



Ministry of Foreign Affairs

# *Lobito Corridor (Angola) - Fruit mapping*

*Commissioned by the Netherlands Enterprise Agency*

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

## Preface

Anyone who has travelled through the countryside of Angola, has surely been inspired and impressed by the sheer beauty of the scenery, and by the richness and fertility of nature and the potential for agriculture.

It is completely evident that there are abundant possibilities for increasing the agricultural productivity of Angola. This is of utmost importance to reduce poverty in the countryside and to increase rural employment. On a macro-economic level it is also of great significance for Angola in terms of import-substitution and export-promotion. Agriculture is an important sector in the context of the much needed diversification of the Angolan economy.

The Netherlands -with a surface area that is only 1/30<sup>th</sup> of Angola- **is the world's second largest** exporter of agricultural products and has record levels of efficiency and productivity. This position, combined with the great expertise and experience in the field of transport and logistics, makes it only logical that the Embassy of the Kingdom of the Netherlands in Angola is highly interested in and committed to cooperating with Angolan partners in the field of agriculture and logistics.

We do feel that there is a win-win position for Angolan and Dutch entrepreneurs, as well as for both countries, in working together to further develop agricultural production and exports in Angola.

This report aims to assist in increasing the productivity, quality standards and agro-logistics in Angola, particularly by assisting the development of the Angolan fruits sector & the Lobito corridor. The report provides valuable information about the production and market potential for a variety of fruits, particularly in the provinces of Benguela and Huambo. It furthermore identifies potentially interesting other crops with a high potential for export to the EU market. It also identifies possible next steps and business cases to improve and implement priority adaptation strategies.

An important quality of the fruit-mapping research that was done for this report is that it demonstrates how integrated logistical solutions have a positive influence on the economical agricultural value chain along the Lobito Corridor.

The aim of this mapping is to provide the private sector and the government of both Angola and the Netherlands with the necessary information for investments in the Angolan fruit sector and the development of the Lobito corridor. These investments could potentially restore the status of Angola as an agricultural powerhouse and provide jobs for the local population.

The Embassy of the Kingdom of the Netherlands in Luanda believes that this report makes a valuable contribution to the further development of the fruit producing sector in Angola and we remain gladly available to all interested partners to be of further advice and assistance.

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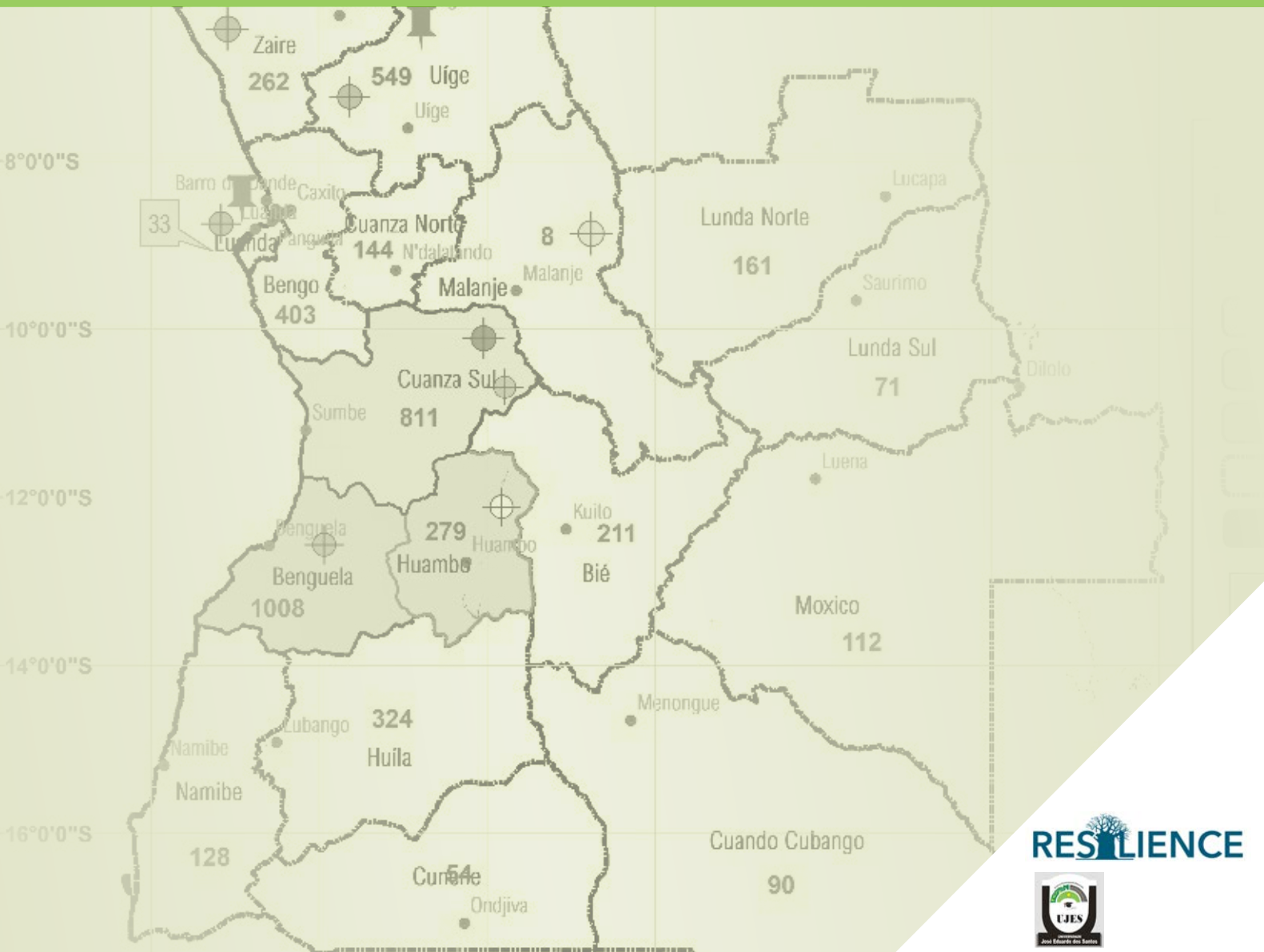
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# LOBITO CORRIDOR – FRUIT MAPPING

Current production, potential & business cases

NOVEMBER 2019



RESILIENCE



Commissioned by:

Netherlands Enterprise Agency



# ACKNOWLEDGEMENT

The authors would like to thank the team of the Embassy of the Kingdom of the Netherlands in Luanda, Mr Anne van Leeuwen, Mr Armino Teuns and Mr Alex Oosterwijk, for the exceptional support in organizing the missions, presentations and events that were part of this study; as well as for bringing up new ideas and feedback for this report. In the same vein we want to thank Mr Jack Vera, the Netherlands Agricultural Counsellor for South Africa and Angola, and Mr Abel Neering of RVO, for the technical advice and practical support in implementing this project. From the Angolan side we are grateful for the high-level collaboration with the Ministries of Commerce and Transport, and in particular the help of Mr Catarino Perreira of the Conselho Nacional de Carregadores and Mr Nelson Martins of the Gabinete Técnico do Corredor do Lobito. They have been true Ambassadors of the fruit sector of the Lobito corridor, both inside and outside of Angola. We further much appreciate the collaboration with the Universidade José Eduardo dos Santos (UJES) in Huambo, and in particular the support of Dr Imaculada Henriques Matias, the Dean of the Faculty of Agricultural Sciences. A special word of appreciations goes to all the companies and institutes that participated in our interviews and meetings. We are grateful for their time and the high level of openness in sharing their knowledge and experience. Lastly, we would like to thank Mr Tiago Teixeira Cepeda, for the editorial support, ensuring correct use of the Portuguese language in all our reports, presentations and communications, and Ms Erika Endrődiné Benkő, for making the beautiful designs of our presentations and reports.

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# EXECUTIVE SUMMARY

## INTRODUCTION

The main objective of the study is to provide the private sector and the government of both Angola and the EU / the Netherlands with the necessary information for investments in the Angolan fruit sector and the development of the Lobito corridor. Specific objectives of the study were to:

- [ Map existing and potential fruit production areas in the Benguela and Huambo provinces.
- [ Assess production and market opportunities for six major fruit commodities with a high potential for export to the EU market. Selected fruit crops are: avocado, banana, citrus, grape, mango and pineapple.
- [ Develop business cases for geographic hotspots that can start exports to the EU in the short to medium term.

## ANGOLA'S FRUIT SECTOR

The Provinces of Benguela, Huambo and Kwanza Sul represent 40% of total Angolan fruit production. Roughly since 2015 fruit imports have stabilized between US\$ 23 and 32 million. Out of these imports apple and pear rank highest, followed by citrus and grape. Angola's exports are of a more recent nature and basically started in 2017. Since that year exports have increased steadily, growing from US\$ 400,000 to close to US\$ 2.5 million in 2018, and are expected to double in 2019. General characteristics of Angola's fruit sector are:

- [ The supermarket sector is well developed with major chains like Kero and Shoprite. Visual quality of most fruits appears decent, with attention for quality standards at producer level.
- [ Domestic supermarket and wholesale prices for fruit crops like citrus, pineapple and grape appear lucrative, and higher than world market prices.
- [ There is a large fruit juice segment, with numerous domestic brands that produce in-country.
- [ There is limited availability of young plants (seedlings or plantlets) of improved cultivars of e.g. mango, avocado, citrus, pineapple and passion fruit.

## EU DEMAND FOR FRUITS

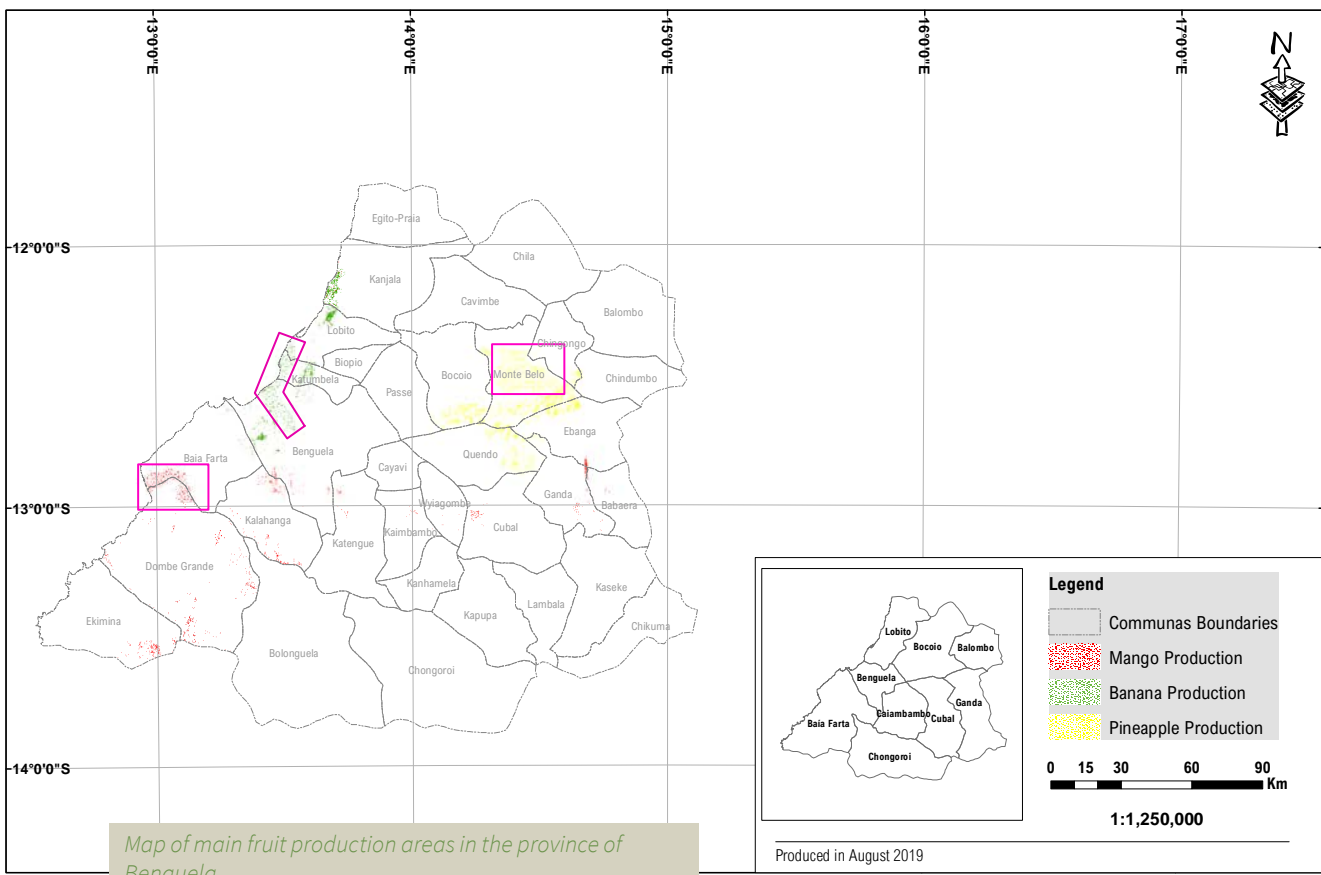
The EU demand for quality fruits increases year on year, with Germany, the Netherlands and the UK the biggest importers. The EU is the largest importer of fruits globally, importing more than 40% of the total traded value. The most traded fruits, by value, are: banana, citrus, grape, avocado, pineapple, mango and melons. Prices for banana and citrus have been stable for the last ten years and average US\$ 0,80 per kg for banana and US\$ 1,05 per kg for citrus (import value). Crops like avocado and grape are generally more high-value commodities, with average prices over the last five years of respectively US\$ 2,60 and US\$ 2,25 per kg. Specific trends in the EU are: (1) greater emphasis on certification: socially certified; (2) stricter phytosanitary regulations (following the new EU Directive, 2019/523); (3) and more emphasis on seafreight, replacing air freight, and reducing carbon dioxide emissions.

## THE LOBITO CORRIDOR

The organizing principle of the Lobito Corridor is the railway that runs from the Port of Lobito in the west to the town of Tenke in Katanga Province of DRC in the east. Both the railway and port of Lobito offer excellent logistics for moving fruits out of the country. Prices for shipping a 40 foot reefer container are competitive, between US\$ 2,500 and US\$ 3,000 to Rotterdam/Antwerp, with a route that first connects a feeder boat to Namibe and Luanda, before transiting to Europe. Transit time is between 18 and 21 days from Luanda to Rotterdam.

The two provinces of Benguela and Huambo have distinct agro-ecological conditions. Benguela, situated at the coast with the major city Benguela as its capital, has a 50 km coastal plain at the west, the 'litoral', gradually running up to the planalto of Huambo. Benguela's Litoral is characterized by low rainfall and high day and night temperatures. Temperatures fluctuate during the year, with a distinct winter season between June and September. The province of Huambo is largely situated on a highland plain with hills, the planalto with cooler temperatures and higher rainfall (1,366 mm per year).





## FRUIT COMPANIES IN BENGUELA AND HUAMBO

Throughout the two provinces 83 commercial fruit farms were identified. Especially citrus and pineapple farms are well represented in Benguela and Huambo, with 32 and 27 farms respectively. The Município of Bocoio has a large number of pineapple farms, mostly between 10 and 15 ha. The Município of Baia Farta in Benguela has five bigger mango farms with an average of around 20 hectares. Whereas most citrus and mango farms use furrow irrigation most commercial banana farms use drip irrigation. Avocado and pineapple farms are rainfed.

## FRUIT PRODUCTION AREAS IN BENGUELA AND HUAMBO

Based on satellite imagery the production areas of the six crops were mapped. Specific areas or 'hotspots' of production stand out with clear clusters of banana, mango and pineapple production areas (see map above). For citrus the geographic cluster consolidation was less explicit. The report further provides detailed descriptions of the fruit farming systems; in terms of: yields, varieties, production windows, farm gates prices, and pest and diseases.



