

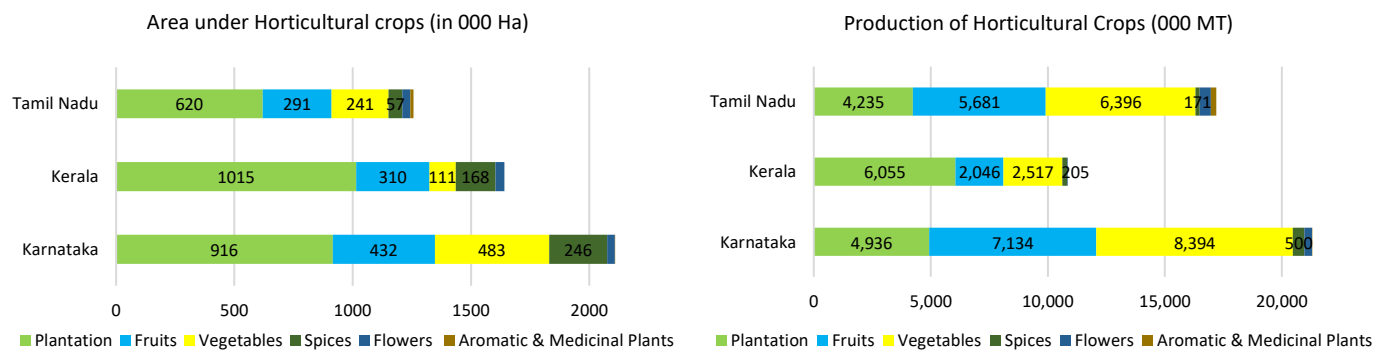
Opportunities for Dutch Companies Across Horticultural Value Chains

Karnataka, Kerala and Tamil Nadu



Horticulture has emerged as a key sector with the potential to contribute to the growth of the Indian economy. The sector contributes to approximately 30.4 per cent of the agriculture GDP of the country. Some of the key factors driving growth in this sector include changing consumer preferences towards horticultural products, change in marketing models and a renewed regulatory thrust by the Government on horticulture production and processing, exports, food safety, hygiene and urbanisation. From 2012-13, horticulture production has exceeded food grain production in the country for 7 years in a row in terms of area and production.

The Government of Netherlands commissioned a study to assess opportunities for Dutch companies in the horticulture sector in the south Indian states of Karnataka, Kerala and Tamil Nadu. The key findings of the study have been presented in this Executive Summary.

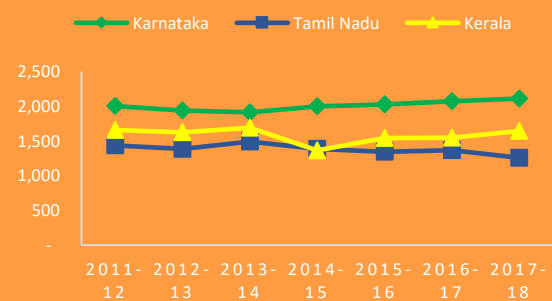


The southern states of Karnataka, Kerala and Tamil Nadu contribute significantly to India's total horticulture production.

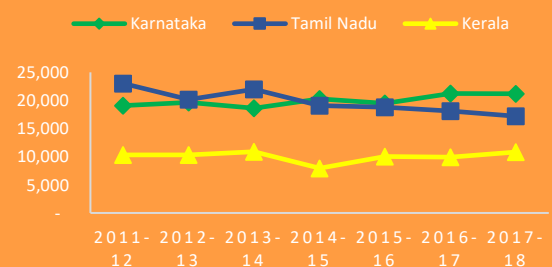
- Karnataka is the 6th largest producer of fruits, 8th largest producer of vegetables, 2nd largest producer of plantation crops and the 3rd largest producer of flowers in the country.
- Kerala, a relatively small state by size, leads in the production of plantation crops and is the 14th and 17th largest producer of fruits and vegetables respectively.
- Tamil Nadu is the largest producer of flowers in India, ranks 7th in the production of fruits, 12th in the production of vegetables and 2nd in the production of aromatic plants.

However, recent area and production trends show that the growth of the horticulture sector in these three states has plateaued after being on a growth trajectory in the previous decade. This is largely due to low yields, poor package of practices and water shortage.

