Opportunities in Export Marketing of Greenhouse Vegetables (Special Reference - North Maharashtra)

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Abstract

India ranks second in the world in vegetable production. At present, according to various estimates, approximately 25,000 to 70,000 hectares of land in the country are under protected cultivation. Although this share is relatively small compared to the total cultivated area, it is expanding rapidly. The Government has set a target to increase the area under protected cultivation to 100,000 hectares by the end of 2025. The adoption of structures such as greenhouses, polyhouses, and net houses has made it possible to produce high-value crops throughout the year under controlled environmental conditions. This production system ensures uniformity in quality, size, colour, and freshness, and enables more effective management of pests and diseases. As a result, residue-free and high-quality vegetable produce suitable for stringent international market standards can be achieved. Protected cultivation provides yields that are two to five times higher than those obtained from open-field farming. Consequently, farmers cultivating high-value crops gain opportunities for higher returns. Global demand for fresh, safe, and exotic vegetables is increasing, thereby creating significant export opportunities for India. The objectives of this study are to examine the current status of vegetable production and exports through greenhouse technology, to identify export market opportunities, to analyse major constraints, and to suggest measures for enhancing exports.

The study adopts descriptive and analytical research methods and is based on secondary data. Data have been collected from sources such as APEDA, the National Horticulture Board, government reports, and academic research publications. Data for the period from 2020–21 to 2023–24 have been analysed using percentage analysis and year-on-year growth techniques. The findings indicate that India's fresh vegetable exports amounted to approximately INR 6,927 crore in 2023–24. While traditional crops account for a major share of vegetable exports, the contribution of high-value vegetables produced under greenhouse conditions remains relatively low. There is substantial potential for crops such as capsicum, cherry tomato, broccoli, lettuce, and specialty cucumbers. In North Maharashtra, particularly the Nashik and Ahmednagar regions, conditions are

favorable for export-oriented protected cultivation. Strengthening crop planning, quality control, training, and infrastructure can enhance exports through protected cultivation and contribute to stable farm incomes.

Introduction :

India is one of the leading countries in vegetable production and currently ranks second in the world. According to various estimates, about 25,000 to 70,000 hectares of land in India are under protected cultivation. Although this area is small compared to the total cultivated land, it is growing rapidly. The central government has set a target to expand the area under protected cultivation to 100,000 hectares by the end of 2025. Across different regions of the country, the adoption of protected farming technologies such as greenhouses, polyhouses, and nethouses is increasing. These technologies support the shift towards modern and sustainable agriculture. Through controlled environmental structures, it is possible to produce high-value crops throughout the year, improve product quality, and manage pests and diseases more effectively. As a result, such produce meets strict international export standards.

The expansion of protected cultivation in India has brought significant changes in vegetable production and marketing practices. Controlled temperature, humidity, and light conditions allow year-round production. Uniformity in quality, size, colour, and freshness is maintained. Pest and disease control is more effective, which reduces the need for chemical pesticides. These features help in producing residue-free and high-quality vegetables that meet global market requirements. Compared to open-field farming, protected cultivation provides two to five times higher yields, creating better income opportunities for farmers growing high-value crops. The main objective of this study is to understand the current status of vegetable production and exports through greenhouse technology, identify export market opportunities and major export-oriented crops, examine key constraints, and suggest policy measures to promote export growth. The study uses descriptive and analytical methods. It is based mainly on secondary data collected from APEDA export statistics, reports of the National Horticulture Board, government documents, and academic research articles. Data from the period 2020–21 to 2023–24 have been analysed using percentage analysis, year-on-year growth, and content analysis.

The study shows that India's fresh vegetable exports were about INR 6,927 crore in 2023–24. The major importing countries include the United Arab Emirates, Bangladesh, Nepal, Malaysia, and the United Kingdom. However, traditional crops such as onion, potato, and tomato account for a large share of total vegetable exports, while the share of high-value vegetables produced under greenhouse conditions is relatively low. This gap indicates strong market potential for crops such as capsicum, cherry tomato, broccoli, lettuce, and burpless cucumber, which are in growing demand in global markets. With special reference to North Maharashtra, districts such as Nashik, Ahmednagar, Jalgaon, Dhule, and Nandurbar offer favorable conditions for protected

cultivation. Proper crop planning, quality control, suitable variety selection, and clean post-harvest handling can help farmers obtain higher prices than in local markets. However, high initial investment, lack of technical knowledge, and limited cold chain and transport facilities remain major challenges. Strengthening government subsidy schemes, training programmes, and infrastructure can increase vegetable exports through protected cultivation and help achieve stable farm incomes.

Keywords: Greenhouse, protected farming, vegetable exports, marketing opportunities, high- value crops, government policies

Major advantages of greenhouse farming are as follows :

- Higher production: Yields can be two to five times higher than traditional open-field farming.
- Uniform quality: Produce has consistent size, colour, and better quality.
- Low pesticide use: The protected environment reduces the need for chemical pesticides.

