



Ministry of Foreign Affairs

# Horticulture in Côte d'Ivoire

*Opportunities for Dutch Businesses*

*Commissioned by the Netherlands Enterprise Agency*

*>> Sustainable. Agricultural. Innovative.  
International.*

# Horticulture in Côte d'Ivoire

## Opportunities for Dutch Businesses

by

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Commissioned by:

Netherlands Enterprise Agency (RVO)

Prepared by:



Zwijndrecht, June 2018

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Ir. Jan Arie Nugteren

Zwijndrecht, June 2018

## Executive summary

The horticulture sector of Côte d'Ivoire can best be described when divided into three sub-sectors:

1. Fruit and vegetable production for the local market
2. Fruit production for the export market
3. Ornamentals for the export market

1. The fruit and vegetable sector for the local market is characterized by a multitude of small farmers growing vegetables and fruits on a low technological level. Old varieties and extensive techniques are used. The markets are shattered, no cool chain is employed, other than at the supermarkets. Quality of the products is in general low. This forces high end supermarkets to import high quality fruits and vegetables from Morocco and France.

After more than 10 years of unrest, the country is booming again. Opportunities (business cases) for the Dutch Agro sector are multiple: high quality seeds, soil analysis services, plant protection products, good quality fertilizers are needed at the input side. Intensification practices can improve quality and yields per ha enormously and enhance the income of the farmers.

Two projects for support by the Dutch Government are proposed but many others seem possible too:

- common trial fields at different spots of Côte d'Ivoire where Dutch seed companies can showcase their improved vegetable varieties
- a demonstration project on intensification of the cropping system.

2. The Fruit Export Sector consists mainly of: banana, mango, pineapple, some minor products like papaya and miscellaneous fruits and vegetables. The banana sector is dominated by two companies of French origin who control the sector by vertical integration. Little opportunities exist in this banana sector. The mango exports are done by independent exporters from mostly medium sized farms. Only a few bigger ones exist. The main port of destination for mango is Rotterdam. Dutch companies are already active in sourcing but there is still room for more. The mango crop can be improved a lot. The main threat actually is the high number of notifications of phytosanitary interceptions in Europe of Quarantine organisms that can ultimately lead to an embargo for import into the (whole) European Union. Opportunities exist for highly specialized Dutch companies active in bio control of those organisms. A second problem is the capacity of the Port of Abidjan. Last year exporters have lost a lot of capital by congestion in the port. Cooling packing houses might partially help the individual exporter to wait until the last moment of shipping. Specialized Dutch companies have an opportunity in this field. Also an alternative, trucking the mangoes overland to The Netherlands, is being investigated. The first news about the port efficiency with the new (2018) mango export campaign is however less dramatic. Pineapple was a high volume export product from Côte d'Ivoire before 2000, but when the world changed to the MD2 variety, Côte d'Ivoire lost its position as it did not adapt itself fast enough to the new situation. Opportunities exist for Dutch importers of niche products (better tasting varieties) and organically grown pineapples which is currently done by two Dutch companies already. The papaya growers suffer from a virus called PRSV. New resistant/tolerant varieties have to be introduced, another opportunity for specialized Dutch companies. Exotic fruits and vegetables can be grown in Côte d'Ivoire and exported to Europe for the so-called 'Soul Food' market for European immigrants. Another business case.
4. The Ornamentals Export Sector includes ornamental flowers and greens as products. The climate in the South of Côte d'Ivoire is favorable for these tropical ornamentals. Before 2000 exports were going on, mainly to France. At the moment some export to The Netherlands is starting up. Some farms are bought by Dutch companies. This is a niche market so no large acreages like the flower cultivation in

Kenya can be expected but it can still contribute to employment and foreign currency coming into the country. Another business case for Dutch companies.

## 1. Introduction

Côte d'Ivoire has experienced some dark years but now, the country is booming again as it was before 2002. As has been the case since independence, agriculture is the core business of the country. Horticulture is an important part of the agricultural sector.

Although there always has been a strong French influence, Côte d'Ivoire and The Netherlands maintain long-lasting relationships. Actually, the main export product, cacao is mainly shipped to The Netherlands. Also for mango exports, the Netherlands is the main destination.

The Dutch government is interested in supporting developments in this revival. The horticultural sector of The Netherlands is leading world-wide in developing new technologies and efficient growing systems in horticulture. For example, the table tomato production in Holland is passing the magic frontier of 100 kg per square meter per crop. The Dutch Embassy in Abidjan and the RVO (Ministry of Economic Affairs) decided that a study on opportunities for the Dutch horticultural private sector in Côte d'Ivoire could contribute to the benefit of both countries.

In chapter 2 the methodology of the study is explained. The major organisations, international, governmental, non-governmental and cooperatives are briefly described in chapter 3. In chapter 4 the subsector of fruit and vegetable production for the local market is described. Some potential business cases for Dutch companies are elaborated on at the end of the chapter. The fruit production for the export market is described in chapter 5. Again, at the end of the chapter the opportunities and potential business cases for Dutch companies are proposed.

Some of those business opportunities might be supported by tools made available by the RVO (ministry of Economic Affairs of The Netherlands). As the number of programs operate by RVO are multiple and can be opened or closed, according to policy or funds available, those tools are not described in detail in this study. The website: <https://english.rvo.nl/> has an extensive description of all, up to date programs of support, subsidy or other support, that are open to businesses.

As an aid to Dutch companies who do already operate in Côte d'Ivoire or for those that are planning to do so, some Attachments are added to this report. Attachment 1 serves as a guide with some simple do's and don'ts for businessmen to do business in Côte d'Ivoire. Attachment 2 is a list of people who provided resources for this study.

Literature used and websites with actualised information of the horticultural sector are also added. Finally, acknowledgements are made for figures, photos and tables.

## 2. Methodology

The horticulture sector of Côte d'Ivoire, and other West African countries, is generally divided into three sub-sectors:

- Fruit and vegetable production for the local market
- Fruit production for the export market
- Ornamental production for the export market.

These three sub-sectors are defined because of big differences between them:

- Export versus local market
- Fruits and vegetables versus ornamentals

The technological level of the production for the local market is relatively low. For the export market this level is much higher and for the ornamental market it is in between.

The ornamental market is highly dependent on the international economic growth and the corresponding demand in the consumer countries, in this case Western Europe. Export crops like mangoes are also considered as a luxury product and can be consumed less in times of economic recession in Europe thus giving lower prices for the producers, but tropical ornamentals are the first products that customers stop buying in a recession. Local vegetables will always sell as everybody needs to eat, although there is also a segmentation in that sector.

Export market crops bring in most of the foreign currency into Côte d'Ivoire while the production for the local market is most important for employment of low level labour both in production as in local trading.

Data on these three production sectors are also very different when it comes to reliability. Export goes mainly to Europe and the surrounding countries. The EU figures on imports and exports are precise, reliable and up to date. Export figures within the West African region are less easy to acquire. Local production monitoring for the local market is even more complicated as sales are taking place on a lot of sites and levels. Production also takes place on a large quantity of small fields of which the acreages are not known, which makes production and yield figures unreliable.

There are no figures for ornamentals except some estimations. The reason is simply because it is (for the moment) a very small subsector.

This report is based on 4 pillars:

- National strategy of Côte d'Ivoire: 'Plan Directeur de l'Horticulture 2006 – 2025'
- Literature
- Visits to companies and institutions, both in Côte d'Ivoire as well as in The Netherlands
- Experience of the author

- 'Plan Directeur' (Government policy of Côte d'Ivoire)

The government policy of Côte d'Ivoire is very clearly described in this national plan, made by the ministries and departments involved. The main action points are:

- Transfer of the productive activities to the private sector;
- Training of every level of people involved in the sector;
- Installing appropriated irrigated areas for vegetable farming;
- Reviving the activities of knowledge transfer and practical research;
- Improvement of the commercial circuits;
- Promotion of the processing of primary products.

- Literature

Both from the classic literature the internet, information was gathered. A list will be added as appendix of this report. The basic problem when it comes to finding trustworthy production and trade figures is that during the last ten years, inside the country little reliable information was gathered because the country went through a period of instability. Some figures that are available are most of the time based on assumptions and extrapolations. Other literature sources are quoting these same assumptions and extrapolations. In general, older figures are more reliable. However, seeing the new spirit that is spreading, we expect that new figures will again be based on thorough field work in data collection.

For the export part of horticultural products to the EU, we were luckier as the 'Groenten Fruit Huis' made a selection of the European import and export figures concerning Côte d'Ivoire for us. A list of the used literature and websites has been added.

- [Visits to companies and institutions](#)

To get up to date on the situation in horticulture concerning Côte d'Ivoire, the country was visited two times. Also The Netherlands was visited two times. Companies and institutions were visited and interviews were made with key persons in the sector.

High ranking government officials, United Nations representatives, NGO employees, Dutch and Ivorian business people and last but not least, innovative farmers, were all very useful resources for this investigation.

At the SARA exposition in November 2017 in Abidjan, a lot of information was gathered both from the Dutch companies present as from stands from other countries (notably Morocco), Ivorian government institutions and NGO's.

In The Netherlands institutions and companies were also visited: both companies that are already working in Côte d'Ivoire as well as companies that might be interested to start doing so.

The list of consulted people from companies and institutions has been added as Annex 2.

- [The authors experience](#)

The first time the author set foot in Côte d'Ivoire was in 1983. After that first trip a lot of visits followed, mostly while being a resident expat in Mali, Senegal or Burkina Faso. The last 5 years, the author visited Côte d'Ivoire much more often being the marketing developer for West Africa for one of the Dutch vegetable seed companies.

For another job, the author recently visited Côte d'Ivoire again. The news about the ongoing export campaign of mango and also the last news of fruit processing is included in this report.

### 3. The organizational environment of fruit and vegetable production of Côte d'Ivoire

In Côte d'Ivoire there exist a large number of organizations (international, governmental and non-governmental including cooperatives) that stimulate fruit and vegetable production. The most important are mentioned in this chapter with their main activities and fields of intervention in the horticultural sector. Also cooperative organizations of producers are mentioned.

#### 3.1 International organizations

- [PARFACI \(French Development Cooperation\)](#)

Mainly irrigation activities in rural areas. These irrigated plots can also receive ownership titles which are normally not available in rural areas.

The association of farmers organizations ADCVI installs drip irrigation on demand for individual farmers or groups of farmers with the aim to intensify agriculture. Nearly all projects are in the vegetable sector.

- [FAO](#)

The FAO is also active in Côte d'Ivoire. The representative is in dire need of reliable figures on horticultural production in Côte d'Ivoire. These figures, normally the basis of decision making by governments and companies are either not available or, if available, extrapolations of earlier extrapolations. He explains the absence of these figures as being caused by the unrest of the last years and is hopeful that new, reliable figures will be published.

Agricultural programs financed by FAO include:

- HORTIVAR, the CNRA program on Horticulture as directed by Dr. Fondio
- SNDCV (mainly on manioc)
- PND (National Development Program)
- Agricultural production on wetlands

- [GIZ](#)

This German development organization is active in Côte d'Ivoire on various subjects. It started as a development organization of the German Government. Nowadays it is also open to collaboration with companies with the objective to improve the situation of the local population. Training 'out-grower' farmers is part of their business.

In the north (Ferkessedougou) a program to include small mango farmers into the Export Value Chain of a large company is ongoing.

- [IFDC \(International Fertilizer Development Center\)](#)

IFDC originated in the USA as a development organization for fertilizers. Today it executes agricultural development projects all over the world. In Côte d'Ivoire the organization was absent during the past period of political instability. Recently they are back and are executing development projects like 2Scale.

### 3.2 Governmental organizations

- [CNRA \(National Agricultural Research Department\)](#)

Apart from agricultural research, CNRA also develops, produces and commercializes new varieties of vegetables and other crops. This was done in other countries by governmental organizations as well but this activity has been abandoned a long time ago. Modern breeding techniques take huge investments in equipment and laboratories. Governments are rarely willing to make these investments. These activities are now left to the commercial sector instead of being performed by state or parastatal organizations. In the 'Plan Directeur' these activities are planned as well to be transferred to the private sector.

Useful research has been done on the hydroponics method of growing vegetables by Dr Lassina Fondio in the Bouake branch of CNRA.

- [ANADER](#)

This governmental organization is coordinating activities of donor organizations that aim to develop agricultural production by small farmers. On the horticultural side ANADER is supporting several ongoing projects.

- [FIRCA](#)

The FIRCA is a central government fund which is used to centralize different development funds designated for agricultural development. Programs of ANADER and other organizations are financed by the FIRCA.

- [OCPV \(Ministère du Commerce\)](#)

After several attempts to get information that is supposed to be gathered by the OCPV (wholesale market prices of vegetables and fruits) nothing seems to be available. The website of the OCPV is also not maintained so no information can be found there too. Probably the unrest during the last decade has disturbed the functioning of this department and many others in Côte d'Ivoire.

### 3.3 Non-governmental organizations and cooperatives

Reliable actualized figures on the numbers of cooperatives that are operational are not available. The number of participants is also not known.

In general, cooperatives have been misused a lot in West Africa for political reasons. Mismanagement of funds have further weakened the image of a cooperative in the perception of the farmers. Often development organizations prefer to work with cooperatives because it makes life simpler for them 'communication-wise'.

A large number of cooperatives exist in the cacao, coffee and cashew sectors. Fruit and vegetable growers are often more individualists. Only when it really pays off to organize themselves they are willing to do so.

In general, cooperatives that are really necessary for the lives of their members are viable. For instance, to run an irrigation scheme with a group of farmers, some kind of organization is inevitable. The central pumping installations, canalizations and filtration systems need maintenance on a daily basis and renewal at the end of their economic life. Watering schemes have to be respected between the farmers. Without some sort of an efficient association these irrigated schemes will fall apart and the future of the farmers with it.

Some sales cooperatives are functional. In some cases, the price of a product (e.g. tomato) is discussed by the presiding committee of the cooperative with the buyer and the production of all members is sold in one batch. In other cooperatives, the prices are discussed only centrally and sales are made individually between the members and the buyers.

Some recently started organizations of producers are:

- 'Interprofession de l'Oignon'  
An organization where members of the whole Value Chain of onion are represented: producers, input dealers, buyers, retailers, importers etc.
- 'Interprofession de la Mangue'  
An organization where all actors in the Value Chain of mango are represented. This association has been set up recently.
- OBAMCI (*Organisation des producteurs-exportateurs de Bananes, d'Ananas, de Mangues et autres fruits de Côte d'Ivoire*). This is a lobbying organization. Only the budget for lobbying at the EU in Brussels is considered to be more than EUR 300.000 annually.  
The biggest member of OBAMCI (by far) is SCB, market leader in banana production in Côte d'Ivoire. SCB is a company of the multinational; 'Compagnie Fruitière'. With the new chairman of OBAMCI, Mr. Gervais Kacou (former ambassador of Côte d'Ivoire in France and former minister of Foreign affairs of Côte d'Ivoire) the organization has won a lot in influence.

- OCAB (*Organisation Centrale des producteurs exportateurs d'Ananas et Bananes de Côte d'Ivoire*). This also a lobbying organization like OBAMCI. The other big banana producer of Côte d'Ivoire, Canavese, is member of OCAB.
- SCOPACI-SCOOPS is a successful organic pineapple export cooperative of small farmers around Bonoua. Pineapple exports from Côte d'Ivoire have been in decline the last decades. This group of pineapple farmers joined forces with a (Dutch) importer to export certified **organic** pineapple to The Netherlands. Without the cooperative this would not have been possible. The first reason is that certification is very expensive and can only be done for a large acreage. The second reason is that the Dutch importer cannot do business with a lot of individual small farmers. Coordination of the (constant) supply is also an issue. It helps that most members have the same ethnic background and are immigrants from Burkina Faso.
- ADCVI (*Association pour le Développement des Cultures Vivrières Intensives*). This association has been started as a Swiss financed NGO. The main activity is conceiving and constructing irrigation systems for small and medium farmers (mainly vegetable producers) and guiding the farmers into a more intensified production system. The association has installed irrigated schemes all over Côte d'Ivoire.

## 4. Fruit and vegetable production for the local market

### 4.1 Actual situation

Figures on cultivated area per crop and their production are gathered by the Ministry of Agriculture from Côte d'Ivoire. These figures are processed and published by the FAO. If figures are not available FAO proceeds by extrapolation of former year's figures.

These agricultural data from the FAO are given in table 4.1. The production and area cultivated increased between 2000 – 2016, sometimes even by 100 %, with an extraordinary growth in the case of dry chilies and peppers:

	Year 2000		Year 2016	
	Cultivated Area (ha)	Production (tonnes)	Cultivated Area (ha)	Production (tonnes)
Avocados	4.770,00	20.032,00	5.071,00	36.462,00
Beans, green	969	3.269,00	1.587,00	4.753,00
Chilies and peppers, dry	14.285,00	18.000,00	26.287,00	148.354,00
Chilies and peppers, green	4.004,00	23.257,00	4.013,00	26.942,00
Cucumbers and gherkins	3.883,00	16.245,00	4.806,00	21.216,00
Eggplants	4.941,00	63.667,00	17.628,00	93.328,00
Fruit, tropical fresh	30.791,00	44.105,00	38.664,00	48.113,00
Okra	39.643,00	92.685,00	41.035,00	112.966,00
Onions, shallots, green	719	5.132,00	828	7.699,00
Papayas	2.095,00	3.981,00	6.180,00	15.951,00
Pumpkins, squash and gourds	1.757,00	16.030,00	2.013,00	19.337,00
Tomatoes	2.331,00	23.026,00	2.839,00	29.037,00
Vegetables, fresh	11.771,00	95.887,00	17.332,00	142.768,00

Table 4.1: Cultivated area per crop and their production in Côte d'Ivoire

Source: FAOSTAT

#### **4.1.1 Producers**

Although the income situation in Côte d'Ivoire has improved there are still poor and vulnerable groups, living mainly around big cities. Those people are the cheap labor reservoir for the urban economies. They often don't own land but a lot of them produce vegetables on very small plots and sell them at the urban market via middle men. The money earned is mainly used to buy staple foods and pay the school fee for the children.

Why do these groups prefer vegetable production over other types of opportunities like the production of staple foods for the family? The reason often is that the access to those small plots, even housing plots where the construction works did not yet start, is expensive. To maximize profits, a very intensive production is needed with multiple harvests per year. Around Abidjan we see a high percentage of immigrants from Burkina Faso or the north of Côte d'Ivoire involved in vegetable production on small plots of land.

Further away from towns we also find vegetable production. Often on bigger plots and less intensive, but often still operated by people who are not the main land owners. Also in these areas the need to get high outputs from a given piece of land is the main objective. Fruits are also grown in between the vegetables and both are marketed to the same middle men.

