

SUSTAINABILITY OF ORGANIC & ORGANIC – FAIRTRADE PINEAPPLE GROWING FOR EXPORT

MISSION REPORT
COSTA RICA NOVEMBER 2010
GHANA DECEMBER 2010



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EXECUTIVE SUMMARY

The mission

During November and December 2010 consultancy missions were carried out in Costa Rica and in Ghana. These missions, organized by Eosta BV of the Netherlands were sponsored by ICCO with the objective to assess the feasibility of sustainable organic pineapple growing for export purposes and its future prospects.

Despite the perceived good potential for organic pineapple production, the sector is underperforming. Organic pineapple farmers face a number of important challenges: some concern sustainable production methods such as soil fertility management, disease control and urgently needed production increases. But most important is that organic pineapple growing has not been a profitable business: most farms operate at a loss. Income from sales has been extremely disappointing over the past years.

The returns on investment in the sector have been too low to encourage this type of agricultural activity, and that fact is clearly reflected in the scaling back of the Costa Rican organic farming activities and the lack of any further progress in West Africa and in Ghana in particular.

The conventional market is an important benchmark for organic pineapple markets' performance and due to underperforming markets in general organic producers in particular were hard hit.

However, markets are changing and structural improvements take place, giving rise to the assumption that the worst is over and that a more promising future can be expected.

Both missions, in Costa Rica as well as in Ghana have focused specifically on improved and sustainable soil fertility by using high grade compost as a basis ingredient for better growth, improved disease resistance and increased productivity. Increased productivity is seen as one of the main stimulants to improve farmers' income.

Adequate value chain management leading to rewarding price levels for the producer is considered the other key element to make the production of organic pineapples a sound business again.

Some other productivity factors such as improved field practices and workers participation schemes have also been put to the test. In Costa Rica 2 farms were visited: Finca La Corsicana on the northern plains of Costa Rica and Agricola La Danta, a much smaller unit about 50 km north of La Corsicana near the Nicaraguan border. In Ghana the mission focused its attention on Bio Exotica Ghana Limited, sole organic pineapple producer and exporter of Ghana.

Overall the mission was inspired by the main guiding principles of the Nature&More Sustainable Flower concept: clean energy, wildlife protection, watercourse protection,

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sustainable soil management, bio diversity and respect for the less privileged who work the pineapple fields in the tropics.

Markets and Supply Positions

Since the beginning of this century ever-increasing volumes of conventional pineapple have been exported from Costa Rica to the European Union; leading to a situation of serious oversupply, declining price levels and diminished farmers' income. Conventional pineapple overproduction and resulting lower price levels in the entire sector had a direct bearing on price levels for organics as well.

The trend of increasing exports to the EU was broken in 2009/2010, specifically for organic pineapples, and since mid 2010 organic volumes imported are declining and prices are moving back to more rewarding levels.

The Producers

At the production side a shake-out has taken place, many have lost faith and stopped organic pineapple operations and others are scaling back their production potential. Among the main survivors, Bio Exotica Ghana Ltd and Finca la Corsicana of Costa Rica can be found. For these organic production companies there may be interesting opportunities in a more balanced marketing environment, provided that improved value chain management and better coordination with the retail sector has a lasting impact on the sustainability of organic pineapple growing for export.

All farms visited in Costa Rica and in Ghana have basically the same type of field problems: mediocre natural soil fertility, substantial disease pressure and high field losses. The sustainability and efficiency of field operations in both countries could be strongly improved by using high grade compost as the basis element leading to improved soil fertility, better disease control and, generally spoken, to a better environmental balance. Compost is also an economic option with regard to supplying fields with most of the required nutrient elements.

Workers participation as stakeholders in the production/export process is an interesting option if land could be made available and properly equipped for this type of agricultural activity. In Costa Rica such initiative will be complicated as to secure good farming land will be very costly and also quite complicated in view of limited availability of farming sites that meet the specifications

In Ghana at Bio Exotica, it appears that participation of workers in an associated growers association for organic pineapple production would not only be possible and feasible, but such venture could be quite profitable as well. Land is available and all stakeholders are willing and interested.

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Conclusions

From this mission a number of explicit conclusions can be drawn:

- Those who invested in sustainable pineapple production during the past few years have been badly disappointed and quite a number among these pioneers have scaled back their activities or have abandoned organics altogether. A difficult starting period at most farms and, simultaneously, collapsing markets were strong negative forces to be faced.
- On the positive side we see since mid 2010 a strongly improving market for organic pineapples; this positive development being fueled by increased demand and lower imports. Prices, for organics in particular, have appreciated sharply and the trade taking an optimistic view on the market considers the changing trend as structural. Remaining organic producers may benefit considerably, provided that they are able to seize upon the opportunity
- Growing organic pineapples for export is also a relatively new activity in the fresh fruit sector. Most if not all farms were created between the years 2003 and 2008 and these enterprises went through a difficult and costly learning period, which coincided with a general decline in returns from sales due to unfavorable market conditions and economic downturn.
- Cultivation methods and quality have certainly improved over the past years but at the same time little concern was given to soil fertility in terms of holistic soil management and making use of the raw organic materials generated by the farming operations itself. This state of affairs has not really advanced the sustainability of farming operations.
- It is the consultants' opinion that the sustainability and efficiency of organic production in both countries could be strongly improved by using high grade compost as the basis element leading to improved soil fertility, better disease control and, generally spoken, to a better environmental balance. Compost is also an economically viable option with regard to supplying fields with most of the required nutrient elements.
- Consultants also consider the knowledge base of those who operate in the organic pineapple sector to be too limited yet. Farm management and workers must be trained in all aspects of sustainable farming practices in order to promote understanding and acceptance of new approaches and encourage innovative thinking. Any new composting setup should be accompanied initially by expert technical assistance.
- Improved market conditions should principally benefit the producers, as these remaining operators in the tropics are not only the weakest but also most important link in the entire chain. No production, no sales, that's clear.

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Improved value chain management and better coordination with the retail sector will only have a lasting impact on the sustainability of organic pineapple growing for export if this leads to rewarding income for producers.

- The organic pineapple sector is at present in a delicate position. Producers face a number of problems with productivity, quality and profitability and lack the financial means to improve their operations. The risk of losing a large part of this sustainable and fair agricultural production segment is therefore absolutely realistic. The disappearance of the sector would have a serious impact on the social fabric of the areas where organic and fair trade enterprises operate. Sustainable farming practices, knowledge bases, employment and fledgling social justice initiatives may be lost.

Recommendations

“Limited know-how leading to low productivity coupled to disappointing sales results and a lack of transparency in the value chain have made the production of organic pineapples a hazardous activity”

It is recommended to set up an international knowledge exchange system (Organic Pineapple Association) with close links to interested market parties. A number of crucial factors that determine the viability of the sector would be bound together by such organization

Exchange of know-how, research activities, learning programmes, carbon credits management and value chain management among others, would be brought under the umbrella of the Organic Pineapple Association.

Founding members of the Association would be Finca la Corsicana of Costa Rica, Finca la Danta of Costa Rica, Bio Exotica Ltd of Ghana, Eosta BV of the Netherlands and ICCO. The Association would be open for any new members active in the organic pineapple sector. New members should pay an annual membership fee.

Summarizing it can be stated that there is a great need for an interprofessional co-ordinating organization that addresses the problems of the organic pineapple sector.

Learning programmes

Two key pilot projects are considered of prime importance in advancing the cause of sustainable production methods.

1. Compost pilots are seen as important regional learning projects and the setting up of a pilot compost facility in Ghana and in Costa Rica respectively is strongly recommended.

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2. Workers participation schemes should be encouraged if critical success factors can be met. These conditions do exist in Ghana in the Bio Exotica area and this initiative is strongly recommended for that particular area.
Although it is not yet clear at this point in time, whether workers participation – and/or associated smallholders schemes can work in Costa Rica, the possibility can not be excluded and a successful venture in Ghana could set the trend.

These projects will have a considerable practical impact and have the advantage that they can be quickly realized.

The available technical support structures in Costa Rica and in Ghana can, with the help of external expertise, easily manage and carry through such undertaking.

Moreover, composting will lead to earning carbon credits and proposed compost projects in Ghana and Costa Rica would therefore create an additional source of income for the sector.



A. ASSESSMENT

A.I MARKET DEVELOPMENTS

General context

Till 1999-2000 fresh pineapple markets were relatively stable; most fruit for European markets being produced by West Africa (64%) with Ivory Coast as a principal supplier. Costa Rica as a good second filled 36 % of the total volume imported in the year 2000 (314,903 MT)¹

Fruit prices were still rewarding and farmer's income generated from pineapple production was a source of steady income for many rural families.

The main cultivars imported were the Smooth Cayenne from Africa and the MD2 Extra Sweet produced in Central America by the large international fruit companies mainly.

Three major events sealed the fate of West African pineapple production.

1. Africa was not able to produce a competitive and uniform quality level with its Cayenne variety and the European retail sector adopted the MD2 Extra Sweet as its standard.
2. African producers were not able to convert in time to this new variety, not available on the African continent.
3. Latin American producers, Costa Rica in particular, multiplied their exports to the EU between the years 2000 and 2008 by a factor five. Costa Rica alone moved from 113,346 tons to 668,436 tons exported to the EU. In 2008 a total of 914,881 metric tons were absorbed by EU markets of which about 99,000 tons from West African origins.²

The pineapple, once a luxury item on the supermarkets' shelves, had now become a commodity to be sold at discount prices. And Costa Rican exporters ruled the markets.

Organic productions

It is in this context that we have to review the emergence of an organic pineapple sector in both West Africa as well as in Costa Rica. Organic pineapples were a very rare commodity at the beginning of this century and prices were extremely high. The main hurdle was the farmers' inability to regulate harvests by means of ethylene forcing. This matter was solved in 2006 when the European Commission adapted its Organic Regulations, allowing the use of ethylene in organic pineapples.

Anticipating on this move, several initiatives started as early as 2002-2003 in Ghana and in Costa Rica as well in order to set up production sites for organic pineapples.

¹ Annex 1 European imports comparison

² Annex 2 European imports 2000-2010

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In Ghana, Bio Exotica Ghana Limited set up a small organic enterprise with a production potential of 500-1000 tons annually. The size of the company's planned production capacity having been determined by the size of the expected market potential. Expert advice was provided by marketing partner Eosta of the Netherlands. MD2 "in vitro" plantlets were purchased in France and in Honduras, weaned and multiplied in the company's nursery and planted in the commercial fields. Export production came on stream during the first part of the year 2007.

Costa Rican exporters and growers also moved into the gap, and in a big way by planting a few thousand hectares of organic pineapples. (for which at the time no clear markets existed)

Finca la Corsicana was one of the largest organic pineapple farms established in Costa Rica, if not worldwide. Corsicana's production started in the second part of 2007.

Meanwhile the entire pineapple production/export sector had entered a situation of serious overproduction and price levels dropped dramatically as from 2007 onwards. Conventional pineapple overproduction and resulting lower price levels in the entire sector had a direct bearing on price levels for organics and all highly pitched expectations just evaporated. Economic downturn as from 2008 only aggravated an already serious situation.

The year 2009 saw a slight decrease in general pineapple volumes marketed and during 2010 it became clear that specifically in the organic production sector a shake-out was on its way. In Costa Rica but also in West Africa organic farmers have scaled back or have stopped this activity entirely and large certified areas have now reverted back to conventional farming practices.

Among the main survivors we count La Corsicana in Costa Rica, La Danta in Costa Rica and Bio Exotica Ghana Ltd in Ghana, West Africa.

Value Chain

The tropical fresh fruit value chain comprises 5 separate sectors:

1. Production
2. Export
3. Marine and/or air freighted logistics
4. Import and marketing
5. Retail

Production side's income position depends largely on production cost, shipping cost and sales.

In many cases in West Africa producers simultaneously act as exporters and sell their fruit directly to the European retail sector through a marketing intermediary.

Over the past 10 years producers have faced an ever-increasing cycle of price erosion, increased energy cost, increased shipping cost and increased cost for all other inputs.

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Mastering the value chain, main strength of the large multi-national fruit companies is an ever-elusive goal for the small and medium sized independent units that account for the bulk of the organic producers.

The Costa Rican situation is different as most farmers sell their produce basis “ex farm” to mostly large international fruit companies. However, the same dynamics apply here as well: sales income erosion coupled to increasing cost levels have brought many to the brink of bankruptcy.

There appears to be a lack of coordination in the trade and strange discrepancies exist, as for example:

“the North American market demands larger fruit and the European markets will only pay a reasonable price for the smaller grades”

It is not really conceivable that in-depth consumer studies are at the basis of this assumption. The fact that fruit is bought by European retailers by the box and sold to the general public on a per fruit basis might be closer to the truth.

Such anomalies, from a producer’s point of view, have crept into the trade over a long period and in a situation of a too abundant supply position will be difficult to eradicate.

Countries that produce, for geographical reasons, for the European markets only, are disadvantaged as their farmers have been obliged to gear their production methods to producing smaller fruit as there is no market for the larger sizes.

Average exported fruit weight in Ghana is therefore 1.30-1.35 kg

Costa Rica is in the position to produce all sizes for two different markets and has an average exported fruit weight of about 1.8 kg³.

Compared to his Costa Rican counter part’s operations, the Ghanaian producer, under similar conditions, will thus lose about 25% of his exportable income due to this practice. Ghanaian strength on the other hand is the ability to adopt a low cost structure with regard to net production cost.

Improved value chain management and better coordination with the retail sector will certainly improve the sustainability of organic pineapple growing for export. A coordinated effort by production, marketing and supermarkets has been started by Eosta, stressing the common interest of all sectors to reach the consumers with a healthy high quality fruit of sustainable and organic origin. It is the right moment for such initiative, considering increased demand for organic pineapples and the tightening of supply positions worldwide.

³ Annex 3 comparison of exportable grades Bio Exotica Ghana Ltd and Finca La Corsicana
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A.II CORSICANA SA COSTA RICA – SITUATION REPORT

II 01 General Information

La Corsicana S.A. is owned by the US based company Collin Street Bakery Limited. La Corsicana's agricultural operations comprise 2 separate farm units; Finca La Corsicana Organica with an organic rotation area of approx. 400 ha and Finca La Linda with a conventional rotation area of approx. 700 ha.

On site the company operates a modern packing and cold storage facility that supports both organic as well as conventional productions on strictly separated processing lines.

Finca Corsicana is located near the small town of Llano Grande de la Virgen de Sarapiquí on the northern Plains of Costa Rica. The certified farming area consists of 400 hectares of land devoted to the growing of organic pineapple of the extra sweet variety.

Finca Corsicana has been growing pineapple from 1991. In 2004 wishing to take better care of the local environment and seeing the opportunities for sustainably produced fruit, the company started converting the farm to 100% organic. This process took 5 years and required considerable investment due to not being able to use large portions of the farm, having been set apart as fallow areas under organic conversion.

