

Crop resilience sector study Netherlands

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Abbreviations

A	Actual		United Nations		Safety Authority
ADB	Asian Development Bank	FDOV	Facility for Sustainable Entrepreneurship and Food Security	PIB	Partners for International Business
APEC	Asia-Pacific Economic Cooperation			PPP	Public-private partnerships
ASEAN	Association of Southeast Asian Nations	GM	Genetic Modification / Genetically Modified	PSD	Private Sector Development
CAGR	Compound Annual Growth Rate	ha	Hectare	PSI	Private Sector Investment Programme
Ctgb	Het College voor de toelating van gewasbeschermingsmiddelen en biociden	IFAD	International Fund for Agriculture Development	R&D	Research and Development
DHI	Demonstration projects, feasibility studies and investment preparation projects	IPM	Integrated Pest Management	SDGP	Sustainable Development Goals Partnership
e-COI	Electronic Certificate Of Inspection	kg	Kilogram	SWOT	Strength, Weakness, Opportunity and Threat
EFSA	European Food Safety Authority	Larive	Larive International B.V.	TRACES	Trade Control and Expert System
EKN	Embassy of the Kingdom of the Netherlands (in Vietnam)	MARD	Vietnamese Ministry of Agriculture and Rural Development	USD	United States Dollar
EU	European Union	MBCA	Microbial Biological Control Agent	USAID	United States Agency for International Development
EUR	Euro	MN	Million	WB	World Bank
EVD	Economische Voorlichtingsdienst	MRL	Maximum Residue Levels		
EVFTA	EU-Vietnam Free Trade Agreement	MT	Metric Tonnes (1,000 kg)		
F	Forecast	NEA/RVO	Netherlands Enterprise Agency / Rijksdienst voor Ondernemend Nederland		
FAO	Food and Agriculture Organization of the	NVWA	Netherlands Food and Consumer Product		



Introduction



Background

Vietnam is facing serious challenges concerning the amount and toxicity of the pesticides used in horticulture. With hardly any domestic pesticide production, Vietnam has experienced exponential growth in the quantity and the value of imported pesticides in recent years. Increasing imports of newly formulated (and safer) pesticides have not yet replaced or reduced highly toxic pesticides with low efficacy. Improper use of pesticides by farmers (too high dosages, cocktailing of pesticides, inadequate pre-harvest intervals, among others) has further contributed to environmental and health problems.

The Vietnamese Ministry of Agriculture and Rural Development (MARD) has requested that the Plant Protection Department reduces the number of chemical pesticide brands registered in Vietnam by 30%, replacing them with bioproducts. The current list of crop protection products includes 4,000 trade names. The government plans to cut these and limit registrations of new chemical products. The plan is to replace chemical products with more environmentally friendly crop protection products, such as biologicals, physical methods, and promoting organic farming. The government also looks to encourage and extend IPM models (integrated pest management).

The Netherlands has extensive expertise in biological crop protection and (farming) methods to reduce the usage of agrochemicals. Biological control of pathogens and insect pests in agriculture and horticulture is based on the use of natural enemies of the agents that cause disease and infestations. As such, the Dutch private and public sector may be well-positioned to help Vietnam deliver tangible results in improving the responsible use of crop protection products.

The Embassy of the Kingdom of the Netherlands in Vietnam (hereinafter referred to as “EKN”) has the ambition to positively address the residue and contamination risks in the Vietnamese horticulture sector, through matching knowledge, technology and innovation. To achieve this ambition, the present study provides an in-depth understanding of Dutch companies, institutes, experts and other stakeholders able to provide biological crop protection solutions and other alternatives to agrochemicals, and IPM models, into Vietnam. Upon understanding the opportunities and needs, the Dutch private sector can leverage its expertise and capital to improve current crop protection methods employed in Vietnam. The study provides the following:

- An overview of Dutch companies, institutes, experts and stakeholders, and IPM suppliers able to provide biological crop protection solutions and alternatives to agrochemicals, relevant to reducing the use of traditional pesticides, herbicides and agrochemicals in the Vietnamese vegetable production.
- Identification of clear business and sector development opportunities.
- Recommendations for further consortium development including opportunities to increase Vietnamese farmer knowledge and awareness on biological crop protection alternatives, farmer methods and IPM protocols and integration of Dutch solutions.
- Recommendations on follow-up opportunities with NEA (Netherlands Enterprise Agency) Instruments such as PSD Toolkit, Impact Cluster, PIB and DHI.



Approach and methodology

This study has been performed on behalf of the Netherlands Enterprise Agency by **Larive International B.V.**, a Netherlands-headquartered business development advisory firm specialized in assisting companies in developing and implementing their market entry or expansion strategies in(to) high-growth emerging markets.

Larive International is the parent of the Larive Group, a license-based network of independent business development advisory firms with exclusive members in 24 countries throughout Asia, Central & Eastern Europe, Turkey and Sub-Saharan Africa.

The analysis has been completed on a 'best effort' basis through desk research and qualitative research, including a vast number of in-depth interviews with private sector players (companies active in hybrid seeds, IPM, bio stimulants, farming systems substrate and more, including suppliers, manufacturers, and other providers) in the Netherlands, and public stakeholders (regulatory departments, business associations, universities/educational institutes and NGO's).

In addition to the expert interviews conducted in the Netherlands, several Vietnamese stakeholders active in the horticulture sector have been contacted to get a better understanding of their views on the business opportunities in Vietnam, how Dutch actors could strengthen the sector and how knowledge transfer between Vietnam and the Netherlands can be stimulated.

This study has been conducted between August and October of 2021.



Executive summary

Biological alternatives to agrochemicals

- Integrated Pest Management (IPM) is a holistic approach to plant protection, focusing on prevention, risk assessments and direct crop protection. It is a desired step in horticulture farming, as it aims to reduce the need for agrochemicals through a focus on plant resilience and alternatives for agrochemicals.
- The alternatives for chemicals are biologicals, which can be divided into three categories: biofertilizers, bio stimulants (including seeds) and bio control agents (pesticides). Globally, the market for bio control agents will grow by CAGR of 13.6%, from USD 7.4 billion in 2018 to USD 20.6 billion in 2026. This excludes products categorized as biofertilizer or bio stimulant.
- Although more effective, chemicals are more harmful to the natural environment and human health than their biological alternatives. Adverse effects of chemical agents include damage to the natural environment (ecosystem and biodiversity loss), limited long-term efficiency and crop resistance. Chemicals can also be harmful to human health, with several examples of cancer and other health issues.
- Biologics can negatively impact the environment through the higher land requirement and the possibility of predatory insects escaping, disturbing the balance of ecosystems.

Sector overview: Vietnam

- The Vietnamese horticulture sector is growing rapidly, with production systems slowly moving away from traditional open-field production to protected cultivation.
- The market is relatively fragmented, especially in the Red River Delta. Most farms are family businesses. Da Lat, located in the Central Highlands of Vietnam in the province Lam Dong, is considered the agricultural powerhouse of Vietnam.
- Nearly all horticulture products (95%) are used for domestic consumption, with the remaining products exported to nearby countries (Singapore, Thailand, China).
- The use of pesticides has increased exponentially in Vietnam (x100 from the 1950s to 2012). The high use of pesticides has led to numerous environmental and health problems. The effects of climate change are also increasingly visible.
- The government is implementing policies to reduce agrochemical usage, but for several reasons, this has not yet led to effective market regulation. Effective regulation combined with farmer training programs and market availability of alternatives is necessary to reduce agrochemical usage.
- Vietnam has been severely hit by the pandemic but expects a full recovery.

Sector overview: the Netherlands

- The Dutch horticulture sector is globally renowned for its high-tech, innovative solutions. In 2018, companies in the horticulture sector contributed EUR 21.1 billion to the Dutch economy (2.7% of the GDP).
- After years of explosive growth, the organic market in the Netherlands is expected to grow at a lower pace. The main reasons for stagnating growth are lack of knowledge amongst conventional farmers, fulfilled consumer demand and market factors.



Executive summary

Stakeholder analysis

- Several Dutch companies are considered world-class, both in the biologicals segment and equipment manufacturing business. Equipment manufactures and greenhouse construction companies are important in reducing the need for agrochemicals, as closed systems reduce the risk of diseases compared to an open field.
- Dutch companies or companies with an office in the Netherlands, active in the biologics segment, include:
 - Bio control agents: Benfried, Biobest (Belgium and NL), Entocare, Koppert, Nufarm (Benelux), Valto, and Van Iperen.
 - Biofertilizers: Bio-Kultura, Biocompig, BVB Substrates, De Ceuster Meststoffen, Ferm o Feed (Den Ouden Group), Grodan, Komeco Organic Fertilizers.
 - Bio stimulants: Axia Vegetable Seeds, Bejo, Enza, Incotec, Onings Holland Flower Bulbs, Rijk Zwaan.

Supply & trade

- The Vietnamese market is expected to professionalize and increase horticultural export. However, the professionalization of the Vietnamese horticulture sector is restrained by limited knowledge of IPM and limited investment.
- Market opportunities include the increasing consumer demand for safe food, grower's demand for technological advancement and active government support. Innovative Dutch technologies in precision farming and IPM are vital for the advancement of the Vietnamese sector. Precision farming is the overarching name for any farming technology that allow for improved accuracy in plant treatment. This is usually combined achieved through digitalization (GPS, sensor technology, ICT and robotics).
- The EU-Vietnam Free Trade Agreement (EVFTA) eliminates import tariffs and lifts existing market access barriers.
- Barriers for Dutch companies looking to advance their business in Vietnam include limited knowledge amongst growers, limited investment power, small-scale and low-tech farms, and restrictions on import of (bio control) products and untreated seeds.
- Collaboration between parties, knowledge sharing, and demonstrations are essential for successful market entry. Strategies for market entry include Public-Private Partnerships, local presence in Vietnam, regional presence in South-East Asia, or working with companies already active in the sector.

Legislation & legal assessment

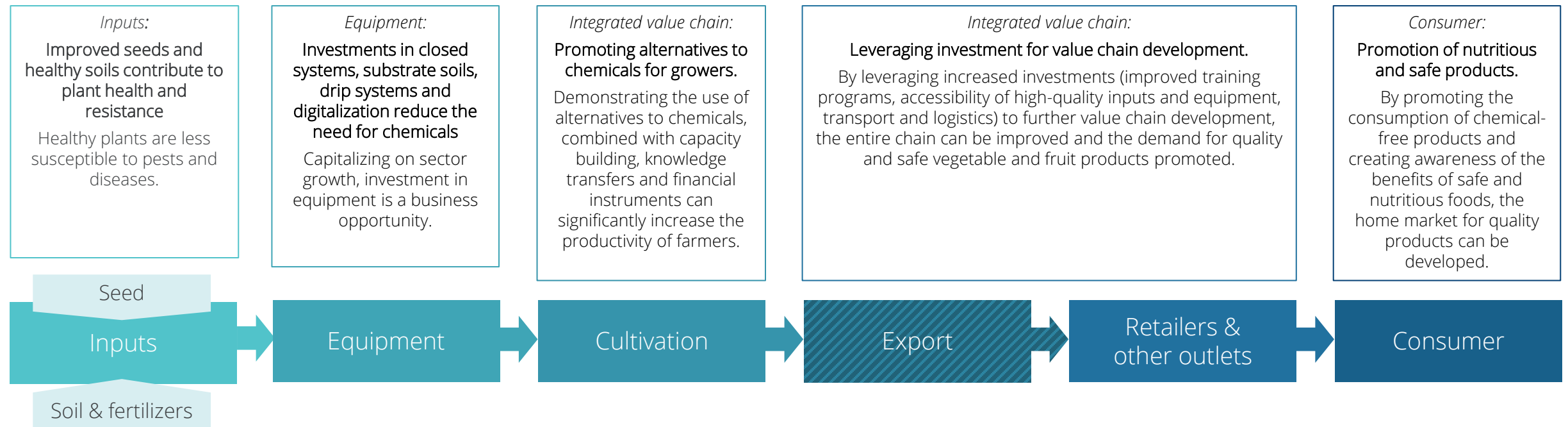
- The EU must approve active substances for new products, a lengthy and costly process. The NL approves final products.
- Maximum Residue Levels for pesticide residues (MRLs), phytosanitary regulations and legislation for organic products are the major regulations for import. Other requirements relate to contaminants, microbiological hazards, marketing and control.
- Chemical companies are shifting towards 'soft chemicals' to comply with strict requirements. Furthermore, the EU is considering changing the categorization under which biological products fall, which could make the registrations of new products up to 100 times more expensive.



Executive summary

Recommendations

- The main obstacle to the development of the Vietnamese horticulture sector is the lack of knowledge amongst growers. This not only limits the uptake of alternatives to agrochemicals but also makes it difficult for growers to appreciate the need for investment in technological advancements.
- An important step to allow for the reduction of agrochemical use in Vietnam is to enable interested Dutch companies to collaborate on entering the Vietnamese market. Several Dutch companies are eager to collaborate in advancing the Vietnamese horticulture sector, as they perceive a largely unfulfilled demand and therefore less fear of competition and foresee a large growth. Through collaboration in a consortium or PPP, companies from different parts of the value chain can offer one complete solution to Vietnamese growers and help growers see the effects of improved methods through demonstrations. Training programs and demonstrations will lift the knowledge level (both in growing techniques and post-harvest), which will naturally lead to an increased uptake in biologics and technology. Increased investments in equipment, including closed systems, substrate soils, drip irrigation systems and digital solutions are essential for sector professionalization.
- At present, there are still travel restrictions and obligatory quarantine measures. Business and trade are experiencing a setback, after which a full recovery is expected. Many Vietnamese inhabitants have severely struggled with the strict lockdown and the consequences of the pandemic, making it essential to be considerate of what local businesses and people have been through.



I) Sector overview

Integrated Pest Management (IPM)

IPM is a holistic approach to plant protection, focusing on prevention, risk assessments and direct crop protection

Integrated Pest Management is stimulated by the FAO to carefully consider all available pest control techniques and the integration of those to reduce pest populations while minimizing the risk to human health and the environment. "IPM emphasizes the growth of a healthy crop with the least possible disruption to agro-ecosystems and encourages natural pest control mechanisms." (FAO, 2019). The categories of pest management include:

Category	Preventive (indirect) crop protection	Risk assessment	Responsive (direct) crop protection
Action	Biofertilizers: soil substrate, manure	Warning and forecasting systems	Biological control (crop protection)
	Bio stimulants (plant breeding): pest-tolerant and resistant cultivars; Disease-free seed	National pesticide plans and policies	Integrated Weed Management
Relevant stakeholder groups	Substrate suppliers; organic fertilizer suppliers	Knowledge institutes	Biological crop protection suppliers
	Hybrid seed suppliers	Governmental agencies and import regulations	

Biological products

The term 'biological' has two meanings in English, namely organic products or biological products (often microbial). In the latter category, biological products include biofertilizers, bio stimulants, and biological control (see next slide for more details). Unlike chemical or synthetic products, biological products ('biologicals') exist of naturally occurring materials, often living organisms. As biologicals are non-toxic to humans, wildlife or the environment, several advantages exist for using biological control agents instead of chemicals:

1. Biologicals help increase long-term crop yields, crop quality and farm profitability, leading to reduced indirect costs;
2. Biologicals create a healthier work environment for farmers;
3. Biological agents decrease pesticide residue levels in the harvest;
4. Biologicals require smaller quantities than chemical pesticides (tens of grams per hectare, compared to tens of kilos of chemicals);
5. It takes longer for crops to become resistant to biologicals than to chemicals.

Biologicals can consist of different active substances: semiochemicals, natural products, macrobials (predators, parasites, nematodes) and microbials (viruses, bacteria, fungi) (see also Annex I). Microbials are very common, with microbial biological control agents (MBCAs) defined as "naturally occurring living organisms that are numerically enhanced to reduce specific plant pathogens or pests".

Biological product segments

The three main segments of biologicals are biofertilizers, bio stimulants (seeds), and biological control (crop protection)

Biological products can be categorized into three product categories, biofertilizers, bio stimulants, and biological control, whereby biopesticides represented 51.8% of the market in 2018.

1. Biofertilizer (or soil amendment) is a substance containing living organisms that promotes growth or increases the availability of nutrients to plants. It is the natural alternative to synthetic fertilizers.
2. Bio stimulants are biological materials used for the modification of physiological and biochemical plant processes. The aim is to boost growth, nutrition efficiency, resistance, or overall plant health. This includes the modification of seeds (usually through cross-pollination), creating hybrid seeds.
3. Biological control, also known as biological crop protection products or biological pest control, is the controlling of pests and diseases by introducing natural enemies or natural plant protection products. However, due to regulatory issues, many companies providing biological control refer to themselves as bio stimulant companies, increasing plant resilience rather than actively fighting pests.

Biological products						
(1) Biofertilizers		(2) Bio Stimulants		(3) Biological control products		
Microbials		Amino acids	Seaweed extracts	Biopesticides		Macrobiols
		Plant extracts	Organic acids	Semio-chemicals		Insects
		Microbials		Natural products		Mites
				Preventive microbials	Direct microbials	Nematodes
Nitrogen fixing		Nutrient assimilation		Insect/fungi/ disease repellent	Insecticide	
P205 solubilizing		Seed/soil treatment		Seed treatment	Fungicide	
K mobilizers				Coating	Herbicide	
Others				Inoculation		

Global trends and developments

The biological control market will grow by CAGR 13.6% from 2018 to 2026

Horticulture farmers globally are influenced by four major global trends, including a growing world population, pricing pressure and rising costs, food safety and consumer awareness, and more extreme diseases and plagues.

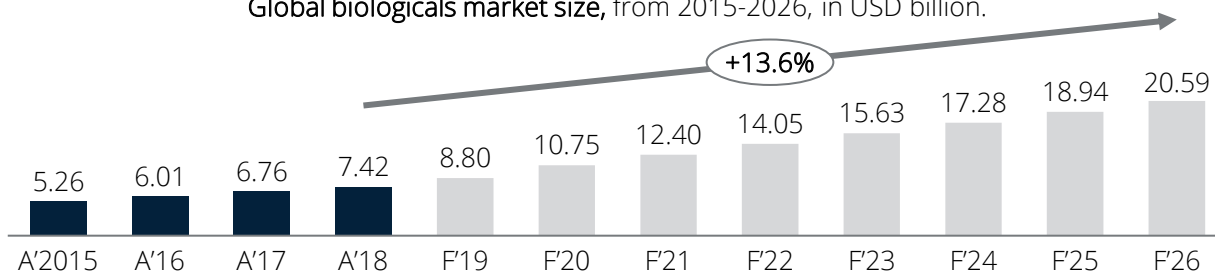
The market for biological control agents has been facing difficulty competing with the mainstream market for chemical control agents. The biologicals market is smaller in size, has higher a cost of production and registration, and therefore lower profitability than chemicals. In 2011, biological alternatives were on average 2.5 times more expensive than chemicals. Other key issues include limited knowledge (delivery techniques need adoption to be applicable for biocontrol agents), development issues (farmer training, dissemination of information) and industrial issues (quality must be guaranteed and distribution system must be improved).

