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Quality and branding: The twin pillars of India's global horticulture push

Synopsis

A coordinated push involving policy support, private investment, and technology adoption can help India shift from volume-driven to value-led horticulture by fixing productivity, post-harvest, and market gaps, say experts.

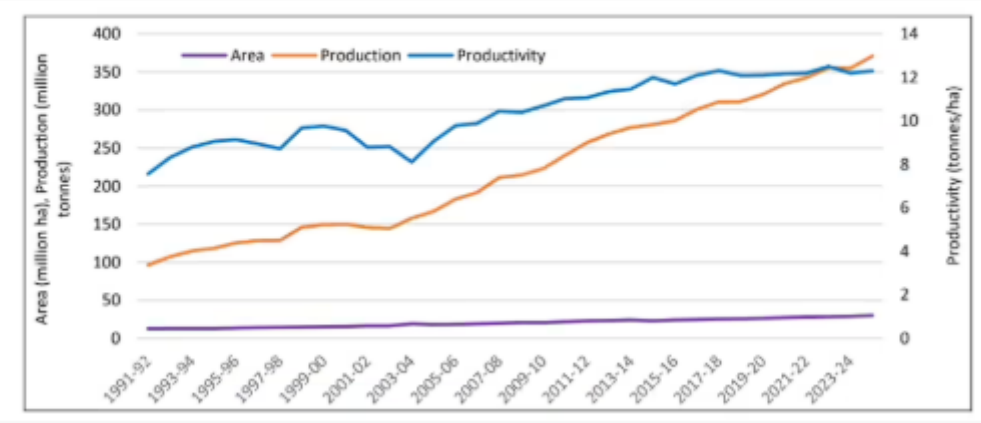
India is the world's second-largest producer of fruits and vegetables, accounting for around 12% each of the global output.

Even as geopolitical tensions and supply chain disruptions continue to pose challenges for India's **horticulture** exports, India must strengthen quality standards and brand integrity to stay competitive in global markets, says a recent research paper. Improving efficiency across production systems is essential to raise farmer incomes while protecting value chain stakeholders, according to the research paper by the **National Academy of Agricultural Sciences** (NAAS).

Notably, India is the world's second-largest producer of fruits and vegetables, accounting for around 12% each of the global output. The horticulture sector contributes nearly 38% to India's agricultural output while utilising only 13% of the cropped area, underscoring its high value and productivity.

Recognising this potential, the government has prioritised horticulture since the Eighth Five-Year Plan and launched the Mission for Integrated Development of Horticulture (MIDH) in 2014-15 with cumulative investments of Rs 37,601 crore through 2025-26. While productivity improved from 11.7 tonnes per hectare in 2015-16 to 12.5 tonnes per hectare in 2024-25, growth has recently plateaued.

Trends in area, production and productivity of total horticulture in India, 1991-92 to 2024-25



Source: Government data

According to the government data, India in 2024-25 produced 370.74 million tonnes of horticultural output from 30.14 million hectares, with long-term productivity rising from 7.6 tonnes per hectare in 1991-92 to about 12.3 tonnes per hectare. However, recent growth has been driven more by area expansion than efficiency gains. Export performance remains modest, with India accounting for just 1-2% of global horticulture trade. Meanwhile, imports, primarily fresh fruits, cashew, cocoa, and spices, constitute 18-20% of agricultural imports, reflecting underlying structural gaps. Post-harvest losses remain significant, ranging from 6-15% for fruits and 4.9-11.6% for vegetables, largely due to inadequate storage, logistics, and processing infrastructure, says the research paper.

The paper titled "Horticulture Innovations to Enhance Exports from India" calls for adopting advanced and innovative technologies that will be key to boosting India's global export presence. At the same time, the country's comparative and seasonal advantages remain underutilised for diversifying into new markets and products. Integrating risk management frameworks, such as Good Agricultural Practices (GAP) and Biodiversity-friendly Agricultural Practices (BAP), is also critical to ensure food safety and long-term sustainability, the policy paper adds.