### AGRONOMIC SUITABILITY: POTENTIAL FOR EXPANSION

The study further investigated the potential for expanding the current production locations, making projections of where conditions are most favourable. As a result a series of maps were developed, in particular indicating that the litoral is very suitable for the expansion of banana, grape and mango. The three maps below highlight this GIS-supported exercise that was based on the results

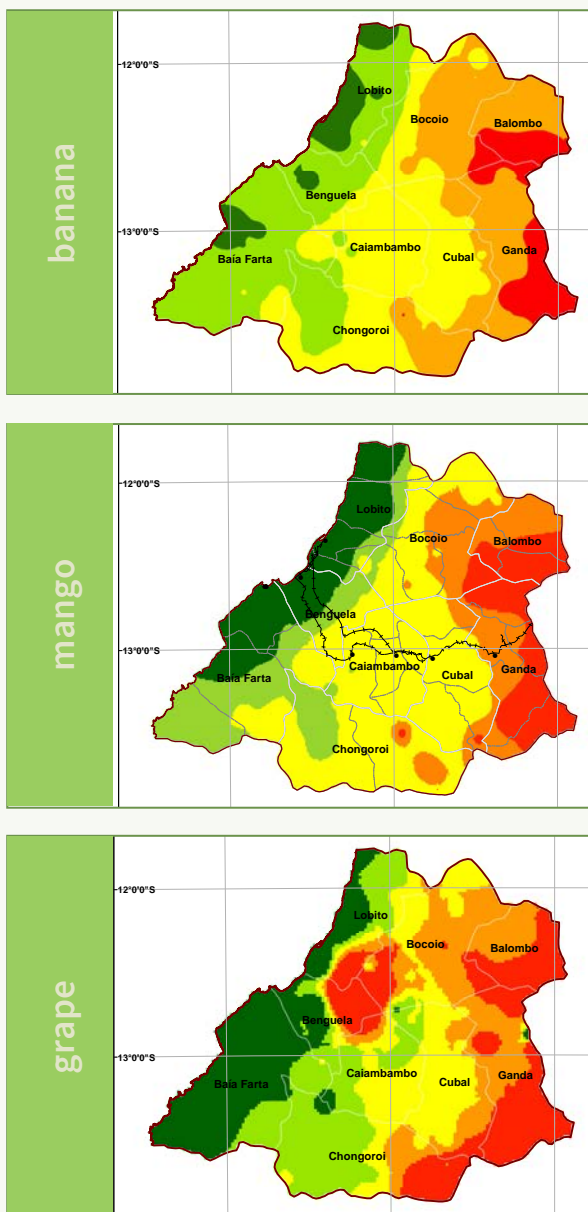
of the currently best producing farms which were interpolated and extrapolated (in the case of grape) taking into account: temperature, rainfall, altitude and water availability.

### FRUIT SECTOR SWOT ANALYSIS

Based on 20 in-depth company and 16 sector interviews, 4 interviews with Dutch importers, and the GIS and Remote Sensing analyses, the study arrived at the following SWOT analysis:

*Suitability maps of: banana, mango and grape; highlighting excellent conditions in Benguela's litoral*

*SWOT Analysis of Angola's fruit sector*



STRENGTHS		WEAKNESSES	
Agro-ecological conditions at the coast	Land and water availability	Domestic market for quality fruit and juice	Banana & mango meet EU requirements
Port and rail Infrastructure	The Lusophone connection	Level of sector organization	The phytosanitary system
		Access to finance	Doing business: Rule of law and corruption
		Domestic market prices for some fruits	High input prices
OPPORTUNITIES		THREATS	
Government focus on export and import substitution	Availability of reefers and cargo space	Specialty niche products (organic)	UJES & the Research Centre in Cavaco
		Climate change: Unpredictable rains & floods	Spread of diseases: Panama & citrus greening

## BUSINESS CASES: EXPORT BANANA AND MANGO FROM VALE DO CAVACO AND DOMBE GRANDE

The *Vale do Cavaco* covers around 3,500 ha of land with more than 700 ha dedicated to banana production. The valley has sufficient water for irrigated crop production and is situated next to the railway that runs to the Port of Lobito. The *Valle do Cavaco* has excellent production conditions, with high temperatures (average of 26°C), high relative humidity (rH = 80%) and low annual rainfall (250 mm). A number of companies in the valley apply good agricultural practices and crop yields are high at more than 30 t/ha. Companies in the *Vale do Cavaco* have the opportunity to start exports to the European Union. The cost price is acceptable, their quality and productivity is high, and the scale of production is interesting for foreign buyers. Importantly, bananas do not require strict phytosanitary measures, making it an easy first crop to start exports with. In order ‘to get there’ the following activities need to be implemented in the next 2–3 years: (1) start Global GAP and a socially certified certification process; (2) organize access to finance to invest in farm expansion, infrastructure and certification; (3) organize the logistics process; ensuring fast transit times from Lobito to Rotterdam/Antwerp (maximum of 21 days).

*Dombe Grande* presents a mango cluster of more than 50 companies, together comprising more than 1,000 ha. The area hosts a number of professional farms that produce 15–20 t/ha of quality mangoes of Kent, Keitt and Tommy Atkins varieties. Like the *Vale do Cavaco*, *Dombe Grande* has high average temperatures, humidity and low rainfall; with relatively low disease pressure. The mango cluster is situated on an alluvial fan with rich soils. Mango prices are modest at US\$ 0,21 per kg delivered in Luanda, creating good opportunities for exports. In order to facilitate exports, investments are required in packhouses with cold storage facilities and certification. Unlike for banana, mango requires strict phytosanitary measures, for which Angola’s Ministry of Agriculture will have to take the lead, developing protocols/guidelines to control fruit fly at farm level (using a systemic approach). Good potential exists for both Fair Trade and Organic export production.

## CONCLUSIONS AND RECOMMENDATIONS

Taking into account all analyses, one clear winner emerges: the litoral area in the Province of Benguela, and the production of banana, grape and mango. Looking at the planalto citrus grows well at lower altitude areas of between 1,400 and 1,550 masl and slightly lower annual rainfall of 1,000–1250 mm. These areas are interesting for the domestic market, substituting for imports from South Africa and Spain. For export production we don’t see enough opportunities given the high farm gate prices, high disease pressure and strict EU phytosanitary regulations for citrus.

Looking at the litoral area, Angola could become the ‘Peru of Africa’ having very similar production conditions in terms of day and night temperatures and humidity, and the absence of rainfall. In order to get there it is recommended to implement a broader fruit sector development strategy, ingredients of which could be:

- [ Clear private sector incentives to invest in export fruit farms, including loans at favourable terms: longer-term loans with lower interest rates and grace periods of 1–2 years.
- [ A land bank that has land available for investors at key fruit production locations.
- [ Development of large irrigation schemes along the coast, possibly organized in a public-private partnership.
- [ A sound phytosanitary system, with well-trained inspectors and electronic certification.
- [ Sector support services, like professional nurseries for young plants and agronomic advice.

**1**

# INTRODUCTION

## BACKGROUND

Angola and the Netherlands have been strong partners in agri-logistics and agricultural development over the past years. In particular Angola's Ministries of Transport and Commerce, and the Port Authorities of Luanda and Lobito have visited the Netherlands on a number of occasions to explore partnerships. At one of these visits a presentation was made that included a Fruit Mapping of Ethiopia's fruit sector, highlighting opportunities for multi-modal transport to the European Union (EU). At the time, Angola's Minister of Transport, attending the presentation, and Dutch representatives from Foreign Affairs and Agriculture, indicated that a similar study would be valuable for assessing Angola's fruit export opportunities.

The Lobito Corridor, and in specific the provinces of Huamba and Benguela, is known for its excellent conditions for fruit production. Whereas the lower situated Benguela province produces tropical fruit like banana, pineapple and mango, the Huambo province, with altitudes higher than 1,200 masl, is well positioned for fruit crops like avocado and citrus. At higher altitudes even strawberries, peach and pear grow well. At the moment these crops are mostly produced for the domestic market, with a sizeable middle class present in bigger cities like Luanda and Benguela.

As this study reveals, Angola more and more is able to substitute for fruit imports by domestic production (see Chapter 3 on the Angolan fruit sector), while exports of a number of fruits are on the increase. As such, Angola instead of a net importer of fruits, is slowly becoming a net exporter of fruits. Accelerating this trend, are the plans and ambitions of the Angolan government, highlighted in the PRODESI plan: the plan to Support Production, Export Diversification and Import Substitution. Increasing fruit exports is important to reduce forex dependency, in a world with highly volatile oil prices.

## OBJECTIVES

The main objective of this study is to provide the private sector and the government of both Angola and the Netherlands with the necessary information for investments in the Angolan fruit sector and the development of the Lobito corridor. These investments could potentially restore the status of Angola as an agricultural powerhouse and provide jobs for the local population.

Specific objectives of the study were to:

- [ Map existing and potential fruit production areas in the Benguela and Huambo provinces.
- [ Assess production and market opportunities for six major fruit commodities with a high potential for export to the EU market.
- [ Develop two business cases for geographic hotspots that can start exports to the EU in the short to medium term.



# 2 METHODOLOGY

## METHODOLOGICAL FRAMEWORK

The study worked along five interrelated activity areas:

1. Establishing the study's *focus and scope*: Crop selection and initial hotspot areas
2. *EU Demand analysis*: market requirements and global trends
3. *Angola supply analysis*: market and production conditions
4. *Fruit mapping*: determining existing and potential fruit production areas
5. *General recommendations and business cases*: main export opportunities and boundary conditions for realizing them

## FOCUS AND SCOPE

The team undertook an inception mission at the start of the project to select the six fruit crops, develop the detailed methodology and have an initial discussion on key market and production constraints. At an inception meeting in Huambo on Thursday 13 June, attended by key government and private sector representatives, the six fruit crops were selected.

Some of the outcomes of the inception mission are included in Chapters 5 and 6 on respectively the Lobito corridor and the Fruit mapping.

## EU DEMAND ANALYSIS

The EU demand analysis is built on the basis of key import and export data of the EU market. Further, the study analysed major trends in the EU's fruit consumption patterns. The activities that contributed to the analysis are:

- [ Analysis of EU import data (ITC Trademap): volumes and value, price development, major sources of production and key importing countries.
- [ Interviews with four Dutch importers, looking at their requirements in terms of: varieties, quality

and certification; market windows; volumes and prices; and crop specific issues related to diseases and phytosanitary measures.

- [ Literature study on global market trends; e.g. certification, climate change, consumer preferences and logistics innovations.

Results of these analyses are presented in Chapter 4 EU Market demand and global trends.

## ANGOLA AND LOBITO SUPPLY ANALYSIS

The supply analysis looked at both market and production issues. At the heart of these are the fruit production companies, as well as the fruit markets and input suppliers. The project undertook the following activities to this end:

- [ A map showing key production areas in Angola, based on information provided by a study that was part of ACOM, the EU's Trade Support Project (*Projeto de Apoio ao Comércio*).
- [ Development of a database with 85 fruit production companies.
- [ In-depth interviews with a selection of 20 larger and more professionally run companies. In-depth company interviews focused on: farm size and production, yields, production windows, varieties, pest and disease management, irrigation, input and output markets and prices, certification, labour, transport and access to finance.
- [ 16 Sector interviews with government representatives, fruit wholesalers and traders, input suppliers, train stations and the Port of Lobito. Interviews focused on: inputs availability, market prices, research activities, government services, infrastructure development, farmer organizations (e.g. cooperatives), and transport options and costs.

The results of these analyses are mainly reflected in Chapters 3 and 8 on Angola's fruit sector and the PSD challenges analysis.

## FRUIT MAPPING: REMOTE SENSING AND GIS

In parallel with the supply analysis we worked on the fruit mapping. The mapping consisted of two main activities: (1) the mapping of the existing fruit production areas, and (2) projections on potentially suitable fruit production areas, a suitability analysis:

[ *Existing fruit production areas (remote sensing).* Because limited agricultural statistical information is available in Angola, we resorted to satellite imagery for mapping existing fruit areas. To this end, we used 25 images of the Sentinel-2 satellite, with 0% cloud cover, of Zone 33S of the WGS-84 UTM, taken in July 2019 with a spatial resolution of 10×10 meters. The 25 images were united using the mosaicking tool available of the software program ENVI 5.3. A number of filtering, enhancement and extraction steps were implemented afterwards, in order to improve data quality. Classification of pixels for the six fruit crops was performed, pixel by pixel, using the Maximum Likelihood classifier, with an acceptance threshold of 99%. Validation of maps was undertaken by field visits of trained UJES (Labsigder) staff. GPS points were collected from a number of fruit producing farms (i.e. the in-depth company interviews), which were superimposed on the classified maps, verifying whether production areas corresponded to computed fruit crop classes. In the end, five fruit maps were developed; leaving out the one on grapes, as there were too little grape production activities present in the two provinces (though having high potential for it).

[ *Agronomic suitability mapping (GIS).* The development of the agronomic suitability maps is based on key factors that influence crop growth, i.e. altitude, temperature and precipitation. In this, we were restricted by the availability of free and accessible data. The classification as further informed by the data that was provided by farm interviews; in particular those farms with the highest productivity. For these farms the precise information on altitude, temperature and precipitation was brought together. As such, the coordinates of the farms with the highest productivity served as a reference for identifying ideal conditions for fruit production in both provinces.

Afterwards, ArcGIS 10.4.1 was used for interpolation of the six fruit crops, using Interpolation IDW of the Spatial Analyst Tools extension. As a result, three interpolated maps of altitude, precipitation and temperature, were generated for each fruit crop. In the final stage, these maps were integrated, using algebraic operations, with as a result one interpolation map for each fruit crop.

Results of these activities are highlighted in Chapters 6 and 7 of this report: Fruit mapping and Agronomic suitability.

## GENERAL RECOMMENDATIONS AND BUSINESS CASES

Based on the interviews, the fruit mapping and secondary information sources, two business cases were selected. The business cases are a combination of a geographic hotspot and fruit crop having the potential for short to medium term exports to the EU. For the selected business cases additional detailed information was collected on: cost-price at farm level, transport modalities and overall margins in the chain (at both the exporting and importing side).

Furthermore, preliminary findings were presented and discussed at:

- [ A validation meeting on 17 July in Benguela, discussing the preliminary PSD challenges analysis and envisaged business cases.
- [ A meeting with Dutch importers at the Fresh Produce Center, Zoetermeer, on Tuesday 3 September, discussing export opportunities from Angola.
- [ A meeting with key actors in the Lobito Corridor, at the Hotel Terminus in Lobito on Tuesday 10 September, discussing production supply and logistics topics.
- [ A final meeting in Luanda with key government partners, companies and foreign missions, on Thursday 12 September (Epic Sana, Luanda).

Based on the feedback during these meetings, and own analyses, a number of general recommendations were formulated on 'what does it take to get there', including both company-level and sector-level recommendations.



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# ANGOLA'S FRUIT SECTOR

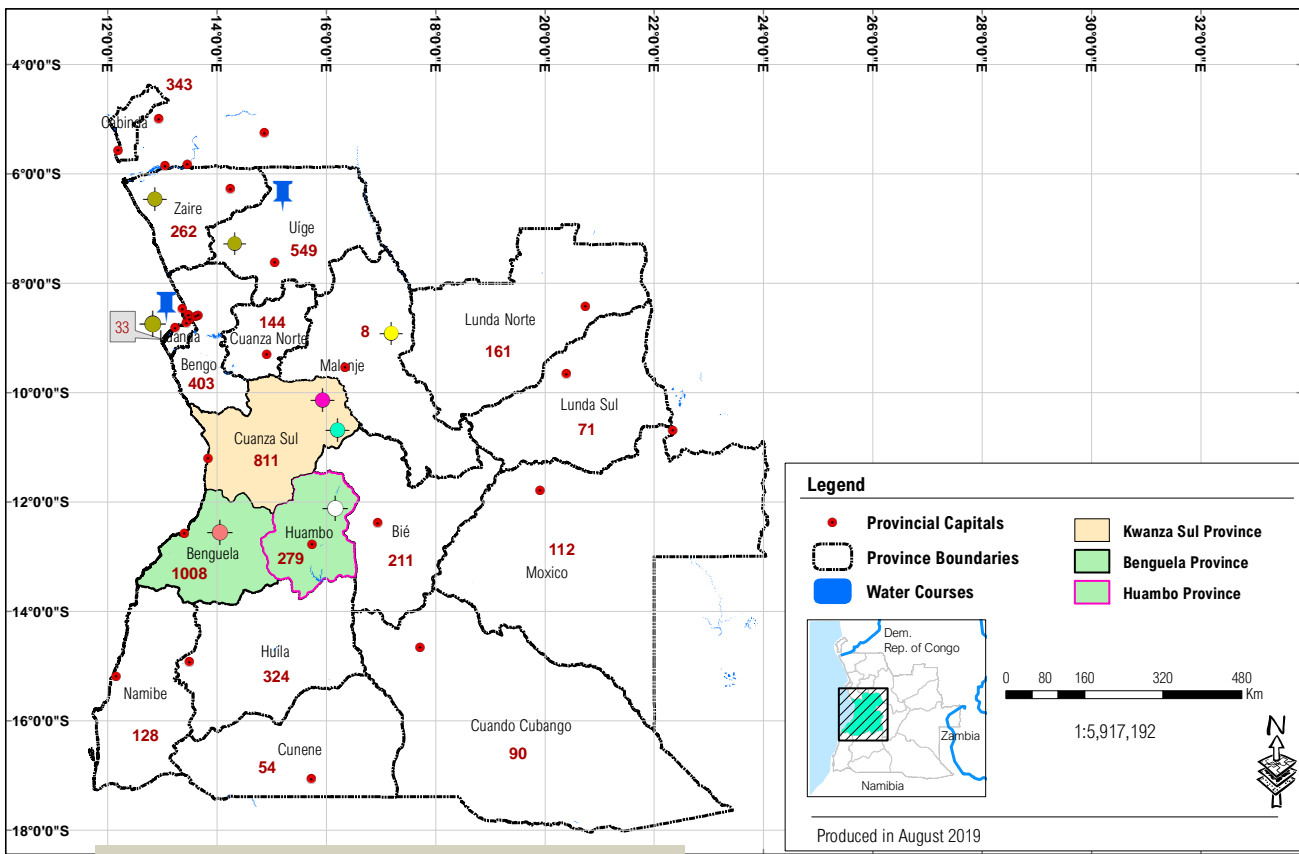


Figure 1 Fruit production and major fruit producing companies of Angola (ACOM, 2018)

