varietal diversity, nutritional and medicinal value, as well as methods for enhancing yield and plant protection. It has enormous potential for sustainable agriculture, nutritional security, and the creation of functional foods because it is a rainfed crop that can be grown on marginal soils.

Key words: Spiny gourd, rainy season crop, emerging seasonal crop, nutritional value.

1.0 Introduction:

Vegetables play a crucial role in the human diet by providing key nutrients like vitamins, minerals, fiber, and health-promoting phytochemicals. Although research and commercial farming have traditionally focused on major vegetable crops, growing interest is now being directed toward minor, indigenous, and underutilized varieties. These crops are well adapted to specific agro-climatic conditions and hold cultural significance through their integration in local diets and traditional knowledge systems.

One such promising underexploited vegetable is *Momordica dioica* Roxb. ex Willd., widely known by regional names such as spiny gourd, kakrol, kantola, or kartoli. Belonging to the family Cucurbitaceae, spiny gourd is a dioecious, perennial climbing vine, typically cultivated for its immature, spiny, green fruits, which are consumed as a vegetable in various regional cuisines,

especially during the monsoon season. The fruit is known for its distinct texture and mildly bitter taste, and is often stir-fried, stuffed, or curried in traditional recipes.

In recent years, spiny gourd has gained recognition as a "functional food", owing to its impressive nutritional and therapeutic profile. It is a rich source of antioxidants, flavonoids, phenolic compounds, and essential micronutrients such as iron, magnesium, potassium, vitamin C and dietary fiber. These bioactive components have been associated with a range of health-promoting effects, including anti-diabetic, hepatoprotective, anti-inflammatory, anti-obesity, and antimicrobial properties.

Traditional medicine systems, including Ayurveda and various indigenous healing practices, have long recognized the therapeutic value of *Momordica dioica* Roxb. Its fruits, roots, and leaves have been used to treat fevers, ulcers, skin infections, respiratory ailments, and digestive disorders. Recent scientific investigations are beginning to validate these ethnomedicinal applications, providing empirical support for its traditional uses and emphasizing its potential role in preventive and integrative healthcare.

Given its climatic adaptability, minimal input requirements, and suitability for organic and rainfed farming systems, *Momordica dioica* offers substantial promise not only for improving local food diversity and nutritional security, but also for enhancing livelihoods through the development of value-added products, nutraceuticals, and commercial cultivation. Ongoing research in agronomic practices, genetic enhancement, and post-harvest management is key to transforming this overlooked vegetable into a valuable resource for mainstream agriculture and nutrition.

Origin

Spiny gourd (*Momordica dioica* Roxb. ex Willd.), a member of the Cucurbitaceae family, is believed to be native to tropical Asia, with a long history of cultivation in India. Archaeobotanical and ethnobotanical evidence suggests that the crop has been domesticated and utilized since ancient times, primarily for its edible fruits and medicinal properties. The Indo-Gangetic plains are considered the center of its origin and domestication, where it has been traditionally grown and selectively propagated by indigenous communities (Rai et al., 2008)

Distribution

Spiny gourd is primarily distributed across South and Southeast Asia, where it grows abundantly in tropical and subtropical climates. The crop's native and naturalized range includes

countries such as India, Bangladesh, Nepal, Sri Lanka, Myanmar, and certain regions of Thailand and Vietnam, where it is cultivated both in the wild and in domestic settings for its nutritional and ethnomedicinal value.

In India, which serves as a major center of cultivation and consumption, spiny gourd is predominantly grown in the eastern, central, and western parts of the country. Key states involved in its cultivation include Bihar, Jharkhand, Odisha, West Bengal, Uttar Pradesh, Chhattisgarh, Maharashtra, and parts of Karnataka and Madhya Pradesh (Kumar et al., 2020). These regions offer favourable agro-climatic conditions, such as monsoonal rainfall, warm temperatures, and loamy to lateritic soils, which support optimal vine growth and fruit production.

Though still largely confined to local and regional markets, the crop's adaptability to rainfed and low-input agricultural systems has led to a gradual expansion of its cultivation in non-traditional areas as well. With rising interest in underutilized and climate-resilient crops, spiny gourd has potential for wider distribution both within India and across other parts of Asia. (Kumar et al., 2020).

Botany of *Momordica dioica* Roxb.

Spiny gourd is a perennial, dioecious, herbaceous climber that grows from underground tuberous roots. Key botanical features include:

- Leaves: Simple, alternate, broadly ovate with palmate venation.
- Flowers: Unisexual, yellow, with male flowers in axillary racemes and solitary female flowers.
- Fruits: Ovoid or oblong with spiny surface, green turning yellowish when mature.
- Seeds: Flat, brown, and enclosed in reddish pulp (Yadav et al., 2017).