Year-round cultivation: Vegetables can be grown even outside the normal season.

- Efficient use of resources: Water and fertilizers are used more efficiently, which lowers production costs.

All these benefits can be achieved through protected cultivation.

At the global level, countries such as the United Arab Emirates, the United Kingdom, Singapore, and the Netherlands import clean and high-quality vegetables like capsicum (bell pepper), cherry tomato, broccoli, and lettuce from India. Most of these crops can be produced effectively in India using greenhouse methods. In this context, it is important to examine the opportunities for increasing exports through greenhouse vegetable farming.

Research Objectives:

1. To study the current status of vegetable production and exports through greenhouse technology in India.
2. To identify export markets, major products, and opportunities for greenhouse-grown vegetables.
3. To examine the problems and challenges faced in greenhouse vegetable exports.
4. To suggest policy measures and strategies to increase exports.

Hypotheses :

1. Greenhouse farming significantly increases vegetable production and quality, thereby improving export potential.
2. There is growing demand for greenhouse-grown vegetables from India in international markets, and these vegetables receive higher prices than in domestic markets.
3. Government subsidies, training, and cold chain facilities have a positive relationship with the success of greenhouse vegetable exports.
4. Compared to traditional farming, protected cultivation offers greater opportunities for increasing vegetable exports.

Research Methodology :

This study follows both descriptive and analytical research methods. The required data have been collected mainly from secondary sources. These include annual export statistics published by APEDA (Agricultural and Processed Food Products Export Development Authority) reports of the National Horticulture Board (NHB), and scientific literature such as academic research papers and journals.

Study Period and Sample:

The study covers the period from 2020–21 to 2023–24 and analyses available data related to India's vegetable exports. No primary data were collected. Available statistics and published case studies were used as the sample. For example, successful greenhouse-based export projects from Maharashtra and Punjab were examined.

Tools and Analysis Methods:

The collected data were analysed using percentage analysis and year-on-year growth rates. Where required, the data were presented in tables and graphs. Qualitative information was analysed using content analysis to draw conclusions.

Data Analysis:

Greenhouse farming is particularly suitable for many high-value vegetable crops. An analysis of selected crops from the perspective of export potential is presented in the table below.

Crop	Export Potential	Suitable Production Regions
Coloured bell pepper (Capsicum)	High demand in UAE, UK, and Russia	Pune, Himachal Pradesh, Bengaluru
Cherry tomato	Demand in specialty food markets of Europe and Japan	Nashik, Sikkim, Ooty
Broccoli	Demand from premium hotels and export markets	Nilgiri Hills, North-Eastern India
Lettuce (salad greens)	Used for salads and sandwiches; strong domestic and global demand	Haryana, Tamil Nadu, North-Eastern India
Burpless cucumber (special variety)	High demand in Gulf countries (e.g., UAE)	Punjab, Maharashtra

All the above crops can be successfully grown in greenhouse or polyhouse structures using controlled temperature, drip irrigation, fertigation, and protected pollination. As a result, these crops can produce export-quality output, such as residue-free produce with uniform size and appearance.

Status of Vegetable Exports in India:

India's total exports of fresh vegetables during the financial year 2023–24 were approximately INR 6,927 crore (USD 828 million). The major importing countries included the United Arab Emirates, Bangladesh, Nepal, Malaysia, and the United Kingdom. An important point to note is that over the five-year period from 2019–20 to 2023–24, India's total fruit and vegetable exports increased by 47.3 percent. This growth was supported by the Agricultural Export Policy and financial assistance schemes of APEDA. However, at present, most of these exports consist of traditional crops such as onion, potato, and tomato, while the share of high-value vegetables produced under greenhouse conditions remains very small. At the global level, the Netherlands, Spain, and Israel are leading exporters of protected vegetables.

To gain a competitive advantage in international markets, India needs to focus on the following key areas:

1. Increasing the production of exotic and niche vegetables, such as coloured vegetable varieties.
2. Producing residue-free and certified products with zero pesticide residues.

3. Developing cold chain, packhouse, and storage facilities close to production centres.
4. Training farmers in Good Agricultural Practices (GAP) and international quality standards.
5. Developing cluster-based export zones with concentrated production of specific crops.

States such as Maharashtra, Karnataka, Himachal Pradesh, and Telangana have started implementing these measures, and early positive results are already visible. For example, several successful cases highlight the effectiveness of these initiatives.

1. **Baramati-(Maharashtra)**

With the support of the Krushi Vigyan Kendra, some farmers produced capsicum (bell pepper) and cherry tomatoes in polyhouses and exported them to Dubai and Singapore. As a result, they received prices of about INR 100–150 per kg, which is almost three times higher than local market prices of INR 30–40 per kg.

2. **Bengaluru Rural, Karnataka:**

With the help of the National Horticulture Mission (NHM), a group of farmers started producing leafy vegetables and broccoli using hydroponics in about one acre of greenhouse area. By exporting this high-quality produce, they are earning around INR 2–2.5 lakh per month.

