



Business Case: Improved Quality Mango Nursery (+ other trees)



Description of Business Model

A tree nursery that grows primarily fruit seedlings such as mango seedlings, mango clones, citrus. In addition, indigenous savannah trees, cocoa trees, ornamental baobabs etc. can be included.

Mango seedlings and grafted clones are grown in an insect-proof tunnel.

The nursery investor would work on land in Les Niayes or Centre zone or near Saint Louis. This should be far from existing orchards. The nursery would be established under shade-cloth and insect proof tunnels. Microjet irrigation using municipal water, or a plot with ready access to an existing borehole would be used. Water will be used for the production of a variety of tree seedlings for small and commercial farmers, reforestation programs such as the Grande Muraille Verte and private gardeners.



Typical Entrepreneur

Entrepreneur

- A cooperative or individual farmers (SMME's) who are looking to expand activities. The attention to detail required, small plots of land and high revenue per ha, makes this especially suitable to female entrepreneurs and to youth.
- Large vertically integrated producers might opt to develop a nursery to support their own activities, but also to retail trees to smaller producers. This is especially valuable in that it would cement Senegal as an industry leader during this period- both for quantity and quality of fruit production. This has sector wide benefits.



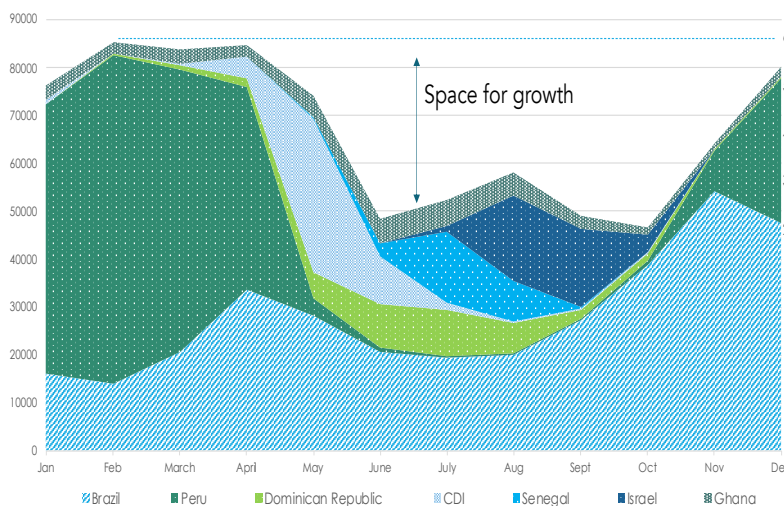


Market

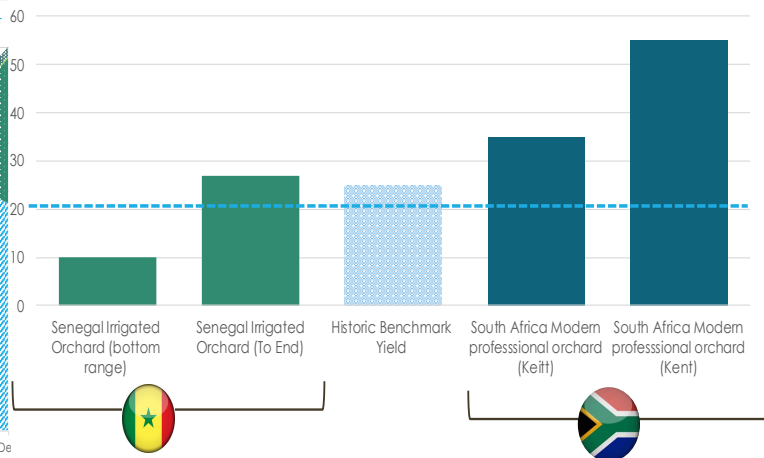
Senegal has a unique export window from May to July. During this period, the leading suppliers of mango in South America are not producing. As a result, there's great potential to expand during which there is no other Kent or Keitt mango on the EU market. Between €15 000- € 30 000 per month of fruit can be accommodated on the market from Mid May to October (see figure below), which represents a doubling of the current capacity. To accommodate this opportunity new orchards will need to be established, current orchards will need to be renewed and farming techniques will need to be improved to increase yields.