Pollination is mainly insect-mediated, and fruit set depends on the presence of male and female plants in proximity.

Climate and Soil Requirements

Spiny gourd is a rainy season crop, thriving well under the following conditions:

- Climate: Warm and humid tropical to subtropical climates. Optimal temperature range: 25–35°C.
- Rainfall: Requires moderate rainfall; sensitive to waterlogging.

- Soil: Grows best in well-drained sandy loam or loamy soils with pH 6.0–7.5. Tolerates low fertility soils but responds well to organic amendments (Kumar et al., 2020).

Varieties

Being an underutilized crop, spiny gourd has limited improved varieties. However, some regionally selected lines and germplasm collections are maintained by ICAR and SAUs. Local landraces exhibit variability in:

- Fruit size and shape (oval, spindle, or cylindrical)
- Spine density and fruit color (green, dark green, striped)
- Tuber yield and vine length

There is ongoing research for hybrid development and sex identification at early stages to improve productivity (Ghosh et al., 2019).

Nutritional Composition

The high moisture content (84–87%) makes the fruit hydrating and ideal for consumption in tropical climates. Its moderate protein levels (3.1–4.5 g/100 g) make it a valuable addition to vegetarian diets, particularly in regions where plant-based nutrition dominates. The carbohydrate content (6.5–8.0 g) is primarily derived from complex sources, supporting sustained energy release and satiety.

The dietary fiber (2.0–3.0 g) aids in digestive regulation, glycemic control, and cholesterol management, making it beneficial for individuals suffering from type 2 diabetes, cardiovascular disorders, and obesity (Singh et al., 2014). Additionally, its low-fat content (0.5–0.7 g) aligns with heart-healthy dietary recommendations.

A notable feature of spiny gourd is its richness in vitamin C (30–50 mg), which enhances immune function, improves iron absorption, and supports antioxidant defense mechanisms. The iron content (2.0–3.5 mg) can help combat iron-deficiency anemia, especially in vulnerable populations. Furthermore, calcium (25–40 mg) present in the fruit contributes to bone health, although in moderate amounts.

Importantly, spiny gourd exhibits a high level of antioxidant compounds, particularly flavonoids and phenolics, which offer protective effects against oxidative stress and related chronic diseases such as cancer, cardiovascular diseases, and premature aging (Yadav et al., 2017).

Approximate Nutrient Composition (per 100 g edible portion):

COMPONENT	AMOUNT
MOISTURE	84–87%
PROTEIN	3.1–4.5 g
CARBOHYDRATES	6.5–8.0 g
DIETARY FIBER	2.0–3.0 g
FAT	0.5–0.7 g
VITAMIN C	30–50 mg
IRON	2.0–3.5 mg
CALCIUM	25–40 mg
ANTIOXIDANTS	High (flavonoids, phenolics)

(Source: Singh et al., 2014; Yadav et al., 2017)

2.0 Medicinal Properties and Health Benefits

Spiny gourd is used in Ayurveda and tribal medicine for various ailments. Documented health benefits include: Documented Health Benefits and Pharmacological Properties:

Anti-diabetic Activity: Extracts from the fruit and root of spiny gourd have demonstrated significant hypoglycaemic effects in animal models, attributed to the presence of bioactive compounds such as flavonoids and saponins, which enhance insulin sensitivity and regulate glucose metabolism (Yadav et al., 2017). This makes it a promising candidate for managing type 2 diabetes mellitus, particularly in populations dependent on plant-based remedies.

Anti-inflammatory Properties: Traditionally used to relieve pain and swelling, extracts from the leaves and roots have shown anti-inflammatory activity by inhibiting inflammatory mediators. This supports its use in managing conditions like arthritis, muscle inflammation, and skin eruptions.

Antioxidant Effects: The plant is rich in polyphenols, flavonoids, and ascorbic acid (vitamin C), which are potent antioxidants. These compounds help in neutralizing free radicals, reducing oxidative stress, and protecting cells from damage, thereby contributing to its anti-aging, anti-carcinogenic, and cardioprotective effects (Yadav et al., 2017).

Hepatoprotective Activity: Preclinical studies have shown that Momordica dioica extracts can protect liver tissues from damage induced by toxins or oxidative agents. The hepatoprotective properties are linked to the enhancement of liver enzyme functions and the prevention of lipid peroxidation, making it useful in the treatment of jaundice, fatty liver, and hepatitis (Patel et al., 2011).