In July of 2008 last conventional fruit was packed on the farm. Since then La Corsicana Organica has been 100% organic pineapple. It was quickly discovered that the organic market is a rather complicated playing field; a fast developing sector, which, nevertheless, can be easily oversupplied.

In 2009 more than half of the organic production had to be packed and sold as conventional pineapple due to a lack of organic markets. This caused considerable financial hardship as, according to La Corsicana's management, the cost of producing a box of organic pineapple is higher than for conventional fruit at Finca la Corsicana ; organic yields per hectare have been significantly lower.

Also in the wake of the global financial crisis demand for, and prices of, organic pineapple decreased which put the company in serious economical problems.

However, Corsicana is very much inclined to continue its organic project – Corsicana Organica is at this time one of the largest organic pineapple ventures in the world - but the economics of the project have not been favorable sofar. Significantly higher yields of exportable produce per hectare and a keen marketing management are required to solve this company's economic problems

Collin Street Bakery outsourced the management of La Corsicana to the company Grupo Agroindustrial El Angel who provides the CEO of La Corsicana Mr. Dennis Gaughen. The executive manager of La Corsicana is Mr. Luis Carlos González.

La Corsicana was converted to full organic management in a step by step procedure that began in 2001 and was completed in 2008.

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II 02 Climate data

Farming areas situate at latitude 10° 24' North at an altitude of about 150 m. The climate is of the humid tropics with regular rainfall pattern throughout the year. Natural vegetation is of the rain forest type.

Climate data have been recorded at the farm during the past 3 years.

Table 1 - monthly rainfall in mm

	Jan	Feb	March	Apr	May	Jne	Jly	Aug	Sep	Oct	Nov	Dec	totals
2008	nr	nr	nr	nr	nr	nr	nr	nr	288	381	466	558	
2009	405	422	380	75	394	296	569	365	212	446	445	171	4,180
2010	271	372	324	222	352	408	295	477	640	398	383	371	4,513

*source: CSB La Corsicana

Table 2 - Average monthly Relative Humidity Percentages

	Jan	Feb	Mrch	Apr	May	Jne	Jly	Aug	Sep	Oct	Nov	Dec	avg
2008	nr	nr	nr	nr	nr	nr	nr	nr	86	89	89	91	88.8
2009	90	89	86	82	87	88	90	89	86	90	92	90	88.3
2010	88	89	88	87	89	89	89	89	89	87	89	90	88.6
max	99	99	98	97	97	97	97	97	98	98	98	98	97.8
min	58	47	51	44	55	57	56	58	53	52	58	58	52.8

*source: CSB La Corsicana

Table 3 - Average monthly temperatures

	Jan	Feb	Mrch	Apr	May	Jne	Jly	Aug	Sep	Oct	Nov	Dec	avg
2008	nr	25.5	24.8	23.6	23.1	24.2							
2009	23.0	22.6	23.3	25.0	25.3	25.2	24.6	25.0	25.8	24.9	24.3	24.3	24.4
2010	23.5	24.4	25.5	25.8	25.8	25.4	25.5	25.4	25.1	24.9	23.7	21.9	24.7
max	31.0	33.9	33.6	33.5	34.3	33.6	33.2	33.5	33.6	33.5	31.4	29.6	
min	17.0	17.6	17.3	17.7	20.2	19.8	19.8	20.8	19.7	20.1	16.9	17.0	

*source: CSB La Corsicana

La Corsicana's climate conditions are characterized by heavy rainfall year around, high humidity and mean annual temperature range of 24.2 to 24.7 degrees Celsius.

Maximum day temperatures may reach 34° Celsius during the warm summer months and 31° Celsius during the cooler winter months.

Minimum temperatures range from 20° Celsius during the summer period to 17° Celsius during the cooler period. Occasional cold spells may be experienced.

At times heavy overcast situation is prevailing.

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II 03 Soils, texture, structure and natural fertility

Finca La Corsicana has a flat to slightly undulating topography with slopes of about 1%. Deep gullies 50 to 100 m wide with primary and secondary forest cover separate the different farming sections and provide for natural drainage of the land.

Soils are of volcanic origin; old volcanic sediments more precisely and have a yellow brownish color.

Predominant texture can be described as clay loam: a top layer of 40 cm of clay loam and increasingly heavier clay in the lower profile. Arable top soils are medium textured friable soils, well suited to pineapple cultivation.

Considering the high rainfall conditions year around and the heavier textures in the subsoil, such cultivation will only be possible if an extensive drainage infrastructure conveys the surplus water quickly from the pineapple plots to a lower main drainage area and, if pineapple plants are planted on high raised plant ridges.

N.B.: In some areas the reduction line could be found at 30-40 cm, indicating the presence of perched water tables during at least part of the year

Chemical composition of La Corsicana's soils indicates low to medium natural nutrient levels and high acidity.

Pineapples do prefer acidic soils with pH levels from 5.0 to 6.0. but pH levels from 4.0 to 4.5 as found at Corsicana Farm are at the lower end of the acidity scale, when considering commercial pineapple growing requirements.

Table 4 - Chemical properties of the soils at la Corsicana, Costa Rica sampling depth 20 cm

Sample	pH (H ₂ O)	E.C ds/m	Total N -----%-----	O.C. -----	avail. P ₂ O ₅ mg/kg	Exchangeable Bases cmol/kg				total Acidity H+Al	base saturation	CEC
						Na	K	Ca	Mg			
lot 7	4.5	low	low	*	1.02	*	0.29	0.58	0.31	2.22	35%	
lot 6	4.5	low	low	*	0.97	*	0.41	0.67	0.53	2.06	56%	3.66
<u>Trace elements</u>												
S	Fe	Mn	Cu									
high	high	medium	medium	low		low	low	low		high	low	
high	high	high	medium	low		med.	low	low		high	med.	low

*data not checked in this analysis

Source: Laboratorios Analyticos Agrotec

Results of recent soil analysis carried out by Koch Eurolab of the Netherlands during January 2011, specifically indicate very low levels of P, Boron, Copper, Zinc. Also Mg is in short supply.

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II 04 Analysis of current farming practices

Farming operations at La Corsicana are fully mechanized. The company has any type of equipment required and all is in a good shape and well maintained.

Weed control measures consist of covering the entire plot with black plastic and hand weed around the rims. The farm looks clean and tidy. Of course, all organic areas were conventionally farmed during a long period in the past, before conversion and most nuisance weeds were eradicated a long time ago by chemical means.

This certainly is an advantage as in many other organic areas weed control is a true problem, requiring high cost weeding operations by hand to achieve some kind of control.

As La Corsicana' s labour cost "all in" amount to close to USD 30.00 a man-day, weeding by hand is clearly not an economic option.

Cultural practices and rotation period

It is general practice at La Corsicana to use 65% of the planted area for main and ratoon cropping, whilst 35% of plantings have one main crop and these fields are, after harvesting all fruit, being put to sucker production. (new planting material) The main crop+ratoon area is not used for further sucker production.⁴

Rotation cycle for main crop + sucker production is 31 months including a six month fallow period under green manure cover crop.

Rotation cycle for main crop + ratoon crop combination is 36 months including a six month fallow period.

At present La Corsicana plants about 2 hectare weekly or 8.7 hectares on a monthly basis

All works at land preparation have been mechanized and for the destruction of old vegetation, leveling, sub soiling, ploughing and ridging adequate equipment is available. Removal of old plastic mulch appears to be a problem however.

Planting is carried out by hand, but most other farming jobs such as fertilization and disease control are mechanized and carried out by large boom sprayers.

The entire farming area is covered by an extensive drainage system.

Still, some areas of the farm that are not perfectly level, suffer of water logging in small superficial depressions and it appears that the raised plant beds may not be sufficiently high to protect plants and root systems during heavy rainfall.

The result of such water logging, as it could be witnessed in some areas, is extensive field losses due to Phytophthora fungal attacks and other rots.

Corsicana' s fields look at first sight fresh, green and healthy, but field losses appear to be considerable and are a heavy drain on general productivity.

⁴ Annex 2: rotation period and cultural practices at La Corsicana

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Fertilization

In view of the low natural fertility of the soils and the considerable amount of nutrient elements removed by intensive cropping, the following fertilization programme is carried out by La Finca.

Table 6 - nutrient supply Finca la Corsicana*

fertilizer	nutrient	content	per hectare	nutrient per hectare	nutrient per plant
Blood meal	Nitrogen	10%	3500 kg	350 kg	5.06 gr
Rock phosphate	P ₂ O ₅	30%	350 kg	115 kg	1.77 gr
Potassium sulphate	K ₂ O	50%	400 kg	200 kg	3.08 gr
Magnesium sulphate	MgO	16%	160 kg	25 kg	0.35 gr
Calcium Carbonate	CaO	32%	1500 kg	480 kg	7.38 gr
Zinc Metalosato	Zn	6%	5 kg	0.3 kg	
Iron sulphate	FeSO ₄	19%	61 kg	12 kg	
Solubore	Boron	21%	61 kg	13 kg	

* based on 65,000 plants per hectare

Soil's chemical analyses show low levels of principal nutrient elements Nitrogen, Phosphorus, Potassium and Magnesium. Calcium is low and acidity is high. Pineapple's requirements, during the vegetative period, for good growth and excellent fruit quality are as follows:

- Nitrogen 4 gr per plant
- Phosphorus 2 gr per plant
- Potassium 10 gr per plant
- Magnesium 2 gr per plant
- K / N ratio 2 - 2.5

Source: CIRAD,France

La Corsicana's nutrient supply programme is not well balanced. In particular the Nitrogen/Potassium balance is deficient. Too much Nitrogen will encourage fast growth but produces weaker plants. Not enough Potassium will have negative effect on fruit quality in general, shorten shelf life, and may lower the resistance against adverse weather conditions and diseases. Too much Ca will inhibit the uptake of K.

Disease Control

Main pineapple diseases to be found at La Finca Corsicana are Phytophthora Heart Rot, Fusarium and Erwinia Rot.

Main pests are ants/mealybugs, scale and the pineapple borer Thecla basilides. All pests may cause extensive damage to fruit and plants.

At La Corsicana most fungal diseases are being controlled by regularly applying Trichoderma funghi to the pineapple fields. Several strains of *Trichoderma* have been

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developed as bio-control agents against fungal diseases of plants. The various mechanisms include antibiosis, parasitism, inducing host-plant resistance, and competition. Trichoderma generally grows in its natural habitat on the root surface, and so controls root diseases in particular, but can also be effective against foliar diseases. The specific Trychoderma strain is produced by La Corsicana in a small but well equipped laboratory situated on the farm.

An efficient drainage system is considered a main condition for avoiding wide spread plant losses due to fungal attacks.

Results, as witnessed during the mission, are mixed; some plots showed a large number of infected plants whilst other plots appeared to be clean. Main reason appears to be localized deficient drainage due to small depressions in an apparently level field and plant ridges that are too low to correct this deficiency.

Pest control

Control of common pineapple pests is based on spraying garlic oil emulsions and using the organic insecticide Bacillus thuringiensis. Bt is a gram-positive, soil dwelling bacterium, commonly used as a biological alternative to a pesticide. Despite regular pest control applications specifically mealybugs and Thecla damage were still abundantly found on fruit delivered to packing-station.

According to La Corsicana's field and packing-station data gathering, about 20-25% of plants or fruit are lost in the field due to disease and pest activities and about 25% of harvested fruit is being rejected at the packing-station due to quality defects caused by pests, rots and abnormal growth.

II 05 Corsicana Smallholder Participation Scheme Assessment

Company's position

The company is in favour of training people in the proper organic farming practices so that they can set up their own farm outside the nucleus farm's own premises.

Availability of land

For those that do not possess land in Costa Rica it will not be easy to find unencumbered parcels of land near to a nucleus farm area. Land has to be purchased and good land is expensive.

All the lands of Finca La Corsicana are owned by the US based company Collin Street Bakery Limited. The entire area is cultivated by their subsidiary Finca La Corsicana. To make portions of this land available to workers is not an option as it may be difficult later, to retain ownership rights, when policy changes are called for.

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Conclusions

In view of above mentioned facts, the establishment of a workers association that farms on company lands is not considered feasible at this point in time.

II 06 Corsicana – Overview

Finca La Corsicana Organica in Costa Rica converted between 2005 and 2008 to full organic pineapple growing. Considerable cost has been involved to carry through this operation. Market prices have not been rewarding however over the past years and past organic learning period cost the company dearly, putting La Corsicana in a difficult financial position.

Labour cost is high in Costa Rica and La Finca runs, not surprisingly, a fully mechanized farming operation. Farm infrastructure and equipment is well maintained and in a good shape.

Finca la Corsicana is lead by a professional and experienced management team.

Soils consist of old volcanic deposits with low natural fertility, high acidity and low organic matter content. Fertilization depends strongly on nitrogen and less on potassium. Principal source of nitrogen supply is blood meal from local slaughter houses. Serious problems in the blood meal supply chain may lead to serious problems at La Finca. Nutrient supply is not in balance and specifically the N/K ratio is out of tune.

Climate in this part of Costa Rica is of the humid tropics type with very high rainfall throughout the year (4500 mm) and limited solar radiation. Cold spells may occur, leading to natural flowering, which disturbs planning of harvests and proper maturity of fruit harvested. The specific climate of this area makes irrigation superfluous but on the other hand demands a sophisticated drainage system.

Field losses before harvesting are high, mainly due to the incidence of fungal, bacterial diseases, pests and drainage deficiencies. Excessive nitrogen supply could affect the farm's performance as well.

Also packing-station losses are surprisingly high. Surprising, because La Finca is such a well managed, well equipped agricultural enterprise.

Phytophthora heart rot, Erwinia rot and Thecla moths are the main culprits. Quite often the incidence of Phytophthora rot is directly related to the state of drainage, field by field.

Productivity stands at about 4800 boxes of 12 kg each per hectare. The farm is not profitable at this level and break even point is close to 5500 boxes per hectare according to management sources.

La Corsicana sells its fruit basis "ex farm" directly to its exporter Dole and is further not involved in the product's value chain.