HORTICULTURE AREA TREND ('000 HA)



HORTICULTURE PRODUCTION TREND ('000 MT)



Key Highlights

- **Mission for Integrated Development of Horticulture (MIDH)** is the flagship scheme of the Government of India for holistic growth of the horticulture sector; with significant funds allocated for production activities.
- **Banana and Mango** are the two most important fruit crops in all the three states along with grapes, pomegranate, papaya, pineapple, sapota and lime / lemon.
- Amongst vegetables, the important crops in the three states are onion, tomato, chilli, potato, brinjal, beans and cucumber. **Tapioca** is a major crop in Tamil Nadu and Kerala.
- **Ooty in Tamil Nadu** has emerged as a major production cluster of Nantes carrot that meets the demand of most South Indian markets. An opportunity exists for improving yields by introduction of high yielding varieties as well as improved package of practices and mechanisation.
- Karnataka is emerging as a key state nationally for the production of horticultural crops using **protected cultivation**, driven by suitable agroclimatic conditions, emerging local demand for exotic vegetables and also by export-oriented production (gherkin).

The area near Bengaluru has particularly emerged as a hub for exotic leafy vegetables cultivated using hydroponics technology.
- **Theni in Tamil Nadu** has emerged as a key banana production cluster in South India, with the potential to become an important export hub for Gulf countries, if competitiveness and efficiency is reached in unit cost of production;
- In Kerala, farmers have been mostly growing traditional varieties of fruits (e.g. Nendran Banana) and vegetables. **Roof top vegetable farming** has been gaining popularity in the State recently.

Key Challenges

- **Growth of horticulture sector has stagnated** in all the three states, although scope exists to increase crop area and production by bringing additional area under irrigation and improving yield levels respectively.
- **Fragmented land holdings** in all three states specifically Kerala, have restricted the adoption of farm mechanisation and other capital-intensive production technologies.
- **Lack of irrigation and depleting ground water levels**, specifically in Tamil Nadu, is a cause for concern for farmers; making affordable water saving irrigation technologies / systems the need of the day.
- **Relatively low yield levels** of horticultural crops, such as banana, papaya, pomegranate in fruits and okra, cabbage, potato, onion and carrot amongst vegetables is a challenge. There is a need to introduce new seed varieties and increase farmers' awareness of improved production practices.
- **Moderate adoption of production technologies** such as tissue-culture based planting material, adoption of micro irrigation and protected cultivation in vegetable production in select clusters has been due to lack of awareness, access and affordability of technologies for small and marginal farmers.

Production Opportunities

In horticultural production, some potential crops for Dutch companies to focus on in Karnataka, Kerala and Tamil Nadu are banana, seasonal vegetables such as cole crops, solanaceae crops (potato, tomato, capsicum, brinjal etc.), cucurbits (cucumber, gourds etc.) and carrot, as Dutch companies have established expertise in them. Crops such as banana, potato and carrot are already cultivated across a huge area in these states and need research & development, extension, seeds, planting material and quality input support.

Micro-irrigation and **water management technologies** are an urgent need in crop production and have got a recent thrust from the Government with the formation of the Jal Shakti (*water power*) Ministry. This is an opportunity area for Dutch companies and aligns well with protected cultivation opportunities including hydroponics.

Use of IT in production optimisation is another opportunity area for Dutch companies to collaborate and develop with Indian counterparts. This is an area where start-ups have consistently been able to attract the attention of investors. Bengaluru being **India's start-up hub**, has got a very conducive eco-system in terms of infrastructure and talent-pool and the technologies developed through such collaborations would have the potential for scale-up to other geographies as well.



While **Dutch seed companies** already have a **major market share** in seed for protected cultivation, including hydroponics, there is an opportunity to support farmers in this space through specialised training and capacity building for customised package of practices and by providing compatible inputs for nutrient management and pest control.

Dutch seed companies, such as Bejo, Rijk Zwaan, Seminis and Nunhems have established themselves well in the Indian vegetable seed market in general and in the niche market category of protected cultivation, in particular. There is a general perception that Dutch branded seeds are costly. As a result of this a large number of small farmers, who contribute significantly to vegetable production have not been reached by these companies. Additionally, there are many vegetable seed varieties in South India, that are a key ingredient in local cuisines such as local cucumber varieties for pickle making but are not sold by Dutch companies. This is a big market segment that needs further exploration on the back of long-term research & development efforts and strategic business partnerships between Dutch and Indian companies.

Organic farming and pesticide residue free crop production are emerging areas that have a premium market in urban areas of the three states. However, for most vegetable crops, there is lack of standard scientific protocols suited to local agro-climatic conditions. There is also poor availability of quality bio-inputs and bio-pest control measures in the market. Both areas need long-term research projects, where Dutch research institutes and companies can play a vital role. Dutch companies like Koppert B. V. are already present.

The use of information technology (IT) has been increasing the area of crop production, specifically **protected cultivation and vegetable production**. Start-ups such as CropIn, Tartan Sense, Intello Labs and others are developing farming solutions based on data analytics, artificial intelligence, machine learning and robotics to improve production.