Antimicrobial Potential: Extracts of the plant have demonstrated broad-spectrum antimicrobial activity against both gram-positive and gram-negative bacteria, as well as certain fungal

pathogens. These findings support its traditional use in the treatment of skin infections, wounds, and gastrointestinal ailments (Patel et al., 2011).

Digestive Health: The high dietary fiber content and certain phytochemicals in the fruit help in promoting gut motility, improving digestive enzyme activity, and alleviating constipation. Traditionally, it is used to enhance appetite, relieve dyspepsia, and improve bowel regularity.

Traditional and Ethnomedicinal Applications:

In tribal regions, spiny gourd is used not only as a vegetable but also as a curative food. The roots are decocted to treat diabetes and dysentery, the leaves are crushed to apply on skin rashes and boils, and the fruit pulp is consumed for cooling, detoxifying, and digestive purposes. These practices are gradually being validated by phytochemical and pharmacological studies, providing a scientific basis for its inclusion in nutraceutical formulations and herbal therapeutics.

Increasing Popularity: Why Is Spiny Gourd Trending?

Spiny gourd (*Momordica dioica*) is increasingly recognized as a high-value vegetable due to its multiple nutritional, economic, and functional advantages. It offers superior nutrient content compared to many common vegetables, with high levels of fiber, protein, vitamin C, and antioxidants, along with a low glycemic index, making it ideal for diabetic and health-focused diets.

Its availability during the monsoon season, when other vegetables are scarce, adds to its market demand, particularly in urban areas and among health-conscious consumers. The crop's potential as a functional food or nutraceutical has further elevated its appeal in both domestic and international markets.

Additionally, spiny gourd lends itself well to value addition and shelf-life extension through processing into pickles, dehydrated slices, and frozen products. As a result, it is now being commercially marketed in supermarkets and health food stores and is also being exported to Southeast Asia and the Middle East, signaling its rising economic and global significance.

3.0 Strategies to Enhance Spiny Gourd Production

To meet growing demand and improve the commercial viability of spiny gourd (Momordica dioica), several targeted strategies are being recommended:

i. Development of high-yielding hybrids with traits like early sex determination can significantly improve productivity and ensure consistent fruiting.

ii. Vegetative propagation through tubers or tissue culture techniques ensures genetic uniformity, faster crop establishment, and the multiplication of elite lines.

iii. Implementing training and trellising systems increases light exposure and air circulation, leading to enhanced vine growth and fruit yield.

iv. Off-season cultivation can be achieved using polyhouses, low tunnels, and drip irrigation, allowing year-round supply and higher profitability.

v. Adoption of organic farming practices not only promotes soil health but also helps meet export certification standards for chemical-free produce.

vi. Value addition through drying, pickling, and freezing improves shelf life and market value, opening new avenues in the processed food sector.

vii. Farmer training programs on best agronomic practices and integrated pest management (IPM) are essential to minimize losses and promote sustainable farming.

viii. Continued research and development support from institutions like ICAR and State Agricultural Universities (SAUs) is crucial for varietal improvement, disease resistance, and region-specific cultivation technologies.

These strategies, if effectively implemented, can transform spiny gourd from a minor crop to a mainstream horticultural commodity.

4.0 Conclusion

Spiny gourd (*Momordica dioica* Roxb.) stands out as a highly promising yet underutilized vegetable crop that offers a unique combination of nutritional richness, medicinal value, and adaptability to rainfed agriculture. Traditionally grown during the monsoon season, its increasing popularity is driven by rising consumer awareness of its health benefits, such as its low glycemic index, high antioxidant content, and potential applications in functional and therapeutic diets.

Despite its limited presence in mainstream horticulture, spiny gourd exhibits several traits favorable for wider adoption, including resilience to climatic fluctuations, ability to grow on marginal soils, and suitability for organic farming systems. Its value is further enhanced by the possibility of value-added processing (e.g., drying, pickling, and freezing), which can reduce post-harvest losses and improve marketability.

With the support of systematic scientific research, particularly in areas such as genetic improvement, pest and disease management, and propagation techniques, spiny gourd has the potential to be transformed from a niche crop into a mainstream component of nutrition-sensitive and climate-resilient agriculture. Integrating this crop into farming systems can not only diversify food baskets and improve dietary diversity but also significantly boost farmer income, especially in rainfed and resource-limited regions. Therefore, spiny gourd represents an opportunity for agricultural innovation, rural development, and the promotion of sustainable food systems.