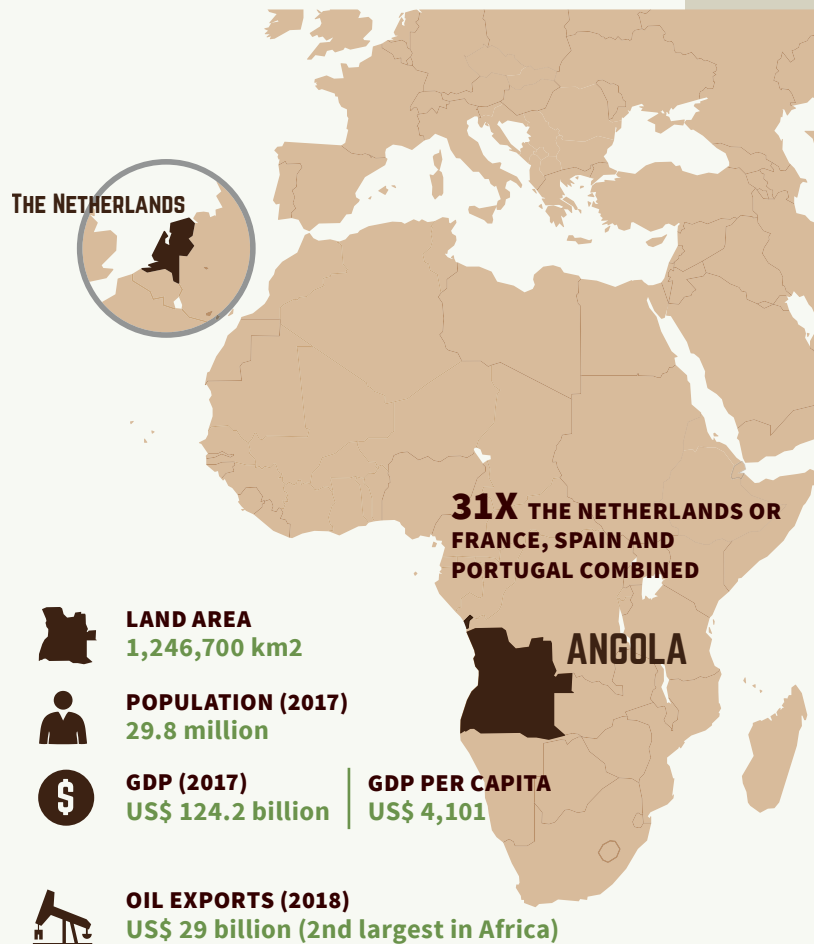
## FRUIT PRODUCTION IN ANGOLA

Limited data is available on the size and value of Angola’s fruit sector. Only aggregated information was obtained on Angola’s overall fruit sector, bringing together main production areas and key production companies. The above map presents this information.

The red highlighted figures present the aggregated production volumes of all fruit crops in Angola. The two provinces that stand out are the province of Benguela, as the largest fruit producer with more than 1 million tons of fruits, and Kwanza Sul with more than 800 thousand tons of fruits. Together with Huambo province they represent 40% of total Angolan fruit production. Additionally, the largest fruit production companies are plotted on the map, with Novagrolider of particular interest to this study, as it is the main exporter of fruits at this moment.

Before the civil war broke out in 1975, Angola used to be a major exporter of banana, in addition to coffee, sisal, sugar cane and cotton, and it was self-sufficient for all food crops except wheat. Currently Angola imports more than half of its food. For those less acquainted to the economy and geography of Angola, the following key figures can give some rough overview:

Figure 2 Key figures of geography and economy of Angola



## FRUIT TRADE TO AND FROM ANGOLA

Mainly due to the oil boom that started in earnest in 2008, Angola has been a major importer of fruits up to now. The oil boom peaked in 2012, in which year Angola imported close to US\$ 75 million. After 2012 oil prices went down, which is reflected in

lower fruit imports. Roughly since 2015 fruit imports have stabilized between US\$ 23 and 32 million. Out of these imports apple and pear rank highest with a value of close to US\$ 12 million in 2018, followed by citrus and grape with more than US\$ 6 and 2 million respectively. The following table provides the details of Angola's fruit imports:

**Table 1** Angola's fruit imports 2014–2018 (Source: ITC Trade Map)

	US\$ (2014)	US\$ (2015)	US\$ (2016)	US\$ (2017)	US\$ (2018)
Apple/pear	32,238,000	11,356,000	11,186,000	14,702,000	11,904,000
Avocado	52,000	10,000	1,000	0	0
Banana	0	0	0	0	0
Citrus	15,099,000	5,861	5,645,000	8,466,000	6,536,000
Grape	7,044,000	2,429,000	2,023,000	2,030,000	2,063,000
Mango/guava	251,000	55,000	211,000	507,000	198,000
Melon (sweet)	209,000	15,000	46,000	3,000	5,000
Papaya	62,000	14,000	14,000	9,000	17,000
Pineapple	73,000	8,000	5,000	6,000	7,000
<b>FRUIT TOTAL</b>	<b>66,046,000</b>	<b>23,215,000</b>	<b>32,225,000</b>	<b>32,225,000</b>	<b>26,059,000</b>

Angola's exports are of a more recent nature and basically started in 2017. Since that year exports have increased steadily, growing from US\$ 400,000 to close to US\$ 2.5 million in 2018. Based on information from Angola's largest exporter, Novagrolider, this figure will probably double in 2019. Angola's main export crop is banana, taking more than 90% of the total. Export destinations include: Spain, Portugal and South Africa, in that order. Limited other exports take place to DRC and Namibia,

especially for pineapple, mango and citrus. Though non-recorded informal trade can still be substantial. Table 2 below portrays Angola's first steps in the international fruit export arena. At this speed (basically doubling from 2018 onwards), Angola could become a net exporter of fruits by 2022. The likelihood of this to happen depends to a large extent on the number of exporting companies stepping up their production volumes and production quality.

**Table 2** Angola's fruit exports 2014–2018 (Source: ITC Trade Map)

	US\$ (2014)	US\$ (2015)	US\$ (2016)	US\$ (2017)	US\$ (2018)
Avocado	0	0	0	0	0
Banana	0	120,000	15,000	323,000	2,274,000
Citrus	0	30,000	10,000	14,000	21,000
Grape	0	9,000	7,000	2,000	2,000
Mango/guava	0	6,000	1,000	15,000	61,000
Melon (sweet)	0	4,000	16,000	2,000	0
Papaya	0	13,000	11,000	1,000	33,000
Pineapple	0	10,000	1,000	6,000	4,000
<b>FRUIT TOTAL</b>	<b>0</b>	<b>258,000</b>	<b>83,000</b>	<b>407,000</b>	<b>2,455,000</b>

## GENERAL CHARACTERISTICS OF ANGOLA'S FRUIT SECTOR

Based on a number of wholesale market and sector interviews in Luanda, Huambo and Benguela, the following general observations can be made about Angola's fruit sector; also comparing Angola to other sub-Saharan African countries:

- [ Domestic supermarket and wholesale prices for fruit crops like citrus, pineapple and grape appear lucrative, and higher than world market prices.
- [ The supermarket sector is well developed with major chains like Kero and Shoprite present in the country. Visual quality of most fruits appears decent, with some attention for quality standards at producer level.
- [ There is a large fruit juice segment, with numerous domestic brands that produce in-country. This leaves room for B-grade processing of fruits. Locally produced juices available in the market include: mango, passion fruit, mucua, pineapple and guava.
- [ There are basically two parallel market streams, the higher quality supermarket channel that is estimated to do 20% of the fruit consumer sales and the informal markets that are supplied by wholesale markets like Mercado Treinta in Luanda, Mercado Quatro in Benguela and Alemanha in Huambo. The informal market is estimated to do 80% of the fruit sales.
- [ Traders or aggregators (*quitandeiras*) are the main link between the small-scale producers and the wholesale markets. They typically rent a truck to transport fruits from the province to the market.
- [ There is limited availability of young plants (seedlings or plantlets) of improved cultivars of e.g. mango, avocado, citrus, pineapple and passion fruit. There is a small University nursery at the University of José Eduardo dos Santos (UJES) in Huambo, and a few small-scale initiatives.

# 4

## EU MARKET DEMAND AND GLOBAL TRENDS

## EU IMPORTS: VOLUMES AND VALUES

Based on data from the last five years the EU-28 (including the UK) remains the largest importer of fruits in the world (ITC Trade Map). In terms of volume the EU imports 36% of the world's total and in value it reaches 41%. It shows the EU is also paying more than other countries for (quality) fruits. Table 3 below illustrates this:

**Table 3** EU fruit imports as a percentage of total world imports (Source: ITC Trade Map)

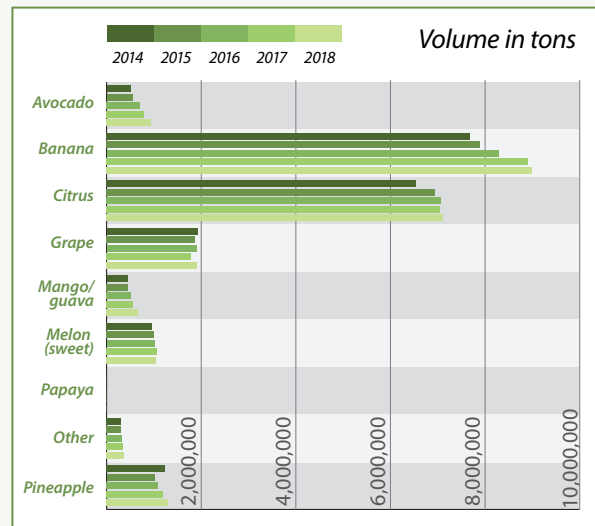
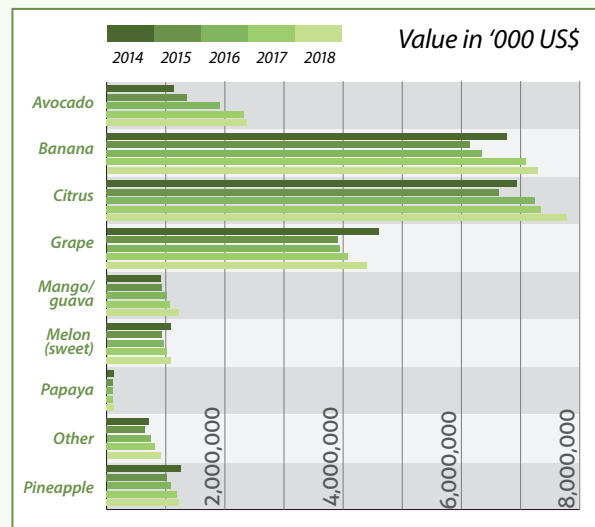
	VOLUME	VALUE
Avocado	37.6%	39.3%
Banana	38.5%	45.2%
Citrus	41.7%	47.6%
Grape	35.1%	38.5%
Mango/guava	31.0%	39.1%
Melon (sweet)	45.3%	56.8%
Papaya	37.3%	37.8%
Other*	11.8%	26.1%
Pineapple	36.3%	44.7%
<b>FRUIT TOTAL</b>	<b>36.3%</b>	<b>40.6%</b>

\* Includes: Tamarinds, cashew apples, jack fruits, lychees, passion fruit, pitaya and pomegranate

The table also shows that the EU especially is a large importer of sweet melons (e.g. Galia, Cantaloupe), citrus, banana and pineapple, with import percentages of 45% and higher.

Total imports of fruits and nuts to the EU stood at US\$ 55 billion and 34 million tons in 2018 (ITC Trade Map, HS-code 08). The top-3 biggest importers are

**Figure 3** Fruit imports EU-28 in value (above) and volume (below), 2018 (Source: ITC Trade Map)



Germany, the Netherlands and the UK, in that order; with the three most traded commodities banana, citrus and grape (in value). Figure 3 presents the main imported fruits to the EU.

**Table 4** Top-5 Importers of fruits in the EU by value (Source: ITC Trade Map)

	1	2	3	4	5
AVOCADO	Netherlands	France	Germany	Spain	UK
BANANA	Belgium	Germany	Netherlands	UK	France
CITRUS	Germany	France	Netherlands	UK	Poland
GRAPE	Netherlands	Germany	UK	France	Poland
MANGO/GUAVA	Netherlands	Germany	UK	France	Spain
MELON (SWEET)	France	Netherlands	UK	Germany	Spain
PAPAYA	Germany	Portugal	Spain	Netherlands	UK
OTHER*	Netherlands	Germany	France	Belgium	Italy
PINEAPPLE	Netherlands	Spain	Italy	Germany	UK
<b>OVERALL</b>	<b>Germany</b>	<b>Netherlands</b>	<b>UK</b>	<b>France</b>	<b>Belgium</b>

\* Includes: Tamarinds, cashew apples, jack fruits, lychees, passion fruit, pitaya and pomegranate

**Table 5** Yearly average import prices per major fruit crop (Source: ITC Trade Map)

	US\$ (2014)	US\$ (2015)	US\$ (2016)	US\$ (2017)	US\$ (2018)
Avocado	2.27	2.47	2.74	2.97	2.53
Banana	0.88	0.78	0.77	0.80	0.81
Citrus	1.06	0.96	1.03	1.04	1.09
Grape	2.40	2.09	2.07	2.28	2.30
Mango/guava	2.07	2.04	1.94	1.94	1.86
Melon (sweet)	1.13	0.93	0.95	0.97	1.05
Papaya	2.44	1.99	2.18	1.98	2.37
Other*	2.40	2.19	2.27	2.37	2.51
Pineapple	1.03	1.01	1.00	0.99	0.95

\* Includes: Tamarinds, cashew apples, jack fruits, lychees, passion fruit, pitaya and pomegranate

The graphs also show that banana and citrus are by far the most traded commodities by volume, taking up more than 70% of all imported (selected) fruits. Prices for these two commodities have been stable for the last ten years and average US\$ 0.80 per kg for banana and US\$ 1.05 per kg for citrus (import value). Crops like avocado and grape are generally more high-value commodities, with average prices

over the last five years of respectively US\$ 2.60 and US\$ 2.25 per kg. The table above provides an overview of the price development of major fruits over the last five years.

General lessons that can be drawn from these data are:

AVOCADO	BANANA	CITRUS	GRAPE	MANGO	SWEET MELON	PAPAYA	PINEAPPLE
<b>MARKET AND VOLUME</b>							
Increased demand (volumes doubling every five years)	Slowly growing demand at 3–4% per year	Very competitive market with stable prices and slowly growing demand at 2% per year	Very little growth in the market both in terms of price and volume	Volume growth of 6% per year	Low value, bulky export commodity	Small traded volumes	High volume commodity at 1.3 million tons import (fourth largest by volume)
At generally high volumes of close to 1 million tons per year	The largest traded fruit commodity worldwide	The second largest traded fruit commodity by volume	The third largest traded fruit commodity by volume at US\$ 4.4 billion per year	Volume reaches 660 thousand tons in 2018 (including guava)	Yearly volumes of more than 1 million tons	A bit more than 50 thousand tons per year	
<b>PRICE LEVEL</b>							
A stabilizing price level at <b>US\$ 2.50 per kg</b>	Low, stable price levels at <b>US\$ 0.80 per kg</b>	The number one traded fruit commodity by value	High-value crop at <b>US\$ 2.20 per kg</b>	Prices have gone down slowly at 2% per year, now averaging <b>US\$ 1.85 per kg</b>	Import prices are stable at around <b>US\$ 1.00 per kg</b>	Fluctuates between <b>US\$ 2.00 and US\$ 2.40 per kg</b>	A low value at around <b>US\$ 1.00 per kg</b>
<b>MAIN EXPORTING COUNTRIES</b>							
Peru, Chili, South Africa	Panama, Costa Rica, Ecuador	(outside EU-28): South Africa, Egypt, Morocco	(outside EU-28): South Africa, Peru, Chili	Brazil, Peru, Ivory Coast	Brazil, Costa Rica, Honduras	Brazil	Costa Rica

## GLOBAL TRENDS

Talking to a number of importers in the Netherlands they indicate the following trends in terms of market demand and production:

- [ Peru has gone up rapidly in the last decade as a major exporter of fruits (especially: avocado, grape and mango), benefited by good climatic conditions, water availability and professional growers, and logistics. This shows the potential of a new country if the total package is right.
- [ Production in Angola largely follows the seasons of the Southern hemisphere, with a distinct colder season during the months of June, July, August and September. This is opposite to the main production seasons of Northern hemisphere countries like Costa Rica, Egypt and Morocco and as such specific market windows can be targeted. Countries with similar seasons, and hence competitors are: South Africa, Peru and Chili.
- [ Phytosanitary regulations are becoming stricter and stricter, especially for citrus and mango. Pests and diseases that are particularly looked after are: fruit fly, false codling moth and black spot (the latter two for citrus). For a relatively new fruit exporting country it will be difficult to implement all measures at the same time.
- [ Certification of products: Global-GAP is now the bare minimum; companies need other certificates as well like socially certified (e.g. Fair Trade or SMITA).
- [ For banana and pineapple the market is consolidated by a few multinational players: Chiquita/Fyffes, Delmonte and Dole. Competition is high

and margins are very low in this market. Though there are possibilities for smaller scale Fair Trade producers.

