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Original Research Paper

Unearthing the hidden treasure: Economic viability of teasel gourd (*Momordica dioica*) enterprise in Uttara Kannada, India

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ABSTRACT

Uttara Kannada district, nestled in the western Ghats of Karnataka, harbours a treasure trove of underutilized crops thriving in their natural wild habitat. Teasel gourd is traditionally grown by a few farmers, primarily for personal consumption or sporadically collected from the wild for sale. This crop has remained largely unexplored in terms of its economic viability. This study endeavours to shed light on its economics, based on primary data collected from 30 randomly selected farmers in Uttara Kannada, India during the year 2023. The findings revealed that the teasel gourd garden establishment requires an investment of up to ₹ 5,97,668 per hectare. The subsequent maintenance costs ranged from ₹ 2,94,460 in the first year to ₹ 3,65,830 by the fifth year. The net returns from teasel gourd farming are strikingly promising, fluctuating between ₹ 16,49,795 in the first year to ₹ 14,13,020 by the fifth year and the higher B:C ratio figures out the crop's potential to significantly boost the income of farmers. This study underscores the need for capacity-building programs aimed at popularizing teasel gourd cultivation among farmers in the Uttara Kannada, India. By tapping into this underutilized crop's economic potential, one can not only enhance the livelihoods of local farmers but also contribute to the realization of the Government of India's vision of vocal-for-local. Hence, teasel gourd farming will be the key to unlocking prosperity in Uttara Kannada's agricultural landscape.

Keywords: Benefit, cost, investment, teasel gourd, Uttara Kannada

INTRODUCTION

The Teasel gourd fruit is characterized by a short beak and dense echination with soft spines, initially green and later turning yellow as it matures. This climbing creeper is also grown in Pakistan, Bangladesh, and Sri Lanka. The fruits are rich in protein, calcium, phosphorous and iron, and boast the highest carotene content among cucurbitaceous vegetables. Despite its nutritional value, the vegetable faces underutilization and limited exploitation, primarily due to its vegetative propagation and dioecious nature. With proven nutritional and medicinal benefits, good keeping quality, the ability to endure long-distance transportation, and a high market price, teasel gourd has the potential to emerge as a major vegetable commodity, similar to bitter gourd, contributing significantly to farmers' income. Local farmers in various regions across the country appreciate teasel gourd for its easy availability in nature, as well as its nutritional and medicinal attributes (Tiwari et al., 2022).

Nestled in the western ghats and coastal areas of Karnataka, Uttara Kannada, stands as a treasure trove, showcasing the potential of cultivating under-utilized and neglected horticultural crops—a testament to the "*Vocal for Local*", a visionary ethos. This study delves into the significance of this district as a fertile ground for cultivating unique crops. Teasel gourd, an unexploited vegetable crop, takes centre stage due to its potential in doubling farm income, aligning with the Government of India's ambitious objective.

Thriving within the verdant expanse of the Western Ghats, the teasel gourd exhibits its distinctive characteristics as brief beak and a dense covering of soft spines. Flourishing seamlessly in areas dedicated to coffee cultivation, this unique gourd underscores its adaptability and ecological importance in the midst of the sprawling coffee plantations of the Western Ghats (Ashoka et al., 2013).

In the verdant expanse of Uttara Kannada district, the "Unearthing the Hidden Treasure" study not only focuses on the economic viability of Teasel gourd but also acknowledges the region's diverse agricultural tapestry. Beyond the allure of teasel gourd, the district boasts the popularity of other crops, such as pepper, coconut, areca nut, and paddy weaving a rich agricultural narrative. This study aligns with the "Vocal for Local" spirit, shedding light on the economic potential of teasel gourd while celebrating the enduring popularity of this traditional crop which continue to be the backbone of Uttara Kannada's agrarian legacy.