So, vegetable growing is a way for the poor to make a decent living without too much access to land nor capital. The fast moving product cycles guarantee a continuous income. Men, women and children alike, are active in this production system. It's not rare to also find retired people active in this sector. Even when they get a pension, in West Africa it is only one salary in three months. Therefore, vegetable growing gives a welcome extra income to this small pension. Often these 'retired' farmers are open to new techniques as in their former jobs they became familiar with innovations.

Vegetable growing is a very commercial type of agriculture, much more than growing cereals or tubers as staple food in a traditional village setting. This is why vegetable growers are often very open to change if opportunities present themselves.

The demand for vegetables is rising. The upcoming middle class in Côte d'Ivoire wants to use more vegetables in the diet. This is why vegetable markets, especially in urban areas are growing fast.

A big issue in West African agriculture in general and in Côte d'Ivoire in particular, is the fact that more than one third of the farmers, involved in production for the local market in rural areas, is older than 50 years. A very large part of the adolescents tries to get a job in urban centers or wants to emigrate to Europe, but in fact these people are unemployed. This means that the food for the nation has to be produced by a small group of older people. In an interesting *Tedx Koulouba* talk, cineaste Inoussa Maïga stresses this situation.

In fact, the situation is even worse. When in a farmer's family there are two boys, the most intelligent one is sent to town to become something else than farmer. Often the extended family in the village 'invests' in intelligent boys by getting money together so they can go to

town to study. Later on this investment has to give ‘returns’ so there is a heavy social pressure on these young men to make money to pay their relatives back. The less gifted son becomes the new farmer. In genetics this phenomenon is called ‘negative genetic pressure on a population’. The girls will, in general not inherit the family farm, but a similar phenomenon exists.

So in short: the most entrepreneurial rural youngsters feel the urge to go to town, preferably, greater Abidjan and even better: Europe.

Mr. Akinwumi Adesina, former Federal Minister of Agriculture of Nigeria and current President of the African Development Bank Group stated: “*The future of African youth lies in agriculture, not Europe*”.

Therefore, it is very important to show that agriculture can be a very attractive sector for young, well trained and intelligent people. Horticulture is one of the most commercial agricultural activities where money can be made, either in production or in processing of the products.

Mr. Adesina also stated: “*Agriculture is not a way of life, is not a development activity, it's a business.*”

#### **4.1.2 Production zones**

Vegetables are produced in strategic zones. Hereby 2 factors are important:

- Distance to the market
- Climate

##### **4.1.2.1 Distance to the market**

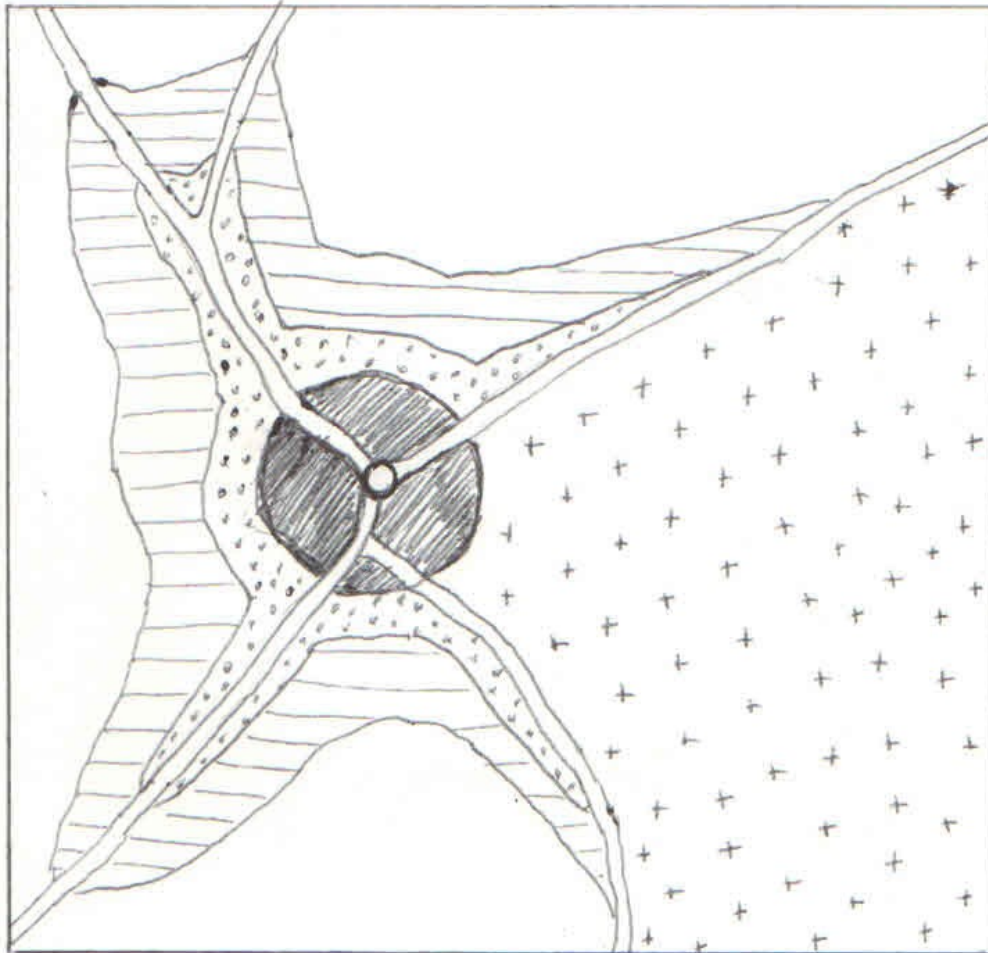
Already in 1826 Mr. Von Thünen, one of the first agronomists in the world, stated that there is a *stratification of production* in concentric rings around a town depending on shelf life of the products: the shorter the shelf life the nearer by the vegetable production has to be to the consumer’s market.






With modern transports, the original circles can be extended by areas at the sides of tarmac roads (See figure 4.1).

Nearly everywhere in West Africa, highly perishable vegetables like lettuce and other leafy vegetables are grown very close to town. An interesting example is that, at the end of runways of airports, you will always find them. Abidjan is no exception! The logic is that this is land, close to the market, but forbidden for building structures, so perfect for vegetables!

Further away, less perishable vegetables and often fruits are grown. Being close to a highway will speed up the development of these production areas. The new highway from Abidjan to Yamoussoukro and further to Bouake (see figure 4.2) will give an enormous boost

to the production of fruits and vegetables as transport prices will be lower which makes the 'fresh distance' to town lower.



-  City (vegetable production on non-used building plots: lettuce and herbs)
-  Leafy vegetables (perishable like lettuce and herbs)
-  Less perishable vegetables with longer shelf life (cabbage, tomato, pepper etc.)
-  No agriculture possible (e.g. for rocks or lack of irrigation)
-  Well transportable agricultural products (cabbage, onion, cereals, beans etc.)

*Figure 4.1: Concentric rings of vegetable cropping around urban centers in Africa (adapted from Von Thünen)*

Very good storable and transportable crops like onions can come from far away as Sahelian countries like Niger, Mali, Burkina Faso etc. The onions can be stored a while when dried correctly and trucks are driving off and on to take a big part of the harvest to the coastal urban areas of the richer, neighboring countries like Côte d'Ivoire. Transports of 1200 km are no exception.



Figure 4.2: Map of Côte d'Ivoire

Onions are even imported from The Netherlands.<sup>1</sup>

Watermelon, melon and zucchini are often imported from Burkina Faso by train and trucks.

<sup>1</sup> The preference of housewives in Abidjan when it comes to taste goes out to the '*djaba mizeni*', the shallot of Mali. Rough estimates are that per year around 40.000 tons of these shallots are imported in Côte d'Ivoire from Mali. The red onions, second choice, (mainly *Violet de Galmi*-variety, probably of Indian origin) come from Burkina Faso and, to a lesser extent, from Niger. Niger exports large quantities to the coastal areas of Nigeria, Benin, Togo and Ghana. The total export from Niger is estimated at 400.000 tons per year. The Dutch onions are cheaper, but are considered to be less tasty. The advantage of the Dutch exporters is that they start the import at the moment that local stocks are finished so prices are high, even when the taste is less appreciated.

#### 4.1.2.2 Climate

A second reason for producing vegetables in a certain zone is climate.

Côte d'Ivoire has several climate zones suitable for vegetable growing:

- A narrow coastal zone is more or less suited for 'European' vegetable growing during the dry seasons because of the temperate influence of the sea.
- More inland temperatures are higher and more suitable to tropical fruits and vegetables. During the rainy season vegetable growing can become difficult because of too heavy showers and high relative humidity, causing bacterial and fungus diseases. Less insect problems occur in this season.
- In the north with less rainfall, irrigation is needed. The relative humidity is lower and gives hence less problems with diseases, but pests can become a nuisance. In the cooler 'winter' period, onions and other 'European' vegetables can be grown here.

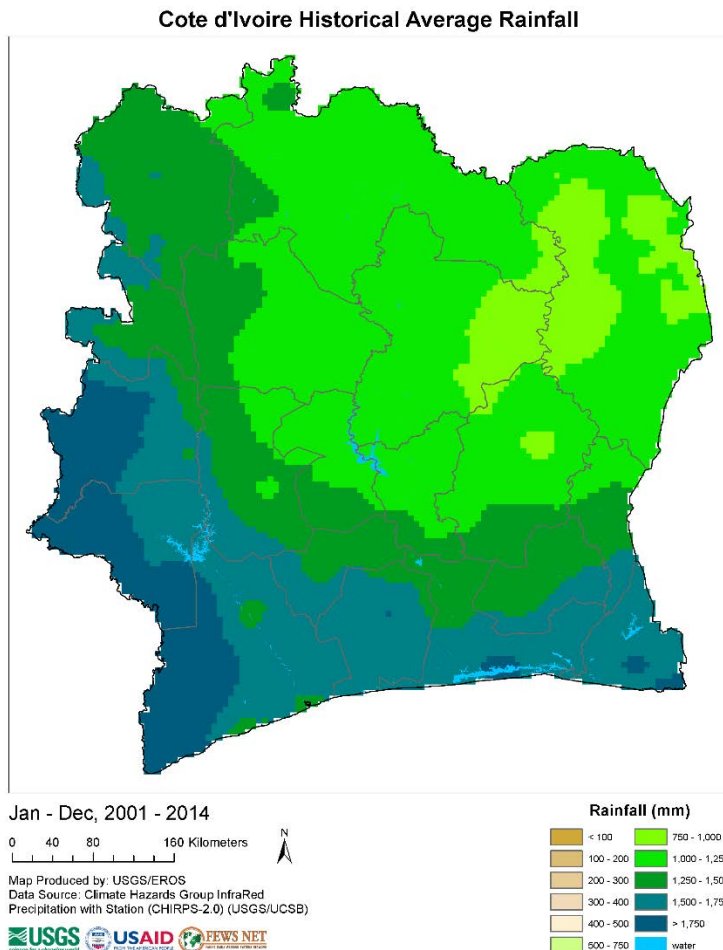


Figure 4.3: Rainfall (mm/year) in Côte d'Ivoire

Vegetables can roughly be divided into

1. so-called 'European' types (lettuce, onion, garlic, tomato, cabbage, carrot, string bean, cucumber, bell pepper, European eggplant etc.) which are grown in Africa at lower temperatures during 'winter' time and
2. tropical vegetables which require higher temperatures (African eggplant, chili pepper, okra, African leafy vegetables like bitter leaf, jute leaf, cowpea leaf, amaranth, hibiscus leaf etc.)

A lot of vegetables in Africa were introduced by colonial powers and hence of temperate or Mediterranean offspring. Growing these 'European' vegetables in the hot season (= 'off season'), will consequently lead to problems related to:

- Temperature (too high)
- Rain (too little, too much, not well distributed, too high relative humidity etc.)
- Pests and diseases (as a result of non-adapted varieties and adverse climatic conditions)
- Non-adapted genetics

Market prices are strongly linked to these seasons: in the 'off season' of 'European' vegetables sales prices are high because growing them is difficult and consequently yields (and quality) are lower. That is why the most entrepreneurial vegetable farmers always try to grow crops in the 'off season'.

Specially adapted varieties of 'European' vegetables can be grown under tropical, 'off season' circumstances with higher yields and quality and often resistances to diseases than the traditional Open Pollinated varieties. Dutch seed companies are in general very good at breeding these adapted (Hybrid) varieties. In chapter 4.2.3 a proposal is made to promote these adapted varieties (and other inputs) from Dutch companies.

#### **4.1.3 Markets**

The main markets for fruits and vegetables serving the local population are the urban centers of Côte d'Ivoire. There, the customers live who have (some) purchasing power. Also people live in very densely populated areas where they cannot cultivate their own vegetable plot, as is the norm in the countryside.

Although the figures are not very reliable, an estimated 90% of the fruits and vegetables produced for the local market are sold at farm gate by the farmer to the middlemen (or women), transported to towns and sold to wholesalers at certain large wholesale markets, mostly in the outskirts of towns.

Here the retail market women come to buy their supply for their daily sales in smaller markets downtown. These markets are highly seasonal. When products become rare and thus expensive they disappear from the market.<sup>2</sup>

The middle and higher class customers purchase their fruits and vegetables more and more in specialized shops and supermarkets. This sector is growing fast.<sup>3</sup>

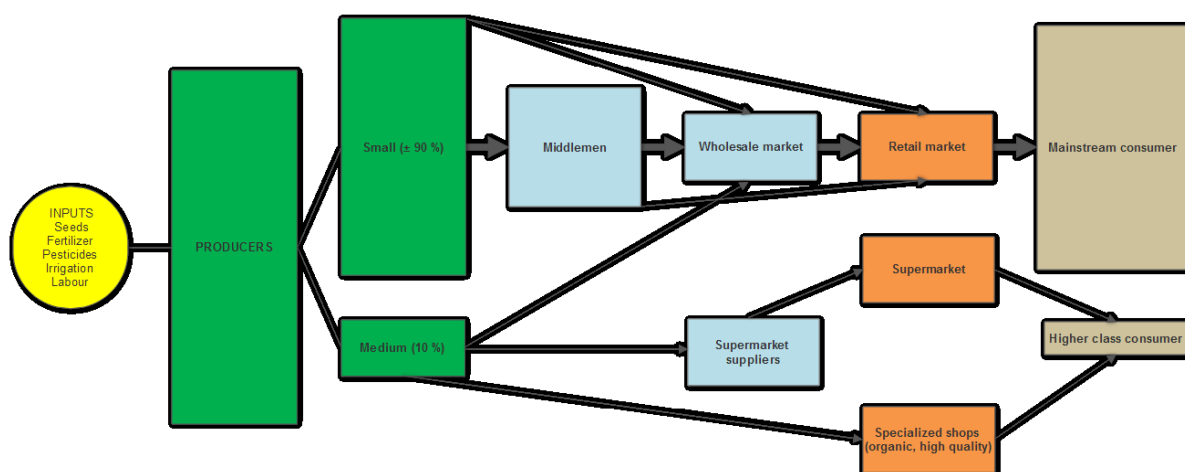


Figure 4.4: Value chain of the fruit and vegetable production for the local market

Companies in Côte d’Ivoire, like Prosuma, buy fruits and vegetables from local farmers and sell them to supermarkets (Casino excluded). Prosuma’s main problem is to ensure a constant availability of the same vegetables all year around, regardless of season. Buying fruits and vegetables from Morocco, South Africa or Europe is much easier as most products are available the whole year around (see table 4.2).

In supermarkets in Côte d’Ivoire we do see a lot of products from abroad at huge prices. Some 30 years ago these supermarkets were few and only frequented by expats but today the Côte d’Ivoire middle class is shopping there too and the number of supermarkets is growing fast.

The problems concerning the local fruit and vegetable production as conceived by Mr. Coulibaly, Junior Purchaser Fruits and Vegetables of Prosuma, are:

- As stated above: the seasonality of the supply of fruits and vegetables. He adds that access to irrigation (especially drip-) might contribute to longer availability and better

<sup>2</sup> African house wives prepare different dishes, according to the season and thus price of vegetables: peanut sauce with leafy vegetables can replace tomato based sauces. Also relatively cheap zucchini (mainly imported from Burkina Faso) can replace ‘European’ vegetables that have become too expensive.

<sup>3</sup> Not only because of better quality, but also because going to a marketplace is tiresome and time consuming. The modern, middle class woman combines the management of the kitchen with a job somewhere in town. These customers prefer also to have access to the same vegetables year around like in Europe.

quality of products in the market. The climate change that results in a less reliable rainfall in Côte d'Ivoire is also a good reason to become more independent from the rainfall. Compared to arable crops, vegetables can often not survive a few weeks of

Exporter country	product	2017 (until sept)	2016	2015	2014
<b>EU</b>	<b>total</b>	<b>18.516</b>	<b>20.206</b>	<b>26.985</b>	<b>16.870</b>
<b>Netherlands</b>	<b>total</b>	<b>13,389</b>	<b>14.353</b>	<b>20.684</b>	<b>12.513</b>
	onion	12,700	13,200	19,000	11,700
	carrots	734	939	766	764
<b>France</b>	<b>total</b>	<b>2,840</b>	<b>3,534</b>	<b>3,222</b>	<b>2,175</b>
	onions	590	901	522	249
	carrots	113	97	83	69
	apples	977	1,099	1,304	805
	Fresh vegetables	322	308	350	2014
<b>Belgium</b>	<b>total</b>	<b>1,540</b>	<b>1,369</b>	<b>1,874</b>	<b>849</b>
	onions	508	133	524	48
	carrots	981	1,205	1,283	779
<b>Italy</b>	<b>total</b>	<b>357</b>	<b>460</b>	<b>482</b>	<b>148</b>
<b>Spain</b>	<b>total</b>	<b>354</b>	<b>468</b>	<b>721</b>	<b>1,181</b>
<b>Grand total<sup>4</sup></b>		<b>19.245</b>	<b>35.492</b>	<b>48.877</b>	<b>30.383</b>

*Table 4.2: Export of Fruits and vegetables from EU countries to Côte d'Ivoire in thousand Euros Imports from other countries into Côte d'Ivoire are considerable (mainly tomato paste from China) but it is difficult to get an impression of the figures. Source: Eurostat*

lack of rain. He adds that the government should look for ways to finance drip irrigation for small fruit and vegetable farmers.