Post-harvest Management and Marketing Opportunities

Post-harvest wastage of some horticultural crops in India is as high as 30%. As per the National Centre for Cold Chain Development (NCCD), **a wide infrastructure gap** exists for handling perishable produce in all three states. Therefore, highly efficient post-harvest management systems and infrastructure for logistics and storage are required. In order to bring **supply chain competencies, promote alternate marketing channels and attract private sector investment in marketing infrastructure**, the Central Government has been working with State Governments to adopt the Model APMC Act (2003), which has further been amended in 2017. This Act, if implemented by any State can facilitate in creating a conducive environment for market linkages for farmers by developing wholesale market yards, farmer to consumer markets, enabling the declaration of existing cold storage and other similar structures/spaces as market sub-yards amongst other measures.

Regulatory Perspective		
The amended State APMC Act (2014) of Karnataka , levies no market fee on horticultural produce such as flowers, fruits and vegetables. However, the Market Committee can collect user charges for any infrastructure and services provided for these products.	In Kerala , there is no State APMC Act in force and, as such, there is no regulation on the marketing of horticultural products in the State.	In Tamil Nadu , the marketing of agricultural produce is regulated under the 'Tamil Nadu Agricultural Produce Marketing (Regulation) Act', which covers more than 40 commodities, including horticultural crops such as coconut, onion, potato, banana, mango amongst others.

While traditionally, horticultural crops have been traded through regulated market yards, primary local and wholesale markets, there has been a **rapid evolution in the market and marketing models** in the last decade and a half. First organised retail chains (Reliance Retail, ABRL (More), Heritage, Big Bazaar, Easy Day, Nilgiris, Star Bazaar, Safal etc.) disrupted traditional markets. Today, the **organised retail segment handles upto 15 per cent of the total market share** in metro cities like Bengaluru, with similar trends expected to reach in other cities in the region. This was followed by venture capital funded start-ups (Ninjacart, WayCool, Big Basket, Kamatan etc.) disrupting the market to drive change using **end-to-end technology enabled collection and distribution models**. Now as international players such as Walmart, Metro Cash & Carry and online grocers have entered the market, there are expectations of huge investments in back end value chains.

Key Highlights and Challenges

- **The Government** is focusing on modernising key wholesale markets, by creating an electronic auctioning platform and modern infrastructure for storage and material handling.
- **Private wholesale markets** are being allowed by state governments to attract investment in the sector.
- **Major organised retailers** who have been manually handling produce at their distribution centres, are facing challenges of ensuring quality produce (due to increased competition), timely delivery of material to stores, minimising human errors in inventory management, allocation and tracking, cost competitiveness and controlling transit losses.
- Farmer institutions, such as **Farmers' Producer Organisations (FPOs)** are playing a key role in creating backward linkages with large numbers of small and marginal farmers as well as in setting up farmer owned infrastructure and processing facilities at the producer level.
- **Changing consumer preferences**, demography and a renewed **regulatory thrust** by the government are pushing players source sustainably grown produce and adopt high quality production practices and operations.
- **Large corporate**, such as Reliance, Walmart and Metro Cash & Carry (also start-ups like Udaan), have built volumes (10 – 80 MT of F&V per day) and are looking for solutions for specialised bulk material handling systems for horticultural crops.
- Organised players are avoiding traditional regulated markets and are instead directly approaching farmers, by creating **collection centres and pack-houses** near the farm-gate.
- **Exports** are also driving demand for pack-houses for handling produce and primary value addition near the farm-gate.
- **Funded start-ups**, who are building smart warehouses, are ready to invest in technology for inventory tracking, operation optimisation, procurement cost optimisation, MIS and market intelligence.

While handling fresh fruits and vegetables, most companies do not follow any customised protocol for Indian conditions to reduce wastage and to keep produce freshness intact. **Development of such protocols and training of manpower** for this purpose is a big opportunity for Dutch technical institutions. **Post-harvest management, market systems and infrastructure are areas of expertise for many Dutch companies**. Market modernisation, including setting-up e-auctioning systems, design for material handling and infrastructure can be explored by Dutch companies. As large corporates, organised players and start-ups in the horticulture sector increase their volumes, demand can be created for customised technology solutions for cold storage management (sensor-based monitoring systems), warehouse operation management (optical reading, RFID tracking) and ERP solutions.

Specific Business Opportunities for Dutch Companies

Business opportunities exist across the horticultural value chain for Dutch companies in the states of Karnataka, Kerala and Tamil Nadu. The diverse agroclimatic conditions, good institutional and infrastructure support, a supportive eco-system for corporates and start-ups along with an available local talent pool, make the conditions in these three states conducive for Dutch companies to set up operations that can eventually be scaled up to the rest of the country and region. We summarize here some specific business opportunities that exist for Dutch companies in production, post-harvest and marketing in the target states.

