Sustainable Horticultural Crop Production in The Netherlands

Tom Nass

Undergraduate Student, Hort 3002W, Sustainable Horticulture Production (Greenhouse Management), Dept. of Horticultural Science, University of Minnesota, 1970 Folwell Ave., Saint Paul, MN 55108 U.S.A.

Introduction.

The Netherlands is a country located in Western Europe, divided into twelve provinces, and bordered to the north by the North Sea, to the south by Belgium, and by Germany to the east. This country consists of mostly coastal lowland with some hills in the southeast portion and experiences a marine/temperate climate of cool summers and mild winters. The total area of the country is 41,526 square kilometers with 21.96% of that being arable land (C.I.A., 2009).

Population density is a concern for The Netherlands with 16,645,313 people (July 2008 est.) living in a country that is slightly less than twice the size of New Jersey (Pearson Education, 2008). The vast majority of the people living in The Netherlands are between the ages 15-64 (67.8%) and the rest split almost equally on the other ends of the age distribution (C.I.A., 2009). Also, the dominant ethnicity is Dutch (80.7%) with about 5% from other European Union countries (C.I.A., 2009).

The economy of The Netherlands has a GDP (PPP) of $687.5 billion and a GDP (OER) of $909.5 billion (C.I.A., 2009). Agriculture comprises 2% of the GDP which is a large amount in comparison to other top agriculturally productive nations (U.S. 1.2%, U.K. 0.9%). The Netherlands is also a rather wealthy nation with the GDP per capita being $41,300 (C.I.A., 2009).

The Netherlands as a whole has a thriving agricultural sector. There are a number of factors that have aided this country in becoming one of the top exporters of agricultural products,

particularly in the area of horti/floriculture. One of the key aspects of this is that the mouths of three major European rivers are found in The Netherlands: the Rhine, Maas, and Schelde. This has allowed for relatively easy transportation for the exportation of agricultural products to the rest of Europe. The Netherlands ranks second in terms of agricultural exports. In 2007, 58 billion Euros (almost US $75 billion) worth of agricultural products (dairy products, pig- and poultry meat, vegetables, flowers and ornamental plants) were exported (Wageningen U.R., 2008). In 2003, $6.3 billion worth of the world's $12.4 billion of plant exports were produced in The Netherlands (U.S.D.A., 2005). These exports can be broken down into various categories: cut flowers (37%), ornamental plants (29%), and bulbs (10%) (U.S.D.A., 2005). The vast majority of these exports end up in Germany, the United Kingdom, and France.

Another aspect that has allowed the nation to develop such a strong and profitable horticulture industry is that they have vast amounts of natural gas reserves. This, at least for the crops grown under glass, has made energy costs much less expensive than in other parts of the world. Other important natural resources for the agriculture industry include petroleum, peat, and large amounts of arable land.

Finally, the climate found in The Netherlands (marine/temperate) is very conducive to agriculture. Temperature extremes are not as severe as those found closer to the equator or further north where winters can be devastating. This was the reason why agriculture as a whole began with success in this country prior to the advent of greenhouse operations where the environment is controlled.

Sustainability

The Netherlands has successfully become one of, if not the most, premier countries for horticultural production. Over the growth of this industry there has been a very high amount of

inputs that have been put into the crops season after season. This has been a cause for much concern of the ecological impact that this industry is beginning to have on the country. It has not been until recent times that society as a whole has begun to look at these issues and tried to offset them. The biggest concerns for The Netherlands include: nutrient concentrations (nitrates and phosphates), ammonia (acid rain), greenhouse gases, pesticide use (water and air pollution), food safety, landscape and biodiversity, energy, and organic farming (Wageningen U.R., 2008). These concerns have led to a growing interest in sustainability not just in The Netherlands, but across all European Union countries as made evident by the European Union Sustainable Development Strategy (EU-SDS).