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II 07 SWOT Analysis

SWOT analysis La Corsicana

Production-farming

<p><u>Strengths</u></p> <ul style="list-style-type: none"> ➤ Good soils ➤ Irrigation not required ➤ Flat topography ➤ Dedicated management and labour ➤ Good social policy ➤ Pioneer organic organization ➤ Well equipped farm ➤ Well equipped workshop ➤ Good farm roads and access to fields 	<p><u>Weaknesses</u></p> <ul style="list-style-type: none"> ➤ High labour cost ➤ High overheads ➤ High cost of inputs ➤ High field losses and therefore a too low exportable production per hectare ➤ Excessive rainfall and heavy overcast
<p><u>Opportunities</u></p> <ul style="list-style-type: none"> ➤ Increasing demand for organics 	<p><u>Threats</u></p> <ul style="list-style-type: none"> ➤ Uncontrollable disease outbreaks ➤ Adverse weather conditions ➤ Shortage of finance to sustain operations ➤ Limited availability of basic inputs

Packing-Exports

<p><u>Strengths</u></p> <ul style="list-style-type: none"> ➤ Modern and well equipped conditioning-station ➤ Stable ex-farm purchasing relationship with Dole ➤ Good export quality packed ➤ Export opportunities for all fruit sizes ➤ Good road to main port Limon ➤ Several reefer loadings weekly to all destinations ➤ Rewarding local markets for non-exportables 	<p><u>Weaknesses</u></p> <ul style="list-style-type: none"> ➤ Too much dependence on 1 single exporter ➤ Lack of entrepreneurial knowhow and initiatives regarding new market development ➤ Lack of control regarding marketing, sales and income ➤ Too high packing-station losses
<p><u>Opportunities</u></p> <ul style="list-style-type: none"> ➤ Increasing demand for organics 	<p><u>Threats</u></p> <ul style="list-style-type: none"> ➤ Global overproduction for target markets ➤ Decreasing sales value ➤ Unpreparedness for new market penetration initiatives ➤ Finance squeeze

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A III FINCA LA DANTA – SITUATION REPORT

Overview

Finca La Danta, situated at about 40 km from Finca la Corsicana, and near to the Nicaraguan border was only briefly visited by consultants, and the following is a global impression of its structure, operations and possible potential.

La Danta is an association of 6 shareholders. Mr. Luis Carlos Gonzalez, the former sole owner of the farm had started to grow organic pineapples in 2007 on 4 hectares. However, he was not too successful and lacked the support of his exporter. When he met his future associates the idea of doing something together was born. The new associates arranged a refinancing of Gonzalez' farm in 2008 whereby Gonzalez gave up a large part of his ownership to the other five associates.

Management of current farming operations is still carried out by Luis Carlos Gonzalez, with considerable support from the other partners in the field of organization, supplies and finance.

La Danta employs 8 permanent workers who live (with their families) on the property in primitive houses built by the farm. Whenever necessary La Danta will employ casual labour in order to get all key jobs done at the farm.

The property covers a total of 200 hectares of land, partly in pineapple farm and cleared uncultivated areas and partly in original rain forest cover

The farming area consists of 30 hectares of cleared and cultivated land of which, according to organic certificate, 22 hectares have been certified. (current pineapple plantings November 2010)

Finca La Danta would like to expand its operations to 80 hectares of cultivated land and to keep the remaining area of 120 hectares as natural rain forest.

At the moment the property shows signs of neglect and is in desperate need of improvement. It was interesting to see that a number of plots had received a good amount of compost at planting and those plots looked very good indeed.

The soils are freely draining and friable and there was no evidence of Phytophthora rot which may be the result of good internal drainage of these La Danta soils

Finca la Danta is a small agricultural enterprise, financed by venture capital. They are having a hard time due to the collapse of markets and exporters' interest alike.

The soils are of very good quality and disease pressure is low.

Climate conditions are similar to La Corsicana' s with a heavy rainfall and low solar radiation regime.

The farm' s cost structure is simple and La Danta can be considered a low cost, but well managed operation. Consultants noticed however that technical management practices have not followed the same pace as the farm' s development over the past three years. Regular technical controls and advice are required.

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Finca La Danta wishes to improve its fields and production potential by using compost as a soil conditioner.

The farm's management also wishes to train neighboring smallholders in organic practices and to form an association of sustainable pineapple growers in this remote corner of Costa Rica near the Nicaraguan border and become exporter of their own fruit in stead of having to depend on third parties.

La Danta would benefit greatly by improving its infrastructure, i.e. upgrade its maintenance workshop, build a proper warehouse and an efficient packing-station to ensure a consistent quality of fruit to be exported.

A IV BIO EXOTICA GHANA LIMITED – SITUATION REPORT

IV 01 General Information

The Company

Bio Exotica Ghana Limited is a limited liability company established in Accra, Ghana on the 15th of August 2003 and the company's business is the production of fresh organic produce for export to overseas markets. Principal activity is in organic pineapples. The entire Bio Exotica farming site is a certified organic area. The company is managed by a Board of Directors.

History

Bio Exotica Ghana Limited was established in 2003. During 2004 the feasibility of an organic pineapple venture was the subject of various studies in origin as well as in the European markets. Long term land leases were secured and venture capital raised.

Early 2005 first land clearings began and main farm infrastructure was established. Extensive nursery operations provided MD2 cultivar's planting material for the commercial fields and first harvests came on stream during March 2007. A small but efficient conditioning-station and a cold storage facility were constructed on the farm and warehouses, workshop, a guesthouse and a farm office facility were built in order to be able to facilitate and coordinate all operational activities in this remote area.

Bio Exotica also operates and export and accounts office on the main highway to the port of Tema, in the village of Akraide.

General management, financial management and production management operations are run by Ghanaian nationals.

Site

The farming area is located at 100 km north of the export port of Tema, near the village of Gyakiti on the banks of Lake Volta. The certified farming area consists of 150 hectares EOSTA – ICCO 01-04-03-025 / Sustainability of organic pineapple growing for export



of land, of which 90-100 hectares devoted to the growing of organic pineapple for export, 20-30 hectares of buffer areas and 30 hectares still to be developed and presently under shrubs, thorn bush and elephant grass.

The entire pineapple farming area is irrigated. Electric pumps power the irrigation system. Electricity is being produced by the Akosombo hydro-electrical dam in the Volta River. Construction of the dam created one of the largest man-made bodies of water in the world. Bio Exotica has the right to pump water from the lake for irrigation purposes.

The Ghana government did commission 8 km of new high tension line in order to connect the farming area to the national grid. Government also improved and hard topped the larger part of the Akosombo-Gyakiti road and Bio Exotica is currently negotiating with the regional Administration to complete the road improvement programme for the peninsula sector. The remaining 20 km of lateritic road leading to the farm are in a very bad shape. Hauling a container load of organic pineapples from the farm to the port of Tema will take 3 to 4 hours, depending on the traffic congestion situation around the port area

Employment and Corporate responsibility

The Volta Lake peninsula is an area of great poverty and main activities are subsistence farming and fishing. Within 25 km Bio Exotica is the sole employer and the company employs about 100 workers from the neighbouring villages. The workforce is fully unionised and Bio Exotica enjoys an excellent relationship with the local community. The company has built a primary school and provides educational tools and equipment whenever possible. The school has been commissioned in 2006 as a gift to the local community.

Finance

Sofar 1.8 million Euros have been invested in the area financed by venture capital only. Bio Exotica Ghana Limited has also been the recipient of a 250,000 euro Dutch PSOM grant.

However, low price levels in the oversupplied pineapple markets of the past years have negatively influenced the ability of the company to properly finance its current operations and to invest in equipment, plant and machinery, innovative technology and extensions. Reserves have been depleted, new investments have been put to a stop and Bio Exotica is on a minimum cash flow/low cost regime in order to survive the onslaught of the economic downturn.

Extensions

Nevertheless, Bio Exotica considers the possibility to extend its production capacity by developing new areas that border the current farming sector. The company has been certified EU organic since 2005; Fair Trade since May 2009 and Bio Suisse in 2010. New markets, increased demand and positive pricing developments during the second part of 2010 and a more optimistic view on future market developments for organic pineapples by importer and marketing partner Eosta encourage the Ghanaian

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company's feeling that the worst could be over and that an expansion policy should be envisaged in view of positive market developments.

Summary

Bio Exotica is a fully organic agricultural enterprise in Africa, financed by venture capital. The farm is sited on good pineapple land adjacent to Volta Lake and the entire area is irrigated. The distance to the port of Tema is 110 km of which 90 km of good tarmac main road and 20 km of low grade secondary road, earmarked to be hard topped in the near future. Electricity high tension line has been extended to the farming area and within the farm electricity is available throughout the operational area.

It is Bio Exotica's mission to produce and export high value organic fresh produce for its export markets.

It is also Bio Exotica's mission to provide employment and to improve educational infrastructure in the hamlets that are its neighbours.

IV 02 Climate data

Farming area situates at latitude 6° 24' north and is positioned exactly on the Greenwich 0 meridian at an altitude of 50 m. The climate is of the humid tropics with an irregular rainfall pattern due to its geographical position at the tip of the Kudi peninsula far into the vast Volta Lake. Vegetation is savannah type.

Climate data have been recorded at the farm during the past 5 years.

Table 7 - monthly rainfall in mm

	Jan	Feb	Mrch	Apr	May	Jne	Jly	Aug	Sep	Oct	Nov	Dec	totals
2006	45	50	92	37	221	181	34	6	49	131	31	0	877
2007	0	15	35	145	126	176	128	118	208	262	44	3	1260
2008	0	18	84	181	201	308	324	84	83	139	23	32	1477
2009	3	25	54	106	85	296	70	40	38	110	17	4	851
2010	0	29	58	109	147	127	35	75	190	205	59	10	1044

Table 8 - Average monthly Relative Humidity Percentages

	Jan	Feb	Mrch	Apr	May	Jne	Jly	Aug	Sep	Oct	Nov	Dec	avg
2008	59	67	68	70	72	74	77	77	77	76	76	72	72
2009	62	67	67	69	69	75	77	79	77	77	75	74	73
2010	73	70	70	71	76	77	76	77	79	80	78	75	75
max	90	90	89	91	91	93	90	91	93	97	92	90	91
min	30	41	42	43	54	51	54	50	60	60	62	51	50

Table 9 - Average monthly temperatures

	Jan	Feb	Mrch	Apr	May	Jne	Jly	Aug	Sep	Oct	Nov	Dec	avg
2008	27.4	29.7	30.0	30.0	29.2	28.4	27.6	27.6	28.2	28.8	29.1	28.8	28.7
2009	28.9	30.6	30.7	30.5	29.1	28.8	27.4	26.7	28.0	28.1	28.3	29.1	28.9
2010	29.2	30.7	30.8	30.8	29.6	28.8	27.5	27.5	27.6	27.9	28.5	29.1	29.0
max	36	38	40	39	37	35	35	35	34	34	34	34	
min	23	23	24	24	24	22	22	22	22	22	22	24	

*source: Lake Farm Bio Exotica Ghana Ltd

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Bio Exotica' s Lake farm climate conditions are characterized by an irregular rainfall pattern, averaging about 1000 mm annually, high solar radiation, low overcast conditions and an annual mean temperature range of 28.7 to 29.0 degrees Celsius.

Highest day temperatures around 40° Celsius are recorded during the February thru April hot season and lowest night temperatures (22° Celsius) occur during the cooler summer period. The main dry season extends from mid November till the end of March and a second shorter dry period may occur during the cool summer months, specifically the period from the end of July till early September.

Harmattan weather conditions mainly during the month of January may cause a short period of cool weather and low relative humidity. During Harmattan, the whipped up dust from the Sahara desert will cause a heavy dust haze and lower solar radiation as a result. Simultaneously temperatures and R.H. will drop sharply

IV 03 Soils, texture, structure and natural fertility

Physical properties of the soils

All the soils of the Bio Exotica farm are deep and contain more than 70% sand. Compacted layers may occur in the subsoil. The high sand content of the soils is reflected in the texture, which is loamy sand, sandy loam or sandy clay loam. All soils have limited waterholding capacity. All soils are freely draining. Soils have been developed in situ and can be classified as Red and yellow/brown Oxisols

Table 10 - Physical properties of the soils at Bio Exotica

Sample	depth cm	particle size analysis (%)			texture USDA
		sand	silt	clay	
Lower slope	0-20	82	3	15	loamy sand
	20-40	83	4	13	loamy sand
Middle slope	0-20	84	3	13	loamy sand
	20-40	79	6	15	sandy loam
Upper slope	0-20	76	6	18	sandy loam
	20-40	72	5	23	sandy clay loam

Source: soil dept University of Accra

Chemical properties of the soils:

- Soil pH: All the soils are slightly acidic with a pH range of 6 to 7
- Electrical Conductivity (EC): The electrical conductivity levels of all the soils are very low. Thus all soils examined are non-saline.

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- Total Nitrogen: The soils are very poor in total Nitrogen.
- Organic Carbon: All the soils contain very small amounts of organic carbon.
- Available Phosphorus: The soils contain low to moderate amounts of phosphorus.
- Exchangeable Bases: the levels of sodium-Na and potassium-K are very low while calcium-Ca and magnesium-Mg are in low to moderate amounts.
- Cation Exchange Capacity (CEC): Soils have a low CEC as reflected in the low levels of organic Carbon and exchangeable bases. Exchangeable base saturation is between 60 and 80%
- Total Acidity: The total acidity content of all soils is low.

Table 11 - Chemical properties of the soils at Bio Exotica sampling depth 20 cm

Sample	pH (H ₂ O)	E.C ds/m	Total N -----%-----	O.C.	avail. P ₂ O ₅ mg/kg	Exchangeable Bases cmol/kg				total Acidity H+Al	CEC
						Na	K	Ca	Mg		
Lower slope	6.4	0.112	0.14	1.04	2.74	0.16	0.34	2.0	3.0	0.30	8.91
Middle slope	6.2	0.084	0.13	1.31	2.04	0.19	0.27	2.4	2.4	0.35	7.83
Upper slope	6.5	0.129	0.17	1.18	5.14	0.22	0.29	3.4	4.0	0.30	9.44
	med.	low	low	low	med.	low	low	low	med	low	low-med

Source: soil dept. University of Accra

Trace elements

Deficiency signs on existing vegetation and historical data from other farms in the district indicate possible deficiencies of S, Fe, B and Zn. It is highly recommended to have soil and leaf analysis carried out to determine the levels and requirements.

Recommendations:

These light textured soils are suitable for pineapples. However, the following management practices should be considered so as to enhance the productivity of the soils.

1. The land should be deeply ploughed and subsoiled so as to break and pulverize the hard subsurface layers.
2. The original vegetation should be ploughed in and allowed to decompose completely so as to improve the organic matter content and also the water holding capacity of these soils before developing pineapple farms.
3. It would be advisable to use leguminous cover crops to improve upon the nitrogen and organic carbon content of the soils.

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4. For the same reason the use of compost is strongly recommended.
5. The exchangeable bases' levels should be checked again before planting is done. It is advisable to raise the levels, in particular for exchangeable K (potassium) It also might be advisable to raise the levels of exchangeable SO₄ (sulphur) in view of deficiency signs on surrounding small holder crops. Trace element levels will have to be checked and possibly raised.
6. In view of the specific climate conditions at the site and the poor water holding capacity of its soils it is strongly recommended to make use of an irrigation system during those months that show a rainfall deficit.

Experts found out that most of above practices, except composting, are being applied at Bio Exotica' s farming site. The trace element component will have to be checked as quickly as possible however.

Results of recent soil analysis carried out by Koch Eurolab of the Netherlands during January 2011, indicate very low levels of Organic Matter; very low available P; low Mg, low S and very low levels of Boron, Zinc, Copper and insufficient Fe reserves.