Particular	Production	Post-harvest and marketing
Research & Development	<ul style="list-style-type: none"> - Seed production of high-quality seed with characteristics of local varieties for use in local cuisine - Farm mechanisation for small scale farms - Bio-inputs and biologicals pest control measures to support organic and pesticide residue free production 	<p>Customization of post-harvest protocols for fresh fruits and vegetables for organised retailers, exporters, start-ups and multinational players handling horticultural products.</p>
Extension, Training and Capacity Building	<p>Improved and customised package of practices in the following clusters:</p> <ul style="list-style-type: none"> - Exotic vegetable cluster grown for urban markets around Bengaluru (Karnataka) - Banana cluster in Theni (Tamil Nadu) - Carrot cluster in Ooty (Tamil Nadu) - Mango cluster in Krishnagiri (Tamil Nadu) - Pineapple cluster in Vazhakulam (Kerala) - Floriculture under protected cultivation cluster in Hosur (Tamil Nadu) <p>Sustainable production practices and good agricultural practices (GAP) for:</p> <ul style="list-style-type: none"> - Farmer institutions such as FPOs / FPCs and cooperatives; - Government bodies, multilateral organizations and companies engaged in agriculture / horticulture projects; - Start-ups, growers and technology providers in the hydroponic and aquaponic sector that is fast growing in the Bengaluru area 	<p>Operational efficiency and resource use optimisation training for:</p> <ul style="list-style-type: none"> - Quality control of fresh produce - Handling of fresh horticultural products at the backend - Developing direct market linkages - Efficient pack-house operation management - Operation management at wholesale and terminal markets - Management of waste generated from fresh fruits and vegetables - Business management, product handling, market development, and marketing trainings for Farmers Producer Organisations (FPOs) <p>Customised training programmes can also be developed for Government agencies and private sector players as per their specific need.</p>
Consulting / Advisory / Information	<p>Production planning and decision support systems for:</p> <ul style="list-style-type: none"> - Weather and market intelligence - Crop and season specific, customised advisory content for production - Preventive advisory systems - Data on area under crop, crop conditions at various growth stages along with production estimates - Market arrivals and price intelligence 	<p>Process automation and infrastructure modernisation in:</p> <ul style="list-style-type: none"> - Wholesale markets for state agricultural marketing boards and other government agencies - Private wholesale markets created by large corporates - Modern Pack-houses and distribution centres of organised retailers, start-ups, online grocers, back-end players aggregating supply, FPCs / FPOs, Government agencies and multilateral agencies

Particular	Production	Post-harvest and marketing
Material / Hardware	<ul style="list-style-type: none"> - Bio-inputs such as bio-fertilizers and biological pest control measures - Quality growing medium and affordable seeds for protected cultivation and hydroponics - Biodegradable mulching material - Quality material for protected cultivation including screens. 	<ul style="list-style-type: none"> - Material handling machinery and equipment - Primary value addition – sorting and grading machinery - IT enabled sensors and equipment for material and cold chain management - Environment friendly packaging material and solutions
Technology	<ul style="list-style-type: none"> - Automation technologies in hydroponics and protected cultivation for start-ups and growers - Smart farming applications for corporates and large exporters/traders that are undertaking horticulture production on a large scale - Smart solutions to ensure traceability of produce for processing industries and modern retailers 	<ul style="list-style-type: none"> - Cold chain technologies (energy efficient, modular, multi-commodity), monitoring and control systems - Automation technologies for material handling and operation (Optical Sensors, RFID sensors) - ERP solutions for pack house/ distribution centre management. - Wholesale market management and auctioning systems.

Dutch organisations, institutions and corporates can **explore tie-ups with Government research institutions, universities as well as private institutions** for research, training and capacity building. Partnerships, collaborations and joint ventures can be explored with Indian companies such as seed and other bio-input manufacturers, material suppliers for protected cultivation and organised retailers. Partnerships and funding options can also be explored with agri-tech start-ups in the area of **production technology and use of data and robotics in horticulture production.**

Given that India is a **price sensitive market**, Dutch companies will need to develop creative and innovation strategies to be competitive in the market on product and technology pricing.

As some business areas such as seed licensing and cold storage automation technologies **need specific Government approvals and accreditation with local government regulatory organisations**, it would be critical for interested Dutch companies to study these statutory requirements in detail and take expert opinion before entering India. In case of business areas, such as **cold-chain infrastructure components**, government subsidy is a critical business driver, making government approval / certification / accreditation necessary for entering these business areas. For **import of seeds, plants, plant material** (including biological controls measures, there are regulatory and quarantine requirements under the Plant Quarantine (Regulation of Import into India) Order, 2003 which Dutch companies would have to look into carefully.

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