There are many differing ideas as to exactly what this idea of sustainability means and in addition to this many differing ways of achieving these goals. Many definitions, if not directly then indirectly, point towards a bettering of the quality of life, but this is a very subjective perspective and one that changes in different situations. Ultimately, it is reasonable to say that each entity whether it is a national, state, or local government will to some extent need their own version of what sustainability means for their specific situation. The EU-SDS says:

> Sustainable development stands for meeting the needs of present generations without jeopardizing the ability of futures generations to meet their own needs – in other words, a better quality of life for everyone, now and for generations to come. It offers a vision of progress that integrates immediate and longer-term objectives, local and global action, and regards social, economic and environmental issues as inseparable and interdependent components of human progress (European Commission, 2008).

This is a very broad and non-specific definition for sustainable development, but it shows some of the areas that need revision in our current state of society to achieve sustainability.

Very similar to the EU-SDS sustainable development definition is The Netherland's governmental policy on sustainable development which says:

> Sustainable development requires a coherent effort in socio-economic development and in dealing carefully with the earth. Sustainable development also implies the consideration of long-term developments, including the way in which our current behavior impinges on them. Many societal challenges -if not all- require sustainable approaches towards their solution (Wageningen U.R., 2008).

Again this definition is vague, but seems to be for a reason. It is not known precisely what measures are necessary to become sustainable, and it will be up to the Dutch government in this example to put into place standards and requirements for all industries.

There have already been standards set by the EU and The Netherlands specifically on issues of manure and minerals (example of an EU restriction), energy, and pesticide use. For instance, in the 1990s energy use was required to become 50% more efficient by 2000 for the horticultural sector. Also, pesticide use was to be reduced by 50% in this same sector. This type of legislation shows the commitment that the government of The Netherlands has for furthering sustainability and environmental awareness.

Historical Production Practices

In the recent two centuries the Dutch horticulture industry has been one of the biggest in the world. In the 17th century they started to target neighboring countries primarily due to the easy transportation that they had access to. The main exports at that time being dairy products, pork, and flower bulbs (Wageningen U.R., 2008). Horticulture continued to grow largely due to the increased agricultural research, education, and extension which helped growers to increase yields and productivity (Wageningen U.R., 2008).

Initially all of the crops were grown outside (field production), but as technology developed there were a greater number of greenhouses being constructed for the flower industry. This allowed for greater control of the growing environment, but along with this came increased inputs. In addition to greenhouse construction, there were also increased inputs for field grown crops in the way of pesticides. These increases in inputs have led the industry to where it is today, searching for ways to become more sustainable in their practices.

The industry has become very specialized over the past few decades and continuing into the present. "Vegetables, flowers, and ornamental plants are grown almost entirely in greenhouses using cheap (Dutch) natural gas as [an] energy source" (Wageningen U.R., 2008). Farmers growing crops in the field specialize in high value crops which include ware potatoes, seed potatoes, and sugar beets (Wageningen U.R., 2008).

Current Production Statistics

As stated previously, The Netherlands has a thriving agricultural sector which can be easily seen when looking at their economic statistics. Roughly 17% of all exports of goods and services are from the agriculture industry (Wageningen U.R., 2008). This accounts for almost 10% of the GDP of the country; similarly this sector employs about 10% of the working population (Wageningen U.R., 2008). There are some 80,000 farms employing around 200,000 people that make up the agriculture industry (crop cultivation, animal husbandry and horti-/floriculture) of The Netherlands. With 23,041 km^2 of farmland, over half of the total area of the country (total area is 41,528 km^2) is utilized by this industry. Horticultural production accounts for 92,000 hectares of this area as well (Table 1). Noord Holland, Gelderland, Noord Brabant, and Zuid Holland are the top four provinces in terms of number of agricultural holdings (Table 2).

Of the crops grown on this large amount of agriculturally productive land, vegetables, followed by flowers, then fruit are the top three categories of crops grown (Table 3). These categories are then divided into open ground (field production) and under glass. For vegetables in field production brussel sprouts, leeks, then strawberries are the top three (Table 4). In terms of total vegetables produced, tomatoes is far and away the largest with the majority of them being grown under glass (Table 5).