<sup>4</sup> Including other smaller export products and minor export countries

- The lack of adapted mechanization for vegetable farmers. In Asia small farmers have access to buy small two wheeled tractors with tools which enhance their productivity enormously. In Côte d'Ivoire paid labor becomes too expensive to be also used in low productivity activities. This calls for higher productivity of the farm and/or more mechanization and rationalization of the techniques used.
- The absence of classification of the product: nice and bad products of all colors and sizes are offered all mixed up.
- The danger of the non-controlled pesticides used by the farmers make clients hesitant buying them.<sup>5</sup>
- Transport and packaging is poor, resulting in high losses and quality loss of the remaining product.<sup>6</sup>

#### **4.1.4 Intensification of the production system: experiences in Côte d'Ivoire**

The need for high production levels on small fields becomes evident to keep down investment costs per unit of product. This brings us to the main theme of improving this sector: Intensification.

A development from extensive to intensive farming will give much more rationalness and profitability. With extensive farming, fertilizer and organic matter is 'diluted' so it is not effective. Weeds suppression becomes expensive and crop protection becomes difficult. Trellis to give better quality products becomes expensive when only a few kg of produce is hanging on it. Investments in irrigation and drainage systems become very expensive on a large field with low yields.

Some research and practical improvements have already been tried out in Côte d'Ivoire in order to intensify the production system. Five examples that exist in Côte d'Ivoire will be described here:

##### **1. Completely 'hors sol'**

In the south of Côte d'Ivoire, a lot of soil-borne diseases exist (bacteria, fungi and nematodes). One way of dealing with it is to use resistant varieties. Another way is to avoid

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<sup>5</sup> At the local market you may see bluish tomatoes being sold: they look like this because of the blue pesticide residue! Some middlemen see this as a positive aspect because it shows that the farmer has "preserved" his products well and shelf life will be good!

<sup>6</sup> In Burkina Faso the middle men (mainly women: 'Mama Benz') coming from Côte d'Ivoire distribute empty wooden boxes to have the farmer fill them up with tomatoes. In the past 35 years those boxes became slightly bigger every year while the price per box stayed the same. Arrived in Abidjan the bottom 20 cm is transformed into tomato paste!

working in the soil at all. Trials and small scale production of growing vegetables ‘hors sol’, as it is called in French, have been worked out in Côte d’Ivoire.

The work of Dr. Lassina Fondio, head of CNRA horticultural research division, is interesting. One of his systems is based on local available containers like empty water bottles. The bottles are filled with sterilised coconut peat, placed as a cascade structure on a rack and irrigated by a water solution with the exact nutrients that plants need for production. A small pump is running to have this solution run through the coco peat filled containers. As rain will dilute the feeding solution, the crop has to be placed under cover (Figure 4.5).

At the moment this system is still under research so the scale is still small. Results are promising and the used materials are cheap. However, the system will still be expensive to install at ‘farm’ scale. It also costs a lot of labour and wood for sterilisation when compared to soil based production systems. Other systems of hydroponics are under research featuring coconut peat in plastic bags and floating systems.



*Figure 4.5: A lettuce farm using the technology developed by Dr. Lassina Fondio, using discarded water bottles. Courtesy Dr. Fondio.*

There is a need of trying to find a ‘foolproof’ solution, because the fertilizer-water solution is constantly changing due to the uptake of nutrients by the plants on one hand and the water uptake and evapotranspiration etc. on the other hand. Too high concentrations of nutrients in the water will result in excess fertilizer and eventually plant burn, too low concentrations will lead to poor growth. Some type of permanent control by skilled labourers or an automated system to control the water solution is needed to avoid errors.



*Figure 4.6: An upscaled installation of Dr. Fondio's system. Courtesy Dr. Fondio.*

## **2. AgriFer/InnoFer**

AgriFer/InnoFer, a company owned by mr. Fer Weerheim is experimenting with a similar system. The difference is that he has a commercial company who sells the production systems. The company is already installing larger scale sites for their clients who are provided by the company with the necessary materials, seeds, tools and advice.

The results look promising, but the costs are still high compared to normal soil based cropping. Also, keeping up the attention of the farm workers on the crucial details involved in operating the equipment is not always easy.



*Figure 4.7: The AgriFer/InnoFer innovation system. Courtesy Fer Weerheijm.*

### **3. The local version: ‘greenhouse’ with ‘pasteurized’ soil in bags**

Several small farmers in the south of Côte d’Ivoire have developed their own way of ‘hors sol’. 90% of these very small farms grow tomatoes for the Abidjan market. This system is based on used fertilizer bags and other woven plastic bags filled with a mixture of soil, organic matter and fertilizer. This mixture has been wetted and heated for approximately half an hour on a hot, iron plate. Under this plate a wood fire is maintained. When cooled down the bags are filled and put on a black plastic sheet that covers the soil.

It is not very clear at what temperatures and for how long the heating is done. Often the farmers do not use a thermometer during the process. Sterilisation at 120 ° C is not to be expected without pressurized vessels so in reality there will be a sort of ‘pasteurisation’ taking place, which is not bad as the beneficial microorganisms can escape extinction. Often these farms are also covered with transparent plastic sheets to prevent the heavy rainfalls from washing out the nutrients and giving way to fungal and bacterial attacks.

However, Bacterial Speck (*Pseudomonas* spp.) is still observed a lot, even when plastic covers protect against rain. This is probably due to lack of air circulation causing a high relative humidity and high temperatures in the ‘greenhouse’.



*Figure 4.8: Bacterial Speck caused by Pseudomonas spp. Courtesy Mrs. Sirirat.*

The nursery is often made with available, recycled materials. One of the farmers had seed pots made of used plastic coffee cups that he collected somewhere in town:



*Figure 4.9: Used coffee cups in a nursery in a 'hors sol' small tomato farm. It is visible that the plastic roof sheet is starting to disintegrate by the UV radiation. Photo made by the author.*

The problems with this system are:

- Relatively high investments and recurrent costs.
- Not sustainable system: The plastic cover is decaying fast because UV resistant plastics are not readily available on the market. Even if they would be available, probably they wouldn't be used as they are much more expensive than simple plastic. This is not sustainable as the plastics are not recycled.<sup>7</sup>
- Labour intensive. Most of the work is done by hand: mixing the soil mixture, putting it on the hot plate, mixing it on the plate continuously, putting it in the bags and bring the bags into the 'greenhouse'. Labour is relatively cheap in Côte d'Ivoire, but not in the vicinity of Abidjan.
- Heating the soil mixture cost a lot of wood fuel.
- Roots from the crop don't always stay in the bag and creep through very small holes in the underlying plastic to grow into the underlying infected soil. This results in Bacterial Wilt (*Ralstonia solanacearum*) attack and death of the crop because the varieties used have no resistance against this disease.

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<sup>7</sup> In the systems promoted by CNRA and AgriFer probably UV-resistant plastics are used for covering the greenhouse. The reason is that their 'clients' dispose mostly of more capital and buy complete greenhouses.



*Figure 4.10: (Susceptible) tomato plants dying of Bacterial Wilt (*Ralstonia solanacearum*). Photo by Craig Rousell, LSU AgCenter*

- The plastic cover gets dirty and covered by moulds resulting in low light intensity and therefore causing very thin plants and low yields.
- The plastic cover keeps night temperatures high and thus cause very low pollination of the tomato flowers (no special high ‘heat set’ varieties are used), so few flowers turn into tomatoes. To ‘repair’ this problem, farmers are using plant hormones to get some a-sexual fruit setting. These fruits are much less tasty and are often deformed.

This shows how, finally, a ‘solution’ can become a problem! This system could be improved by using insect netting instead of plastic and plant varieties with good ‘heat set’ abilities and resistances against pathogens.

#### **4. The Asian alternative**

In Thailand, the Philippines and Indonesia the problems that we face today in Côte d’Ivoire were similar some 30 years ago: a lot of soil-borne diseases made vegetable growing very difficult. The low yields prohibited investments in better irrigation and other intensifying measures. With the development of new disease resistant varieties, it became possible to continue growing in the soil, but other parts of the system were also perfected. Especially water management nowadays is very well taken care of: raised beds, covered with plastic mulch protect the soil against too much water from heavy showers and drying out in periods of little rain. Underneath the plastic, drip lines are installed. In this way the crop can have

the right root humidity. The plastic can be recycled into plastic poles etc. when investing in recycling systems.

A young African farmer who started to grow tomatoes in the central region of Côte d'Ivoire on 5 ha. tried the Asian system. At first he had a big problem with Bacterial Wilt, but when he found a resistant variety (from a Dutch seed company!) this was solved.



*Figure 4.11: Young farmer proud to have extended his tomato cropping area over 100 ha in the Central Region of Côte d'Ivoire. Photo made by the author.*

After trying out several techniques and ways of mechanisation to make the beds, he got, for his environment, the right system and expanded into 17 ha. The business became successful and he is now growing more than 100 ha. of tomatoes, selling directly to Abidjan wholesalers (see figure 4.11)!<sup>8</sup>

Several Ivorian farmers tried out the Asian alternative successfully. The great advantage of this system when compared to 'hors sol' is that less investment, labour and wood fuel (for pasteurisation) is required. The disadvantage is that soil disease resistant varieties are needed.

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<sup>8</sup> He employs the best part of the youth of the neighbouring village. He himself is not at all from the region, which is often an advantage in West Africa. When you become an entrepreneur in-between your relatives you are considered to resolve all social problems of the clan, often resulting in employing a large part of the family not because they are capable workers but because they are family. He has very good relationships with the elders of the village and when the 100 ha became available, they offered it to him as they expected much more employment to keep the youth in the village.



*Figure 4.12: Another proud young African farmer shows his results with the Asian system to grow bell peppers in a high rainfall area. Photo made by the author.*

### **5. Organic vegetables cropping**

Organic growing of vegetables is a form of intensive farming. It recently started on a very small scale in Côte d'Ivoire. The upper class is often afraid of poisoning by eating fruits and vegetables produced by small farmers. They therefore prefer to eat 'organic', having also acquired the habit while living abroad. This is probably just a very small niche market with a limited number of possible customers.<sup>9</sup>

#### **Wrap-up**

In horticulture seldom only one solution is the right one. It is important to study several solutions to the problems to finally decide which elements could be used by whom and where. Finally, the individual farmer will choose, depending on his crops, his farm location, his investment power and the availability of resistant varieties, which system suits better.

The work aimed at developing a suitable hydroponic method for the circumstances in the south of Côte d'Ivoire is very interesting. Workable systems that can be used on a wider scale (Abidjan needs hundreds of truckloads of fresh vegetables per day!) are, however not

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<sup>9</sup> Organic growing in a humid tropical climate faces more difficult challenges than in Europe. The point of departure is also completely different. In Europe, fields that are transformed for organic production are in general saturated with fertilizer. To get this situation normalised the farmer has to grow for 3 years without using agrochemicals to get his field being accepted as 'organic'. In Africa it is often the other way around. Fields are often very poor in nutrients because of years of growing crops without much fertilizer. To get these soils fertile without the use of fertilizer is not easy.

yet available. More work has to be done, especially to make the system foolproof and (even) more affordable.

Moreover, a high tech way of growing vegetables cannot become a success when the farmers and farmhands involved are still barely educated people. Therefore, besides research on the system, also new educational programs, involving a lot of practical ‘hands on’ training as AgriFer/InnoFer and Dr. Fondio are doing, are important. East West Seed is training farmers in the use of the Asian system.

The ‘Local version’-system used in the south of Côte d’Ivoire does not look like a good system. Investment and running costs are high and yields are low. There are already some of these farmers who have abandoned this system.

The Asian system is also promising as it is soil based and therefore less laborious. This system is only possible when resistant or tolerant varieties to soil borne diseases are available. Several are already available at Dutch seed companies.

#### **4.1.5 Conclusions**

Fruits and vegetable growing in Côte d’Ivoire as a whole can be summarized as follows:

#### **SWOT**

##### **Strenghts**

- Good climate zones for commercial fruit and vegetable cropping for the local market
- Profitable activity for growers
- Employment for young and old in the whole value chain
- Motivated growers and entrepreneurs available
- Good access to urban markets
- Growing need for fruits and vegetables in the urban areas
- Fruit and vegetable consumption enhance the health of the population
- Ongoing research and practical trials to improve and intensify the existing production systems are already carried out on a small scale.

##### **Weaknesses**

- Scarcity of land in and near urban areas
- Climate change can give rise to unpredictable heavy showers or dry spells
- Poor soils
- Lack of access to soil laboratories
- Lack of special fertilizers adapted to horticulture
- Lack of more efficient irrigation and drainage systems
- Lack of affordable loans for investment Lack of agricultural knowledge and education
- Lack of cheap labor close to the consumption areas
- Lack of mechanization
- Handling and transport are suboptimal

- Road network not yet optimal, but improving a lot!

#### Opportunities

- Intensification: the use of improved seeds, specialized fertilizer, biocides, better techniques etc. on a smaller area is already being practiced and can be improved further on. This also offers opportunities for Dutch enterprises.
- Year round production esp. of 'European' vegetables
- Year round supply of good quality vegetables may replace imports
- Organic fruits and vegetables niche market
- Commercial vegetable growing is lucrative and creates employment.
- Offers opportunities for enterprising young people who are now focusing on emigration to Europe.

#### Threats

- Wrong and excessive use of biocides giving the local product a bad image.

## 4.2 Perspectives for horticulture and business opportunities for Dutch companies

### 4.2.1 General principles

Before starting with the recommendations some basic knowledge on horticultural processes and logic will be given here. This will help in understanding what improvements could be made and in which sectors, Dutch companies can become successful in Côte d'Ivoire.

Von Liebig's law of the minimum describes the way yields of crops can be improved. It states that growth is determined, not by the total amount of resources available, but by the scarcest resource (= limiting factor).

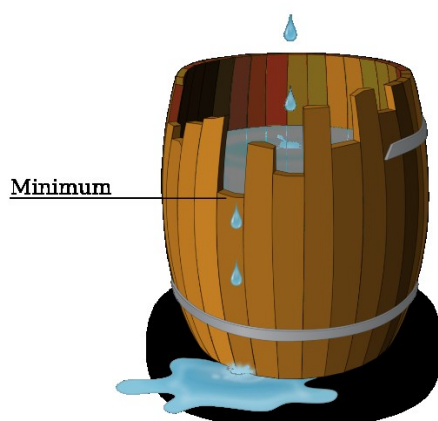
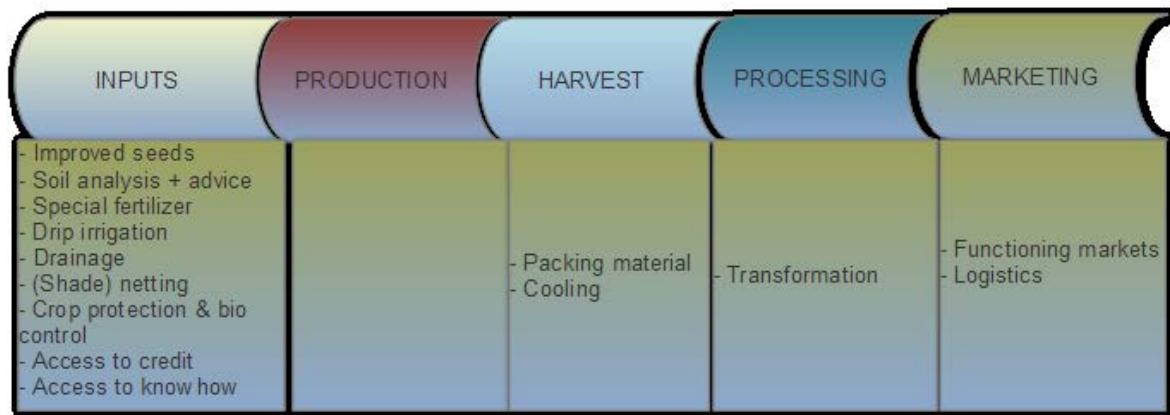


Figure 4.13: Von Liebig's barrel visualizing The Law of the Minimum

Von Liebig postulated that the production factors are like staves in a barrel. The amount of water in the barrel (= yield of the crop) depends on the lowest stave. With every improvement, another stave will become 'the minimum' determining the yield. By working on the most crucial factor, which is the limiting factor at that moment, yields can be improved (See figure 4.13). After that another factor has to be improved.

It is important to understand that to get a better production, various factors have to be worked on together. Just focusing on one factor like 'better seeds' does not make the difference when other factors are limiting the yield. Therefore, it is often necessary to work together with a group of (Dutch) companies from different disciplines to get a good result. Von Liebig focused on the soil fertility side of cropping, but actually one can see the whole process of growing and marketing in these terms.

The 'staves' or production factors, offering opportunities for Dutch companies, then are:



All production factors combined together in optimal form will ultimately result in intensified production systems. Two possible systems:

- Hydroponics or ‘hors sol’
- The Asian soil based production system

#### **4.2.2 Production factors**

##### **4.2.2.1 Genetics: improved seeds**

The Ivorian horticultural sector needs **better varieties** to develop the sector and solve some of its problems. It is striking that of the varieties used now, 90% are (very) old fashioned. These varieties often do not produce much because of e.g. the lack of resistances against pests and diseases. They are mostly Open Pollinated Varieties (OPV) which the farmers grow often from self-saved seeds. These seeds are weak and also often already infected with diseases.

OPV are often at the basis of ‘sustained poverty’ in the rural sector. These varieties have low potential (= low stave in Von Liebig’s barrel) and prevent the farmers from progressing, even when they are doing their utmost best in weeding, fertilizing, watering etc. Hybrids, apart from cabbage and some tomatoes, are rare to find in Côte d’Ivoire.

As explained before, the origin of most of these varieties is from Mediterranean climates, it is often only possible to grow them a few months per year. This results in very ‘sharp’ seasons which make Ivorian supermarkets prefer to buy vegetables from abroad.

The Dutch vegetable seed sector is leading, world-wide.<sup>10</sup> Often, the focus in Africa was on the ‘export vegetables’ aimed at Europe like string beans, but the last years, several Dutch seed companies have become interested in producing improved seeds for the vegetable market of West Africa itself. Côte d’Ivoire has been a very interesting market for a long time but because of the unrest most companies did little business in Côte d’Ivoire during the last 15 years.

Specific strong points of the Dutch vegetable seed industry are:

- Good seed quality (germination rate, purity of the variety, packaging etc.)
- Resistances to local diseases like (soil borne) bacteria, fungi, nematodes and viruses
- Adaptation to adverse weather conditions e.g. during the ‘off season’,
- High yielding varieties
- Uniform crops
- Earliness of the crop
- Longer shelf life
- Good taste and colour of the products

Dutch Vegetable Seed Companies		
name	website	activities
Rijk Zwaan	<a href="http://www.rijkszwaan.nl">www.rijkszwaan.nl</a>	High end market of vegetables. Present in Côte d’Ivoire.
Bakker brothers seeds	<a href="http://www.bakkerbrothers.nl">www.bakkerbrothers.nl</a>	Both OPV as Hybrid vegetable seeds. In West Africa mainly OPV. Well established in the Côte d’Ivoire market
East West Seeds	<a href="http://www.eastwestseed.com">www.eastwestseed.com</a>	High quality vegetable seeds for tropical conditions. active in Côte d’Ivoire
Pop Vriend Seeds	<a href="http://www.popvriendseeds.com">www.popvriendseeds.com</a>	Open-pollinated and hybrid seeds for all vegetables. For usage in Africa, Middle East and Eastern Europe
Bejo Seeds	<a href="http://www.bejo.nl">www.bejo.nl</a>	High end vegetable seeds, for Africa mainly Onion. In West Africa, active in Senegal.
Enza Zaden	<a href="http://www.enzazaden.nl">www.enzazaden.nl</a>	High end market of vegetable seeds.

