



**ASJEBA  
FOUNDATION**  
PLANTING YOUR FUTURE



**GLOBAL INITIATIVE FOR RESTORATION OF  
DEGRADED SOILS  
THE UN DECADE OF RESTORATION**



**Global Compact**  
Network  
Switzerland & Liechtenstein

**ASJEBA AGROFORESTRY CONCEPT**

**MAY 2023**

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## 1.0. Introduction

*“We need a paradigm shift; we have to realise that Africa is not the continent of cheap commodities but that the people of Africa need infrastructure and a future.”*

Gerd Müller, German Development Minister

Our first and foremost goal is to create a sound and high-performing business which leverages sustainable and future-proof market opportunities of bio fuel and vegetable oil (non-edible) for commercial applications, and at a later stage into the production cycle, opportunities of select food products. As a result, we shall be able to contribute to sustainable development of the living conditions in certain developing countries. Our first Agroforestry projects are planned to be built in Ghana, Nigeria, Angola, Senegal, Cameroon, Tanzania, RC, DRC, Zambia, Mozambique, Madagascar and Zimbabwe.

Each Agroforestry project is designed as a commercially viable project, which, after a few years, will generate investment as well as intellectual capital to self-support itself in the future and finance further expansion, benefitting the region and its population, notably in health, education, energy, and food areas.

The Asjeba Group will use areas with degraded soil for its agroforestry projects, with the aim of regenerating and revegetating those areas;

as such no conflict with food production will arise.

Our vision is to be the world’s pre-eminent producer of bio fuel and non-edible vegetable oil for commercial applications.

Our purpose is to improve the living conditions of people living in rural regions in developing countries through commercially viable agroforestry projects.

We intend to deliver on our vision by creating a sound and high-performing business which will generate substantial returns in a sustainable manner. This approach will enable us to execute on our purpose: to re-invest in the local environment and infrastructure and in doing so ensure a solid base for future business and a positive contribution to the local communities and individuals - for themselves and generations to come.



## 2.0. Executive Summary

Degraded, unused and economically sub-optimal areas in African countries can be transformed into fully productive Agroforestry areas. The successful implementation of the syntrophic concept was achieved also by our partner **Clean Fuels and Energy las Americas SA (C-Fela)** in Costa Rica over the last 20 years. It includes optimal crop sequence; labour intensive farming on a large scale and the cooperation with smallholder farmers through an out-grower concept.

For Africa we could implement the Demonstration project in Ghana, either in the region of Techiman or in other regions with limited infrastructure due to degraded soil. Asjeba Techiman 1 (Ghana) Ltd., -SPV to be established- will become a subsidiary of the Swiss humanitarian foundation Asjeba Planting Your Future ([www.asjeba.com](http://www.asjeba.com)) and has the ultimate goal to support a sustainable development for the living conditions in Africa by establishing Productive forests for food production and produce vegetable oil (non-edible) for commercial applications (e.g. bio fuel). Project Management will be carried by Asjeba Management AG, Switzerland during the lifetime of the emphyteutic lease contract.

Benefits of the Asjeba conceptual approach:

- **Afforestation**

Asjeba SVP 1 (Ghana) Ltd., will sign a long term emphyteutic lease agreement with Asjeba SVP 1 (Ghana) Ltd., will sign a long term emphyteutic lease agreement with various families around Techiman, Ghana facilitated by Ghana Permaculture Institute GPI, ([www.ghanapermacultureinstitute.org](http://www.ghanapermacultureinstitute.org)), for 75,000 hectares of unused/degraded land for 20 years with an option of renewals for up to 50 years. The government of Ghana has expressed their willingness to facilitate more than 300'000 hectares degraded land from various families around them country. The government wants to boost development in underdeveloped areas of the country.

In the first year Ricinus and one or more blocks of Moringa will be planted. Ricinus is a one-year plant with deep roots that break up the soil. Ricinus oil can be sold internationally in any quantity at stable prices. The Moringa tree will produce leaves that can either be eaten as fresh vegetable, dried for powder or extracted for the protein. Thereafter Jatropha and Acrocomia trees will be planted. Jatropha and Acrocomia will produce 30/40 resp.60/70 year's vegetable oil. The syntrophic concept is totally organic, restricts the use of chemicals in the Agroforestry area and results in a positive ecology.



*Jatropha plantation*

- **Promotion of renewable energies**

The production of vegetable oil is a significant contribution to the reduction of the dependence on imported fossil fuel. The oil can be used directly as fuel for tractors, engines, vehicles, generators, power plants, etc. for local use. In case market prices allow, the oil can be refined to bio-diesel or bio-kerosene for local use or for export. This oil can also be used as raw material for the chemical industry.

- **Jatropha out-grower concept**

Smallholder farmers do employ in average less than 2 hectare. Unfortunately, this land has in most cases not been, used economically or generated optimized results. The Asjeba concept is to support smallholder farmers in planting and harvesting trees and plants on their land. In addition, the Agroforestry area of Asjeba SVP 1 (Ghana) Ltd will provide processing equipment, oil mills and the scientific bio-technical support in order to keep added value in the country for the farmers. Long term purchase contracts for the harvest can be signed with the smallholder farmers to ensure a durable stable income.

“master” and attend school for 2 days. After 3 years they will receive a licentiate degree that certifies their proven capability and ability to execute the profession.

- **Infrastructure development**

The transformation of the agricultural areas requires the creation of local infrastructure. This includes, amongst others, housing (one village per minimum 2000 ha); primary healthcare; potable water supply; treatment of waste and waste water; energy supply; education and transportation as well as upgrading of infrastructure. These investments will be covered by the income generated on the Agroforestry area.

The Asjeba model is supported by experienced specialist’s world-wide, as well as agricultural universities and institutes. Asjeba’s objective in Ghana is to invest in the country’s resources, which in turn safeguards the yield on the capital investment.

We shall capitalize on the long-term lease of the land and aim to balance the investment within 6 to 9 years. As soon as this milestone of 6-9 years has been achieved, all profits will be reinvested in the site of the lease and their inhabitants through a local foundation to be established on behalf of the local population; an intention, The Asjeba Group has explicitly expressed as an obligation by a written statement with the OECD in Paris in 2016. The Asjeba Group will execute project management and worldwide distribution.

Initial capital investment is estimated at approx. US\$100 million for both the out-grower project and the agroforestry area. (a summary of the Finance Plan is included a separate document)

The project will be profitable – as follows:

- It is planned to break-even within three (3) years.
- The trees will reach their maximum harvest volume approx. five (5) years after planting.
- Repayment of initial capital investment (for project 1) within nine (9) years.

Furthermore, we will actively be seeking foreign aid programs to support the related projects of a dual education system, primary healthcare and social network support systems.

For both the Asjeba Agroforestry area and the out-grower project in Ghana we will seek certification to achieve carbon credits in accordance to The Gold Standard. This will be achieved for the Agroforestry project in accordance to The Gold Standard. For the out-grower project we will monitor the planted trees by satellite in cooperation with Rabo Carbon Bank The Netherlands. The accumulated Carbon Credits scheme will grow as the plantations develop.

*Note: A An overview of a conservative estimate of future Carbon credits is available on request.*



*Jatropha plantation*

- **Intercropping**

The moment the soil becomes more fertile (after approx. 7 years) intercropping can start, meaning a complete shift from mechanical towards labour intensive farming.

Research from the agricultural faculty of the University of Hohenheim (Germany) and a local university in cooperation with the expertise of our local partner Ghana Permaculture Institute, Techiman will provide analysis for the optimal combination of fruits/vegetables which can be planted with the Agroforestry area trees. With this add-on planting to the existing program a further stream of revenue will be created.

- **Employment creation**

Labour intensive planting of oil producing trees, combined with intercropping create sustainable employment and mitigation towards the causative factors of mass emigration. In this plan each 5 hectare of the project area will result in 1 job being created.

- **Capacity development / vocational training / dual professional education**

Every year millions of young people leave school without a realistic job perspective. The Asjeba Group is planning to create a dual educational system for participants in cooperation with Ghanaese authorities and Swiss organizations. The participants will work 4 days on the field (in case of an agricultural apprenticeship) under supervision of a

### 3.0. Location of the land

In Africa, about 28 percent of the land is being degraded <https://www.dw.com/en/alarm-over-land-degradation-in-africa/>. Asjeba has been exploring where to start setting up agroforestry projects, considering the following criteria: Soil and climate conditions acceptable; Local people accepting the Asjeba concept; Security for our people; Government and authorities willing to support this concept; Land titles to be controlled and approved. At the end we have concentrated on Ghana, Angola and Nigeria, although we do have other options as well.

#### Ghana

Various families around Techiman, Ghana facilitated by Ghana Permaculture Institute (GPI, <https://www.ghanapermacultureinstitute.org>) have agreed to make available 75 000 hectares of unused/degraded land for 20 years with an option of renewals for up to 50 years. The government of Ghana has expressed their willingness to facilitate more than 300'000 hectares degraded land from various families around them country. The government wants to boost development in underdeveloped areas of the country.



## 4.0 Introduction to Ghana

### Country Overview

After overcoming a history of slave trading, war and political and economic turmoil, the Republic of Ghana has become a stable constitutional democracy. In March of 1957, Ghana declared independence from British colonial rule, becoming the first sub-Saharan African country to gain independence.