IV 04 Analysis of current farming practices

Bio Exotica employs a fully unionized labour force of about 80-90 workers. Management and staff number 5, i.e. production manager, chief accountant, farm overseer, packing-station overseer, timekeeper and an export clerk. Project is being coordinated by Mr. Kwame Yeboah-Afari, a member of the Board of Directors.

Farming area situates along the rim of Volta Lake and comprises a total of 120 hectares of land, of which 90 hectares are being cultivated.

The farming area is fully irrigated by a travelling reel system and fixed underground main supply pipes and hydrants. During the long dry and hot season from November to March irrigation is indispensable.

Cultural practices

The farm aims to plant 2.0 – 2.5 hectares on a monthly basis but due to lack of equipment an average of 1.5 hectares monthly is being realized. The full production cycle is 12 to 14 months from planting to harvesting and fruit is harvested when having reached the required translucency and Brix, which takes place from 139 to 146 days after ethylene forcing, depending on prevailing weather conditions.

The rotation period at Bio Exotica is from 33 to 36 months and production is based on 1 main crop.⁵ After harvesting fruit, each plot will produce new planting material (suckers) during a period of 8 months. Area will then be cleared of all old plants and debris and

⁵ Annex 3 rotation period Bio Exotica and cultural practices



ploughed. As a green manure cover crop *Mucuna* is planted, grown and ploughed into the top soil. The total fallow period is about 12 months.

Ratoon cropping has not been practiced so far, but production trials have started on a 1 hectare experimental plot to be prepared after first harvest; for a second crop (ratoon) in about 12 months.

Pineapple plants are planted on raised beds or ridges along the main contour that runs south to north parallel to the lake's rim. Natural depressions that convey rain water from the higher parts to the lake are not planted and used as drainage channels. Nevertheless, small depressions that occur irregularly in the pineapple fields may turn into waterlogged areas after heavy rainfall and resulting phytophthora fungal attacks may bring about heavy plant and fruit losses. Plant beds are clearly too low and should be raised in order to limit water logging near the plant lines and to bring down the losses caused by stunted growth and phytophthora fungal attacks.

Plant ridges only are covered with black plastic mulch for weed control and soil protection mainly. In between the plant ridges a weeding crew will clean weed the area by hand. Guinea grass and Imperata spear grass cause the greatest problem and weeding is one of the main cost factors of this farm. Plastic mulch is of the bio-degradable type but debris are still present at the end of the production cycle and will have to be removed by hand before the land is ploughed again.

Disease control

Data examined at the farm's office show that most of field losses originate from Phytophthora heart rot infection. And most of these phytophthora losses occur in less than perfectly drained areas within each plot. About 15% of all plants planted will succumb to phytophthora infection. It has been noted that the ridging machine used for making the plant beds produces ridges that are too low. Bio Exotica's farm management is aware of this and a ridging plough has been ordered. It is expected that higher plant beds and improved main drainage channels will solve at least a part of the problem.

Acidity of the farm's soils is low and pH is found around the 6.5 level. It is known that the Phytophthora soil-borne fungus thrives in low acidity soils. The company therefore treats the plant ridge's soil with elemental sulphur in order to bring down the soil's pH. Sulphur also is a known fungicide effective against all phytophthora strains.

Furthermore, all plantings are regularly treated with compost tea; acting as a bio-control agent for phytophthora and other rots affecting the plant. Experts found out that the compost tea installation currently in use at the farm has not sufficient capacity for the 1000 litre reservoir used. This results in a less efficient compost tea.

It is highly advisable to improve the drainage situation in each particular plot, raise the plant beds and improve the compost tea operation.

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Pest control

Common pests are quite rare at Bio Exotica's farm. Soil-borne symphillids that destroy the root system were a problem initially, but better field sanitation and the use of Neem oil emulsions to be sprayed around the plant's base solved the problem to a large extent according to farm management. The mealybug population is extremely low and of no economic importance. So far no other insect damage has been noted on the plants. At the packing-station low percentages of insect feeding on the fruit are being recorded, main feeding marks found are of larger insects or possibly snakes or rats, being attracted to the ripening fruit.

Fertilisation

Bio Exotica's farms use organically certified fertilizers only; as per table 8 below.

Table 12 - certified organic fertilizers used by Bio Exotica

item	N	P	K	Mg	SO4	Ca	Trace
monterra	1	1	15	0	-	-	-
fontana	3.5	1	8	0.2	-	-	-
gogreen	3	3.3	4.5	1.0	-	-	-
fybrophos	-	22	12	21	8	5.5	yes

Monterra and Gogreen fertilizers are incorporated in the ridge at planting; Fontana is a liquid foliar agent applied monthly as from month 4 to month 9 and Fybrophos is applied 3 months after planting around the plant as a solid dressing, mixed with dried chicken manure.

Bio Exotica has a problem in securing a balanced nutrient supply, specifically with regard to Nitrogen and trace elements. Organic fertilizers available have relatively low Nitrogen contents.

Ground elemental Sulphur is incorporated in the ridge as a SO4 nutrient as well as with the aim to lower the Phytophthora inoculum in the soil. Phytophthora is a soil-born fungus sensitive to sulphur.

Table13 - Nutrient supply at Lake Farm Bio Exotica

fertilizer	Nutrient supply per kh/hectare during the pineapple's growing period				
	nitrogen	phosphorus	potassium	Magnesium	Trace elements
monterra	18	18	270	0	0
Fontana/chicken manure	20	7	19	-	possibly
gogreen	120	125	162	54	0
fybrophos	-	132	72	130	yes
totals	158	282	523	184	some
per plant at 60,000 /ha	2.63 g	4.70 g	8.72	3.06	some

Both Monterra as well as GoGreen fertilizers are so-called slow release fertilizers that release the contained nutrients over a period of about 7 months.

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Trace element deficiencies could be at the origin of the whitish/ yellowish patches of plants that can be seen occasionally all over the farm.

Also nitrogen levels should be increased slightly; 2.6 g of N per plant is rather low for commercial cropping procedures; increased levels would improve growth and productivity. Objective being 3.75 g per plant or about 225 kg per hectare.

IV 05 Bio Exotica Workers Participation Scheme Assessment

Company's position

Bio Exotica favors the establishment of a workers/out growers organization on land controlled by the company. A new area of about 25 hectares, already covered by organic certification, is available, but needs to be developed. The company is ready to earmark this land for a workers/out growers initiative.

Availability of land

Bio Exotica's Lake farm consists of 6 sectors that situate south to north (A, B, C, D, E, and F). All sectors border Volta Lake and can be irrigated. Each section comprises about 25 hectares of land. F sector, north of E sector is an area that still has to be developed and is at present under thorn bush vegetation. The land is adjacent to Volta Lake and needs to be cleared from bush, sub soiled, cleaned and ploughed. Roads and irrigation and electricity infrastructure have to be established. This area is considered good pineapple land and is already covered by various organic certifications. All lands have been leased by Bio Exotica from traditional owners (Chiefs) on long term leaseholds (40-50 years), approved by the appropriate government institutions. Chiefs will not lease any land to individual smallholders.

Workers / smallholders potential and knowhow

The workers union has been consulted and the idea of an outgrowers organization has been warmly received. Union will propose a shortlist of candidates to be discussed with the company's management. It is understood that F sector's development is considered a first step and that possibly other sectors, within the company's land could be developed as outgrower areas once the experimental F sector is successful.

Nucleus farm principle

Bio Exotica is in favour of worker's participation schemes, but certain conditions have to be met. Many farmers' cooperatives and associations on the African Continent have failed because of a combination of deficient planning, management, finance and equipment situations. Export quality standards and reliable weekly volumes could not be met and organisations fell apart. Bio Exotica wants to avoid such failure by all means possible and has proposed a nucleus farm concept to the workers union.

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Associated out growers will be operating under the technical management umbrella of Bio Exotica on land that has been acquired by the company from the traditional landlords. The sector will have to be cleared from bush; farm roads constructed; electricity line extended and irrigation system established. The company will remain responsible for maintaining and operating the infrastructural installations and all other equipment.

The company's account office will also oversee and control the association's finance situation in order to avoid disagreements among the association's members

Organisation

The matter of workers/out growers organization has been discussed with company's legal council and it is the opinion that such workers body should be organized as an Association. A cooperative organization is considered too complicated under the laws of Ghana.

Social Impact

Social impact will be considerable as responsibility for growing crops will be transferred from the company to the smallholders association. Also in terms of income per family, sizeable improvements can be expected. Associated smallholders will at least double their income, when compared to actual wages earned.

Conclusions

The company is willing and the workers are willing. Finance tables show that a workers participation scheme would be feasible, provided that finance could be found.

IV 06 Bio Exotica Ghana Ltd – Overview

Bio Exotica in Ghana, West Africa is a much smaller farm than La Corsicana and the conditions in Ghana are quite different from those in Costa Rica.

Bio Exotica is a limited liability company and is financed with venture capital as it is the case with La Corsicana, but the similarities end here.

The farming land is leased from the local traditional chieftaincy, leases being endorsed and registered by government, for a duration of 45 years. This procedure is usual practice in Ghana as practically all land belongs to local rulers, who, as caretakers of the tribal rights, are not in a position to sell land outright.

Compared to Costa Rica, labour cost in Ghana is very low indeed and on the Bio Exotica farm many tasks are still carried out by workers in the field. The level of mechanization is lower here than in Costa Rica.

Soils of the area, are sandy to loamy oxysols with mediocre natural fertility and very low organic matter content. Bio Exotica is using various organically certified fertilizers. The EOSTA – ICCO 01-04-03-025 / Sustainability of organic pineapple growing for export



nutrient balance of this organic mix is relatively efficient, albeit that the nutrient mix is short on Nitrogen and lacks trace elements. Bio Exotica abandoned an initial test of compost making, because of lack of experience and is at present not using any compost at all.

Initial compost testing indicated that compost would be beneficial for this farm. The company does run a compost tea operation and fields are regularly sprayed with compost tea. The compost tea production process is not very efficient and could be considerably improved.

The climate of the Volta Lake peninsula where Bio Exotica's farm situate at the very end in the middle of the lake, has a savannah type of climate; long and hot dry season and possible heavy rainfall during a couple of months. This particular area experiences a very high solar radiation. Total annual rainfall is about 1000 mm. Number of dry months: 5. This farm has to be irrigated, and so it is: water for irrigation is abundantly available from the lake. The farm situates along the lake's rim and irrigation pumps are electrically powered. The climate is considered excellent for pineapple production for export.

Bio Exotica's main problem is the incidence of Phytophthora heart rot and an estimated 15% of all plants planted fall prey to this disease. Phytophthora hits hard during the period of heavy rainfall and its incidence is partly drainage related.

In the packing-station losses fluctuate wildly between 10 and 20% of fruit delivered. Bio Exotica produces about 3700 boxes per hectare, is not profitable now and stays alive by running a very low cost operation. The company would become profitable at the break even point of 4300 boxes per hectare. It is to be noted that this company serves the European market only and is obliged to produce the smaller grades as required for this market. This bites into the production potential.

Bio Exotica Ghana has an export branch and sells its produce through an import and marketing agent, directly to retailers in Europe. Bio Exotica is part of the Nature&More value chain concept by Eosta of the Netherlands, its sole marketing agent.

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IV 07 SWOT Analysis

Production-farming

<p><u>Strengths</u></p> <ul style="list-style-type: none"> ➤ Suitable pineapple soils ➤ Excellent climate conditions ➤ Fully irrigated farm ➤ Abundant irrigation water availability ➤ Dedicated management ➤ Well trained labour force ➤ Low overhead cost structure ➤ Good social policy ➤ Pioneer organic organization ➤ Organic Fair Trade, BioSuisse and Eurepgap certifications 	<p><u>Weaknesses</u></p> <ul style="list-style-type: none"> ➤ High cost of organic inputs ➤ Low nutrient status of soils ➤ High field losses and therefore a too low exportable production per hectare ➤ Ageing farming equipment ➤ Tight finance situation
<p><u>Opportunities</u></p> <ul style="list-style-type: none"> ➤ Increasing demand for organics 	<p><u>Threats</u></p> <ul style="list-style-type: none"> ➤ Uncontrollable disease outbreaks ➤ Adverse weather conditions ➤ Shortage of finance to sustain operations

Packing-Exporting

<p><u>Strengths</u></p> <ul style="list-style-type: none"> ➤ Simple but performing packing-station and coldstorage on the farm ➤ Company operated trucking to port ➤ Member of Exporters Cooperative ➤ Regular weekly reefer services from Tema to Antwerp ➤ Preferential relationship with marketing partner Eosta ➤ Direct access to international markets ➤ Marketing knowhow and entrepreneurial approach ➤ Good export quality packed ➤ Rewarding local markets for non-exportables 	<p><u>Weaknesses</u></p> <ul style="list-style-type: none"> ➤ Too low export volume to penetrate new markets successfully ➤ Too low income from sales in target markets during past years ➤ Tight finance situation ➤ Delayed modernization of harvesting and conditioning plant and machinery ➤ High cost of packing materials and shipping
<p><u>Opportunities</u></p> <ul style="list-style-type: none"> ➤ Increasing demand for organics ➤ New markets ➤ Improved prices 	<p><u>Threats</u></p> <ul style="list-style-type: none"> ➤ Global overproduction to be dumped in target markets ➤ Low prices in target markets ➤ Unfavourable exchange rates

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A V The use of compost and its benefits

Compost

All organic pineapple farms visited basically see their soil fertility problem in the context of nutrient replacement values without considering the holistic approach favoured by the Nature&More value chain approach. In nature all processes are closely related. The rain forest is a perfect example. Soils of the rain forest belt are not necessarily fertile but undisturbed growth and subsequent trash fall create a perfectly balanced natural environment where nutrient complements are not required to ensure luxuriant growth.

In commercial farming this balance has been greatly disturbed; organic matter content of most soils having been depleted and growth can only be realized now by adding large quantities of fertilizers, either organic or synthetic, to the soil and plant. To reverse this negative trend a number of alternative approaches are possible and applying compost to the productive fields is considered the most efficient option.

Compost has the ability to help regenerate poor soils. The composting process encourages the production of beneficial micro-organisms (mainly bacteria and fungi) which in turn break down organic matter to create humus. Humus, a rich nutrient-filled material, increases the nutrient content in soils and helps soils retain moisture. Compost has also been shown to suppress plant diseases and pests, reduce or eliminate the need for chemical fertilizers, and promote higher yields of agricultural productions.

Using compost as mulch in the soil is beneficial in many ways. Compost contains a full spectrum of essential plant nutrients, but obviously nutrient levels in compost and soil should be tested in order to find out what other supplements may needed for specific plants.

