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Scope of Off-Season and Exotic Vegetable Cultivation for Export in India: From Local to Global

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Off-season and exotic vegetable cultivation has emerged as a promising approach to overcome the limitations of seasonal, open-field vegetable production in India. Through protected cultivation, year-round production of high-quality vegetables is possible, leading to better resource-use efficiency, higher farmer income, and stable market supply. At the same time, rising demand for exotic vegetables driven by urbanization, health awareness, and expansion of organized retail and food services is creating new market opportunities. Although India still imports a large share of exotic vegetables, expanding protected cultivation with appropriate policy and institutional support can reduce import dependence and promote a high-value, export-oriented horticulture sector.

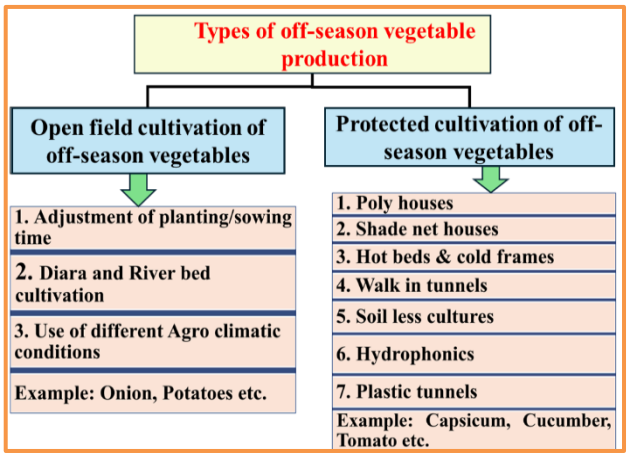
Introduction

Off-season vegetables are high-value crops cultivated during unfavorable climatic conditions, enabling extended growing periods, efficient input use, and higher farm income (Kumar and Singh, 2020). Although India is the second-largest vegetable producer globally, its horticulture sector remains largely dependent on seasonal, open-field cultivation, which exposes farmers to climatic risks, price fluctuations, and low profitability. In this context, off-season vegetable cultivation under protected environments has emerged as an effective alternative, allowing year-round production through the regulation of temperature, humidity, light, and moisture. This enhances yield and improves resource-use efficiency, and stabilizes vegetable availability during periods of market scarcity.

Exotic vegetables are those vegetables which are not native to our country. The common exotic vegetables in India are Lettuce, Broccoli, Bok Choy, Brussels sprouts, Asparagus, Parsley, Leek, Zucchini, Kale, Cherry Tomato, Celery, Chinese cabbage, Red Cabbage, Coloured Capsicum, Chives etc. (Navya and Nagnur, 2022). India imports over 85% of exotic vegetables and exotic vegetables market demand growing rapidly at 15-20% per year (Singh *et al*., 2025). Their demand is rising due to urbanization, changing dietary patterns, and growing health awareness, supported by the expansion of hotels, food services, organized retail, and e-commerce. Although India still imports a large share of these vegetables, domestic production under protected cultivation is steadily increasing. Such technologies reduce pest and climatic risks and enable the production of uniform, residue-free, export-quality produce. With adequate policy support and capacity building, exotic vegetable cultivation can significantly contribute to a high-value, export-oriented horticulture sector.

Scope of off-season cultivation in India

- Off season cultivation under Protected cultivation has a tremendous scope to make elite the Indian horticulture sector.
- Off season cultivation creates an extensive scope to protect the farmers from economic losses.
- High-quality vegetables and ornamentals have a massive demand throughout the year in technically developed cities.
- Also, cities' demand for off-season vegetables and high-priced fresh vegetables.
- Therefore, greenhouse production is mainly promoted to accomplish urban needs.
- Many healthful herbs, High value veggies and Exotic vegetables are generally cultivated under protected cultivation in India (Samantha *et al.*, 2023).