*Table 4.3: Dutch vegetable seed companies specialized in breeding varieties adapted to tropical zones*

<sup>10</sup> The CNRA also tries to breed new varieties of tomato and other vegetable crops. This is difficult because the modern breeding techniques require large and costly laboratories and very specialized personnel and equipment. Therefore, the main problems, like soil borne diseases which are everywhere in Côte d’Ivoire cannot be addressed properly. All over the world it is actually recognized that breeding of commercial varieties is an activity that best can be done by breeding companies and not by government structures.

Often the originally Dutch companies are more and more becoming international. Research stations are operated globally. This is necessary to get feedback on newly developed varieties in various climates and markets. To get adapted varieties, breeding also has to take place in the areas where the projected market is. Sales are also world-wide. Also, the locally bred new varieties are often more adapted to local circumstances compared to varieties, conceived in other climatic and biotic environments.<sup>11</sup>

Objective trials are necessary to compare the improved varieties under Ivorian circumstances, because the only way to sell better varieties is to show them: 'seeing is believing'. These improved varieties are often more expensive than the ones that are currently used so the added value must show.

In the three main climate zones, there should be, in the middle of a vegetable farmer area, a test field where the different Dutch companies can show their varieties, compared to what is used locally. To avoid direct competition between the Dutch seed firms, it is recommended to use only numbers at the signs of the plots.

In chapter 4.2.3 a proposal is made to work together with several Dutch companies on seeds and other inputs to install and maintain those **demonstration plots**. A subsidy from RVO would encourage the companies in investing in this marketing tool.

#### 4.2.2.2 Soil fertility

Small farmers who produce for the local market don't have information on fertilization nor access to soil analysis and fertilization advice. In the past this service of sampling, soil analysis and fertilization advice was a governmental task.

In a country like Côte d'Ivoire with a large agricultural sector, there is room for Dutch companies to start operating **soil fertility laboratories** as commercial (joint) ventures in cooperation with local companies (fertilizer, pesticides and seed distributors).

In Côte d'Ivoire serious partners are available to investigate the possibilities with a Dutch partner company to start up soil analysis and advisory services.

An FDOV<sup>12</sup> subsidy request from one of the Dutch companies active in this field and a local partner company, can be successful if they fit into the criteria.

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<sup>11</sup> Of Bacterial Wilt alone, a very serious soil borne disease mainly in Solanaceous crops, there have been distinguished 4 different strains. This means that a BW resistant variety conceived in one area might not be resistant in another infected area. A remarkable detail: according to Prof. Dr. Daouda Kone of the Abidjan-Cocody University, there are certain areas in the South of Côte d'Ivoire where all 4 strains are present in the soil!

<sup>12</sup> Facility for Sustainable Entrepreneurship and Food Security. This is the last year of this program but probably another similar program will replace it.

The main Dutch companies, active in this market:

Dutch companies, active in soil analysis etc.		
Company	website	activities
Koch Bodemtechniek	www.kochbodemtechniek.nl	Both chemical and biological analysis of soil samples
Soiltech	www.soiltech.nl	Chemical analysis
Gaia Bodemonderzoek	www.gaiabodem.nl	Soil analysis for the organic farmer
Soil Cares	www.soilcares.com	New method of soil analysis via smart phone
Groen Agro Control	www.agrocontrol.nl	Chemical soil analysis, residue analysis and diagnostics of pests and diseases
Eurofins	eurofins-agro.com/nl	Chemical soil analysis, residue analysis and diagnostics of pests and diseases

Table 4.4: Dutch companies, active in soil analysis etc.

#### 4.2.2.3 Water: irrigation and drainage

We have already seen the need for (drip) irrigation and drainage if only to cope with climate change. Probably this market is not very interesting for Dutch enterprises as the Chinese companies offer much cheaper systems for irrigation. Nowadays the quality of this equipment is reasonable. Drainage on fields of small farmers consists mostly of growing the crops on raised beds and digging ditches to drain away the excess water.

For **large scale irrigation and drainage systems**, however, design and training is more complicated. Here there is still probably room for Dutch knowledge institutes or companies to provide their expertise.

#### 4.2.2.4 Light: (shade) netting

Some crops might need **shade netting** (in the north) or **netting against insects** (some insects like whitefly are vectors of serious virus diseases like *Tomato Yellow Leaf Curl Virus (TYLCV)*). Small net houses are very useful as nurseries, because if the plants are already infected by viruses in a young stage, there is little chance for a good yield. However, when plants are attacked at an older age there still is yield reduction, though much less than when attacked early. In Senegal, a lot of farmers, including small ones have a ‘net house nursery’.

Plastic covered greenhouses have been tried a lot (all over West Africa) but are seldom successful. It may be possible to adapt these greenhouse structures to provide shadow or insect netting. Here in Côte d’Ivoire an ornamental crop grower was interested to buy such a structure to support shade netting.

Greenhouse structures and netting material might become an interesting market but at the moment will still be small because of the high investment costs involved. When intensification increases, these innovative techniques will come within reach of a larger number of farmers.

#### 4.2.2.5 Crop protection and bio control

First of all, there is a need for a **diagnostic service** on pests and diseases. This service might be offered to farmers by soil fertility labs (see table 4.4.) or by agrochemical dealers.<sup>13</sup>

Secondly there is a need of **safe and effective pesticides**. Products from illegal imports are not safe and can become a hazard for both the farmer's as consumers' health. The pesticide imports in Côte d'Ivoire are mainly composed of Chinese substances. As a professional Dutch company it is very difficult to compete with these as the farmer has no tools to compare the quality. The prices of the Chinese products are also very low. This is not a viable market for Dutch companies.

Methods of **biological control**<sup>14</sup> and/or plant reinforcing micro-organisms like *Trichoderma* are very useful new developments. The latter can improve yields and create better resistant plants against pests and diseases. Dutch companies are generally very active in this market and can compete very well with competition.

Technical knowledge of actual agrochemical dealers has to be upgraded so that they are able to give proper advice to their clients. Sometimes a farmer is sold a pesticide against a fungus attack and vice versa, resulting in crop losses even when the farmer invests in pesticides. There is probably a role for NGO's here to train the agrochemical dealers and it stresses the need to have young educated farmers with technical know-how.

A list of Dutch companies active in biological control is given here below:

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<sup>13</sup> Occasionally quick tests for certain viruses, fungi and bacteria (Pocket Diagnostics ® or Agdia ®) can be sold if storing conditions are good. These quick tests have to be used by personnel who already have knowledge on pests and diseases and just want their suspect against a certain pathogen to be confirmed.

<sup>14</sup> It is interesting to see new initiatives of Koppert Biological Systems B.V. They reformulate their successful *Trichoderma*-mixtures into storable products for small farmers that can be stored outside the refrigerator. In this way these bio-stimulants may become available also to small farmers.

Dutch companies, active in biological control of pests and diseases		
Company	website	activities
Koppert Biological Systems	www.koppert.nl	Koppert is the world leader in biological crop support systems. Products include natural enemies of pests and diseases, plant reinforcing micro-organisms and pollination insects for fruit production. Koppert West Africa is based in Abidjan. (info@koppertwestafrica.com)
Greenguard	www.greenguard.nl	This company is specialized in the biological control of pests and diseases in lawns, parks and sports fields.
Raja Trading	www.rajatrading.nl	A company specialized in bio solutions for home gardening.
Pireco	www.pireco.nl	Plant reinforcing products for both the hobby sector and the commercial biological vegetable production. Focused on the Dutch market.
Hortipro	www.hortipro.net	Company producing biological solutions for the vegetable, fruit and recreational sectors.
Entocare	www.entocare.nl	Specialised in niche markets of biological control. Has even insects killing cockroaches!
Pronafit	www.pronafit.nl	Products based on garlic that chase away insects from crops.

Table 4.5: Dutch companies, active in biological control of pests and diseases

#### 4.2.2.6 Access to credit

Especially small farmers have no access to **credit facilities** to invest in their farm. This is a bottleneck that is general in West Africa. Bankers don't accept land as a collateral. This has to do with the non-transparent system of land tenure in rural areas. One of the problems is that land ownership is not yet formalized in the rural sector of Côte d'Ivoire. Both production for the local market as export crops are suffering from this. Of the commercial Dutch banks, only Rabobank has some experience in working with local banks in West Africa. The FMO has been participating in the Bank of Africa and Ecobank in order to obtain easier access to investment funds for small farmers.

#### 4.2.2.7 Access to know-how

In Côte d'Ivoire fruits and vegetable farmers who produce for the local market don't dispose of sufficient funds to procure professional advice like is done in the Netherlands. Therefore the necessary changes to intensify their cropping systems will still have to be introduced by non-commercial parties (governmental, NGO's, foundations etc.). So this doesn't offer opportunities for Dutch advisory firms.

#### 4.2.2.8 Harvest: packing material

After the harvest products have to be collected and transported to the urban areas. Often they are put in big bags or wooden boxes, resulting in high losses and quality reduction. Dutch companies could provide better, smaller boxes and other **packing material** to maintain the quality of the products. If Dutch companies are pricewise competing has to be found out. A company like Prosuma might be interested in better packing material because they need a higher quality than average for the supermarket chain.

#### 4.2.2.9 Cooling

For the **local market production**, at the moment, cooling would probably not pay back the costs. With the extra efforts of the government improving road transport, the need is higher for more resistant varieties and better packaging than cooling. However, as we see in Asia, some extra cooling at wholesale markets in urban centers (where space could be hired per day) could be profitable. In Abidjan this is not yet a reality, but developments might go fast with the current spirit of rebuilding the nation.

In the next table some (but not all), Dutch companies, active in the vegetable and fruit cooling industry are summarized:

Dutch companies, active in the fruit and vegetable cooling systems sector		
Company	website	activities
Celtic Cooling	<a href="http://www.celtic.nl">www.celtic.nl</a>	Worldwide cooling solutions for all climate control sectors. Also experts in Controlled Atmosphere for storage of fruits and vegetables. Also experts in Tissue Culture systems. In Mali they designed and built the Plaza Mango pre-cooling system for the Malinese mango exporters.
Cooling Systems Holland	<a href="http://www.coolingsystemsholland.nl">www.coolingsystemsholland.nl</a>	Design, building and maintenance of cool chain solutions in the fruit sector. Specialists in ripening systems of banana and mango.
Coolmark	<a href="http://www.coolmark.nl">www.coolmark.nl</a>	Supplier of refrigeration machinery and spare parts for cooling equipment. Web shop!
Heiden Systems Holland	<a href="http://www.heidensystems.com">www.heidensystems.com</a>	Cool systems, banana ripening systems and pre-cooling systems
Isolare	<a href="http://www.isolare.nl">www.isolare.nl</a>	Building cooling systems.

Table 4.6: Dutch companies active in the fruit and vegetable cooling systems sector

#### 4.2.2.10 Processing

In most West African countries, development agencies and governments have tried to start up tomato paste factories. Except for Senegal, where the conditions are positive for this industrial tomato crop, it has failed nearly everywhere. The reason for this is that the strategy is based on temporary overproduction of table tomatoes. These table tomato varieties are, however, not suited for a profitable tomato paste production (they contain too much water and not enough sugar). Also the periods of over-production are very short so the factory cannot be in use for a long campaign. Competition from Mediterranean and Asian countries is very strong because in their countries the paste production industry is highly mechanized and totally focused on good industrial varieties and long campaigns.

At most tomatoes can be dried on a household scale during a short period of overproduction. This activity doesn't offer opportunities for Dutch enterprises.

Processing of fruits for export is a promising activity. This will be treated in chapter 5, which covers export crops.

#### 4.2.2.11 Functioning markets

A non-functional market can make the financial result of a nice crop turn to nothing. Direct links between (groups of) farmers and supermarket suppliers might lead to a win-win situation. The quality of the product and a **reliable supply chain** will be an advantage for the supermarkets while a guaranteed sale of products against fixed prices is advantageous to the farmers.

Marketing strategies will help to make sales a success. The advantages of high quality vegetables can be stressed: health benefits, no toxic residues, better taste, better shelf life etc. And the products can be packed and displayed in an attractive way for the supermarkets.

A special niche market like '**organic**' might also be set up with an 'association of farmers' where some kind of product programming and purchase prices could be made. As long as production is aimed at the local market there are not much opportunities for Dutch companies, except for consultancy services.

#### 4.2.2.12 Logistics

The Ivorian Government is very active in building roads and bridges. The new highway between Abidjan and Yamoussoukro (at the moment extended to Bouake) is a very positive

contribution to the vegetable sector. Products can be transported on longer stretches at lower prices.<sup>15</sup>

#### **4.2.3 Demonstration plots: an opportunity for Dutch input companies to acquire publicity**

As proposed already in chapter 4.2.2.1, a demonstration should be set up to give a stage to the Dutch seed industry to showcase their improved varieties.

In a big country as Côte d'Ivoire, one demonstration site will not be representative for the different climate zones. Therefore at least three demonstration sites should be identified.

A very important issue is that these test fields should be producing the whole year around to show to Ivorian farmers and agri-business community that it is possible to do the same. Visits of farmers, but also extension officers, traders and officials from the area should be organised regularly to 'sow the seed of change' into the minds of all.

Again, in reference to Von Liebig's barrel, the rest of the production factors on these demo plots should be good. Not necessarily perfect, but the production factors have to be at such a level that the good genetic potential of the varieties can come out and be shown.



*Figure 4.14: Demonstration plots: discussing the results of “off season” variety trials in Benin. Farmers, input dealers and market ladies are present and give their opinion on the varieties. The author, to the left, representing three of the varieties, is getting the feedback that he needs. Photo courtesy: CADDUP NGO and IFDC/2Scale.*

<sup>15</sup> For the government it is difficult and risky to invest money on infrastructure. In the long run however, infrastructure is important for the wellbeing of the population.

Five Dutch seed companies have already been found interested to discuss this kind of cooperation. A project proposal can be made and proposed as an ‘Impact cluster project’ presented to RVO for extra financial support.

The testing conditions should be clearly defined before starting. Are we going to test in a hydroponic system or just in the field as 99% of the farmers do? The seed companies might have a preference for the environment that suits their varieties best. Probably both systems have to be chosen.

A possible consortium can be found in combining:

- Dutch seed companies
- A company (or the CNRA) specialized in hydroponics
- A company (or NGO) specialized in the ‘Asian’ system
- A biological control company (or foundation) to make lower pesticide use possible
- An irrigation party to set up and maintain the plots.
- An NGO to manage the funds, do the administration, supervise the personnel, pay their salary, organize the visits etc.

This proposal is probably interesting for a support from one of the RVO tools. For most aspects companies and organisations have been found to discuss this proposal. If the setup proves to be too complex, some smaller demonstration plots should be set up for partial demonstrations.

## 5. Fruit export sector

### 5.1 Introduction

The fruit export sector in Côte d'Ivoire is important as it generates foreign currency and employment. In general, this sector has received a blow during the recent years of unrest, but it is starting up strongly again. The world market for exotic fruits is growing fast. Côte d'Ivoire has an important advantage for the European market over Latin America because of its shorter distance to Europe.

Main features fruit export sector Côte d'Ivoire (2017)					
	Banana	Mango	Pineapple	Papaya	Miscellaneous fruits and vegetables <sup>16</sup>
Area of production in Côte d'Ivoire	South and Central	North	South and Central	South	Anywhere
Production scale of companies	Large	Medium Small	Medium Small	Small	Small
Ranking main export countries	1.France 2.Belgium 3.UK	1.Netherlands 2.Belgium 3.France 4.UK	1.France 2.Belgium 3.Netherlands 4.UK	France	Hardly any export yet

*Table 5.1: Main features of the fruit export sector in Côte d'Ivoire*

In May 2016, a thorough study of the export fruit sector of Ghana, Burkina Faso, Mali and Côte d'Ivoire has been published by RVO: 'West Africa Fruit – Scoping Study (by Joep van den Broek, Nerissa Apenteng-Sackey, Michiel Arnoldus, Salif Keita and Roland Waardenburg).

This study has summarized the main features of the export fruit sector in Côte d'Ivoire. This information is still valid at the beginning of 2018.

<sup>16</sup> Lower sales volume fruits and vegetables like: passion fruit, guava, jack fruit, bitter gourd, sponge gourd, bottle gourd, okra, bitter garden egg, hot pepper

## 5.2 Banana

The banana production and export is the main fruit business of Côte d'Ivoire. Banana is grown mainly in the coastal and central areas of Côte d'Ivoire. The value chain of bananas is organized as follows:

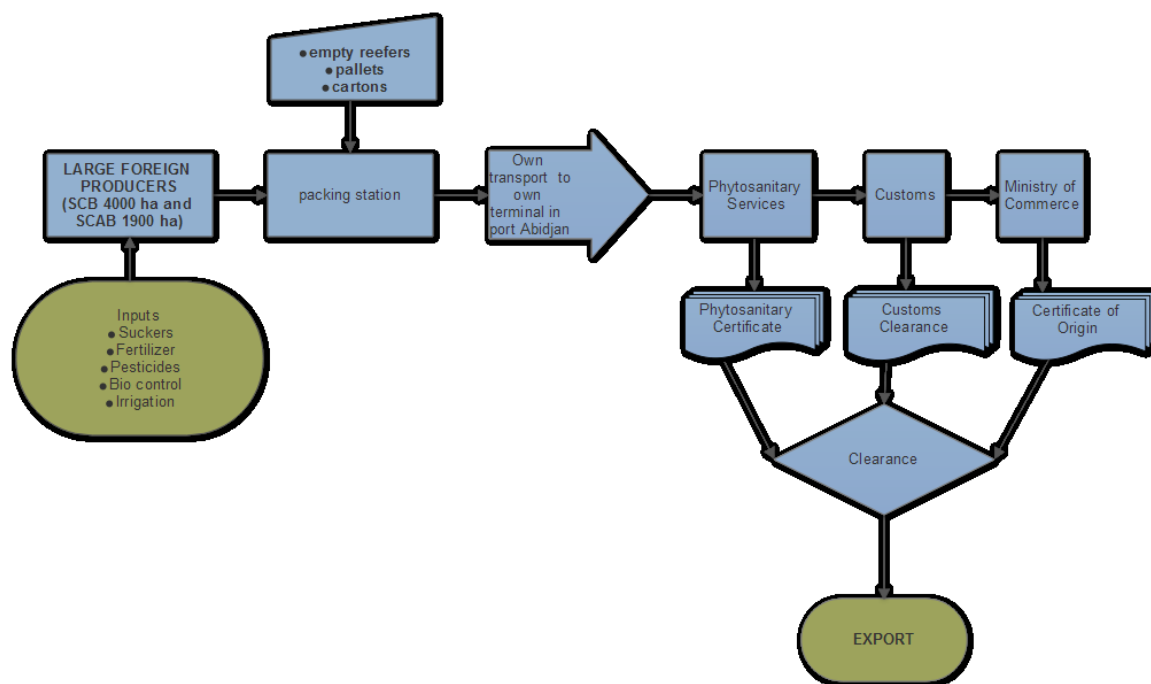


Figure 5.1: Banana production and export in Côte d'Ivoire

After the eighteen years of 'Banana wars' between Europe (with preferential customs tariffs for African bananas) and the Americas via the WTO, the production and market has changed considerably.

