

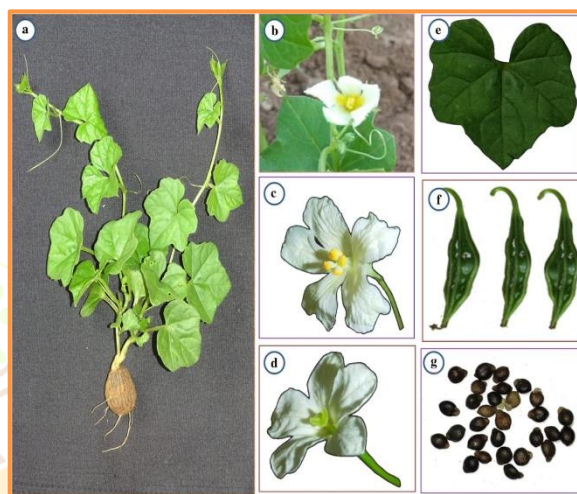
The Silent Vine of Virudhunagar: Rediscovering Athalakkai (*Momordica cymbalaria* hook.f.): An Underutilized Vegetable Crop

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In the dry scrublands and field bunds of Virudhunagar district, Tamil Nadu, a quiet vine emerges every monsoon. Farmers often overlook this slender vine because of its small lobed leaves and pale yellow flowers, mistaking it for a common weed. Beneath the soil, however, lies a remarkable perennial tuber that can remain dormant for decades. With the arrival of the rainy season, it sprouts naturally, producing fresh vines, flowers, and fruits without being replanted. This unique plant is Athalakkai, scientifically known as *Momordica cymbalaria* Hook. f., a wild relative of bitter melon (*Momordica charantia* L.) and one of India's most neglected underutilized vegetable crops. Athalakkai belongs to the family Cucurbitaceae and is known by different vernacular names across South India, including Kasarakayee in Andhra Pradesh, Karchikai in Karnataka, Kadavanchi in Maharashtra, and Athalakkai in Tamil Nadu. In Virudhunagar district, it has traditionally been collected from the wild rather than cultivated as a commercial crop. The small, ridged, orange-red fruits are commonly harvested during the season and prepared as curries or fried dishes. The tubers and leaves are also valued in traditional medicine for treating ailments such as diarrhoea, skin disorders, ulcers, and liver-related problems. Despite its rich nutritional and medicinal value, Athalakkai remains largely neglected in mainstream agriculture. The absence of improved varieties, poor seed germination due to hard seed coat dormancy, and limited scientific awareness have restricted its cultivation. However, its resilience to harsh environmental conditions, nutritional richness, and medicinal potential make it a promising crop for future research, conservation, and sustainable cultivation. Promoting Athalakkai can contribute to nutritional security, biodiversity conservation, and climate-resilient agriculture in dryland regions of India.



Propagation Techniques of Athalakkai

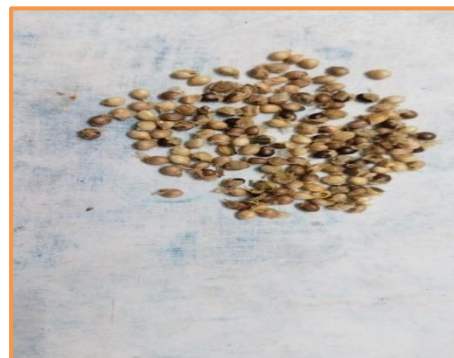
1. Vegetative Propagation (Tuber-based)

- The perennial woody tuber is the main organ of survival and propagation; the crop is propagated through tuber setts almost exclusively in traditional practice.
- Some sources note the crop duration runs roughly June–September in a growing cycle, with the tuber persisting dormant thereafter and re-sprouting the next season.
- Tubers are reported to remain viable in soil for extended periods (cited up to ~30 years in some literature), but multiplication rate via this method is inherently slow



2. Seed Propagation

- Seeds are hard-coated, and natural germination is poor and erratic; seeds are described as largely dormant under normal conditions.
- Comparative dormancy-breaking trials have found mechanical scarification (sandpapering or nicking the seed coat) more effective than chemical treatments (H_2SO_4 , GA_3) or hot-water soaking.
- Even after treatment, germination remains modest (roughly 10–20%).