- Compost contains macro and micronutrients often absent in synthetic fertilizers.
- Compost releases nutrients slowly—over months or years, unlike synthetic fertilizers
- Compost enriched soil retains nutrient elements better.
- Compost buffers the soil, neutralizing both acid levels to the optimum range for nutrient availability to plants.

Compost brings and feeds diverse life in the soil. These bacteria, fungi, insects, worms and other beneficial elements support healthy plant growth.

- Compost bacteria break down organics into plant available nutrients. Some bacteria convert nitrogen from the air into a plant available nutrient.
- Compost enriched soil have lots of beneficial insects, worms and other organisms that burrow through soil keeping it well aerated.
- Compost may suppress diseases and harmful pests that could overrun poor, lifeless soil.

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Healthy soil is also an important factor in protecting our waters. Compost increases soil's ability to retain water & decreases runoff into waterways and lakes.

By applying compost, organic matter of maximum usefulness is supplied to the soil providing food for the micro organisms to live on. By doing so, nutrients are stored in the living micro organisms, preventing leaching and resulting loss of nutrients so common in the humid tropics. In compost the organic materials are transformed into humus by the micro organisms.

The benefit of compost is thus two-fold. First, it has the immediate effect of adding nutrients and bacterial components that aid in soil conditioning. Second, as the season's progress, it gradually converts into humus and increases your humus count.

So, by interaction micro organisms create their own habitat. Resulting in higher water holding capacity and natural fertility and buffering of nutrients. Macro as well as micro nutrients are attached to the humus and will eventually become available to crops. Humus is organic matter that has reached a point of stability where it will break down no further.

Humus also has a high cation exchange capacity, which means it acts as a veritable storehouse for plant nutrients, something that can be especially important for those with sandy soils.

Applying compost to cultivated areas, specifically in organic agriculture is therefore a key requirement in safeguarding and improving the soil's fertility, which may lead to improved yields of superior quality fruit.

Setting up adequate composting installations in Ghana and in Costa Rica can therefore be considered beneficial for all growers concerned. Most soils were found low in organic matter and with low micro-biological activity. Adequate use of high grade compost would certainly improve this situation.

Carbon Credits

Composting could also qualify according to the guidelines of the UNFCCC as greenhouse gas emission reduction project. In this case organic waste that would usually go to landfills, deep-ploughing or incinerator will be used as input material in the composting process.

In a landfill or by ploughing the raw plant debris into the soil, the material will be decomposed partly under anaerobic (with limited oxygen available) conditions. The processes under these conditions will lead to the formation of methane, a greenhouse gas 21 times as strong as CO₂.

When plant debris are used as input for composting, the material is aerobically decomposed in the composting process. The composting process -when done correctly- does not produce methane. So when plant waste is used in a composting process, methane is being avoided. This reduction in greenhouse gas emissions can in some cases be rewarded with carbon credits. These credits could form an additional revenue

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stream for the composting project and make the composting project economically feasible.

Depending on the local situation and the volumes of waste treated a compost project in Ghana and/or Costa Rica could reduce greenhousegas emissions of up to 60.000 ton CO₂e, which would correspond to the generation of 60.000 VERs. (Verified Emission Reduction Credits)

B. Conclusions and Recommendations

“The overall objective is to improve the market value of organic pineapples through improved sustainable farming techniques and participation of smallholder associations in the production process”.

From this mission a number of explicit conclusions can be drawn:

- Those who invested in sustainable pineapple production during the past few years have been badly disappointed and quite a number among these pioneers have scaled back their activities or have abandoned organics altogether. A difficult starting period at most farms and, simultaneously, collapsing markets were strong negative forces to be faced.
- On the positive side we see since mid 2010 a strongly improving market for organic pineapples; this positive development being fueled by increased demand and lower imports. Prices, for organics in particular, have appreciated sharply and the trade taking an optimistic view on the market considers the changing trend as structural. Remaining organic producers may benefit considerably, provided that they are able to seize upon the opportunity
- Growing organic pineapples for export is also a relatively new activity in the fresh fruit sector. Most if not all farms were created between the years 2003 and 2008 and these enterprises went through a difficult and costly learning period, which coincided with a general decline in returns from sales due to unfavorable market conditions and economic downturn.
- Cultivation methods and quality have certainly improved over the past years but at the same time little concern was given to soil fertility in terms of holistic soil management and making use of the raw organic materials generated by the farming operations itself. This state of affairs has not really advanced the sustainability of farming operations. The problem is two-fold: i) a new activity and limited knowhow to start with and; ii) a dramatic drop in income as from first crop, which made farmers think twice before endeavoring into new, unknown and possibly costly technical approaches.

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- It is the consultants' opinion that the sustainability and efficiency of organic production in both countries could be strongly improved by using high grade compost as the basis element leading to improved soil fertility, better disease control and, generally spoken, to a better environmental balance. Compost is also an economically viable option with regard to supplying fields with most of the required nutrient elements.
- Consultants also consider the knowledge base of those who operate in the organic pineapple sector to be too limited yet. Farm management and workers must be trained in all aspects of sustainable farming practices in order to promote understanding and acceptance of new approaches and encourage innovative thinking. Any new composting setup should be accompanied initially by expert technical assistance.
- All farms visited have basically the same type of field problems: limited soil fertility, substantial disease pressure and high field losses.
- The sustainability and efficiency of organic production in both countries could be strongly improved by using high grade compost as the basis element leading to improved soil fertility, better disease control and, generally spoken, to a better environmental balance. Compost is also an economically viable option with regard to supplying fields with most of the required nutrient elements.
- Improved market conditions should principally benefit the producers, as these remaining operators in the tropics are not only the weakest but also most important link in the entire chain. No production, no sales, that's clear. Improved value chain management and better coordination with the retail sector will only have a lasting impact on the sustainability of organic pineapple growing for export if this leads to rewarding income for producers.
- The organic pineapple sector is at present in a delicate position. Producers face a number of problems with productivity, quality and profitability and lack the financial means to improve their operations. The risk of losing a large part of this sustainable and fair agricultural production segment is therefore absolutely realistic. The disappearance of the sector would have a serious impact on the social fabric of the areas where organic and fair trade enterprises operate. Sustainable farming practices, knowledge bases, employment and fledgling social justice initiatives may be lost.

Workers Participation

- Workers participation as stakeholders in the production/export process is an interesting option if land could be made available and properly equipped for this type of agricultural activity. In Costa Rica such initiative will be complicated as securing good farming land will be costly and difficult affair.

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- In Ghana at Bio Exotica, it appears that participation of workers in an associated growers association for organic pineapple production would not only be possible and feasible, but such venture could be quite profitable as well. Land is available and all stakeholders are willing and interested.
- Consultants consider that such association in Ghana could be successful under strict financial and technical management supervisory conditions and recommend that first; all practical issues that surround such organizational change must be studied and discussed with all stakeholders in order to have a fully documented common position.

Recommendations

“Limited know-how leading to low productivity coupled to disappointing sales results and a lack of transparency in the value chain have made the production of organic pineapples a hazardous activity”

It is recommended to set up an international knowledge exchange system (Organic Pineapple Association) with close links to interested market parties. A number of crucial factors that determine the viability of the sector would be bound together by such organisation

Exchange of know-how, research activities, learning programmes, carbon credits' management and value chain management among others, would be brought under the umbrella of the Organic Pineapple Association.

Founding members of the Association would be Finca la Corsicana of Costa Rica, Finca la Danta of Costa Rica, Bio Exotica Ltd of Ghana, Eosta BV of the Netherlands and ICCO. The Association would be open for any new members active in the organic pineapple sector. New members should pay an annual membership fee.

There obviously is a great need for an interprofessional co-ordinating organization that addresses the problems of the organic pineapple sector efficiently and expertly.

Learning programmes

Two key pilot projects are considered of prime importance in advancing the cause of sustainable production methods..

1. Compost pilots are seen as important regional learning projects and the setting up of a pilot compost facility in Ghana and in Costa Rica respectively, is strongly recommended.
2. Workers participation schemes should be encouraged if critical success factors can be met. These conditions do exist in Ghana in the Bio Exotica area and this initiative is strongly recommended for that particular area.

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Although it is not yet clear at this point in time, whether workers participation –and/or associated smallholders schemes can work in Costa Rica, the possibility can not be excluded and a successful venture in Ghana could set the trend.

These projects will have a considerable practical impact and have the advantage that they can be quickly realized. The available technical support structures in Costa Rica and in Ghana can, with the help of external expertise, easily manage and carry through such undertaking.

Moreover, composting will lead to earning carbon credits and setting up composting operations in Ghana and Costa Rica would create an additional source of income for the sector.



C. DEVELOPMENT PLAN

C.1 COMPOST OVERVIEW

Why compost?

In order to have improved control of crucial soil building processes, it is recommended to apply compost for a balanced nutrient supply and for adding the necessary micro-organisms to the soil. Micro-organisms are essential for plant growth; they are responsible for the amount and type of nutrients available to the plant. Micro-organisms also play a major role in the health of plants; bacteria (e.g. erwinia) and fungi (e.g. phytophthora) can be a hazard to plant health and crops.

However, most, if not all micro-organisms supplied by compost are beneficial. Specific fungi, like trichoderma species, do control other fungi related plant diseases. Trichoderma's are commonly found in well produced compost.

Which compost?

Compost is organic matter in a purposeful state of partial decomposition. The purposeful part is important. Dead stuff on the ground is NOT compost, just decaying organic matter. It is the controlled, or semi-controlled conditions that make it compost.

The compost we are talking about is made by the CMC method. CMC stands for Controlled Microbial Composting. This type of compost is not commercially available on large scale and production on farm is therefore the best option. During the compost process the ingredients used are sanitized by the heat generated by the very composting process. Mature CMC compost is compost that has decomposed to the point of maximal usefulness.

So, all mature compost is organic matter, but not all organic matter is mature compost and that is what we have to keep in mind

Soil Food Web

CMC compost is essential to (re)build and maintain the soil -fertility and -structure , as all living plants need soil-based micro organisms to be able to sustain themselves. Compost (re-)inoculates the soil with these beneficial micro organisms. The Soil Food Web illustrates this well; the SFW in the soil is similar to the food chain we have above the soil. In a healthy soil micro-organisms are being created continuously, prey on each other and decompose; creating plant nutrients as a consequence.

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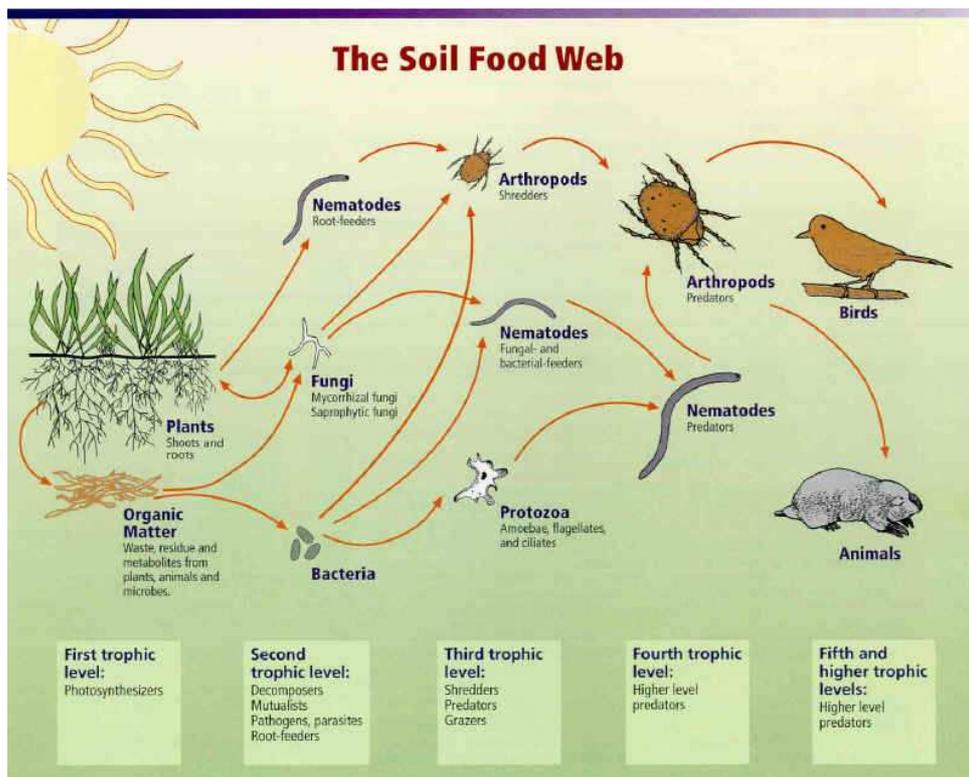


Soil fertility and structure.

By applying CMC compost, organic matter of maximum usefulness is supplied to the soil providing food for the micro organisms to live on. By doing so, nutrients are stored in the living micro organisms, preventing leaching and resulting loss of nutrients so common in the humid tropics. In compost the organic materials are transformed into humus by the micro organisms.

The benefit of compost is therefore two-fold. First, it has the immediate effect of adding nutrients and bacterial components that are instrumental in soil conditioning. Second, as the seasons progress, CMC compost gradually converts into humus and increases the humus count.

So, by interaction micro organisms create their own habitat. Resulting in a better water holding capacity and increasing natural fertility and buffering of nutrients. Macro- as well as micro nutrients are attached to the humus and will eventually become available to crops. Humus is organic matter that has reached a point of stability where it will break down no further. Humus has a high cation fixing capacity, so useful when the soil's clay minerals have a low cation fixing capacity, as it is the case in the Ghana and Costa Rican pineapple areas visited.



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C. II OPERATIONAL PLAN FOR A COMPOST FACILITY IN COSTA RICA

II 01 Description

Proposed conversion to full composting of the organic farming area should be approached as a step by step operation. At strategic positions throughout the farm, compost plants will be set up eventually, providing compost for all parts of the farm due to be replanted. The initial stage of the conversion is to set up a compost pilot plant. Such pilot plant must have sufficient capacity in order to ensure an economically viable operation. Operating the pilot plant will create an opportunity for learning and building up of a firm knowledge base, before expanding the compost operation to other plantation sectors.

Capacity of pilot plant

Finca La Corsicana re-plants about 9 hectares of new fields monthly (2 ha weekly) in order to maintain its production potential. Also, on a monthly basis, 9 hectares of old plantings have to be destroyed and fields cleared of any pineapple debris. New plants are planted on plant ridges and before planting compost could be spread on the plant ridges only, for maximum efficiency. In view of the close spacing of the ridges at La Finca and the relatively high cost of labour, mechanized spreading of compost, before creating the plant ridges may be the most economical option.

60 cubic metres of compost spread per hectare is considered a minimum requirement.

Consultants consider a pilot plant that covers the compost requirements for 1 hectare of new plantings monthly as the best possible starting option, i.e a compost pilot facility that is able to produce a minimum of 60 cubic metres of compost monthly. The minimum equipment requirement⁶ will enable the farm to produce a much larger volume than the assumed 60 m³ of compost monthly, but it is considered best policy to start the learning curve with a realistic objective.