- [ Importers are always looking for new sourcing areas; especially because of recurring droughts in South Africa and Mexico.
- [ Angola is part of the ACP (Africa, Caribbean and Pacific) trade agreement of the EU, having reduced import tariffs on fruits like banana.

A major study on global fruit trends was presented at the Fruit Logistica of 2018 (Oliver Wyman, 2018); Disruption in fruit and vegetable distribution. A number of general trends, relevant to Angola, can be distilled from this report:

- [ Global consumption of fruit and vegetables will grow from € 2.1 to € 4.8 trillion between 2015 and 2030.
- [ The main market for fruits and vegetables will remain the European Union with a population of 500 million consumers, that are quality conscious and with a high purchasing power.
- [ Because of climatic change, fuel efficient transport will become even more important; benefitting seafreight over airfreight.
- [ Multimodal transport systems, using reefer containers and combining road, rail and seafreight, will become more important; decreasing travel time and bringing down costs.
- [ Certification will become even more important; looking beyond Global GAP at socially certified and climate labels.



# 5

## THE LOBITO CORRIDOR AND THE PROVINCES OF BENGUELA AND HUAMBO

## THE BENGUELA RAILWAY AND PORT OF LOBITO

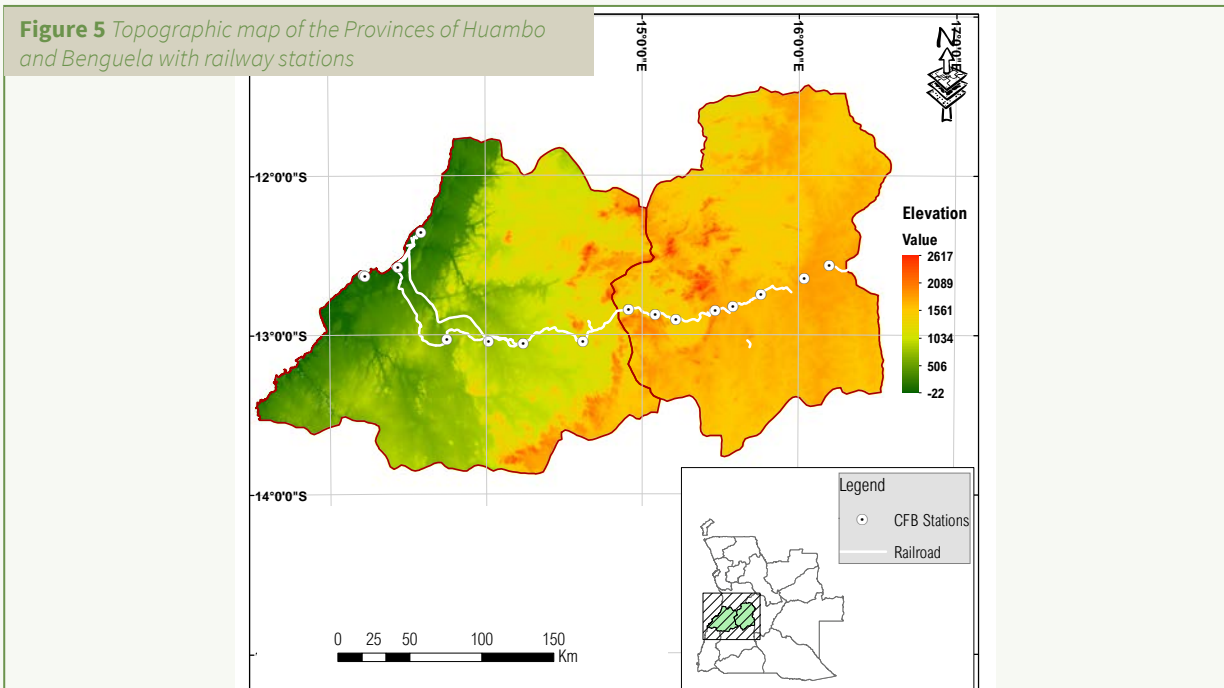
The organizing principle of the Lobito Corridor is the railway that runs from Lobito and Benguela in the west to the town of Tenke in Katanga Province of DRC in the east. The railway is 1,866 km long and connects the Port of Lobito with important mining areas in both the DRC and Zambia's copper belt. On the Angolan side the corridor runs through the provinces of Benguela, Huambo, Bié and Moxico. The railway was reconstructed between 2006 and 2014.

The Port of Lobito has been reconstructed between 2013 and 2016 and can now serve 20 ships and 50,000 TEU (twenty-foot equivalent containers) per day. The total capacity of the port is estimated at 11 million tons per year. There is sufficient capacity for reefer containers with 370 connections. At the moment the Port receives around 450 reefer containers per month (mainly meat and fruits and vegetables), while exporting around 5 reefer containers (mainly fish). The train reaches directly to the inside of the port and there are sufficient loading trucks available. Main shipping lines are Nile Dutch, MSC, Bolloré. Prices for shipping a 40 foot reefer container are between US\$ 2,500 and US\$ 3,000 to

Rotterdam/Antwerp, with a route that first connects a feeder boat to Namibe and Luanda, before transiting to Europe. Terminal Handling Costs are around US\$ 400 (which are negotiable). Transit time is between 18 and 21 days from Luanda to Rotterdam.

Figure 4 The Benguela-Katanga railway (en.wikipedia.org)





### AGRO-ECOLOGICAL CONDITIONS

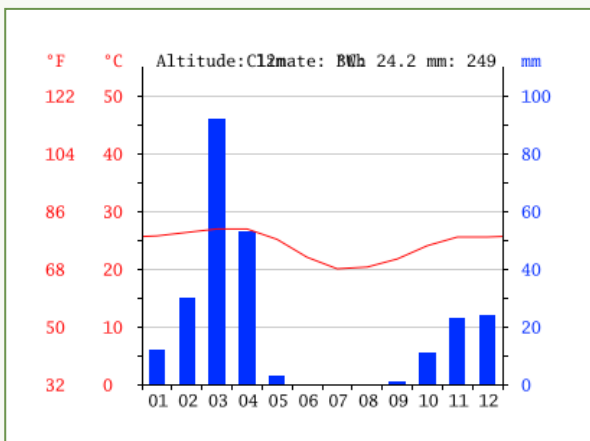
The two provinces of Benguela and Huambo have distinct agro-ecological conditions. Benguela, situated at the coast with the major city Benguela as its capital, has a 50 km coastal plain at the west, the ‘litoral’, gradually running up to the planalto of Huambo. Most areas in Benguela are below 1,200 masl.

Benguela’s *Litoral* is characterized by low rainfall and high day and night temperatures. Temperatures fluctuate during the year, with a distinct winter season between June and September. Night temperatures can go down to 16°C in August,

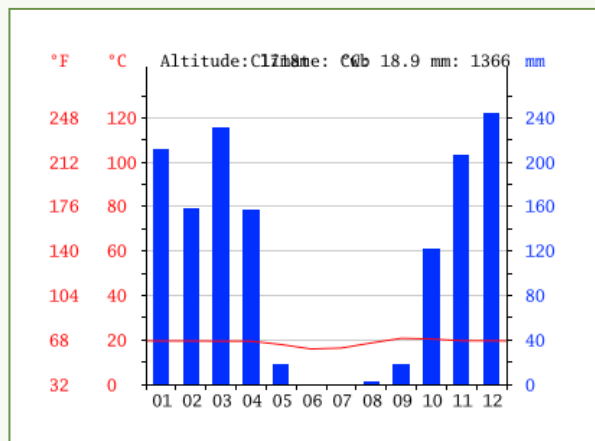
reducing the crop growth of banana and pineapple. Rainfall is very low at an average of 250 mm per year. Figure 6 below presents the average temperatures and rainfall data per month in Benguela.

The province of Huambo is largely situated on a highland plain with hills, the planalto with cooler temperatures and higher rainfall. The capital city of Huambo is situated at 1,718 masl and has average annual temperatures of around 20°C and an annual average rainfall of 1,366 mm. Night temperatures in August can go below 5°C in July and August with day temperatures relatively stable at 25–30°C throughout the year.

**Figure 6** Monthly temperature and rainfall in Benguela (Source: climatedata.org)



**Figure 7** Monthly temperature and rainfall in Huambo (Source: climatedata.org)



## FRUIT PRODUCTION AND CROP SELECTION

In general, the Province of Benguela has for long been a major producer of banana, mango and pineapple. Feedback from government officials and private sector representatives indicated that mango grows well – basically from Benguela to Balombo, and pineapple production is largely concentrated around the Northern area of Benguela in the Município of Bocoio. For Huambo, citrus stands out as the major fruit crop, with avocado as a potential crop given the high rainfall and conducive temperatures in some (lower) areas. In the end, grape was selected as the sixth crop because of the EU's demand and high prices. Also, promising production results have been achieved in other parts of the country (especially in Bengo). In summary, the reasons for the six selected crops are as follows:

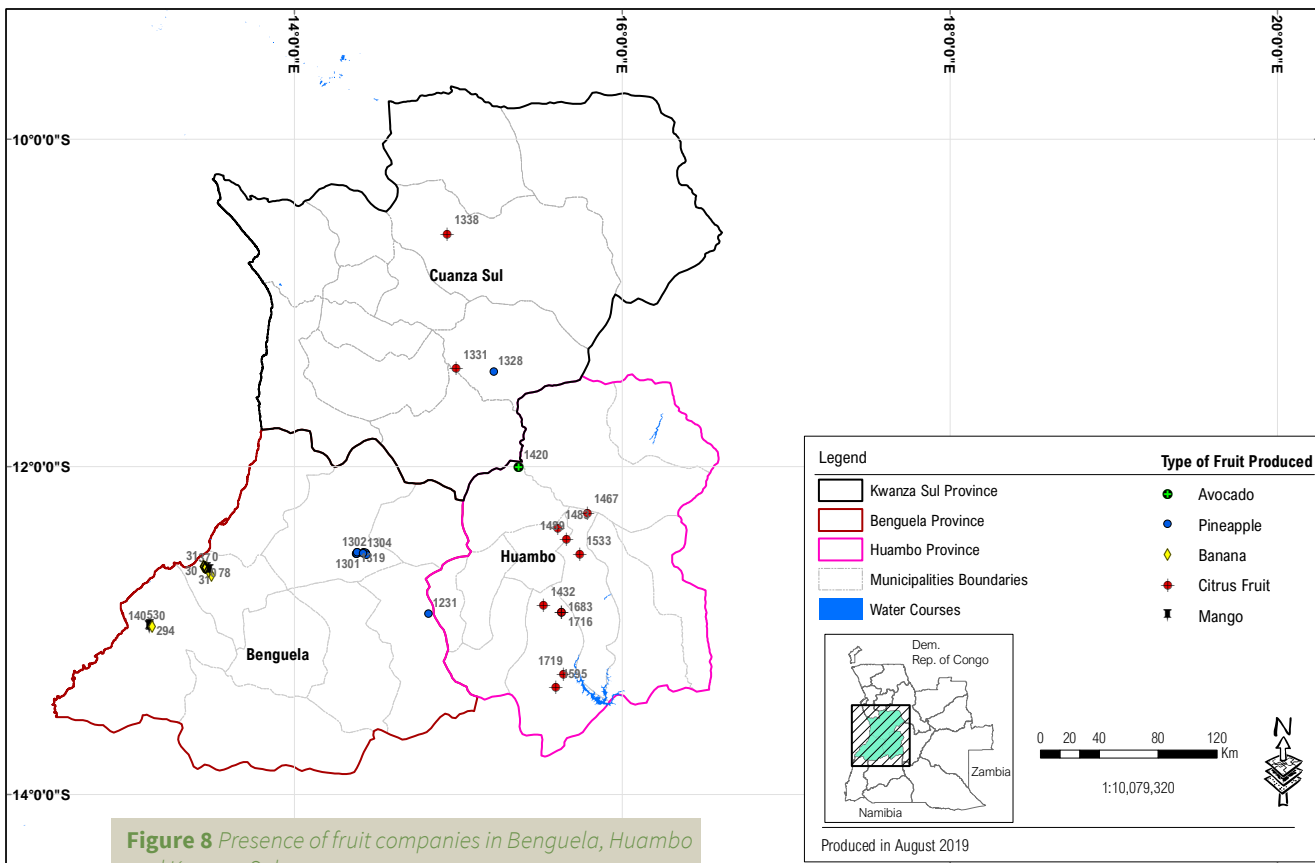
In the end, passion fruit, papaya and guava were not selected because of the limited import volumes of the EU, as well as relatively high domestic prices in Angola. Still, for niche markets these crops can be interesting, e.g. airfreight organic passion fruit. The market for sweet melons is dominated by Brazil and Costa Rica and prices are low; though there could be a small window during May–June (before the cold sets in) for production along the Benguela coast line (hot and dry). For now, melons have not been taking into account.

**Table 6** Summary of crop selection criteria

	EU MARKET DEMAND (volume)	EU MARKET DEMAND (price/kg)	ANGOLA CURRENT PRODUCTION	ANGOLA AGRO ECOLOGICAL POTENTIAL	ANGOLA EXISTING EXPORTS
AVOCADO	Medium-high & increasing	High & stabilizing	Low	High, in lower areas of Huambo	Absent
BANANA	High & stable	Low & stable	High	High, in litoral of Benguela	Upcoming (seafreight)
CITRUS	High & stable	Low & stable	Medium	High, throughout Huambo province	Absent
GRAPE	High & stable	High & stable	Low	High, in lower areas	Absent
MANGO	Medium-high & increasing	High & decreasing	Medium	High, in litoral of Benguela	Small (airfreight)
PINEAPPLE	High & stable	Low & decreasing	High	High, in intermediary zone of Benguela	Absent

# 6

## FRUIT MAPPING: COMPANIES AND PRODUCTION AREAS



**Figure 8** Presence of fruit companies in Benguela, Huambo and Kwanza Sul

## MAIN FRUIT PRODUCING COMPANIES

Throughout the provinces of Benguela and Huambo the main producers of the six selected fruits were mapped. This exercise was informed by interviews with key representatives from the Ministry of Agriculture and wholesalers at the main markets, knowing their suppliers. The above map shows the presence of those farms larger than five hectares dedicated to fruit production. For this specific exercise we included three farms in Kwanza Sul as well, as these were advised as larger, professional farms with export potential.