3. **Punjab (Punjab Agri-Export Corporation Project):**

Under a contract farming model supported by the Punjab Agri-Export Corporation, small farmers produce high-quality cucumber and lettuce in greenhouses. Through this initiative, farmers have gained access to international markets, and the corporation provides assured purchase of their produce.

These examples show that with proper use of technology, farmer training, and direct market linkage, protected cultivation can be converted into a highly profitable export business. Many Indian farmers are increasing their incomes through this model and shifting towards modern farming, which can contribute to the growth of the country's agricultural exports.

Major Findings :

- Protected cultivation (greenhouse or polyhouse farming) gives two to five times higher yields than traditional farming and improves product quality. This makes export-quality fruit and vegetable production possible.

- Global demand for high-quality Indian vegetables is increasing, especially in Gulf and European countries. Imports of Indian capsicum, broccoli, lettuce, and similar vegetables have increased in countries such as the UAE, the UK, Singapore, and the Netherlands.
- In 2023–24, India's fresh vegetable export value was about INR 6,927 crore. However, most exports still consist of traditional crops such as onion, potato, and tomato, while high-value greenhouse vegetables account for a small share. At the same time, growing global demand shows strong growth potential in this sector.
- Greenhouse farming allows year-round production of crops such as coloured capsicum, cherry tomato, broccoli, and lettuce, and their export potential is well proven. Some farmers have earned nearly three times higher prices than local markets by directly exporting these crops from polyhouses, leading to a significant increase in farm income.
- At the government level, several initiatives support protected cultivation and exports. Under the Mission for Integrated Development of Horticulture (MIDH), subsidies of 50–65 percent are provided for polyhouse construction. The Agricultural Export Policy (2018) supports cluster development, and APEDA provides financial assistance for packhouses, cold chain facilities, and certification.
- Major challenges in greenhouse vegetable exports include high initial investment costs (about INR 800–1,200 per square metre), lack of technical knowledge, difficulty in maintaining consistent quality, limited cold chain and air transport facilities, and low awareness of global GAP and HACCP standards.

Overall, these findings clearly show that India has strong potential to increase vegetable exports through greenhouse technology. However, this requires a combined approach that includes technical improvement, investment, farmer training, and direct access to markets.

Suggestions:

- Develop region-specific greenhouse clusters for export-oriented vegetables so that production and collection of related crops can take place at a single location.
- Promote innovations such as automated control systems and advanced greenhouse technologies through startups and technology support in order to reduce production costs and improve quality.
- Strengthen global certification systems such as organic certification and traceability systems to enhance the quality and credibility of export products.
- Build farmers' capacity by providing training on cultivation practices for exotic crops, post-harvest hygiene, packaging, and requirements of international markets.
- Create direct linkages between farmer groups and exporters through buyer–seller meetings and international trade fairs to reduce the role of intermediaries.

- Strengthen infrastructure development, financing, and marketing management through Public–Private Partnership (PPP) models and Farmer Producer Organisations (FPOs).

Conclusion:

The study highlights several important conclusions regarding export marketing opportunities for greenhouse-grown vegetables in North Maharashtra. Districts such as Nashik, Ahmednagar, Jalgaon, Dhule, and Nandurbar already have a strong base of farming experience, irrigation facilities, market connectivity, and agricultural entrepreneurship. The adoption of greenhouse and polyhouse farming is increasing in this region, making it suitable for the production of high-value, quality, and export-oriented vegetables. The study shows that greenhouse farming ensures stable production, uniform quality, and lower pesticide residues, which are critical requirements for export markets. Global demand, especially from Gulf and European countries, is increasing for vegetables such as capsicum, cherry tomato, broccoli, lettuce, and specialty cucumbers. Although India's overall fresh vegetable exports are substantial, the share of high-value greenhouse vegetables remains limited. This situation indicates a major opportunity for North Maharashtra. For farmers in North Maharashtra, greenhouse-based exports represent not only an opportunity to increase production but also a means to achieve income stability. Several cases show that vegetables produced under greenhouse conditions fetch higher prices than those in local markets. However, to achieve these benefits, farmers must focus on market-oriented crop planning, quality control, appropriate variety selection, and proper post-harvest handling. Export success depends not only on production but also on the entire value chain.

The study also identifies key constraints. These include high initial investment costs for greenhouse structures, limited technical knowledge and training, inadequate cold chain facilities, packhouses, and fast transportation systems, as well as limited awareness of global quality standards, certification, and traceability systems. Overall, North Maharashtra has strong potential for export marketing of greenhouse vegetables. To realise this potential, cluster-based development, active participation of Farmer Producer Organisations, farmer training, infrastructure development, and direct linkage with exporters are essential. With coordinated efforts in these areas, North Maharashtra can emerge as an important centre for greenhouse vegetable exports and support sustainable growth in farmers' incomes.

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