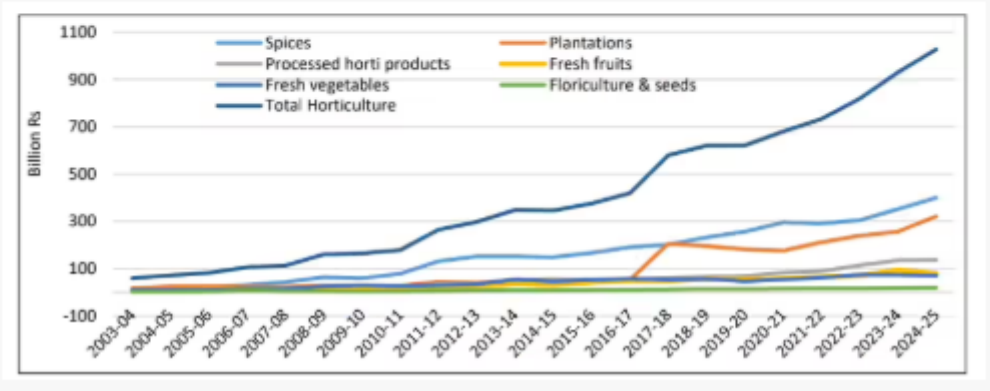
Challenges

Despite significant progress, India's horticulture sector faces mounting challenges. With the population projected to reach 1.7 billion by 2050, demand for fruits, vegetables, and allied products will rise sharply. However, constraints such as weak extension services, low productivity, high post-harvest losses, evolving quality preferences, global competition, climate change, poor market linkages, and price volatility threaten both domestic supply and export potential, says the policy paper.

"On the export front, key challenges include product traceability (forward and backward linkage), phytosanitary issues like quarantine requirements, pesticide residue limits, poor quality control, lack of certification awareness, varying standards of importing countries, erratic enforcement of domestic phytosanitary regulations, both tariff and non-tariff barriers, etc.," notes the research paper.

The paper argues that horticulture provides a better alternative for agricultural diversification, owing to higher returns received than those of traditional crops like rice and wheat. To harness the potential of horticulture, India needs to enhance the adoption of global best technology and practices to improve productivity, develop post-harvest and marketing infrastructure to avoid losses, invest in strengthening the supply chain and value addition activities, and use market intelligence to increase the sector's domestic and global market reach and trade share, it adds.

Trends in export value of broad group of horticulture crops in India



Source: Government data

M.L. Jat, President of NAAS, Secretary of the **Department of Agricultural Research and Education** (**DARE**), and Director General of the Indian Council of Agricultural Research (**ICAR**), says, "Agricultural diversification will be the engine of future growth and enhancing trade in the sector of India. India's horticulture value of production (VOP) contributes about a 37% share to agriculture and has shown a 100% increase during the last decade, rising from Rs 380 crore in 2012 to Rs 760 crore in 2024, and the export of horticulture and its products is valued at Rs 1,02,700 crore and is projected to reach Rs 9,56,500 crore by 2047."

R.G. Agarwal, Chairman Emeritus of **Dhanuka Agritech**, says that India must pivot to market-aligned breeding that meets export specs on size, colour, firmness, brix, and residues. Shelf-life hinges on crop management and post-harvest as much as genetics, while breeding must reflect logistics like sea freight, cold chains and phytosanitary norms. Global competitiveness will depend on shifting from yield to consistent, market-driven quality, he says.

Unlocking full potential via advanced tech

Horticulture offers a strong pathway for agricultural diversification as it provides higher returns compared to staple crops. However, unlocking its full potential requires adoption of advanced technologies, improved post-harvest management, stronger supply chains, enhanced value addition, and better market intelligence to boost both domestic efficiency and global competitiveness. The sector faces multiple challenges, including rising population pressure, climate risks, low productivity, weak extension services, poor market integration, and price volatility. Export competitiveness is further constrained by traceability issues, stringent phytosanitary standards, residue limits, inconsistent quality, and trade barriers, says the policy paper.

"India has already demonstrated its strength in horticulture production. The next phase of growth must focus on productivity, quality, and value realisation. The gap is not in what we grow, but in how efficiently we handle, store, process, and market it. The solution starts at the farm level. We need wider adoption of high-quality planting material, precision farming, protected cultivation, and micro-irrigation. However, productivity alone will not solve the problem. The real opportunity lies in enhancing an efficient post-harvest ecosystem. Today, 10-40% of produce is lost due to gaps in storage, handling, and logistics. Investing in scientific warehousing, cold chains, and integrated supply chains is critical to preserving both quantity and quality," says Sandeep Sabharwal, Group CEO of Sohan Lal Commodity Management (SLCM).