Gyawali *et al.*, 2022

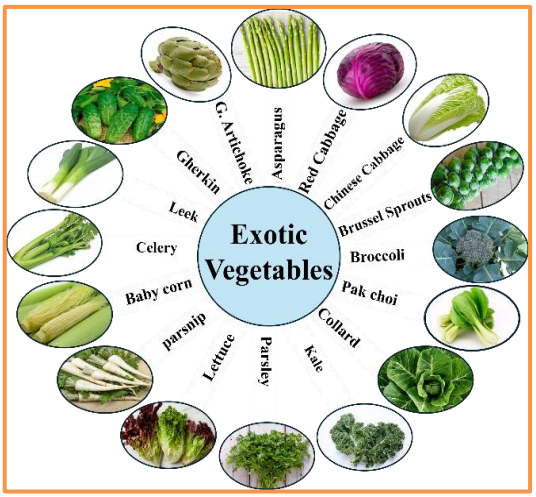
Status of protected cultivation in India

Protected cultivation is vital for the growth of the Indian agriculture sector. Depending upon various climatic conditions, the success rate of protected cultivation in country varies significantly. Like in the northern part of the country, this type of technology is facing big challenges due to severe climatic conditions. Whereas areas like Bengaluru and Pune, the mild climatic condition becomes easily adaptive to this controlled cultivation technology. Nearly 30,000 hectares of areas are under protected cultivation till now in India. (Somasundaram *et al.*, 2020)

Status of Exotic vegetables in India

Interestingly majority of **Exotic vegetables** are fall under the category of Underutilized vegetables in India.

- *Viz.*, Broccoli, Red cabbage/Savoy cabbage, Chinese cabbage, Celery, Leek, Parsley, Asparagus, Lettuce, Pok-choi, Globe artichoke etc.,
- The newly constructing polyhouses are undertaking for exotic vegetable cultivation in 75% of their area
- Almost 50% of Floriculture farmers are shifting their cultivation to Exotic vegetable cultivation
- The open area for Exotic vegetable cultivation is 3 - 5% among the all vegetables
- Major cultivating Locations are Himachal Pradesh, Uttarkhand, Ooty, Sangli, Satara, Nashik, Pune, Jammu, Banglore, Hyderabad
- Exotic vegetables market is growing at the rate of 15-20% per annum and is increasing day by day India is importing more than 85% of exotic vegetables
- Growing of exotic vegetables is more profitable buisness than cultivation of traditional Indian vegetables.
- Increasing demand in domestic market due to their nutritive value
- These vegetables are getting increasing demand in five-star cultures of the cosmopolitan cities.



Scope of Exotic Vegetables in India

The demand for exotic vegetables in India is growing at 15–20% annually, driven by urbanization, rising incomes, health awareness, growth of the food service industry, and expansion of organized retail and e-commerce (Thakur and Singh, 2025; Singh *et al.*, 2025). Major production hubs include Himachal Pradesh, Uttarakhand, Nilgiris, Pune, Nashik, Bengaluru, and North-Eastern states, where climatic conditions favor quality production. Hill regions supply exotics during summer, while plains produce them in winter, effectively supporting off-season marketing (Janakiram and Reddy, 2016).

Health Benefits Driving Consumer Demand

Exotic vegetables are rich in vitamins, minerals, antioxidants, and dietary fiber, contributing to disease prevention and overall health. Broccoli, kale, lettuce, asparagus, red cabbage, and celery are increasingly preferred for salads, soups, pasta, and functional diets (Pathania *et al.*, 2021; Yadav and Kumar, 2025). The **ICMR-NIN (2024)** recommends a daily intake of **400 g vegetables**, further supporting market growth.