The cultivation of teasel gourd not only holds promise for economic growth but also contributes to sustainability by stabilizing farm income. Traditionally confined to kitchen gardens and wild habitat. Teasel gourd has recently gained traction among farmers, evolving from a household crop to a commercially viable venture as a result of intervention by a few research institutes like ICAR-IIHR, Bengaluru and College of Horticulture, Sirsi (Anonymous, 2023). As this crop begins to carve its niche in the agricultural landscape, it becomes imperative to understand its economics, specifically the capital required for establishment, cost of cultivation, and returns. This study aims to unravel the economic dimensions of teasel gourd production in Uttara Kannada, providing valuable insights for decision-making and the potential widespread adoption of this hidden gem in agricultural practices.

MATERIALS AND METHODS

Uttara Kannada was purposefully chosen due to its prominence in teasel gourd cultivation in Karnataka state. The aim was to assess the economic viability of teasel gourd farming, a critical component of the agricultural landscape in the region. Random samples of 30 farmers were selected for the study. The primary data collection centred on a pre-tested questionnaire, focusing on the initial investment pattern (establishment cost), year-wise maintenance cost, and returns derived from teasel gourd cultivation. The initial investment cost was distributed across the crop's lifespan *i.e.* 5 years. Expenditure data were categorized into material cost, labour cost, and fixed cost. Interest on working capital and fixed assets was computed at rates of 8 and 12 per cent per annum, respectively (Ashoka et al., 2021). To determine the yield per hectare, the yield per vine was calculated, factoring in vine mortality. This comprehensive methodology allowed us to delve into the economic intricacies of teasel gourd farming, providing valuable insights into the viability and sustainability of this agricultural enterprise in Uttara Kannada. Gross and net returns were calculated based on the tabular analysis.

This study aimed at identifying constraints; respondents' opinions play a pivotal role in providing nuanced insights. A purposive sampling approach was adopted, targeting individuals directly involved in the study. The study focused on diverse questions or domains, gathering opinions from a range of perspectives. Data collection was conducted through structured interviews, enabling respondents to articulate their views on identified constraints. The questionnaire incorporated a mix of seven questions. Participants were encouraged to express their opinions freely, emphasizing a comprehensive understanding of the challenges they perceive.

The constraints were identified based on frequency and percentage, allowing for a nuanced exploration of the most prevalent challenges (Ashoka et al., 2019). The methodology ensured a rich tapestry of opinions, providing a holistic view of constraints from the perspectives of those directly impacted.

RESULTS AND DISCUSSION

Initial investment for establishing teasel gourd garden

Teasel gourd, a perennial vegetable crop with a fruit-bearing potential spanning 5-6 years, entails an establishment cost. This initial investment encompasses the expenses associated with planting teasel gourd seedlings in the inaugural year. The per-hectare cost for setting up a teasel gourd garden was determined by evaluating the input resources and labour utilized within the research area. The primary constituents of the teasel gourd's startup outlays

Table 1 : Establishment cost of teasel gourd garden

Particular	Quantity	Rate (₹/unit)	Amount (₹/ha)	Share (%)
A. Material cost				
Teasel gourd seedlings (No.)	3333	20	66660	11.15
FYM (tons)	17.5	1897	33198	5.55
Fertilizers (kg)			4896	0.82
PPC			2510	0.42
Support structure (trellis system)			325410	54.45
Bio-agents			4856	0.81
Drip irrigation system			74256	12.42
Miscellaneous*			2501	0.42
B. Labour cost				
Land preparation (digging pits) (mandays)	216	305	65880	11.02
Planting + after care	50	289	14450	2.42
Miscellaneous**			3051	0.51
Total establishment cost			597668	100

*transportation + fencing + silt cost; **watch and ward, weeding, PPC application cost

include labour and materials, as delineated in Table 1. On average, the entrepreneurs incurred a gross establishment cost of ₹ 5,97,668 per hectare. A substantial portion of the material expenses was allocated to the support structure, specifically the trellis system and its accompanying accessories (₹ 3,25,410), constituting 54.45 per cent of the total establishment cost. Furthermore, the cost of drip irrigation facilities amounted to ₹ 74,256, accounting for 12.42 per cent of the total establishment expenses. The procurement of robust seedlings also constituted a notable portion of the material costs, totaling ₹ 66,660 or 11.15 per cent of the total establishment expenses. The labour expenses on land preparation activities also contributed significantly, amounting to ₹ 65,880 per hectare, or 11.02 per cent of the total expenditure.