Acknowledgment

The authors sincerely acknowledge the support of Principal, Z. B. Patil college, Dhule for providing necessary facilities and encouragement during the preparation of this manuscript. We also thank the faculty members of the Department of Botany, JET'S Z. B. Patil college Dhule for their valuable insights and constructive feedback.

5.0: References:

1) Chandra, S., & Sharma, R. K. (2013). Nutritional and pharmacological potential of spiny gourd (*Momordica dioica*): A review. *International Journal of Pharmaceutical Sciences Review and Research, 21*(1), 24–27.

2) Choudhary, B. R., & Gaur, K. (2018). Genetic variability studies in teasel gourd (*Momordica dioica* Roxb.) germplasm. *Indian Journal of Agricultural Sciences, 88*(5), 777–781.

3) Ghosh, A., & Dey, S. (2022). Antioxidant and antimicrobial potential of extracts from *Momordica dioica*. *Journal of Pharmacognosy and Phytotherapy, 14*(3), 78–84. https://doi.org/10.5897/JPP2022.0643

4) Ghosh, A., Ghosh, C., & Roy, S. (2019). Evaluation of genetic variability in indigenous teasel gourd (*Momordica dioica* Roxb.). *Journal of Pharmacognosy and Phytochemistry, 8*(3), 3156–3160.

5) Jha, A., & Chauhan, D. (2020). Underutilized cucurbits in India: A promising source for nutritional security and functional food. *Vegetable Science, 47*(1), 87–92.

6) Kumar, P., Singh, B., & Meena, M. K. (2020). *Momordica dioica*: A potential underutilized cucurbit. *International Journal of Current Microbiology and Applied Sciences, 9*(7), 2311–2318. https://doi.org/10.20546/ijcmas.2020.907.269

7) Kumar, R., Sharma, R., & Singh, A. (2016). Phytochemical and pharmacological profile of *Momordica dioica* Roxb. ex Willd.: A review. *Asian Journal of Pharmaceutical and Clinical Research, 9*(3), 14–20.

8) Pandey, S., & Rai, M. (2015). Prospects of wild cucurbits in food and pharmaceutical industry. *Acta Horticulturae, 1101*, 111–118. https://doi.org/10.17660/ActaHortic.2015.1101.17

9) Patel, D. K., Kumar, R., & Sairam, K. (2011). Review on medicinal importance of *Momordica dioica*. *International Journal of Pharma and Bio Sciences, 2*(1), 452–463.

10) Patil, S. M., & Salunkhe, A. M. (2021). Influence of organic inputs on the yield and quality of *Momordica dioica* Roxb. under rainfed conditions. *Journal of Agroecology and Natural Resource Management, 8*(2), 60–66.

11) Rahman, M. M., & Akter, M. (2014). Traditional uses and phytoconstituents of *Momordica dioica* in Bangladesh: A review. *Journal of Ethnopharmacology, 152*(2), 446–452. https://doi.org/10.1016/j.jep.2014.01.015

12) Rai, N., Pandey, S., & Kumar, S. (2008). *Minor vegetables of India: Genetic resources and production*. New Delhi: IBDC Publishers.

13) Sharma, P., & Singh, V. (2012). Domestication of spiny gourd (*Momordica dioica* Roxb.) for commercial cultivation in India. *Indian Journal of Horticulture, 69*(4), 491–494.

14) Singh, V., Rai, M., & Kumar, S. (2014). Nutritive value of some underutilized vegetables of India. *Indian Journal of Agricultural Sciences, 84*(4), 506–510.

15) Verma, R. K., & Dwivedi, P. (2019). Evaluation of tuber and fruit yield of teasel gourd (*Momordica dioica*) accessions under eastern Indian condition. *Vegetable Science, 46*(2), 236–240.

16) Yadav, J. P., Yadav, R. N., & Yadav, S. (2017). *Momordica dioica* (spiny gourd): An important vegetable crop with various health benefits. *Journal of Medicinal Plants Studies, 5*(2), 177–181.

Cite Article As: Samadhan Patil, Pratik Shinde, & Sarita Shinde. (2025). Revitalizing *Momordica dioica* Roxb.: A Nutrient-Rich and Therapeutically Valuable Crop for the Rainy Season. International Journal of Science Info (IJSI), XI (4), 62–70. https://doi.org/10.5281/zenodo.16732913

International Journal of Science Info (IJSI)
ISSN: 2455-4367 (Online)
Publisher: Vimal Publications Nandurbar
89, Namaskar Colony Nandurbar MS India.