Certified trees play an important role in a reliable expansion of production. Using certified seedlings and grafted trees provides certainty to investors around the variety being grown, the fruit quality and the yields. Good quality trees would also play a role in improving yields overall.

European Imports by Lead Origins
2019, Euros



Yield per hectare, Senegal compared to South Africa



Rationale for investment

Senegal's unique EU market window:

- From Mid-May to September there is a real shortage of mango on the EU market, which only Senegal can supply, attracting exceptionally high prices
- Importers have 12-month supply contracts with clients
- Investment in a mango farm in Senegal is a long term invest to secure supply during this period when no other production areas can supply
- Establishing a nursery is a 5-year investment. Without certified root stock the final fruit might differ from the intended variety. This can have great impact on the investor.
- Establishing nurseries ensures that positive traits can be selected from fruit trees, which can have a positive effect on the yields, fruit quality and to an extent tolerance for salinity, heat etc.

Product or Service

	Certified Mango Seedling	Mango Clone Seedlings	Citrus Seedlings (lemons and limes)
Volume of trees produced	16 000	12 000	12 000
Sales Price per tree	200 FCFA	500 FCFA	500 FCFA

Assorted other trees are included in the business model, 50% of trees are delivered



Key Assumptions

Budwood seed and inputs

- In year 1 the nursery will need to buy-in suitable budwood as the mother blocks from which own-budwood will be produced will not yet be fully grown
- Seeds and other inputs such as potting soil, planting bags and phytosanitary chemicals can be sourced locally.

Sales Price

- Grafted mango clones in this model are sold at FCFA 500 with a 56% gross margin.
- However commercial farms are reputedly willing to pay up to FCFA 1500 per tree.
- These trees would need to be certified, which is a service that does not yet exist in Senegal.
- Delivery of 50% of trees is paid for by the purchaser. The rest are collected from the nursery.

Irrigation Investment Costs

- The nursery requires irrigation. This model assumes municipal water which is salt free and reliable i.e.. water purchased from the Senegalese water utility SDE.
- Alternately, in areas where groundwater is shallow a borehole or well can be drilled as this is more affordable.
- Finally, in the Saint Louis area water using solar pumps over short distances is feasible. The initial investment in boreholes or pipes and pumps is however significantly higher than in this model.

Labour requirement

- Skilled labour is required for grafting, sourcing of seeds, management of the irrigation system and disease control.
- Other labour is casual

Land Requirement

- Land outside of the Dakar metropolitan area is available for € 3 000 /ha (FCFA 1 968 000)

Sales and Production Season

- Sales occur mostly from May to August, ahead of the rainy season. Planting costs are incurred in January
- Grafting takes place in April.

Location: Niayes, Centre, Senegal River Valley Saint Louis

- The nursery will be established close to the commercial mango orchard centres. This is to allow renewal of these orchards. Closer to Saint Louis the nursery would cater for new orchard developments.



Production Costs & Gross Margins

Name of the product/service	Quantity Sold after losses	Revenues per product	Variable costs per product	Gross margin per product	Gross margin per unit of sales	Gross margin per unit of sales
Mango Seedlings	16 000	3 040 000	735 987	2 304 013	152	75,8%
Mango Clones	12 000	5 700 000	2 481 320	3 218 680	282	56,5%
Citrus	12000	5 700 000	3 021 320	2 678 680	235	47,0%
Indigenous savannah trees	18 000	3 420 000	2 497 987	922 013	54	27,0%
Cocoa tree	12 000	5 700 000	2 007 987	3 692 013	324	64,8%
Ornamental baobabs	10 000	6 175 000	1 389 187	4 785 813	504	77,5%
delivery	50%	1 900 000	720 000	1 180 000	31	62,1%
TOTAL (FCFA)		31 635 000	12 853 787	18 781 213		59,4%

Investments Required

Investments	Cost FCFA
Land	1 968 000
Fencing & windbreak	350 000
Insect proof tunnels	656 000
Shed	200 000
Equipment	470 000
Vehicles	1 130 000
Certified mother block	262 400
Irrigation	1 000 000
Total	6 036 400
	EURO 9 202

Return on Investment

Working Capital

- In the first 6 months of year 1 the nursery will require FCFA 13 500 000 in working capital to cover operating costs. Seedlings will be sold mostly from May to August at the start of the rainy season.