Latin America is the main competitor for the Côte d'Ivoire banana sector. Some changes that are observed lately is that the north American buyers try to protect their position in Latin America against European buyers. This makes the Côte d'Ivoire banana production more important for Europe. For EU-import data on bananas see table 5.2.

The export crop is grown on large plantations, owned by two French companies:

- SCB: mother company in France: 'Compagnie Fruitière'; exploits 4000 ha
- SCAB: mother company in France: Canavese; exploits 1900 ha.

Both companies have a large number of expat personnel and control the whole value chain: growing, packing, transport to port, loading on specialized vessels for transport to Europe.

Imports of bananas into the EU countries from Côte d'Ivoire in tons						
Country	2017 (until Sept.)	2017 prognostic	2016	2015	2014	2008
France	125.121	166.828	136.468	120.234	126.861	
Belgium	62.032	82.709	99.745	88.794	81.052	
UK	56.227	74.969	43.247	40.893	37.724	
Netherlands	0	0	40	0	0	
<b>total EU</b>	<b>243.380</b>	<b>324.507</b>	<b>279.500</b>	<b>249.921</b>	<b>245.637</b>	<b>355.000</b>

*Table 5.2: Imports of bananas into the EU countries from Côte d'Ivoire in tons  
Source: 'Groenten Fruit Huis', Zoetermeer. 2008 data from Van den Broek et al (2016)*



*Figure 5.2: Banana plantation close to Dabou, at 45 km from Abidjan*



*Figure 5.3: Banana conditioning close to Dabou, at 45 km from Abidjan.*

As being dependent on one crop is a big hazard, the large French companies are trying to diversify. Large trials with sweet corn (for the Dutch market) have been undertaken by SCB without promising results. Attempts of SCB to diversify with pineapple were also not very successful. SCB has become involved into mango export from the north which has turned out to be more profitable.

The port of Rotterdam does not play a significant role in bananas while it has a leading position in other fruits import.<sup>17</sup> The Antwerp harbor specialized into this business in the nineties of the last century, taking nearly all banana business from Rotterdam. While the biggest banana import ports of the EU, Hamburg and Antwerp are getting less West African bananas the last years, imports via Rotterdam are on the rise again. Most West African bananas however, are offloaded in French harbors, probably because of the French domination on Ivorian banana. At the moment, in Côte d'Ivoire the whole chain is French so for a 'foreigner' it might be difficult to penetrate.

## SWOT

### Strengths

- Vertical, top down, organized value chain (from farm to arrival port in Europe) assuring a good quality and profitability.
- Côte d'Ivoire is 2000 km from Europe. Latin America is at least 5000 km from Europe.
- US based multinationals try to monopolize the Latin American market, making it more difficult for European importers to procure bananas from Latin America.

### Weaknesses

- The civil war in Côte d'Ivoire has negatively influenced the production, economy, investment and export of bananas since 2009.
- Replanting is necessary every four to nine years in Côte d'Ivoire due to less fertile soils and erratic rainfall. In Ecuador and Costa Rica this is only needed every 25 years.
- Production and transport costs went up in Côte d'Ivoire, much faster than in Latin America in the last 30 years.
- Inland transport was difficult in the last years, also because of infrastructure damage during the civil war. Lately a lot of progress has been made in the road quality.
- There is no processing industry for bananas. However, there is a growing market for banana powder and banana chips in the EU and USA.
- Due to the domination of the banana export market by *Compagnie Fruitière* and *Canavese*, Côte d'Ivoire is mainly exporting to France. Exports to the 2 main importers of banana in the EU, Germany and Belgium, have diminished by 66 %.

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<sup>17</sup> This has to do with the way stowing the bananas, still mainly in bulk ships while other fruits come in reefer containers.

- Phytosanitary inspections in the port of Abidjan can take a long time (up to 72 hours instead of the stipulated 24 hours) and are not necessarily effective.
- Congestion in the Port of Abidjan. The (two big) banana companies can use their weight to get preferential treatment when loading the bananas. Being plugged into the network of French expats helps since even the port is managed by a French company.
- Lack of Ivorian and foreign investment capital for the national banana industry.

### Opportunities

- The Eastern European and Russian markets for banana are growing fast with tariff advantages for both. Trade within the *Union Économique et Monétaire Ouest-Africaine* (UEMOA) is tariff free. Within the West African zone, there might be a preference for Ivorian bananas because of better handling in the packing house, resulting in better quality. All these markets offer opportunities. Dutch trading companies are strongly present in the Russian and Eastern European markets.
- Bananas can be grown year around in Côte d'Ivoire which is an advantage compared to countries where traditionally it can only be grown during the rainy season.
- Drip irrigation can help banana plantations to overcome drought periods which appear to occur more frequently with climate change. It does require very high investments.
- A good drainage system will help to drain excess water caused by incidental very heavy rainfall, another aspect of climate change.
- Companies are looking into installation of plantations more to the north into Côte d'Ivoire where the rainfall is less, less drainage is needed and there are less problems with harmful fungal diseases.
- Growing bananas up north creates a possibility for organically certified banana production since less fungus attacks can be expected. This is a niche market where other parties than the traditional ones, might come in.
- Small and sometimes red colored 'African bananas' exist. They have a better taste than the mainstream bananas. They have a much shorter shelf life but may be interesting as 'specialty' products for sales in the higher segment of supermarkets or special fruit and vegetable shops in Europe.
- New highways are under construction. Together with the new bridge in Abidjan this is improving the logistic situation a lot. However, there is still a lot to be done.

### Threats

- With the apparent climate change, rains are less regular. Periods of drought are alternated by heavy rains. Both phenomena come with problems.
- The occurrence of pests and diseases<sup>18</sup> form a threat to banana production in Côte d'Ivoire.

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<sup>18</sup> Notably the fungi *Mycosphaerella fijensis* and *Colletotrichum musae* and harmful bacteria like *Ralstonia solanacearum* and *Xanthomonas campestris* will be a problem in zones with high rainfall. Also the *Cercospora* is a big problem in high rainfall-areas. The troublesome insect *Thrips* occurs mainly in drier zones.

- Production and transport costs need to be decreased. Otherwise, in time Côte d'Ivoire will not be competitive for the EU-market.
- Being dependent on one crop is a financial hazard.

### 5.3 Mango

Mango production is highly seasonal. This is why there is no real competition between the Asian, West African and Latin American mango growing areas. Large international fruit companies buy mangoes year around switching between different countries and continents depending on the period of the year. This is their solution to have mangoes the year around in the supermarkets that they serve. The main production is in Asia (see figure 5.4).

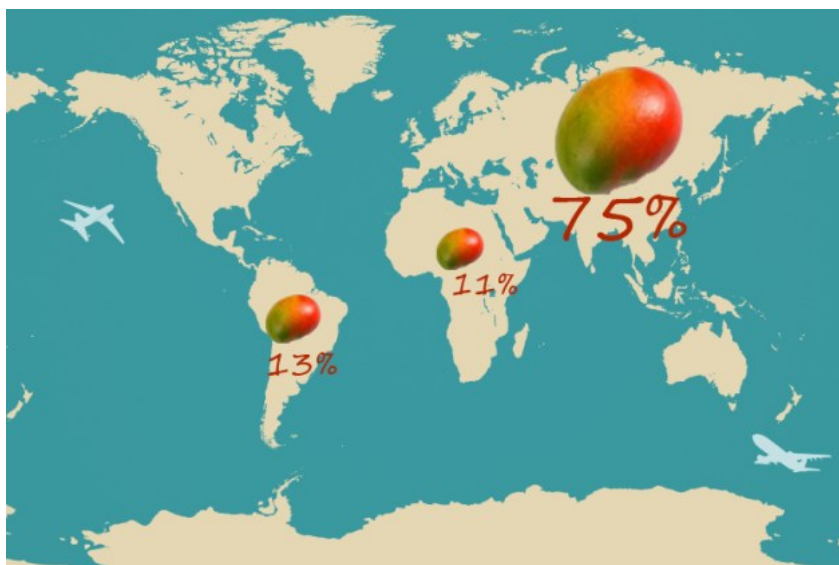


Figure 5.4: Distribution of mango production in the world

In the next figure 5.5 the origin of mangoes imported into The Netherlands is shown. The import from Côte d'Ivoire is limited to a short period: however, it is important because during May and June there is little available on the other international markets, notably Brazil and Peru:

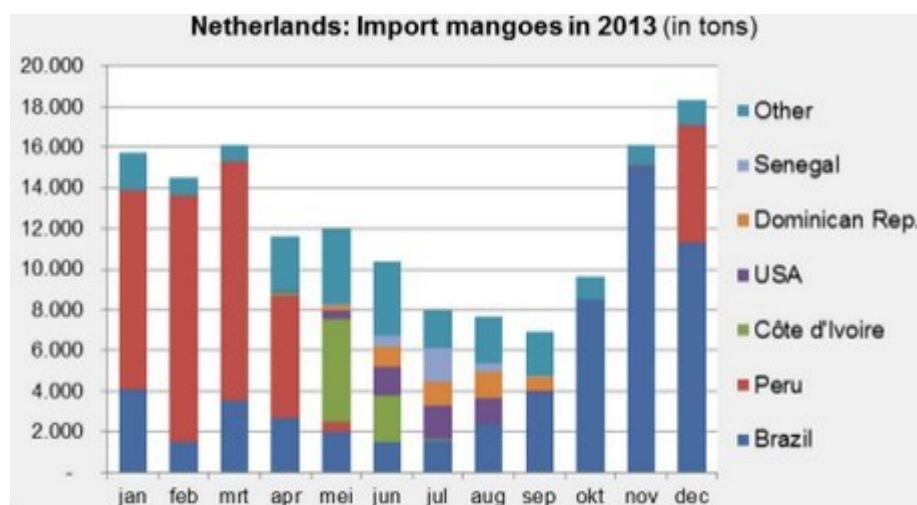


Figure 5.5: Import (tons/ha) and origin of mangoes imported in The Netherlands in 2013.

Source: [www.freshplaza.com](http://www.freshplaza.com)

It is striking that the consumption of mangoes is relatively high in the Netherlands when compared to other international consumers' markets (see figure 5.6):

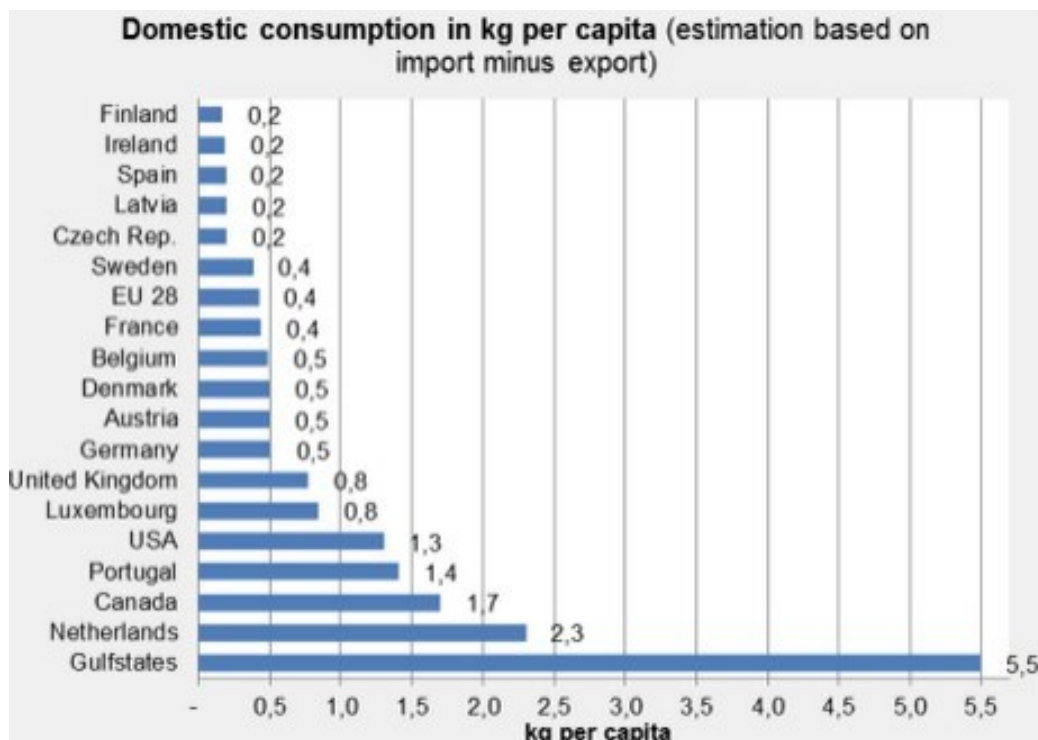


Figure 5.6: Domestic consumption per country in 2013

Source: [www.freshplaza.com](http://www.freshplaza.com)

Mango trees prefer drier areas than banana and pineapple. In fact, the Ivorian mango area is part of a greater growing area consisting of the north of Côte d'Ivoire, the south of Mali and south of Burkina Faso and the north of Ghana. The nature of the borders between those countries makes all statistics on production difficult. The 'pisteurs', small businessmen who go, buy and harvest the mangoes from medium size farmers (mostly between 5 and 20 ha per farmer) sell them to exporters at packing houses. The exact origin of those mangoes may be unknown, although the certification mentions a distinct place.

When the port of Abidjan is open, Malinese and Burkinabe mangoes are exported from Abidjan and might easily be calculated under Ivorian mangoes. When the country was in civil war, transports to Abidjan were sometimes difficult and Malinese exporters went through Dakar.

The production and marketing of mangoes is organized as follows:

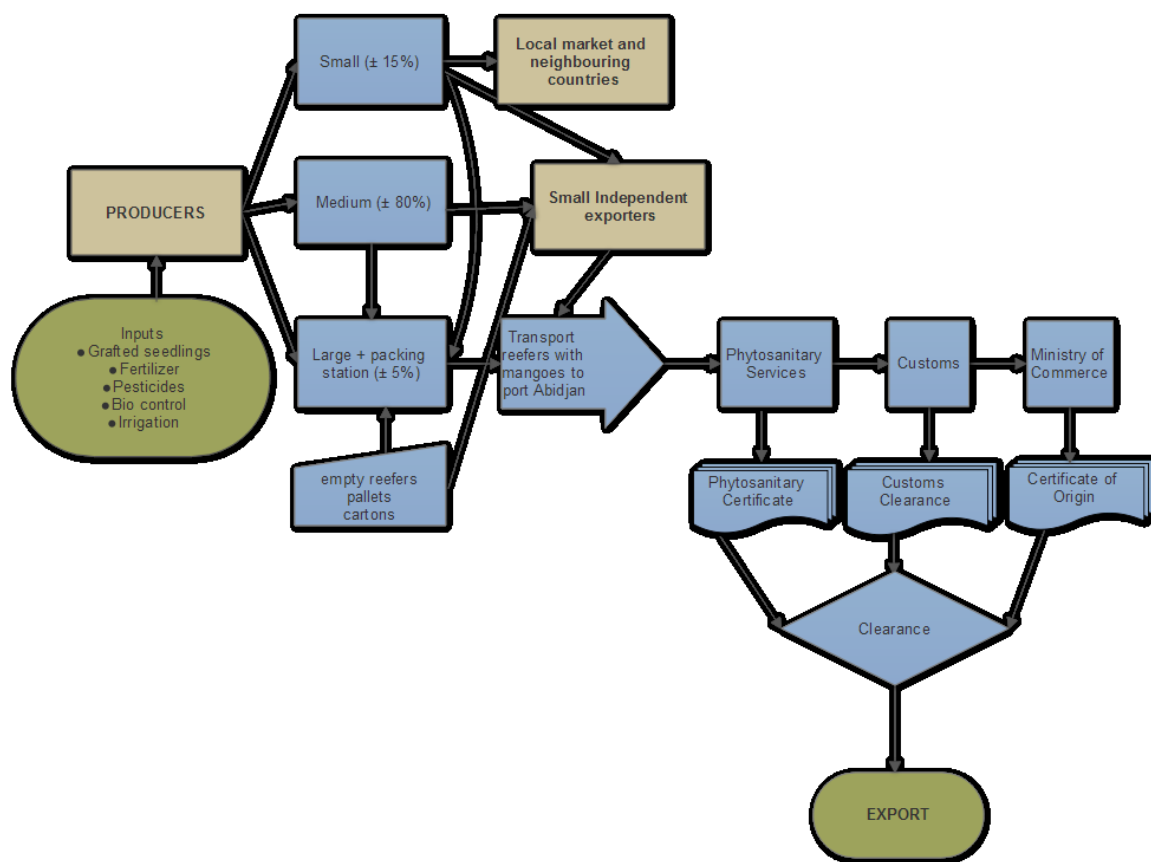


Figure 5.7: Mango production and export in Côte d'Ivoire.

A few larger growers like ‘Nembel Invest’ with 340 ha, export themselves. They often buy extra mangoes from surrounding smaller farmers. This can be a lucrative business to have a higher efficiency in the packing house, etc., but it can easily turn into a headache, when the situation in the port turns out in a disaster like in 2017.<sup>19</sup>

Mangoes are prone to pests and diseases. Some have Quarantine-status and are forbidden to enter into the EU. Interceptions made by phytosanitary services when these mangoes are entering the EU lead to notifications<sup>20</sup> which is not only a direct loss for the owner of the container (destruction is at the cost of the owner). When it happens too often, an embargo

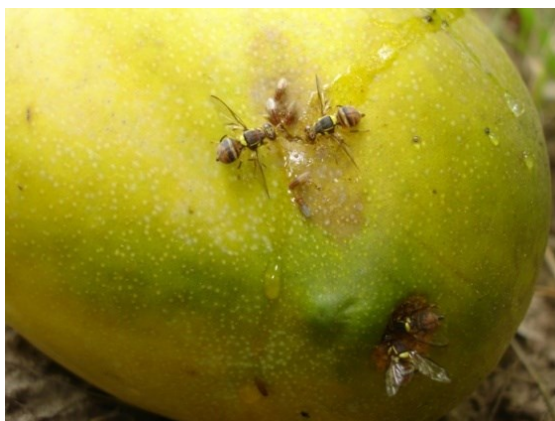
<sup>19</sup> Reefer containers with mangoes were delayed for long periods in the Port of Abidjan. Of the 6 portal cranes available for the container loading only 2 were operational in the middle of the mango season. Consequently, ships passed Abidjan because of long waiting time. This led to a shortage of empty reefer containers for export. The full containers that arrived in could not be branched to a power outlet which shortened the shelf life enormously. A large number of mangoes were lost. Some local exporters went close by bankruptcy.