The flower bulb industry of The Netherlands is one that dates back to the 1500s and is still thriving today. Tulips began the craze and are still the leader today, followed by lilies, then daffodils (Table 6). In contrast to the field grown bulbs, there is a large floriculture industry with many crops under glass. There are two crops that stand out as the majority leaders: roses and chrysanthemums (Table 7).

One astonishing statistic is the amount of plant materials that the Netherlands exports. As stated previously, $6.3 billion of the world's $12.4 billion of plant exports originated in The Netherlands. They export large amounts of agricultural products to almost every country in the European Union (Table 8).

Current Production Practices

Today, horticultural production in The Netherlands is at the cutting edge of technology. As mentioned earlier, The Netherlands has been very successful in the research and development of many new and innovative technologies since World War II. This is the result of a good chain involving research, education, and extension across the country. Around the world, members of the horticulture community look towards The Netherlands for ways to build more efficient greenhouses, achieve higher quality crops and greater yields to name of few.

Due to the increased pressure worldwide to become more sustainable and the willingness of the Dutch government to achieve a high level of sustainability and efficiency, many of the newest innovations and technologies allow for greater production in a sustainable manner. One enormous breakthrough is the concept of an energy producing greenhouse. Although these structures are still in an experimental stage some of the possibilities that they hold are starting to be realized. One prototype is being observed at the Wageningen University and Research Centre. The roof of this greenhouse contains a filter that allows visible light to pass through but not solar heat/infrared radiation. This solar heat is instead reflected on to a set of solar panels which produce both heat and electricity (Juijin, 2009). Structures such as this allow greenhouses to evolve from energy consuming to energy generating. In addition to providing energy for the greenhouse itself, any excess energy can be put into the local grid and utilized by the public for free or bringing in additional revenue to the greenhouse.

This leads into the topic of energy consumption, both the amount and efficiency, of production operations. One innovation that is becoming commonplace in The Netherlands is a co-generation engine that provides both heat and electricity. This allows for a greater efficiency because excess heat is converted to electricity that can then be utilized in the greenhouse. A perfect example of this is Royal Pride Holland, a commercial tomato producer, which uses gas to produce heat, and electricity. In addition to this the exhaust from their generator is treated and purified so that the CO2 can be pumped back into the greenhouses to help foster plant growth. The Royal Pride Holland company is not only able to provide enough energy for themselves but they also provide enough electricity to support some 30,000 homes in their surrounding area (Royal Pride Holland, 2008).

An additional way of becoming more efficient in terms of energy is by utilizing an aquifer thermal energy storage system. These systems have an underground water reserve with some sort of solid in them (gravel, sand, silt). During the summer months excess heat is stored in the aquifer that can be later utilized in the cold winter months. Studies have shown that using this system greatly reduces energy expenses, and also increases crop yield (Turgut, et. al. 2009). This seems like a perfect solution to a difficult problem and is gaining a lot of popularity in the vegetable production industry.

The amount of irrigation required to produce the thousands of tons of crops being produced has until recently been a very large concern. Most of the large greenhouses today have some sort of irrigation recycling system where the water applied is collected and purified, usually with UV light. In addition to this type of recycling, many operations will collect the water runoff from the greenhouses and run it through the same purification system where it can then be applied to the plants. This greatly decreases the amount of water consumed by some of these enormous companies.

Probably one of the greatest concerns in the agriculture industry worldwide is the use of chemicals in the form of pesticides, herbicides, fungicides, etc. Due to the increased regulation of the Dutch government there are strict controls on the chemicals that greenhouses can use on their crops. Because of this, many of these companies are focusing on implementing comprehensive integrated pest management systems. For the most part this eliminates chemical use unless a significant and unexpected outbreak should occur. In the case of tomato production in The Netherlands chemicals cannot be used because the plants are pollinated by bees that are far too sensitive to the chemicals for them to be applied.