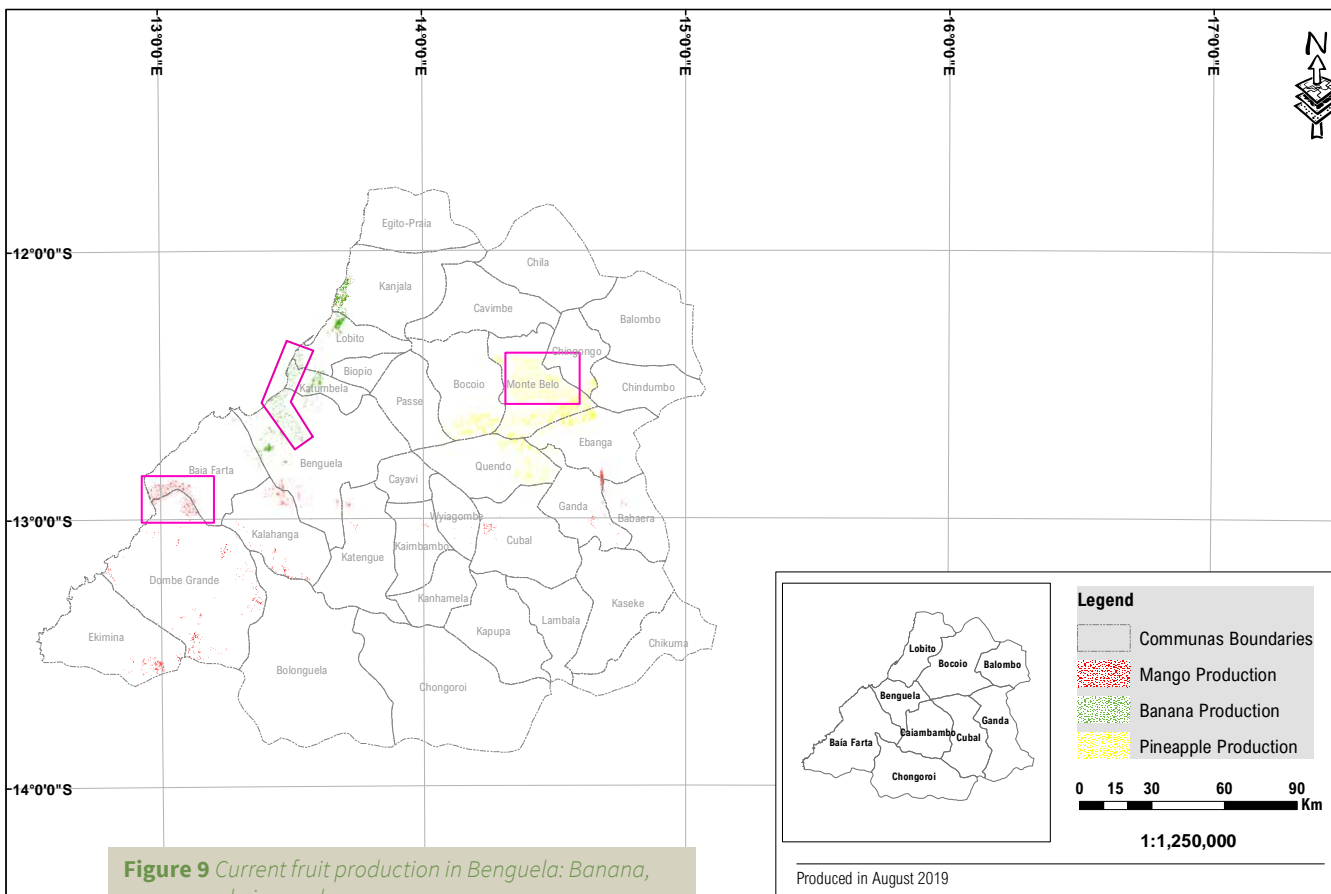
Citrus farms are spread throughout the Province of Huambo, whereas pineapple farms were more concentrated in the Municipios of Bocoio and Ganda. The bigger banana farms are all located along the coast and especially close to Benguela. The larger mango farms are also located along the coast and especially in the Municipio of Baia Farta. In the underlying database we brought together 83 farms, and we described their main characteristics. Table 7 provides summarized information of the farms.

The table shows that especially citrus and pineapple farms are well represented in Benguela and Huambo,

**Table 7** Farms in the Lobito corridor and their main characteristics

CROPS	NUMBER OF COMPANIES	AVERAGE SIZE (ha)	DOMINANT IRRIGATION TYPE
Avocado	1	5	rained
Banana	18	14	drip irrigation
Citrus	32	15	furrow irrigation
Mango	5	23	furrow irrigation
Pineapple	27	19	rained
<b>TOTAL</b>	<b>83</b>	<b>15</b>	

with 32 and 27 farms respectively. For citrus the focus is mainly on oranges and lemons, and to a lesser degree also on tangerines and limes. The Municipio of Bocoio has a large number of pineapple farms, mostly between 10 and 15 ha, though two farms have 40 and 100 ha of production (increasing the average to 19 ha per farm). The same holds for the five mango farms in Baia Farta, where one farm had 67 hectares, compared to the average of the other four farms of 12 hectares. Whereas most citrus and mango farms use furrow irrigation most commercial banana farms use drip irrigation. Though there were a few citrus and mango farms that used drip as well. Avocado and pineapple farms are rained.



**Figure 9** Current fruit production in Benguela: Banana, mango and pineapple

## MAIN FRUIT PRODUCING AREAS AND CHARACTERISTICS: BENGUELA

Based on satellite imagery the current production locations were mapped; also taking into account the smaller producers. The above map shows the current production areas for the three selected crops in Benguela province.







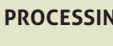

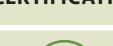
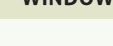
The map shows that the largest production of bananas is located along the coast in the Municipios of Kanjala, Lobito, Catumbela and Benguela. Farms are irrigated with subsurface water that can be found at reasonable depths (10–50 meters). The area is popular for construction given the vicinity to major cities like Benguela and Lobito and an established tourism industry. There are signs of salinization closer to the coast. As such the first few kilometres next to the sea are less suitable for agricultural production. In general, banana is sensitive to salt stress and farmers in the area should be cautious draining their soils well. Some general characteristics of the main banana cluster are shown on the right.

BANANA	
	<b>YIELD</b> Well-managed farms obtain yields of more than 40 tons/hectare
	<b>VARIETIES</b> Cavendish: Williams and Grand Nain
	<b>DISEASES</b> Especially nematodes, and a little bit of sigatoka
	<b>INPUTS</b> Improved planting material from South Africa, local propagation
	<b>IRRIGATION</b> All drip with boreholes using shallow groundwater
	<b>PROCESSING</b> A number of farms with professional washing, grading, packing and ripening chambers (cold storage)
	<b>FARM GATE PRICES</b> Akz 100–120 per kg (US\$ 0.30–0.35) for higher end retail
	<b>CERTIFICATION</b> No certification yet
	<b>PRODUCTION WINDOW</b> October till May

The key mango area is more situated to the south of Benguela province, in particular in the Municipio of Baia Farta. Mangoes grow well up to higher altitudes of Balombo and Ganda, though farms are more scattered and depending on rainfall. A cluster of larger mango farms can be observed at the border of the Communes Dombe Grande and Baia Farta. Farms here use furrow irrigation and are general larger than in the other parts of the province. Some specific information from the farms interviewed in the area:

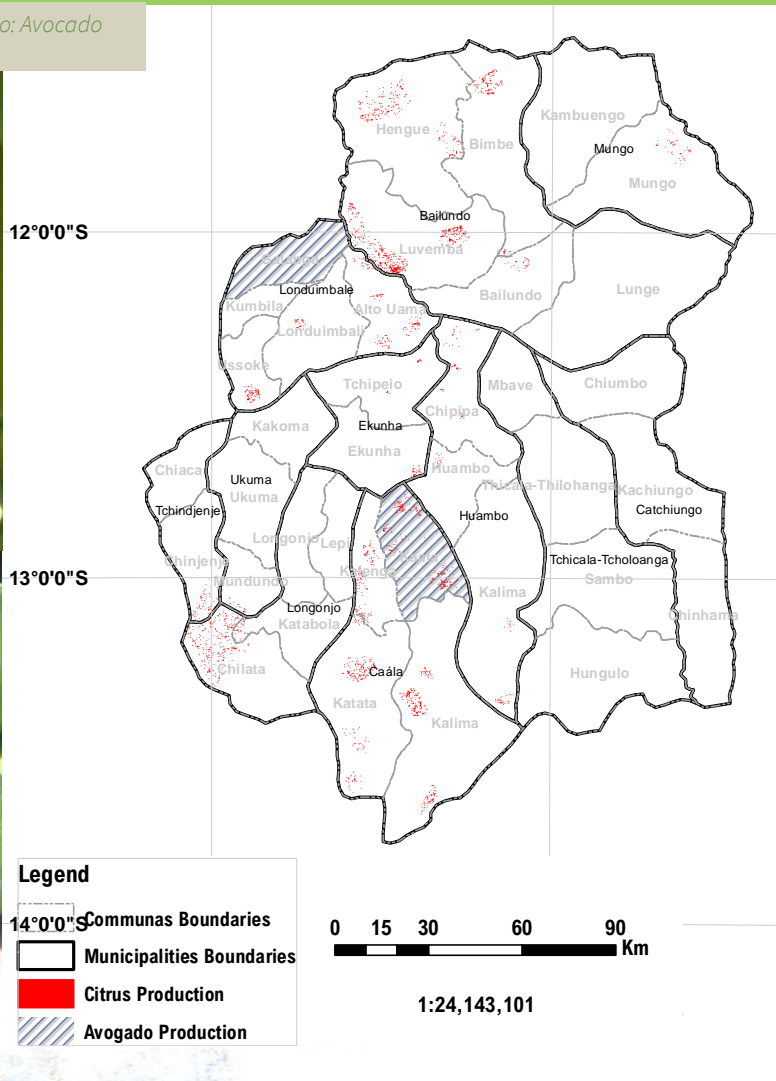
MANGO 	
 <b>YIELD</b>	Well-managed farms obtain yields between 20–25 tons/hectare
 <b>VARIETIES</b>	Keitt, Kent and Tommy Atkins
 <b>DISEASES</b>	Fruit fly is present, limited other diseases
 <b>INPUTS</b>	Improved planting material from South Africa
 <b>IRRIGATION</b>	Furrow irrigation using boreholes from shallow groundwater
 <b>PROCESSING</b>	No packhouses, and washing and grading facilities
 <b>FARM GATE PRICES</b>	High season: Akz 100 per kg (US\$ 0.30/kg) for higher end retail
 <b>CERTIFICATION</b>	No certification yet
 <b>PRODUCTION WINDOW</b>	December till March

Pineapple production is mainly concentrated in the intermediate zone between the litoral and the planalto at altitudes ranging from 800 to 1,200 masl. There is a large cluster of pineapple farms in the Municipio of Bocoio and in particular in the Commune of Monte Belo. The cluster consists of both larger and smaller growers. Specific characteristics of the crop and the area:

PINEAPPLE 	
 <b>YIELD</b>	Well-managed farms obtain yields between 30–35 tons/hectare
 <b>VARIETIES</b>	Smooth Cayenne, and a local variety called
 <b>DISEASES</b>	Fruit fly is present, limited other diseases
 <b>INPUTS</b>	Local materials, locally multiplied
 <b>IRRIGATION</b>	Rainfed
 <b>PROCESSING</b>	No packhouses, and washing and packaging facilities
 <b>FARM GATE PRICES</b>	Akz 150–200 per kg (US\$ 0.45–0.60/kg) higher end retail
 <b>CERTIFICATION</b>	No certification yet
 <b>PRODUCTION WINDOW</b>	November till May



**Figure 10** Current fruit production in Huambo: Avocado and citrus



## MAIN FRUIT PRODUCING AREAS AND CHARACTERISTICS: HUAMBO





















The map of Huambo particularly shows the prevalence of citrus farms. These are spread throughout the province though more towards the west of the province than further inland. Especially the western part of the Municipio of Bailundo, and the Municipios of Longonja and Caála take up the largest production areas of the Province of Huambo. The grey shaded area highlights the main avocado producing areas, which were hard to detect on a 10x10 meter grid as they are mainly grown in backyards or more scattered throughout the farm.



For citrus we see that many orchards are of older origin with mostly local varieties produced. The farms are larger *fazendas*, often more than 200 hectares, with between 20 to 50 hectares dedicated to citrus. The remainder of the farm is used for grazing or lays fallow. Farmers have a few hectares mainly focusing on oranges and lemons. Coloring of oranges does take place due to the colder months of June–September, unlike in other tropical countries. Blackspot was observed at a number of farms, and appears to be a problem throughout the province (though manageable applying right agronomic practices). More detailed characteristics of the production system for most of the farms:

For avocado limited information is available because of the dispersed nature of production. Some key findings from the market and one farm interviewed are below.

The case of grapes we couldn't study in detail because of non-existent production in Benguela and Huambo. However, we did visit a grape farm in Bengo, and we extrapolated the production conditions of that farm to the Benguela province (having similar production conditions); results of this are presented in the next chapter.

CITRUS 		AVOCADO 	
 <b>YIELD</b>	Most farms obtain yields of around 5 tons/hectare	 <b>YIELD</b>	NA
 <b>VARIETIES</b>	Baía, Valencia and Navel oranges, Mexerica and Clementine tangerines, Rugoso and Siciliano lemons and Tahiti limes	 <b>VARIETIES</b>	Margarida, Fortuna, Hass and Geada
 <b>DISEASES</b>	Fruit fly, blackspot, mealybug, powdery mildew, <i>Phytophthora hibernalis</i>	 <b>DISEASES</b>	Mealybug, <i>Botryosphaeria ribis</i>
 <b>INPUTS</b>	Local and own nurseries, limited use of fertilizer and pesticides	 <b>INPUTS</b>	Local nurseries, limited use of fertilizer and pesticides
 <b>IRRIGATION</b>	Rainfed supplemented by furrow irrigation	 <b>IRRIGATION</b>	Rainfed supplemented by furrow irrigation
 <b>PROCESSING</b>	Except for a few no packhouses and packaging facilities	 <b>PROCESSING</b>	No packhouses and packaging facilities
 <b>FARM GATE PRICES</b>	Akz 150–200 per kg (US\$ 0.45–0.60/kg) for oranges	 <b>FARM GATE PRICES</b>	Akz 250 per kg (US\$ 0.75/kg)
 <b>CERTIFICATION</b>	No certification yet	 <b>CERTIFICATION</b>	No certification yet
 <b>PRODUCTION WINDOW</b>	December till May	 <b>PRODUCTION WINDOW</b>	September–December

7

# AGRONOMIC SUITABILITY: POTENTIAL FOR EXPANSION

Based on the results from the top performing farms in terms of yield and production risks like pest and diseases we have made interpolations and extrapolations of most suitable growing areas of the six selected crops. The maps do not indicate that fruit growing is impossible outside of the dark and light green coloured areas, only that it will be more difficult to achieve high yields, e.g. in terms of water availability and temperatures. Specific assumptions are explained for each of the crops below.

## AGRONOMIC SUITABILITY

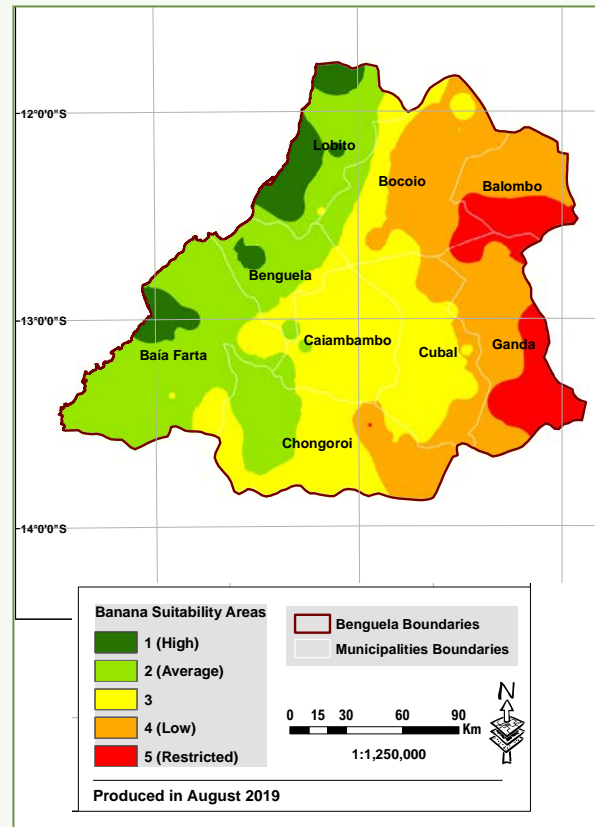


Starting with banana we see that especially the strip alongside the coast is very suitable for banana production. Given the high water consumption of banana the existing irrigation schemes around the cities of Lobito and Benguela, as well as the scheme more to the south in Baia Farta, stand out. These dark green coloured areas are highly suitable for banana production because of the warm and humid production conditions, and good water availability. Towards the Municipio of Chongoroi good production conditions exist as well (currently little explored) because of the low altitude conditions and water availability through the Coporolo River. If rail transport to the Port of Lobito is the objective then the area from Bimbas do Cavaco to Lobito is best served. This is a stretch of 43 km and runs three times per day.