Despite these challenges, the biological control market is growing steadily, with its share of the total crop protection sales increasing from 0.4% in 1993 to 5.6% in 2016. In 2008, the global chemicals market was worth EUR 21 billion, whereas the biologicals market was worth EUR 620 million (EUR 122 million in Europe). However, these numbers are most likely underestimated, since many biological crop protection agents fall under the category of 'biological stimulants' and are not included in these numbers.

Since 2010, several multinationals have struck deals that have boosted the market for biologicals: Bayer-Monsanto, ChemChina-Syngenta and Dow-DuPont. The biologicals market is forecasted to grow by a CAGR of 13.6% between 2018 and 2026. The biological control segment accounts for the largest market share. However, these forecasts do not include the impact of the COVID-19 pandemic.

Countries with high consumer purchasing power and societal awareness and acceptance of biological products, are known to have the highest share of organic food consumption (food produced with biological methods and certified organic). These countries include Denmark and Sweden. In countries such as the United States, where consumers are more price-sensitive, organic products are considered an elite product choice.

Global biologicals market size, from 2015-2026, in USD billion.



Global trends and developments, continued

Non-treated seeds and genetics could offer a solution to reduce chemical dependency

There are several ways of dealing with production problems in horticulture. Especially considering the impact of global warming, it is possible problems can no longer be solved by technology alone. Therefore, growers can either move their production location or try genetics.

1. The first step, when production problems occur, is to turn to technological solutions. This includes crop protection products, data-driven technology, and closed production systems such as greenhouses.
2. Secondly, if it is no longer possible to produce in the current locations, production can be shifted to another product location.
3. When changing production location is no longer an option, genetics (genetically modified crops or GM) can offer the final solution to allow for crop production under difficult conditions.

A promising long-term solution to crop pests and diseases is the advancement in crop genetics. Although many seed companies and knowledge institutes are researching the potential of genetically modified crops, EU legislation prevents this from being used commercially in the market.

Global GM legislation differences causing uneven playing field

GM crops are not allowed in agriculture or as feed in most of the EU member states (including the Netherlands). The US, however, does not have official legislation banning GM crops, although labeling is mandatory. Although companies understand the possible moral and ethical elements of genetic modification, the uneven global legislation causes an uneven playing field and increased competition for companies operating in countries where genetic modification is not allowed.

Market for non-treated seeds limited by regulations

With genetics unavailable in many parts of the world and chemicals being increasingly limited or banned, growers are looking for alternatives to meet their needs. Untreated seeds are cleaned, primed, and coated, but not treated with a biological or chemical crop protection agent (fungicide or pesticide). They are increasingly requested by growers as it leaves them the choice to use crop protection only when necessary (data-driven precision farming). The use of untreated seeds requires ideal soil conditions, making it a popular product in Europe, but less frequently demanded by growers in Vietnam. Untreated seeds are not necessarily organic, as that requires the seeds to be grown under Certified Organic conditions.

However, for export, the treatment of seeds is mandatory. In the Netherlands, Maxim and Apron are allowed (both from Syngenta), for export, Thiram is mostly requested.

Global trade increases spread of pests and diseases

Import and export of crops throughout the world have tremendously increased the risk of spreading diseases. An example of this is the Tobamovirus (tomato brown rugose fruit virus) found in tomatoes. The disease was first discovered in South America around 2017. Within four years, the virus had spread all around the globe, which is relatively fast for a horticulture virus.

Environmental impact: chemicals

Although more effective, chemicals are more harmful to the natural environment and human health than their biological alternatives

Until the 2000s, the impact of chemical pesticides on human health and the environment were widely underestimated, mainly because toxicity levels were measured for the active substance, not for the final product. There are hundreds of studies around the world that have investigated the serious harmful effects of agricultural chemicals. The results showed that they are related to some types of cancer such as breast, prostate, brain, bone, thyroid, liver, lung, etc. Recently, there have been various cases of products being recalled due to harmful substances (sesame seed, ginger and vitamins containing ethylene oxide in August 2021). The effectiveness of chemical control agents has been questioned, especially in the most recent years, as chemicals have demonstrated the following harmful effects:

Damage to the ecosystem and biodiversity loss

Impacts on biodiversity have tremendous direct and indirect effects on all ecosystem services. Well-known chemical pollution scenarios include excessive nutrient loads and acid rain. Biodiversity provides an “insurance policy” that minimizes the risk of drastic changes in an ecosystem. For example, in the 1950s, the Panama disease destroyed nearly all banana plantations in North and Central America, as all producers were only producing one cultivar (Gros Michel or “Big Mike”). Similarly, Arabica coffee may face extinction through the ‘coffee rust’ disease.

Crop resistance

Resistance is potentially inevitable, with weeds developing resistance to any new product introduced to the market. Although resistance varies between species and chemicals, it can develop after only three years of consecutive use of a single product.

Limited long-term efficiency

The use of chemicals throughout the entire growing season is considered unnecessary and even harmful for Dutch horticulture, as long as natural enemies exist for the specific pest. The average density of pests even increases. Control agents reduce pests, which in turn, means the natural enemies of pests have nothing to eat and reduce in numbers. With fewer natural enemies around, the density of pests increases in the long run. Researchers emphasize the importance of not only looking at the short-term consequences of pesticides on pests but also study the long-term effects.

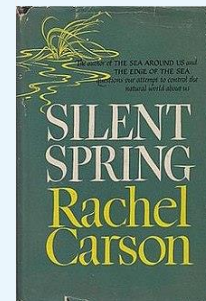
Case study: Roundup

Roundup was introduced to the market in the 70s, but a 2002 study showed the formula of Roundup was a thousand times more toxic than its active substance level. In 2019, American press published tens of thousands lawsuits against Monsanto, with people stating that Roundup had caused them to develop cancer. Several of these lawsuits led to settlements, sometimes for amounts as high as USD 80 million.

The European Union has not banned Roundup, although individual member states may ban it. The Netherlands temporarily banned Roundup for non-commercial use in 2011, but since 2015, the product is once again for sale in the Netherlands.

Case study: DDT

DDT (Dichlorodiphenyltrichloroethane), widely used in the US from the ‘40’s to 1972, has caused dramatic damage to human health and the population of bees, birds and insects. DDT is proven to cause cancer, male infertility, miscarriage, developmental delay, and liver damage. Rachel Carson’s *Silent Spring* led to a nationwide ban on DDT for agricultural uses, as well as spreading environmental awareness and indirectly leading to the creation of the U.S. Environmental Protection Agency. Today, DDT is manufactured only in North Korea, India and China.



Environmental impact: biologics

Biologics negatively impact the environment through escapees disturbing ecosystems and high land requirements

Biological agriproducts generally break down quicker and cause less pollution than chemical pesticides (Centre for Agriculture and Environment). As biologic agents usually contain different substances, insects are less quick in developing resistance against biologics. The use of biological agro-products leads to lower levels of pesticide residue in foods, which is why biological food products are often used or producing food for babies and infants, as low levels of residue are more dangerous to them than to adults.

Invasive alien species

Invasive species are a risk for the natural environment, as they often do not have (many) natural enemies. This happens both in plants and animals. The main cause for increasing uniformity is international transport. The EU estimates the number of invasive species at 10,800 – and continuously increasing. Researchers fear for “Mac Biodiversity”, whereby the uniqueness of many different ecosystems is disappearing quickly.

Biological crop protection methods can make use of non-native invasive insects or plants (predators, herbivores, anthropoids, parasites, or pathogens) to fight pests and diseases. When these predators escape (from greenhouses or other controlled environments), they are at risk for disrupting the balance of the natural environment.

Higher land requirements

The majority of conventional systems achieve a significantly higher yield compared to organic systems. Therefore, organic production requires up to 40% more land than conventional production for all food types (including fruits and vegetables). Greater land use is impactful to the environment, as it often requires deforestation, leading to habitat loss, biodiversity loss, and increasing carbon dioxide levels in the atmosphere. However, although larger land requirements negatively impact biodiversity, organic farmer allows for more species richness than conventional farming – meaning there is more space for different animals and plants in organically farmed arable land than in conventional farming.

Lower effectiveness and less food

Biological products are approximately 70% as effective as chemicals. A biological product can never be 100% effective, meaning there are higher risks for farmers and more losses in yields.

Case study: Asian ladybugs

Asian ladybugs (*Harmonia axyridis*) were introduced in 1955 into Dutch greenhouses to protect crops from aphids. In 2002 the ladybugs were first spotted outside of greenhouses. Since then, the animal has been multiplying rapidly. The European Commission has labelled the ‘exotic species’ as being responsible for disrupting the European flora and fauna, causing a yearly damage of EUR 12 million.

Comparative study: organic farming promoting biodiversity

On average, organic farming increased species richness by about 34%. Compared to conventional farming, organic methods could play a role in halting the continued loss of diversity. Mostly plants benefited from organic farming, but also anthropoids, birds and microbes are positively affected.



Horticulture in Vietnam

The horticulture sector is growing fast, with production systems ranging from low-tech to high-tech

Vietnam is one of the fastest growing economies in the ASEAN region. The country has a population of 97 million people (2019) and a GDP growth of 7.5% on average. The horticulture and floriculture sector have been growing by an average rate of 26.5% per year; from USD 439 million in 2009 to almost USD 4 billion in 2018. The sector is expected to continue to grow, due to strong exports, Free Trade Agreements with various partners (including the EU) and an increasing domestic demand. Furthermore, the Vietnamese government has announced a USD 4.4 million package to develop high-tech agriculture. At present, the export of fruits and vegetables is mainly towards the US, Japan, Australia, South Korea, Germany and the Netherlands. The interest in the Vietnamese horticulture sector has been increasing since 2005, with over 168 horticultural development projects and programs worth over USD 1 billion between 2005 and 2014 (donors included ADB, WB, FAO, IFAD, USAID, IDH, Syngenta Foundation, and Dutch programs including EVD, PSI, RVO and FDOV).

Horticulture farming systems

The sector is moving away from traditional open field production to protected cultivation. Several developments include greenhouse technology, increased digitalization, precision and automatic irrigation, computerized crop management systems, better flower and vegetable varieties (hybrid and post-harvest technology). This is a trend that has also been observed in other countries in the region, including the Cameron Highlands in Malaysia and Chiang Mai in Thailand.

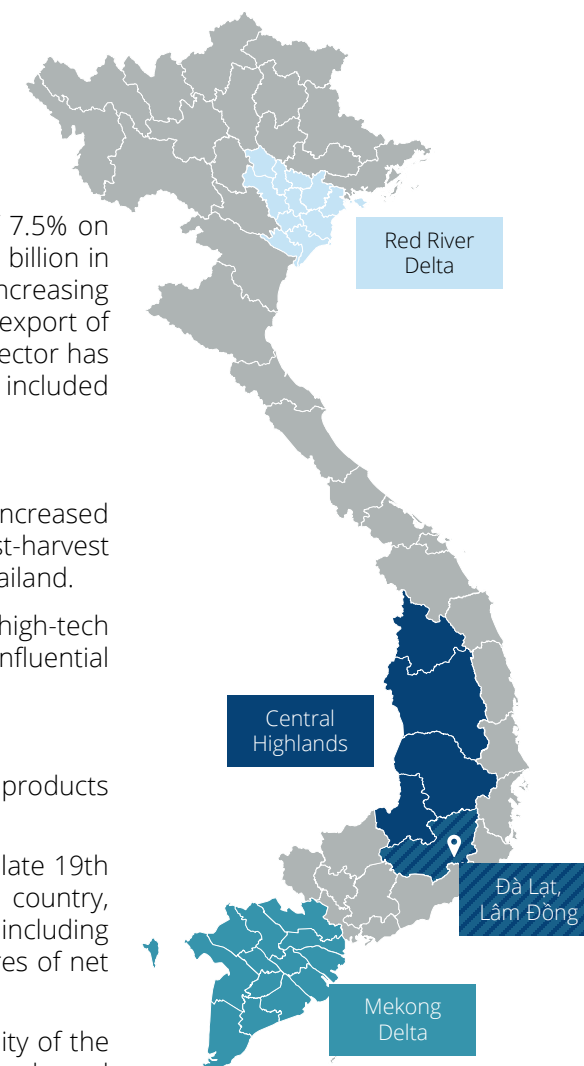
The market is relatively fragmented, especially in the Red River Delta. Most farms are family business. Although the number of companies active in the high-tech market in Vietnam is relatively limited, the new generation of growers is more likely to invest in long-term modern greenhouses and equipment. Influential Vietnamese companies active in the horticulture or floriculture sector are Vin Group and Hasfarm.

Geographical highlights

Vietnam has a diverse climate ranging from temperate to tropical with each location producing different crops (see also Annex I). Nearly all horticulture products (95%) are used for domestic consumption, with the remaining products exported to nearby countries (Singapore, Thailand, China).

Da Lat, located in the Central Highlands of Vietnam in the province Lam Dong, is considered the agricultural powerhouse of Vietnam. Established in the late 19th century, the city has been a research station for agriculture since its establishment. At present, Da Lat produces fruits and vegetables for the entire country, including lettuce, cabbage, carrots, cauliflower, potatoes, pepper, strawberry and coffee. The region is known for its high-tech production systems, including greenhouses, laboratories and hydroponic farming systems. The Lam Dong province has around 4,500 hectares of plastic greenhouses and 1,222 hectares of net houses. Da Lat city accounts for over 60% of this total area (2,800 ha).

The Mekong Delta is also a relevant region for horticulture, with fertile soils and thousands of farmers. However, due to dry seasons and increasing salinity of the water due to climate change, many smallholder farmers are unsure of their future. Improved practices are required, including increased crop diversity and good agricultural practices. The Mekong Delta Agricultural Transformation (2013) emphasizes the importance of efficient and innovative agriculture.



Crop protection in Vietnam

Pesticide use has increased drastically, with levels of awareness still limited

The Vietnamese pesticides market is estimated to have grown at a compound annual growth rate of 6.8% over 2017-2022 and is projected to grow at a CAGR of 4.1% during the forecast period 2022-2025. It is estimated that half of the agriculture production would be lost without using herbicides and pesticides in Vietnam. In Vietnam, the crop protection industry has been witnessing a relatively steady to high growth due to the growing demand for agricultural produce in the region. However, environmental and regulatory constraints on agrichemical usage, increasing demand for food safety and quality, and market saturation are poised to limit growth. The effects of climate change are notable, with farmers experiencing rash and extreme weather conditions, higher temperatures and rising sea levels causing salinisation, drought and floods. Statistics from the Ministry of Agriculture and Rural Development (MARD) in 2017 showed that Vietnam spent U.S. \$500 to \$700 million annually to import raw materials and pesticides from China. Of these, 48% were herbicides (19,000 MT) while pesticides and insecticides accounted for 32% (16,400 MT). The rest were chemicals for growth regulators. The volume of herbicides imported to Vietnam has increased rapidly over the past few years, from 6,500 to 9,000 MT per year from 1981-86 to 100,000 MT in 2015 and 120,000 MT in 2017 (source: MARD).

Pesticide challenges in Vietnam

Vietnam is facing serious challenges with respect to the amount and toxicity of the pesticides used. With hardly any domestic pesticide production, Vietnam has experienced exponential growth in the quantity and the value of imported pesticides in recent years. Pesticide use increased from just 100 tons a year in the 1950s to 35,000 tons in 2002 and to about 105,000 tons in 2012. The amount of active ingredients per cultivated area (kg / ha) increased from 0.3 kg (1981-1986) to 1.24 - 2.54 kg (2000-2010). Pesticide use in Vietnam was much higher than four major countries using pesticides (USA, France, Japan and Brazil). Increasing imports of newly formulated (and safer) pesticides have not yet replaced or reduced highly toxic pesticides with low efficacy. Improper use of pesticides by farmers (too high dosages, cocktailing of pesticides, inadequate pre-harvest intervals, among others) has further contributed to environmental and health problems.

The level of awareness and social responsibility of the users of pesticides in Vietnam is limited, causing numerous undesirable impacts on public health and the environment in recent times. Despite growth in pesticide policies and regulations, the state has yet to effectively regulate the pesticide market. Reasons behind the lack of effective pesticide market regulation include the governance structure (i.e., centralized decision making), corruption, information distortion and a failing legal system.

Amongst farmers, especially smallholder farmers (mostly family businesses), Dutch exporters of biologicals see the limited awareness of the negative effects of chemical use and artificial fertilizer growing. As many regions in Vietnam have a climate that allows for year-round production and multiple harvests per year, the soil is easily exhausted due to over-production. For this reason, more and more farmers acknowledge the importance of using fertilizer to nourish the soil.

Key takeaways

- The use of pesticides has increased exponentially in Vietnam (x100 from 1950s to 2012);
- The high use of pesticides has led to numerous environmental and health problems. The effects of climate change are also increasingly visible.
- The government is implementing policies to reduce agrochemical usage, but for several reasons, this has not yet led to effective market regulation.
- Effective regulation combined with farmer training programs and market availability of alternatives are necessary to reduce agrochemical usage.



Crop protection in Vietnam, continued

The Vietnamese government aims to reduce the number of pesticide brands by 30% (currently >4,000 registered trade names)

Current status

Pesticide chemicals are mostly imported from overseas, with 99% chemicals and 100% pesticides. The leading pesticide importers in Vietnam include Hai Binh Service Trading Production (8.7% market share), An Nong Group (6.2%), Bayer VN (5.7%), and Viet Thang (5%). There are 200 manufacturers of pesticides in Vietnam focusing on importing raw materials, mixing and packaging. Throughout the country, 30,000 wholesalers and retailers sell pesticides. Company Loc Troi Group has the largest market share. Over 1,800 active ingredients are allowed.

Farmers experience several symptoms after applying pesticides, including weariness, itchiness, dizziness, headache, and dry skin. Farmers who apply pesticides on rice (8.8% have reported poisonings due to exposure) and fruits (8.8%) are more likely to be exposed to pesticides than on vegetables (7.7%).

Research has found heavy metal contamination and related risks in several vegetables, exceeding the standards recommended by the WHO by at least 2-fold, up to 5-fold.

Lack of knowledge is considered the major problem preventing growers to reduce their dependency on agrochemicals and to advance protected cultivation. As soon as the level of knowledge (technical cultivation and post-harvest) increases, the demand for technology and alternatives for agrochemicals will increase automatically.

Reducing Pesticide Usage and IPM

The Vietnamese MARD has requested that the Plant Protection Department reduces the number of chemical pesticide brands registered in Vietnam by 30%, replacing them with bioproducts. The current list of crop protection products includes over 4,000 trade names (see table). The government plans to cut these and limit registrations of new chemical products. The plan is to replace chemical products with more environmentally friendly crop protection products, such as biologicals, physical methods, and promoting organic farming. The government also looks to encourage and extend IPM models (integrated pest management).