Current (2024-25) and projected area, production and yield of horticultural crops

Commodity	TE 2024-25			Projected* (2047-48)		
	Area (Mha)	Production (Mt)	Productivity (t/ha)	Area (Mha)	Production (Mt)	Productivity (t/ha)
Fruits	7.11	113.98	16.03	14.03	296.27	21.12
Vegetables	11.42	211.81	18.56	21.88	554.11	25.32
Flowers	0.33	3.55	10.79	1.34	29.14	21.75
Medicinal & aromatic plants	0.87	0.71	0.81	3.63	3.04	0.84
Plantation crops	4.53	17.29	3.82	6.93	31.42	4.53
Spices	4.74	12.27	2.59	7.88	43.05	5.46
Total	**29.00**	**359.76**	**12.40**	**55.69**	**957.04**	**17.19**

Source: Government data; *Estimate by policy paper's author

Despite strong production, export performance remains limited. India exported horticultural products worth Rs 92,532 crore (TE 2024-25), led by spices (38%), plantation crops (29.4%), processed products (13.9%), fresh fruits (8.8%), and vegetables (7.9%). Exports have grown more than 17-fold since 2003-04, with a compound annual growth rate of about 11.7%, contributing 16-18% of total agricultural exports. Spices remain the dominant category, consistently accounting for over 40% of exports in recent years.

On the import side, horticultural imports reached Rs 45,956 crore (TE 2023-24), driven mainly by fresh fruits (42-45%), cashew (29-30%), and spices (20-22%). Fresh fruit imports, especially apples, along with grapes and oranges, continue to dominate, while demand for exotic fruits, such as avocados and dragon fruit, is rising due to changing consumer preferences, health awareness, and greater availability. Spice imports are concentrated in pepper, clove, asafoetida, spice oils or oleoresins, and mint products, which together account for more than half of total import expenditure. These trends highlight persistent gaps in domestic productivity, quality, and supply chains.

Consumption of fruits and vegetables has more than doubled over the past four decades and is projected to reach around 700 million tonnes by 2047-48. Production, under current trends, could exceed 850 million tonnes. However, rising incomes, urbanisation, and export demand will necessitate further productivity gains, as the scope for area expansion remains limited.

High-quality seeds

In precision farming, the use of 'high-quality seeds and planting materials' is equally important to enhance the yield per unit area and quality to scale up the horticultural commodity export, the paper notes.

Over the past five years, 4,240 quintals of breeder/truthfully labelled seeds of improved vegetable varieties and spices; 11,455 tonnes of seed tubers (including potato, onion, and other tuber crops); 11.446 million fruit crop plants; and 2,373 quintals of mushroom spawns have been produced.

Dhanuka says that precision horticulture has the potential to substantially enhance productivity, particularly for smallholder farmers operating under limited land and resource conditions. For instance, drip irrigation systems can improve water-use efficiency by nearly 40-60%, while enabling precise fertigation. This reduces input wastage, optimises nutrient delivery and enhances crop uniformity—key factors for export competitiveness, adds Dhanuka.

"Rainwater harvesting, check dams, and expanded micro-irrigation infrastructure are equally important for building climate resilience in horticulture. Efficient water management directly supports stable yields and long-term sustainability. Access to high-quality, disease-free planting material approved by ICAR-recognised institutions is another critical requirement. Many smallholders face challenges due to fragmented supply systems. Promoting CBOs and FPOs can help aggregate demand and improve access to certified planting stock," says Dhanuka.

Need for a coordinated push

India faces strong competition in global horticulture markets but retains key advantages, including favourable seasonal windows and untapped potential in crops such as grapes, pineapple, and melons. Spices remain a major strength, contributing roughly 40% of global exports. However, competitiveness increasingly depends not only on cost but also on quality, traceability, branding, and diversification of export markets to mitigate geopolitical risks.

Technological advancements, such as improved crop varieties, precision farming, protected cultivation, and decision-support systems, are enhancing productivity and resource efficiency. Value addition is expanding into processed foods, nutraceuticals, and bioactive products, while organic farming and GI-tagged products present niche export opportunities. Infrastructure development, including cluster-based approaches, cold chains, irradiation facilities, and sea-export protocols, is improving supply chain efficiency and reducing losses, according to the paper.

Nevertheless, the research paper says key challenges persist, such as relatively low productivity compared to global benchmarks, high post-harvest losses (10-40%), limited processing capacity (below 10%), climate change risks, weak market linkages, and stringent global quality requirements. Continued import dependence on fruits, spices, and plantation crops reflects these structural constraints.

To address these issues, the research paper says that India must focus on improving productivity through better crop varieties, irrigation, and technology adoption; reducing losses through enhanced cold chain and logistics infrastructure; promoting processing and value addition; strengthening farmer organisations and market linkages; simplifying certification and compliance systems; and diversifying export markets. A cluster-based, export-oriented, and quality-driven strategy, supported by policy stability and digital traceability, will be critical to achieving self-reliance and strengthening India's position in global horticulture trade, it adds.

A coordinated push involving policy support, private investment, and technology adoption can help India shift from volume-driven to value-led horticulture by fixing productivity, post-harvest, and market gaps, says Sabharwal.