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RESEARCH PAPER

Exploring the Opportunities of Gherkin Farming and its Export Potential in India

B. Keerthika[1*], M. Thilagavathi[2], C. Indu Rani[3], M. Prahadeeshwaran[2] and R. Vasanthi[4]

[1*]ICAR-Indian Institute of Millet Research, Hyderabad, India
[2]Department of Agricultural Economics, TNAU, Coimbatore, India
[3]Department of Vegetable Science, TNAU, Coimbatore, India
[4]Department of Social Sciences, HC&RI, Periyakulam, India

[*]Corresponding author: keerthikakural@gmail.com (**ORCID ID:** 0000-0003-2749-5501)

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ABSTRACT

The growth of horticultural crops surpassed agricultural growth in India during recent years. Gherkin is an important export market crops which is gaining attention during recent decades and has the potential for good returns. This study involves both primary and secondary data to explore the export potential of India and value- chain map of the gherkin industries in Dindigul district of Tamil Nadu. The secondary data regarding export of two different gherkin products viz., HS-200110 (Cucumbers & Gherkins, Prepared/ Preserved by Vinegar/Acetic Acid) and HS-071140 (Cucumbers & Gherkins, Provisionally Preserved) was collected for 30 years (1994-2023) and the Compound Annual Growth Rate (CAGR) was analysed. The result revealed that the export of HS-071140 was positive in both periods with the overall CAGR of 15.48 percent. Likewise, the HS-200110 was positive in period I but negative in period II with the overall CAGR of 11.32 percent. The primary survey involves purposive selection of two blocks from Dindigul viz., Vedasanthur and Dindigul blocks with 60 farmers in each block thus making total sample size of 120 farmers and four gherkin pickling cum export companies were also interviewed. The cost under conventional, drip and drip + mulch was ₹ 72962.30, ₹ 74914.60 and ₹ 77544.60 respectively whereas the net income was higher in drip + mulch with ₹ 152455 compared to conventional (₹ 42037.70) and drip alone (₹ 86085.40). The value chain analysis showed that two grades fetch higher prices viz., 160+ and 100+ where the net returns was higher in the export of former with ₹ 1,73,950/tonnes compared to the latter with ₹ 1,61,950. Gherkin is a profitable crop for farmers and the major constraint faced by them was fixed amount for each grade, hence laws should be strengthened so that the processors should not exploit the farmers.

HIGHLIGHTS

- Gherkin is an export oriented profitable crop for farmers as well as exporters.
- Gherkins are consumed in pickled form and Indian gherkins are preferred for their high quality/grades.
- Most of the gherkin are cultivated under contract farming and the entire pickled gherkins are exported.

Keywords: Gerkin, Compound Annual Growth Rate, Value-chain, Cost and Returns and Export

Gherkin (*Cucumis anguria*) is a high-value, export-oriented crop predominantly cultivated in Karnataka, Tamil Nadu, and Andhra Pradesh under contract farming arrangements. In this model, processing companies provide essential inputs, ensuring consistent quality and supply for international markets. The favourable agro-climatic conditions in South India allow for multiple cropping cycles annually, as gherkin is a short-duration (90 days),

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labour-intensive crop. India has emerged as the leading exporter of pickled gherkins, supplying premium-quality produce to global markets since the late 1980s.

Despite low domestic consumption limited to niche segments at around 100 metric tons. India has shown remarkable growth in gherkin exports. Studies by Kumar *et al.* (2008) and Naveen *et al.* (2020) highlight a steady rise in both provisionally preserved and ready-to-eat gherkin exports from 1991 to 2018. Prior research, primarily focused on Karnataka, indicates that contract farming has improved farmer profitability, especially when producing high-grade gherkins (Ahmed, 2009; Vembu, 2008). However, profitability remains contingent on effective crop management, given the high rejection rates and input costs (Ahmed *et al.* 2015).

While gherkin farming provides assured markets and employment opportunities, challenges such as seed availability, labour shortages, and quality compliance persist (Reddy *et al.* 2012; Prasad *et al.* 2016). Existing literature largely overlooks the experiences of farmers and processors in Tamil Nadu. This study aims to fill this gap by analysing the production trends, export performance, and key constraints in gherkin cultivation and processing within select regions of Tamil Nadu.

METHODOLOGY

Sampling method and data

This study utilized both primary and secondary data to analyze the trends, production systems, cost structures, and export performance of gherkins from India.

Data Collection

Secondary data on export volume and value of gherkins was collected for a 30-year period (1994–95 to 2022–23) under two major HS codes:

- *HS-200110*: Gherkins prepared/preserved by vinegar/acetic acid.
- *HS-071140*: Provisionally preserved gherkins.

Sources included APEDA, UN COMTRADE, and the Horticultural Statistics Handbook.

For the primary survey, Dindigul district in Tamil Nadu was randomly selected due to its prominence in gherkin farming. A purposive sampling approach was followed to select 120 farmers from two blocks: Vedasanthur and Dindigul (60 farmers each). Additionally, four processing-cum-export companies were interviewed to understand contract farming practices and value chain dynamics.