Key factors driving the rapid adoption of biologicals in Vietnam include pesticide residue problems in agro-products for local consumption, new requirements for Maximum Residue Levels on agro-products imported to the EU and U.S., and a growing number of banned pesticides. This may provide an opportunity for the Netherlands to add value based on existing knowledge and expertise, allowing Vietnam to protect its import license under the new free trade agreement.

Pesticides used in agriculture	Nr of allowed active ingredients	Nr of trade names
Pesticides	874	1,796
Fungicides	573	1,202
Herbicides	235	659
Rodenticides	8	26
Molluscicides	33	153
Growth regulators	52	148
Pheromones	8	8
Chemicals used for drainage	5	6
Timber preservatives	8	9
Storage chemicals	4	10
Chemicals used for golf courses	4	4
Total	1,804	4,021

Main crops and crop diseases

Vietnam exports mostly tropical fruits to the EU, with exports of fruits and vegetables to NL valued at EUR 228 MN

Data from the Ministry of Industry and Trade revealed that Vietnam's shipments of fruits and vegetables to the EU stood at 2.26 billion USD in the first eight months of this year, a decrease of 11.3 percent from a year earlier, due to COVID-19. Popular tropical fruits include papaya, mango, pineapple, dates, tamarind, passionfruit, avocado, figs, melons and grapes. In 2019, Vietnam exported fruits and vegetables to the Netherlands valued at EUR 228 million (4% of total export value) (source: CBS).

In Vietnam, geographical region and host plant are two major factors to determine viral populations.

	Production in Vietnam (in MN MT)	Vegetable export from Vietnam to the Netherlands (EUR in 2020)		Fruit export from Vietnam to the Netherlands (EUR in 2020)		Pests and diseases
1	Vegetables, fresh nes*: 15.3	Vegetables, uncooked or cooked by steaming or boiling in water, frozen	909	Coconuts, Brazil nuts and cashew nuts, fresh or dried, whether or not shelled or peeled	340,853	<ul style="list-style-type: none"> ➤ Food poisoning: 133 cases of food poisoning in 2005, with additional 4,000 people injured. Chemicals responsible for 25% of these food poisonings. ➤ Injury by chemical residue on produce: 7,329 people injured in 2007, 55 who died (MOH). ➤ Rice brown planthopper bloom (2005 to 2007)
2	Cassava: 10.1	Roots and tubers of manioc, arrowroot, salep, Jerusalem artichokes, sweet potatoes and others.	642	Citrus fruit, fresh or dried	9,766	
3	Fruit, fresh nes: 2.8	Other vegetables, fresh or chilled (excluding potatoes, tomatoes, alliaceous vegetables, etc.	393	Fresh strawberries, raspberries, blackberries, back, white or red currants, gooseberries, etc.	8,757	
4	Bananas: 2.2	Onions, shallots, garlic, leeks and other alliaceous vegetables, fresh or chilled	187	Other nuts, fresh or dried, shelled or peeled (excluding coconuts, Brazil nuts, etc.	6,081	
5	Coconuts: 1.7	Dried vegetables, whole, cut, sliced, broken or in powder, but not further prepared	163	Fruit and nuts, uncooked or cooked by steaming or boiling in water, frozen, etc.	2,952	
6	Sweet potatoes: 1.4	Vegetables provisionally preserved, e.g., by sulphur dioxide gas, in brine, in sulphur water, etc.	145	Dates, figs, pineapples, avocados, guavas, mangoes and mangosteens, fresh or dried	39	
7	Watermelons: 1.2	Dried leguminous vegetables, shelled, skinned or split	52	Dried apricots, prunes, apples, peaches, pears, papaws "papayas", tamarinds and others	35	
8	Mangos, mangosteen, guavas: 1.2	Carrots, turnips, salad beetroot, salsify, celeriac, radishes and similar edible roots, etc.	4	Bananas, incl. plantains, fresh or dried	8	
9	Cabbages and other brassicas: 1.1	Leguminous vegetables, shelled or unshelled, fresh or chilled	1	Melons, incl. watermelons, and papaws (papayas), fresh	5	
10	Oranges: 1.0	Potatoes, fresh or chilled	0	Apricots, cherries, peaches incl. nectarines, plums and sloes, etc.	0	

Source: [International Journal of Molecular Sciences](#), [WUR](#), [IFPRI](#), [FAOSTAT](#), ITC Trade Map

*Including inter alia: bamboo shoots, beets, chards, capers, cardoons, celery, chervil, cress, fennel, horseradish, marjoram, sweet oyster plant, parsley, parsnips, radish, rhubarb, rutabagas, swedes, savory, scorzonera, sorrel, soybean sprouts tarragon, watercress.

Larive International for EKN Vietnam | Agrochemical reduction

COVID-19 pandemic in Vietnam

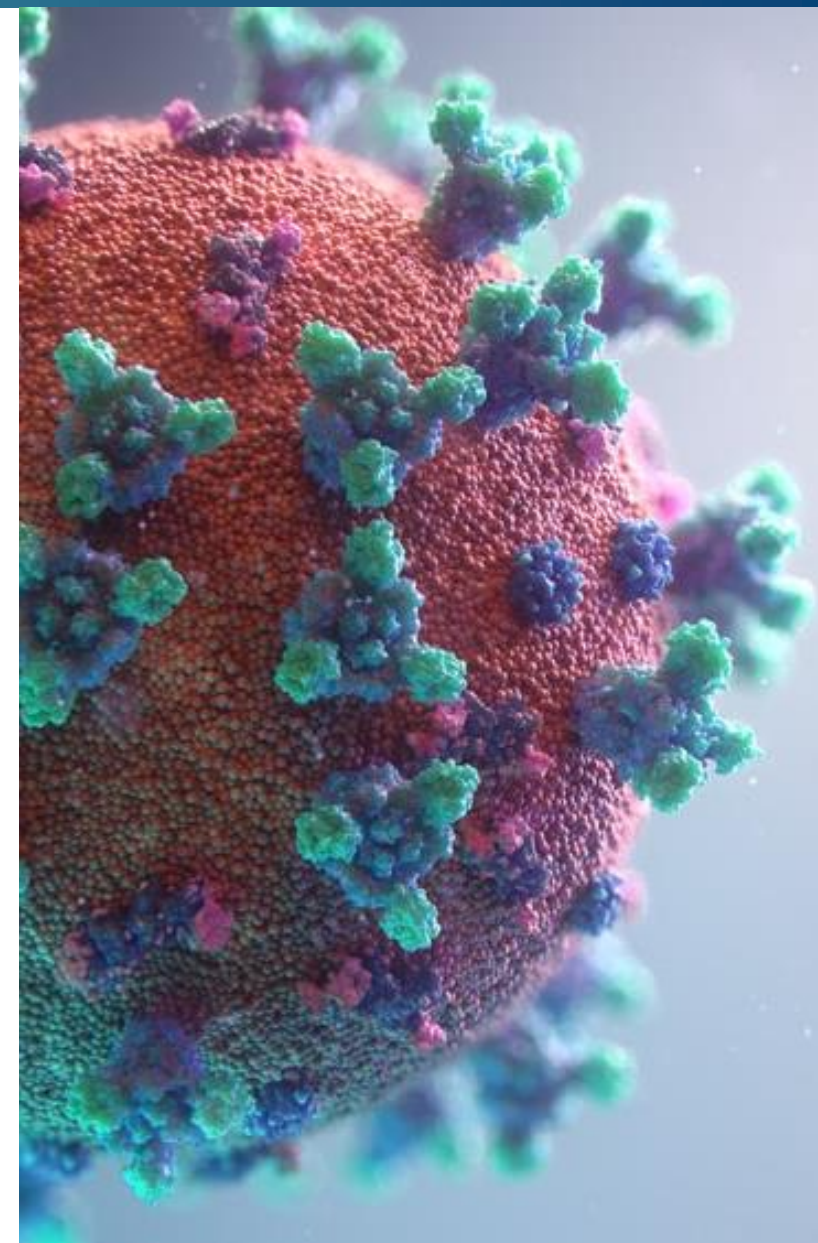
Vietnam has been severely hit by the pandemic but expects a full recovery

Vietnam has been severely hit by the COVID-19 pandemic. Especially Ho Chi Minh City (9 million inhabitants) has been affected, accounting for more than 80% of the 18,500 COVID-19 deaths and 50% of the 756,000 cases (Reuters, as of September 27, 2021).

The pandemic has led to a dent in the welfare of inhabitants of Vietnam. With the highly contagious Delta variant spreading, the government announced a strict lockdown to prevent further contamination in April 2021. The nationwide lockdown has been successful in reducing the contamination rate, but also led to adverse effects on the economy and people's lives. A study published in September 2020 demonstrated the effects, showing the lockdown had led to income loss for 67% of the households. Negative effects on mental health were also prominent, with anxiety and depression. It has even led to the return of hunger, leaving tens of thousands of people hungry on a diet of only rice and fish sauce.

During the COVID-19 pandemic, the Vietnamese borders have been closed, although authorities still allow foreign investors, expats, skilled workers and students to enter the country using a special entry permit. The Dutch Business Association Vietnam (DBAV) is one of the organizations offering help to professionals wanting to get into Vietnam during the pandemic and weekly updates on the developing Covid situation. For organizations interested in entering the Vietnamese market, it is important to consider the pandemic as a practical hurdle. Although limiting economic activity at the moment, the regulations are expected to allow for increased business in the near future. On the mid-long term, Vietnam remains country with tremendous potential.

As of October 1st, 2021, the Vietnamese government plans to ease the restrictions and to restart production.



Source: [The Guardian](#), [Reuters](#), [Tran et al., 2020](#).

Horticulture in the Netherlands

The Dutch horticulture sector is globally renowned for its high-tech, innovative solutions

The Dutch horticulture sector focuses on vegetables and flower bulbs. Westland, a region in the Netherlands, is home to the world's highest concentration of greenhouse horticulture. Since 1880, growers started making use of greenhouses for horticulture. There are over 9,000 expert greenhouse companies in the Netherlands, with over 10,000 hectares in greenhouse area.

In 2018, companies in the horticulture sector contributed EUR 21.1 billion to the Dutch economy (2.7% of the GDP). 4.5% of all R&D expenditures in the Netherlands is in the horticulture sector. Export was severely hit by the COVID-19 pandemic, with horticultural exports being 11% lower in April 2020 compared to April 2019 and confidence among farmers and horticulturists declining all the way through the second quarter of 2021.

Floriculture

The flower export sector is worth over EUR 9.2 billion, exporting to more than 120 countries (ornamentals and flower bulbs). Dutch growers produce over EUR 7.1 billion in flowers and plants. The sector employs 83,000 people permanently and a further 51,000 workers temporarily employed during peak times. The largest decline in export was seen in cut flowers (35% lower in April 2020 compared to April 2019).

Horticulture

Dutch growers produce vegetables and fruits worth over EUR 3.5 billion, with many products also imported. The total value of export lies at EUR 11.3 billion. The sector employs 56,000 people permanently and a further 58,000 workers employed during peak times.

Low-energy greenhouses

The Dutch government aims to reduce the energy and gas consumption of the greenhouse horticulture sector, through the following interventions:

- Use of solar energy;
- Light-saving measures (use of natural light and more efficient lamps);
- Energy-efficient growth strategies;
- Geothermal applications;
- Use of biofuels (the use of biogas (green gas) and (residue) wood offer great potential);
- Generation and use of (more) sustainable electricity.



Biologics & organic foods in the Netherlands

After years of explosive growth, the organic market in the Netherlands is expected to grow at a lower pace

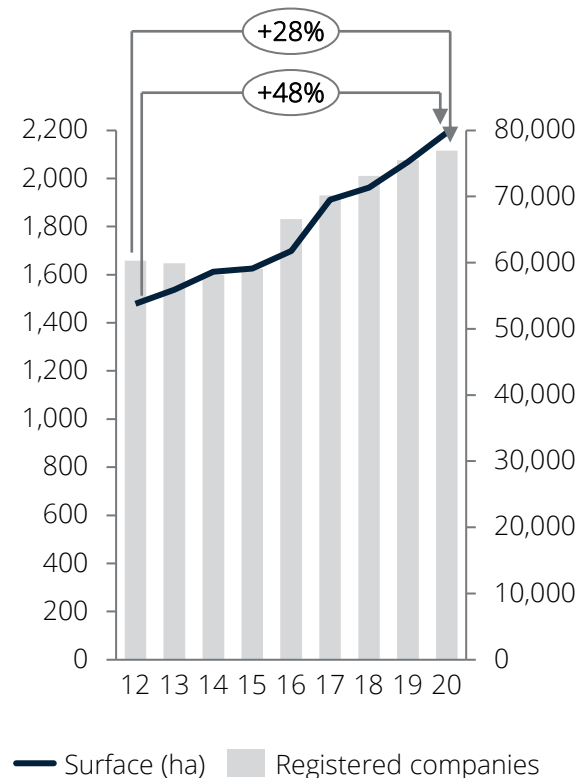
The Netherlands has extensive expertise in biological crop protection and (farming) methods to reduce the usage of agrochemicals. Biological control of pathogens and insect pests in agriculture and horticulture is based on the use of natural enemies of the agents that cause disease and infestations. As such, the Dutch private and public sector may be well-positioned to help Vietnam deliver tangible results in improving the responsible use of crop protection products.

Proper products, farming methods and IPM protocols can help farmers to access effective crop protection tools to produce more safe, affordable, and nutritious food for the community and export, without having to rely on excessive pesticides.

The Dutch organics sector (production using only biologics and no chemicals), accounts for approximately **3-10%** of the total market. SKAL Biocontrole is the independent organization registration, certifying and monitoring the organic sector. With an explosive growth in the early 2000s, the growth has been slower but steady in the past ten years and is predicted to remain steady in coming five years.

	2010-2015	2015-2018	2019
Yearly increase in revenue organic market (%)	20%	5-8%	5%
Revenue (MN EUR)	-	1.548 in 2018	1.625

Development of the Dutch organic sector:
surface in use by organic companies (in ha) and the total number of companies registered at SKAL, from 2012 to 2020 (per 31st December).



Organic market in the Netherlands

The main reasons for stagnating growth are lack of knowledge amongst conventional farmers, fulfilled consumer demand and other market factors

Restraining market factors

- Knowledge: farmers are unsure of how to switch from conventional methods to alternatives. The risks are great.
- Machinery: organic farming requires different machinery. However, as machinery is an expensive investment, many farmers are unable to attract additional financing.
- Price: conversion from conventional farming to organic farming is costly in the Netherlands. A large obstacle is the requirement of producing for two years using organic methods but selling at the conventional market.
- Experience: established players in the market have the advantage of established connections with buyers, knowledge, experience, and have survived the costly two-year conversion period.

Satisfied consumer demand

According to growers, the reason for the stagnation of the organic market in the Netherlands is the saturation of the market: the consumers who want to buy organic products are already doing it. 85% of fruits and vegetables are sold in retail and due to consumer saturation, retailers see no reason to increase the share of organic products on the shelves. The satisfied demand and the fact that conventional agriculture is still more lucrative than organic production, means many growers are unwilling to acquire the exclusive SKAL certification for organic production. Furthermore, some products are easier to produce organically than others. Carrots and chicory are easier to produce without the use of any chemicals, whereas other crops, soft fruits and hard fruits are far more difficult.



II) Stakeholder analysis

Commercialized biologicals and farming systems

Several Dutch companies are considered world-class, both in the biologicals segment and equipment manufacturing business

Bio control agents:

The bio control market is dominated by Dutch company Koppert Biological Systems, followed by the originally Belgian Biobest (offices in NL). Koppert Biological Systems is the global leader in macrobial crop protection (insects). With these companies in the lead in terms of size, there are many smaller-sized companies. The number of start-ups and scale-ups active in the biological control agent market is estimated at over 200.

- Dutch: Benfried, Biobest (Belgium and NL), Entocare, Koppert, Nufarm (Benelux), Valto, Van Iperen.
- Non-Dutch: Biobee (Israel), Certis and Mitsui (Japan).

Biofertilizers:

- Dutch: Bio-Kultura, Biocompig, BVB Substrates, De Ceuster Meststoffen, Ferm o Feed (Den Ouden Group), Grodan, Komeco Organic Fertilizers.
- Non-Dutch: Agrico (Canada), Yara (Israel).

Bio stimulants and breeding:

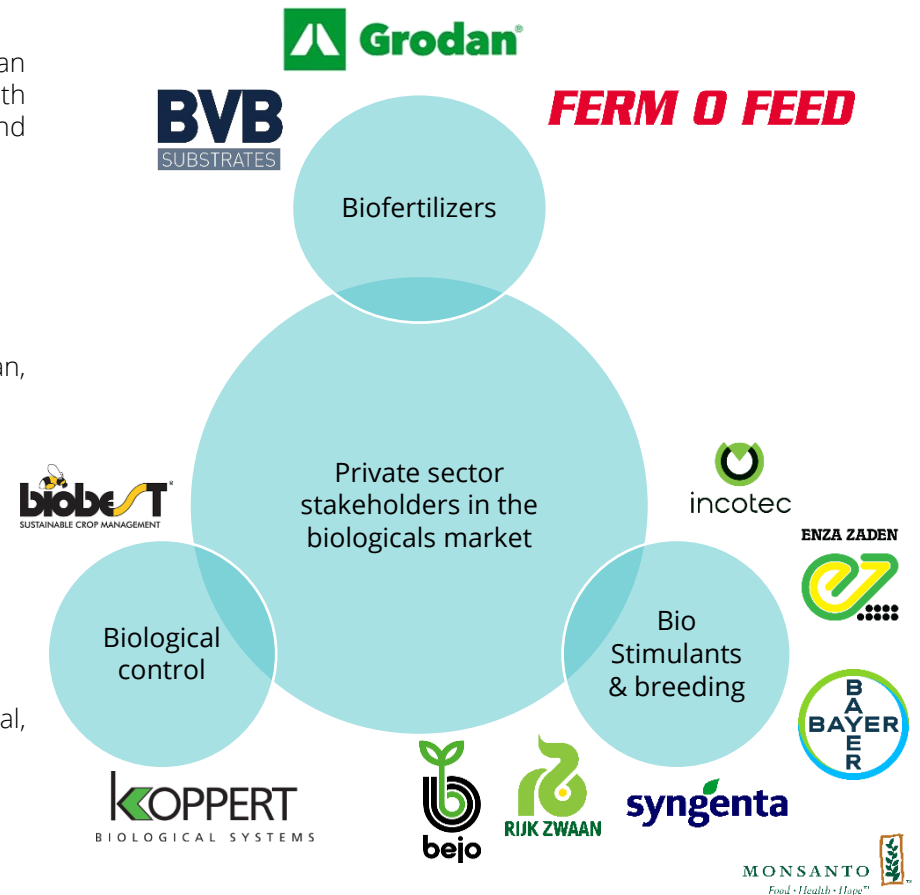
- Dutch: Axia Vegetable Seeds, Bejo, Enza, Incotec, Onings Holland Flower Bulbs, Rijk Zwaan.
- Non-Dutch: BASF (Germany), Bayer Crop Science (Germany), East West Seed (Thailand), Monsanto (US).