Ghana has as per 2021 a population of roughly 31 million people ([www.microtrends.net](http://www.microtrends.net)) spread across ten administrative regions and 170 districts. The people of Ghana are composed of numerous ethno-linguistic groups and religions creating a culturally diverse nation.

### Geography

Ghana lies within latitude 4o 44'N and 11o 11'N and 3o 11'W and 1o 11'E longitude. Covering approximately 238,500 km<sup>2</sup>, Ghana is bordered by Cote-d'Ivoire to the west, Togo to the east, and extends inland from the southern coast along the Gulf of Guinea to the border of Burkina Faso (Oppong-Anane 2006). The overall topography is low and gently undulating with

slopes of less than one percent. Despite the gentle slopes, approximately 70% of the land is susceptible to significant erosion.

The Low Plains consist largely of flat grassy scrub lands, undulating hills and valleys and the coastal river network. The Akwapim-Togo Mountain Range begins near the mouth of the Densu River, near Ghana's capital, Accra, and stretches approximately 320km northeast along the boundary of Togo. The average peak heights are around 460m, with the tallest peak being 880m. The Ashanti Uplands geographic region is comprised of the strongly rolling forested Southern Ashanti Uplands, and the Kwahu Plateau.

This plateau separates the southwestern river network and the Volta river network. The southwestern river network originates from the plateau and drains south into the Gulf of Guinea. The Volta river network lies northeast of the plateau within the Volta Basin and High Plains geographic regions. The Volta Basin is Ghana's primary drainage system and includes the world's largest reservoir, Lake Volta.



The Adome Bridge over the Lower-Volta Lake, Ghana

The general terrain of the High Plains in northern Ghana is defined by a dissected plateau with rivers draining into Lake Volta.

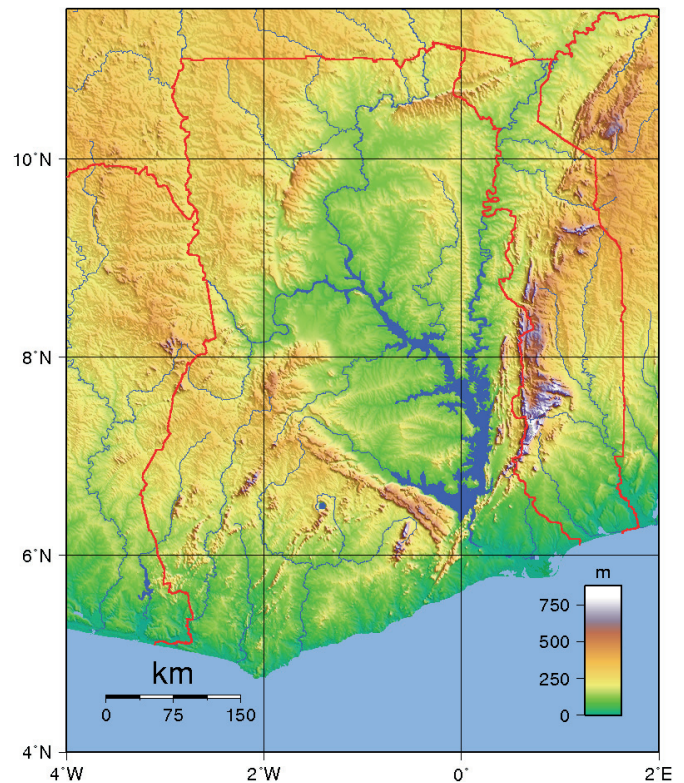
### Agro-ecological Zones and Climate

Ghana is composed of six agro-ecological zones distinguished by natural vegetation and influenced by climate and soil characteristics. Variation in precipitation and temperature are controlled by the movement and interaction of continental and maritime winds. The evergreen rain forest, deciduous rain forest, transition and coastal savannah zones make up the southern half of the country.

These agro-ecological zones have a bimodal equatorial rainfall pattern, allowing for two annual growing seasons (major and minor growing seasons). The Guinea and Sudan Savannah make up the northern half of Ghana. These agro-ecological zones have a unimodal tropical monsoon, allowing for only one growing season (major season). The single growing season in the north is bound by the harmattan period, which begins in December and ends in March. Harmattan refers to the hot, dry continental winds that blow from the northeast across the Sahara Desert and into Ghana causing extremely hot, dry days, and cool nights.

Annual precipitation in Ghana ranges from 600 to 2800 mm. Annual precipitation generally decreases from the hot and humid southwest coast, north, to the relatively hot and dry savannah (average of 1000 mm). However, the lowest annual precipitation typically occurs within the warm southeast coastal savannah zone (600 to 1200 mm). Relative humidity also tends to decrease from south to north, creating a general increase in evapotranspiration potential in the north relative to the south.

Temperatures do not have the same degree of variation across the country as precipitation. The mean monthly temperature across Ghana rarely falls below 25°C, a consequence of Ghana's proximity to the equator and absence of wide-spread high-altitude regions. Mean annual temperature is 27°C. Mean maximum annual temperature approaches 40°C, while mean minimum annual temperature is nearly 15 °C.



*Ghana Topography*

### Soils

The soils of Ghana are developed from highly weathered parent material. Alluvial and eroded shallow soils are common to all agro-ecological zones. Most soils are inherently infertile, or infertile as a result of human activities. The southern half of the country is dominated by Acrisols, which are rich in clay, but have low fertility and toxic amounts of aluminium.

Along with Acrisols, Ferralsols dominate the rainforest zone, and are characterized by high contents of kaolinitic clay, metal oxides, and low cation exchange capacity. The far southeast of the country contains a variety of soil types that are known to be largely unsuitable for cultivation and crop production. The northern half of Ghana is dominated by Luvisols. Luvisols are defined as having a mixed mineralogy, high nutrient content and good drainage. Percent organic matter and nitrogen are particularly low in the savannah and transition zones. Most of Ghana's soils have low fertility.





*Electricity pylons Ankasa, Ghana*

## Economy

Ghana's economy has remained primarily agrarian; however, there is a shift towards the service sector. The agriculture sector makes up over 50% of Ghana's total employment and approximately 25% of the nation's Gross Domestic Product (GDP). The cocoa industry, in particular, is extremely important for Ghana, contributing around 30% of export revenue.

Furthermore, the industrial sector provides the greatest contributions to the country's foreign exchange earnings through exports of oil, gold, bauxite, aluminium, manganese ore, diamonds, natural gas and electricity.

## Development

Recent Developments. Real GDP growth was 6.5% in 2019, up from 6.3% in 2018. The services sector contributed most to economic growth in 2019 (2.8%), followed by industry (2.4%) and agriculture (1.3%). Growth in non-oil activities slowed to 5.8% from 6.5% in 2018. The robust services sector growth (7.6%) was driven by strong expansions in Real Estate (up 19.9%) and information and communication technology (ICT) (up 46.5%) activities, while growth in industry was mainly supported by mining and quarrying. Agriculture grew by 4.6%, supported by favorable weather conditions and the Government's flagship program Planting for Food and Jobs. The country is suffering from a 50% inflation in the moment.

## 5.0. General Description of the project

The syntrophic concept of our partner **Clean Fuels and Energy las Americas SA (C-Fela)** has been successfully executed over the last 20 years in Costa Rica where 3 different species of plants have transformed degraded agricultural land into fully productive land as well as a biodiversity beauty at the same time producing vegetable oil that can be used as biofuel as well as many other high value products for food and other sectors.

The idea is to develop an Agroforestry area using the syntrophic system in marginal, degraded and unused lands and to maximize production through the appropriate combination of different oil producing species, with food and animal feed species, which produce good yields and are easily adapted to dry soils and climatic conditions.

The strategy also includes the protection of existing forests. Deforestation to clean the land to establish the oil producing Agroforestry areas has no place in this project. Other positive effects of the project include reduction of CO<sub>2</sub> emission, control of erosion and better water management.

For the conditions found in West Africa, we have to modify and adapt the syntrophic system to meet the requirements of large-scale Agroforestry area and a high degree of mechanization. Therefore, we will develop a customised scheme to plant the different oil plants in rows. The planting in rows will allow us to mechanize most operations.