The cost of maintaining teasel gourd garden

The substantial initial investment or establishment cost for the teasel gourd orchard appears to be outweighed by the subsequent returns. The annual expenses encompass, material, labour, and fixed costs along with ammortized establishment costs all of which contribute to the garden's yearly maintenance expenses. Additionally, when estimating the cost of cultivation, interest on both fixed and operational costs was taken into consideration (Table 2).

In the first year, the average cost of cultivating the teasel gourd amounted to ₹ 2,94,460 per hectare. Subsequently, the total maintenance costs were projected at ₹ 3,77,136, ₹ 3,39,286, ₹ 3,57,145, and ₹ 3,65,830 per hectare in the second, third, fourth, and fifth years, respectively. The cumulative effect of higher labour wages and increased material inputs led to an escalation in total costs as the plants matured. Within the total variable cost, expenses related to harvesting, pollination, training operations, inter-cultural operations, farmyard manure (FYM), PPC, fertilizers, and miscellaneous costs ranked prominently. Notably, the expenses associated with harvesting and pollination were particularly significant within the labour cost category due to the region's higher wage rates and labour scarcity in Uttara Kannada. Given that teasel gourd is a dioecious plant with separate male and female flowers, manual pollination, performed early in the morning, is an intricate and labour-intensive process, thus incurring higher costs. Conversely, fixed costs remained consistent across plant age groups, including the amortized establishment cost.

Returns from teasel gourd garden

The cost and revenue structure of teasel gourd gardens at different stages (Table 3), demonstrates a

Table 2 : Comparative maintenance cost of teasel gourd garden (₹/ha)

Particular	Age of the garden (years)				
	1	2	3	4	5
A. Material cost					
Training material	3850	4256	4589	4896	5021
PPC	5120	5987	5987	6021	6324
Fertilizers	5014	5369	5892	6058	6504
Fruit fly traps	3750	3685	3987	4012	4520
FYM	20450	22589	25987	27852	29680
Miscellaneous	5042	60589	7056	8080	8605
Interest on working expenses (8%)	3458	8198	4280	4554	4852
B. Labour cost					
Training operation	12568	13574	14580	15960	15980
Pollination	25691	28650	30756	32580	33501
Spraying PPC	5692	6057	6816	7250	7605
Inter-cultural operations	12568	15047	17057	19850	20684
Irrigation	5068	5980	6480	7806	8067
Harvesting	25920	32589	38620	42589	43501
Miscellaneous (repairs)	2045	2569	2989	3102	3268
Interest on working capital (8%)	7164	8357	9384	10331	10608
Rental value of land	15256	17560	18620	19850	20658
Land revenue	85	85	85	85	85
Apportioned establishment cost	119534	119533	119533	119533	119533
Interest on fixed capital (12%)	16185	16461	16589	16736	16833
Total Maintenance cost (A+B+C)	294460	377136	339286	357145	365830

noteworthy pattern. Teasel gourd plants begin to bear commercially viable fruit in their first year, albeit with a modest yield. As the gardens age progresses, the yield per plant increases, subsequently impacting the overall production.