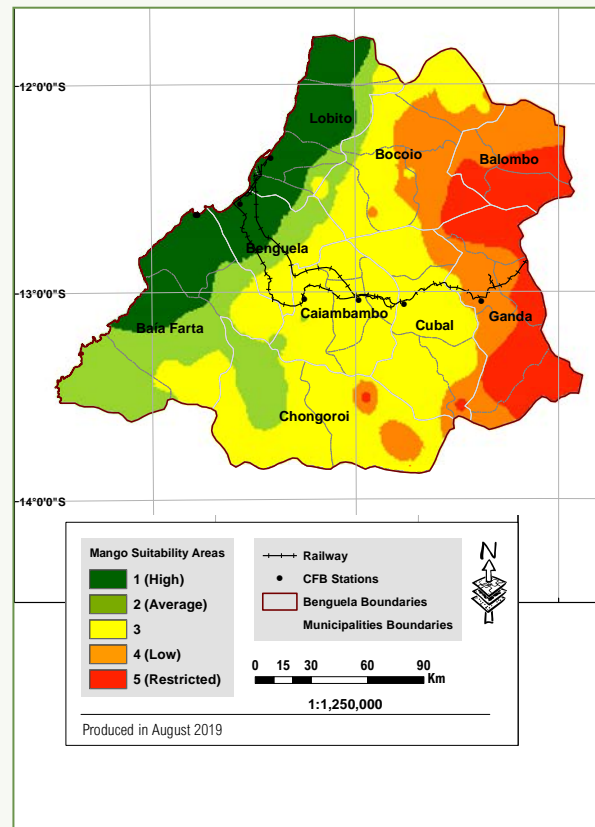


The suitability of mango follows similar lines as that of banana. Best production areas are adjacent to the sea and run North-South, in line with the land strip that is 50 km wide and roughly at sea level. Due to the colder winter period the mangoes develop a distinct single harvest season. Flowering starts during the coldest months of July and August, after which fruits start maturing from September onwards. The main harvest is between December and March. Production along the coast is advantageous because of the low rainfall, that remains around 250 mm per year, and hence significantly reduces pest pressure for *anthracnose*, a fungal disease, and bacterial blackspot. Fruit fly presence should be lower as well.

**Figure 11** Suitability for irrigated banana production in Benguela province



**Figure 12** Suitability for irrigated mango production in Benguela province

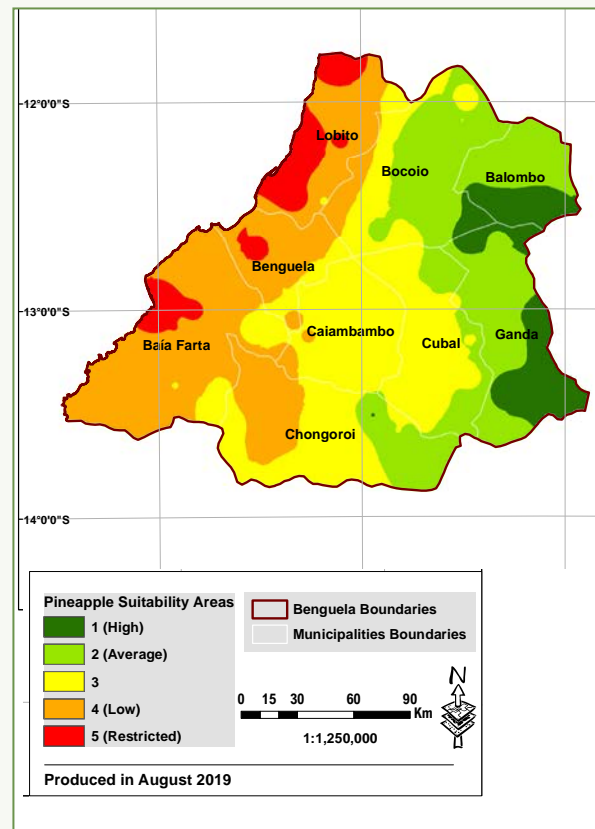




Rainfed pineapple production prefers humid conditions and warmer temperatures. It is for these reasons that pineapple production in Benguela Province can mainly be found at altitudes between 800 and 1,200 masl that receive around 1,000 mm of rainfall per year (and have average temperatures of 22–23°C). Given the tradition of growing pineapple rainfed in Angola, we used rainfed production as the basis for our interpolation exercise. This does not mean that pineapple can't grow well at lower altitudes using irrigation.

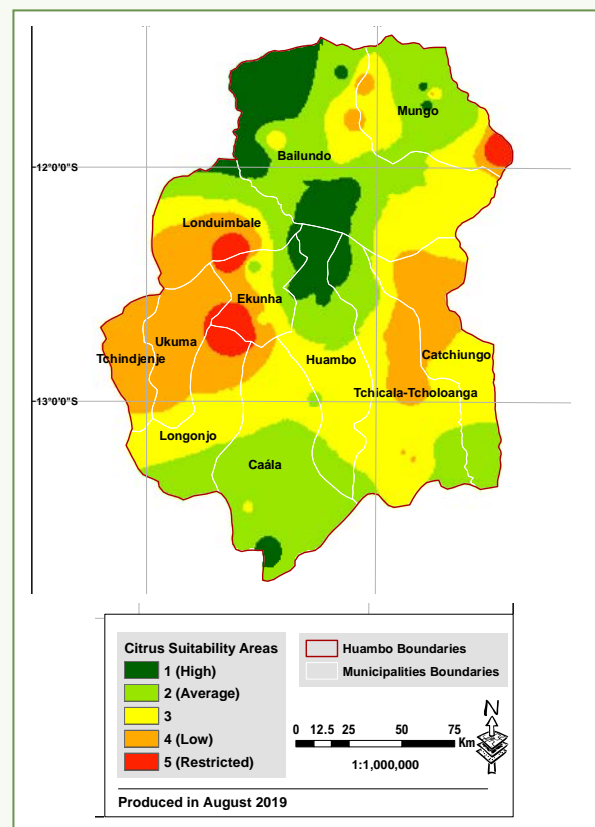
Pineapple prefers temperatures between 20 and 30°C, as well as high relative humidity of between 70 and 80%, and a more loose soil enhancing drainage. These temperatures, humidity and soil types are available throughout the Benguela province. Given the distinct colder season in Angola during the months of June till September pineapple production seriously drops during these months. Growing pineapples at lower altitudes with irrigation could extend the season.

**Figure 13** Suitability for rainfed pineapple production in Benguela province



For citrus we focussed on the Province of Huambo, mainly looking at oranges and lemons. In Huambo the best production areas can be found in the lower areas of 1,200 to 1,600 masl as temperatures and crop growth are general higher there. Generally, the Municipio of Bailundo, northern part of Huambo and the southern part of Caála stand out as suitable production areas. However, given the high rainfall and humidity during the months of November to April the trees can be affected by many pests and diseases (as evidenced in the earlier chapter); and rigorous pest and disease management is required. As such, for export production, other areas (globally) look more suitable.

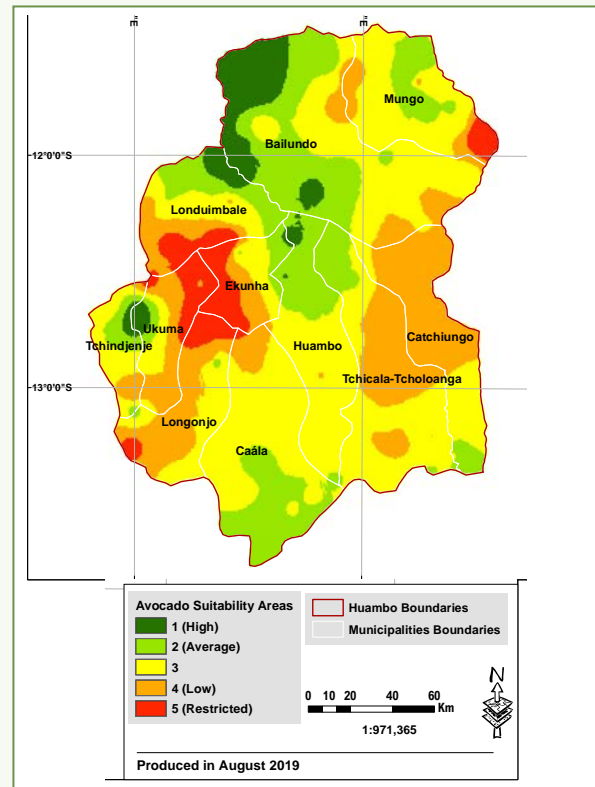
**Figure 14** Suitability for citrus production in Huambo province





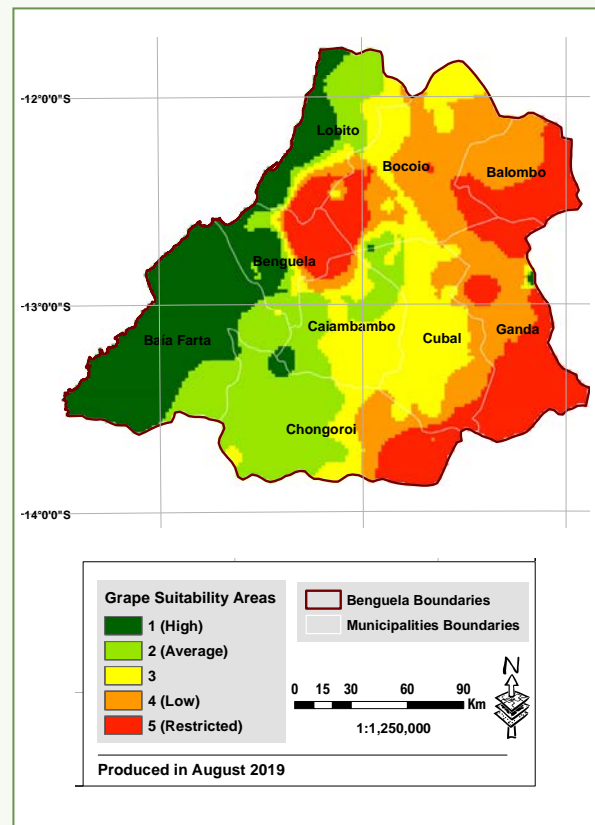
Avocado presents itself as a special case, as we observed limited high productivity farms in the two provinces of Benguela and Huambo. From literature we know that avocado grows well between 900 and 1,300 masl in tropical areas, with relatively high levels of rainfall of between 1,000 and 1,500 mm per year, with mean temperatures between 20 and 25°C. These temperatures and altitudes can be found in the Province of Huambo; especially at the western part of the Municipios of Ukuma and Tchindjenje. For this study we focused on rainfed production, though plantations in Peru and Chili are situated along the desert coast using large volumes of Andes irrigation water. Something similar could be explored in Angola (see also Chapter 10, Business cases).

**Figure 15** Suitability for rainfed avocado production in Huambo province



Lastly, we looked at table grape production. For this map we used the existing grape production locations in Catete and Caxito of Bengo Province and extrapolated the underlying agro-ecological conditions to the Province of Benguela. What can be observed, again, is the high suitability for producing this crop along the coast line. The area has sufficient groundwater and soils are well drained, sandy soils. The richer alluvial soils along the coast fit this profile and can be very suitable for grape production; having higher pH and calcium levels.

**Figure 16** Suitability for irrigated table grape production in Benguela province



# 8

## FRUIT SECTOR SWOT ANALYSIS

Though Angola's fruit exports have started in earnest during the last two years, there are still a lot of challenges – as expressed by companies – that hold back further growth. These challenges play out at both macro-economic level (e.g. access to finance and forex availability) as well as at company level (e.g. selection of inputs and technical knowledge). In this chapter we try to highlight the main strengths and weaknesses of Angola's fruit sector; looking at the agro-ecological, economic and logistical conditions present. In addition we analyse a number of opportunities that can be seized and threats that could hinder further growth of the sector. A summary of the SWOT analysis is provided below:

**Figure 17** SWOT Analysis of Angola's fruit sector

STRENGTHS	WEAKNESSES
Agro-ecological conditions at the coast	Level of sector organization
Land and water availability	The phytosanitary system
Domestic market for quality fruit and juice	Access to finance
Banana & mango meet EU requirements	Doing business: Rule of law and corruption
Port and rail Infrastructure	Domestic market prices for some fruits
The Lusophone connection	High input prices
OPPORTUNITIES	THREATS
Government focus on export and import substitution	Climate change: Unpredictable rains & floods
Availability of reefers and cargo space	Spread of diseases: Panama & citrus greening
Specialty niche products (organic & socially certified)	
UJES & the Research Centre in Cavaco	





## STRENGTHS

### AGRO-ECOLOGICAL CONDITIONS: THE LITORAL

As presented in previous chapters, Angola is endowed with favourable natural resources. Especially the coastal plain (*litoral*) that runs adjacent to the plateau (*planalto*) harbours excellent production conditions for a large number of tropical and subtropical fruits. The main advantage of this coastal stretch of roughly 250 km long and 50 km wide is the low rainfall, constant temperatures, limited slope, well-drained fertile soils and high water availability. The conditions limit pest and disease pressure and ensure steady maturation of quality fruits; in particular mango, banana and grapes.

### LAND AND WATER AVAILABILITY

Though land around Lobito and Benguela is getting more scarce due to planned real estate investments and tourism opportunities, the wider area that runs down to the Province of Namibe has ample land available for fruit farm investors. Anecdotal evidence further suggests that fallow land, owned by absentee farmers, can be leased at reasonable rates. The land along the coast as well as at the *planalto* has good groundwater and surface water availability, especially in the vicinity of the main rivers of Catumbela and Corporolo in Benguela, and the Kunene, Balombo and Ceve rivers in Huambo. These areas have fertile alluvial soils well-suited for fruit production.

### DEVELOPED DOMESTIC MARKET FOR QUALITY FRUIT AND JUICE

Angola has a well-developed high-value fruit market, controlled by supermarket chains Kero, Maxi and Shoprite. These chains have introduced quality standards for fruit and source directly from larger farmers. In addition, Angola has a well-developed juice market, offering fruit farms an outlet for their lower grade fruits.

### BANANA AND MANGO MEET EU MARKET REQUIREMENTS

Farm gate prices of producers along the *litoral* seem competitive, also at a global level. Specifically the prices for banana and mango (both roughly at Akz 100 or US\$ 0.30 per kg during the high season) are in line with world market prices. In addition, the varieties cultivated are in demand varieties of Cavendish, and Keitt and Kent for banana and mango respectively. In addition, the peak of Angola's banana harvest coincides with the highest demand in the EU (December–May).

### PORT AND RAIL INFRASTRUCTURE

The facilities and prices offered by the Port of Lobito are comparable to other exporting destinations like Chili, Peru and South Africa. Transit time to Rotterdam of 18 days (from Luanda) is reasonable and port handling costs are moderate and still negotiable. Reefer containers are sufficiently available, given greater imports (of meat) than exports at the moment. Currently, feeder routes from Lobito run first through Namibe and then Luanda, taking an additional nine days transfer cargo to larger vessels to connect to the EU. For most fruits three weeks transit time is the maximum (to ensure quality).

### THE LUSOPHONE CONNECTION

Historical relations with Portugal and Brazil provide Angola with potential linkages to professional fruit growers and investment capital of these countries. Brazil is big in mango and melon exports and could assist Angola in providing the right inputs and expertise. In addition the Portuguese fruit market, though much smaller than the one of north-western Europe, provides good export opportunities.

## WEAKNESSES

### LEVEL OF SECTOR ORGANIZATION

At the moment there is limited coordination of sector activities; e.g. in terms of knowledge and education on fruit production, research and development, irrigation infrastructure, targeted finance for fruit companies, phytosanitary services and input supply. A number of these topics are elaborated on below; but it is the sum that is greater than the parts and successful export nations have been able to organize their fruit sector through specific institutions and development programmes (e.g. Ethiopia's integrated flower export strategy or Kenya's Horticultural Crops Development Authority).

### PHYTOSANITARY SYSTEM

The EU has enacted a new phytosanitary Directive on 21 March (2019/523). The directive poses stricter requirements for the export of fruits and vegetables, and in particular the export of citrus and mango. For the latter two crops systems need to be put in place that monitor the presence of harmful organisms like fruit fly and false codling moth (for citrus), and protocols need to be designed to control and/or introduce effective treatments for these insects. At the moment, Angola has limited implementation capacity to comply with these regulations. On the positive side, banana and pineapple do not need a phytosanitary certificate.

### ACCESS TO FINANCE

Hardly any of the interviewed companies had taken a loan for their investments. Companies indicate that access to finance and excessive interest rates are major bottlenecks for their expansion plans. The new PRODESI plan addresses these concerns, and the fruit sector is prioritized in these plans. It is not clear at the moment if small- and medium sized enterprises can also have access to these facilities.

### DOING BUSINESS: RULE OF LAW AND CORRUPTION

Angola ranks 173rd out of 190 countries in the World Bank's Doing Business list. Topics that Angola specifically scores low at are: getting credit (rank 184), trading across borders (174), enforcing contracts (186). A number of these topics touch on an underdeveloped 'rule of law' in the country. Further, corruption is a problem, with Angola ranked 164th out of 176 countries on the Transparency International Corruption Index (of 2016).

### DOMESTIC MARKET PRICES FOR A NUMBER OF FRUITS

For citrus, grape and pineapple domestic market prices are higher than world market prices (FOB Luanda). The advantage is that, hence, there is an interesting business opportunity for these crops domestically; also in the light of import substitution. For exports, however, at the moment Angola is not competitive. Possibly these crops can be grown for the regional market (DRC, Namibia), but this market is limited in size.