Before we can start planting trees, we shall execute an environmental, social impact assessment and begin our basic infrastructural master planning. Thereafter we start with planting *Ricinus Communis*, a one-year plant, with deep roots. First harvest is approx. after 6 to 9 months. Ricinus can be sold to the cosmetic and pharmaceutical industry in any quantity at a fix price. Ricinus was traded fob Rotterdam for US\$ 1505 per ton in February 2021 & for US\$ 1875 per ton on April 27, 2023

*Ricinus Communis plant*



Read more at:

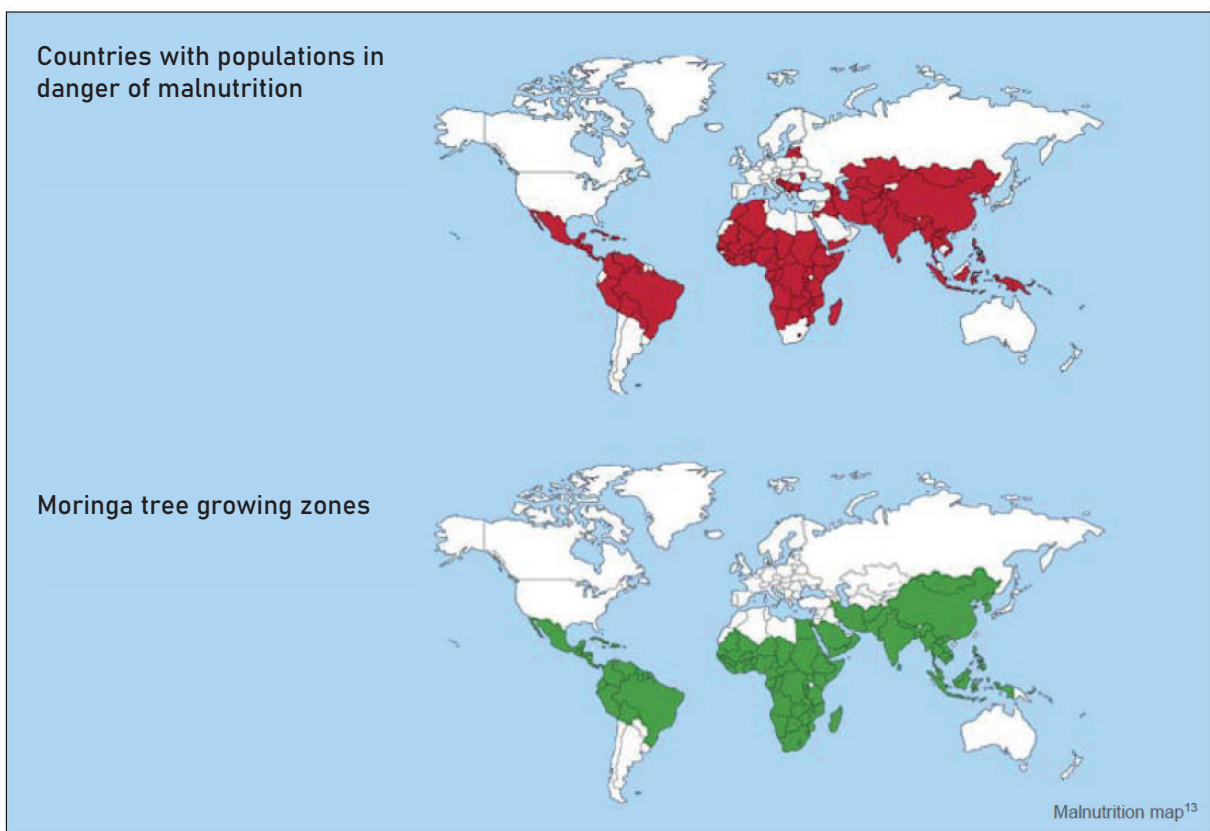
[www.commodity3.com/physical/vegoilsbeneluxsoft/vegoils-eu-softs-vegoils](http://www.commodity3.com/physical/vegoilsbeneluxsoft/vegoils-eu-softs-vegoils).

20% of the total 75 000 hectare will be used for infrastructural purposes. For planting therefore 60 000 hectares will be available. After the Ricinus planting, the first tree planted will be Moringa oleifera. Planting of Moringa trees will be extremely dense – 95 000 trees per ha – since we are aiming only for the fresh leaves. Production parameters will be: Fresh Matter 19.6 t/ha/cutting; Dry Matter 3.33 t/ha; Protein 566 kg/ha. For the Moringa trees we will select a separate area of 20 000 hectares. The fast-growing Moringa trees would disturb growing of the other species too much. Market price of Moringa powder varies from US\$ 5 to US\$ 10 per kg.

An alternative would be to extract protein from the Moringa leaves and sell the protein.

The oil can be used directly as fuel for tractors, engines, vehicles, generators, etc. for local use or even to produce electricity with a MAN power plant. Another Asjeba partner, Dr. Georg Gruber is specialized on research of vegetable oil as fuel. In case market prices allow, the oil can be refined to bio-diesel or bio-kerosene for local use or for export. It can also be used as raw material for the chemical industry.

The medium to long term perspective is to improve the soil fertility. This will allow a change to food production in selected areas of the Agroforestry areas.



*The Moringa tree growing zones and global areas in danger of malnutrition*

The other two trees will be Acrocomia Aculeata and Jatropha Curcas. Acrocomia is similar to the African palm tree. Acrocomia is however very good for the soil, as is Jatropha. Jatropha and Acrocomia will produce 30/40 resp. 50/60 year's vegetable oil.

Read more at:

[https://www.alibaba.com/showroom/moringa+powder.html?fsb=y&IndexArea=product\\_en&CatId=&SearchText=moringa+powder&isGalleryList=G](https://www.alibaba.com/showroom/moringa+powder.html?fsb=y&IndexArea=product_en&CatId=&SearchText=moringa+powder&isGalleryList=G)

## 5.1. Ricinus Communis



*Ricinus Communis plant*

The first phase of the Agroforestry area will be planting of Ricinus, a one-year plant with deep roots, which have a short-term harvest potential (6-9 months), producing vegetable oil (castor oil) which is a common base in pharmaceutical and cosmetic industries.

Ricinus seed oil is a vegetable oil obtained from the seeds of the Ricinus Communis plant. A number of ingredients made from Castor Oil may also be used in cosmetic and personal care products, including lipstick, skin-care products, and bath soaps.

### Applications in the pharmaceutical industry

Castor oil is viscous, pale yellow, non-volatile and non-drying oil with a bland taste. It has good shelf life as compared to other vegetable oils. The seeds contain 40 to 60% oil that is rich in triglycerides mainly Rici Nolin a toxic alkaloid Rici nine and very toxic albumen called ricin.

The seed coat contains ricin, a poison which is present in lower concentrations throughout the plant. Ricinus communis has not only medicinal value but it also has great promises in the field of biodiesel production. It is inexpensive and environment friendly. There are different varieties of castor oil bean and on the average, they contain 46-55% oil by weight.

The United States Food and Drug Administration (FDA) has categorized castor oil as "generally recognized as safe and effective" (GRASE) for over-the-counter use as a laxative with its major site of action the small intestine where it is digested into ricin oleic acid. Despite castor oil being widely used to induce labour in pregnant women, to date there is not enough research to show whether it is effective to ripen the cervix or induce labour.

Therapeutically, modern drugs are rarely given in a pure chemical state, so most active ingredients are combined with excipients or additives. Castor oil, or a castor oil derivative such as Kolliphor EL (polyethoxylated castor oil, a non-ionic surfactant), is added to many modern drugs, including:

**Miconazole, an antifungal agent**

**Paclitaxel, a mitotic inhibitor used in cancer chemotherapy**

**Sandimmune (cyclosporine injection, USP), an immunosuppressant drug widely used in connection with organ transplant to reduce the activity of the patient's immune system**

**Nelfinavir mesylate, an HIV protease inhibitor**

**Tacrolimus, an immunosuppressive drug (contains HCO-60, polyoxyl 60 hydrogenated castor oil)**

The Ricinus planting will later give way to other plant developments:

## 5.2. Moringa oleifera

Moringa is native to north India but is now found throughout the tropics. Moringa is also known as horseradish tree, drumstick tree and mother's best friend. It grows fast and reaches up to 12m. The bark is grey and thick and looks like cork, peeling in patches. It loses its leaves from December to January and new growth starts in February to March. Moringa produces cream-coloured flowers when it is 8 months old and the flowering season begins in January and continues through to March. The fruit ripens from April to June and the pods are triangular in cross section, 30 to 50cm long and contain oily, black, winged seeds.

Moringa requires an annual rainfall of between 250 and 3000mm. It is drought resistant, though in drought conditions it may lose its leaves. This does not mean it is dead and it should recover when the rain arrives. It grows best at altitudes up to 600m but it will grow at altitudes of 1 000m. It will survive in a temperature range of 25°C to 40°C but has been known to tolerate temperatures of 48°C and light frosts.

Moringa prefers neutral to slightly acidic soils and grows best in well-drained loam to clay-loam. It tolerates clay soils but does not grow well if waterlogged. All of the parts of the tree can be used in a variety of ways. Moringa is full of nutrients, protein and vitamins and is good in your food as well as in the food of your animals. Moringa helps to clean dirty water and is a useful source of medicines. It provides lots of leafy material that is useful when using alley cropping systems.

- **Human food**

All Moringa food products have a very high nutritional value. You can eat the leaves, especially young shoots, young pods, flowers, roots, and in some species even the bark. Leaves are low in fats and carbohydrates and rich in minerals, iron and Vitamin B. It is particularly useful as a human food because the leaves appear towards the end of the dry season when few other sources of green leafy vegetables are available.

Of all the products of the tree the leaves are used the most. They become tougher as they get older so it is best to pick the growing tips and young leaves. Remove the leaves from the woody stem, as this will not soften during cooking. The leaves can be used in the same way as spinach. An easy way of cooking them is to steam 2 cups of freshly picked leaves for a few minutes in one cup of water, seasoned with



*Moringa Oleifera pods*

an onion, butter and salt or other seasonings according to taste. A leaf powder can be produced by drying the leaves and crushing or pounding them. You can sift the powder to remove leaf stems. This powder can then be added to sauces as other condiments or vegetables are added.