3. In Vitro propagation (Tissue Culture)

- Developed to address the slow multiplication rate of tuber and seed methods, particularly for germplasm conservation.
- Explants used include seed, root-tuber, leaf, internode, and fruit tissue, cultured on MS (Murashige and Skoog) medium.
- Callus induction has been achieved using 2,4-D (3 mg/L) combined with BAP (0.2 mg/L); crude protein has also been extracted directly from callus tissue for biochemical/antidiabetic assays (α -amylase inhibition studies), linking tissue-culture work directly to the pharmacological research on Mcy protein.
- Direct organogenesis from axillary buds and multiple-shoot regeneration from nodal/leaf explants (using BA/Kn with IAA, NAA, or 2,4-D) have also been reported, with stem-derived explants generally outperforming leaf explants.

Nutritional and Medicinal Value of Athalakkai (*Momordica cymbalaria*)

1. Nutritional composition of athalakkai (*Momordica cymbalaria* hook .f.) fruit (per 100 g edible portion)

Nutrient	Content (per 100 g)
Potassium	505.92 mg
Calcium	73.57 mg
Sodium	41.58 mg
Zinc	2.76 mg
Iron	1.71 mg
Ascorbic acid(vit c)	299-300 mg
Total carotenoids	2.81 mg
Lycopene	1.86 mg
Crude protein	Present
Dietary fibre	High
Carbohydrates	Present
Unsaturated fatty acids	Palmitic, oleic, stearic acids

2. Medicinal Value

Traditional Uses

Used for the treatment of skin disorder.

- Used to manage rheumatism and ulcers.
- Used to treat diarrhoea.
- Traditionally used for spleen and liver disorder.
- Reported in folk medicine as an abortifacient.

Culinary Uses

- Prepared in southern India (Tamil Nadu, Karnataka, Andhra Pradesh) as stir-fries (*poriyal*), kuzhambu, and pickles. It has a bitter taste similar to bitter gourd (*karela*) but is smaller and crisper

Validated Pharmacological Activities

- Hypolipidemic: Reduces blood lipid levels along with glucose-lowering effects.
- Hepatoprotective and Nephroprotective: Improves liver and kidney function markers in diabetic animal models.
- Cardioprotective: Demonstrates protective effects on cardiac function.
- Antioxidant: Attributed to the presence of phenolic compounds, flavonoids, and tannins.

Conclusion

Athalakkai (*Momordica cymbalaria* Hook. f.) exemplifies the untapped potential of India's underutilized vegetable crops. It combines a nutrient-rich fruit containing high levels of vitamin C, essential minerals, and dietary fibre with well-documented medicinal properties, including antidiabetic, hypolipidemic, hepatoprotective, nephroprotective, and antioxidant activities. Despite these promising attributes, the species remains largely confined to wild populations in Virudhunagar district due to hard seed coat dormancy, slow tuber-based propagation, and the absence of improved varieties and standardized cultivation practices. However, recent advances in propagation techniques, including mechanical seed scarification and tissue culture-based micropropagation, together with the documented genetic variability among local accessions, offer promising opportunities for its domestication and commercial cultivation. With continued efforts in germplasm conservation, crop improvement, agronomic standardization, and pharmacological validation, Athalakkai has the potential to become a valuable climate-resilient vegetable crop, contributing to nutritional security, biodiversity conservation, and sustainable agriculture in India.

Reference

1. Parvathi, S.; Kumar, V. J. F. (2002). "Studies on chemical composition and utilization of the wild edible vegetable athalakkai (*Momordica tuberosa*)". Plant Foods for Human Nutrition. **57**(2): 215
2. Rao, B. K.; Kesavulu, M. M.; Giri, R.; Appa Rao, C. (1999). "Antidiabetic and hypolipidemic effects of *Momordica cymbalaria* Hook. Fruit powder in alloxan-diabetic rats". Journal of Ethnopharmacology. **67** (1): 103–109.
3. K. Raju; R. Balaraman; Vinoth Hariprasad; M. Kumar & A. Ali (2008). "Cardioprotective Effect of *Momordica Cymbalaria* Fenzl in Rats with Isoproterenol-Induced Myocardial Injury". Journal of Clinical and Diagnostic Research
4. B Kameswara Rao et al. J Ethnopharmacol (199)Antidiabetic and hypolipidemic effects of *Momordica cymbalaria* Hook. fruit powder in alloxan-diabetic rats
5. M Ailenia et al. Efficient *in vitro* regeneration and micropropagation of medicinal plant *Momordica tuberosa* roxb