Compostable materials

After harvest of fruit and plant shoots (suckers) the remaining pineapple vegetation debris are presently shredded and ploughed into the topsoil. But these debris could also be easily used for composting. The Finca plants 65,000 plants per hectare and field losses amount to 25%. Average weight per plant at the end of the cycle is estimated at about 1.75 - 2.0 kg. Weight of compostable pineapple debris per hectare at the end of the production cycle is therefore about 90 metric tons or 110 M³.

⁶ Chapter II 02 - Investment Plan



Presently raw debris are ploughed into the soil to decompose. This process is slow and often not complete when fields are planted again with a new pineapple crop. Bacteria and fungi are instrumental in the decomposition process and use nitrogen to support their life cycle. These organisms are much more efficient to access available nitrogen than plant roots and will therefore compete with plants for available nitrogen. This is an undesirable situation.

Pineapple plant debris are a free source of green and cellulose containing base material. Of this base material approx. 35% is used as microbial fuel during composting. This means that from every ton of material approx 650 kg is left after the composting process.

In addition to this on-site available matter, a number of other base ingredients will be needed. These are chicken manure and wood chips. Wood chips being the lignine source which is at the basis of the desired C:N ratio of 25:1 to 40:1. Also some clay will have to be added to the mix.

A starting pile of 1 cubic metre of base materials will then produce after the composting process about 600 litres of pure CMC compost

It should be noted that another on-site available material is the pure waste coming out of the packing station.

Formula for producing 1 cubic metre of CMC compost

All quantities are expressed in cubic metres

Table 14 - Maximum requirement of 60 cubic metres per hectare

<i>Ingredients in cubic metres</i>	<i>Total availabilities</i>	<i>Per cubic metre of compost*</i>	<i>Per pilot plant Approx. 60 c.m 1 ha requirement</i>	<i>Whole farm 9 hectare min. requirement</i>
Pineapple debris	990 m ³ ex farm	0.850	51	459
Wood chips	Ex sawmill	0.600	36	324
Chicken manure	Ex poultry farm	0.085	5.1	46
Clay	Available	0.160	9.6	86
Compost produced		1 m ³	60 m ³ / month	540 m ³ / month

*in units of weight: 1 cub. M. of compost equals 750 kg of weight

Nutrient supply

With each ton of CMC compost approx. 3 kg of water soluble Nitrogen is provided to the crop. In addition to this, microbial predation can supply a further 2 kg per ton. Nitrogen fixing bacteria can provide a further 1-5 kg per ton. The latter two supplies are microbial initiated. This underscores the importance of microbially active compost.

CMC compost also supplies approx 1 kg water soluble P and 2 kg water soluble K per ton.

Trace elements are normally available in sufficient quantities, not requiring additional supply.

One cubic metre of compost equals 750 kg of weight

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Table 15 - Nutrient supply per hectare

Compost applied In cubic metres	Weight conversion	N-supply	P-supply	K-supply	Trace elements
45 M ³ per ha	34 MT	102 + 68 kg	68 kg	68 kg	Sufficient
60 M ³ per ha	45 MT	135+90 kg	90 kg	90 kg	Sufficient
90 M ³ per ha	67.5 MT	204+136 kg	136 kg	136 kg	sufficient

Nutrient support and disease suppression.

To support the compost with the production of nutrients in the soil 50 liters of compost tea must be sprayed weekly. Compost tea assists the compost to build a proper foodweb in the soil which is responsible for nutrient production and disease suppression. The compost tea can be sprayed with a standard clean sprayer. All possible chemical residues have to be removed from the sprayer before using it for compost tea. The pressure in the system of the sprayer must be kept below 5 bars. To spray the tea at least 500 l of water per hectare is needed for penetration in the soil.

Compost tea can be produced on farm, basic ingredients are compost, and nutrient complements for the micro organisms. The production of compost tea extract, takes 8 hours. A compost tea extractor of 1000 liters is needed for this production to be able to spray a lot of 10 hectares. Compost tea can be sprayed during light rain fall and on moist plants, preferable in the evening or in dark weather. Compost tea must not be sprayed during bright sunshine as UV radiation will damage the micro-biological organisms in the tea.

Conclusions

La Coricana will greatly benefit from compost application. The large amounts of waste and plant debris available on the farm would allow this company to produce sufficient quantities of compost to cover its requirements.

The use of compost may cover most if not all of the crop's Nitrogen requirements and part of its other macro-elements needs. Trace elements are also sufficiently available in CMC compost..

The major benefits of composting are listed below.

- Sustainable nutrient supply.(less fertilizer-type of nutrients)
- Less or no dependence on bloodmeal as main source of Nitrogen supply.
- Lower incidence of fungal and bacterial diseases
- Improved nutrient retention
- Better fruit quality
- Better waterholding capacity of soil
- Reduction of CO2 emission
- Carbon credits earned

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II 02 INVESTMENT PLAN AND DEPRECIATION TABLE

La Corsicana, Costa Rica – Investment Plan for a mobile composting facility

CAPITAL INVESTMENTS	PILOT PLANT		
	cost in euros	depreciation percentage	yearly depreciation
1 compost turner machine 3-metre st 300	26000	10%	2600
1 compost fleece roller	22000	10%	2200
1 tractor 100 HP super creeper	54000	10%	5400
1 mobile chipper + trailer	20000	15%	3000
1 tractor + front end loader	41000	10%	4100
1 compost spreader	16500	10%	1650
compost fleece cover	5000	25%	1250
compost tea equipment	2500	15%	375
tools	2500	25%	625
laboratory equipment	4500	15%	675
total investment	194000		22288

CAPITAL INVESTMENTS	FULL FARM		
	cost in euros	depreciation percentage	yearly depreciation
1 compost turner machine 3-metre st 300	26000	10%	2600
1 compost fleece roller	22000	10%	2200
tractor 100 HP super creeper	54000	10%	5400
2 mobile chippers + 3 trailers	50000	15%	7500
1 tractor + front end loader	41000	10%	4100
2 compost spreaders	40000	10%	4000
Compost fleece cover	15000		
Compost tea equipment	5000	25%	3750
tools	2500	15%	750
Laboratory equipment	4500	25%	625
total investment	260000		31600

Pilot compost plant's capital investment reflects the minimum equipment level required to set up an efficient composting facility. For a full farm option the initial pilot's investment remains valid and the move from pilot to full farm option would only require an additional cost layout of about 56,000 euro.

US dollar values for equipment directly purchased in Costa Rica have been converted into euros at the rate of 1.35 US dollar/euro

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II 03 OPERATIONAL COST COMPOST SITES

La Corsicana, Costa Rica – Operational Cost of a mobile compost facility Annual Cost Projections

**Basis: 60 m³ compost
applied per hectare
at planting**

Pilot Plant	Full Farm Option
output: 60 m ³ monthly	output: 540 m ³ monthly
1 hectare monthly	9 hectares monthly

COST OF ORGANIC INPUTS

Pineapple debris
Wood chips
Poultry manure
Clay

euros
300
2100
2150
187

euros
2700
18900
19350
1683

COST OF OTHER INPUTS

Fuel and lubricants
Miscellaneous

2500
300

10000
500

COST OF LABOUR

wages

7200

13500

MAINTENANCE&REPAIRS

OVERHEADS

1000

1000

MOBILE SITE PREP.

500

2000

CONTINGENCIES

1000

1000

DEPRECIATION

22288

31600

TOTAL ANNUAL COST

39525

102233

ANNUAL PRODUCTION m³

720

6480

COST PER M³

€	16
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Taking into account current cost of nutrient supply, the use of high grade compost is considered an economically sound option. And cost per m³ of compost could be lowered considerably by increasing the plants' production. Compost facility's production capacity is significantly higher than the volume required for Corsicana's organic operations and surpluses could be sold, thus creating a separate compost profit centre.

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C. III OPERATIONAL PLAN FOR A COMPOST FACILITY IN GHANA

III 01 Description

Proposed conversion to full composting of the organic farming area follows the same lines as envisaged for Finca la Corsicana: a compost plant should be set up at a central site near to the productive sectors. The initial stage of the conversion is to set up a compost pilot plant. Such pilot plant must have sufficient capacity in order to ensure an economically viable operation. Operating the pilot plant will create an opportunity for learning and building up of a firm knowledge base, before expanding the compost operation to other plantation sectors.

The farm aims to plant 2 hectares monthly and to reach an annual productive area of 24 hectares. Under the best possible conditions a production cycle of 11-12 months can be realized.

Also at Bio Exotica consultants consider a pilot plant that covers the compost requirements for 1 hectare of new plantings monthly, as the best possible starting option, i.e a compost pilot facility that is able to produce a minimum of 60 cubic metres of compost monthly. This operation will be a learning project.

Compost will have to be spread over the plantable area with a compost spreader, immediately prior to creating the plant ridges

Compostable materials

After harvest of fruit and plant shoots (suckers) the remaining pineapple vegetation debris are currently destroyed and burned. Nevertheless these debris could be easily used for composting. Bio Exotica plants 60,000 plants per hectare and total plant losses after the fruit and sucker production period of 23 months are estimated at 45%. Average weight per plant at the end of the cycle is estimated at about 1.50 kg. Weight of compostable pineapple debris per hectare at the end of the production cycle is therefore about 50 metric tons or 66 M³. Another source of compostable raw material is packing-station waste of which monthly about 20 tons will be available.

A starting pile of 1 cubic metre of basis materials (plant debris, wood shreadings, chicken manure and clay) will then produce after the composting process about 600 litres of pure CMC compost

Table 16 - Formula for producing 1 cubic metre of CMC compost

<i>Ingredients in cubic metres</i>	<i>Total availabilities</i>	<i>Per cubic metre of compost*</i>	<i>Per pilot plant Approx. 60 c.m 1 ha requirement</i>	<i>Whole farm 2 hectare min. requirement</i>
Pineapple debris	132 m ³ ex farm	0.850	51	102
Wood shreadings	Ex farm	0.600	36	72
Chicken manure	Ex poultry farm	0.085	5.1	10.2

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Clay	Available	0.160	9.6	19.2
Compost produced		1 m ³	60 m ³	120 m ³

*in units of weight: 1 cub. M. compost equals 750 kg of weight

Nutrient supply

With each ton of CMC compost approx. 3kg of water soluble Nitrogen is provided to the crop. In addition to this, microbial predation can supply a further 2 kg per ton. Nitrogen fixing bacteria can provide a further 1-5 kg per ton. The latter two supplies are microbial initiated. This underscores the importance of microbially active compost.

CMC compost also supplies approx 1 kg water soluble P and 2 kg water soluble K per ton.

Trace elements are normally available in sufficient quantities, not requiring additional supply.

One cubic metre of compost equals 750 kg of weight

Table 17 - Nutrient supply per hectare

Compost applied In cubic metres per hectare	Weight conversion	N-supply	P-supply	K-supply	Trace elements
45 M ³ per ha	34 MT	102 + 68 kg	68 kg	68 kg	Sufficient
60 M ³ per ha	45 MT	135+ 90 kg	90 kg	90 kg	Sufficient
90 M ³ per ha	67.5 MT	204+136 kg	136 kg	136 kg	Sufficient

Nutrient support and disease suppression.

Also at Bio Exotica regular compost tea application will be beneficial. A pilot tea installation is operational at the farm but is not efficient due to too small capacity of the equipment purchased.

Compost tea should be sprayed with a standard boom sprayer. All possible chemical residues have to be removed from the sprayer's reservoir before using it for compost tea purposes. The sprayer's operating pressure must be kept below 5 bars. To apply the tea properly at least 500 l of water per hectare is needed for penetration in the soil. The boomsprayer currently in use applies about 3500 l of liquid per hectare, which is therefore largely sufficient.

Compost tea can be produced on farm, basic ingredients are compost, and nutrient complements for the micro organisms. The production of compost tea extract, takes 8 hours. A compost tea extractor of 1000 liters is needed for this production to be able to spray a lot of 10 hectares. Compost tea can be sprayed during light rain fall and on moist plants, preferable in the evening or in dark weather. Compost tea must not be sprayed during bright sunshine as UV radiation will damage the micro-biological organisms in the tea.

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Conclusions

Also Bio Exotica Ghana will greatly benefit from compost application. The waste and plant debris available on the farm would allow this company to produce sufficient quantities of compost to cover all its requirements at a maximum rate of 60 m³ per hectare planted.

The use of compost may cover most of the crop's Nitrogen requirements and part of its other macro-element needs. Compost is a source of trace elements as well.

The major benefits of composting are listed below.

Composting results in :

- Sustainable nutrient supply.(less fertilizer-type of nutrients)
- Improved Nitrogen supply.
- Sufficient trace element supply
- Lower incidence of fungal and bacterial diseases
- Improved nutrient retention
- Better fruit quality
- Better waterholding capacity of soil
- Reduction of CO₂ emission
- Earning carbon credits

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III 02 INVESTMENT PLAN AND TABLE OF DEPRECIATION

Bio Exotica Ghana – Investment Plan for a fixed composting facility

CAPITAL INVESTMENTS	PILOT PLANT		
	cost in euros	depreciation percentage	yearly depreciation
1 compost turner machine 3-metre st 300	26000	10%	2600
1 compost fleece roller	22000	10%	2200
1 tractor 100 HP super creeper	35000	10%	3500
1 mobile chipper + trailer	20000	15%	3000
1 tractor + front end loader	35000	10%	3500
1 compost spreader	20000	10%	2000
compost fleece cover	5000	25%	1250
compost tea equipment	2500	15%	375
tools	2500	25%	625
laboratory equipment	4500	15%	675
Site preparation and contingencies	10000	10%	1000
total investment	182500		20725

CAPITAL INVESTMENTS	FULL FARM		
	cost in euros	depreciation percentage	yearly depreciation
1 compost turner machine 3-metre st 300	26000	10%	2600
1 compost fleece roller	22000	10%	2200
tractor 100 HP super creeper	35000	10%	3500
1 mobile chipper + trailer	20000	20%	4000
1 tractor + front end loader	35000	10%	3500
1 compost spreader	20000	10%	2000
compost fleece cover	10000	25%	2500
compost tea equipment	3000	15%	450
tools	2500	25%	625
laboratory equipment	4500	15%	675
Site preparation	5000	10%	500
contingencies	5000	10%	500
total investment	188000		23050

The pilot plant investment is the minimum equipment level required to ensure an efficient operation.

Site preparation: an area of 100 x 150 m will have to be leveled and hardened with gravel. At Bio Exotica this has to be done with hired equipment from Accra or Tema based contractors, which is relatively expensive.

The Bio Exotica compost plant will be situated at a central site near to all production sectors.