- **Animal fodder**

Cattle, sheep, pigs, goats and poultry browse the bark, leaves and young shoots of Moringa. The best diet for pigs is 70% Moringa, 10% Leucaena and 20% other leaves. It is possible for their diet to be 100% Moringa but it should be no more than 30% Leucaena. The pork from pigs fed on this diet is lean. If trees are intended for animal fodder it is useful to prune them to 4m high, but if they are not, they should be pruned to 6m so harvesting for human consumption can be easily carried out.



*Moringa Oleifera tree*

- Some of the remedies are described here but there is no guarantee they will work for every case!
    - \*Leaves rubbed against the temple can relieve headaches.
    - \*To stop bleeding from a shallow cut apply a poultice of fresh leaves.
    - \*There is an anti-bacterial and anti-inflammatory effect when applied to wounds or insect bites.
    - \* Extracts can be used against bacterial or fungal skin complaints.
    - \*Leaf tea treats gastric ulcers and diarrhoea.
    - \*Eating Moringa food products is good for those suffering from malnutrition due to the high protein and fibre content.
- Living fence
 

Planted as a living fence, Moringa provides wind protection and shade. It grows very quickly and if cuttings are planted close together, they will form a fence that livestock cannot get through in just 3 months.
- Alley cropping
 

Moringa has a large tap root and few lateral roots so it will not compete for nutrients with the crops. It will also add to the nutrients available as it produces many protein rich leaves. They grow very quickly but do not provide too much shade due to the structure of their leaves. They are also very good at reclaiming marginal land.
- Natural pesticide
 

By digging Moringa leaves into the soil before planting, damping off disease (*Pythium debaryanum*) can be prevented among seedlings.
- Domestic cleaning agent
 

Crushed leaves are used to clean cooking utensils or even walls.
- Fuelwood and other uses
 

The wood is light and is a good fuel for cooking. However, it is not suitable for building. The bark can be beaten into a fibre that can be used to make rope or mats and the wood produces a blue dye. Chippings of wood can be used to make a good quality paper. The tree also produces viscose resin that is used in the textile industry.
- Water purification
 

Seed powder can be used as a quick and simple method for cleaning dirty river water. The powder joins with the solids in the water and sinks to the bottom. This treatment also removes 90 -99% of bacteria contained in water. Using Moringa to purify water replaces chemicals such as aluminium sulphate, which are dangerous to people and the environment and are expensive.
- Natural medicines
 

Around the world every part of the Moringa tree has been used effectively against varying ailments.

## 5.3. Jatropha Curcas

An extract from:

[www.fao.org/docrep/012/i1219e/i1219e.pdf](http://www.fao.org/docrep/012/i1219e/i1219e.pdf)

### “A smallholder bioenergy crop, the potential for pro-poor development”

Food And Agriculture Organization  
 Of The United Nations

As developing countries face increasing local demand for energy in rural areas, they also must deal with both economic and environmental pressure on agricultural lands in general. The possibility of growing energy crops such as *Jatropha curcas* L. has the potential to enable some smallholder farmers, producers and processors to cope with these pressures.

Jatropha oil is a moderately unsaturated oil and liquid at room temperature.

Depending on different factors including contamination with particles, CJO should be fluid at around 10 degrees Celsius. Its structure comprises a triglyceride containing mostly linoleic and oleic fatty acids and under correct circumstances Jatropha oil will make high quality biodiesel. The high triglyceride content of the oil is highly suitable for transesterification so that Jatropha oil lends itself well to conversion into biodiesel and aviation fuel. Like rapeseed oil it has a low solidifying temperature and has lower levels of gum & resin than many of the vegetable oils, which means that it can be used as straight vegetable oil (SVO) in simple agricultural equipment.

However, many of the actual investments and policy decisions on developing Jatropha as an oil crop have been made without the backing of sufficient science-based knowledge. Realizing the true potential of Jatropha requires separating facts from the claims and half-truths.

To avoid making these mistakes we have asked the world most experienced scientist on Jatropha, Dr. George Francis from the agricultural university of Hohenheim and we will ask the local agricultural university to partner with us in our Agroforestry area set up. (Francis, G., Edinger, R. & Becker, K. 2005. A concept for simultaneous wasteland reclamation, fuel production, and socio-economic development in degraded areas in India: need, potential and perspectives of Jatropha Agroforestry areas. Natural Resources Forum. 29: 12-24.)

#### General properties of Jatropha oil

Specifications	Value
Triglyceride (%)	80-95
FFA (%)	3-19
Moisture (%)	0.5-3
Diglyceride (%)	2-5

Source: Biocube Corporation

Advantages over mineral-oil derived diesel include:

1. lower particulates
2. very low sulphur levels
3. lower smoke emissions\*
4. a high cetane rating as biodiesel\*\*
5. 4% more efficient than conventional aviation fuel [Boeing 2009]

\*An important requirement for coastal shipping

\*\*A measurement of the combustion quality of diesel fuel during compression ignition

Interest in *Jatropha Curcas* as a source of oil for producing biodiesel has arisen as a consequence of its perceived ability to grow in semi-arid regions with low nutrient requirements and little care. The seed typically contains up to 35 percent oil which has properties highly suited to making biofuel.

The rooting nature of *Jatropha* allows it to reach water from deep in the soil and to extract leached mineral nutrients that are unavailable to many other plants. The surface roots assist in binding the soil and can reduce soil erosion.

*Jatropha* has a number of strengths: the oil is highly suitable for producing biofuel but can also be used directly to power suitably adapted diesel engines and to provide light and heat for cooking, it is fast growing and quick to start bearing fruit, and the seed is storable making it suited to cultivation in remote areas.

*Jatropha* could eventually evolve into a high yielding oil crop and may well be productive on degraded and saline soils in low rainfall areas. Its by-products may possibly be valuable as fertilizer, livestock feed, or as a biogas feedstock, its oil can have other markets such as for soap, pesticides and medicines, and *Jatropha* can help reverse land degradation.

*Jatropha*'s chief weaknesses relates to the fact that it is an essentially wild plant that has undergone little crop improvement. Its seed yields, oil quality and oil content are all highly variable.

To combat this weakness Asjeba has selected high quality non-toxic hybrid seeds for its Agroforestry area cultivated in India by our partner Jatropower AG, Switzerland.

These seeds achieve a 3 times higher yield as usual seeds.

*Jatropha* production systems can be characterized in terms of their direct or indirect potential contribution to pro- poor development. It is expected that large Agroforestry areas developed by the private sector will predominate in the future and that smallholders may be contract farmers for such commercial enterprises.

*Jatropha* biofuel production could be especially beneficial to poor producers, particularly in semi-arid, remote areas that have little opportunity for alternative farming strategies, few alternative livelihood options and increasing environmental degradation.

Local utilization of *Jatropha* oil is one of a number of strategies that may be used to address energy poverty in remote areas and could be part of production systems or part of a "living fence" to control livestock grazing.



*Jatropha Curcas*

Extracted and filtered vegetable oil can be used directly as a fuel in suitable diesel engines without undergoing the transesterification process (Achtenet al., 2008). There is now considerable experience with using straight vegetable oil in suitably modified diesel engines. Our partner from VWP has the patents enabling us to do so.

Growth of the biofuel industry is being driven by government policies in three main areas. This includes policies aimed at mitigating climate change, improving energy security and using biofuel production as a strategy to support rural development.

Transportation is responsible for some 30 percent of current global energy usage, practically all in the form of diesel or petrol. Using current technology, biofuels offer the most convenient renewable alternative to fossil transport fuels since they require the fewest changes to the distribution infrastructure.

The link between poverty alleviation and energy provision makes it critical to consider both when



looking toward rural development. Availability of local energy and farm power is fundamental to intensifying agriculture, and agricultural development is essential to poverty alleviation.

Jatropha grows readily from seed which germinate in around 10 days, or from stem cuttings. Growth is rapid. The plant may reach one metre and flower within five months under good conditions (Heller, 1996). The growth is sympodial, with terminal flower inflorescences and lateral branching, eventually reaching a height of 3 to 5 metres under good conditions. It generally takes four to five years to reach maturity (Henning, 2008a).

Vegetative growth occurs during the rainy season. During the dry season, there is little growth and the plant will drop its leaves. Flowering is triggered by rainfall and seed will be produced following the end of the rainy season. Seeds are produced in the first or second year of growth. Jatropha trees are believed to have a lifespan of 30 to 50 years or more.

Jatropha has proven effective in reducing the erosion of soil by rainwater. The taproot anchors the plant in the ground while the profusion of lateral and adventitious roots near the surface binds the soil and keeps it from being washed out by heavy rains. Jatropha also improves rainwater infiltration when planted in lines to form contour bunds.