Greenhouse construction and primary process:

- Dutch: Agrocare, Beekenkamp, Certhon, DOOR, Holland Gaas, Hoogendoorn, Hortus Supplies International, Koppert Cress, KUBO, Priva, Ridder, Royal Brinkman, Ter Laak, Van der Valk Horti Systems.
- Non-Dutch: Hasfarm (Vietnam), Orlar (Vietnam), Vineco / Vin Group (Vietnam).

Importers and traders:

- Dutch: Best Fresh, Eosta, Nature's Pride, Nautilus Organic, Royal Flora Holland, The Greenery.



Application in tropical horticulture

Many products are appropriate for tropical climates, but require closed systems or advanced knowledge

Several of the products offered by the Dutch commercialized market are applicable to a tropical climate. However, there are several considerations to keep in mind:

➤ Bio control agents:

- The use of natural predators in horticulture production is applicable in tropical climates but can only be applied in closed systems to prevent escapees. Smaller-scale farms with open systems cannot use this effective solution. Especially in the Da Lat region, where there are more closed systems and greenhouses, this product is appropriate.

➤ Bio stimulants:

- Many of the seeds are developed for the crop varieties mostly produced in Western Europe and the US, as the market for alternative products has been largest in these areas. Therefore, there are some common crops in Vietnam for which there is no Dutch alternative offered yet. However, many seed companies indicate their assortment is based on demand. Should there be a larger market in Vietnam for a variety of crop, they are open to investigating the possibility of targeting to that market.
- Although there is farmer demand for untreated seeds, at present, Vietnam does not allow for the import of untreated seeds. The government's phytosanitary requirements have not been updated to allow for the alternatives to chemically treated seeds. Therefore, Dutch companies active in Vietnam usually import treated seeds from the Netherlands and clean them with a biological substance once in Vietnam.

➤ Biofertilizers:

- Organic fertilizers are applicable and suitable to tropical horticulture. For some products, such as chicken manure, the application is very easy. For the more complex products, such as liquid fertilizers and substrates are more complex in use. Many farmers are unaware of how to apply these.

➤ Greenhouse construction and primary process:

Although not a key focus of this study, it is relevant to consider the importance of products and solutions for growers and breeders, including greenhouse construction, equipment and technology.

- The use of greenhouses and closed systems in general can greatly reduce the need for agrochemicals. A closed system reduces the risk of pests and diseases reaching the crops.
- The use of other equipment (including computers, robotics, sensors and drones) can greatly reduce the dependency on agrochemicals. Data-driven horticulture allows growers to know exactly which crop is at risk for a pest, disease, or water shortage.
- For this reason, several equipment manufacturers and greenhouse construction companies have been included in the study.



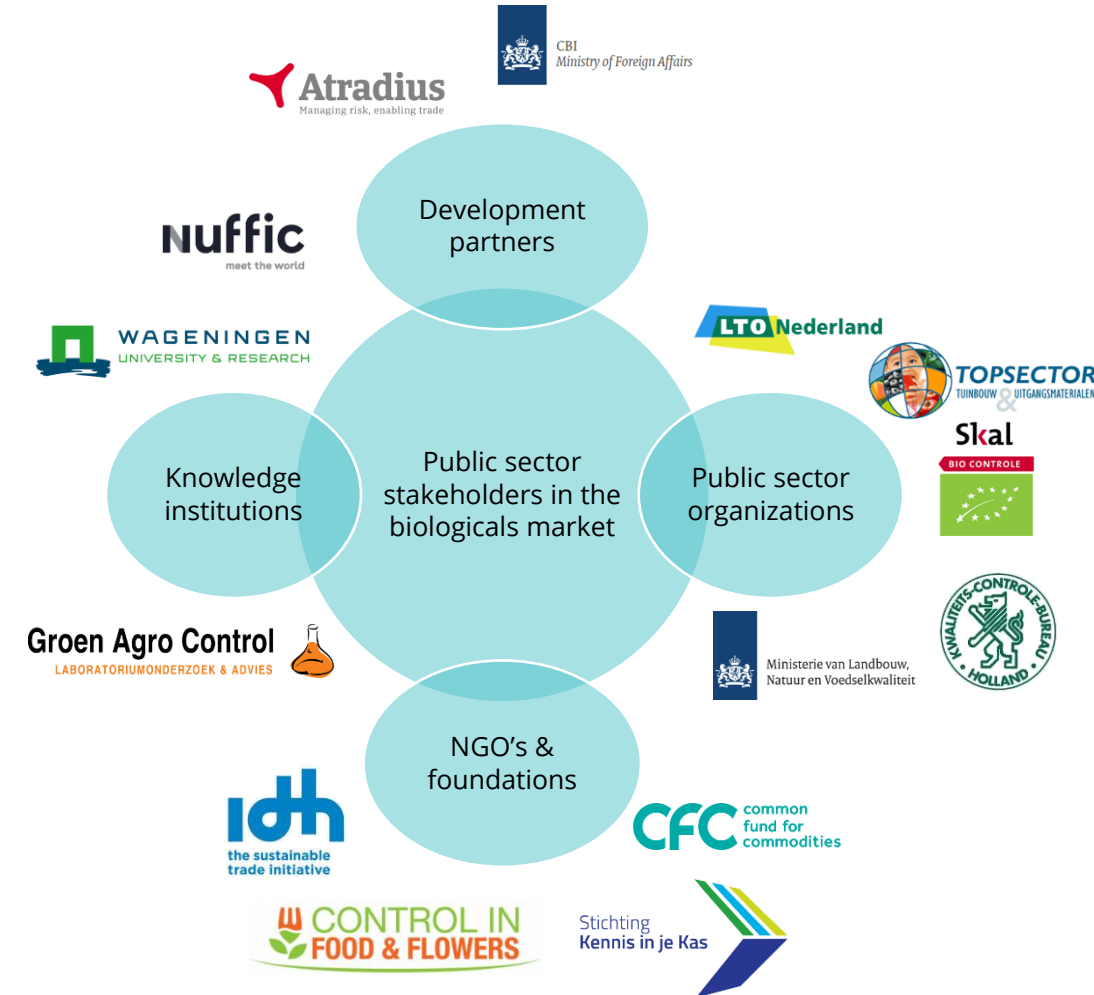
Public sector stakeholders

The Netherlands is home to several influential public stakeholders, including development partners, knowledge institutes, NGOs, and sector associations and sector organizations

Public sector stakeholders active in the horticulture sector include both Dutch and international organizations. Some have already been actively engaged in horticulture in Vietnam, other organizations are considered relevant, but have not (yet) participated in any programs in Vietnam.

- Multilateral development partners: ADB, FAO, IFAD, WB.
- Bilateral development partners: ACIAR, AECID, AFD, DFAT (Australia), Danida, DFATD (Canada), DFID, GIZ-BMZ, JICA, LuxDev, NZAID, RDA, SDC, SNV, USAID.
- Other development partners: Atradius, CBI (Centre for the Promotion of Imports from the developing countries) of the Dutch Ministry of Foreign Affairs, Trade and Investment Promotion Centre in Vietnam, other direct programs of the Dutch government (including EVD, FDOV, PSI, RVO).
- Public sector organisations: EFSA (European level), interest groups of consumers and retailers, KCB, Lam Dong Tourism, LTO, NVWA (part of Ministry of Agriculture, Nature and Food Quality or 'LNV'), Topsector Horticulture & Starting Materials and Kennis- en Innovatieagenda Landbouw, Water, Voedsel, SKAL.
- Sector associations: Artemis, Bionext represented by Biohuis, BioNederland and Biowinkelvereniging, Dalat Flower Association (Vietnam), Dutch Business Association Vietnam, European bio stimulant industry council (EBIC), Fresh Produce Centre (Groentenfruihuis), International Biocontrol Manufacturing Association (IBMA), Nautilus Organic, Netherlands Vietnam Smart Horticulture Platform, Plantum, VinaFruit (Vietnam).
- Knowledge institutions: Aeres, Groen Agro Control, Nuffic, Wageningen University & Research.
- NGO's & foundations: relevant Dutch foundations include IDH, Stichting Control in Food & Flowers, and Stichting Kijk.

International or global foundations and NGOs include Asialink, AVRDC, BFDW, CISU, Common Fund for Commodities, Cordaid, European Commission, Global Crop Diversity Trust, IBSA Fund, ICGEB, ILRI, Oman Royal Court Affairs, SEARCA, Syngenta Foundation, UK Biotechnology and Biological Sciences Research Council, and VLIR.



Source: RVO

Certification schemes

Most global retailers demand GlobalG.A.P., a global program certifying producers as using good agricultural practices

Europe

The EU uses one visual identity for all organic products. This is called the organic logo, a green leaf. The logo was introduced to facilitate consumers in recognizing organic products and to help organic growers sell their produce throughout the entire EU. The logo can only be used when the producer is certified by an accredited authority. Criteria include production, processing, transport and storage. Products with this logo are registered by organizations within each member state. In the Netherlands, this is done by SKAL.

The Netherlands

- [SKAL Biocontrole](#): this independent organization is the overseeing body of the organics sector in the Netherlands. They are responsible for registration, certification and supervision. All farmers and companies looking to sell their products as 'organic', must be certified by SKAL.
- [MPS-ABC](#): founded 25 years ago, MPS is a joint initiative of Dutch growers. MPS certification aims to assure quality and sustainability of the floriculture sector.
- [On the way to Planet Proof](#): this independent quality label is an initiative of [SMK](#). The label is available for six sectors in the Netherlands, Portugal, Spain, Italy, Belgium, Germany, France and Poland. The number of certified farmers and organizations is growing rapidly, from 300 in 2017 to 2,400 in 2020. 47% of potatoes and vegetables and 35% of fruits are certified.

Global/Vietnam

- [GlobalG.A.P.](#): this trademark of standards for good agricultural practices was founded in 1999 by seventeen retailers. GlobalG.A.P. offers over 50 standards and programs for crops, livestock and aquaculture. There are over 200,000 certified producers in over 135 countries.
- [VietGAP](#): an initiative from the Vietnamese Ministry of Agriculture and Rural Development. Although used in Vietnam, the certification scheme is often not recognized by international retailers.



Research and development

Multinationals have most R&D power, with startups adding innovative solutions. Focus is shifting from prevention to curation

Main sources of R&D

With many startups entering the market, the main sources of innovation are the three largest companies in crop protection (both chemical and biological): Bayer (Germany), Monsanto (US), and Syngenta (Switzerland). With many years of experience, high-tech facilities, and investment power, these companies have the funds available to advance biologicals, both in terms of reducing production cost and in increasing effectiveness of the products.

Smaller-scale and more specialized companies in biologicals are led by leading companies such as Koppert (Netherlands), Biobee (Israel) and Biobest (Belgium).

Although private companies are considered very important sources of research and development, the leading knowledge institutes also contribute greatly to innovation. Number one agricultural university in the world, Wageningen University & Research, is considered the leading center for innovation in crop protection (Wageningen Plant Research, Wageningen Food & Biobased Research, business unit Greenhouse Horticulture, Wageningen Laboratory of Virology).

Research focus shifting from curative to preventive

For years, research was focused on curative (direct) crop protection methods. This is now shifting towards preventative crop protection and plant resistance. The more resistant a plant is to natural enemies, it is much more likely to thrive on light, nutrients and integrated pest management, rather than requiring pesticide programs.

Furthermore, researchers specifically consider the localities of the plant, taking climate, predators, and soil quality into consideration when developing better varieties, improved fertilizer or better crop protection methods.

Preventive crop protection

- Consider the plant characteristics
 - Product-specific requirements and threats
 - Plant resistance and 'ingredients', such as jasmonic acid and salicylic acid
- Consider the characteristics of the natural environment
 - Climate
 - Predators
 - Soil quality



Case study: seed treatments (Incotec)

Incotec provides seed enhancement techniques (priming, pelleting, filmcoat liquids etcetera) to a wide variety of seed companies in the global seed industry

Introducing Incotec

Incotec is one of the all-round international market leaders in seed enhancement. The company has its roots in the Netherlands, dating all the way back to 1868 and has been specialized in the treatment of seeds since 1968. Their ambition is to contribute to sustainable agriculture through improved seeds. Since 2015, Incotec has been a member of the Croda Group, a producer of specialized chemicals and an increasing assortment of field crops. Incotec has seven offices globally, with one business unit focusing on vegetables and one focusing on agricultural crops. The vegetable business unit serves many international clients, whereas the field crop business unit serves international seed companies.

Assortment

Incotec offers seed enhancement techniques for both vegetables and field crops. They deliver to small-, mid- and large international seed companies. The seed enhancement industry is a global industry with players and seed companies with a global infrastructure. Hence Incotec offers its services globally to their customers. In both vegetables and field crops, large seed companies are having deep knowledge of local circumstances and diverse resources to help growers and farmers all of the world.

Developments

Within Europe, the demand for untreated seeds is growing steadily. With untreated seeds is meant that no plant protection products are applied to the seeds. The untreated seeds have many advantages, reducing the number of agrochemicals used and challenges like crop loss in an early stage. Possibly import restrictions could be limiting for Vietnam, but many Vietnamese growers also use different growing techniques than European growers, which limits the suitability of untreated seeds in their systems.

Experience in Vietnam

It is important for Incotec to know not only their customer but also the end-user (like growers and farmers) of their product. Therefore, they do have some local experience with Vietnamese growers. However, as their largest production facility and R&D capacity is in the Netherlands and seeds are distributed mostly out of Europe by seed companies, they are not interested in joining a trade mission at this point.



Image source: Incotec

Case study: improved organic seeds (Rijk Zwaan)

Rijk Zwaan is ambitious to invest in R&D to reduce the global dependency on agrochemicals

Introducing Rijk Zwaan

Rijk Zwaan is an international vegetable breeding company with over 3,600 employees in 30 countries. Their head quarters is in the Westland in the Netherlands, the epicenter of Dutch horticulture. Rijk Zwaan is a family company, owned for 90% by three families. Annually, 30% of their revenue is spent on innovation through research and development.

Global developments

Rijk Zwaan is aiming to move away from the use of chemicals by focusing on research into alternatives. Many bio stimulant products are in development. Furthermore, Rijk Zwaan is increasingly offering solutions to growers focusing on growing methods and training programs. Training programs are focused on for example IPM measures and efficient irrigation. Rijk Zwaan offers these training programs independently and often free of cost for participants.

Assortment

Rijk Zwaan offers a wide and growing range of vegetable seeds, including three main segments: conventional seeds, organic certified seed (separately packaged) and non-chemically treated seeds. The assortment is based on the demand of growers and the rules and regulations of the relevant country.

Experience in Vietnam

Rijk Zwaan has a local presence in Vietnam for three years with a sales office in Ho Chi Minh City and a 3,5-hectare R&D station in the Lam Dongh province, whereby vegetable seeds are selected for Vietnamese growing conditions and directly imported from the Netherlands and sold to local growers. Their experiences are included in several findings of this report.

Organic seeds

- 19 crops, a range of more than 400 varieties.
- Require certification schemes.
- In general, the yield is slightly lower for organic, but this is usually compensated by the higher sales price. With regard to organic seed production, growers sometimes must sow more to spread the risk, so for example two fields in the hope that at least one will succeed.
- Biological coatings can be used to increase the visibility of the seed (usually white, so it contrasts with the soil).

Non-chemically treated seeds

- Conventional production of seeds (with the use of chemicals).
- No chemical coating is permitted and no fungicides or any other chemical pesticide can be added to the seed.



Case study: Organic fertilizers (Ferm o Feed)

Ferm O Feed is a pioneer in introducing organic fertilizer to small-scale growers in Vietnam

Introducing Ferm O Feed

Ferm O Feed, part of Den Ouden Group, is a producer of organic fertilizers in solid and liquid form, biostimulants, and substrates situated in the Netherlands (production in Helmond). Approximately 95% of their products are exported to more than 70 countries. The product range includes Organic Fertilizers, Organic Fertilizer for Biological Cultivation, Organic Mineral Fertilizer, Organic Compound Fertilizer Liquid Fertilizer biostimulants and substrates.

Experience in Vietnam

Approximately ten years ago (2011), Ferm O Feed was one of the first exporters of organic fertilizers to Vietnam (chicken manure). The company sells to an importer, who in turn sells to distributors or large-scale farmers. Most of their export (80%) ends up at small-scale family-owned farms. The demand in Vietnam is largely unfulfilled. Because of the favorable climatic conditions, many farmers harvest three to four times a year, meaning the soil is easily depleted. To reduce the use of agrochemicals and to feed their soil in a healthy manner, many farmers request organic fertilizer. Relevant crops are the high-quality crops ('cash crops'), including vegetables, fruits, coffee and cocoa. With lower-value crops, the added costs of high-quality inputs are less favorable due to the lower profit margins.

The successful flow of information is essential for successful business. With information about the usage of products passing from Ferm O Feed to the producer, to the distributor, to the farm owner, to the person applying the fertilizer, there is plenty of opportunity for miscommunication. Products complex in use are a higher risk.

Knowledge and a positive support from the government are considered critical success factors for entering a new market. Another important consideration is registration of products, which requires field testing and takes approximately one year. The Vietnamese government has extensive legislation about organic fertilizer, which makes Vietnam a frontrunner in the South-East Asian region.

To enter Vietnam, Ferm O Feed collaborates successfully with an importer, whom they connected with through a business fair. However, the company sees great value in collaboration with other Dutch parties. Preferably, companies in different parts of the value chain (seed, mineral fertilizer) form an alliance and inform each other of successful collaboration with importers, distributors or local parties.

Critical success factors to enter Vietnam

1. Improved knowledge amongst growers;
2. Positive support from the Vietnamese and Dutch governments;
3. Facilitation of easier registration of products;
4. Collaboration with other Dutch parties;
5. Local knowledge and collaboration with importers, distributors, and other local parties.



Case study: Growing media solutions (Grodan)



Grodan foresees an important future role for Vietnam, but places its focus elsewhere in the coming three years

Introducing Grodan

Grodan was founded in 1969 with its head office located in Roermond, the Netherlands. The company is renowned for supplying sustainable stone wool growing media solutions (substrate) for the professional horticultural sector. The products apply to a variety of vegetables and flowers, including tomatoes, cucumbers, sweet peppers, eggplants, roses and gerberas. The products are also suitable for vertical farming. Grodan is part of the ROCKWOOL Group and is active in over sixty countries globally.