Another method of reducing the amount and likelihood of disease outbreaks is a product called Clean Light. This product uses UV light to protect the plants. It is used extensively in The Netherlands in tomato production. It applies a certain amount of UV light that will kill powdery mildew, botrytis, and fusarium diseases, but it does not emit enough light to harm the plants themselves. This is interesting because the only input would be electricity to power the product.

In terms of production an interesting product that is relatively new is the Stomata Sensor. This sensor takes readings to see if the stomata of the plants are accidentally closed. This is something that greenhouse workers are not able to detect, but inhibits the plants uptake of CO2 which would result in slower growth and development. If the sensor detects that the plant is in this closed stomata state it will prompt changes in the greenhouse environment so the plant will reopen its stomata. It has been reported that use of this product has increased yields in edible production by 10-15% (McEwan, 2007).

All in all The Netherlands is constantly reinventing the greenhouse production industry. They are continually coming up with new products that allow for a little greater efficiency or yield. Today these innovations are not only geared at yield and the bottom line, but they also look to be sustainable and beneficial to society as a whole not just their own industry needs.

Integration of Historical and Current Production Practices: Ranked Strategies

Due to The Netherlands being such a horticultural powerhouse worldwide, it is not reasonable to attempt to discuss all of their current production practices in contrast to the historical practices. Instead focus will be put on the tomato industry which is extremely successful in The Netherlands. In 2007, 685,000 tons of tomatoes were produced in The

Netherlands (Table 5). This industry has come an extremely long way from the traditional methods of growing tomatoes.

When looking at the way tomatoes are produced today there is no way that the argument could be made that there has been any sort of regression in their methods. In addition to this the modern facilities that do exist are extremely sustainable in their practices as well. Although some of the elements are not completely sustainable, when coupled with the innovations and technologies that exist or are being developed they can become quite sustainable.

In the past, for instance, artificial lighting was not used to the extent that it is today in tomato production. Year round, these crops are receiving 16 hours of light. The amount of electricity that is needed to power these high pressure sodium lamps is astronomical. Although the additional electricity usage is not as sustainable as historical methods, in order to produce the amount of products necessary to meet demand it is a necessity to utilize artificial lighting to the extent that it is today. With the advent of the co-generation engines mentioned previously, companies are able to minimize their inputs by utilizing the heat produced to generate electricity. Continued usage and increased implementation of these generators in production facilities will help to increase sustainability for this high electricity consumption.

For the most part in the tomato industry bees are used to pollinate the plants. This means that great care must be taken to insure that the bees are healthy because they are not cheap to bring into the greenhouse. Instead, comprehensive integrated pest management programs have been installed to combat pest and disease occurrences. The use of chemicals in the greenhouse therefore is greatly reduced or eliminated altogether. In doing this, the industry has taken an enormous step from the past towards sustainability. In comparison to historical practices, the current practices are much more sustainable.

In addition, because these tomatoes are grown semi-hydroponically there is little soil use. Ideally in these types of systems the plants are spaced at a density of two and a half plants per meter squared. This means that as much of the space is utilized as possible, but also means that there is a large amount of water use. Again this has been offset by these companies recycling their water for later use. So not only is there little soil used, not to mention that the soil used stays intact for six to eight months (life span of the tomato plant), but also there is little net loss in the amount of water applied. This again is another huge step towards sustainability in comparison to historical practices.

The entire horticulture industry of The Netherlands is progressing towards sustainability. In terms of sustainability the industry probably hit its lowest point in the middle of the last century up until 15-20 years ago when sustainability started to become a hot topic. Since then, the industry worldwide, but especially in The Netherlands, has focused on ways to become more sustainable to the benefit of the industry and society.

For the final two sections of this paper, focus will again be placed on the tomato industry in The Netherlands.

Finalized Sustainable Development Strategy

In attempting to incorporate all of these sustainable elements into a single production facility, the biggest obstacle or challenge to be overcome is money. All of these new and innovative products are expensive simply because they are new. As time goes by and more facilities are utilizing these products the cost will go down, but for the near future it will be difficult to attempt to incorporate all of these products into one sustainable enterprise.