Structured and pre-tested questionnaires were used for both farmers and exporters to gather data on cost of cultivation, returns, production practices, and constraints in production and marketing.

ANALYSIS OF DATA

(i) Compound Annual Growth Rate (CAGR)

To assess the long-term trends in gherkin exports (both quantity and value), CAGR was computed using the semi-log functional form was similar as described by Angles *et al.* (2011) of the exponential growth model:

$$Y^t = ab^t u^t \quad \ldots(1)$$

where,

Y = Export quantity (MT/yr) and value (US $ mill)

a = intercept

b = Regression coefficient

t = time variable

The prescribed model then transformed into logarithmic form as given below and used for the estimation of co-efficient of selected variables in this study.

$$ln\ Y_t = ln\ a + t\ ln\ b + ln\ ut \quad \ldots(2)$$

The Ordinary Least Squares (OLS) method was used to estimate the model. The CAGR was derived from the regression coefficient using the formula:

$$CAGR\ (r) = [Antilog\ (log\ b) - 1] \times 100 \quad \ldots(3)$$

(ii) Cost and Returns

- **Variable costs** included inputs such as seeds, fertilizers, plant protection chemicals, irrigation, labor, and transportation.
- **Fixed costs** accounted for rental value of land, depreciation on fencing and staging, and land revenue.

- **Net returns** were calculated as the difference between gross returns and total costs (fixed + variable).

RESULTS AND DISCUSSION

Over the past two decades, India has seen a steady increase in the area and production of gherkins. The cultivation area expanded from 18,183 hectares in 2001 to 28,763 hectares in 2022, with India contributing 15 percent of the global production (PIB, 2022). Gherkins are primarily grown for export and pickling purposes (Prasanna and Singh, 2019), with only a small portion consumed domestically in international fast-food chains like Domino's and Pizza Hut.

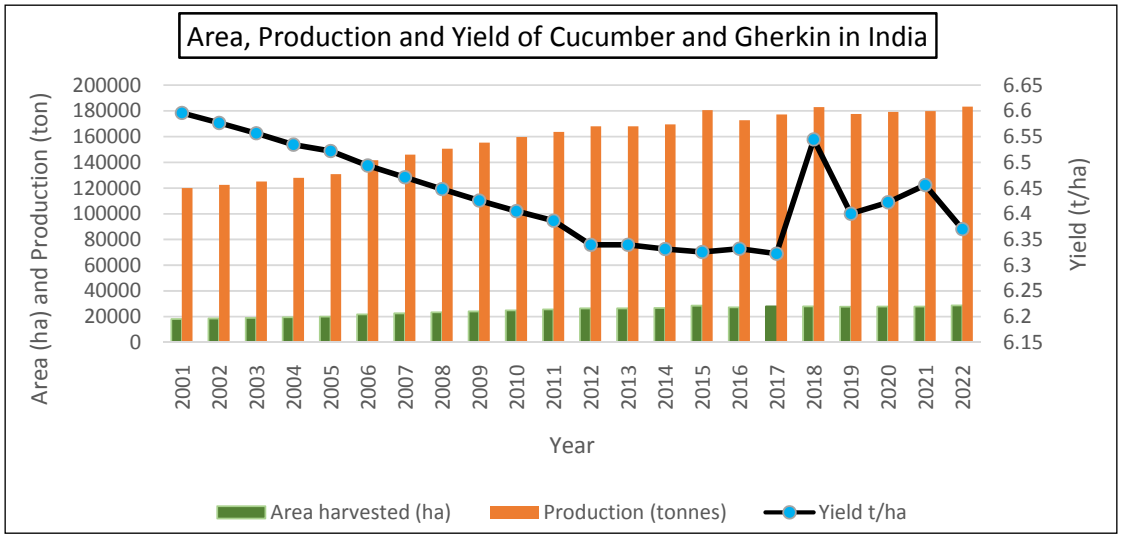
Table 1: Percentage of Export of Cucumber and Gherkin Products from India (Trade value in US $ Mill)

Year	Cucumbers & Gherkins, Prepared/ Preserved by Vinegar/ Acetic Acid (200110)	Cucumbers & Gherkins, Provisionally Preserved (071140)	Total Export
2020-21	137.72	85.32	223.04
	(61.75)	(38.25)	(100.00)
2021-22	127.63	71.83	199.46
	(63.99)	(36.01)	(100.00)
2022-23	136.3	82.44	218.74
	(62.31)	(37.69)	(100.00)

Table 1 presents the export data for cucumbers and gherkins from India over the past three years. The data indicates that bulk-packed gherkins (HS-200110) are exported in larger quantities compared to ready-to-eat gherkins (HS-071140). There was a decline in total exports in 2021-22 due to the pandemic's spillover effects. Despite this, India remains the top exporter of gherkins globally, with a total export value of USD 218.74 million in 2022-23, maintaining a leading position amidst strong competition (Kumar *et al.* 2008).