The most promising vegetables for protected cultivation and export include

Crop	Export Potential	Region Suitability
Coloured Capsicum	High demand in UAE, UK, Russia	Pune, Himachal, Bengaluru
Gherkins	USA, Russia, Canada, Germany, France	Karnataka, Tamil Nadu, A P., Telangana & parts of MH.
Cherry Tomato	Gourmet markets in Europe, Japan	Nashik, Sikkim, Ooty
Broccoli	Premium hotels and export	Nilgiris, North Eastern Hills
Lettuce	Used in salads and sandwiches	Haryana, Tamil Nadu, NE India
Cucumber (Burpless)	UAE and Gulf markets	Punjab, Maharashtra

India's Export Scenario of off season and exotic vegetables

- India's export of fresh vegetables was valued at ₹6,927 crore in 2023–24 with major exports to UAE, Bangladesh, Nepal, Malaysia and UK (APEDA, 2024).
- But, most of these exports are from open-field grown onion, potato and tomato etc.,
- Protected cultivation vegetables and exotic vegetables are contributing very minimal contribution among the vegetable exports in India
- Globally, Netherlands, Spain and Israel lead in protected vegetable exports.
- In 2021-22, the top exported countries in India were the UAE, Saudi Arabia, Qatar, Italy, the UK and the USA
- The exotic vegetables market in India was USD 2.4 Billion in 2024. It is expected to reach USD 6.7 Billion by 2033, at the average annual growth rate of 11.45% between 2025 and 2033.

India can tap into market by

- Focusing on niche and exotic vegetables cultivation
- Ensuring residue-free and certified produce
- Establishing cold chain and pack houses near production hubs
- Training growers in GAP (Good Agricultural Practices)
- Promoting cluster-based export zones
- Strengthening the Extension agenda on cultivation and marketing of exotic vegetables
- Implementing subsidies and financial supports to the farmers
- State initiatives in Maharashtra, Karnataka, Himachal Pradesh and Telangana have already shown promise in this direction.

Health Benefits

Vegetable	Key Health Benefits
Cherry Tomato	Rich source of lycopene, Vitamin C and antioxidants
Zucchini	Source of iron, calcium, zinc and several vitamins
Baby Corn	Low in carbs and high in fibers
Celery	Prevents inflammation & cancer, regulates BP, controls liver diseases, gout, asthma, psoriasis and fever
Lettuce	Packed with Vitamin A, Vitamin K and folate
Asparagus	Low in calories, neutralizes stomach acids, packed with essential vitamins, minerals and antioxidants
Broccoli	Good source of fiber, Fe, folate, K, Ca, selenium and Mg, as well as Vitamins A, C, E, K, and a good array of vit. B including folic acid
Parsley	Helps prevent diabetes; prevents and treats kidney stones. it is proven all-natural anti-cancer remedy. Rich in Vit. K, Vit. C, Iron
Kale	Vitamin K, Vitamin C, Calcium and Antioxidants
Chinese Cabbage	Contains several vitamins such as Vitamin B, C, K, folic acid, antioxidants and dietary fibers
Red Cabbage	Lowers inflammation and protects against various kinds of cancers
Bell pepper	Rich in vitamins, helps in the formation of collagen and improves skin health

(Pathania *et al*., 2021; Yadav and Kumar, 2025)

Future prospects

- Expansion of protected cultivation for year-round production.
- Promotion of exotic and underutilized vegetables to reduce import dependence and diversify diets
- Development of region-specific varieties tolerant to heat, cold, and humidity for off-season cultivation
- Adoption of advanced technologies such as hydroponics, aeroponics, and vertical farming
- Strengthening value chains including cold storage, processing, and organized retail linkages
- Focus on export-oriented production to tap premium international markets
- Enhanced farmer profitability through high-value crops, assured markets
- Integration with climate-smart agriculture to address climate variability and resource efficiency
- Policy support and subsidies to scale up adoption among small and marginal farmers

Conclusion:

- Off-season and exotic vegetable cultivation can shift Indian Horticulture from subsistence-based to high-value, export and market-oriented farming
- Protected cultivation technologies (polyhouses, net houses, bamboo structures, mulching, drip fertigation, hydroponics) enables year-round production
- These technologies improve yield, produce quality, and resource-use efficiency
- India, though the world's second-largest vegetable producer, has limited area under protected cultivation
- This indicates significant untapped potential to meet growing urban demand and expand export opportunities
- By fulfilling this we can reduce the importing dependency from other countries

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