

# The power of technological value chains in Dutch horticulture



## Growth markets and promising technologies

In recent decades, Dutch horticulture has become a major global player in devising technological solutions for various social challenges.

Expansion of the global population, the impact of climate change, the increasing demand for locally sourced food, and workforce shortages all present significant opportunities to strengthen this position, leverage newly acquired knowledge, and enhance sustainability. The sector is therefore also of strategic value to the Netherlands in the international arena. Over the next few years, the Dutch government and the horticultural sector will invest heavily to accelerate technological advances in both breeding and high-tech production systems.

Get acquainted with the economic power of this top sector which is so crucial for the Netherlands, as well as the technological growth markets and the associated contribution to solving social challenges.

### Domestic

Dutch horticulture enjoys an excellent national and international position due to technological innovations and strong business know-how. This economically healthy sector is growing year on year in terms of production, adding value, exports, job creation, and R&D expenditure (source: Horticulture figures CBS-WEER 2022). Companies in the horticultural chain are investing almost 1 billion euros annually in research & development, 5 percent of the entire R&D expenditure in the Netherlands. Approximately 75% of this R&D expenditure in the horticultural chain is realised by companies active in seed breeding, plant propagation, horticultural technology and the wholesale of horticultural products.

Companies in the horticultural ecosystem, namely those in the fruit, floriculture, starting materials, and horticultural technology, including supply chains and logistics services, contribute 23.6 billion euros directly and indirectly to the Dutch economy. This represents about 2.8% of the country's entire gross domestic product. The horticultural chain has experienced a notable surge in added value since 2020, with a remarkable 10% growth in 2021 alone. The cluster accounts for around 246 thousand employees, 3.1 percent of total employment across the Netherlands.









International

In global terms, breeding, plant starting materials, and horticultural technology are particularly important. The export value of starting material is more than 2 billion euros, an increase of no less than 20% compared to 2020. If the starting materials for arable farming are included, total exports are estimated at 3.6 billion euros. The Netherlands is the largest exporter of vegetable seeds in the world. Almost 40% of the seeds traded globally for horticulture and arable farming come from the Netherlands. This share rises to approximately 50% for seed potatoes. In the floriculture sector, the Netherlands' share in the European trade in starting materials exceeds 40%.

The export value of horticultural technology, such as greenhouse equipment, was approximately 1.7 billion euros in 2021 (source: CBS-WECE estimate agricultural trade figures 2022), with growth expected to continue. The value of exports of the entire horticultural chain was 27.6 billion euros in 2021, or 4.7% of all Dutch exports.

Dutch horticulture is the prime supplier of fresh vegetables, fruit and ornamental plant products for northern and western Europe. The value of these exports is more than 24 billion euros, and growing. The sector thus makes a significant contribution to boosting the autonomy of the food supply, health, and well-being across Europe. The Netherlands has traditionally acted as a hub for the international trade in floricultural products. This is being further developed through a global, digital trading platform created by the Dutch floriculture industry.

Horticulture & Starting Materials complex – Statistics Netherlands/LEI 2022						
Key figures						
	Production value chain, Horticulture & Starting Materials	Added value	Number of companies (primary horticulture*)	Workforce (annual work units)	Export value NL	R&D expenditure in NL
Size (in € billion)	31,2	23,6	23.7K	246K	27,5	0,98
Share of the Netherlands (%)	PM	2,8	1,6	3,1	4,7	5,1

Growth markets in practice

There is a significant potential market for horticultural technology due to the global challenges surrounding population growth, food systems, and climate. Smart technological solutions from the horticultural sector can provide a solution:

1. Food security and geopolitics: the growing world population, increasing urbanisation, and geopolitical tensions are boosting calls for locally produced, high-quality plant-based fresh products. The transition to vegetable proteins is stimulating the demand for new plant varieties. Worldwide, the strategic importance and need for autonomous food production is increasing, including through controlled-environment agriculture. In a controlled environment, growers can create the ideal climate for their crops, putting them in a position to increase yields on a small surface area with a lower environmental impact.



2. Climate adaptation/crops: the impact of climate change is becoming increasingly severe, with longer periods of extreme heat, drought, and precipitation worldwide. There is a pressing demand for cultivation systems that perform effectively irrespective of climatic conditions, and for plants that thrive optimally even in extreme weather.
3. Sustainable, local ecosystems: protecting local ecosystems is important for the quality of life and health of people and their environment. Water-efficient and energy-efficient circular production systems and green energy are necessary to limit emissions to the environment to a minimum.

Dutch horticulture has an answer to these social challenges, thanks to key technologies such as AI, biotech, robotisation and data science:

- Protected production systems (greenhouses, shaded halls), significantly reduce dependence on the climate, allowing fresh and healthy products to be grown anywhere in the world.
- Biological plant protection reduces the need for chemicals, and modern high-tech greenhouses discharge virtually no water or nutrients.
- By combining these smart hi-tech applications with the development of new resilient varieties with high yields and a long shelf life, the Netherlands is setting the standard for the most sustainable production system in the world.
- Dutch horticulture supplies this technology for sustainable, high-tech production systems worldwide, adapted where necessary to local conditions. Dutch horticultural technology companies are already involved in nearly 80% of international projects, and annual global turnover growth of 6% is expected for greenhouse horticulture technology (greenhouses and installations).



## Key technologies and horticulture

The horticultural cluster is a leading pioneer in the development, application, and optimisation of technology, collaboratively engaging with businesses and knowledge institutions both within and outside the cluster. This expertise is harnessed for the global cultivation of plants. These are the most important three technologies for international value creation:

### 1. AI and data science



AI and data science are important in every link of the horticultural chain, from starting materials to the consumer. Examples include genetic analyses, machine learning, autonomous cultivation in greenhouses, digital trading platforms, chain transparency, and personalised nutrition.

### 2. Biomolecular and cell technologies



Biomolecular and cell technologies are exploited to develop improved genome-editing tools to breed the crops of the future. These crops will be resistant to diseases and pests, and designed to thrive in the changing climate. New knowledge investments are underway through the Growth Fund initiatives PlantXR and Crop-XR. Other technologies that use genome-editing tools are genetic analyses such as QTL identification, genomic prediction, pangenomics, and recombination prediction for looking for connections between phenotype versus genotype and other genomic data of species and breeds.



### 3. Opto-mechatronics, mechatronics and optical systems



Advanced economies are experiencing a significant need for robotics and automation to address labour shortages, reduce manual labour, replace repetitive tasks, and at the same time enhance production management with less use of resources. Dutch horticulture is participating in the NXTGEN Hightech growth fund project.

### 4. Imaging and sensing



Imaging and sensing technologies are used in Dutch horticulture to phenotype gene bank material, determine plant properties during the breeding process, detect fruit or flower quality in a non-destructive manner, and detect diseases in crops more quickly and more accurately.

The Dutch Horticulture & Starting Material sector is among the best in the world in terms of entrepreneurial capacity, innovative strength, level of expertise, and professionalism. The business community and knowledge institutions are working together with the Dutch government to ensure that this top sector remains a global leader and a strategic sector for the Netherlands.

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