Gherkin exports initially began in Karnataka and later expanded to Tamil Nadu and Andhra Pradesh (Prasanna and Singh, 2019). The export of non-traditional food items, including fish and fish preparations and processed foods, saw an increase during 2008-09 (Kumar and Rao, 2010). These commodities experienced significant growth rates following the liberalization period (Shah, 2012). Within the APEDA export basket, cucumbers and gherkins hold the highest comparative advantage and export specialization (Leua *et al.* 2017), driven by the rising demand for Indian gherkins (Kumar *et al.* 2008).

In the TE-2023, the primary destinations for the export of HS-200110 and HS-071140 gherkins were the USA and Russia. In 2018-19, HS-071140 gherkins were mainly exported to France, generating USD 152.96 million, while the USA remained a consistent trade partner for HS-200110 gherkins



Source: FAOSTAT, 2021 (https://www.fao.org/faostat/en/#data/QCL)

Fig. 1: Area, production and yield of gherkin in India

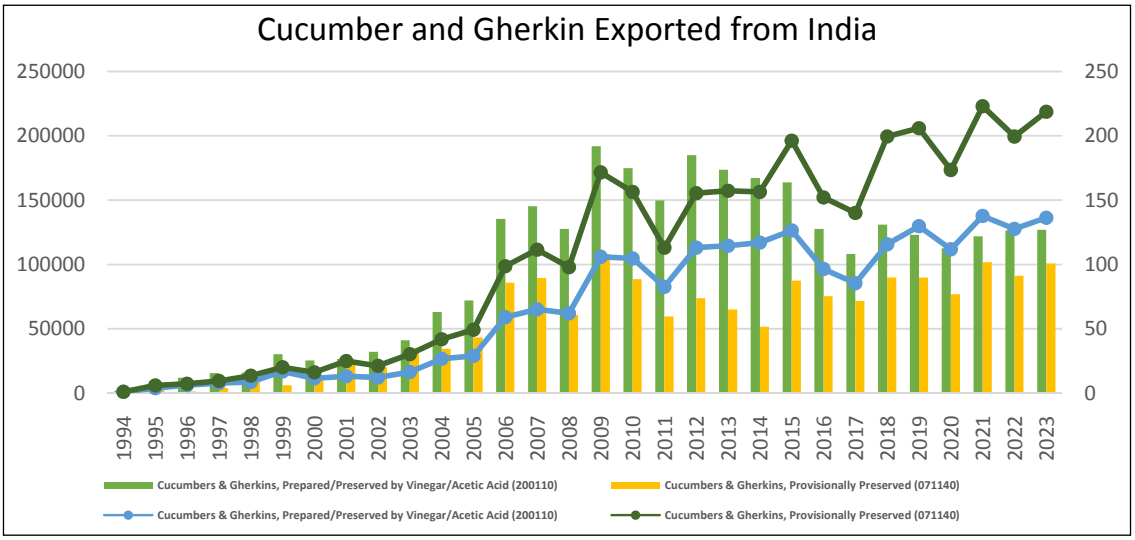


Fig. 2: Export trends in gherkins from India (1994-2023)

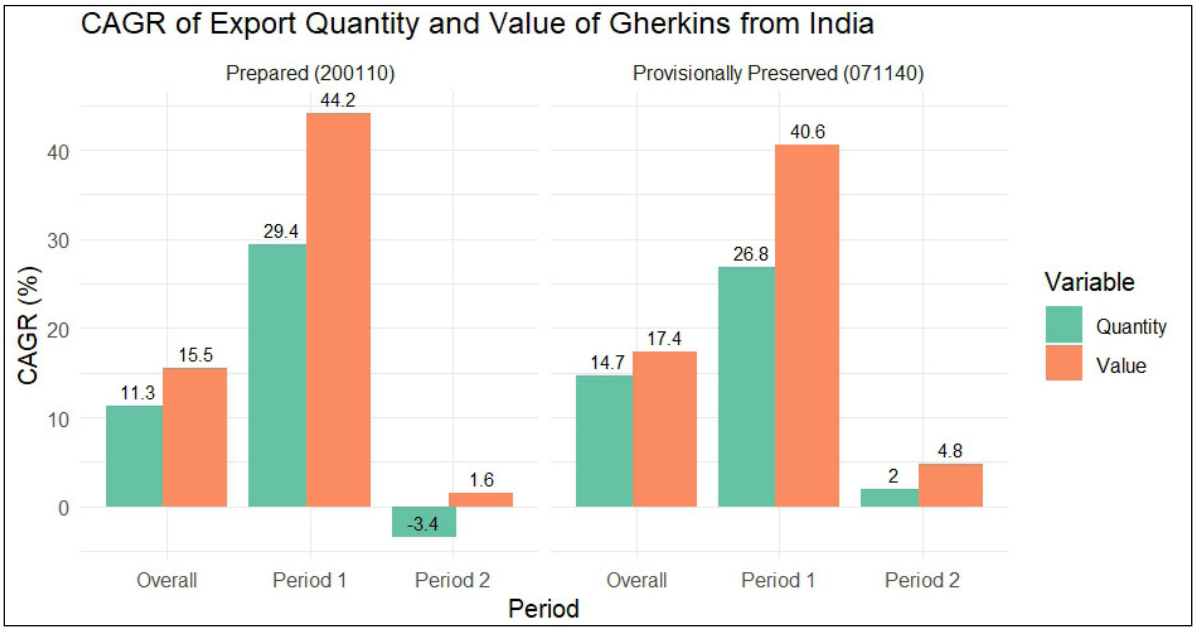


Fig. 3: Trend in the Export of Cucumber and Gherkin (Processed) from India (Qty in MT; Value in million US$)