Assortment and use

Grodan products are intended for professional growers using high-tech equipment. It is a difficult product for growers who are used to cultivation in an open field, as it requires different practices and a change in approach. This new way of cultivation requires training and guidance. Grodan supplies this service to new users. Once growers use the product and become familiar with its use, their experience is very positive.

International ambitions

Grodan is active in the international market and exports to over sixty countries. Within the Asia-Pacific, the company currently focuses on Australia, Japan, New Zealand, and South Korea. The company has been active in Japan and South Korea for over twenty years and have employed a local technical expert to serve the region. Grodan has been active in China and Malaysia for several years and intends to increase its presence in the coming three years.

Experience in Vietnam

Although Grodan foresees involvement in Vietnam in the future, it is not a focus country at this moment. Due to limited capacity, the company feels they do not have the necessary time or human capital to move into this new market. Based on experiences of companies in the horticulture sector, local companies, and general market developments, the company has decided against placing its focus on Vietnam for the coming three years.

What is stone wool?

A stone wool slab is a substrate (the surface on which a plant is grown) that allows for simple irrigation and ready drainage. This promotes good, horizontal root development. Compared to open field cultivation, stone wool substrate provides a higher yield with improved, highly consistent product quality. It also ensures the crop is less sensitive to diseases.



Case study: improved organic seeds (Bejo)



Bejo has a large assortment of organic seeds (zero chemicals)

Introducing Bejo

Bejo is a Dutch specialist in vegetable seeds, focusing on the breeding, production and sales of vegetable seeds. The family business has locations in more than thirty countries and employs 1,900 people.

Global developments

Bejo sees an increase in the demand for zero-residue products in the European and US market. The EU is likely to ban chemicals for seed coating in the near future, which aligns with Bejo's ambitions. Bejo plans to extend their assortment in organic and biological products, as the importance of plant resistance cannot be underestimated. However, it is difficult to prove these advantages, as the final results depend on the practices of the farmer.

For some pests and diseases, the use of chemicals can be abolished altogether (for example, downy mildew on onions). Weeds can be controlled mechanically or by flaming. However, for other diseases, the use of some chemicals is still necessary.

Assortment

Bejo offers organic seeds (no chemicals used at all) and non-treated seeds ('zero-residue', reducing the need for chemicals throughout the growing process). Of the total assortment of 1,100 seeds, 170 are organic. The assortment is mostly based on the European and US market, as the demand is highest in these markets.

The organic seed assortment includes seeds for carrots and onion, which have been developed together with the Technical University of Twente. They have developed a method to treat the seeds with hot water, thereby reducing the need for chemicals, while retaining the germination abilities of the seed.

Experience in Vietnam

Bejo has a local presence in Vietnam, with a Business Company in Da Lat and a Manufacturing Company in Lam Ha District (both Lam Dong Province).



Case study: Macrobiotics (Koppert Biological Systems)

Koppert is the global leader in using insects and bumblebees for pest control and natural pollination

Introducing Koppert Biological Systems

Koppert Biological Systems (also referred to as 'Koppert'), is a Dutch company offering sustainable solutions for food and flowers. They are the global leader in the use of macrobiotics, which are applied for pest and disease control (insecticides, herbicides), natural pollination, and bio stimulation (NatuGro and seed treatments). They are famous for their use of natural enemies for pests (e.g., mites and ladybugs) and bumblebees for pollination. The technologies and tools for application techniques and monitoring are also offered. The company was founded in 1967 by Jan Koppert, who saw the effectiveness of chemical control agents decrease rapidly and personally developed an allergy, making him ill from the use of agrochemicals. The family company currently employs more than 1,500 people, is active in 90 countries, and has a yearly revenue of approximately EUR 220 million (as of 2019). Koppert has 29 daughter companies and dozens of production facilities globally.

Global developments

Koppert is the world leader in macrobial and microbial bio control, bio stimulants and biofertilizers. For the three main product groups, Koppert is serving farmers with, global developments on regulations are active. In general, the rule applies that negative impact requires higher requirements and longer timelines to market. For example, in July 2022 a new EU fertilizer product regulation will enter into force, which will cover biostimulants. Microbial, amino-acids and seaweed-based biostimulants are covered by the regulation, amongst others. However, at this moment, the number of macrobiotics that can be used in CE marked biostimulants is too limited. This will hamper innovation and new product development.

These regulatory shifts are also happening in Asia, with more and more countries relaxing some regulations for biological control agents but increasing the requirements for research. Koppert is working with an ecosystem of parties and stakeholders to bring the sustainable farming policies into practice, to make sure farmers can make use of the biocontrol products. The parties include Artemis, the agriculture attaché network, the Dutch embassies, IBMA, retail, and others.

Assortment

Although the assortment differs per region, the products can be divided into seven or eight categories. Globally, Koppert offers 117 products, of which the majority are pest control products (53 out of 117).

Experience in Vietnam

Koppert has a local presence in Vietnam through representation by Fresh Studio (The Fruit Republic), with a n office in Hanoi and Da Lat, Lam Dong province. Koppert was an exhibitor at the HortEx Vietnam in March 2018 in Ho Chi Minh City.

Products

1. Pest control products (53)
2. Disease control products (4)
3. Pollination products (8)
4. Plant growth promotion and crop resilience (12)
5. Monitoring (28)
6. Application products (5)
7. Biological seed dressing products (2)
8. Additives (5)

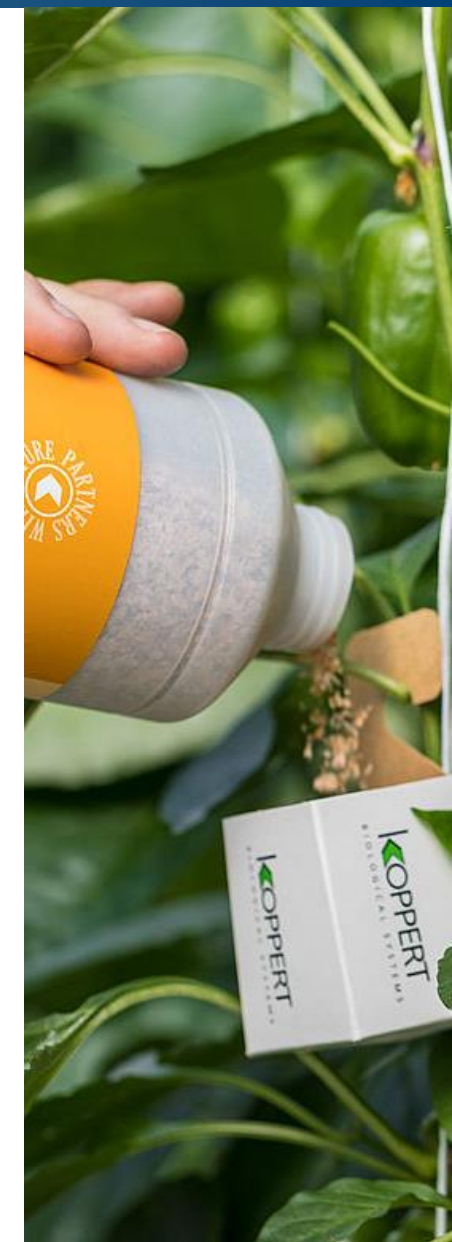


Image source: Koppert



Case study: the promise of Vietnam (Ridder)

Ridder perceives great potential for Vietnamese horticulture, but sees lack of knowledge as the main obstacle for investments

Introducing Ridder

Ridder Group (referred to as 'Ridder') is a family business with over 65 years of experience in the agriculture and horticulture sector. They are the supplier of technical solutions including electromechanical drives, automation solutions, and energy-saving systems for greenhouses. The company has an international focus and offices in Canada, China, France, Mexico, Spain and the US and customers in over 100 countries. In the Netherlands, Ridder has offices in Harderwijk and Maasdijk. The company employs approximately 330 people and has a revenue of EUR 78.5 million, as of 2017. The company experienced a growth of 19.3% from 2013 to 2017.

Assortment

Ridder offers a variety of drive systems, climate screens, climate computers, water treatment systems, labor tracking systems, and collaboration tools (Ridder HortOS).

Experience in Vietnam

Ridder sees great opportunities in Vietnam, with Vietnamese showing interest in stimulating the horticulture sector. Vietnam has selected the Netherlands as a preferred partner for developments in agri-food, but there are also other countries seeing the need to advance the horticulture sector, with many South Korean and Japanese partners are involved in projects. Ridder sees Vietnam (especially the Da Lat region) as a contender to become the biggest horticulture producer in Southeast Asia. The favorable climate, combined with the increasing demand for safe foods and food security offers large potential. The emergence of large-scale restaurant chains, such as McDonald's, Burger King and Pizza Hut also leads to an increased demand for uniform, high-quality ingredients. Vietnamese consumers buy the most flowers compared to any other country in the region and are increasingly relying on vegetable production.

However, Ridder observes that many growers do not have the technological tools to produce high-quality, uniform and safe products. Many growers are unaware of what technology has to offer and are therefore not interested in investing. Most Vietnamese growers are used to seeing a return on their investments within three years.

Together with Fresh Studio, Ridder has conducted a study into the reusage of drain water in Vietnamese horticulture systems, which reduces water usage and fertilizer use. Ridder has paused their activities in Vietnam because there were not enough large-scale customers ready to invest, other than Hasfarm. To advance the Vietnamese sector, Ridder envisions growers to stop planting in open fields but using substrates and drip irrigation. This reduces water and fertilizer usage and allows for recirculation. In China, they have perceived similar advancement (open soil to substrate), which led to 50% more production. The costs of investing in drip irrigation systems are highly dependent on consumer demand but estimated at ~EUR 12,000. for many small-scale growers, this is too high.

Business opportunities

1. Precision irrigation
2. Substrates instead of open fields
3. Recirculating water



Overcoming obstacles in Vietnam

1. Improving knowledge through demonstrations. Allowing growers to see the results of investing in technologies.
2. Improved regulation and implementation from the government to reduce agrochemicals.
3. Focusing on larger-scale farms or farmer groups, as investments into equipment are often relatively high for a small field.

Image source: Ridder CleanLite

Article: [Het uitdagende agrofood-potentieel van Vietnam | Ridder](#)

Report: Improving water availability and safety through irrigation water recycling, 2016-2021.

Case study: data-driven cultivation through drip irrigation (Hoogendoorn)

Growers must invest in mid-tech solutions, while Dutch companies should collaborate to jointly advance the horticulture sector

Introducing Hoogendoorn

Hoogendoorn is a Dutch innovator in horticulture automatization. Since 1967, Hoogendoorn offers advanced process computers helping growers to manage irrigation and energy processes and to control climate inside greenhouses. With a global presence, Hoogendoorn offers product advice, training programs and service.

Application of drip irrigation

Hoogendoorn observes that Vietnam is gradually moving towards protected cultivation but still has steps to take in terms of knowledge on cultivation and suitable post-harvest conditions, good agricultural practices, and the ability of smaller scale growers to make investments. One of the most impactful mid-tech solutions with high benefits is a drip irrigation system with a computer to drive the system. Drip irrigation helps growers reduce water usage and the need for chemicals. Drip irrigation simply means controlled, automatic watering for plants. The system measures and automates when and how much to water each plant. The needs for plant for water can be based on time (watering every x minutes), radiation (sunlight from outside, artificial light or photosynthetic active radiation, the direct light reaching the plant), or EC and pH values. For radiation, a sensor is installed on the roof of a greenhouse and/or closer to the plant.

Hoogendoorn offers a climate computer suitable for small to medium-scale farmers called IIVO compact. The systems hardware and software is modular, the investment costs depend on the farmer's needs. The IIVO compact is especially designed for growers interested in mid-tech solutions to start data-based cultivation. The interface is easy-to-use and shows which parameters are important and can be accessed from any online device. The system comes with extensive training programs and personalized service. Hoogendoorn provides an online training platform with modules for each step of the system implementation. Besides the online platform, they offer personalized training and service for each farmer, either online or on-site.

Advice for the development of Vietnamese horticulture

Hoogendoorn advises Vietnamese growers to start with investments in gaining more knowledge about mid-tech solutions in data-driven horticulture, precision farming and drip irrigation. To enable this, the Vietnamese government must support growers through financial support and demonstrating examples. Through demonstrations and education from a trusted source, growers can greatly increase their yields and meet the consumer demand for safe and healthy food and good quality flowers.

The target group of Hoogendoorn in Vietnam includes larger-scale producers (e.g., Hasfarm), but also smaller-scale producers and projects in the public or private sector. They look forward to working with ambitious growers ready to make the next step in their business. They are currently developing a partner network of local Vietnamese stakeholders.



Public-private partnership programs

Cultivation in water-efficient zero-emission greenhouse

According to the European Water Framework Directive, farmers and growers must adhere to the strict standards aimed at reducing discharge of nitrogen and phosphate, as this is harmful for groundwater and the environment in general. By 2027, the horticulture sector in Europe must be virtually emission-free.

The project 'Cucumber and bell pepper cultivation in water-efficient zero-emission greenhouses' (2014-2015) demonstrated techniques and strategies reducing discharge to zero. The project showcased cucumbers and bell peppers can be produced emission-free with a similar quality and yield to conventional methods. In the conventional production control group, 4% of water was discharged (418 m³ per hectare per year). The technological advancements included different filters, water drain analysis, and the use of good irrigation water.

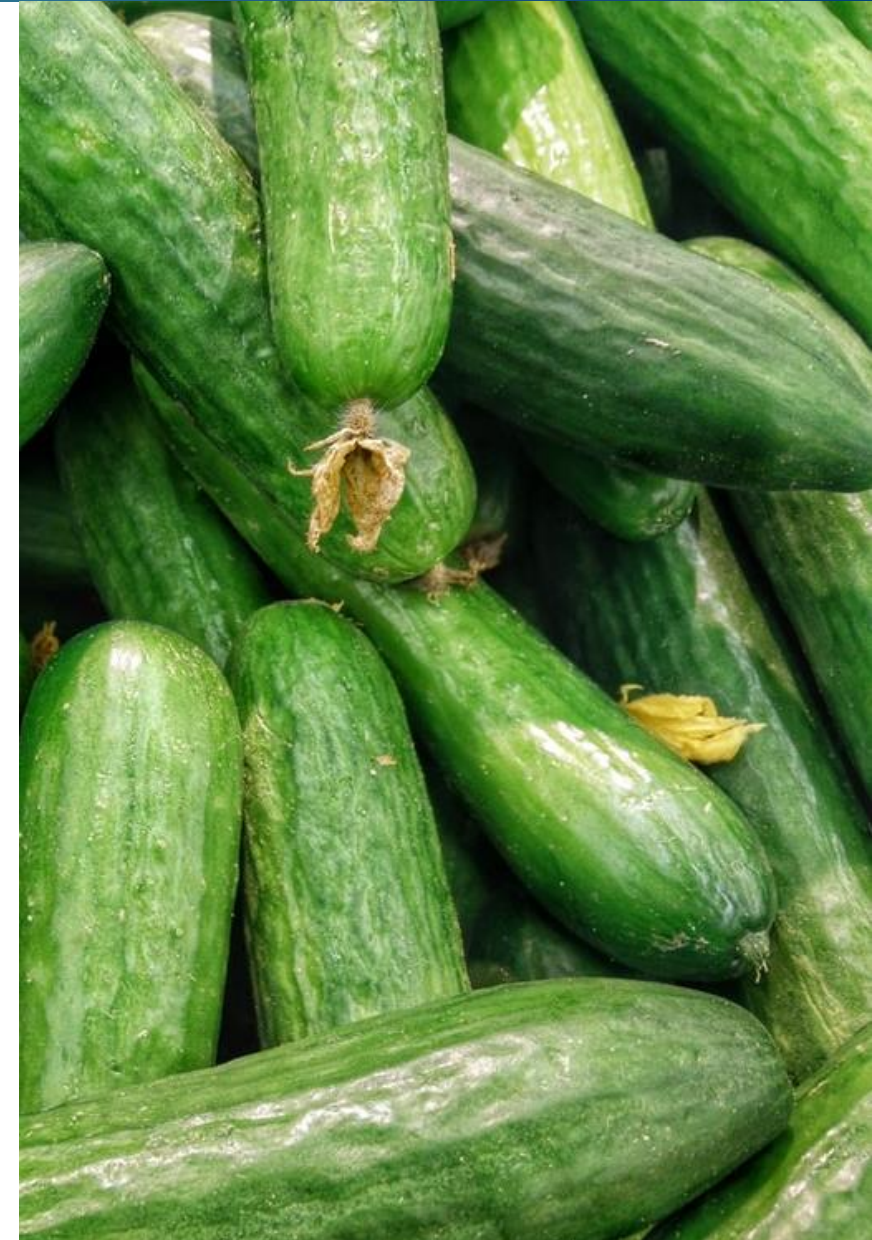
Project partners: Grodan, Groen Agro Control, Agrozone, Infatechniek, Fiber Filtration, Elektravon-Haket, Plantenkwakerij Van der Lugt, Enza Zaden, Wageningen University & Research.

Blue light as an alternative for chemical inhibitors

To prevent plants from growing too large, taking away natural light for other crops, chemical inhibitors are used to prevent elongated growth. However, the use of this chemicals limits the reuse of irrigated water more difficult, which is why this project (2016-2017) was focused on finding more sustainable production systems for greenhouse horticulture.

The light spectrum is used as an alternative to chemicals to limit excessive growth. By increasing the proportion of blue light from 10% to 50%, flowers grew into more compact plants with darker leaves and stem colors, similar to the effect of chemical inhibitors. The effect and effectiveness of blue light varied per species, variety, season and starting material.

Project partners: Members of the club of 100 of Wageningen University & Research, Business Unit Greenhouse Horticulture. Represented in this project by Florensis, Mardenkro, Philips, Low&Bonar, Ludvig Svensson, Sion, Priva, Oerlemans Plastics and Oreon.



Source: [PPP zero emission](#) and [PPP Blue light](#)



III) Supply & trade

Vietnam: Market opportunities & needs

The Vietnamese market is expected to professionalize and increase horticultural export

High-potential Vietnamese sector hampered by limited knowledge and financial restraints

The South-East Asian region is considered a key area of interest. Especially the horticulture sectors of Vietnam, Malaysia, and Indonesia are seen as high-growth markets. China, Japan and South-Korea have a more developed horticulture sector. The Vietnamese horticulture sector is expected to professionalize in the coming years and to become a noteworthy export country. An increasing number of investors and companies have recognized the potential of the country, including Olam International.

The Vietnamese market is mostly held back by limited knowledge amongst growers and financial restraints limiting investments. The same developments have been observed in China. With growers cultivating crops in open fields or soil unable to know the best practices of IPM, they are often too late in discovering pests and diseases, which leaves them no choice but to turn to heavy chemicals and pesticides.