Read more at:

[www.eppo.org/QUARANTINE/  
Pest\\_Risk\\_Analysis/PRA\\_intro.  
htm](http://www.eppo.org/QUARANTINE/Pest_Risk_Analysis/PRA_intro.htm)



#### Jatropha Strengths

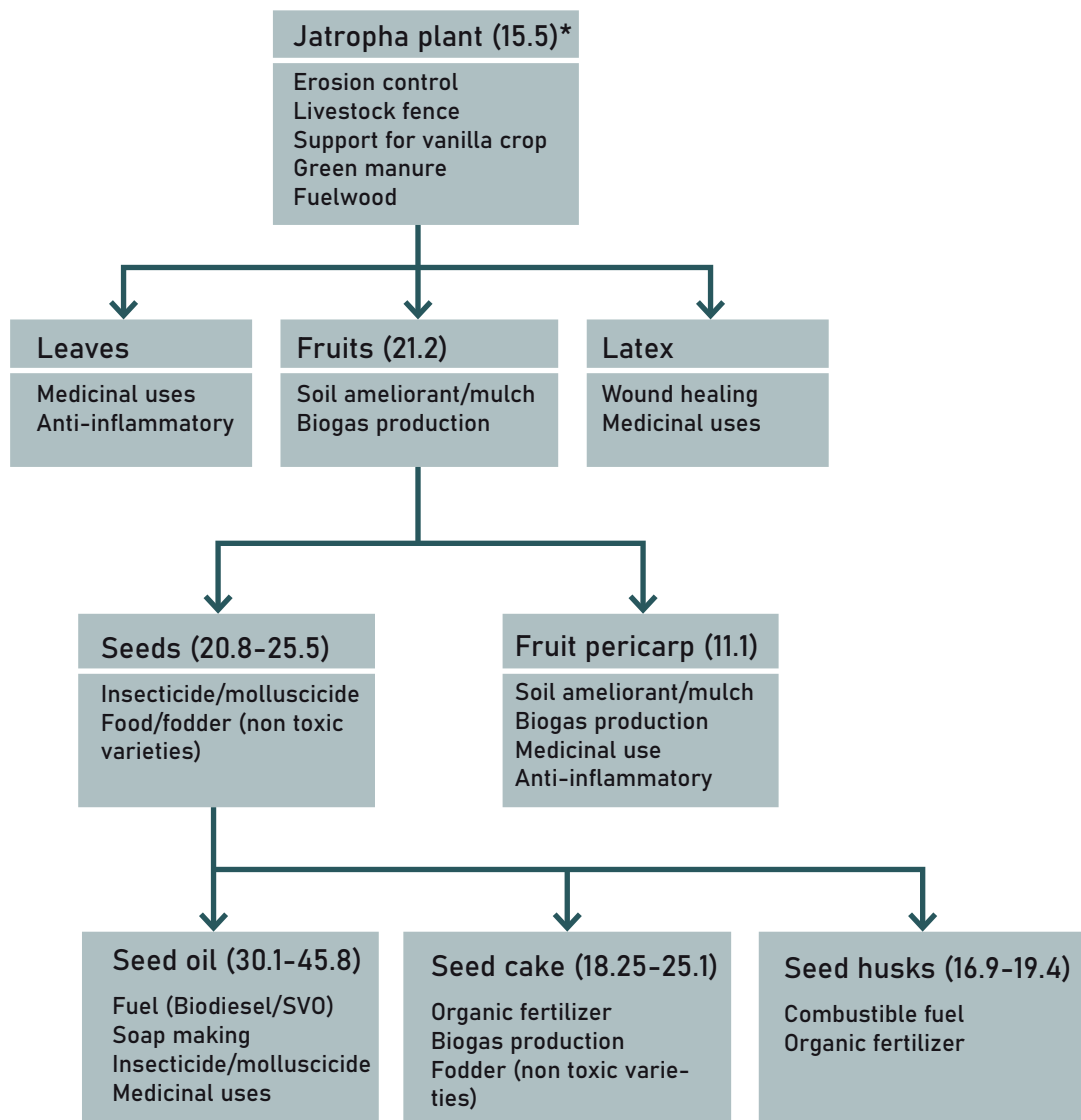
- Jatropha has the potential, through varietal improvement and good farming practices, for a high level of oil production per unit area in the subhumid tropical and subtropical environments
- Jatropha grows and is potentially productive in semi-arid areas on degraded and saline soils
- Jatropha can be used for halting and reversing land degradation
- Jatropha grows fast, as compared to as many other tree-borne oilseeds
- Jatropha trees remain small, enabling ease of management
- Jatropha has periodic leaf shedding which facilitates nutrient recycling and dry season irrigated intercropping with short-term crops
- Jatropha leaves are unpalatable to grazing livestock, making it a good barrier hedge to protect crops
- Jatropha oil has physical and chemical properties that make it highly suitable for processing into biodiesel
- Jatropha oil can be used directly in suitable diesel engines, lamps and cooking stoves
- Jatropha by-products have potential value, such as using seed cake as fertilizer, animal feed (non-toxic varieties) or biogas, and using fruit shells and seed husks for biogas and combustion
- Jatropha oil has markets other than for fuel, such as the production of soap, medicines and pesticides
- Jatropha seeds are storable and processing can be delayed, which makes production suited to remote areas
- Jatropha has attracted investment, mainly from the private sector, into plant breeding, which increases the likelihood of developing jatropha varieties with improved and stable yields

Jatropha trees grow from seed develop taproots. Thus, they are able to extract minerals that have leached down through the soil profile and return them to the surface through leaf fall, fruit debris and other organic remains. In this way, Jatropha acts as a nutrient pump which helps rehabilitate degraded land.

Jatropha plant extracts have many uses in traditional societies (Heller, 1996). The dried latex resembles shellac and is used as a marking ink. The leaves and bark are used for dyeing cloth. Jatropha has medicinal qualities, including a blood coagulating agent and antimicrobial properties that are widely used in traditional medicine and for veterinary use. All parts of the plant are used.

### Inter-cropping in Jatropha cultivation

Most shade loving and short duration crops are suitable for inter-cropping in a Jatropha Agroforestry area. Short duration grain and vegetable crops like: green gram, black gram, pumpkin, ash gourd, cucumber, tomato, green chili, bitter melon can be grown during initial 2 years. Thereafter shade loving herbal/aroma plants like Patchouli, Cocoa, Vanilla and Pitaya (dragon fruit) can be grown as inter-crops.



\*Energy values of the components are given in MJkg<sup>-1</sup>

Source: Adapted from Gubitz et al. (1999). Energy values are ranges taken from various sources cited in Jongschaap (2007) and Achten (2008).

*The use of Jatropha Curcas and the energy values of its components*

## 5.4. Acrocomia aculeata

Acrocomia is a native palm tree of Latin America. It is growing in Mexico, Central America, Colombia and Venezuela, but also in Brazil, Bolivia and Paraguay and in the North of Argentina.

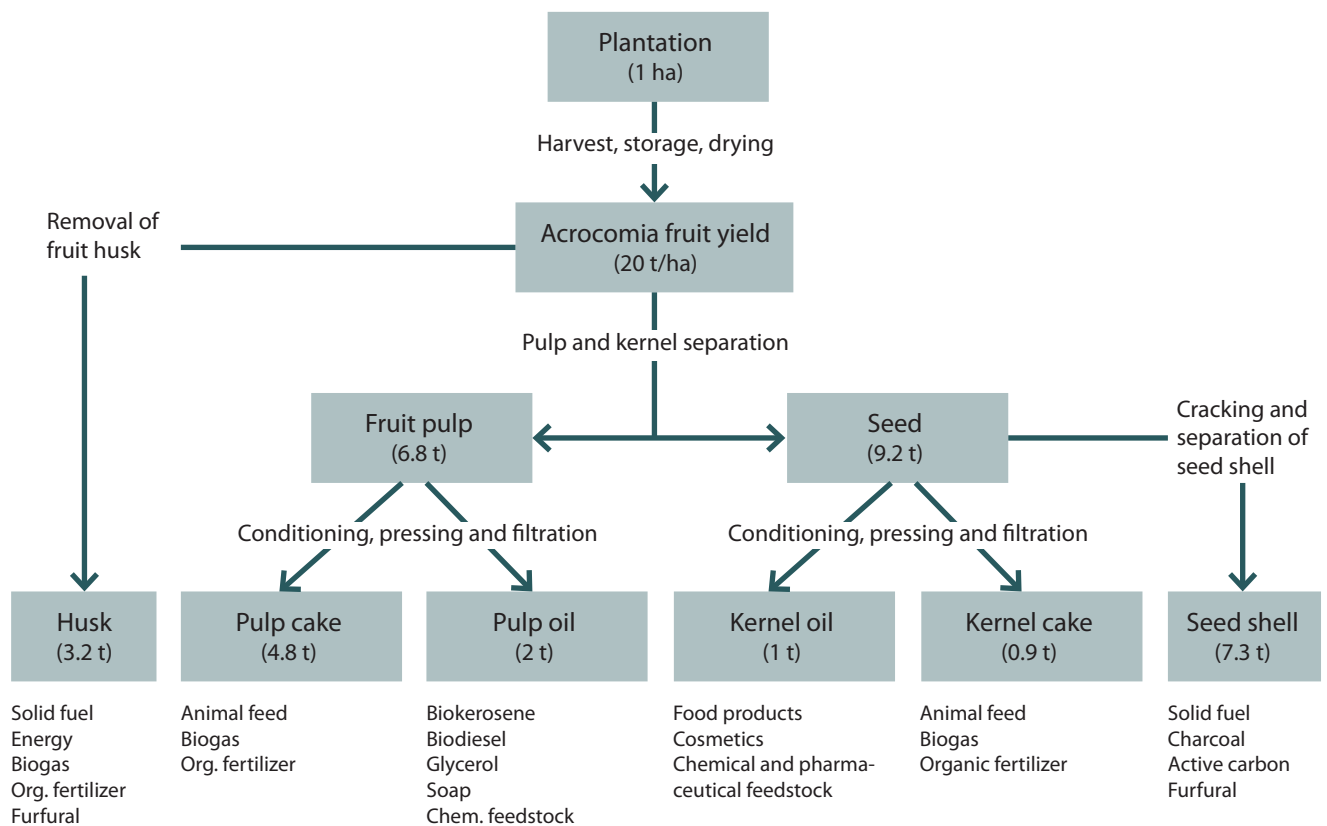
The fruits of the palm-tree can be processed to fuel, food and fodder. At the moment only Paraguay has a tradition in processing its fruits, whereas Brazil nowadays recognized the bio-economic potentials of the fruits and starts to build up processing facilities. This means, that the know-how of processing is available and first markets for Acrocomia products have been successfully established.