ROI

- Month 6 to 8 months

Profit and Loss year 1

Revenues	Year 1 FCFA	Year 1 EURO
Mango Seedlings	3 040 000	4 634
Mango Clones	5 700 000	8 689
Citrus	5 700 000	8 689
Indigenous savannah trees	3 420 000	5 213
Cocoa tree	5 700 000	8 689
Ornamental baobabs	6 175 000	9 413
delivery	1 900 000	2 896
Total revenues	31 635 000	48 224
Variable costs		
Mango Seedlings	735 987	1 122
Mango Clones	2 481 320	3 783
Citrus	3 021 320	4 606
Indigenous savannah trees	2 497 987	3 808
Cocoa tree	2 007 987	3 061
Ornamental baobabs	1 389 187	2 118
delivery	720 000	1 098
Total variable costs	12 853 787	19 594
Gross margin	18 781 213	28 630
Fixed costs		
Maintenance and insurance	577 400	880
Fixed staff	4 200 000	6 402
Other fixed costs	180 000	274
Depreciation	996 667	1 519
Long term loan interest exp	1 068 245	1 628
Seasonal loan interest exper	647 580	987
Total fixed costs	7 669 892	11 692
Profit before tax	11 111 322	16 938



Capability and Skills

- Nursery staff need to be trained in horticultural techniques of grafting, selection of budwood, disease prevention
- Owner or manager will require competence in marketing and sale of different tree species to different sectors
 - Production of high yielding mango clones for commercial farmers may be accompanied by production of more robust and cheaper seedlings for small-scale farmers and the domestic market.
 - Cocoa trees may be sold to farmers in areas with high salinity
 - The option of growing indigenous savannah trees for reforestation programs would require a supply agreement with programs such as Grande Muraille Verte.



2

Access To Quality Imported Material

- It will be necessary to import grafted clones of proven productivity from established high performing nurseries in Senegal. This will allow them to develop a mother block from which budwood can be harvested.
- Alternately nurseries are able to import seedlings from established origins such as Brazil and South Africa to establish their mother block. These could offer a premium market opportunity for select clients looking for guaranteed high quality , guaranteed yields trees.



3

Certified disease-free seedlings of predictable performance

- To get commercial farmers to place orders for large numbers of grafted tree clones, the nursery will need to be certified disease free. Certification of nurseries and seedlings does not yet exist in Senegal
- Good grafting techniques and rootstock selection will ensure high survival rate of early bearing fruit trees



4

Strict Phytosanitary Controls In The Nursery

- Mango, cocoa and citrus clones will need to be produced in an insect proof tunnel to avoid diseases entering the nursery
- The nursery may produce baobabs and indigenous savannah trees under shade cloth mango, cocoa and citrus clones will need to be produced in an insect proof tunnel to avoid diseases entering the nursery
- Access to a laboratory may be required to assure that clones are certified disease free before delivery to customers
- Access to the nursery should be strictly controlled, especially to the insect proof tunnels where sanitary footbaths will be required
- Grafting equipment should be sterilized after each graft, using alcohol
- No street clothing should be allowed in the nursery.





Risk Analysis

Phytosanitary Issues:

- If diseases such as Fusarium enter the nursery, it will have to be closed and relocated to another site.
- If infected trees are allowed to be delivered to farmers, the nursery's reputation will be damaged.

Market access:

- It may take time to establish a reputation for high quality trees with commercial farmers.
- Small-scalers and the public may not understand the value of grafted clones and prefer to simply plant seeds and graft in the orchard.
- Production of trees that can as easily be grown from seed may be hard to sell.