Consumer demand for safe food

Consumers (both in Vietnam and Europe) are increasingly aware of the negative effects of chemical use and are demanding safely produced food. With growers aiming to meet this demand, there is increasing interest in good agricultural practices and techniques aimed at safer food production.

Grower's demand for technological advancement

- Increasing demand for technology: Larger-scale companies delivering to retail (approximately 15% of the consumer market) are using more advanced technology and are complying with the demands of chemical use of retailers. More low- and mid-tech farmers are interested in professionalizing.
- Unlike neighbouring countries, the Vietnamese horticulture sector has no limited availability of labour.
- Many farms are family-owned, with passionate growers interested in technological advancements.
- Training programs are very well-received, with growers learning fast.

Active government support

- Favorable Vietnamese regulations, aimed at reducing the use of agrochemicals and fertilizer. However, limited effectiveness, due to the governance structure (i.e., centralized decision making), corruption, information distortion and a failing legal system.
- For successful advancement of the sector, the Vietnamese government needs to actively support growers through policy and financial support.



Dutch knowledge to meet Vietnamese needs

Innovative Dutch technologies in data-driven precision farming and IPM are vital for the advancement of the Vietnamese sector

The Dutch horticulture sector excels and is focused on further advancing innovative technologies, which could advance the Vietnamese horticulture sector to a more professional level. These essential (key) technologies include controlled cultivation systems, circulated water, thermal heat, and wastewater treatment. Technologies are centred around four themes:



Sustainable plant production

- Plant resistance,
- Healthy soils,
- Plant health,
- Biodiversity.



Consumer, market and society

- Food health and safety,
- Transparency,
- Consumer trust,
- Clean transport,
- Reducing food waste,
- Sustainable packaging.



Energy & water

- Energy and water efficient cultivation,
- Climate adaption.



High-tech & digital transformation

- Big data,
- Robotics and sensors,
- Innovate materials,
- Circular production,
- Logistics.

Technologies are appropriate for mid- to high-tech growers. [Smart technologies](#) in 2021 include:

- a) Data-driven drip irrigation
- b) Real-time biomolecular sensing for Smart Food Industry
- c) The next Fruit 4.0 (WUR)
- d) Automatic morphological descriptions of ornamental crops through machine learning
- e) Future sensors and digital twins to improve perishable food quality
- f) Colourful lighting

The Netherlands benefits from favourable European and Dutch regulations and policy, leaning towards an increased reliance on biological crop protection and moving away from chemicals.

EU-Vietnam Free Trade Agreement

The EVFTA eliminates import tariffs and lifts existing market access barriers

On August 1st, 2020, the Free Trade Agreement between the EU and Vietnam entered into force (EVFTA). The EU mainly exports high-tech products to Vietnam, whereas Vietnam exports electronic products, clothing, and foods to the EU. Export to Vietnam and imports from Vietnam have both increased between 2010 and 2020. In 2020, the EU imported goods from Vietnam worth EUR 34.4 billion, while the EU export to Vietnam was worth EUR 8.8 billion. The EVFTA eliminates 99% of import tariff lines between the two countries in the coming 7 to 10 years. Tax rates for many agricultural products are cut immediately or in the near future.

With the safety of food being of critical importance to the EU, the EVFTA helps ensure that traded food and feed is safe and meets the sanitary and phytosanitary (SPS) measures in the importing country. Food businesses have the primary legal responsibility to ensure food safety. The EU Member States have control units for incoming products, with the EFSA providing scientific opportunities to update the SPS measures.

The EVFTA is committed to tackle existing market access barriers and delays, through the following measures:

- Risk assessments are carried out without undue delay;
- Pest free areas, areas of low pest prevalence, protected zones and pest free production sites are recognized;
- Plant health status is based on the information provided by the exporting party.

Obstacles

For Vietnamese horticulture companies exporting to the Netherlands, the following obstacles are identified:

- Certification schemes: Many retailers in northwestern European countries require organic certification (SKAL, GlobalG.A.P.), which is difficult and expensive for small-scale producers to obtain. According to exporters, especially exotic fruits (grapes, papayas) would be popular in the Netherlands. The 'rules of the game' for these certification schemes and production methods are different from what farmers are used to.

Challenges for farmers in countries with tropical countries to comply with organic legislation include:

- Limited access to organic reproductive material and inputs;
- Maintaining the required soil fertility and water retention;
- Avoiding cross-contamination;
- Using organic inputs and reproductive materials.



Critical success factors for market entry

Collaboration between parties, knowledge sharing, and demonstrations are essential for successful market entry

➤ Knowledge sharing & teach-the-trainer

The Vietnamese producers have limited knowledge towards crop protection, with most farmers heavily relying on traditions. The science behind crop protection is highly complex, requiring not only the right products, but especially the right practices. Extensive training programs, preferably according to the teach-the-trainer format, are necessary to ensure proper usage of crop protection agents.

➤ Offer demonstrations

The Vietnamese farmers have limited trust in new products, especially from companies they are not familiar with. With most growers, 'Seeing is believing'. Therefore, it is important to facilitate the farmers to see the effects of alternatives to chemicals with their own eyes. A proven way to demonstrate the effect of products is to establish demonstration sites, displaying the effect of different technologies on sample-size fields. By exactly describing the techniques and products used (quantities, time of application) and the effects of these products over time.

➤ Promote controlled production

Many biological crop protection agents, such as insects, require closed off production such as greenhouses or plastic domes. Without this protection, the insects can escape into the wild and severely disturb the balance of the local ecosystem.

➤ Start with the right network

It is important to know the right people when entering the Vietnamese market. Furthermore, it is essential to know the language and be familiar with the culture. Many Dutch entrepreneurs and organizations are eager to collaborate (the pie is big enough for all), so it is useful to alert the EKN of interest in Vietnam. Both the EKN and the DBAV have a large network in Vietnam.

➤ Prepare for long-term commitment and collaborate

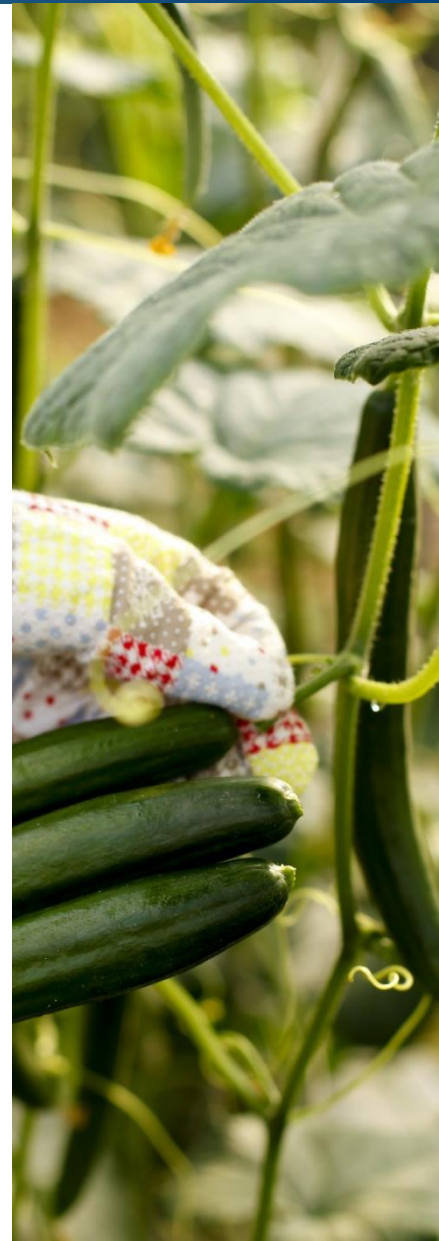
The sector is developing, but this requires commitment from the public and private sector. Vietnamese growers want to build up a relationship and to trust their supplier. Therefore, a local presence or service network is essential. Unlike more developed economies such as the US and Singapore, personal relationships and long-term trust are essential to succeed in the Vietnamese market.

➤ Offer attractive payment terms

Many growers struggle with attracting finance. They are helped by companies helping them finding sources of funding, but also with paying in installments and offering insurance.

➤ Governmental support

The support of governmental policies regarding agrochemicals and alternatives is essential for successful product launch. This affects the registration process, which is currently elaborate and requires approximately one year. Furthermore, it can facilitate trade through supportive mechanisms, tax regulations, etc.



Entering the Vietnamese horticulture market

Dutch companies are eager to collaborate in advancing the Vietnamese horticulture value chain

Strategies for market entry

1. Public-Private Partnership: valuable networks include consortia of partners aiming to achieve the same, which is to professionalize the horticulture sector in Vietnam. As this requires investments in all parts of the value chain, companies and public sector organizations from different parts of the value chain (equipment, starting materials, primary production, logistics, retail).
2. Local presence in Vietnam: opening a local office is a common strategy, practiced by, for example, Koppert and Rijk Zwaan.
3. Regional presence in South-East Asia: a regional hub can be used to support several partners and customers in the area. For example, Hoogendoorn has five offices to serve the different time zones (the Netherlands, France, Canada, Mexico and China). Ridder has also chosen this strategy, although they are exploring opportunities for opening up another office in the APEC region, which includes Vietnam.
4. Working with companies already active in the sector. Companies in the same value chain can choose to collaborate, so only one needs to have a local or regional presence in the selected area.

Trade fairs

- [BIOFACH](#) in Nurnberg, Germany;
- [Fruit Attraction](#) in Madrid, Spain;
- [Fruit Logistica](#) in Berlin, Germany;
- [GreenTech](#) in Amsterdam, NL;
- [HortEx](#) in Ho Chi Minh City, Vietnam;
- [HortiContact](#) (Tuinbouw Relatiedagen) in Gorinchem, NL;
- [IPM](#) in Essen, Germany.

Platforms and associations

- [Dutch Business Association Vietnam](#);
- [Dutch horticulture](#);
- Mekong Delta Business Platform (in development, launching late September 2021);
- [Rabo Foundation](#): financial support and local consultancy in the Mekong Delta;
- Strategic Partnership Agreement (SPA) on Sustainable Agriculture and Food Security;
- [The Netherlands Vietnam Horti Business Platform](#);
- [Vietnam Trade International](#);
- [WUR](#) Vietnam ATP-Mekong.



Obstacles and information needs

The professionalization of the Vietnamese horticulture sector is restrained by limited knowledge of IPM and limited investment

Obstacles in Vietnam

- Limited knowledge, highly based on traditions. Crop protection is very difficult, requiring not only the right products, but especially the right practices.
- Limited trust in new products. Seeing is believing. "People here aren't likely to listen to the advice of outsiders. So, we always find the most respected farmer in the area to work with first" – Cung Nguyen (Rabo Foundation).
- Market underdeveloped. At present, farmers are unaware of how to switch their conventional methods to alternatives and are afraid of the risks.
- Many growers are not looking for certification but satisfied with self-declared labels such as 'safe' or 'pesticide free'.
- Many farmers request treated seeds (not interested in non-treated materials).
- Restrictions on the import of non-treated seeds (an alternative for chemicals) and bio control agents.
- Restrictions on advertising.

Low accessibility of PSD instruments

The ease of use for SMEs is relatively low, as many consider the application process too complex and time consuming. Many SMEs would benefit from a faster and less complex process.

Information needs

Companies request additional insights into the Vietnamese market, especially:

1. General market developments in the past three to five years;
2. The number of growers using technology, data and automatization, and the share of farmers in the low-, mid- and high-tech segment;
3. The governmental policy surrounding agrochemicals and alternatives, including registration for new products, and its future ambitions;
4. An overview of the main exporters of agrochemicals and alternatives into Vietnam (including Japan, Belgium, Australia);
5. An overview of all Dutch companies with a local presence in Vietnam.

A follow-up study could further tailor to these information needs.

Limited access to finance

Financing new and advanced technology is often an obstacle for Vietnamese growers. Reasons for this include:

- Banks often request elaborate business plans and track records of the company dating several years back;
- Most growers have relatively small areas. This makes an innovation more expensive per square meter and therefore more relatively more expensive.

However, both Dutch and Vietnamese companies can make use of several support opportunities provided by the Dutch government. This can include credit, subsidy, or making use of the existing network of the Dutch government. Furthermore, export insurance company offer insurance and credits for suppliers and buyers.

The next slides present several opportunities for companies to attract finance in order to invest in more advanced technology and data-driven solutions.

Dutch Government instruments

Available NEA instruments for Private Sector Development

NEA instruments	Description
Develop2Build	<u>Develop2Build (D2B)</u> is a Government-to-Government programme offering governments in 37 developing countries and emerging markets direct assistance in setting up infrastructural projects.
DGGF	<u>The Dutch Good Growth Fund (DGGF)</u> is set up to help Dutch entrepreneurs realise their international ambitions in emerging markets and developing countries (DGGF countries). The fund supports investment, import, export and investment funds.
DHI	<u>The demonstration projects, feasibility studies and investment preparation studies (DHI)</u> is a subsidy for SMEs with international ambitions in emerging markets. Dutch companies can apply for subsidy for demonstration projects, feasibility studies or investment preparation projects.
DRIVE	<u>DRIVE</u> facilitates investments in infrastructural projects that contribute towards a good business climate and entrepreneurship in the priority sectors: water, climate, food security, and sexual and reproductive health and rights (SRHR). Public infrastructure projects that have a high development relevance in other sectors also can apply for DRIVE support.
FVO	The <u>Fund for Responsible Business</u> supports Dutch partnerships that wish to address the underlying causes of Responsible Business Conduct risks and misconduct in their value chains and implement measures to address them.
Impact Cluster	The Impact Cluster is a NEA tool available for the development of integrated value chain clusters. An Impact Cluster is mutually designed by an Embassy, a consortium of Dutch and local businesses and NEA.
PIB	<u>Partners for International Business (PIB)</u> is a programme that allows Dutch businesses to enter into a public-private partnership to realise their international ambitions. This is primarily focussed on matchmaking, networking and economic diplomacy.
PSD Toolkit	The PSD Toolkit is a set of instruments available to the Embassy and NEA to develop small projects such as sector studies, small training programmes or for the formation of Public-Private Partnerships.
SDGP facility	<u>The SGDP facility</u> supports Public Private Partnerships that contribute to achieving the SDGs through a grant subsidy. This partnership should have at least one Dutch partner. The instrument is temporarily closed for applications.
SIB vouchers	<u>SIB vouchers</u> can be used by Dutch businesses, to hire a consultant for market studies, participate in a trade mission or to hire an international lawyer.

Dutch Government instruments

Other Dutch organizations and tools

Other Dutch (funded) organizations or initiatives	Description
Atradius Dutch State Business	<u>Atradius Dutch State Business</u> offers a wide range of insurance and guarantee products for Dutch exporters of capital goods, their financiers and/or investors. It also assist in finding other funding through the Dutch Good Growth Fund.
CBI	The <u>CBI</u> supports entrepreneurs to become successful exporters to the European market through export coaching projects.
FMO	<u>FMO</u> is the Dutch entrepreneurial development bank. FMO manages funds for the Ministries of Foreign Affairs and Economic Affairs of the Dutch government to maximize the development impact of private sector investments.
Invest International	Invest International is a new initiative owned by the Dutch government (51%) and the FMO (49%). Invest International aims to help establish and finance Dutch investment and projects abroad (e.g., in Vietnam).
NUFFIC OKP	<p>The Orange Knowledge Programme offers scholarships, training and institutional partnerships between education institutions in Technical and Vocational Education and Training (TVET) and higher education, in fields related to the priority themes of the Dutch government:</p> <ul style="list-style-type: none"> • Food and nutrition security • Water, energy and climate • Sexual and reproductive health and rights • Security and the rule of law <p>This is implemented through a number of calls, published on the website of <u>NUFFIC</u>.</p>
PUM	<u>PUM</u> is a volunteer organization of Dutch experts supporting businesses worldwide. 180 PUM representatives are spread over 35 countries across the globe, with 1,700 experts being active in 45 sectors.
YEP Program	The <u>Young Expert Programme</u> allows young experts, both Dutch and local, in the Agro&Food sector to gain experience in an intercultural environment an work on a specific project related to either Water, Agrofood and/or Renewable Energy. Up to 50% of the salary of this young expert is subsidized by the Dutch Ministry of Foreign Affairs.



IV) Legislation & legal assessment



Regulations for new products

The EU must approve active substances for new products, a lengthy and costly process. The NL approves final products.

EU registration is complex, expensive and lengthy compared to other countries. Research pinpointed the complex EU regulation as a major obstacle for the growth of the (Dutch) biologicals market. At present, however, many biological products do not fall under the category of 'crop protection', but are considered 'bio stimulants', meaning they do NOT have to adhere to the strict regulation process of pesticides. These regulations on categorization are likely to change (see slide 55).

The EU uses a 2-tiered approach to approve new pesticides, both chemical and biological. The active substance must be approved by the European Commission. The 'EU chemicals and pesticides legislation' governs the marketing and use of chemical and biological products, with the aim of protecting human health and the environment. Specifically, the REACH is responsible for regulating the registration, evaluation and authorization of dangerous substances. This registration process is much stricter than, for instance, in the US and takes approximately 2.5 years. This is approximately 1.6 years more than in the US. As of 2019, the total number of approved microbial active substances stood at fifty. Once legalized by the EU, the substance can be used in products for the next fifteen years.

After acceptance by the EU, the final product must be approved by the individual Member States. In the Netherlands, this is carried out by Ctgb (het College voor de toelating van gewasbeschermingsmiddelen en biociden). If approved, the European Food Safety Authority (EFSA) monitors the level of pesticide residues in food, to ensure it is below the set limits.



Dutch ambitions

In the Netherlands, biological crop production has been integrated into national agriculture policy since 2012 and is named as one of the methods towards sustainable agriculture. In 2017, the Dutch Ministry of Agriculture, Nature and Food Quality set the target for 2030: the policy Green Crop Protection (Groene Gewasbescherming) aims for reduced dependency on chemical pesticides, combined with nature-inclusive agriculture. The Dutch agriculture sector must retain its position as a global leader, which is why chemical agents are allowed, provide they do not contain active substances with a high-risk profile. The policy is designed in collaboration with Wageningen University and focuses on integrated production systems and effective crop protection.

Mandatory requirements and quality control

MRLs, phytosanitary regulations and legislation for organic products are the major regulations

Mandatory requirements include MRL, phytosanitary regulations, organic legislation, and several other requirements. Buyers (retail companies) can also have additional requirements, including certification schemes, social and environmental compliance, and company performance.

1. Maximum Residue Levels for pesticide residues

The traces left by pesticides on food products are called 'residues' and the Maximum Residue Level (MRL) is the highest level of residue that is legally allowed. The European Commission fixes MRLs for all food and animal feed products, with the complete list available at the [EU Pesticides Database](#). EFSA is responsible for analysis and data collection, with EU decision-makers using EFSA's conclusions and recommendations for the development of future monitoring programs. In 2015, 84,000 food samples were collected and tested for over 770 pesticides. The 20 million individual test results were summarized by EFSA in an annual report. In 2015, 97% of samples were free of residues or contained residues below the MRL.