The Acrocomia palm is robust on poor soils and needs only about 800 mm rainfall per year. Compared to other oil-plants Acrocomia has one of the highest oil-yields per hectare and further multiple use of the by-products of its non-poisonous fruits.

So a one hectare Agroforestry area ( $\approx$  500 palms) accounts for about 20 t of fruit per year (after 6/7 years of growing). This means 3 tons of oil; which is derived from 1 t of kernel-oil and 2 t of pulp-oil.

The fruit includes 6 sub-products: Besides the kernel- and pulp-oil, this is the press cake, kernel- and outside-shell. The kernel-oil is mainly used as food and in the cosmetic and chemical industry. It contains mainly lauric acid (40%). Market conditions refer to a price of about US\$ 1 000/ t. The pulp-oil is used rather for soaps or bio-energy in terms of fuel. It contains oleic acid (57%) and palmitic acid (29%). The price of this oil is oscillating between US\$ 700 and US\$ 900/ t.

To achieve sufficient experience with this palm it is planned to start planting rows right in the beginning of the project under close supervision of the agricultural universities in the nursery. With this operational experience, Asjeba will be well prepared, to plant the intended quantities.



Acrocomia plant yield flow chart showing produce from 1 hectare

## 6.0 Description of an Agroforestry cluster and Industrial Development

### Project Development

All relevant data of the project sites will have to be surveyed and detailed topographic maps elaborated as base for the exact project planning.

### Development of Nurseries

The first step to implement the project will be the establishment of the first nursery and storage for seeds for the production of vegetative material for the start of the first planting in 2024. The location of the first nursery should be close to an existing agricultural institute due to the better infrastructure and the option to integrate the nursery into the University complex. This will make access to trained people easier and also will give us the opportunity to cooperate with the university in research and development. It is also planned to sell plant material in a garden centre at the same location.

The nursery plays a crucial role especially for the introduction of *Acrocomia* and its adaption to the native environment after the propagation cycle in the lab.

### Construction of Laboratories

As we will need very large quantities of planting material, we must rely on the option of in-vitro propagation. C- Fela has developed a method of in-vitro propagation for *Acrocomia aculeata* in Costa Rica.

This is very important to the project as the natural cycle of *Acrocomia* may last up to 3 years. Of course, we can apply this method also to the other plants according to necessity and capacity.

### Development of Planting Scheme

The original planting scheme developed by C-Fela in Costa Rica referred to hilly terrain and smaller Agroforestry areas using a large amount of manual labour. As the project in Ghana will have to manage a large Agroforestry area, we will have the planting scheme adapted to a more mechanized system. This means that the different biofuel plants will be planted in lines with distances between the lines that will allow the operation of machines.

### Planting Program

As the project will start, a detailed topographic, geological and meteorological survey of the assigned block will be executed. Based on this data an exact planting plan will be developed.



## Social and Economic impacts

- Sustainable social impacts in remote rural areas. It will be of top priority to provide permanent and stable employment with adequate payment to provide a sufficient standard of living in rural areas. This will be an important approach to control immigration to Europe. The employment provided by the project will also trigger secondary employment i.e. groceries, barbers, medical services etc. The project also wants to integrate the small farmers in the area to provide them with plants, knowhow and contracts to buy their products.

We also will promote women's access to employment and education.

- **Food security und access to fresh water.** As the intercropping scheme will also integrate food production in an ecologically improved environment, local food production will improve and meet local needs. Clean drinking water will be provided by drilling of deep wells and a local water management system will be introduced.
- **Development of integrated infrastructure.** The masterplan will develop the Agroforestry projects in remote areas, which will make it necessary to develop most of the infrastructure to implement the project. First this will mean to build access roads as well as to connect the project areas as the roads within the plantations. Later also local generation of electric energy, professional training, basic and secondary education, basic health care, housing schemes and the implementation of social and health insurance for the employees will follow as the project will develop.
- **Products for local markets.** The project is designed to provide in the initial phase food, biofuels, energy and high quality planting materials for the local population by providing all elements for local sustainable development.
- **Products for international markets.** At medium and long term the project will also process products for international markets like biofuels (jet fuel), tropical fruits, processed food fruits and special lifestyle products (i.e. moringa powder).
- Impacts for national economy. The main problem of developing countries is the low standards of living in rural areas and providing long term perspectives an economic stability is a cornerstone of national development.

The project also plans to provide food security by improving food production. The substitution of imported fossil fuels and energy will free financial resources for internal investment.

The inclusion in international scientific networks will also boost national development.

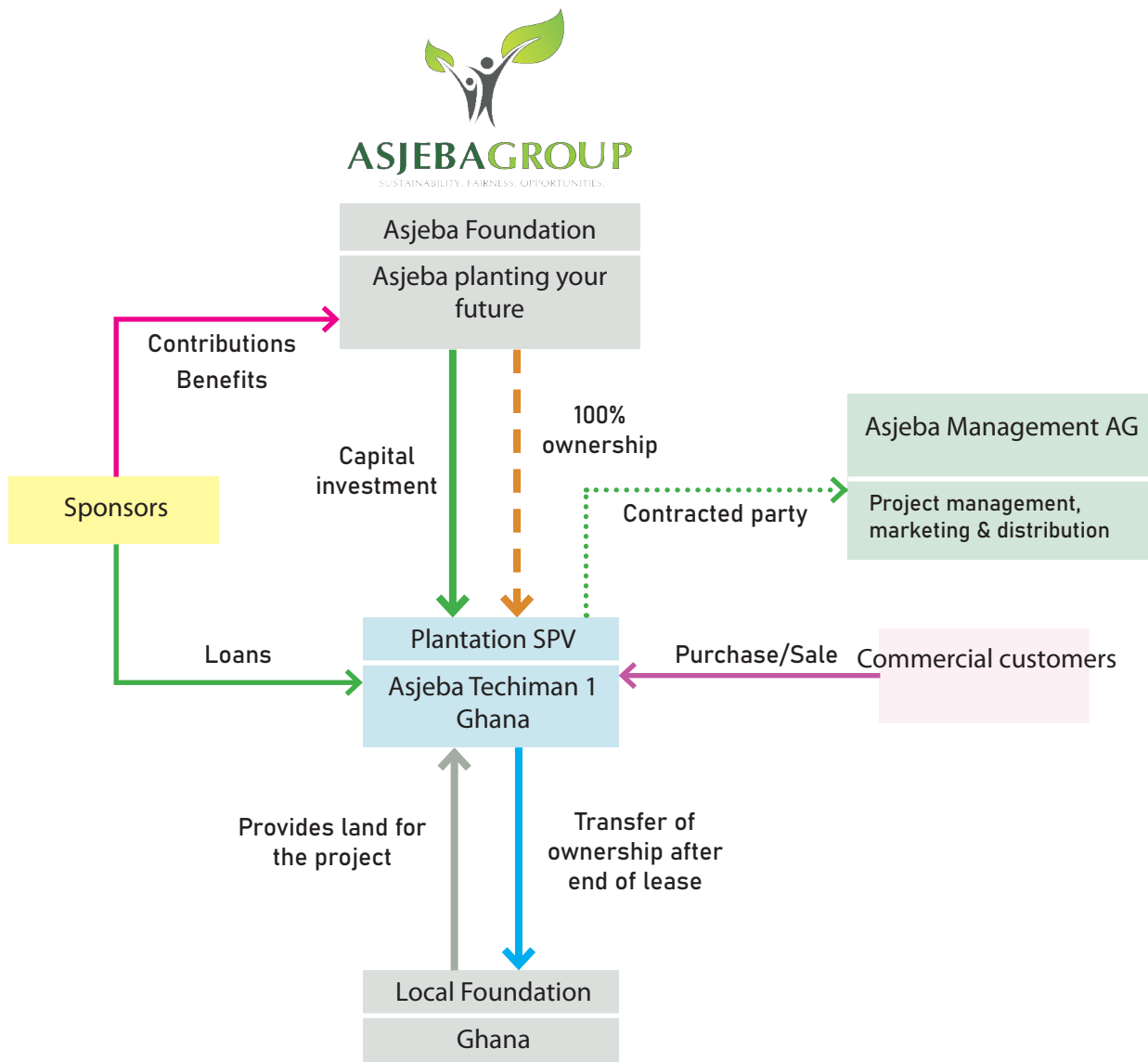
- **Development of Knowhow and sustainable Technologies.** The project will generate very specific scientific and technical knowhow to provide tools to meet the challenges of a changing climate and a growing population.