over the past five years. The changing direction of trade highlights the evolving export patterns and geographic diversification of both types of gherkins from India, which will be discussed later. The Indian export basket is shifting from primary agricultural commodities to high-value secondary processed products (Kumar *et al.* 2005; Patil *et al.* 2023), as Indian exporters seek to penetrate new markets.

Export of Cucumber and Gherkin (Processed) from India

The export growth rate for cucumbers and gherkins (HS-200110 and HS-071140) indicated that during Period I, there was a positive and significant increase in both the volume and value of trade. However, in Period II, the growth rate for the trade volume was negative, while the value of trade continued to grow positively. This discrepancy was due to quality improvements in gherkins (Kumar and Rai, 2008), which resulted in higher per unit prices in the export market. The decline in the quantity exported from 2011 to 2021 was attributed to a reduction in gherkin production, as exporters faced increased logistic costs (APEDA, 2023). Additionally, the Russia-Ukraine conflict and geopolitical tensions contributed to the negative growth rate. Russia,

being the second-largest market for Indian gherkins after the USA, saw many shipments cancelled due to the conflict. The depreciation of the Russian Ruble against the US Dollar also led to payment issues, causing losses for Indian exporters and prompting a reduction in production, which further contributed to the negative growth rate in Period II (Ritter *et al.* 2023).

The primary export destinations for HS-200110 and HS-071140 gherkins in TE-2023 were the USA and Russia. In contrast, during 2018-19, HS-071140 gherkins were primarily exported to France, generating USD 152.96 million, while the USA remained a consistent and reliable trade partner for HS-200110 gherkins over the past five years. The changing direction of trade highlights the evolving export patterns and geographic diversification of both types of gherkins from India, which will be discussed later. The Indian export basket is shifting from primary agricultural commodities to high-value secondary processed products (Kumar *et al.* 2005; Patil *et al.* 2023), as Indian exporters seek to penetrate new markets.

Cost and returns

The cost and returns for the production of gherkin in different production systems for the study period is presented in Table 2.

There are three methods of production methods followed by the farmers of gherkin in the study area viz., conventional method, drip irrigation alone and drip irrigation along with mulch practices which also alters the cost of the production. From the table it is observed that the total cost of production per acre was ₹ 38873.06 for conventional farmers, ₹ 34665.32 for drip irrigated farmers and ₹ 32895.32 for drip irrigated and mulch followed farmers. Adoption of drip irrigation systems also reduces the irrigation charges, manures and pesticides requirements compared to conventional practices.