<sup>20</sup> Farmers often over-react to these notifications by spraying more pesticides than accepted. They use types of insecticides that are prohibited in the EU. Often the timing of spraying is too late because the fruit fly and/or fruit weevil are already inside the fruit. Destruction of the container content because of excess pesticide residue is even more expensive because it will be destroyed as ‘chemical waste’, at the owners’ costs.

on Ivorian fruits into the EU is a realistic possibility. This happened to Ghana for the export of vegetables into the EU recently.

There are 3 Quarantine-organisms in mango that are not allowed to enter into the EU: specific fruit flies, mango stone weevil and a fungus, commonly called ‘anthracnose’.

Already in 2017, the number of “notifications” from the EU was frightening. The situation in the 2018 campaign is even worse. The Ministry of Agriculture was supposed to purchase pesticides and pheromones to combat the quarantine organisms but finally came through with the products very late and in non-sufficient quantities. Only two out of the sixty exporters of mango are at the necessary professional level to sort out infected fruits before export. At the end of April, beginning of May, 2018 the fruit fly and stone weevil infestation levels were sky high in the production level. Official data on interceptions in the EU are not yet known but the future is not shiny.



*Figure 5.8: Fruit flies on mango*



*Figure 5.9: Mango stone weevil damage.  
From: Verghese, Abraham & MA, Rashmi (2014)*



*Figure 5.10: Anthracnose damage in mango*

Very good biological control methods are available on the market to solve the problems. Koppert West Africa, a daughter company of the Dutch company Koppert Biological Systems is the world leader in this area of biological control and is doing business in mango protection in Côte d'Ivoire. Other companies, active in biological control are mentioned in table 5.7. It is also necessary to discuss the problem of the notifications with the farmers, show them the possibilities of biological control and enable them to buy the products.

Imports of mangoes into the EU countries from Côte d'Ivoire in tons				
Country	2017 (until Sept.)	2016	2015	2014
France	6.222	2.959	1.638	1.483
Belgium	6.495	4.704	4.051	5.424
UK	4.407	7.135	2.980	1.889
Netherlands	10.860	13.283	11.896	10.322
<b>Total EU</b>	<b>27.984</b>	<b>28.081</b>	<b>20.565</b>	<b>19.118</b>

*Table 5.3: Imports of mangoes into the EU countries from Côte d'Ivoire in tons  
From: 'Groenten Fruit Huis', Zoetermeer*

The 2017 logistic problems only harmed the exports to The Netherlands and the UK. Exports to Belgium and France were not affected. To the contrary, exports to Belgium were raised by 50% and to France by 100%. This could be because SCB is now also involved in the export of mangoes and they have a particular position in the port and their way of transport (self-owned ships) is different from the competitors.

Little is done with second and third grade mangoes. The second grade mangoes are sold at local and regional markets. Opportunities to export second grade mangoes to Morocco and Algeria should be investigated, possibly together with second grade banana and pineapple. Moroccan orange exporters bring their first grade products to Europe but decided, with success, to penetrate the markets of Senegal, Mali, Burkina Faso and also Côte d'Ivoire for second grade oranges.

Processing: mango drying is often still done at an artisanal scale with small solar dryers at village or cooperative level or at a semi-industrial scale. Lately new initiatives for mango processing are started on a more professional scale: Ultra frozen chunks, juices and concentrates.

Two major exporters who expect an embargo on export of fresh mangoes to the EU soon are investing already in processing equipment and training. In this way they hope to stay in business (the orchards will continue producing and the local markets are flooded already) and keep their trained personnel employed within the company throughout the embargo period.



Figure 5.11: Transformation of mango



Figure 5.12: Dried mango strips

## SWOT

### Strengths

- The climate is perfect for the production of mangoes.
- There are larger farms and existing trees with a very high production capacity.
- According to professionals, the taste of the West African mango is the best.
- Farmers are open minded to adopt new varieties when market demands it.
- Harvest occurs right into a time slot with less other suppliers on the world market.
- If all systems work, the shipping time is short so more mature mangoes can be picked without spoiling. This results in a better taste at destination.
- There are two factories that produce packaging material locally.

### Weaknesses

- Lack of affordable loans for investment for producers leading to low yields and low quality. Land ownership is not formalized in rural areas, so land cannot serve as collateral.
- Need for improvement in logistics. After the events of 2017, it could be interesting to find out if other parties than the actual one are more effective in running the port.
- Shortage of reefer containers. Particularly in the high season when Ivory Coast has a large mango volume, exporters struggle to obtain reefer containers. It is possible to have a pack house full of mangoes waiting for export, with no available containers. Exporters can then only re-sort, try to ship the best mangoes by plane, and sell the rest as second grade at a huge loss.
- Inland transport is expensive: transport of a 40 feet container from Ferkessedougou to Abidjan costs around € 2000, =. Current government has highly improved the infrastructure but a lot remains to be done.
- The mango season is very short due to lack of early varieties. Additionally, the problems with fruit flies and anthracnose are limiting the growing season.

- The control of pests and diseases is not yet effective, resulting in notifications by the EU phytosanitary authorities at arrival in Europe.
- Very little is done with second and third grade mangoes.
- Processing of mangoes (dried strips) is done but often still on a artisanal or semi-industrial scale.

### Opportunities

- Mango crop can be improved considerably. Only 30% of the mangoes on a tree are fit for export. Improving soil fertility, pruning and introduction of young stage drip irrigation will increase this percentage considerably. Some larger growers help their neighbors who have small orchards with technical support and access to export.
- The use of growth hormones or early varieties (e.g. *Tommy Atkins*) can increase the season by 1,5 months.
- Faster transport means could bring back the better tasting varieties into the market in Europe. All new plantations use the Kent variety because of its long shelf life. There are tastier mangoes with a shorter shelf life. Instead of testing varieties on the shelf life criterion alone, testing should also be done with taste panels to find premium varieties.
- One of the exporters is looking into the possibility of bringing the mangoes to The Netherlands by truck (itinerary: Côte d'Ivoire, Mali, Senegal, Mauritania, Morocco, Spain, France, Belgium, The Netherlands). This trucking method can use the empty trucks bringing second grade oranges and tangerines from Morocco to Senegal, Mali and Burkina Faso.
- Biological control of the pests and diseases of the crop (especially of the 3 EU Quarantine organisms) should be priority number one, to avoid an embargo for export to the EU. As the mango zone consists mainly of three countries (northern Côte d'Ivoire, southern Mali and southern Burkina Faso), a good solution has to be applied in all three countries together. This is a major opportunity for specialized Dutch companies who happen to be world leaders in their trade.
- There is more international demand than supply in the specific months that Côte d'Ivoire is on the market. Local and regional markets are also emerging, providing opportunities for increased export.
- Côte d'Ivoire is relatively close to Europe.
- There is a lack of cold storage facilities offering opportunities for investors.
- Little is done with second and third grade mangoes. Other African markets can be explored.
- Processing of mangoes is still at an artisanal or semi-industrial scale and can be improved to a more industrial scale resulting in higher uniform quality. Especially transformation into dried strips, juices and pulp are to be investigated professionally. There is a growing demand on dried mango in EU and its production pays off.

## Threats

- The inadequate control of pests and diseases in mango-production, resulting in notifications by the EU phytosanitary authorities might lead to an embargo.
- The inadequate logistics in the congested port.

## 5.4 Pineapple

Pineapple production and export in Côte d'Ivoire are organized as follows:

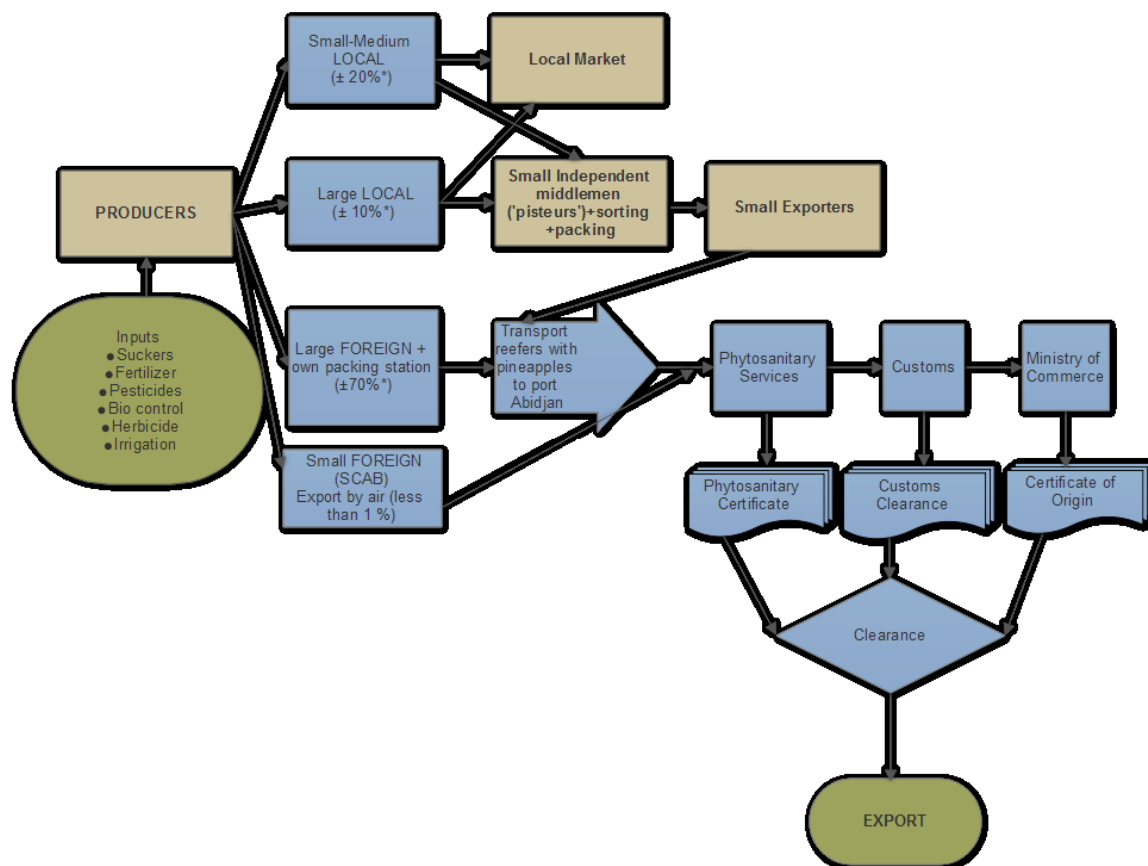


Figure 5.13: Production and export of pineapple in Côte d'Ivoire

The climate in the south of Côte d'Ivoire is very favorable for pineapple growing. It is grown year around. There are no important pests and diseases. Even small farmers have good yields and a low amount of second and third grades. It is an activity that pays off. The production is close to the port so inland transport costs are relatively low. Transport for export however is expensive and not very reliable: there is a long transit time, and the availability of containers during the mango season is limited<sup>21</sup>.

Pineapple exports reached 200.000 tons per year around the year 2000. Production and export dropped dramatically because of the introduction of the double sweet variety *MD2* in Latin America (see table 5.3). Currently only 22.000 tons is exported. The first company that

<sup>21</sup> A Dutch importer says that although the transport is less than half the distance compared to Latin America, the transport price is higher. This company imports organic certified pineapple from Côte d'Ivoire on a weekly basis but is now discussing the purchase price with the farmers, because it becomes difficult to compete with other importers in The Netherlands who source from Latin America.

got hold of the MD2-variety (SCB) burned all suckers<sup>22</sup> (side shoots) from the plantation to avoid other farmers getting access to this variety.

From importers in Europe we hear that the MD2 fruit quality of Costa Rica is superior to the MD2 from Côte d'Ivoire<sup>23</sup>. Probably because of the professionalism of the growers and/or better climatic factors. When the world market demanded the pineapple variety to change into MD2 the political unrest started in Côte d'Ivoire. This contributed to the drop in export and lack of investment to start up tissue culture labs contrary to other production areas in the world.

Imports of pineapple into the EU countries from Côte d'Ivoire in tons						
Country	2017 (until Sept.)	2017 prognostic	2016	2015	2014	2000
France	9.560	12.747	8.474	10.784	9.635	
Belgium	6.832	9.109	8.664	9.995	11.119	
UK	1.526	2.035	1.365	1.501	961	
Netherlands	2.646	3.528	2.235	1.438	736	
total EU	20.564	27.419	20.738	23.718	22.451	200.000

Table 5.4: Imports of pineapple into the EU countries from Côte d'Ivoire in tons  
From: 'Groenten Fruit Huis', Zoetermeer except for 2000 figures which come from Van den Broek et al (2016)

Contrary to mango and banana, the pineapple value chain has a juice company in Côte d'Ivoire: *Ivorio*. In an attempt to diversify this company has also brought other juices and mixtures on the market but with no success yet. In a marketing study, especially the packaging was criticized by the respondents. Only one size cans are available which get them only one place in the supermarkets shelves. Other, imported juices have several stands because of different bottle and/or can sizes.

Lately, a small factory has started in Grand Bassam, processing organic pineapple into fresh cut pieces, frozen 'carpaccio', 'kebab' and chunks. The production is exported to France. The business is successful and the company is going to build a much bigger factory on the 'Free Zone' of Grand Bassam. Sustainability is very important to the owners and management: only organic fruits are used. Regeneration of heat and bio-generation of the

<sup>22</sup> Like bananas and potatoes, pineapples are just clones from other pineapples. You only need one living plant to copy it into a multitude of plants, e.g. by using the suckers, or more sophisticated and more effectively, by tissue culture. When a plant is infected with a virus it will give only virus infected new plants. It took a long time to have this desired MD2 variety spread over the production area in Côte d'Ivoire.

<sup>23</sup> Some say the local variety 'Cavendish' tastes better than the MD2 and that transport by air should be attempted. This has been tried several times without success. The difference in taste is not seen as an advantage by most consumers in Europe and transport prices are prohibitive compared to the price of the product.

produced waste materials to generate electricity, is part of the factory design. They are also expanding now into coconuts and other fruits for processing.

## SWOT

### Strengths

- The climate in the south is very good for pineapple production.
- Year around production is possible.
- Producers have adopted the *MD2*-variety with its cultivation practices. It also seems to be more adapted to climate change.
- There are no important pests and diseases.
- Production is close to the port.
- Prices on the national and regional markets for second and third grades are good.
- The activity is profitable for all involved in the value chain.

### Weaknesses

- Farm gate prices are high compared to other production areas. There is room for negotiation with the farmers. Currently, farmers make some 50% margin (Van den Broek et al, 2016).
- In the traditional production areas land is limited: during the pineapple crisis many farmers changed to oil palm and rubber cultivation.
- Small farmers have left the pineapple cultivation during the political crisis.
- Availability of quality planting material is still limited.
- Irrigation facilities are poor on small farms.
- Cold storage is lacking in the packing stations.
- Logistics is expensive and not very reliable. Availability of containers during the mango season is limited.
- Export is dominated by many smaller, less professional exporters. Their working capital is also often limited.
- Air-freight is expensive and is therefore prohibitive for the pineapple export by air.
- The CNRA is trying to breed a new variety to replace the *MD2* but cannot compete compared to the commercial breeders of Dole, Chiquita and DelMonte. They lack the necessary expensive, modern equipment and laboratories, e.g. on gene sequencing<sup>24</sup>.

### Opportunities

- Good possibilities for growth on the European market esp. with the *MD2*-variety.
- The crop is very profitable when managed by well trained, commercial farmers.
- If producers accept lower sales prices, the organic market could become a more important niche market.

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<sup>24</sup> With gene sequencing traditional breeding can become more efficient.

- Processing of second and third grade pineapples into juice, frozen, cut or dried pineapple can be extended, both for the West African market as well as for the export to Europe.
- There is already a juice company in Côte d'Ivoire: Ivorio. It might be interesting to investigate if improvements can be made technically as well as on marketing.

#### Threats

- International competition on the world market on production and logistics efficiency
- Climate change forms a challenge. The majority of farms still rely on rainfall only.
- Alternative crops like rubber and oil palm are competitive on land use.

## 5.5 Papaya

It is difficult to find figures on the papaya export from Côte d'Ivoire but considerable quantities were shipped in the 80's and 90's of the last century.

The main commercial variety is 'Solo Sunrise' developed in Latin America as a small ('Solo' means for one person) breakfast ('Sunrise') papaya. Starting 2010 heavy infestations of the *Papaya Ring Spot Virus* (PRSV) were observed in the main production area around Azaguié. The production per ha decreased as well as the area planted. Nowadays papaya is only produced for the Abidjan market but on a low level. Small quantities are exported to Mali, mainly from the north of Côte d'Ivoire.

Until some 8 years ago the European market only wanted this small 'Solo Sunrise' variety, but lately there is a movement towards larger papayas in Europe. This opens the way to replace the 'Solo Sunrise', which is very susceptible to this PRSV, by bigger fruited modern hybrids. The latter varieties often produce 10 times more kg per ha, have a better shelf life, good taste and larger fruits. The most important feature is that they are tolerant to the virus, so they will get it but production goes on: of the Dutch seed companies, only East-West Seeds Company has several PRSV-tolerant hybrids in this product range. The PRSV-resistant varieties of papaya, bred in Brazil, are GMO based and will have a problem of being accepted in the European market.

## SWOT

### Strengths

- The climate in Côte d'Ivoire is ideal for papaya.
- Growing market for papaya in EU: customers know it from their exotic holidays.
- Distance to the European market is relatively short.
- Strong demand for good tasting papayas in the urban areas of Côte d'Ivoire itself.

### Weaknesses

- Still 100% old varieties in use.
- Papaya is a fragile fruit which has to be handled with care.
- Shelf life of papaya is short so international transport has to be done by air.

### Opportunities

- Introduction of new PRSV-resistant or -tolerant hybrids can revitalize the sector.
- The international papain market is growing fast. Papain is a natural meat tenderizer. There exist special varieties for papain production.