On the other hand the potential opportunities and rewards associated with these products are enormous. For instance, the solar greenhouse would allow a facility to not only supply all of

its electricity by capturing the solar energy hitting the glass but to also supply neighboring communities with energy. This extra energy could be given for free or be an additional source of income in which no labor is needed to generate. The co-generation engines mentioned previously are also able to supply energy to the greenhouse facility and neighboring communities, but these generators are not nearly as sustainable as a solar greenhouse would be.

Some of the other products mentioned would also help reduce the amount of energy that these greenhouse facilities consume. One example of this is the Stomata Sensor. Because the stomata of the plants are being monitored, unnecessary adjustments to the greenhouse environment would not be made. Only adjustments to maintain that the stomata of the plants remain open would be made. Although it is difficult to say whether this would result in more or less adjustments it would increase the overall efficiency of the facility. Also, if their research on the product is accurate then this would result in a 10-15% yield increase. In the tomato industry alone in The Netherlands that would mean 68,500 additional tons of product produced (based on the 685,000 tons of tomatoes produced in The Netherlands in 2007).

Although the initial cost of these products would be large, eventually they would pay for themselves. By installing a solar greenhouse, a given production facility might be able to completely eliminate their energy expenses, which is a huge expense for any greenhouse facility. Also, the company stands to become more profitable, not only in terms of reduced expenses, but many of these new innovations are geared at increasing yield and efficiency. This could mean less labor expenses with a greater output of products.

In a place like The Netherlands, it would not be particularly difficult to attempt to implement many of these products due to their ever-increasing focus on sustainability. Government funding could potentially be gotten for using some of these products, especially

those that would reduce energy consumption and also utilize excess energy by providing it to the local grid or neighboring communities.

The first step in incorporating these innovations would be to check the validity of the statements that the producers make as to benefits associated with their products. By implementing the Stomata Sensor in a facility will there actually be a 10-15% increase in yield? Is this yield crop specific or is it universal? These are the types of questions that are at the heart of any new product. If the producers can prove to the growers that they will gain in terms of profitability from incorporating this new product, then it will be implemented. As for products like the GE co-generator, it already seems apparent that the benefits are real as evidenced by The Royal Pride Holland Company. In the case of the solar greenhouse, additional research needs to be conducted as to the development of the product. There is current research being conducted at the Wageningen University and Research Centre. Hopefully they will be able to finalize plans of how this structure could be built in a large scale facility. After this, they would then have to conduct more research on the growth of plants under this type of greenhouse to see if there are any detrimental effects.

If plant growth and development is sufficient in these new greenhouses or if these products actually do increase yield compared to current practices, then the next step is to implement them into a production facility. Again, the biggest obstacle is going to be coming up with the money to finance these new expenses.

All of these new innovations would seem to be advantageous to growers. This is assuming that proper prior research has been conducted to see the actual benefits associated with the various products. If the advantages outweigh the disadvantages then it would seem that the given products would be a wise choice for growers. Unfortunately it may not be as clear cut

as advantage versus disadvantage. The growing facility is likely to be looking more at the bottom line numbers as opposed to the sustainability aspect. Fortunately it seems that most of the producers of these new innovations understand this, and are producing their products to help with both of these issues.

Design a Future Sustainable, Controlled Environment Production Facility

As has already been stated, I will be focusing on tomato production. The facility that will be designed will be attempting to produce tomatoes in a wholly sustainable greenhouse. The tomato industry is extremely successful in The Netherlands, producing 685,000 tons in 2007 (Table 5). I chose this crop because of the large amounts produced annually, and also because of the inputs that are involved in the production process. Often in these facilities supplemental light is utilized 16 hours a day regardless of the outside conditions. It seemed like a good choice for analyzing on a sustainable level to find ways that they could help themselves and also the environment.