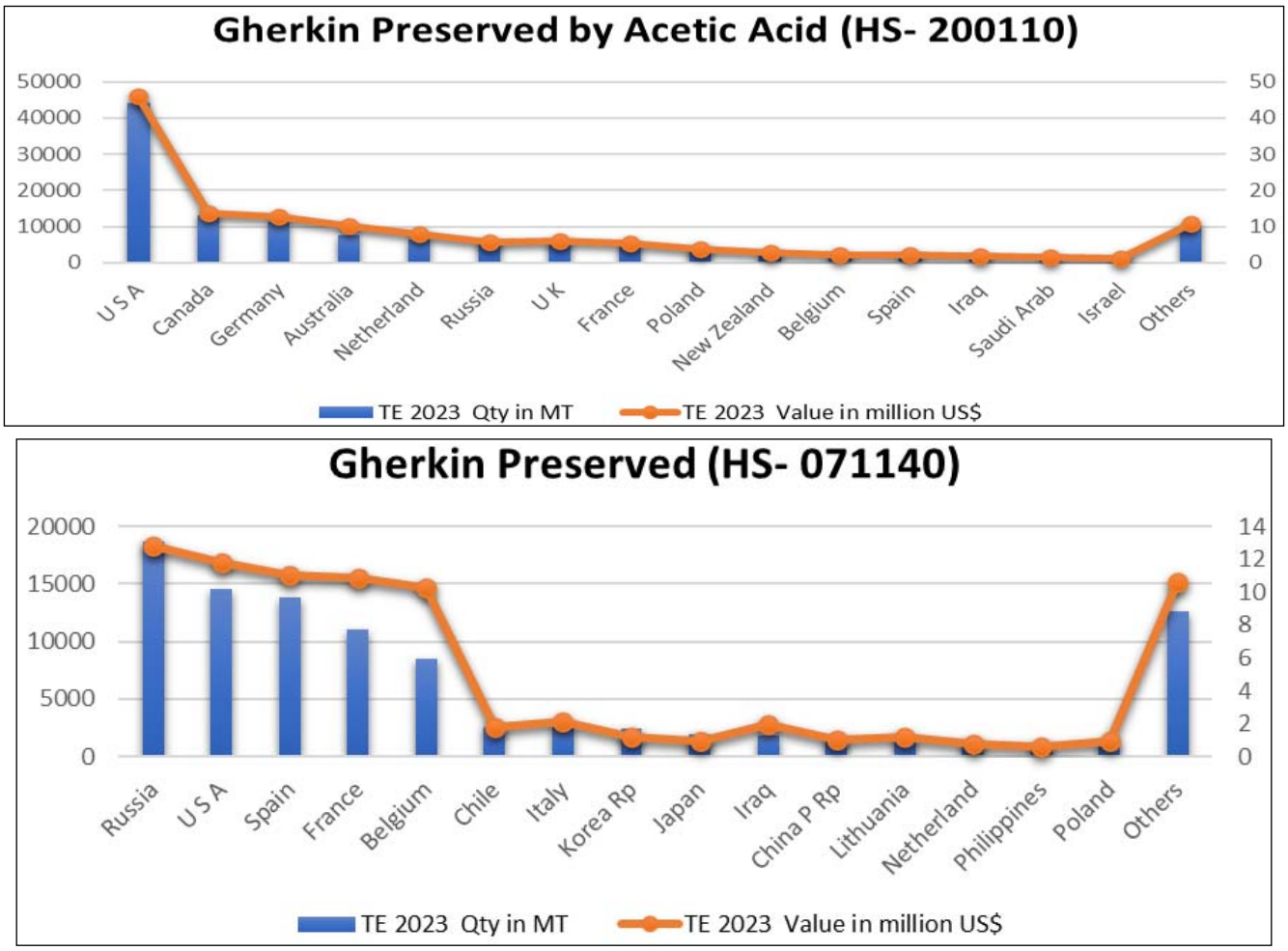


Fig. 4: Major Destination for Export of Cucumber and Gherkin from India

Table 2: Cost of production of gherkin under different production system *(in Rupees; figures in parentheses represents per centage to total)*

	Conventional		Drip irrigation		Drip irrigation + Mulch	
Sl. No.	**Particulars**	**Cost/acre**	**Particulars**	**Cost/acre**	**Particulars**	**Cost/acre**
	Fixed cost		Fixed cost		Fixed cost	
1	Rental value of owned land	2867.34 (3.93)	Rental value of owned land	2867.34 (3.83)	Rental value of owned land	2867.34 (3.70)
2	Land revenue	44.53 (0.06)	Land revenue	44.53 (0.06)	Land revenue	44.53 (0.06)
3	Depreciation on implements and farm buildings	2608.94 (3.58)	Depreciation on implements and farm buildings	2608.94 (3.48)	Depreciation on implements and farm buildings	2608.94 (3.36)
4	Fencing and staging	20000.00 (27.41)	Fencing and staging	20000.00 (26.70)	Fencing and staging	20000.00 (25.79)
5	Interest on fixed capital	3062.50 (4.20)	Interest on fixed capital	3062.50 (4.09)	Interest on fixed capital	3062.50 (3.95)
6			Drip	7000.00 (9.34)	Drip + mulch	12000.00 (15.47)
	Total	**28583.30 (39.18)**	**Total**	**35583.30 (47.50)**	**Total**	**40583.30 (52.34)**
	Variable cost		**Variable cost**		**Variable cost**	
1	Seeds	10000 (13.71)	Seeds	10000 (13.35)	Seeds	10000 (12.90)
2	Manures and fertilizers	3700.67 (5.07)	Manures and fertilizers	2570.24 (3.43)	Manures and fertilizers	2570.24 (3.31)
3	Plant protection chemicals	7500.20 (10.28)	Plant protection chemicals	7500.20 (10.01)	Plant protection chemicals	6430.21 (8.29)
4	Irrigation	6820.23 (9.35)	Irrigation	5430.12 (7.25)	Irrigation	5430.12 (7.00)
5	Labour	12827.20 (17.58)	Labour	10300 (13.75)	Labour	9000 (11.61)
6	Miscellaneous	3530.72 (4.84)	Miscellaneous	3530.72 (4.71)	Miscellaneous	3530.72 (4.55)
	Total	**44379 (60.82)**	**Total**	**39331.30 (52.50)**	**Total**	**36961.30 (47.66)**
	Grand Total	**72962.30 (100.00)**	**Grand Total**	**74914.60 (100.00)**	**Grand Total**	**77544.60 (100.00)**

Likewise, the drip along with mulch practices further reduces manures, pesticides and water requirements as the mulch will control weeds thus increase the irrigation efficiency of the farms.