### Threats

- Climate change: most papaya is grown rain-fed. With irregular rain patterns, drip irrigation will become necessary making production more expensive.
- PRSV is spreading all over the country. Local varieties are highly susceptible.

## 5.6 Miscellaneous fruits and vegetables

The last decade, European customers are getting used to exotic fruits and vegetables. Tourism to exotic destinations has contributed to this, but also the presence of immigrants from tropical areas is a market in itself. For example, the number of people with Asian origins in the Greater London area is estimated at one million. Companies (like Wealmoor) importing the fruits and vegetables that those groups like to eat are thriving well. For these people eating fruits and vegetables from their country of origin goes beyond mere taste and is often described as ‘soul food’. We find some of these products in European supermarkets with a growing group of autochthonous European consumers.

Some of these products are grown in Europe in the summer. In winter production demands too much heating, making it expensive making imports from Côte d’Ivoire profitable. Most production comes from Thailand and some other Asian and Latin American countries. Côte d’Ivoire has very good climate zones to produce these ‘exotics’ with a much lower distance to the EU-market. If transport by trucks to Europe can be realized, Côte d’Ivoire has a competitive advantage compared to air transport. Some British importers and local entrepreneurs have investment plans. Production will start next August.

The possibilities of (water)melon export to Europe is also an interesting option. Especially in the north these crops have proven to give good quality yields. There is competition from Senegalese producers whom are even closer to Europe and have high quality products. The south has a good climate for passion fruits. At the moment these fruits are imported into Europe mainly from East Africa but it might become a niche market for Côte d’Ivoire too.

## SWOT

### Strengths

- Market for new unknown tropical fruits and vegetables in Europe is growing fast.
- Consumers’ prices are high.
- Ideal climate zones for the production of tropical fruits and vegetables.
- Distance to the European market is relatively short in comparison to Asian and Latin American production areas.

### Weaknesses

- Sector unsuitable for small inexperienced companies. Profits can be high, losses too.

### Opportunities

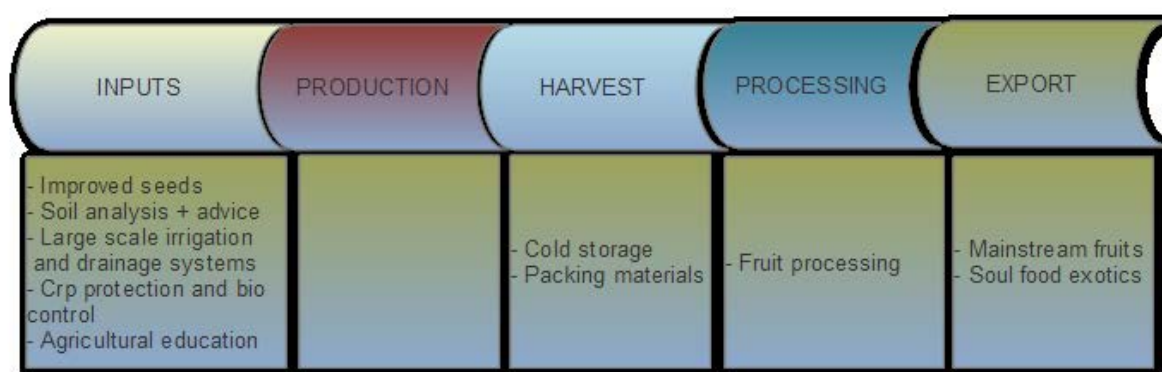
- Sub-sector of ‘soul food’ export production is promising. Good technical knowledge of these products however, is necessary.

### Threats

- Risks and rewards are high. Some initiatives already exist, mostly financed by companies who can take the risk.

## 5.7 Business cases for Dutch companies in the fruit export sector in Côte d'Ivoire

The fruit export sector in Côte d'Ivoire although dominated by French companies, still offers several potential opportunities for Dutch companies in the following fields:



### 5.7.1 Genetics: improved seeds

Almost all the main export fruit species in Côte d'Ivoire -banana, mango and pineapple- are reproduced vegetatively, so from suckers, grafted rootstocks or tissue culture. There are no Dutch companies involved in this sector.

Papaya however, is produced from seed. Only one Dutch seed company, East-West Seed, sells several *Papaya Ring Spot Virus*-tolerant papaya-varieties that can be produced in Côte d'Ivoire despite the occurrence of this harmful virus.

### 5.7.2 Soil fertility

The big banana production companies have their own soil fertility laboratories. For smaller export growers, like in the mango sector, this infrastructure is not in place. In the past this service of sampling, soil analysis and fertilization advice was a governmental task.

There is room for Dutch companies to start operating soil fertility laboratories as commercial (joint) ventures in cooperation with local companies (fertilizer, pesticides and seed distributors). Such a laboratory could be combined with diagnostic services on pests and diseases. Occasionally quick tests for certain viruses, fungi and bacteria (Pocket Diagnostics® or Agdia®) can be sold if storing conditions are good.

In Côte d'Ivoire serious partners are available to investigate the possibilities with a Dutch partner company to start up soil analysis and advisory services. An **FDOV**<sup>25</sup> subsidy demand with one of the Dutch companies, active in this field, and the local partner company, can be successful if they fit into the criteria.

<sup>25</sup> Facility for Sustainable Entrepreneurship and Food Security. This is the last year of this program but probably another similar program will replace it.

The main Dutch companies, active in this market are:

Dutch companies, active in soil analysis etc.		
Company	website	activities
Koch Bodemtechniek	www.kochbodemtechniek.nl	Both chemical as biological analysis of soil samples
Soiltech	www.soiltech.nl	Chemical analysis
Gaia Bodemonderzoek	www.gaiabodem.nl	Also soil analysis for the organic farmer
Soil Cares	www.soilcares.com	New method of soil analysis via smart phone
Groen Agro Control	www.agrocontrol.nl	Chemical soil analysis, residue analysis and diagnostics of pests and diseases
Eurofins	eurofins-agro.com/nl	Chemical soil analysis, residue analysis and diagnostics of pests and diseases

Table 5.5: Dutch companies, active in soil analysis etc.

### 5.7.3 Water: irrigation and drainage know how

There is a need for (drip) irrigation and drainage even if it were only to cope with climate change. This market is not very interesting for Dutch enterprises as the Chinese offer much cheaper systems for irrigation. Drainage on fields of small farmers consists mainly of growing the crops on raised beds and digging ditches to drain away the excess water.

For large scale irrigation and drainage systems, however, design and training is more complicated. This offers opportunities for Dutch knowledge institutes or companies. Drainage for large scale plantations is also an interesting market for specialized Dutch consultants.

A **business case** should be investigated by a specialized consultant in this matter. Royal Brinkman (<https://royalbrinkman.nl>) is the leading company in Dutch water management in horticulture.

### 5.7.4 Crop protection and bio control

Concerning classic pesticides: the big fruit companies import their own bio-chemicals (also pheromones) and pesticides for their own use. Often decisions for procurement are made at the headquarters in France. The Ivorian government often procures plant protection products on a large scale by tenders to redistribute them to small growers of export crops like mango. In some cases these tenders are organised and centralized by FAO, covering several West African countries.

Seen the alarming situation of EU notifications on Quarantine-organisms found in lots of mangoes coming from Côte d'Ivoire, the country might risk an embargo on imports into the EU.

Biological methods exist to combat those Quarantine-organisms, which don't leave toxic residues. Methods of biological control<sup>26</sup> and/or plant reinforcing micro-organisms like *Trichoderma* are very useful new developments. The latter can improve yields and create better resistant plants against pests and diseases.

The leading company in this type of biological control in The Netherlands is willing to take the lead in solving these problems. Leading importers of mango in The Netherlands are also interested in discussing how to solve this problem.

Considering the big interest for both Côte d'Ivoire and the Dutch import companies, Public Private Partnerships form a good cooperation mechanism to solve the phytosanitary problems. For example, an '**Impact Cluster**' subsidy scheme could be created. It depends on the exact criteria that RVO is handling with the 'Impact Cluster' subsidy scheme if this is possible. As the phytosanitary problems are not only present in Côte d'Ivoire but also in the other export countries from West Africa, the results of these projects will have a very positive effect for all involved and even beyond.

A list of Dutch companies, active in biological control is given here below:

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<sup>26</sup> It is interesting to see new initiatives of Koppert Biological Systems B.V. They reformulate their successful *Trichoderma*-mixtures into storable products for small farmers that can be stored outside the refrigerator. In this way these bio-stimulants may become available also to small farmers.

Dutch companies, active in biological control of pests and diseases		
Company	website	activities
Koppert Biological Systems	www.koppert.nl	Koppert is the world leader in biological crop support systems. Products include, natural enemies of pests and diseases, plant reinforcing micro-organisms and pollination insects for fruit production. Koppert West Africa is based in Abidjan. (info@koppertwestafrica.com)
Greenguard	www.greenguard.nl	This company is specialized in the biological control of pests and diseases in lawns, parks and sports fields.
Raja Trading	www.rajatrading.nl	A company specialized in bio solutions for home gardening.
Pireco	www.pireco.nl	Plant reinforcing products for both the hobby sector as the commercial biological vegetable production. Focused on the Dutch market.
Hortipro	www.hortipro.net	Company producing biological solutions for vegetable, fruit and the recreational sector.
Entocare	www.entocare.nl	Specialised in niche markets of biological control. Has even insects killing cockroaches!
Pronafit	www.pronafit.nl	Products based on garlic that chases away the insects from crops.

Table 5.6: Dutch companies, active in biological control of pests and diseases

A **G2G project** could be created to stimulate cooperation between the Côte d'Ivoire Plant Protection Service and the Dutch NVWA (Department of Plant Protection).

### 5.7.5 Agricultural education

The level of training, research and extension used to be quite developed in Côte d'Ivoire. In West Africa only Senegal was considered to be at the same level until 10 years ago. With the political problems in Côte d'Ivoire there seems to be, not surprisingly, a decrease in the level. Training of good qualified personnel, *at all levels*, is the key to good agricultural production.

Small farmer mango production is hampered by a low level of management of the trees and soil. This results in the fact that only 30% of the production is of enough quality to be exported. International Development Cooperation institutions could focus in supporting initiatives to train farmers. These training activities take high efforts, especially in the first

years while results come later. Therefore it is difficult for exporters to support these costs. GIZ is active in this area.

Dutch Agricultural Education centers in horticulture, like `Hogeschool Van Hall Larenstein` (www.hvhl.nl ) might be interested to collaborate with their peers in Côte d'Ivoire. Probably the most necessary levels are below university level as hands on technicians are most needed.

### 5.7.6 Cold storage

As being one of the most important fruit importers in Europe, The Netherlands has a specialized sector in cooling and, more general, climatic conditioning, for vegetables and fruits. In the fruit export sector of Côte d'Ivoire there is a need for extra cooling. A lot of smaller exporters only start cooling the fruits at arrival of the reefer container from the port, but the quality of the delivered fruits in Europe increases and the shelf life is extended if fruits are pre-cooled at the packing station. Some bigger exporters already dispose of this kind of equipment but many do not.

In the next table some (but not all), Dutch companies, active in the vegetable and fruit cooling industry are summarized:

Dutch companies, active in the fruit and vegetable cooling systems sector		
Company	website	activities
Celtic Cooling	<a href="http://www.celtic.nl">www.celtic.nl</a>	Worldwide cooling solutions for all climate control sectors. Also experts in Controlled Atmosphere for storage of fruits and vegetables. Also experts in Tissue Culture systems. In Mali they designed and built the Plaza Mango pre-cooling system for the Malinese mango exporters.
Cooling Systems Holland	<a href="http://www.coolingsystemsholland.nl">www.coolingsystemsholland.nl</a>	Design, building and maintenance of cool chain solutions in the fruit sector. Specialists in ripening systems of banana and mango.
Coolmark	<a href="http://www.coolmark.nl">www.coolmark.nl</a>	Supplier of refrigeration machinery and spare parts for cooling equipment. Web shop!
Heiden Systems Holland	<a href="http://www.heidensystems.com">www.heidensystems.com</a>	Cool systems, banana ripening systems and pre-cooling systems
Isolare	<a href="http://www.isolare.nl">www.isolare.nl</a>	Building cooling systems.

Table 5.7: Dutch companies active in the fruit and vegetable cooling systems sector

### **5.7.7 Packing materials**

For packing fruits for export, the carton boxes are made in Abidjan. Even in Bamako a factory is under construction, especially for the mango cartons for export. If Dutch companies can compete pricewise or quality wise with these existing companies is not sure. One Dutch company in packing materials is present in the local market but is mainly selling net bags for onions.

### **5.7.8 Fruit processing**

The international market for processed fruit products is growing fast.

Dried fruit sticks or small pieces to be mixed in muesli mixtures are very popular in Europe. Especially ‘organic’ dried fruits are very sought after. There is also a growing market for exotic fruit juices, purees and frozen fruit parts.

Because of the phytosanitary problems when exporting fresh fruits some of the bigger local companies already anticipate to an eventual embargo by investing in processing equipment and know how (an embargo is only dealing with fresh fruits and not with processed fruits).

Processing of primary products is also promoted by the Ivorian government. The incentives (tax holidays, zero import duties for equipment etc.) make it very interesting to study the feasibility to engage in investments in this sector. It will be interesting for Ivorian companies to cooperate with Dutch companies in this field because the latter know the EU market for concentrates, chunks, juices etc. and they have the know-how related to it. See the table below.

Dutch companies specialized in processing lines, freezing and cold storage might be interested as the new initiatives (described in the chapter on mango and the one on pineapple) need professional equipment to comply with HACCP and other standards to be able to export to the EU market.

A **specialised trade mission** to Côte d’Ivoire should be organized.

Dutch companies, active in the fruit processing sector		
Company	website	activities
Verbruggen Juice trading Sustainable products	www.vjtsp.com	Worldwide active in Fairtrade and rainforest alliance certified fruit juices and concentrates. Also procures juices from Ghana.
Fruity King	www.fruityking.com	Fruit juices
SVZ International	www.svz.com	A large fruit and vegetable processing company sourcing from all over the world.
HAK	www.hak.nl	Vegetable and fruit conserves
Coroos Conserven	www.coroos.nl	Juices, smoothies
Berrico Food Company	www.berricofood.com	Import, wholesale of fruits, frozen fruit parts, dried fruit and fruit juices.
Dóhler Holland	www.doehler.com	Fruit juice concentrates and fruit purees
Hero Nederland	www.hero.nl	Fruit processing company

*Table 5.8: Dutch companies active in the fruit processing sector.*

### **5.7.9 Export of mainstream fruits to Europe**

Dutch companies might not seem to be the obvious choice to cooperate with for Ivorian exporters because of the small number of Dutch consumers. However, it is important to know that the Dutch companies re-export more fruits and vegetables to other countries than is consumed locally in The Netherlands. So, therefore it is interesting for Ivorian producers and/or exporters to deliver straight to this European distribution center in The Netherlands. Active lobbying for these Dutch businesses in Côte d'Ivoire should be undertaken.

In the next table there is an incomplete list of both organic as mainstream importers/re-exporters:

Dutch companies, active in importing exotic fruits into The Netherlands		
Company	website	activities
Bakker Barendrecht	www.bakkerbarendrecht.nl	Probably the biggest fruit and vegetable company in The Netherlands, serving the biggest supermarket chain of The Netherlands and Belgium. Longstanding relations with suppliers. In West Africa: Import of mangoes from Côte d'Ivoire and Mali.
Agro Fair	www.agrofair.nl	Organic and Fair Trade importers of fruits. Organic banana, pineapple and juices. From Côte d'Ivoire: coconuts.
OTC Holland	otcholland.com	Organic and sustainable importer of exotics. Strong ties with suppliers. Actually in Côte d'Ivoire involved in Organic and Fair Trade pineapples.
Eosta	www.eosta.com www.natureandmore.com	Organic fruits with a strong relationship with the producers. In Côte d'Ivoire, at the moment, buying organic pineapple
Global Fresh Trade	globalfreshtrade.nl	Importer of exotic fruits, mainly from Latin America
Nature's Pride	www.naturespride.nl	Importer of exotics, mainly from Latin America and S.E. Asia. Good relationships with suppliers and customers. Chain responsibility.
Mangaya Trade	mangayatrade.nl	Mainly a fresh mango importer and processor of mango into chunks, paste and juice
MD trading	www.mdtrading.nl	Importers of fruits and vegetables
Bud Holland	www.bud.nl	Importer of exotics including mangoes. In West Africa sourcing in Côte d'Ivoire, Burkina Faso and Mali

Table 5.9: Dutch companies, active in importing exotic fruits into The Netherlands

#### 5.7.10 Niche fruits and vegetables export business

The market for Asian and African fruits and vegetables, as 'soul food' is growing steadily in Western Europe. Côte d'Ivoire is an interesting export country for such products. If cheap air transport can be found has to be seen. Often this is a bottleneck, especially in the beginning when volumes are still small. Price fighters in the passenger's business are coming to Côte d'Ivoire lately too (like TAP). They might be interested in carrying freight because their passengers take little luggage with them to Europe.

Specific Dutch import companies for these products are available. The possibility of promotional activities in this field should be considered by RVO, The Dutch Embassy and NABC.

The Dutch seed company East-West Seeds ([www.eastwestseed.com](http://www.eastwestseed.com)) is market leader in many Asian countries in this tropical fruits and vegetables segment and can play an important role in seed supply.

Dutch importers of 'Soul food' exotics		
Company	website	activities
SAFE	<a href="http://www.safebv.nl">www.safebv.nl</a>	Mainly Surinam fruits and vegetables
BUD Holland	<a href="http://www.bud.nl">www.bud.nl</a>	Worldwide products sourced
Exotimex	<a href="http://www.exotimex.nl">www.exotimex.nl</a>	Worldwide products sourced
Belimpex	<a href="http://www.belimpex.nl">www.belimpex.nl</a>	Sourcing mainly from Latin America and Thailand
Nature's Pride	<a href="http://www.naturespride.nl">www.naturespride.nl</a>	Sourcing mainly from Latin America and Thailand
OTC Holland	<a href="http://otcholland.com">otcholland.com</a>	Mostly from Peru but also pineapple from Côte d'Ivoire
YEX	<a href="http://www.yex.nl">www.yex.nl</a>	Trendy exotics

*Table 5.10: Dutch importers of 'Soul food' exotics*

## 6. Ornamentals export sector

### 6.1 Actual situation

Tropical ornamentals are a niche product in the market. The bulk of flowers imported from Africa into Europe come from tropical highlands (Tanzania, Kenya, Uganda, Ethiopia). The climate in Côte d'Ivoire is not favorable to those flowers (roses, carnations, chrysanthemums etc.).