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III 03 OPERATIONAL COST

Annual Cost projections

Basis: 60 m³ of compost applied per hectare at planting

Pilot Plant		Full Farm Option
output: 60 m ³ monthly		output: 120 m ³ monthly
1 hectare monthly		2 hectares monthly

	euros	euros
COST OF ORGANIC INPUTS		
Pineapple debris	300	600
Wood chips	2100	4200
Poultry manure	2600	5200
Clay	230	460
COST OF OTHER INPUTS		
fuel and lubricants	1440	2200
miscellaneous	300	500
COST OF LABOUR		
wages	1500	1500
MAINTENANCE&REPAIRS	1200	1500
OVERHEADS	1000	1000
CONTINGENCIES	500	1000
DEPRECIATION	20725	23050
TOTAL ANNUAL COST	31895	41210
ANNUAL PRODUCTION in m³	720	1440
COST PER M³		€ 28

Taking into account current cost of nutrient supply, the use of high grade compost is considered an economically sound option. And cost per m³ of compost could be lowered considerably by increasing the plants' production. Compost facility's production capacity is significantly higher than the volume required for Bio Exotica's current organic operations and surpluses could be sold, thus creating a separate compost profit centre.



C. IV OPERATIONAL PLAN FOR AN ASSOCIATED FARMERS SCHEME

IV 01 Description

Project Proposal and objectives

- It is proposed to set up an organic pineapple smallholder extension scheme in an area bordering Volta lake and linked to Bio Exotica's Lake Farm property.
- The intended smallholder extension scheme will occupy a total land area of about 20-25 hectares between Lake Farm and the hamlet of Kudikope.
- Extension will be a part of Bio Exotica's Lake Farm's operations and the company's management structure will be adapted accordingly.
- Bio Exotica will sell all fruit through its European import channels. Separate accounts will be kept in order to ensure a maximum of transparency.
- The project's goal is to encourage workers' participation in such smallholder extension scheme as part of its corporate and social policy. The main objective is to increase organic pineapple volumes in order to satisfy growing market demand and to offer to its workers an opportunity to improve their income by directly participating in the production and export operations

Feasibility

The feasibility of the proposed venture depends on a number of factors of which the most important are highlighted below.

- The availability of good pineapple land.
- The availability of sufficient water resources to allow full irrigation of cultivated area.
- The availability of trained pineapple workers.
- The availability of good management.
- A well equipped farming organisation.
- Good organic farming practices.
- Good export management and access to overseas markets.
- Rewarding revenue.
- The availability of finance.

Land

The land along the lake shore is of a sandy to sandy loam texture and of a flat to slightly sloping topography which will allow fully mechanised operations. Apart from Lake farm's organic farming operation, no other meaningful agricultural activity is taking place

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in the target area, which has a savannah type of secondary bush vegetation. The area can be considered prime pineapple land.

The new farming site is part of a long term lease from the traditional landowner. Landlord has stated that he will not oppose such workers scheme and is in favour of the proposed development.

Water resources

Farming site borders Volta Lake and necessary irrigation water can be pumped from the lake. It is therefore possible to fully irrigate the entire new farming site.

Transfer of know how

Bio Exotica will supply the necessary know how. A large number of workers, have been trained by the company during the past years. Most of the company's workers used to be subsistence farmers in the neighbourhood, before Lake Farm's creation and know their land. Regular training courses will further ensure that management and smallholders will possess the required skills for such a venture.

Management

The proposed extension scheme will be managed as a separate entity, attached to Bio Exotica's main farming activity.

Employment

About 15 workers/outgrowers will farm the new site for their own account.

Equipment

The smallholder area will be outfitted with all agricultural equipment required for mechanised pineapple farming (tractors, plough, harrow and boomsprayer, irrigation equipment) Electricity will be extended to the new farming site so that electric pumps can be employed. A trailer and a light truck will ensure full autonomy during harvesting and packing operations as well as during planting and maintenance tasks. Equipment proposed will enable the extension scheme to operate its pineapple operations in a professional manner. All equipment will be managed and maintained by Bio Exotica's technical staff and workshop.

Farming practices

The entire 20 hectare new farming site will be centrally managed under strict technical and cost supervision by Bio Exotica's farm management.

On the new site, one third of the area will be in production; one third being planted and one third fallowed under green manure cover crops. Before planting, land will be

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ploughed and harrowed. Shoots of 250-500gr will then be planted on ridges that are covered with black plastic for weed control and enhanced growth. Organic planting shoots will be supplied by Bio Exotica's main farm. Before planting manure and organic fertilizers will be worked into the soil. During the immature maintenance period organic fertilizers will continue to be supplied by boomsprayer on a weekly basis. Organically approved fungicides and insecticides/repellents (neem oil-garlick oil) may be applied if required so.

Previous experience indicates however that in these rather dry virgin areas when planted and intercropped with cover crops and fallow areas, pest/disease pressure is quite low.

Exports and marketing

All fruit will be packed and exported under Bio Exotica's supervision and quality control. Bio Exotica will make export boxes available and arrange for haulage to port. All fruit will be marketed through the same import and retail channels as the main farm's fruit.

Revenue

Bio Exotica will export all fruit to its own preferential markets in Europe and sell at same price levels without distinction. Smallholder extension scheme's fruit will participate in special brands, such as Nature&More, COOP Switzerland etc.

Financial information

The investment period for this venture is 20 months, i. e. a positive cashflow will be reached after 20 months. Total investment will reach 269,900 euro after 20 months. 206,000 euro will be spent on fixed assets; and 63,900 euro on working capital items.

Working capital are those funds that are used to make all daily farming and administrative operations possible until the venture will be able to stand on its own feet, which will be within 21 months from starting the project. Working capital will make it possible to prepare the fields; to plant; to maintain the crops and equipment and to harvest, pack and ship.

Table 18 - Summary financial key data – income and cost per metric ton ex farm⁷

Income from pineapple sales per metric ton	€ 500
Production cost per metric ton	100
Management cost	67
Depreciation cost per metric ton	75
Adm. Overhead cost per metric ton	35
Export cost incl packing/haulage/port	150
Net profit before taxes* per metric ton ⁸	€ 73

*5 year tax holiday/initial losses deductible

⁷ Table of Financial Key Data

⁸ Company will apply for project status and fiscal advantages through Ghana Investment Centre EOSTA – ICCO 01-04-03-025 / Sustainability of organic pineapple growing for export



Reserves and debt servicing: financial key data show that sufficient reserves for replacement of ageing equipment and debt servicing will be created.

Financial Key Data:

Total Investment: 269,900 euro of which 206,000 euro as capital expenditure.
Investment Period: 20 months
First profit: year 3 - return on investment year 3: 10.6%
return on investment subsequent years: 10.6%
Internal Rate of Return over initial 7 years: 7%

Finance plan

Total Investment over a period of 20 months: 269,900euro
The workers association seeks to finance the entire capital layout through special partnership arrangements.

Environmental impact and protection measures

The proposed farming area belongs to a larger non cultivated savannah type area typical for the northern part of the peninsula. Secondary growth of thornbushes, neem trees and dispersed cotton trees form the main type of vegetation. The area is slightly sloping towards the lake front. Elevation is 15m from highest point to Lake level over a distance of 500m. Soils are of the sandy loam to loamy sand texture type and have low water holding capacity and are erosion prone.

Cultivation methods will take these characteristics into account in order to protect the fragile environment and avoid excessive silt deposits into the lake.

Along the lake shore a 50m wide buffer area will be planted with indigenous tree species, such as Neem, Leuceana and other drought resistant varieties. Also around the area a forested buffer area will be planted. All farm roads and plant lines will follow the contours and proposed planting system will consist of stripcropping pineapples and green manure covercrops. Organic pineapple will occupy not more than 60% of the farming area and remaining land will be under fallow rotating from green manure cover crops to pineapples.

Advice and approval will be sought from the Environmental Protection Agency. An Environmental Management Plan will be submitted to EPA for that purpose.

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IV 02 INVESTMENT PLAN

BIO EXOTICA GHANA LIMITED - INVESTMENT PLAN smallholders extension

20 hectares area development

investment period: 20

6 hectares productive pineapple annually

months

Description	year 1	year 2	totals	depreciation	annual
	in euros	in euros	in euros	rate	depreciation
Fixed assets					
Land acquisition	10000	0	10000	0.02	200
Planting material	8000	0	8000	0.1	800
Field infrastructure	10000	0	10000	0.1	1000
Roads, Emplacements	12000	0	12000	0.1	1200
Buildings	30000	0	30000	0.05	1500
Electricity	9000	0	9000	0.1	900
Water supply/pumps	9000	0	9000	0.1	900
Field irrigation system	35000	0	35000	0.1	3500
Tractors	25000	0	25000	0.15	3750
Agricultural equipment	15000	0	15000	0.15	2250
Office equipment	3000	0	3000	0.2	600
Trucks and trailers	30000	0	30000	0.15	4500
Contingencies	10000	0	10000	0.1	1000
total fixed assets	206000	0	206000		22100
Working capital					
Management fee	20000				
general farming inputs	3000				
organic inputs	12000				
fuel and lubricants	10500				
utilities	800				
Maintenance& repairs	2000				
insurances	150				
legal cost and audits	2000				
administrative	3000				
overheads					
bank cost	300				
taxes	150				
contingencies	10000				
total working capital	63900				
TOTALS	269900				

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IV 03 TIME TABLE

Bio Exotica Smallholders Association Extension Scheme

months	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
survey and map	█																								
clear land		█	█	█	█																				
build roads		█	█																						
erect buildings			█	█	█	█																			
equipment ordered	█																								
equipment delivered			█	█	█																				
install irrigation					█																				
plough & harrow					█	█	█	█	█	█															
start planting					█	█	█	█	█	█															
maintain fields					█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
start harvesting																				█	█	█	█	█	
export income																						█	█	█	█



IV 04 FINANCIAL KEY DATA

BIO EXOTICA GHANA LIMITED - FINANCIAL KEY DATA KUDIKOPE SMALLHOLDER ASSOCIATION SCHEME

accounting year	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7
New Plantings	6	6	6	6	6	6	6
productive area in hectares	0	4	6	6	6	6	6
Production in metric tons	0	200	300	300	300	300	300
Production in pallets of 840 kg each	0	235	350	350	350	350	350
income per mt FOB Tema	0	86000	150000	150000	150000	150000	150000
income from local sales	0	600	5000	5000	5000	5000	5000
a. Total Sales or turnover	0	86600	155000	155000	155000	155000	155000
b. Direct costs of sales incl. production	31950	70500	75000	75000	75000	75000	75000
c. Gross margin	-31950	16100	79000	79000	76000	76000	76000
d. management fee	10000	10000	20000	20000	20000	20000	20000
e. interest charges	0	0	0	0	0	0	0
f. Depreciation	10000	22100	22100	22100	22100	22100	22100
g. Other overheads	6525	8000	9200	9200	9200	9200	9200
h. Net profit before tax	-38475	-24000	27700	27700	27700	27700	27700
i. Tax paid	0	0	0	0	0	2590	2590
j. Cash flow from operations	-48475	-1900	49800	49800	49800	49800	49800
k. Capital expenditure in year	206000	0	0	0	3000	25000	22500
m. borrowings/equity injection	269900	0	0	0	0	0	0
n. grants	0	0	0	0	0	0	0
o. repayments on loans	0	0	0	0	0	0	0
p. Dividend or advance paid in year	0	10500	13900	13900	13900	13900	13900



q. Net cash position end of the fiscal year	15425	3025	35900	35900	32900	10900	13400
q2. Accumulated net cash	15425	3025	38925	74825	107725	118625	132025

BIO EXOTICA GHANA LIMITED - FINANCIAL KEY DATA KUDIKOPE SMALLHOLDER EXTENSION SCHEME

Accounting year	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7
A. Fixed assets	196000	173900	151800	129700	110600	113500	113900
B. Net current assets*	51600	93000	132925	169825	203725	213035	224845
C. Long-term liabilities	269900	269900	269900	269900	269900	269900	269900
D. Net asset value =	-22300	-3000	14825	29625	44425	56635	68845
E. Capital employed =	247600	266900	284725	299525	314325	326535	338745
F. Gross margin % of sales	0%	18.6%	51.6%	51.6%	51.6%	51.6%	51.6%
G. Net profit margin b. tax =	0	0	18.5%	18.5%	18.5%	18.5%	18.5%
H. Sales/Capital employed %	0	32.2%	54.4%	51.7%	49.3%	47.5%	45.8%
I. Return on capital employed %	0	0	10.1%	9.6%	9.1%	8.8%	8.5%
J. Return on investment %	0	0	10.6%	10.6%	10.6%	10.6%	10.6%
IRR over 7 years							7%

*nett current assets: cash and bank balances + 60% value crop planted and in various stages of development



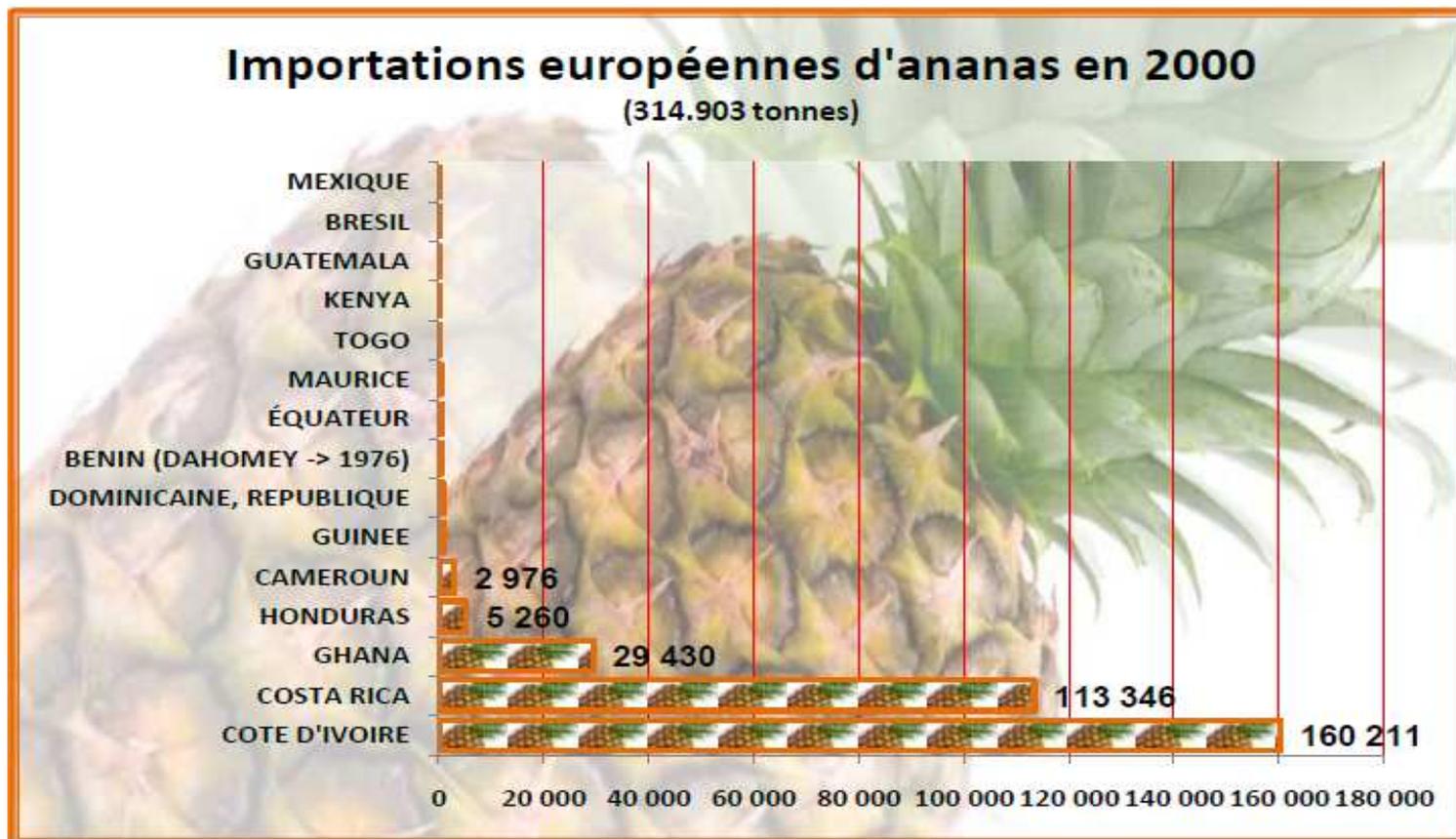
D. ANNEXES

1. Comparison of European imports between 2000 and 2008
2. European imports from 1995 till mid 2010
3. Comparison of export grades between Costa Rica and Ghana
4. Crop rotation cycle Finca La Corsicana
5. Crop rotation cycle Bio Exotica Ghana Ltd
6. Logical Framework