On an average, a single plant yields 5.52, 6.01, 6.20, 6.34, and 4.02 kilograms of produce in the first, third, fourth, and fifth years, respectively. The tangible benefits of investing in teasel gourd crops are evident from the very first year, with gross returns of

Table 3 : Comparative cost and returns from teasel gourd enterprise

Particular	Age of the garden (years)				
	1	2	3	4	5
Total Cost of cultivation (₹/ha)	294460	377136	339286	357145	365830
No. of bearing vines (after mortality)	3202	3109	3050	3015	2950
Yield per vines (kg)	5.52	6.01	6.2	6.34	4.02
Yield /ha (kg)	17675	18685	18910	19115	11859
Price per kg of Teasel gourd	110	125	135	140	150
Gross returns (₹/ha)	1944254	2335636	2552850	2676114	1778850
Net Returns (₹/ha)	1649795	1958501	2213564	2318969	1413020
Benefit-Cost Ratio	6.60	6.19	7.52	7.49	4.86

Table 4 : Constraints of teasel gourd entrepreneurs

Particular	No. of farmers	Percentage*
High labour wages	25	83.33
Lack of consumer awareness about teasel gourd	20	66.67
High input cost	19	63.33
Lack of availability of high-yielding varieties	15	50.00
Availability of market information	15	50.00
Less technical knowledge	8	26.67
Availability of water resource	5	16.67
	30	100

*Multiple responses

₹ 19,44,254, ₹ 23,35,636, ₹ 25,52,850, ₹ 26,76,114, and ₹ 17,78,850 and net returns of ₹ 16,49,795, ₹ 19,58,501, ₹ 22,13,564, ₹ 23,18,969 and ₹ 14,13,020 per hectare, respectively. It's worth noting that the economic life span of a teasel gourd plant is five years, which accounts for the decline in both gross and net returns from fifth year onwards. The benefit-to-cost ratio of cultivating teasel gourd is significantly impressive, surpassing the returns obtained from arecanut cultivation in the study area. The benefit-cost ratio (BCR) for the teasel gourd garden peaks in the 3rd and 4th years at 7.52 and 7.49, respectively, indicating these are the most profitable years, with high yields and favourable market prices. In contrast, the 5th year sees a sharp decline to 4.86, likely due to reduced vine productivity despite the highest market price, signalling diminishing returns as the vines age. The first two years also show strong profitability but not as high as the peak years. The returns generated from teasel gourd cultivation in Karnataka significantly surpass those obtained from arecanut cultivation (Ashoka et al., 2022).

Constraints of teasel gourd garden enterprising

This study also aimed to identify the challenges associated with teasel gourd production (Table 4). A significant number of respondents (25) emphasized that the main constraint is the elevated wage rates during the peak season, which is exacerbated by a limited supply of agricultural labourers. Additionally, twenty respondents expressed concerns about the lack of awareness among the urban population regarding teasel gourd as a potential vegetable. Other notable constraints included the high input costs (19) and the absence of accessible market information (15).

CONCLUSION

Teasel gourd, cherished by local farmers across the country for its easy accessibility and nutritional-medicinal attributes, holds cultural significance. This crop plays a pivotal role in bolstering food security, generating income, preserving rural food culture, and meeting micronutrient needs. Strategic awareness programs, utilizing print and digital media, can highlight its nutritional and medicinal benefits, potentially fuelling market demand and facilitating nationwide availability. Anticipated consumer popularity may drive cultivation expansion, yielding increased profits for farmers.

In conclusion, the economic viability of Teasel gourd cultivation in Uttara Kannada, India emerges as a hidden treasure, offering a lucrative alternative to traditional crops like arecanut. The initial investment, albeit substantial, manifests as a strategic venture with potential returns surpassing those from other established crops. The Teasel gourd's promising yield, though labour-intensive, proves economically rewarding, with escalating profits over the years. This study not only highlights Teasel gourd's profitability but also underscores the challenges faced by farmers. Elevated wage rates, labour scarcity, limited awareness, and high input costs pose constraints to its widespread adoption. As Uttara Kannada district emerges as a focal point for cultivating this hidden gem, policymakers should consider incentivizing teasel gourd cultivation, promoting awareness, and addressing labour-related challenges.

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