## 7. The Asjeba Concept and Participants

### Legal Entities of the Asjeba Group

- The humanitarian foundation “Asjeba Planting Your Future”, Switzerland
- Asjeba Management AG, Switzerland
- Ghana SVP 1 Ltd. (Plantation SPV)
- Ghana 1 foundation (Local foundation)



## 7.1. Management and strategy



### HISKO H. BAAS, lic.oec. HSG

Mentor and Coordinator of a group of private individuals and international companies, acting with the legal entities for the purpose of this concept as partner in the ASJEB GROUP.

Hisko holds a master's degree in Economy from the University of St. Gall, Switzerland, and is a company director and entrepreneur with more than 40 years' experience in banking, investment banking, merger & acquisition transactions and project planning and execution. He is the initiator and manager of the ASJEB GROUP, a partnership of private individuals and companies dedicated to improving the living conditions of people living in rural regions in developing countries. The ASJEB GROUP aims to do this through

the sustainable development of Agroforestry areas - designed as a commercially viable project - producing food supplements and vegetable oil for commercial applications such as bio fuel, cosmetics, and pharmaceuticals.

**Hisko Sr. will act as chairman of the Board of Directors thus shaping future vision and control the sustainable process of the concept. As long as the designated CEO has not yet come aboard Hisko Sr. will hold the position of CEO.**



### JEANNETTE A. BAAS

Economist, has 40 years' experience in HR (Tagesanzeiger), sparring partner for investment decisions and legal issues, trade marks (Metro Group) and Head of trade marks for the Schindler Group.

**Jeannette will jointly with Hisko Sr. shape the future of the Asjeba concept and be interims-wise responsible for HR, oversee trade mark development and legal issues.**



## ROBERT MEIJER

Robert Meijer spent most of his career in Royal Dutch/Shell (20 years) after seven years in Vendex International. In his early Shell career he worked in Brunei, Egypt and Syria in different Finance positions (controlling, audit, treasury). After 10 years of upstream and downstream experience he changed career direction as he became treasurer of the Shell Pension Fund.

He started his venture capital in 1996 by acquiring a leading medical services firm with some 500 employees, which, after restructuring, was divested to a strategic partner. In 1997 he was co-investor acquiring a Spanish staffing firm which was sold in 2001, after a successful buy and build strategy, to a leading Dutch firm in the sector. He initiated the set-up of a VC firm in the ICT

sector which became ultimately very profitable due to the Telfort success and others. His investments vary from Silicon Valley to China.

He has served on the Board of two Pension Funds (one Dutch and one in Rome), he has been executive director of the Amsterdam and London listed Indocam Himalaya Fund, chairman of the investment committee of Waterland Fund I, chairman of the biotech firm Medsciences Capital I and he serves on a variety of advisory committees and boards of private venture capital companies.

He studied corporate finance and accounting at Erasmus University and graduated with a MBA.



## 7.2. Social – Ecological Footprint



### DALE ANNE BOURJAILY,

worked as programme director economic development for the sustainable development agreements between the Netherlands, Benin, Bhutan and Costa Rica at Eco-operation and later as Senior Advisor sustainable economic development at the Royal Tropical Institute in the Netherlands. Ms. Bourjaily's innovations in sustainable chain management was described in papers presented at the OESO, UNEP and UNCTAD and at Greening of Industry Network conferences. She started a venture capital fund in Amazonia managed by Banco Axial and raised 50 million euros from the pharma industry for investment in Phyto pharmaceutical

research and development by local laboratories resulting in 21 patents on active ingredients. Since 2005 she has been engaged in clean tech venture capital and DLT.

**Dale Anne's contribution to Asjeba will be the development of a corporate social responsibility (CSR) strategy and plan, including the development and management of relevant partnerships.**

**Dr. GEORGES TIENDREBEOGO,**



is a MD and specialised in social and preventive paediatrics, applied tropical medicine, public health and medical anthropology (University of Dakar, Maastricht University, University of Amsterdam). Mr. Tiendrebeogo has over 30 years' experience in health systems strengthening, nutrition, maternal and child health, multi stakeholder/country research and evaluation, knowledge generation and sharing, and networking across Africa and Europe. In addition to his professional engagement on the medical side, 3 years ago, he started Laafi Services SARM, a transport company in Burkina Faso aiming at generating funds to support social enterprises on ageing and on youth-

related projects. He has strong negotiation and facilitation skills and can analyse complex situations, align people to innovation and new ideas and get groups to work towards a common goal.

**Together with Dale Anne Georges will shape the CSR portfolio.**

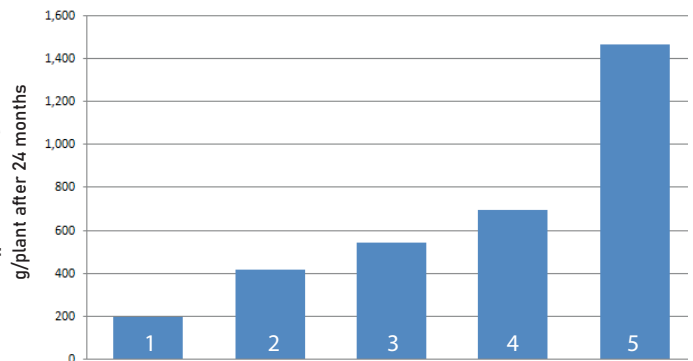
## 7.3. Agricultural Footprint

Jatropower AG, Baar, Switzerland / University  
Hohenheim, Germany

[www.jatropower.ch](http://www.jatropower.ch) is a leading developer of *Jatropha Curcas*, an oil seed plant allowing production of sustainable fuels on degraded soils in an economically viable way. Jatropower owns a unique selection of proven elite accessions of *Jatropha Curcas*, selected from a global germplasm collection of 650 provenances, representing all major global *Jatropha* hot-spots. Jatropower is the only seed development company that sells improved *Jatropha* cultivar seeds to a wide customer base currently.

Jatropower bases its evaluation program on about 650 different accessions. It could be shown over five years that its best performing plants sustainably achieve a 3 to 4 times higher yield than average plants in semi-arid climate and on degraded soil. A further step was taken when producing F1 hybrids of the elite plants. First results indicate that a further yield increase by a factor 2 could be achieved with such hybrids, which needs to be confirmed with multi-location trials. The following graph shows the high yielding character of the best F1 hybrid in relation to the elite toxic cultivars:

Jatropower has supplied commercial quantities of seeds to clients in Mali (smallholder farmer model), Mozambique (industrial farm) and Madagascar (centrally managed farm). From each of these places Jatropower has got positive feedback and repeat orders. The yields that they got were in accordance with the forecasts, i.e. the type of data that Asjeba uses in its business plan.



Seed yield pattern of elite cultivars compared to F1 hybrids

- 1 All toxic
- 2 Average of best toxic
- 3 Best toxic plant
- 4 Average of best F1 hybrid population
- 5 Best F1 hybrid plant



### GEORGE FRANCIS, PhD

CEO of JATROPOWER Group. After obtaining his PhD from the University of Hohenheim, Stuttgart, he conducted 6 years of fundamental research on *Jatropha*. He also has extensive experience of managing intercultural projects. Dr. Francis played a key role in the DaimlerChrysler-DEG *Jatropha* project titled "Biofuels from Eroded Soils in India", during his time at Hohenheim. This was the first comprehensive project to investigate the many aspects of *Jatropha* cultivation on wasteland,

extraction of oil from its seeds, biodiesel production and the potential uses of the by-products remaining after oil extraction.

He has acted as a consultant on *Jatropha* and other bio-energy projects to national governments, multinational financial institutions and private companies world-wide. He has several articles on the potential of *Jatropha* to his credit and has delivered keynote lectures on this and related topics at international fora.

George will be responsible, in cooperation with the agricultural university of Hohenheim, Germany and the local agricultural university, for the agricultural footprint of the Agroforestry areas. What is going to be planted, in which sequence, where and how much? Once the soil is fertile again: what kind of vegetables, fruits or other plants can be planted between the rows of trees as the intercropping modus.

## 7.4. Energy Footprint

### The Vereinigte Werkstätten für Pflanzenöltechnologie



#### GEORG GRUBER, PhD

studied Economics and Natural Resource Management in Erlangen/Nürnberg, Germany, and Santa Barbara, California, U.S.A.