The fixed cost for conventional farmers was Rs. 37450.25 but it was ₹ 44450.25 for drip adopted farmers and ₹ 49450.25 for drip and mulch adopted farmers which was due to the additional cost of raw materials used to adopt drip and mulch like the tubes, pipes and mulch sheets. But the variable cost was less for drip and drip plus mulch adopted farmers which was due to the reduction of manures and fertilizer cost as they will use fertigation method of fertilizer application which reduce the usage of fertilizer and there is difference between drip and drip plus mulch adopted farmers in plant protection chemicals and labours which is from the fact that the mulch controls the weeds which controls the pest that can act as vector for some fungal and viral diseases and the labours for weeding process was

reduced. There is no marketing cost of farmers in gherkin production as the processing industries are directly procuring the gherkins. Hence, the cost for plant protection chemical for drip plus mulch farmers was ₹ 6430.21 when compared with ₹ 7500.20 for drip irrigated farmers whereas the labour charges were ₹ 10300.01 for drip irrigated farmers but it was ₹ 9000 for drip plus mulch adopted farmers.

Returns from gherkins production

The returns from the production of gherkins under different production systems is depicted in Table 3. The net return was high for drip + mulch farmers with ₹ 1,97,105 per acre followed by drip system with ₹ 1,26,335 and ₹ 76,127 for conventional farmers. The higher returns in drip + mulch were due to the higher quantity of 160+ grades production likewise they were strictly following the guidance provided by field officers appointed by the industries. This was the reason the B:C ratio was higher for drip + mulch farmers with 5.99 followed by drip irrigated farmers with 3.64 and lastly the conventional farmers with 1.96. The higher B:C ratio for drip + mulch and drip irrigated farmers was due to the fact that they are generally larger farmers and there is no marketing cost as the industry will collect the produce from farm itself and also the grades produced by these farmers are mostly the premiere grades of 160+ to 100+.

Table 3: Returns from the gherkin production under different production system *(Yield in Kgs; Cost in Rupees)*

Particulars	Conventional	Drip alone	Drip + Mulch
Yield/ac	5000	7000	10000
Price	23	23	23
Total cost	72,962.30	74,914.60	77,544.60
Gross Income	1,15,000	1,61,000	2,30,000
Net Income	42,037.70	86,085.40	1,52,455.00
B:C	1.58	2.15	2.97

Value chain analysis of gherkin preservation

The value chain analysis for the preservation of gherkins of two different grades are illustrated in Fig. 5. The total fixed cost for both the grades are common with ₹ 69.96 which includes salaries for permanent employee of ₹ 57.53 per tonnes, depreciation on building of ₹ 3.29 per tonnes, depreciation on machinery of ₹ 1.64 per tonnes and interest on fixed capital at 12 per cent of ₹ 7.50 per tonnes.

The most demanded grades of gherkins are 160+ and 100+ which means in a kg the number of gherkins should be 160 and 100, respectively. Hence the smaller sized gherkins are demanded more and the reason for this due to the fact that the number of labours involved in cleaning of these small sized gherkins is tedious and in India human labours are available abundantly hence the demand for the smaller sized gherkin was more for Indian gherkins. The price for these grades is immensely high compared to other grades i.e., ₹ 45 per kg for 160+ grades, ₹ 25 per kg for 100+ grades, ₹ 15 per kg for 60+ grades, ₹ 3-11 per kg for 30+ to 30- grades, ₹ 9 per kg for 5+40 mm grades and ₹ 8 per kg for 5-40 mm grades.

The only difference in the cost of production for two different grades was the purchase price which is ₹ 45,000 per tonnes for 160+ grades and ₹ 25,000 for 100+ grades and the price per barrel of 260 litres capacity of preserved gherkins was ₹ 60,000 for 160+ grades and ₹ 52,000 for 100+ grades.

The unit will run with an average capacity of 1 to 2 tonnes per hour and in season time (September-December) the average production will be 2500 to 3500 barrels of preserved gherkins. And in the non-season times they are preserving other vegetables like jalapenos, paprika, onions etc., for the export markets. The returns from the same is given in Table 4.

Table 4: Returns from the pickled gherkins (grade-wise)

Particulars (Grade 160+)	Returns	Particulars (Grade 100+)	Returns
Gross returns/ tonnes	2,40,000	Gross returns/ tonnes	2,08,000
Net returns/tonnes	1,73,950	Net returns/ tonnes	1,61,950
Total net returns/ annum	52.18 crore	Total net returns/ annum	16.20 crores

The marketing efficiency for the industry was estimated using Marketing Efficiency Ratio (MER) and the results for each grade was found to be 3.63 for 160+ grades and 4.52 for 100+ grades, the