Competitive set:

- There are many small-scale nurseries producing trees and other plants for sale on the roadside.



Risk Mitigation

Phytosanitary issues:

- Many fungicides have been tested with varying degrees of efficacy against fusarium, however it is critical that infection is prevented by the use of certified budwood and strict sanitary protocols in the nursery.

Market access:

- It is essential that the owner/manager should have a good understanding and preferably contacts within the market for each tree species before going into mass production.
- The nursery should try to secure orders and down-payment for fruit trees from commercial farmers before producing large volumes of expensive clones.
- Cheap, simple seedlings can be produced for small-scalers and may present an opportunity to explain the value of high- and early-yielding clones.
- Only species for which there is a ready market should be produced in the nursery
- A contract with reforestation programs can provide a guaranteed market for high volumes of trees at a low unit price.

Competitive set:

- Focusing on commercial farmers and institutional customers can avoid competing on price with roadside nurseries.
- Economies of scale could allow the nursery to outcompete roadside nurseries on price.
- Roadside nurseries can become a marketing channel for more technical species such as ornamental baobabs, cocoa, grafted mango clones and especially citrus.



Economic & Social Impact

- Community upliftment
- Job creation
- Wealth Creation
- Increased disposable income to buy more nutritious food
- Increased training and skills transfer
- Improved income for farmers through better quality planting material
- Availability of locally produced fruit for consumption or sale



Environment Sustainability

- Counteract desertification through reforestation of degraded lands
- Establishment of orchards reduces soil erosion



Women & Youth

- Good business opportunity for horticulture graduates, including youth and women
- Seasonal jobs for women and youth
- Reduction of youth migration to cities through local job creation



Knowledge Transfers

While the Netherlands is a leading importer of fruit, mango growing root stock is not a core competence of the Netherlands.

There are thus no foreseeable opportunities for transfers of knowledge around grafting, tree or nursery management etc.

This is knowledge that is best transferred from South Africa, Brazil, Peru or Mexico.



Commercial Trade

While the Netherlands is a leading importer of fruit, mango growing root stock is not a core competence of the Netherlands.

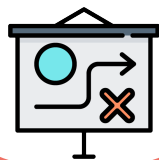
There are thus no foreseeable opportunities for transfers of root stock from the Netherlands. We anticipate that this should be sourced from South Africa or leading producers in South America – Brazil, Peru or Mexico.



Technology

The Dutch are leaders in green house and tunnel farming:

- Structures and material for the insect proof tunnel.
- Phytosanitary products and grafting equipment.
- Sprinkler systems for indoor irrigation.



State Institutions, Universities

ISRA:

ISRA is responsible for agricultural research in Senegal. They would be an important stakeholder in importing root stock and in cloning. There is a potential need to support this authority to develop local research laboratories to diagnose disease and to provide certification for new seedlings.

Extension Services

ANCAR is responsible for coordinating extension services. They work through agencies that focus on specific tasks in the various regions.

Mango development has not been tackled by ANCAR to a great extent. Nevertheless, they could be useful allies in setting up the system and integrating knowledge into existing programs.



Private Sector

Large exporters who source from small scale producers

These producers are also growers and would benefit from being able to source quality fruit from small scalars in their system. They could be a key resource in identifying small scale producers suitable to carry out the nursery project. As a potential off-taker they could play an important role in securing finance required from MFI's or banks.

Industrial Producers interested in mango production

These producers are involved in CSR projects that could strengthen the social compact in Senegal. As potential stakeholders they can provide critical technical support to nursery growers. These could be staff, community members around their farms etc.

MFI's

The funding required for these producers is better suited to MFI's. As a result, developing interest and understanding from MFI's could be a useful support to new nursery developers as they establish their facility.



Professional Associations

AUMN

This is the leading market gardener association in the Niayes. They would be a helpful resource in identifying potential locations for the nurseries and for identifying investors who could be individuals or cooperatives.



This business case was developed by Sense
www.timeforsense.com