Buyers (retailers) in Member States can use stricter MRLs than the MRLs laid down in European legislation. To reduce their risks and protect their legal position, retailers maintain the highest standards and generally demand 33% to 100% of the legal MRL. The German retailer Lidl is the strictest of all retailers, limiting pesticide residues to 33% of the EU legal standard. For this reason, most producers handle this highest standard.

2. Plant health and phytosanitary regulations

The EU's sanitary and phytosanitary requirements must be met by all exporters of fruits and vegetables to prevent the introduction and spread of organisms harmful to plants in Europe. The standard guarantees the products are properly inspected, free from pests, and in line with phytosanitary requirements. The majority of fresh fruits and vegetables must be inspected prior to shipping (including leafy vegetables, tomatoes, peppers, citrus fruit, stone fruit, berry fruit, apples, pears, mangoes and avocados). Exceptions to this rule are pineapples, bananas, coconuts, durians and dates.

3. Legislation for organic products

Organic products fall under different European legislation than 'conventional' products. The organic production method approved by the EU must be practices for at least two years, while products are sold as conventional, before products can be certified with the EU organic logo. Certification can only be done by a recognized control body or accredited certifier during an annual inspection. Furthermore, all organic products imported into the EU must have electronic certificate of inspection (e-COI), managed through the Trade Control and Expert System (TRACES). The new organic regulation (2018/848) has come into force in 2021, with stricter inspection of organic products to prevent fraud. Rules and regulations are the same for producers within the EU as for producers outside the EU.



Mandatory requirements and quality control, continued

Other requirements relate to contaminants, microbiological hazards, marketing and control

Other mandatory requirements

1. Avoiding contaminants: Limited use of pesticides is important to stay well below the MRLs, but also avoiding contaminants is essential to meet European standards. Fruits and vegetables specifically susceptible for contamination of lead, cadmium and nitrate are spinach, lettuce and rucola.
2. Microbiological hazards: Microbiological hazards such as Salmonella and *E. coli* must also be avoided, which is especially relevant for pre-cut fruits. Salmonella must be absent throughout the entire shelf life of a freshly cut products and *E. coli* must be absent during manufacturing. Excellent hygiene practices reduce the risk of contamination.
3. Marketing standards: The EU's marketing standards lay down the minimum quality and characteristics of fresh fruits and vegetables. This includes quality, maturity and size.
4. Control of food imported in the EU: Official controls ensure products meet food safety standards and do not cause environmental damage.
5. Labelling and packaging: Legislation on food labelling and packaging outlines what must be mentioned on products (see Annex IV).

Additional requirements (from buyers)

1. Many retailers require certification as a guarantee. The implementation of a food safety management system must be applied by all buyers in the supply chain, including traders, food processors and retailers. The most commonly requested certification scheme is GLOBALG.A.P., essential for exporting to Europe.
2. Food safety management systems: especially for the handling or processing of fresh fruits and vegetables, almost all buyers in the north-western European market require complicity with the BRC Global Standards (or, alternatively, IFS Food Standard, Safe Quality Food program or FSSC 22000).
3. Social and environmental compliance: many European buyers have a code of conduct and CSR policy, to which producers must comply. Relevant buyer initiatives include the IDH Sustainability Initiative for Fruits and Vegetables and Amfori Business Social Compliance Initiative.
4. Soft skills and company performance: buyers look for trust, reliability and a good reputation.



Importing products into the EU

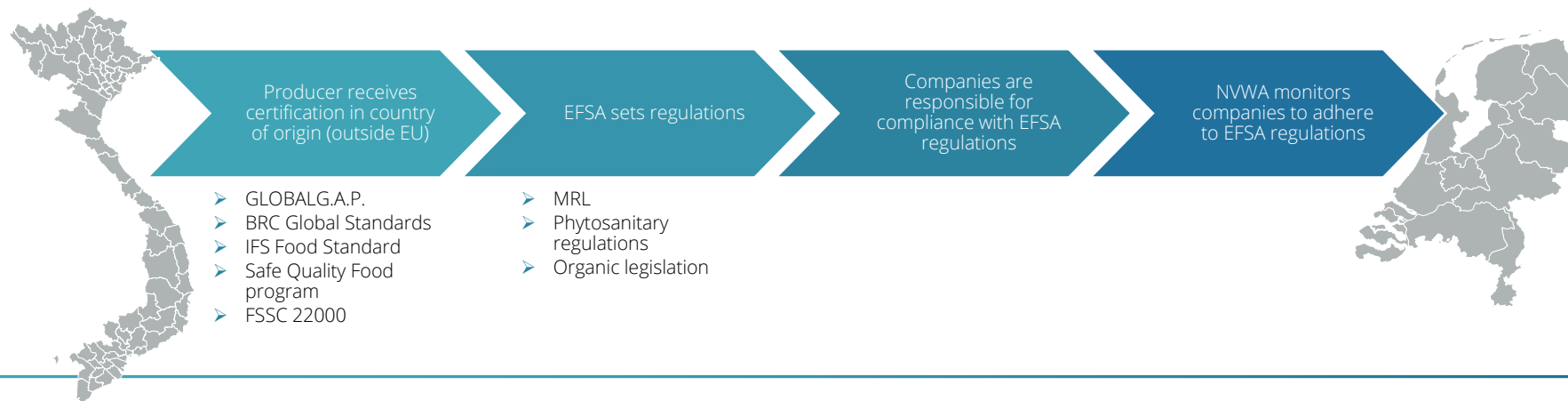
Companies are responsible for compliance, with many buyers require GLOBALG.A.P. certification

Within the European Union, the EFSA is responsible for setting the standards for food safety. The MRL regulations and the phytosanitary requirements are most important for international producers to comply with. European producers wishing to sell their products as organic can use the EU organic scheme. Dutch producers can also use specific Dutch certification schemes, such as MPS or Stichting Milieukeur. The, SKAL is responsible within the Netherlands for monitoring the organic market.

Producers outside of the EU who want to sell their produce as organic, must comply with organic legislation of the EU. Furthermore, although not mandatory, many retailers require additional certification. Producers in countries outside of the EU are advised to apply for international certification schemes such as GLOBALG.A.P. Certified accreditors in the country (Vietnam) can certify producers with an organic certification. Globally, there are several independent control bodies, including the Dutch Stichting Control Food & Flowers, Agro Groen Control (Vietnamese agent is Fresh Studio).

European market for organic products

The organic food industry in Europe, considered a lucrative market, grossed a retail sales value of EUR 29.8 billion in 2015. The Western European market for organic products grew by 5.4% between 2016-16, with the European Market experiencing a growth of 8.8% in the same period. Germany is the leading market for organic products (11.4% market share of global organic sales), with France following suit (7.3%). Within Europe, other countries with a large interest in organic products include Denmark, Sweden and Austria.



Trends & developments

Chemical companies are shifting towards 'soft chemicals' to comply with strict requirements

Changing categorization and guidelines for new products (EU)

The European Green Deal includes three strategies that are likely to revise the EU legislation in the near future, namely:

- Chemicals for sustainability strategy;
- Farm to fork strategy: in 2030, at least 25% of arable land must be used for organic production. At present, this stands at 8%;
- Biodiversity strategy.

More importantly, the EU is currently changing the categorization under which biological products fall. At present, most biologicals fall under the category 'bio stimulants', meaning they do not actively fight pests and diseases, but merely stimulate the plant to become more resistant. However, the EU plans to let those bio stimulants fall under a different category, meaning new, stricter regulations (the cost difference between the fertilizer registration and crop protection is 100-fold). The reason for this is that the EU wants to ensure bio stimulants will not receive a negative or unreliable image. The bio stimulants can either be categorized under the fertilizer legislation (as present) or under the crop protection (pesticide) regulation. The fertilizer regulations are less strict than crop protection regulations, which is why biological companies are pushing towards this categorization. Chemical companies however have the manpower and financial strength to go through the elaborate registration process of crop protection. Therefore, these companies are stimulating the EU to classify bio stimulants as crop protection – meaning many small- and medium-scale biologics companies will go out of business, as they do not have the time or money to register their products under this elaborate law. Technical platforms are currently advising the European Commission on the best strategy for categorization, but the process has been delayed due to the difficulty and the different interests of stakeholders. For this reason, bio stimulant companies are careful with semantics, as the products do not protect *against* aphid but rather increase *plant resilience*.

Short-lived ('soft') chemicals

To meet the strict requirements of Dutch retailers, many producers are increasingly using chemical pesticides with a rapid degradation time. The applied products quickly break down, caused by light and temperature, into harmless substances such as water and nitrogen. Within two days after application, traces of the product can no longer be found on the crop.

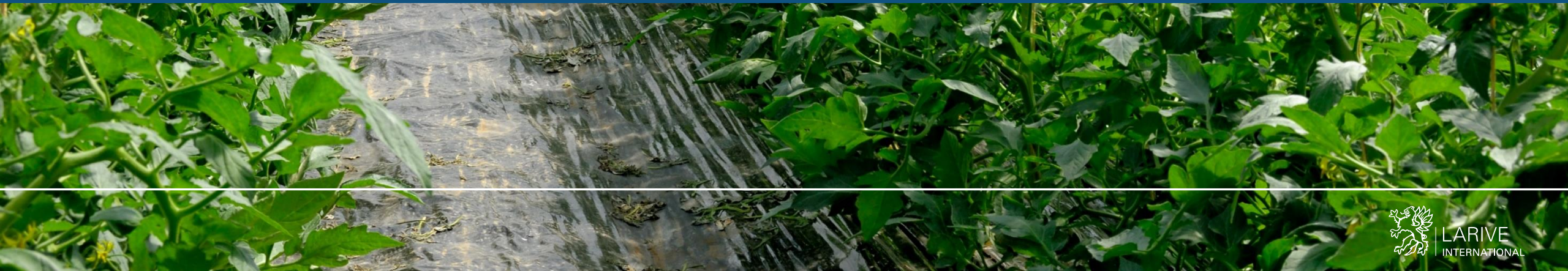
Data-driven precision agriculture

Farmers increasingly use precision agriculture, with which they can specifically target the crop in need of protection. Precision agriculture usually requires extensive data collection and monitoring, often paired with technological advancements such as drone technology, temperature-sensitive cameras, and artificial intelligence.





Recommendations



SWOT of the Dutch biologics sector

Internal origin

Strengths

- Crops cannot become resistant to biological products. Only chemical products can make products resistant, thereby risking biodiversity loss.

Weaknesses

- Effectiveness of biologicals: At present, this is usually 70% effectiveness compared to chemical products.

External origin

Opportunities

- Growing per capita consumption of organic products in the NL.
- Biological products are considered price competitive by producers. With higher production costs, this means the product offers lower profit margins to the produce than its chemical alternative.
- Research and development is supported by the Dutch government, offering tax advantages.
- The large-scale greenhouse production in the Netherlands offers a favorable environment for the use of biologicals, as many biological products rely on a controlled environment.

Threats

- Continued innovation necessary to improve the effectiveness of biologicals.
- Slow admission of new products: both the EU legislation and the national CTGB are time consuming, meaning sustainability is integrally inhibited.
- Changing EU regulations: chemical companies are pushing to classify biologics as 'crop protection', which means many small-scale companies will not be able to afford product registration.
- Retailers are even stricter than EU MRL, up to 50%. Paired with their high product demands in quality and uniformity, it becomes increasingly difficult for growers to meet these requirements while still making profits.
- Higher price for organic product is not guaranteed.
- Mental switch in consumers and retailers is missing, with consumers unwilling to pay higher prices for (organic) food products.

SWOT of the Vietnam horticulture sector

Internal origin

Strengths

- Increasing incomes spur demand for imported and high-quality food.
- Younger, urban based consumers an interesting target group, as millennials (1/4th of the population) are focused on quality.
- No limited labor. Passionate family companies.
- Growers are interested in technological improvements and fast learners.

Weaknesses

- Limited knowledge amongst traders, highly based on traditions. Crop protection is very difficult, requiring not only the right products, but especially the right practices.*
- Limited trust in new products. Seeing is believing. "People here aren't likely to listen to the advice of outsiders. So, we always find the most respected farmer in the area to work with first" – Cung Nguyen.*
- Market underdeveloped compared to the level of technology the NL has to offer (mid- to high-tech).
- Many growers are not looking for certification but satisfied with self-declared labels such as 'safe' or 'pesticide free'.
- Restrictions on advertising. The Vietnamese government bans in-content online advertising, making it more difficult for companies to reach the audience in their target segment.
- Growers are focused on cost reduction, not investments (more OPEX focused than CAPEX).
- Language barriers are a serious consideration, with many growers and associations not replying to English-written emails.
- Smaller-scale growers are struggling with attracting finance.
- Most growers have small plots (2,000m²), which makes investments relatively expensive.
- Foreign companies are hampered by Vietnamese regulations limiting import of biologicals.

External origin

Opportunities

- EVFTA gradually removes most customs duties. Tax rates for many agricultural products are cut immediately or soon.
- Shift towards modern retail channels amongst Vietnamese consumers.
- Increasing interest in food safety amongst Vietnamese and European consumers.
- Developing horticulture sector.

Threats

- Strict food safety legislation with several certifications required.
- Climate change causing rising temperatures, extreme weather and rising sea levels.
- COVID-19 poses a temporary hurdle for business within and with Vietnam.

Source: [EU agripromotion](#), January 2020.

*Source: based on information and experiences of The Greenery employee and [Rabo Foundation](#).

Value chain developments

The horticulture sector in Vietnam is advancing, with farmers increasingly willing to invest

Developments in Vietnam

- Vietnam is likely to professionalize in the near future. Within the region, it is the powerhouse of horticulture. Most crops are grown in small-scale family businesses, with families passionate to advance their business and protect their soils and crops.
- Exports to Europe and the Netherlands will increase, most likely focusing on high-value, exotic products for the European niche markets. High-value crops (including exotic fruits and vegetables, coffee and cocoa) allow for higher profit margins and increased investments.
- At present, many farmers are hesitant to make large investments and have difficulty accessing finance. However, if farmers would see the benefits of investments, this would likely increase their willingness to invest in advanced equipment, technology and high-quality inputs. A main difficulty for small-scale farmers is the relatively high investment costs of advanced equipment, as these are usually tailored for larger-sized farms (similar investment costs for a 2,000m² plot or 6,000m²).

Developments in the Netherlands and Europe

- An increased focus on prevention, data-driven precision agriculture and 'soft chemicals';
- Changes in the European registration process for new active substances in biologic control agents, biofertilizers, and bio stimulants. The current registration complex is costly, timely and has long queues, this is an obstacle to new parties entering the market or for existing companies launching new products. The discussions currently taking place at the EU involve the changing of categorization of biologicals, whereby products that now fall under the 'bio stimulant' category with relatively lenient legislation, could move to the 'crop protection' in which registration of new products costs millions of euros.

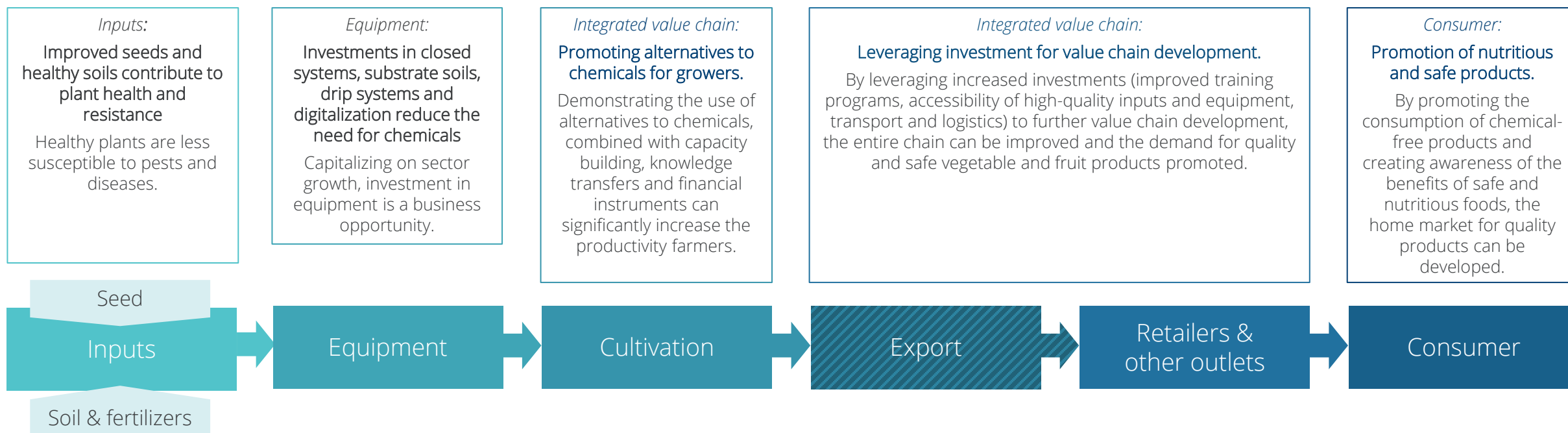


Value chain development recommendations

High-quality inputs, controlled systems and training programs and demonstrations are necessary to professionalize the sector

Although there are many possible pathways, chemical use must be reduced. There are several relatively easy steps that growers can take to advance their production methods, increase their yield, and protect their soils. The entire ecosystem must work together in order to succeed: cultivation, water management, logistics, transport, and food waste reduction. The necessary steps include:

- Preventing is better than cure. Focusing on plant and system resilience through improved plant strength and high-quality inputs (seeds, soils) reduces the needs for chemicals.
- Closed and controlled systems are necessary to allow for several important biological control agents and bio stimulants, including the use of predators. When farmers move away from production from soil to substrate increases nutrition uptake and plant strength. A vital investment for many growers is the investment in digitalization (data-driven horticulture) and drip irrigation systems, which improves water availability and reduces wastewater runoff. Pilots in China have demonstrated a yield increase of 50% through investments (EUR 6,000-20,000) in drip irrigation systems.
- Training and demonstrations are key to allow growers to understand the complexity of IPM. By seeing the improvements of using high-quality inputs and more advanced equipment, it is easier for growers to decide to use larger investments.



Knowledge-to-knowledge & government-to-government

Demonstrations are essential for knowledge sharing and improved practices. Government support is necessary for networking and support in establishing a local presence or travel

Golden triangle

Knowledge institutes and the governments of both countries are essential to create a supportive environment for sector development. Private companies are an essential part of this. Many have indicated the interest of joining a consortium of different partners, including parties along the value chain, knowledge institutes, and public sector organizations, in advancing the Vietnamese horticulture sector. The organizations all benefit from a more professional sector, with increased demand for high-quality inputs, equipment, training programs, and export to Europe.