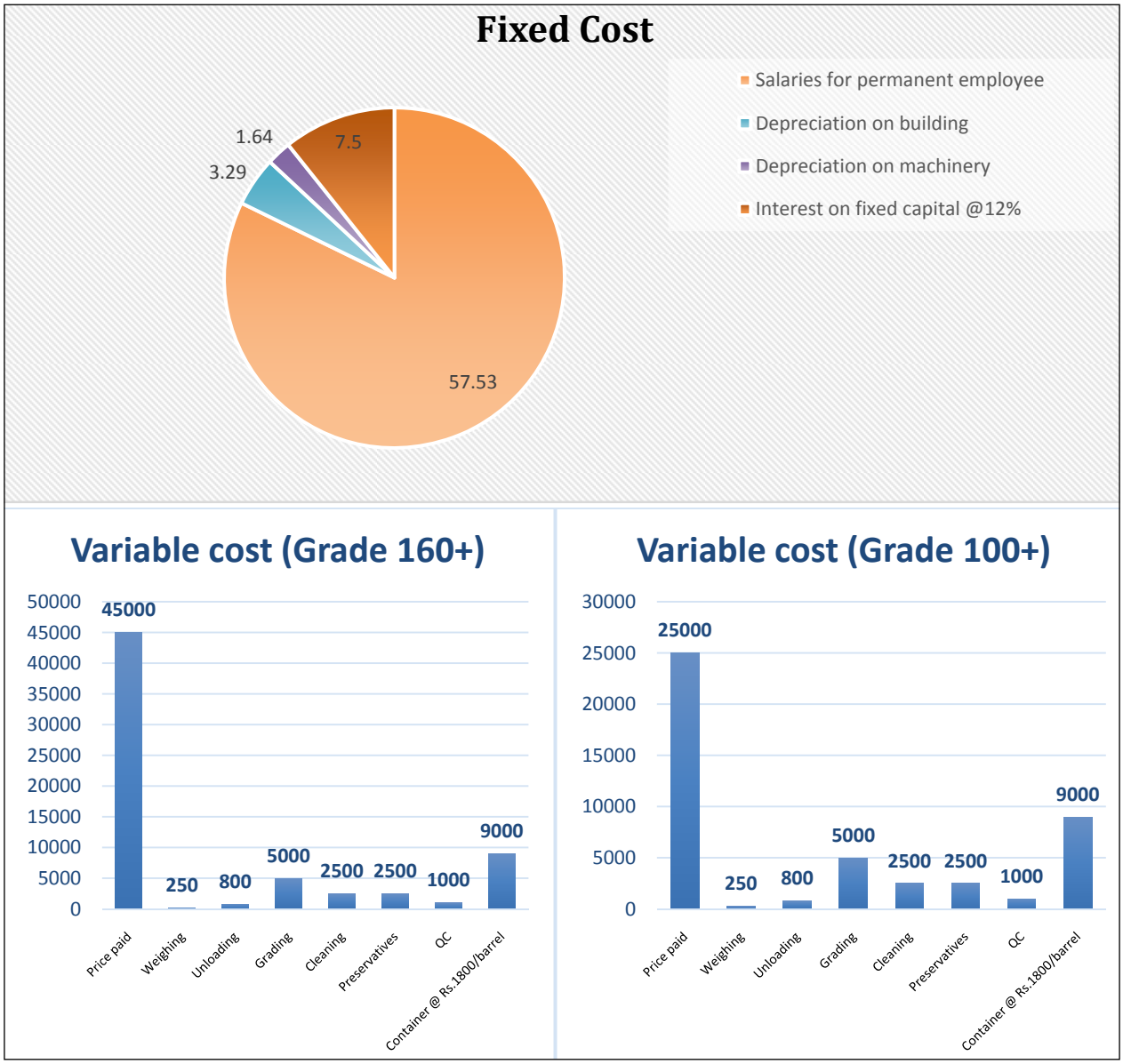


Fig. 5: Value Chain analysis of gherkin pickling for two different grades *(Cost in ₹ per tonnes)*

difference in MER was due to the higher labour cost for 160+ grades.

Functional process involved in gherkin pickling

The gherkin pickling process starts with creating a sowing plan, deciding on the cultivation area, and selecting farmers based on the quantity and quality needed by international buyers. Unlike mango pickling, gherkin processing in India focuses entirely on export, with the product not being ready-to-eat at the beginning.