The location that I would choose for this facility would be just north of Amsterdam. Amsterdam is located at latitude $52^{o}22'$ N, so this site would be just a little north of this. This is also the region that Royal Pride Holland operates out of. The reason for choosing this area is that it is a little peninsula which is advantageous for shipping to all ports of Europe, especially the U.K. which is a close neighbor to The Netherlands. This facility would not be built to the size of other operations like Royal Pride Holland for instance which has about 250 acres under glass. Instead it would be built to test the feasibility of these sustainable production options to determine if they can produce at the same level as current facilities. The structure itself would consist of two growing ranges that are completely separate with a head house between them. One would be a solar greenhouse, while the other would utilize a generator similar to the GE

co-generator, these being the two main treatments being analyzed. Aside from these two differences all other components of the greenhouses would be the same. Ideally they would be 15 meters high, with glass being the glazing materials, and the structural components being steel or aluminum. These greenhouses would both be built with a reservoir system below them to try to conserve heat. 400 watt high pressure sodium lights would be used as the supplemental light source with a height two meters above the plants, three meters between lights in a row, and three and half meters between rows (Barkley, 2007). The hanging trough system would be used with rockwool being the rooting media for the tomato vines. In addition to these structural aspects an advanced computer monitoring system would need to be installed to maintain the proper indoor growing environment.

The experiments that would be conducted would be to test the feasibility of these two separate growing ranges. For the solar greenhouse, the first question would be to see if the growing environment is lessened by the solar panels. It just might not be possible to grow a light demanding crop like tomatoes in one of these structures. In addition to this a good comparison would be to see the economic values of these two different energy sources. Ideally the solar greenhouse would work and produce enough electricity to supply all of the supplemental lighting requirements and thus saving the facility a lot of money. Also, the long-term outlook of these two systems would be looked at to see which is going to be most cost effective. This is something that would need to be looked at anywhere from three to five years, or as long as it takes one of the systems to make money or to show that it is not feasible.

A production schedule for this type of tomato production would follow this type of system. Tomato seeds would be planted into rockwool plugs. They would be kept in a germination inducing environment consisting of 25-26^{o} C at 75-80% relative humidity and

receiving 160 W/m^2 of supplemental light from 400 W high pressure sodium lights for 16 hours/day (Barkley, 2007). In addition to this CO_2 fertilization would be used at 800-1000 ppm (Barkley, 2007). When the first true leaves appear, the first transplanting would occur. This is done into rockwool cubes. All factors from before would remain constant. Roughly five to six weeks after seeding the second transplanting would occur (Barkley, 2007). At this point the seedlings are taken into the actual production greenhouse and the rockwool cubes are placed on rockwool slabs with two plants per slab. This is where the plants will remain. The plants should be receiving the feed solution seven times each day with each irrigation event being about 20 ml for a total of roughly 200 ml/day (Barkley, 2007). Once the plants have been established the remaining task is to constantly be pruning them. The plants should be pruned to four fruits/truss. The recommended ratio is about 20-25 fruit:20 leaves (Barkley, 2007). All lateral shoots are removed. As the plants grow a canopy height of 2.5 meters should be maintained, with the vines being lowered as necessary (Barkley, 2007). With this method the lowest fruit should be that which will be harvested soonest. Fruit is harvested as it starts to show an orange-yellow color. As is common practice in these types of production facilities, bumblebees will be used to ensure pollination of the flowers. This production schedule was derived from a website from the Government of Alberta Canada entitled Commercial Greenhouse Tomato Production (web address?). This website discussed producing tomatoes with sawdust bags as opposed to rockwool slabs, but most of the other literature that I found referenced rockwool slabs.

Again this production facility would operate until it became clear which of the two treatments seemed more feasible in the long run to be a successful tomato production facility. Not only successful in terms of monetary value but sustainability as well. I see this taking anywhere from three to five years which is about four to six crops seeing as the life of a single

vine can be up to or more than a year.