However, the climate in the south of Côte d'Ivoire is good for tropical ornamentals like palm trees, *Heliconia* spp., pineapple-flower, ginger-flower, *Alpinia* spp. (ginger family), *Etilingera* spp., *Dracaena*'s, *Hibiscus* (in pots), *Bougainvillea*, *Croton* etc.

A market in itself is 'ornamental greens' that are used in bouquets. The greens can be cut from palm trees and a lot of other species. Growing these ornamentals only requires, for most species, shade netting. In the tropical forest these plants grow underneath the high trees so in nature they have shady conditions already.

From colonial days, some ornamental crops are grown in the surroundings of Bingerville in Côte d'Ivoire. In the 80's and 90's of the last century cut flowers and also containers of potted plants (mainly palm trees of 120 cm high) were exported to France. Some plantations were co-owned by the French distributor of the products in France.

The economic recession in Europe coincided with serious problems in Côte d'Ivoire. The ornamental market is highly influenced by the economic cycle. In a recession, ornamentals are among the first products on the market to receive a blow. Tropical specialties even more. That is why the economic recession in Europe (which took much longer in France than in the rest of Europe), combined with the local troubles in Côte d'Ivoire made the export of tropical ornamentals coming nearly to a standstill.

An example of the recession and the new interest is the following: The French company, co-owner of one of the bigger farms in Bingerville, went officially bankrupt the third week of January 2018. A Dutch party has bought the farm.

Other farms that are operational are Ivorian, Italian and Dutch owned. The Dutch group of companies involved is one of the biggest in the flower industry of The Netherlands and therefore the world.

Again, this business will never become vast like the rose exports from Kenya but at least it contributes some diversification to the Côte d'Ivoire economy and provides for employment.

There are no recent official figures on production and export of this sector, only some information from 2002 (Union Européenne– Afrique de l'Ouest, 2002) has been found:

Export of cut flowers and green plants						
	1996	1997	1998	1999	2000	2001
Quantities exported (Tons)						
Cut flowers + ornamental greens	663	722	802	834	1099	
Green plants	370	428	381	350	360	
Total	1033	1150	1183	1184	1459	1600
Growth		11 %	3 %	0 %	23 %	10 %
Value (in million fCFA)	1550				2000	

Table 6.1: Export of cut flowers and green plants from 1996-2001

Two categories of farmers:

- Large farms: 17 farmers who exploited together 740 ha, including 20 ha under shade. They were organized in an association called UPHCI (*Union des Producteurs Horticoles de Côte d'Ivoire*). All production was exported.
- 43 small farmers were organized in a cooperative called FLORACI. Together they exploited some 140 ha which was meant to be exported.

According to this source, the export in 2001 was estimated at 1600 tons in total.

Today these quantities are much lower, but these old figures show some potential.

## 6.2 Business cases for Dutch companies

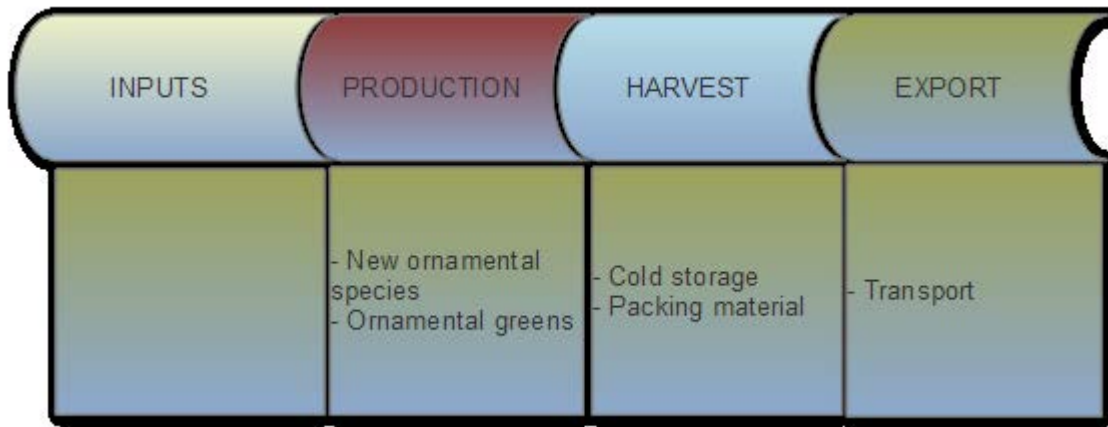
There are some interesting niche markets. A group of Dutch companies, even one of the biggest importers in The Netherlands, is very interested and willing to do some trials. To avoid competition details will not be given in this report on explicit demand of this company. Having had some bad experiences with Dutch subsidy schemes, they are not interested in participating in a subsidy project. One of the remarks was that "Subsidy makes people lazy".

The information that is given in this report comes mainly from two other ornamental growers, one Italian and one Dutch.

These last two, financially less big companies are, contrary to the big group of companies, very interested in a project to try out:

- different species, apart from the mainstream ones.
- Improving packing and transport to achieve longer shelf life

- to see the response of the market to Ivorian grown ornamentals:



RVO may send criteria for subsidy to these two companies and invite them to write a project proposal for species testing, trials on packing material and transport etc. The reason for RVO to possibly accept a project in this sector is that, unlike the sector in East Africa, the sector in Côte d'Ivoire still has to be explored and charted from scratch. In Ghana a successful PSI project was financed in the same sector.

## **Annex 1: The business environment in Côte d'Ivoire and possible Dutch support**

### **Doing business in Côte d'Ivoire (basics and 'couleur locale')**

With a continuous growth of the BNP around 9% annually for the last five years, Côte d'Ivoire is 'the place to be' for a lot of inventive businesses. The thrill in the air is witnessed by full plains from and to the rest of the world, fully booked hotels in Abidjan and, in the case of agriculture, a well visited SARA exposition last November 2017.

For investments related to Euro-countries the most important advantage of Côte d'Ivoire compared to Ghana and many other countries is the currency: franc CFA (international code: XOF). This currency is very strongly related to the Euro. One Euro equals 656 fCFA, in fact since the beginning of the Euro. Especially in import/export businesses this is a blessing because there is no need to fear for currency losses while the container is on its way (either side). Investments and return on investments can be calculated without the danger of huge inflations (like in Ghana a few years ago). Several Dutch companies who have invested and are producing in Côte d'Ivoire mention this currency advantage as an important factor to choose a CFA country.

The Côte d'Ivoire government is also attracting strategic activities from abroad and has incentives going with it. There are tax holidays and tax-free import tariffs for strategic goods, also in horticultural added-value activities.

The best source to get information on the Côte d'Ivoire incentives is probably the Dutch Embassy in Abidjan, or the Ivorian embassy in The Hague. Also the Chamber of Commerce is a good source of information.

To secure investment opportunities and international private partnerships, there are judicial courts dedicated to business and commercial disputes (CACI).

Moreover, Côte d'Ivoire is a member of the Organization of Corporate Law Harmonization in Africa: OHADA.

In 2012 the State decided to set up an autonomous Commercial court in Abidjan that deals with commercial litigations. A chamber dedicated to commercial litigation should be open soon within the Abidjan Court of Appeals.

A difficult factor in doing business in Côte d'Ivoire is, as it is in the whole of West Africa, the question of landownership. Inside urban areas there are no problems as a modern cadastral services exists. Sales are taking place like in Europe.

In the rural areas cadastral services are normally not existing. The land is still into the traditional ownership system. To find out who is really the owner of a piece of land, in a rural area, is difficult. Buying it from somebody who pretends to be 'the owner' is always

dangerous. Often, family members who live as far as in Paris, still have a say in the sales. Without their consent a deal can be turned off, or worse, a 'concluded deal' can be discussed again and again. In any case, the group of elders of the village have their say in land transactions. Often buying and selling farmland is impossible. Only 'renting' is possible. Before entering into a 'land' issue, be sure to be accompanied by very reputed local lawyers, experienced in this matter. Their fee stands in no relation to the damage that might occur when entering into a deal without them.

In the Abidjan region, land is often as expensive as in Europe. When a plot is offered at a price, too good to be true, you can bet on it that the deal is not true at all.

In general, it is important to find an Ivorian local partner for your business. Someone who only makes money when you are, will also do its utmost to make your (and her/his) business a success. The biggest challenge is always to find the right person. Like everywhere in the world, track record, education and offspring is important in your choice. An advantage is a business partner who has "lived your life". This means that the person has been living and trying to do business abroad from his/her own country, the same as what you are trying to do in his/her country Côte d'Ivoire. It is not by coincidence that in the former phrase the his/her is used. Often women, in West Africa are much more dedicated to the job and the company than men (strictly personal opinion, but based on experience, by the author!).

Côte d'Ivoire people are proud of their country. As a foreigner it is very much appreciated if you always speak about 'Côte d'Ivoire' and not 'Ivory Coast', even when you speak English.

An important community in West Africa is the Lebanese population. Every colonial power in Africa created a buffer between the African population and themselves. In parts of the British colonial empire this place is occupied by Indian people, the Portuguese employed Cape Verdeans and the French were working with Lebanese. In general, they do a lot of business, both wholesale and retail. They are not much liked by the local population but in a way very much needed. The Lebanese factions (Christian and Muslim etc.) are also present in West Africa. The animosity can reach also high levels between themselves. They often control imports of consumer goods, although lately, the Chinese are taking a part of the cake too.

French is the official language of Côte d'Ivoire. It is important to speak that language. Fortunately, people tend to speak it much slower and less complicated than in Paris. If you speak French like a child, unfortunately, people risk to consider you as a child or at least some barbarian 'northerner' so it is important to do some language training. The French employ all kind of efforts to create a large French speaking part of the world in the former 'French West Africa'. This is called the 'Francophonie'. It is also a way of keeping a high influence in countries like Côte d'Ivoire. Of course, as a Dutch business person, you know that speaking your client's language is the most direct way to the heart of this person.

The French people in West Africa don't often speak local languages, even if they are born in Abidjan. If you manage to speak just 10 words in the main local language of the area where you are working, you get a lot of credit more than when you just speak French. In Abidjan and the North of Côte d'Ivoire, this is the Dioula language which is also spoken in Mali, Burkina Faso, Guinea Conakry and parts of Sierra Leone, often (like in Abidjan) as a second local language. The number of people speaking Dioula is growing every day.

So it is a very good investment, when starting doing business in Côte d'Ivoire to learn some basic words of Dioula language. You will find out that the taxi fee in Abidjan drops considerably when you address the taxi man with 'initié' instead of 'bonjour', even when the guy does not speak a lot of Dioula!

### **Dutch support for the Dutch business community**

Before the civil war started, Côte d'Ivoire was a very important economy in West Africa. The Dutch government had a big embassy in Abidjan. Companies like DAF had their local companies etc. With the civil war the Dutch embassy closed its doors. A few years ago, a Dutch business promotion office opened in Abidjan as dependence of the Dutch Embassy in Accra. Last year a real Dutch Embassy opened up again in Abidjan.

One of the main objectives of the Dutch Embassy is to promote the Dutch business community in Côte d'Ivoire. If you do business in Côte d'Ivoire or want to do, it is always useful to get yourself known to the embassy staff in Abidjan. They might give you tips, bring you into contact with other Dutch businesses and might also inform you of major happenings in the country. Useful websites:

The *Rijksdienst Voor Ondernemend Nederland*, (<https://www.rvo.nl/onderwerpen/internationaal-ondernemenprograms>) is running programs that are aiming to help Dutch companies to become successful abroad. Some of the tools, like subsidies, are 'open' for Côte d'Ivoire.

A special arrangement is made for clusters of Dutch companies that, together want to start up an innovation activity that benefits the local situation and gives business possibilities for the companies involved. In chapter 5 we have proposed a project who might be co-financed by the Dutch RVO.

## Annex 2: Resource persons

Name	Function	Organisation
Annequin, Patrice	Senior Market Information Specialist	International Fertilizer Development Center (IFDC)
Aphing Kouassi, Ing. Agr. Nicole	Deputy General Manager	Agence Nationale d'Appui au Développement Rural (ANADER)
Badou, Jean	Phytopathologue	Koppert West Africa (KWA)
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Bindels, Elena	Project Advisor	Rijksdienst voor Ondernemend Nederland (RVO)
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Bruisten, Anton	CEO	Simonis B.V.
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Coulibaly, Issouf	Acheteur Junior FRUITS-LEGUMES	PROSUMA, Abidjan
Cisse, Aby	Présidente du Conseil d'Administration	Agence Nationale d'Appui au Développement Rural (ANADER), Abidjan
Dasylla, Germain	Représentant de la FAO en Côte d'Ivoire	Organisation des Nations Unies pour l'Alimentation et l'Agriculture (FAO)
Dao PhD, Daouda	Directeur des Ressources et de la Valorisation	Centre Suisse de Recherches Scientifiques en Côte d'Ivoire (CSRS)
Darmois, Laetitia	Responsable Exploitation & Innovation	Explofarm, Abidjan
Dekker, Andre	Export Manager	Bejo Zaden
Diboma, Marina	Deputy Managing Director	Netherlands African Business Council (NABC)
Fondio, Dr. Lassina	Head of Vegetables and Proteagineous crops Research Program	Centre National de Recherche Agronomique (CNRA)
Gnenye Adou, Bernard	Directeur Central	Office d'Aide à la Commercialisation des Produits Vivriers (OCPV)
Harleman, Gerard	Strategic Sourcing Expert	Bakker Barendrecht B.V.
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Klugt, Edwin van der	Sales Manager Africa	Rijkzwaan
Konan, Armand	Administrator	Agritec S.A., Abidjan
Konan Bogui, Ing. Agr. Nathalie	Conseiller Technique du Directeur Général	Agence Nationale d'Appui au Développement Rural (ANADER)
Kone, Prof. Daouda	Phytopathologie UFR Biosciences	Université Félix Houphouët-Boigny, Abidjan
Kouame, Joel	Advisor Dutch Embassy Abidjan	Dutch Embassy Abidjan
Kouame, Yandaki	Secrétaire Exécutif	Association pour le Développement des Cultures Vivrières Intensives (ADCVI)
Kraan, Anitra van der	Department Agribusiness	Netherlands African Business Council (NABC)
Laarse, Jurjan van der	Directeur	Color IGINZ
Malipaard, Ed	Sales Manager France	GASA Holland B.V.
Marteaux, Raïssa	Deputy Head of Mission	Dutch Embassy Abidjan
Ngwa Muyo, Kingsley	Technical Manager West & Central Africa	ENZA Zaden
Olivier, Rizzieri	Cogérant	JPC Développement International, Abidjan
Omvlee, Dr. Jan	Export Manager	Rijkzwaan
Oosthoek, Henri	Managing Director	Koppert Biological Systems B.V.
Ribbens, Inge	Policy Officer International Affairs	Groenten Fruit Huis
Seurt, Jacques	Directeur des Opérations	Koppert West Africa (KWA)
Swier, Ed	Sales Manager Africa	Bakker Brothers
Timmermans, Leontien	PSD Coach	Rijksdienst voor Ondernemend Nederland (RVO)
Traoré, Faraban	Directeur Général	Agrichim, Côte d'Ivoire S.A.
Visser, Dick	Sales Manager Africa	Popvriend Seeds
Vlonk, Nuria	Supply Development Manager	Organic Trade Company-Holland (OTC-Holland)
Voogd, Michel de	Sales Manager Africa	ENZA Zaden
Zandvliet, Marcel	Directeur Marketing	Dutch Flower Group

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### General information:

- [www.jeuneafrique.com](http://www.jeuneafrique.com)
- [www.ivorian.net](http://www.ivorian.net)
- [www.fratmat.ci](http://www.fratmat.ci)
- [www.news.abidjan.net](http://www.news.abidjan.net)
- [www.nationsonline.org/oneworld/cote\\_d\\_ivoire.htm](http://www.nationsonline.org/oneworld/cote_d_ivoire.htm)
- [www.cia.gov/library/publications/the-world-factbook/geos/iv.html](http://www.cia.gov/library/publications/the-world-factbook/geos/iv.html)

### Government of Côte d'Ivoire:

- [www.commerce.gouv.ci](http://www.commerce.gouv.ci)
- [www.gouv.ci](http://www.gouv.ci)
- [www.agriculture.ci](http://www.agriculture.ci)
- [www.cnra.ci](http://www.cnra.ci)
- [www.anader.ci](http://www.anader.ci)
- [www.firca.ci](http://www.firca.ci)
- [www.lepaysan.ci](http://www.lepaysan.ci)

### International organizations:

- [www.cirad.fr](http://www.cirad.fr)
- [www.fao.org/statistics/en/](http://www.fao.org/statistics/en/)

- <http://ec.europa.eu/eurostat/data/database>

**Dutch companies:**

- [www.bakkerbarendrecht.nl/index.php/nl/](http://www.bakkerbarendrecht.nl/index.php/nl/)
- [www.eosta.com](http://www.eosta.com)
- [www.zoutewelle.nl](http://www.zoutewelle.nl)
- [www.vanoersunited.nl/](http://www.vanoersunited.nl/)
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- [www.naturespride.nl](http://www.naturespride.nl)
- [www.coloriginz.com](http://www.coloriginz.com)
- [www.dfg.nl](http://www.dfg.nl)

**Dutch organizations:**

- [www.nabc.nl](http://www.nabc.nl)
- [www.icra-edu.org](http://www.icra-edu.org)
- [www.rabobankfoundation.nl](http://www.rabobankfoundation.nl)
- [www.topsectorTU.nl](http://www.topsectorTU.nl)
- <https://english.rvo.nl/>

**French companies:**

- [www.compagniefruitiere.fr](http://www.compagniefruitiere.fr)

**Companies Côte d'Ivoire:**

- [www.cocosol-ci.com](http://www.cocosol-ci.com)
- [www.koppert.com/company/subsidiaries/west-africa](http://www.koppert.com/company/subsidiaries/west-africa)

**Organisations Côte d'Ivoire:**

- [www.adcvi.org](http://www.adcvi.org)

## Acknowledgements figures and photos:

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- \* Photo Tomatoes in basket: From: East West Seed International
- \* Photo Mango: [http://www.erexint.com/exotische-fruit/#iLightbox\[gallery-1\]/7](http://www.erexint.com/exotische-fruit/#iLightbox[gallery-1]/7)
- \* Photo *Heliconia*: From: <https://www.amazon.com/Heliconia-Rostrata-Hanging-Paradise-Tropical/dp/B00L6FA9HM>
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- Figure 5.13: *Production and export of pineapple in Côte d'Ivoire.* Courtesy Mrs. Kwie Hiang Nugteren

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From: 'Groenten Fruit Huis', Zoetermeer
- Table 5.4: *Imports of pineapple into the EU countries from Côte d'Ivoire in tons* From: 'Groenten Fruit Huis', Zoetermeer except for 2000 figures which come from Van den Broek et al (2016)

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