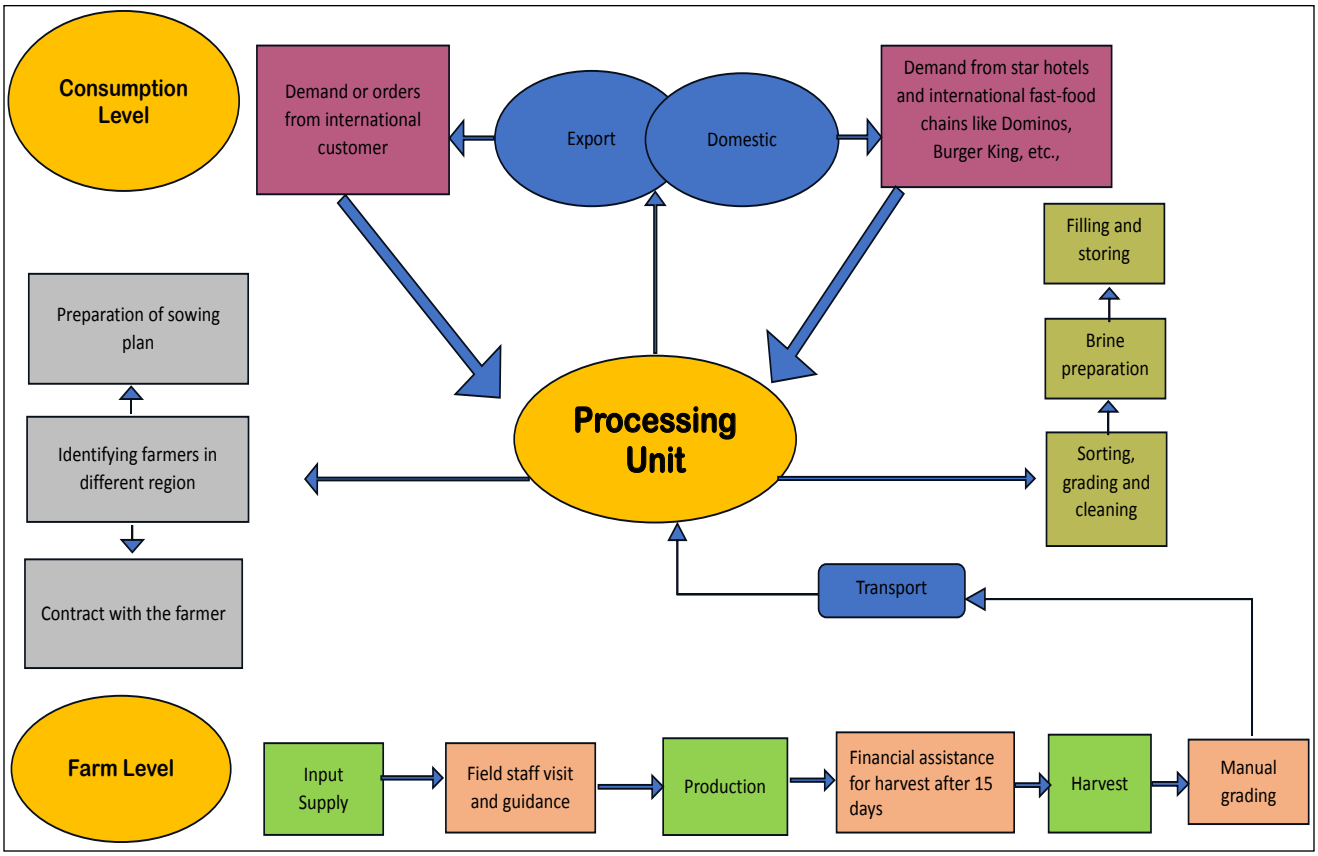
After finalizing the sowing plans and identifying farmers across various regions, field staff are assigned to each operational zone. These staff members, while not always agricultural graduates, get practical on-farm training. Their main duties include providing technical help and supplying necessary inputs to the contracted farmers. Farmers receive financial advances based on their production capacity for the needed varieties, with extra support from processing units to help them access credit through banks and other institutions. Farming activities, such as manuring, weeding, pest control, irrigation, and harvesting, require significant labor, which helps generate rural employment.

Harvesting starts about 30 days after planting, with produce collected every day. Procurement

happens directly in the field, where workers manually grade the produce using grading sieves and assign lot numbers to each farmer. The graded produce is then sent to the processing facility. In the processing units, defective and unwanted materials are removed before the produce is sorted mechanically into about six grades. Further cleaning and sorting are done by hand. Next, gherkins are packed into drums filled with vinegar or acetic acid solution and left to ferment for 7 to 10 days or 13 to 15 days, depending on the grade. After fermentation, a topping process is done to make up for weight loss. The sealed drums are kept in shaded areas until they are ready for dispatch. The final stage is transportation to overseas customers, mainly by sea. Sometimes, buyers handle their own logistics and may ask for sensory evaluation reports to confirm quality standards. Only a few traders buy bulk quantities for independent export. The gherkin pickling industry operates through a straightforward and efficient supply chain, as shown in Fig. 6.

Conclusion and Policy Suggestion

Gherkin is an export oriented horticultural crops which is cultivated under contract farming in India. The contract farming will provide higher gross returns compared to traditional farming (Dev and Rao, 2005; Dileep *et al.* 2002; Kumar 2006 and Swain 2011) which will not only increase the farmer's income but also help in getting sustainable income. The export of gherkins is concentrated to only two countries viz., USA and Russia which needs to be addressed and diversification on geography of export should be promoted. The gherkin cultivation in Tamil Nadu takes place under three methods and mostly the 160+ and 100+ grades fetch good price in export market; hence training should be strengthened to know about the time of harvest to get good grade gherkins. The major constraint faced by contract farmers were the fixed price provided by the processing companies; hence contract farming laws should be strengthened in which no farmers should be exploited with low cost.



Source: *Field Survey*

Fig. 6: Supply chain map of gherkin in the study region

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