The Netherlands Agricultural Statistics (C.B.S., 2008)[1]

Table 1: Area of horticulturally cultivated land (ha) according to land utilization in The Netherlands. (C.B.S., 2007)

Open Ground	Under Glass
81,350	10,374

Table 2: Agricultural holdings by province and type in The Netherlands. (C.B.S., 2007)

	Open Ground	Under Glass	Open Ground and/or Under Glass
Groningen	175	70	215
Friesland	142	66	179
Drenthe	247	118	323
Overijssel	313	134	376
Flevoland	486	101	568
Gelderland	1,829	839	2,284
Utrecht	365	125	425
Noord-Holland	1,720	960	2,224
Zuid-Holland	2,027	3,263	4,365
Zeeland	672	124	731
Nord Brabant	2,659	1,042	3,118
Limburg	1,301	557	1,652

Table 3: Area (ha) under horticultural crops by type in The Netherlands. (C.B.S., 2007)

Vegetables	Area
- Open Ground	24,415

[1] All data from the Centraal Bureau voor de Statistiek 2008 compilation of land utilization and statistics for The Netherlands in 2007.

- Under Glass	4,571
Fruit	
- Open Ground	18,981
- Under Glass	61
Flowers	23,655
Floricultural Crops	
- Open Ground	2,573
- Under Glass	5,327
Nursery Crops	
- Open Ground	14,937
- Under Glass	416
Horticultural Seeds	
- Vegetable	520
- Flower	391

Table 4: Area (ha) of vegetables in the open by crop in The Netherlands. (C.B.S., 2007)

Strawberries	2,964
Asparagus	2,383
Cauliflower	2,633
Leeks	3,063
Brussel Sprouts	3,352
Strain Beans	68
Other Vegetables	4,813

Table 5: Production of fresh vegetables by crop in The Netherlands. (1,000 ton)(only those above 100). (C.B.S., 2007)

Cucumbers	430
Mushrooms	240
White Cabbage	137
Paprika	320
Leeks	114
Tomatoes	685
Apples	391
Pears	260

Table 6: Area (ha) of flower bulbs by crop in The Netherlands. (C.B.S., 2007)

Hyacinth	1,329
Tulip	10,740
Daffodil	1,773
Crocus	505
Gladiola	1,387
Lily	5,009
Iris	392

Table 7: Area (ha) with floricultural crops under glass in The Netherlands. (C.B.S., 2007)

Alstroemeria	93
Carnation	32
Anthurium	120
Chrysanthemum	566
Freesia	155
Gerbera	206
Lily	220

Orchid	240
Rose	652

Table 8: Exports of horticultural products by crop and destination for The Netherlands (million Euro). (C.B.S., 2007)

	Horticultural Seeds	Ornamental Plants	Vegetables	Fruits, Nuts, Spices	Processed Potatoes, Vegetables, Fruits
France	40.5	930.0	178.6	243.6	531.5
Belgium/Luxem-Bourg	20.8	334.9	221.8	251.6	257.5
Germany	64.9	2057.4	1555.7	913.3	901.1
United Kingdom	50.3	1218.5	720.1	297.5	717.3
Italy	66.0	457.6	90.7	74.0	108.7
Ireland	1.7	101.6	74.4	38.3	65.5
Denmark	4.2	205.9	93.5	82.4	63.4
Greece	6.9	46.0	23.1	17.9	32.2
Portugal	1.2	66.8	3.6	9.0	22.9
Spain	96.4	178.2	54.0	95.6	122.0
Sweden	4.2	168.5	185.3	135.1	131.2
Finland	3.7	54.0	51.0	55.0	37.7
Austria	4.5	188.8	37.6	55.0	60.8
Estonia	0.4	10.5	9.3	11.1	2.8
Latvia	0.6	17.2	11.8	12.1	1.3
Lithuania	0.7	14.4	14.8	19.5	2.2

Poland	24.6	162.3	58.1	93.5	75.8
Czech Republic	2.1	65.5	72.3	39.3	29.4
Slovakia	1.1	18.2	9.4	7.1	4.6
Hungary	10.8	55.4	12.7	11.1	13.0
Slovenia	1.7	20.0	5.5	4.5	2.5
Cyprus	0.4	8.0	3.2	2.6	3.1
Malta	0.8	1.6	2.7	4.0	1.9

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