### HIGH INPUT PRICES

Input prices for e.g. pesticides, fertilizers and seedlings are higher than neighbouring countries. It is estimated that bags of urea, NPK, and potassium sulphate, as well as pesticides like Mancozeb, a fungicide, and Nematicuri, a nematicide, are double the price of South Africa. Similarly, imported young plants, like mango seedlings and banana plantlets, are double to triple the price of South Africa.

### ABSENCE OF CERTIFICATION

Apart from Novagrolider, companies haven't started Global-GAP certification yet. There are a few companies that are in the process to start certification, and are applying the basic principles of Global GAP. For those companies that have quality products and the ambition to export, this would be a first step.

## OPPORTUNITIES

### GOVERNMENT FOCUS ON EXPORT AND IMPORT SUBSTITUTION

The government's Programa de Apoio à Produção, Diversificação das Exportações e e Substituição das Importações (PRODESI) has recently started; it supports a range of activities to diversify Angola's exports (beyond oil) and also focuses on import substitution. Access to finance is an important component of the programme, and the fruit sector has been selected as one of the priority sectors.

### AVAILABILITY OF REEFER CONTAINERS AND CARGO SPACE

Both in the Ports of Luanda and Lobito there is excess availability of reefer containers, that arrive full and leave empty. The same holds for the cargo space of major passenger flights like KLM and TAP. As such lower rates can be negotiated for fruit export shipments.

### SPECIALTY NICE PRODUCTS LIKE PASSION FRUIT, LIMES AND PAPAYA

Though not specifically studied in this report there are good opportunities for airfreight exports of niche products like (organic) limes, passion fruit and papaya. Current lime prices look competitive, and at some farms the right varieties are being grown. The same holds for passion fruit and papaya, both requiring less demanding measures in terms of phytosanitary control.

### UJES AND THE RESEARCH CENTRE OF CAVACO

The University of Jose Eduardo dos Santos in Huambo has a strong Faculty of Agricultural Sciences which offers Bachelor and Masters programmes in Agronomy and Agricultural Economics. A new Masters programme could be developed for Horticulture, looking both at the Agronomy and Business Economics of the fruit value-chain. In addition, the Experimental Research Station in Cavaco could be revived to support fruit companies with applied research on, e.g. pest and disease, and soil fertility management.

## THREATS

### CLIMATE CHANGE: UNPREDICTABLE RAINS AND FLOODS

The weather patterns in both Huambo and Benguela are said to be changing. Climate change has caused heavy rains and floods in Benguela, Catumbela and Lobito, in 2015 and 2019. In Huambo rains have been less predictable and heavier. Given the continued increase in global carbon dioxide emissions, more extreme weather is likely to affect fruit production in both Benguela and Huambo.

### SPREAD OF DISEASES: PANAMA AND CITRUS GREENING

Increased international trade and limited inspections at ports of entry can cause introduction of new pathogens into Angola. Diseases most feared are the Tropical Race 4 (TR4) for banana (i.e. Panama disease) and citrus greening disease. Diseases can be imported through affected planting materials.

9

# PSD CHALLENGES ANALYSIS

Apart from the more general SWOT analysis the study looked at specific farm level constraints for increasing crop productivity and quality. For this analysis we looked at those farms that more or less present the average for input use, agricultural practices and postharvest handling. Specifically we looked at ways how these farms can further develop and expand. In this chapter we specifically do not focus on the frontrunner farms that have already optimized their production practices; these farms rather serve as examples on how to bridge the gap. We specifically focussed on the four crops with most medium-sized farms: banana, citrus, mango and pineapple. For both avocado and grape too little information was available.

## BENGUELA: BANANA

Production practices for banana are generally at a high level compared to the other three crops presented in this chapter. All farms interviewed made use of drip irrigation, improved cultivars, and applied relatively high levels of agrochemicals. Yields of the five farms interviewed are moderate to high between 25 and 35 t/ha per year. Farms often buy planting material from abroad (Cavendish Williams) as a start and do local multiplication through suckers afterwards. The main problem in the area is the presence of nematodes (in the soil) for which pesticides are being used, either applied directly or through the irrigation system. In addition, farms apply a rotation after the banana is ready for renewal (about every eight years). Rotation crops include maize, onions and cabbages. Probably some yield improvements can be made by applying better rotation practices and a slightly longer fallow period (of e.g. two years). The sandy soils in the main production areas are very low in organic matter; to increase this it would be beneficial to apply compost or animal manure. This can in turn also increase the uptake of the inorganic fertilizers. In addition, given the proximity of most commercial farms to the ocean, salt levels appear to be high. Some form of flushing of salts is recommended, combined with drainage (so as to prevent the accumulation of salts in the soil).

## HUAMBO: CITRUS

Good practices for planting material are generally well-developed and almost all farmers use grafting techniques for multiplying citrus varieties. They either do that or buy grafted seedlings from the nursery of the agricultural research centre in Huambo. Plant spacing is also quite similar with a spacing of 6×4 meter most common. Some NPK fertilizer is used by most farms. Pruning of trees is also a common practice. At the same time, yields are very low. The farms interviewed achieved yields of below 5 t/ha of marketable fruits for lemons and oranges. This is compared to 30–50 t/ha on the best farm, or e.g. in South Africa more than 40 t/ha on average for oranges.

The largest differences, and room for improvement, can be observed in the irrigation and pest- and disease management practices. All the farms selected for this analysis used a combination of rainfed and supplementary furrow irrigation. The source of the water mainly comes from a river, and is pumped to the farm and distributed by small canals and furrows. Given the costs for the pumps and fuel farmers tend to irrigate minimally, leading to water shortage for the crop, especially in the months of May till the September (the dry period) that coincides with the maturation and harvesting period. Pest and disease management has by far the biggest impact on yield. We observed low number of fruits per tree, and high level of disease pressure. Typical disease include: blackspot (caused by *Guignardia*, a fungus), citrus canker (caused by *Xanthomonas*, a bacteria), powdery mildew (a fungus), *Phytophthora hibernalis* (a fungus), citrus rust mite, aphids, weevils and fruit flies (all insects). This long list is compiled based on eight farm interviews and shows the extent of disease pressure in the area. This is related to the high rainfall environment in Huambo with around 1,350 mm of rainfall in seven months, from October till April. These are also the months that flowering and early maturation takes place; which can explain the low number of fruits per tree. Any support should focus on training of farmers on scouting of pest and diseases and their management (both biological and chemical), as this seems to be the most limiting factor for productivity increase. Given the high domestic prices, related imports and low world market prices for citrus, the main emphasis should be on producing quality fruit for the domestic market.

## BENGUELA: MANGO

Especially along the coast a number of commercial farmers are situated that have small- and medium-sized mango farms. Apart from one large farm with 67 ha of mango, the other farms in the main cluster for mango farming, Dombe Grande, has between 5 and 10 ha. These farms use gravity furrow irrigation with water from a river or stream. Varieties grown are Keitt, Kent and Tommy Atkins, and often the grafted seedlings are purchased from South Africa at a high cost. Farms use NPK fertilizers and both insecticides and fungicides (like mancozeb). Insecticides are used against fruit fly and fungicides against anthracnose. Yields are relatively high at more than 30 t/ha. The trees are often quite tall and wide, which makes harvesting difficult. Main issues observed have to do with controlling the white fly (which can spread diseases) and postharvest management. At the moment none of the interviewed companies have a professional pack house for grading, cleaning and packaging.

Improvements can be made in terms of integrated pest management to fight fruit fly; e.g. through traps and baits (in addition to the use of pesticides) and strict hygiene protocols (e.g. removing and destroying fruits on the ground that serve as a source of insects). To start exports, the farms would need to have strict fruit fly protocols, certification and packhouses. Training and financial support could be considered to develop this e.g. starting with a lead farmer, that in turn supports a number of smaller farmers around him.

## BENGUELA: PINEAPPLE

Pineapple cultivation in the areas of Monte Belo and Ganda is characterized by rainfed production of local varieties that are mostly reproduced (through suckers) on the own farm. Farms are typically between 10 and 20 ha and are run extensively, with low plant densities of 1x1 m. Disease pressure is low and farms in general hardly use any pesticides. Also fertilizer use is low. In general, a low input low output farming system is applied. Compared to the 'top-farm' in the area yields are much lower at the average farms with between 5 and 10 t/ha, while the No 1 farm achieved more than 30 t/ha.

Pineapple in general prefers well-drained soils as the crop cannot stand water logging. The crop can withstand drought well as it is a Xerophytic crop, which means that its stomata can be kept closed during the hot hours of the day when evapotranspiration is highest. Still, for optimal productivity, pineapple prefers an annual rainfall higher than 1,100 mm, well-distributed throughout the year. In Benguela province (Ganda, Monte Belo) rainfall is between 1,100 and 1,300 mm with five months without rain, May–September. It is during these (colder) months that productivity is seriously reduced if no irrigation is applied. Another solution can be more intensive mulching, in order to reduce evaporation from the soil and increase soil temperatures. Training for farmers could consist of support for more intensive cultivation techniques that include (plastic) mulching, organic and inorganic fertilizer use, and supplementary irrigation. The added benefit of irrigation would be that the pineapple season can be extended, also producing in the months of June till September when market prices are highest.

## TOP-10 COMPANIES

Out of the twenty companies that we interviewed the following ten could make it to the next level of quality production for the high-end domestic market and exports; this is based on their current practices, yields, motivation and interest:

COMPANY	LOCATION	FRUIT
Bernardo Francisco	Bimbas/Cavaco, Benguela	banana
BP Agro	Bimbas/Cavaco, Benguela	banana
Fazenda MAM	Bimbas/Cavaco, Benguela	banana
Fernando Marques	Bimbas/Cavaco, Benguela	banana
Fazenda MMM	Calenga, Caála	citrus / passion fruit
Fazenda Simba	Cuima, Caála	citrus
LS & SS Ltd	Catemo, Chipipa, Huambo	citrus
Fazenda Kavili	Ganda	mango
Fazenda Vissoma	Dombe Grande, Baia Farta	mango
Fazenda Otchiviliso	Monte Belo, Bocoio	pineapple

# 10 BUSINESS CASES

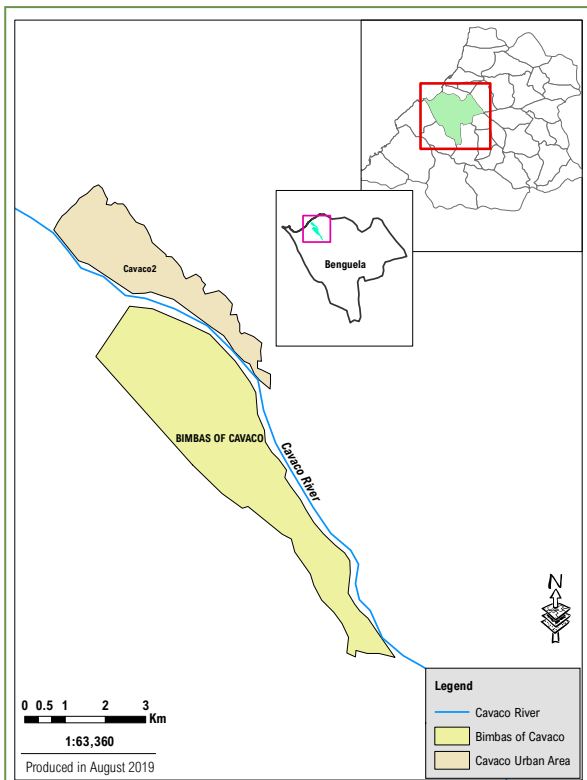
# VALLE DO CAVACO – EXPORT BANANA

## INTRODUCTION

The Valle do Cavaco is a valley situated next to the River Cavaco in the close vicinity of Benguela city (see Figure 18). The valley covers around 3,500 ha of land with more than 700 ha dedicated to banana production and the remainder is used for other horticultural crops like onion, tomato, cabbages and papaya.

The valley received substantial government support, mainly focused at securing sufficient water for irrigated crop production and extending the railway. The infrastructure development project included the rehabilitation of the Dungo dam and a transversal 5,800 meter long tunnel that redirected water from the Cubal River to the Cavaco river. This allowed for the recharge of the groundwater level in the Valle do Cavaco. As a result companies in the valley can drill water at a depth of 8–10 meters deep, significantly reducing the costs for drilling and pumping. Given the proximity to the sea there is a risk of salinization. Sufficient flushing of soil salts and drainage is required to keep the current high productivity in place.

**Figure 18** *Valle do Cavaco*



In addition to the water infrastructure the railway was developed from Lobito Port to Cavaco. This implies that goods can be transported directly (by container) from farm to station to the port. The distance between the station of Cavaco and the Port of Lobito is 40 km.

The last project, still to be finalized, includes the expansion of the electricity grid. This will enable the farms to use electro pumps instead of fuel pumps for their irrigation systems and cold stores and ripening chambers.



### THE AGRO-ECOLOGY

The Valle do Cavaco has excellent production conditions during at least eight months of the year (October–May), with high temperatures (average of 26°C) and relative humidity (rH=80%). The valley receives rainfall of around 250 mm per year reducing pest and disease pressure significantly. As indicated above the Valley has excellent irrigation infrastructure and sufficient water available.

### THE COMPANIES

In the valley there are around 35 farms that produce banana on an area of 720 ha. A number of these companies apply good agricultural practices; they use improved (often imported) varieties of banana plantlets; they apply sufficient and quality agro-chemicals; and they protect their bananas against bruising (through the use of plastic bags). The main production challenges include nematodes and to a lesser extent siga toga. Nematodes are being controlled by crop rotation and nematicides; leaves affected by siga toga are removed immediately. Crop yields are high, with more than 40 t/ha at the more professionally run farms. A number of the farms have professional washing and cooling facilities. Current buyers include Kero and Shoprite, and prices are between Akz 100–120 per kg (during the peak season), or around US\$ 0.30–0.35 per kg.

**Photos 1-2** An exemplary farm in the Valle do Cavaco



## THE BUSINESS CASE

Companies in the Valle do Cavaco have the opportunity to start exports to the European Union. Their cost price is acceptable, their quality and productivity is high, and the scale of production is interesting for foreign buyers. Importantly, bananas do not require strict phytosanitary measures, making it an easy first crop to start exports with. Further, Angola is part of the ACP regulations of the EU with reduced import tariffs.

Also, looking at the current farm gate prices the export case can be an interesting proposition for the banana farmers of Cavaco. Including additional costs of certification, carton boxes and transport, it should be possible to sell Angolan bananas at US\$ 9 per 18 kg box FOB Lobito:

**Table 8** Projected costs for banana exports from Lobito

COST PRICE (FOB Lobito)	UNIT PRICE	UNIT	Akz/kg	US\$/kg
Farm gate price (per kg) *	AOA 150	kg	150	0.41
Carton boxes	AOA 480	18 kg box	27	0.07
Transport to port (reefer)	AOA 117.000	19.44 tons reefer	6	0.02
<b>TOTAL</b>			<b>AOA 183</b>	<b>\$0.50</b>

\* AKZ:US\$ (1/10/2019): 369

Farms that want to export will need to invest in infrastructure, record keeping and certification. Costs for this vary per the size of the farm and the existing infrastructure. Therefore, no detailed budgeting has been included here, rather we have provided a premium for the banana farms of 50% on their current farm gate price that should cater for the additional costs, as well as a higher profit margin to provide the incentive to change their system. There is a carton boxes factory available in Benguela, which can, with some adjustments and small investments, produce quality boxes at a competitive price.

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## CONSIDERATIONS AND NECESSARY INVESTMENTS

In order ‘to get there’ a number of issues need to be addressed. Overall, probably a 2–3 year transition period is needed to start exports at a substantial scale with a consistent quality. Proposed activities:

- [ Start a Global GAP and probably socially certified certification process with 3–4 companies, that are already implementing good agricultural practices, and have a certain farm size (> 20 ha).
- [ Selected farms can further be supported by ensuring access to finance (at favourable terms) to invest in farm expansion (land), infrastructure (irrigation, processing facilities and cool houses) and certification. PRODESI could be approached for this.
- [ Some improvements need to be made at the boxes factory to produce the right quality of boxes (strong enough with appealing branding).
- [ Organize the logistics process from farm to port; ensuring loading and sealing of reefer containers at the farm, and faster transit times from Lobito to Rotterdam/Antwerp (these should stay below 21 days).
- [ Invite new investors to the area (probably including the greater Litoral of Benguela) that want to start export production. Other crops that can be considered are: melons, passion fruit and grapes.
- [ For the medium term (3–5 years) investments in a plant tissue lab and a more professional agronomy research centre need to be made. This can help the cluster of Cavaco to stay competitive by continuously reducing cost price and introduce innovations.