Knowledge-to-knowledge (K2K)

Several parties have indicated the need for knowledge sharing and demonstrations to elevate the knowledge level and practices of growers. Increased knowledge would also allow for a better match between the Vietnamese horticulture sector and the offer of the Dutch market, which mid-to high-tech. Through centers of excellence or demonstration sites, farmers could see the benefits and the results of investing in high-quality inputs and equipment with their own eyes. It is important for Dutch knowledge institutes and private sectors to share their knowledge; however, it is also important to consider local cultural norms and values. With many family-run farms more receptive to information received from a familiar person, it is necessary to collaborate with local influential stakeholders in transferring the knowledge.

Government-to-government (G2G)

Good relations between two governments are essential for sector development. Supportive government measures include the following:

- Governments share networks and invite relevant parties to meet.
- Governments organize trade missions, whereby companies from (e.g.,) the Netherlands are introduced to the Vietnamese sector. This includes networking events, but also an introduction to the country's market, cultural values, and important business manners.
- Market access for foreign companies:
 - The costs and ease of attaining a business visa;
 - The costs and ease of attaining a residence permit;
 - Travel restrictions during COVID-19 pandemic.



Recommendations PSD tools

Companies are open to exploring new markets together

Companies are open to collaboration to advance the Vietnamese horticulture sector together. The market is large enough for multiple companies, meaning there is less fear of competition. Preferably, they work in a consortium consisting of public partners, knowledge institutes and private sectors in different parts of the value chain. Together, they can offer complete, comprehensive solutions for potential clients in Vietnam.

The preferred PSD tools depends on each exact situation. For example, the following support tools could be suitable:

1. Value chain development: SDGP, Impact Cluster, DHI, pre-PPS funding;
2. Improved training programmes and demonstrations: Orange Knowledge Programme (Nuffic), EKN, Impact Cluster, pre-PPS funding, YEP program
3. Increased use of biologics as alternative for agrochemicals: SDGP, FVO, EKN;
4. Regulatory reform: G2G, EKN.

Interest in Vietnam

Dutch companies and organizations interested in doing business in Vietnam, according to DBAV*, include Amstel Agro B.V., Dutch Greenhouse Delta, Grodan, Icologiq, Omnivent, Triscom, TTA, Umincorp, and Wageningen University & Research.

HortEx Vietnam 2022

Although originally planned for 17-19 March, 2021, the HortEx Vietnam has been rescheduled due to the coronavirus to 30 March-1 April 2022 in Ho Chi Minh City. Whether it can take place on that date is uncertain, as the travel restrictions and mandatory quarantine have not yet been lifted. In the coming weeks, the organization behind HortEx (Minh Vi Exhibition and Advertisement Services in Vietnam, Nova Exhibitions in the Netherlands and China Great Wall International Exhibition in China) will announce more information about the upcoming event. Should it not be possible to host the HortEx in March-April 2022, the event might be moved to a later date in 2022 or to 2023. Alternatively, it is possible the event will be hosted in a different form (with online components).

During the last edition, the following companies were involved: Agrico (NL), Asthor Agricola S.A. (Spain), Barnel USA (USA), BVB Substrates (NL), Comptoir Paulinois SAS (France), Enza Zaden (NL), Fresh Studio Innovations Asia (Vietnam), Hortus Supplies International BV (NL), Koppert Biological Systems (NL), Innotec Systems (NL), Netafim (Israel), Richel Group (France), Rijk Zwaan (NL), RKW Hyplast NV (Belgium), Royal Flowers (USA) and many others.



Image source: [PIB HortiTechIndia](#).

*Source: DBAV. These are the organizations who have indicated their interest to the DBAV, this does not mean that parties not mentioned here do not have an interest in Vietnam.



Annex



Annex I: Active ingredients used as biologicals

Category	Definition	Main example
Semiochemicals	<ul style="list-style-type: none">• Communication tools from organisms found in nature• No killing effect• Used to disrupt pairing of pests	<ul style="list-style-type: none">• Pheromones• Plant volatiles
Natural products	<ul style="list-style-type: none">• Botanicals and other natural occurring substances• Used to repel pests	<ul style="list-style-type: none">• Products derived from nature
Macrobiais	<ul style="list-style-type: none">• Natural predators that can protect the crop against natural enemies	<ul style="list-style-type: none">• Predators• Parasites• Nematodes
Microbiais	<ul style="list-style-type: none">• Micro-organisms with similar qualities as pesticides• Used as preventive- and direct/curative pest control	<ul style="list-style-type: none">• Viruses• Bacteria• Fungal pathogens• Yeast• Protozoa

Annex I: List of current legalized microbial products in the NL

Table 7.2: all current allowed microbial products in the Netherlands (Ctgb toelatingendatabank, 2019).

Product	Manufacturer	Active ingredient	Sectors used in
AQ10	CBC (Europe) Ltd.	Fungus	Horticulture
ASPERELLO Biocontrol	T34 Biocontrol Technologies, S.L.	Fungus	Floriculture, horticulture
BIO 1020	Novozymes France S.A.S.	Fungus	Arboriculture, floriculture, horticulture
Blossom Protect	Bio-ferm Biotechnologische Entwicklung und Produktion GmbH	Fungus	Horticulture
BotaniGard vloeibaar	Mycotech Europe Ltd. p/a Certis Europe B.V.	Fungus	Floriculture, horticulture
BotaniGard WP	Mycotech Europe Ltd. p/a Certis Europe B.V.	Fungus	Floriculture, horticulture
CARPOVIRUSINE EVO 2	Arysta LifeScience S.A.S.	Virus	Horticulture
Cedress	Koppert B.V.	Bacteria	Agriculture, horticulture
CERALL	Koppert B.V.	Bacteria	Agriculture
Contans	Bayer CropScience S.A.-N.V.	Fungus	Agriculture, floriculture, horticulture
CoStar WG	Mitsui AgriScience International S.A./N.V.	Bacteria	Agriculture, herb growing, horticulture
Cyd-X	Certis Europe B.V.	Virus	Horticulture
Cyd-X Xtra	Certis Europe B.V.	Virus	Horticulture
DELFIN	Mitsui AgriScience International S.A./N.V.	Bacteria	Agriculture, arboriculture, floriculture, horticulture

Product	Manufacturer	Active ingredient	Sectors used in
DiPel DF	Sumitomo Chemical Europe S.A.S.	Agro Bacteria	Agriculture, floriculture, herb growing, horticulture
Dutch Trig	BTL Bomendienst B.V.	Fungus	Amateur use, public parks
Fado	Nufarm B.V.	Fungus	Agriculture, horticulture
FLORBAC	Sumitomo Chemical Europe S.A.S.	Agro Bacteria	Agriculture, floriculture, horticulture
Gnatrol SC	Sumitomo Chemical Europe S.A.S.	Agro Bacteria	Floriculture
Integral Pro	BASF Nederland B.V.	Bacteria	Agriculture
Lepinox Plus	CBC (Europe) Ltd.	Bacteria	Agriculture, horticulture
MADEX Plus	Koppert B.V.	Virus	Horticulture
Madex Top SC	Andermatt Biocontrol AG	Virus	Horticulture
Met52 granular	Novozymes Frances S.A.S.	Fungus	Amateur use, horticulture, Public parks
Met52 OD	Novozymes Frances S.A.S.	Fungus	Agriculture, floriculture, herb growing, horticulture
MYCOSTOP	Danstar Ferment AG	Bacteria	Agriculture, floriculture, herb growing, horticulture

Source: [WUR](#)

Annex I: List of current legalized microbial products in the NL, continued

Product	Manufacturer	Active ingredient	Sectors used in
MYCOTAL	Koppert B.V.	Fungus	Floriculture, horticulture
Naturalis-L	CBC (Europe) Ltd.	Fungus	Agriculture, floriculture, horticulture
NEXY	Bionext s.p.l.	Fungus	Horticulture
PMV-01	De Ceuster Meststoffen nv	Virus	Horticulture
PreFeRal	Biobest Group N.V.	Fungus	Floriculture, horticulture
Prestop	Danstar Ferment AG	Fungus	Agriculture, floriculture, herb growing, horticulture
PRESTOP 4B	Danstar Ferment AG	Fungus	Agriculture, floriculture, herb growing, horticulture
Proradix Agro	SP Sourcon Padena GmbH	Bacteria	Agriculture
ROMEO	Agrauxine S.A.	Fungus	Agriculture, horticulture
Serenade	Bayer CropScience S.A.-N.V.	Bacteria	Agriculture, floriculture, herb growing, horticulture
Serifel	BASF Nederland B.V.	Bacteria	Agriculture, horticulture

Product	Manufacturer	Active ingredient	Sectors used in
Sonata	Bayer CropScience S.A.-N.V.	Bacteria	Agriculture, horticulture, herb growing, horticulture
T34 Biocontrol	Biocontrol Technologies, S.L.	Fungus	Floriculture, horticulture
Taegro	Novozymes Frances S.A.S.	Bacteria	Agriculture, horticulture
Tellus	Isagro S.p.A.	Fungus	Agriculture, floriculture, herb growing, horticulture
Texio	SBM Développement SAS	Bacteria	Agriculture, amateur use, horticulture
Toreda	BASF Nederland B.V.	Bacteria	Floriculture, horticulture
TRIANUM-G	Koppert B.V.	Fungus	Agriculture, floriculture, herb growing, horticulture, public parks
TRIANUM-P	Koppert B.V.	Fungus	Agriculture, floriculture, herb growing, horticulture, public parks
Turex spuitpoeder	Mitsui AgriScience International S.A./N.V.	Bacteria	Agriculture, floriculture, herb growing, horticulture, public parks
Turex WG	Mitsui AgriScience International S.A./N.V.	Bacteria	Agriculture, floriculture, herb growing, horticulture, public parks
V10	Valto B.V.	Virus	Horticulture
VINTEC	Bi-Pa N.V.	Fungus	Horticulture
VOTIVO	BASF Nederland B.V.	Bacteria	Agriculture
XenTari	Sumitomo Chemical Europe S.A.S.	Agro Bacteria	Agriculture, floriculture, horticulture, public parks

Source: [WUR](#)

Annex I: Vietnam geographical spread of non-staple crops

Below are examples of the non-staple crops and the location of the relevant projects.

- Area:** Northern highlands – Moc Chau and Sapa
Climate: Temperate
Crop(s):
- Temperate/subtropical fruit, e.g. peach, plum, persimmon fruit
 - Vegetable, potato
 - Chilly, cardamom, star anise, cinnamon
 - Tea
 - Flower

- Area:** Central Coast
Climate: Tropical monsoon
Crop(s):
- Fruit: e.g. pineapple, mango, coconut
 - Vegetable, sweet potato
 - Spices e.g. pepper, onion, garlic, ginger
 - Cashew nut

- Area:** Mekong Delta and South-East
Climate: Savanna tropical
Crop(s):
- Tropical fruit e.g. pomelo, watermelon, dragon fruit, gac plant
 - Vegetable
 - Pepper
 - Cacao



- Area:** Red River Delta and North-East
Climate: Sub-tropical
Crop(s):
- Fruit e.g. mango, banana
 - Vegetable
 - Spices e.g. chilly, cardamom, star anise, cinnamon
 - Flower

- Area:** Central Highlands
Climate: Temperate
Crop(s):
- Avocado
 - Vegetable
 - Pepper
 - Cacao
 - Flower

Source: RVO report

Annex II: Dutch crop protection, fertilizers, products & services

In alphabetical order, either form or with an office in the Netherlands

This list includes companies active in crop protection, fertilizers, peat and substrates, as well as companies active in products and solutions for growers and breeders.

- Agrico
- Alcochem Hygiene B.V.
- Aris B.V.
- Axia Vegetables Seeds
- Benfried
- Berg Hortimotive
- Bejo
- Bio-Kultura
- Biobest
- Biocompig
- Biron B.V.
- BTL Bomendienst
- BVB Substrates
- CNC Grondstoffen
- DCM NV
- De Ceuster Meststoffen
- Delphy B.V.
- Dutch Plantin B.V.
- Dutrion
- Empas B.V.
- Entocare
- Environmental Monitoring Systems (EMS) B.V.
- Enza
- Ferm O Feed (Den Ouden Group)
- Floor van Schaik Rack Solutions
- Grodan
- Hoesen Horticultural Projects B.V.
- Holland Farming B.V.
- Holland Gaas B.V. / Holland Scherming B.V.
- Holland Plug International B.V.
- Houweling Horticulture B.V.
- Howitec Netting B.V.
- Incotec
- ITB Climate
- Jiffy Products International B.V.
- Kas TuinbouwCommunicatie
- Knaap Groep
- KOAT B.V.
- Komeco Organic Fertilizers
- Koppert Biological Systems
- Logiqs B.V.
- MJ Tech B.V.
- Nautilus Organic
- Netafim (HQ Israel)
- Nijssen Climate and Refrigeration Technology
- NovaCropControl
- Nufarm
- Onings Holland Flower Bulbs
- Parus Europe
- Plant Health Cure B.V.
- Poly-Hort B.V.
- Priva
- Rijk Zwaan
- Royal Brinkman
- Shakti Cocos B.V.
- Tryptomera
- Van Iperen
- Valto



Annex II: Dutch greenhouse construction, equipment & logistics

In alphabetical order, either form or with an office in the Netherlands

This list includes companies active greenhouse construction, greenhouse equipment, climate and internal logistics, horticultural supplies, machines and equipment.

- AGC Chemicals Europe
- Agrocare
- Agrolux Nederland B.V.
- Alcomij B.V.
- Alumat Zeeman B.V.
- Alweco Scherminstallaties B.V.
- Aruna Horticulture Lighting B.V.
- AVAG
- Bato Plastics B.V.
- Beekenkamp
- BOAL Systems
- BOM GROUP
- Bosman Van Zaal
- Buitendijk-Slaman B.V.
- Certhon
- Codema Systems Group
- Dalsem Complete Greenhouse Projects
- De Gier Drive Systems
- Debets Schalke
- Desch Plantbak B.V.
- Dijk Heating B.V.
- DLV glas & energie
- Dool International B.V.
- DOOR
- Dry Hydroponics
- DS Hortitrade
- Dutch Greenery
- Ende Groep
- Environmental Monitoring Systems (EMS) B.V.
- Flier Systems B.V.
- Floor van Schaik Rack Solutions
- Gakon Horticultural Projects
- Glasimport Greenhouses B.V.
- Hoeven Horticultural Projects B.V.
- Hogervorst-Tabben
- Holland Gaas B.V. / Holland Scherming B.V.
- Holland Heater De Leir B.V.
- Hoogendoorn Growth Management
- Horconex
- Hortus Supplies
- Hotraco Horti B.V.
- Houweling Horticulture B.V.
- ISO Group
- ITB Climate
- Kas TuinbouwCommunicatie
- KG Greenhouses & KG Systems
- Koppert Biological Systems
- Koppert Cress
- Kubo Greenhouse Projects B.V.
- Lande B.V.
- LetsGrow.com B.V.
- Logiqs B.V.
- Lohuis Lighting
- Luiten Greenhouses
- Mardenkgro B.V.
- MJ Tech B.V.
- Netafim Netherlands
- Nijssen Climate and Refrigeration Technology
- Oerlemans Plastic B.V.
- Parus Europe
- Patron Agri Systems International B.V.
- Peter Dekker Installeites B.V.
- Phillips Lighting Horticulture LED Solutions
- Poly-Hort B.V.
- Priva
- Ridder Group
- Royal Brinkman
- Snelder B.V.
- Steenks Service B.V.
- Stolze
- Ter Laak
- Thermet Service B.V.
- Valk Horti Systems
- VB Group B.V.
- Vivi
- Voshol Warmte-Elektrotechniek B.V.
- Vastermans ventilation B.V.
- Vyncke N.V.
- WDP Draadbewerking B.V.
- Zantingh B.V.
- Zielh-Abegg Benelux B.V.



Annex II: Dutch associations, certification, knowledge and NGO

In alphabetical order, either form or with an office in the Netherlands

This list includes companies active in knowledge and services, R&D and propagation, associations, certification bodies, and development partners.

Associations

- Bionext
- DBAV
- Dutch Business Association Vietnam
- Groentenfruihuis (Fresh Produce Centre)
- Netherlands Vietnam Smart Horticulture Platform
- Plantum
- Topsector Tuinbouw en Uitgangsmaterialen
- Vietnam Trade International

Certification schemes

- MPS-ABC
- On the way to Planet Proof
- SKAL

Development partners

- Atradius
- CDI
- EVD
- FDOV
- Invest NL
- Nuffic
- PSI
- RVO

Knowledge

- Agrolux NL B.V.
- Alcochem Hygiene B.V.
- Aris B.V.
- AVAG
- BOM Group
- Bosman van Zaal
- Delphy B.V.
- Ende group
- Flier Systems B.V.
- Grodan
- Groen Agro Control
- Jiffy Products International B.V.
- Kas TuinbouwCommunicatie
- Koppert Biological Systems
- Lentis
- Logiqs B.V.
- Mprise Agriware B.V.
- Parus Europe
- Plant Health Cure B.V.
- Priva
- Royal Brinkman
- Schreurs Holland
- Steenks Service B.V.

- Thermeta Service B.V.
- UvA
- VB Group B.V.
- Visser Horti Systems
- Voshol Warmte-Elektrotechniek B.V.
- Wageningen University
- Zantingh B.V.

NGO

- IDH
- Pesticide Action Network NL
- Stichting Control in Food and Flowers
- Stichting KIJK



Annex IV: Labelling and packaging regulations

The European Union (EU) requires that the text on the label must be written in one of the official languages of an EU Member State and be understandable for the consumer.

Trade packaging and cartons	Processed products or ready-to-eat products
Name and address of the packer or dispatcher;	Common name of the product;
Name and variety of the produce (if the produce is not visible from the outside of the packaging);	Full name of the country of origin;
Country of origin;	Name and address of the producer, packer, importer, brand owner or seller (retailer) in the EU who places the product on the market, and the wording "Packed for:", if applicable;
Class and size (referring to the marketing standards);	Net content in weight;
Lot number for traceability or GGN if certified GLOBALG.A.P. (recommended);	Minimum durability – a best-before date (on all processed fruit and vegetables, such as freshly cut);
Official control mark to replace name and address of the packer (optional);	Producer identification or lot number;
Post-harvest treatment; for example, anti-moulding agents added in a post-harvest treatment of citrus fruits must be mentioned on the trade package;	List of ingredients (if applicable), including additives and post-harvest treatment;
Organic certification, including name of inspection body and certification number (if applicable).	Allergenic declaration (if applicable);
	Declaration of nutritional value (when mixed with other foodstuffs);
	Packed in protective atmosphere, if applicable;
	Additional information about quality class, size, variety or commercial type and post-harvest treatment on the product labelling or in close proximity (on the shelf) for products with specific marketing standards.

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