Annex 1 - European Pineapple Import comparison between 2000 and 2008

2000



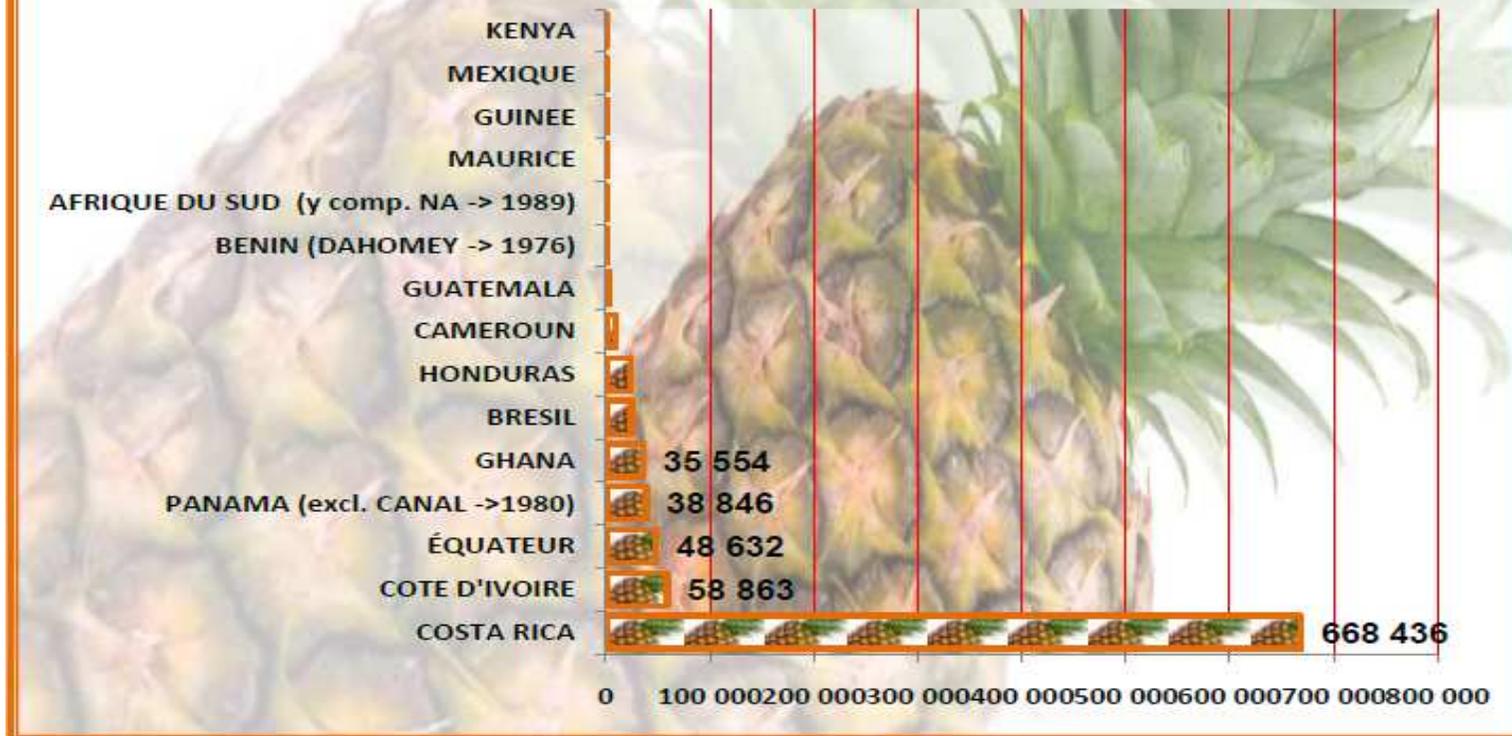
2008

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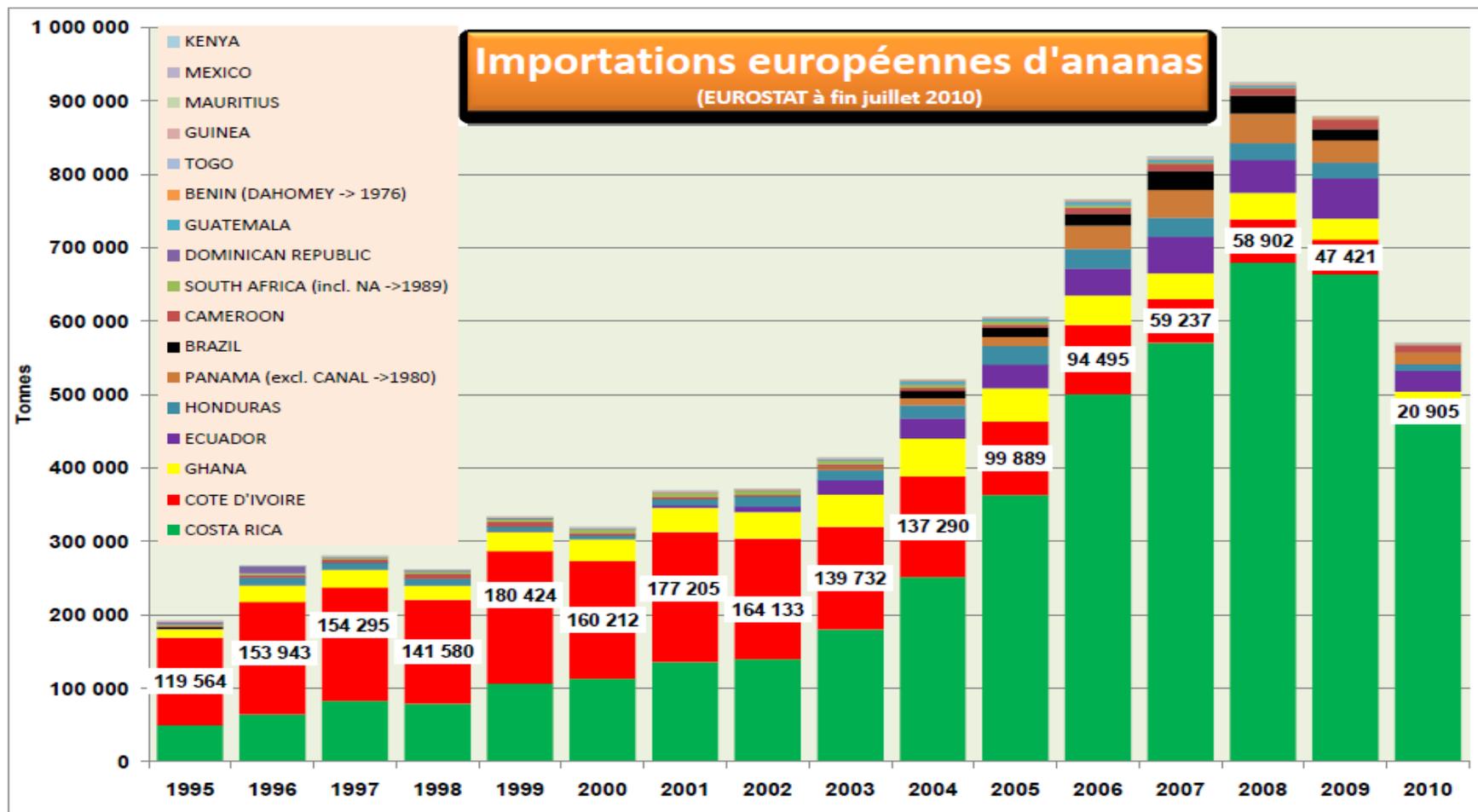


Importations européennes d'ananas en 2008

(914.881tonnes)



Annex 3 - European Imports 1995 - 2010 (8months)



Annex 3 - Comparison of Export Grades

Comparison of export grades

Export grades 2010	5	6	7	8	9	10	12
Finca la Corsicana, Costa Rica	9%	22%	26%	20%	13%	10%	0%
Bio Exotica Ghana Ltd	0%	0%	15%	22%	18%	20%	25%



ANNEX 4 - Crop Rotation Cycle Finca La Corsicana, Costa Rica

OPTION 1 - MAIN HARVEST + RATOON CROP - NO SUCKER PRODUCTION			OPTION 2 - MAIN HARVEST ONLY + SUCKER PRODUCTION		GLOBAL
planting	65,000 plants/ha		65,000 plants/ha		
forcing	At 9-10 months	270-300 days			
1 st crop	At 22-24 weeks = abt 5.5 months	154-168 days			
1 st production period	14-15 months	Large fruit	14 – 15 months		
2 nd crop or ratoon	12 months	Smaller fruit	none		
Harvest suckers	none	No production of follower/suckers	8 months		
Destruction old vegetation, mechanisation	2-3 months		2 – 3 months		
Fallow period	6 months	Mucuna cover crop Or other	6 months		
Total land / occupation cycle	36 months		31 months		
Available rotation area for organic production	65% of 400 ha = 260 hectares		35% of 400 ha = 140 hectares		
Full annual planting area potential	260 ha ÷ 3 = 86 hectares		140 ha ÷ 2.6 = 53 hectares		139 ha /year 11.5 ha /month 2.6 ha /week
Current plantings					2 hectares/week
productivity level	1 st crop = 5,500 boxes / ha	Ratoon crop = 3000-3500 boxes/ha	1st crop = 5,500 boxes / ha		Average level abt 4,800 boxes/ha currently



ANNEX 5 - Crop Rotation Cycle Bio Exotica Ghana Ltd

Bio Exotica Ghana Ltd

planting	60,000 plants per hectare	1 single harvest
forcing	8-10 months after planting	225 – 300 days after planting
Harvesting 1st and main crop	4.7- 4.8 months after forcing	139 – 145 days after forcing
Sucker production	8 months after harvest	
Destruction old fields	1 month	
Fallow period	11 months	1 crop of mucuna duration 4-5 months
Land preparation after fallow	1 month	
Total rotation cycle	34 – 36 months	



ANNEX 6 - Logical Framework

Sustainability of Organic Pineapple growing for Export			
Summary of Objectives	Objectively verifiable indicators (OVI)	Means of Verification	Assumptions and success factors
<u>Development Objective</u> <ul style="list-style-type: none"> - Successful system for sustainable cultivation leading to enhanced productivity. - Improved value chain management leading to rewarding price levels and better farmers' income - Poverty reduction in rural target areas 	<ul style="list-style-type: none"> - increased yields - Increased exports. - Increased farmers' income 	<ul style="list-style-type: none"> - Export statistics by exporter or export cooperative - Producers' invoices for exported goods and local sales - Bills of Lading - Account sales from importer - Farm Workers Union data 	<ul style="list-style-type: none"> - availability of finance - availability of knowhow - availability of adequate management structure - participation of market parties - positive developments in organic pineapple markets.
<u>Immediate Objectives</u> <ul style="list-style-type: none"> - Establish pilot compost facilities in Ghana and Costa Rica - Establish workers participation scheme in Ghana - Study associated farmers scheme in Costa Rica - Establish an International Organisation of organic pineapple producers. (Organic Pineapple Association) - Create a retailers chapter attached to the OPA 	<ul style="list-style-type: none"> - Compost pilot plants working - Workers association in Ghana functioning - International exchange of technical data - Personnel trained and Number of trainees - Infrastructures realised - International Organic Pineapple Association functions 	<ul style="list-style-type: none"> - Follow up and evaluations of schemes proposed - Official publications - Annual technical reports and accounting reports for all schemes proposed 	<ul style="list-style-type: none"> - Availability of finance - Availability of an adequate management and administrative structure - Adequate technical support system /technical assistance - Involvement by all market parties
<u>Results expected</u> <ul style="list-style-type: none"> • working pilot compost plants in Ghana and Costa Rica leading to full use of compost and earning carbon credits • established associated workers scheme in Ghana leading to better income for 	<ul style="list-style-type: none"> - Availability of finance - Availability of management and administrative structure - Workers association functions 	<ul style="list-style-type: none"> - Follow up and evaluations - Publications - Annual technical reports 	<ul style="list-style-type: none"> - Finance available - Knowhow available - Good management - Clear objectives - Positive developments in organic markets



Sustainability of Organic Pineapple growing for Export			
Summary of Objectives	Objectively verifiable indicators (OVI)	Means of Verification	Assumptions and success factors
associated farmers <ul style="list-style-type: none"> An efficient International organisation of all stakeholders in the organic value chain, leading to improved organisation and fair pricing 	<ul style="list-style-type: none"> Technical assistance provided 		
<u>Main Activities</u> <ol style="list-style-type: none"> Establish the Organic Pineapple Association, grouping together stakeholders at production and market sides Establish objectives and procedures for Association's activities to be realised Assemble financing structure Establish pilot compost plants in Costa Rica and in Ghana Establish a compost technical assistance team Establish workers/smallholders participation scheme in Ghana. 	<ul style="list-style-type: none"> Association established Financing agreements Program agreements Compost pilots working Workers association working Documents and data bases accessible 	<ul style="list-style-type: none"> Technical assistance records External evaluations Trainee reports Publications 	<ul style="list-style-type: none"> Favorable local conditions leading to conclusive development Adequate management potential in origin The members of the Association are actively engaged Market partners are actively engaged



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