# DOMBE GRANDE – EXPORT MANGO

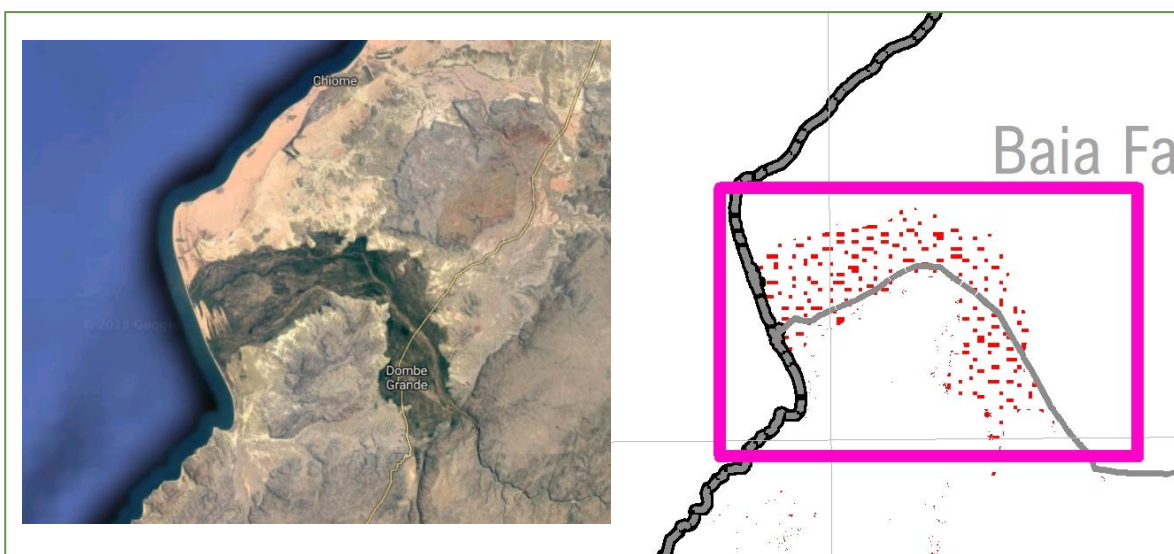
## INTRODUCTION

The second business case focusses on mangoes in and around Domba Grande. The main cluster is situated along the delta of the intermittent river Corporolo that concludes in an alluvial fan towards the ocean. The below two maps show the overlap between the soil type and most important mango farms. The underlying reasons being the higher fertility and moisture retention of these soils, as well as the availability of irrigation water (both surface and subsurface).

As the second map shows there are quite a number of mango farms in this cluster, with around ten farms having farms between 5 and 10 ha with commercial varieties (Kent, Keitt and Tommy). These sizes are comparable to e.g. Ivory Coast where the majority of the commercial farmers also cultivate between 5 and 20 ha (van den Broek *et al.*, 2016). Cultivation practices are professional with yields of 15–20 t/ha. This is higher than the northern parts of Ivory Coast where most production is rainfed and average yields are around 10 t/ha (*id.*).

Because of low rainfall along the coastline the spread of diseases is generally lower than the more humid inland mango farms (e.g. around Ganda), making products more suitable for exports. Fruit fly and anthracnose are present but farmers in the area indicate that its threat can be controlled by the use of insecticides and fungicides.

**Figures 19–20** Geographical map of Domba Grande, Baia Farta and the presence of mango farms



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### THE AGRO-ECOLOGY

Dombe Grande has excellent production conditions for mango with high temperatures (average of 24°C) and relative humidity (rH = 80%). The valley receives rainfall of around 280 mm per year reducing pest and disease pressure significantly. The month of March has the highest average rainfall of around 100 mm. This coincides with the end of the mango season and could increase the spread of fruit fly.

### THE COMPANIES

In Dombe Grande there are around 10 commercial farmers that produce mango on more than 200 ha. A number of these farms apply good agricultural practices and use imported grafted plants of Keitt, Kent and Tommy from South Africa. Plant spacing is typically 200–250 trees per hectare (using a 5×10m or 5×8 spacing). They have furrow irrigation using shallow ground water or river water, and apply proper pruning to keep the trees low and broad branching. Prices for mangoes are around 75 kwanza per kilo, or US\$ 0,21 per kg; delivered in Luanda. Below a picture of a larger mango farm in Dombe Grande.

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**Photo 3** *An exemplary mango farm in Dombe Grande*



**Table 9** Profit analysis of a 25 ha mango farm in Dombe Grande (1 US\$ = 360 kwanza)

ITEM	AMOUNT	UNIT SIZE	PRICE PER UNIT (AOA)	Total (AOA)	Total (US\$)
Fertilizer	8	25 kg bags of NPK	3,750	30,000	83.33
Fungicide	1	liter of Mancozeb	5,000	5,000	13.89
Insecticide	1	liter of Canjila	5,000	5,000	13.89
Planting material	200	grafted from RSA	3,000	600,000	66.67
Tractor	2	land preparation	35,000	70,000	7.78
Irrigation – fuel	40	liters/week (20w)	135	1,612	12.00
Diesel pump + generator	1	system	5,475,000	21,900	60.83
Labour	5	per ha	15,000	75,000	208.33
Transport costs	1	per 10 tons	50,000	75,000	208.33
Total costs of goods sold					\$675.06
Total revenue	15	tons	AOA 75	AOA 1,125,000	\$3,125.00
Gross profit per ha					\$2,449.94

### THE BUSINESS CASE

Though not as advanced as the Cavaco banana cluster, the farms in Dombe Grande have the potential to start exports to the European Union. Also, potential profit margins look healthier than for banana, given the higher market in the European Union, of around US\$ 1.85 per kg (price at destination in the EU). The current cost price of the studied farms looks acceptable; the most important costs for farmers consist of fertilizer (US\$ 83 per ha), planting material (US\$ 67 per ha, using a 25 year depreciation period), pesticides (US\$ 28 per ha), labour (US\$ 208 per ha), irrigation (US\$ 73 per ha) and transport costs to Luanda (US\$ 208 for 15 tons of mango). At a conservative yield of 15 t/ha, revenues are US\$ 3,125 per ha; arriving at a gross profit of US\$ 2,450 per ha. Gross profit does not include overheads, land rent and tax. This shows the sound profitability of running a professional mango farm.

At a farm gate price of around US\$ 0.20 it should be possible to start exports to the European Union. Areas that farms need to invest in are: professional packhouse, certification and packaging material:

- [ Larger mango farms in West Africa invested in professional packhouses where grading, cleaning and packing takes place. Pack houses tend to have simple, automatic washing and sorting lines, where mangoes are sorted according to size. The sorting takes place according to: colour, blemishes and other visible defects and is done by hand. More and more packhouses have pre-cooling and cold storage facilities. Typical investment in a packhouse with cold storage ranges from US\$ 200,000–300,000.
- [ Certification will need to be implemented, requiring investments in toilets/showers for staff and record keeping of agrochemical use. Additionally organic or Fair Trade certification could be considered. Given the rich nature of the soils in the area and the limited disease pressure, converting to organic should be feasible; though requires the introduction of new soil fertility and pest management practices.

- [ Packaging material is currently mostly imported though investments have been made in local carton factories. Box sizes of 4 and 8 kg are common and materials need to be strong enough to hold the boxes on the pallet (e.g. 5 ply for 8 kg boxes and 3 ply for 4 kg boxes).

With these measures in place Angola still competes with large exporters like Brazil, Peru and to a lesser extent South Africa for the December–March window. As such Angola will need to be very competitive in terms of: price, quality and consistent supply.

### CONSIDERATIONS AND NECESSARY INVESTMENTS

In order ‘to get there’ a number of issues need to be addressed. Overall, probably a 2–3 year transition period is needed to start exports at a substantial scale with a consistent quality. Proposed activities:

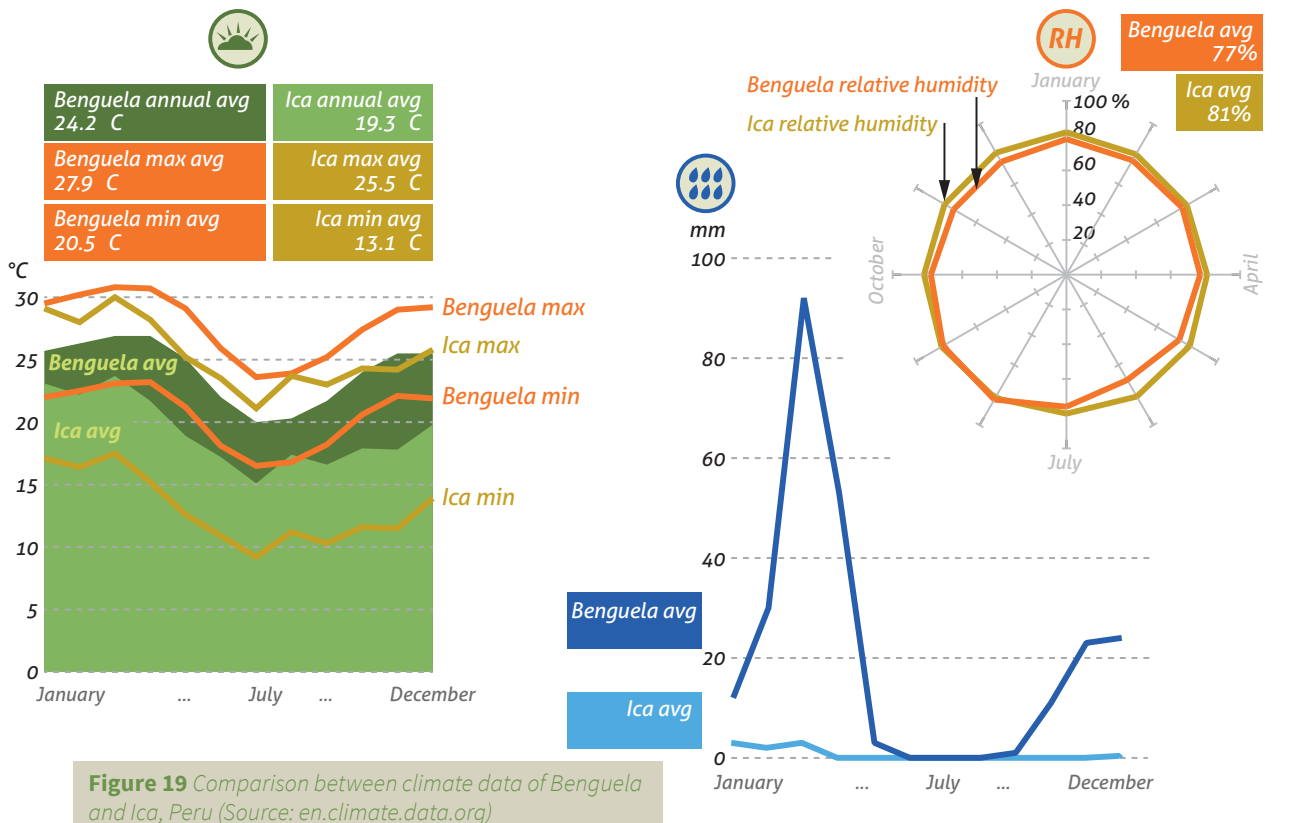
- [ Selected farms can be supported by ensuring access to finance (at favourable terms) to invest in pack house and cold storage facilities, and certification. PRODESI could be approached for this.
- [ Global GAP certification is required, and probably socially certified certification as well. This could spearheaded with one larger farm, possibly working together with a number of smaller scale farmers (option 2 certification).
- [ Some improvements need to be made at the boxes factory to produce the right quality of boxes (strong enough with appealing branding).
- [ Organize the logistics process from farm to port; ensuring loading and sealing of reefer containers at the farm, and faster transit times from Lobito to Rotterdam/Antwerp (these should stay below 21 days).
- [ There is a business opportunity to develop local production of planting material for key mango varieties like Kent, Keitt and Tommy.

The most important investment will be in the government’s capacity to run an effective phytosanitary system. Following the IPPC guidelines, the Ministry of Agriculture, as the competent authority, needs to take the lead in this. Specifically for mango new regulations have been approved recently by the EU (specifically for fruit fly); and the Angolan government will need to present protocols to the EU on how farmers are controlling this pest. Given the presence of fruit fly in the area two options are available to open up trade with the EU: (1) having a pest free production site and information available on traceability; or (2) an effective treatment. With respect to the latter, warm water treatment is being applied in other countries (especially in Latin America). For now it looks like an integrated system’s approach (combining biological and chemical control) is the most practical for Angola. The Ministry of Agriculture should move quickly to develop a protocol/guideline with detailed measures export farmers need to implement in order to control fruit fly, and convince the EU.

**11**

**CONCLUSIONS AND  
RECOMMENDATIONS**





## GREAT PRODUCTION CONDITIONS AT ANGOLA'S LITORAL

Taking into account all the analyses, agronomic and economic, looking both at the demand and the supply side, one clear winner emerges: the litoral area in the Province of Benguela, and the production of bananas and mangoes. The specific examples of the clusters of Cavaco, for banana, and Baia Farta, for mango, can be looked at more broadly as the entire litoral area of Angola, including the provinces of Bengo, Kwanza Sul and Namibe. If water, for irrigation, can be secured these provinces have excellent production conditions for banana, mango, grape, melons and passion fruit. At its current disadvantage is the transit time from Lobito and Luanda to Europe. This is mainly related to lack of current supply, and as such poses a bit of a chicken-and-egg problem; once Angola starts producing sufficient volumes of tropical fruits faster routes with shorter transit times will be developed.

Looking at the planalto citrus grows well, especially at the lower altitude areas of between 1,400 and 1,550 masl and slightly lower annual rainfall of 1,000–1250 mm. These areas are interesting for domestic production, substituting for current imports from South Africa and Spain. For export production we currently don't see enough opportunities given the high farm gate prices, the high disease pressure in the producing areas and very strict EU phytosanitary measures on citrus.

## ANGOLA'S POTENTIAL: 'THE PERU OF AFRICA'

Looking again at the litoral area, Peru can serve as a great example. In this light, it is interesting to look at the similarities between the two countries and their coastal strips. As an example, we used the valley of Ica, one of the main fruit production areas of Peru, and the irrigation scheme of Cavaco, close to Benguela. Both are located at similar latitudes on the Southern hemisphere, with Ica at a latitude of 14.1° South and Benguela at a latitude of 12.5° South. Also, rainfall and relative humidity are similar; both very dry and with a humidity of around 80%. In terms of temperatures, Ica shows a more extreme weather pattern with greater day-night differences. On average Benguela has a temperature of 24°C and Ica of 19°C; with minimum temperatures in Ica lower, with on average 13°C, compared to Benguela 21°C. This could make Benguela more suitable for banana and mango; and Ica for grape and avocado. Also, in terms of distance and transit times the two locations are rather similar with a slight advantage for Benguela/Lobito being closer to the main ports of Europe. As such, Angola could emulate the success of Peru and become a major exporter of tropical fruits.

## AND HOW TO GET THERE...: A SECTOR STRATEGY

In order to get there, a sectoral approach is recommended (e.g. see Westenbrink et al, 2017). Taking the Angolan fruit sector as the starting point, the intervention logic can build on the SWOT analysis and in particular the weaknesses. In addition, Angola can learn from successful other countries that developed a strong horticulture export sector from almost scratch two decades ago, like Peru and Ethiopia. In this context, key ingredients for an Angola fruit sector development strategy are:

- [ Private sector incentives to invest in export fruit farms, including loans at favourable terms: longer-term loans with lower interest rates and grace periods of 1–2 years.
- [ A land bank that has land available for investors at key fruit production locations.
- [ Development of large irrigation schemes along the coast, possibly organized in a public-private partnership with engineering and construction companies, as well as agricultural investors. A good example of this is the new 78,000 ha irrigation scheme of *Chavimochic* in Peru, organizing irrigation facilities in three Valleys.
- [ A sound phytosanitary system, with well-trained inspectors and electronic certification. The phytosanitary service should monitor the current

pest situation, develop protocols on how to control harmful organisms at farm level, and be able to advise fruit farms on (integrated) pest management practices.

- [ Facilitating fast logistics between Lobito and Luanda and Rotterdam/Antwerp: Even though Peru is geographically farther away from north-western Europe, because of the scale of production faster lines have been developed. Angola could initially subsidize a fast line between Lobito and Luanda (either by road or sea) to ensure transit times remain below 21 days.
- [ Specific sector support services, needed to assist fruit farms with the right inputs and services; in particular quality seedlings and plantlets, export quality carton boxes and agronomic advice.
- [ Trade missions to attract foreign companies to invest in and trade with Angola. Participants of trade missions can consist of fruit production companies, traders, input suppliers, service providers and investment firms.

Each of these elements provides a part of the jigsaw puzzle that a competitive fruit sector is made of. For example in Ethiopia it was the combination of good agro-ecological conditions, land availability, sufficient and competitively priced (air) cargo capacity, soft loans and tax incentives that prompted the emergence of a US\$ 400 million flower export sector. Something similar is probably required for Angola.

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