His doctoral thesis (1992) outlines a new developed CO<sub>2</sub>-carbon based prize setting system, executed at the examples of pure plant oil, diesel and hydrogen. For 30 years he does R&D on pure plant oil as fuel for trucks, tractors, generators and 100%

Renewable Energy Hybrid Systems in Latin-American, Asia and Africa. Dr. Gruber is co-owner of Vereinigte Werkstätten für

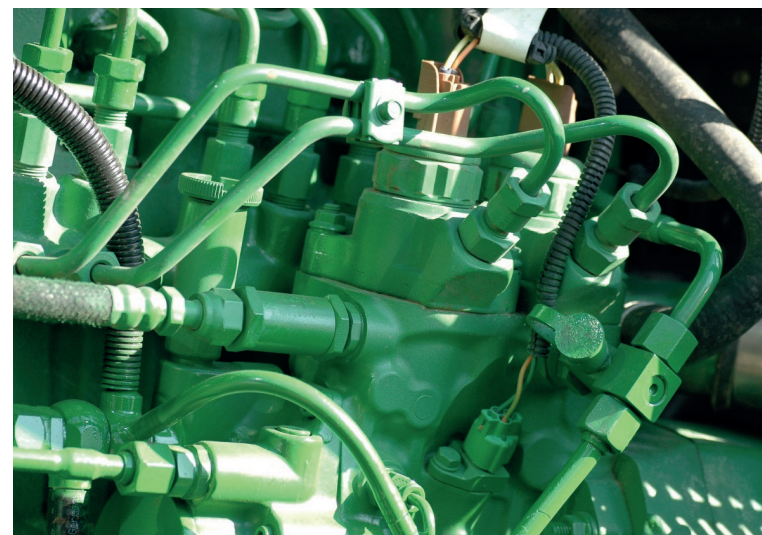
Pflanzenöltechnologie, keeps 10 patents on engine technology, fuel production and fuel quality, grants

licenses on it and sells know-how. Georg will be responsible for an energy transformation concept from centralized, limited fossil resources to decentralized 100% renewable energies systems, including an holistic CO<sub>2</sub>-Recycling Concept of various oil plants to Fuel, Food, Feed and Fertilizer.

Georg will be responsible for the energy concept as well as to create a concept to transform local industry around the Agroforestry area (remote areas) from fossil oil dependence towards vegetable oil use.

([www.vwp-europe.com](http://www.vwp-europe.com)) VWP's "CO<sub>2</sub>-recycling Concept for Fuel, Food, Feed and Fertilizer" promotes the sustainable cultivation of oil plants for the use in adapted pure plant oil diesel engines for mobility or power generation in remote areas in Africa, Asia and South America. The co-product oil/protein cake is regionally and directly used as human/animal food or fertilizer. Left over biomass and straw serves the humus balance. State of the art today is an innovative decentralized production method for 2nd generation plant oil complying with DIN 51623 fuel quality and an engine technology for pure plant oil, biodiesel and diesel.

Such innovative flex-fuel engines can be used for electricity production in stand-alone gen-sets or within a hybrid system of different renewable energies like wind power, photovoltaic, hydro power. The 100% Renewable Energy Off-Grid Hybrid systems and the sustainable vegetable oil production were designed to be economically viable while operating to the needs of closed regional



VWP John Deere Flex-Fuel Engine

CO<sub>2</sub>, energy, resource and value-added cycles for local populations in Africa, Asia and Latin America. Especially for small scale farmers, VWP considers the new management and economic concepts of “Decentralized Social Business Jatropha Biorefineries” as a powerful tool to fight climate change, desertification, poverty and migration. Dry and heat resistant oil plants from semi-arid, degraded soils can even serve as an international resource for bio kerosene. VWP is working on an

international CO<sub>2</sub>-recycling partnership between aviation and integrated Jatropha, photovoltaic and hydrogen production plants for local biokerosene supply.

From 2004 to 2019 VWP was honored with numerous awards for its integrated biofuel concepts and “Best International Off-Grid Project” for the Galapagos Islands Floreana and Isabela.



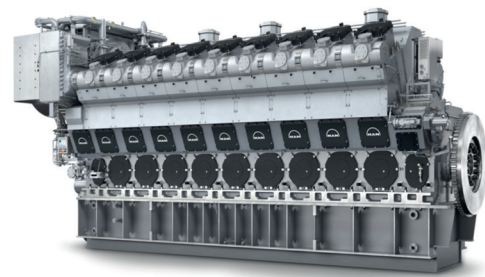
*100% Renewable Energy Hybrid Power Plant on Galapagos Island Isabela. Built from Siemens AG and Designed from VWP*

## MAN Power Plants, Augsburg, Germany

MAN Energy Solutions, headquartered in Augsburg, Germany and part of the VOLKSWAGEN Group, is a world's leading provider of solutions in the power, marine and industrial sector.

MAN Energy Solutions enables its customers to achieve sustainable value creation in the transition towards a carbon neutral future. Addressing tomorrow's challenges with our customers, we improve efficiency and performance at a systemic level. Leading the way in advanced engineering for more than 250 years, we provide a unique portfolio of technologies. MAN Energy Solutions employs some 14,000 people at over 120 sites globally. MAN PrimeServ, offers a vast network of service centres to our customers all over the world and across Africa.

MAN will cooperate in the design and construction of power plants using the organic oils produced by the Jatropha and Acrocomia trees. The company has a hundred-year experience in the area of power plants and has developed technology for the usage of biofuels for energy generation.



### TILMAN TÜTKEN, PhD

Vice President MAN Energy Solutions. Dr. Tütken is responsible within MAN Energy Solutions for the sales of energy solutions including engines, turbines, storage and power plants for power generation customers in the region Europe. He has been working since 2006 for MAN Energy Solutions and previously over 12 years for ABB in the power generation sector. In his career, he was active in all regions of the world.

His background is PhD in physics with a background in photovoltaic components.

Tilman and MAN Energy Solutions will provide invaluable input on the development of sustainable energy solution strategy and implementation plan which uses the crop and other resources of the project. ([www.man-es.com](http://www.man-es.com))

## 7.5. Product Development, Marketing and Distribution

### Sarepta Production and Sarepta Mini Market

Creation and management of SAREPTA PRODUCTION SARL and SAREPTA MINI MARKET, structures that have resumed the processing and marketing of VITRINES St JOSEPH products by expanding the product range and developing new growth prospects as demand for natural products from St Joseph's Showcases persisted after its closure.

The fundamental concepts of SAREPTA, in the current context of poverty and globalization, are based on the belief that the food security of people,

whether rich or poor, depends on nutrition education and the availability of food supplements and foods selected for their nutritional and socio-economic interest.

SAREPTA is putting in place the scientific, human, logistical and financial resources to meet the challenge of marketing processed products of recognized quality, which can feed people, help them prevent disease or recover health.



#### DR. ALINE FLAURE TIENDREBEOGO

Specialties: Pharmacy, Para pharmacy, Dermocosmetics – Tips, “Health” line Training Engineering Vocational training

Aline will be responsible to create all kind of products from the goods produced on the Agroforestry area.

Special focus lies on Moringa.

## CLAUS BARTA

Claus studied business administration and has been working for more than 30 years on the connections between food quality, environmental protection, sustainable agriculture and the special healing power of plants.

About 25 years ago he read about *Moringa oleifera* for the first time and since then he has devoted much of his time to this plant.

For him, the quote from the charity Trees for Life, “These tiny leaves could save millions of lives,” is entirely true. *Moringa oleifera* has a unique

range of positive properties. No other plant can simultaneously improve health, combat hunger and economic hardship, protect the environment, clean water and produce fertilizers, pesticides, animal feed, biomass and energy. If you look at the vitality and nutrient density of the leaves, you can immediately see why *Moringa* is called “green diamonds”. It is therefore actually green footprints that are left behind when eating, disseminating information and growing.

## 7.6. Technical execution

### GI Grupa, Zagreb, Croatia

GI ([www.gin.hr](http://www.gin.hr)) was founded in 1989 and today is made up of three companies and provides services of Project Management, Contract Management, Design and Strategic planning.

The client base ranges from Government agencies in Croatia, worldwide funding institutions such as IBRD(world Bank), EBRD, EU and EIB, and a range of international corporations from China (BCEG, CCEC), Germany (Adidas)and UK (Carillon).

Project experience also stems from large infrastructure programme in South-east Europe, Port of Rijeka, Dubrovnik and Ploce and highway and viaduct projects throughout Croatia), strategic planning in Denmark (Orestaden - largest urban development in Europe in 1995), Russia (consultant to the government of Moscow for redevelopment strategy of south-East district of Moscow) and UK as well a collection of development programmes for Chinese corporations worldwide.

Andrew Yeoman, one of the directors has experience in Africa through projects with Philip Morris in Malawi and Tanzania and the petrochemical industry in Nigeria.



A1 Highway, Croatia



### ANDREW YEOMAN, RIBA. BA hons.Dip. Arch. DipAA (USSR)

Andrew Yeoman is the director of the Architects wing of GI Grupa ([www.gin.hr](http://www.gin.hr)) and heads up Strategic Planning, and Development Analysis. With over 30 years in the business, he brings a wide range of experience to the group as both a designer and project manager. Andrew has led teams in design, development and management on a series of large scale projects in Europe, Russia and USA. He has a broad experience in the delivery of complex projects with multiple partners and participants. Projects

have ranged from large scale land-fill programme, highway and road (including tunnels and bridges), capital scale strategy and development and specific urban developments.

Andrew and his team will be responsible for planning and managing of all infrastructure required in the Agroforestry areas, the development of settlement areas and all auxiliary facilities.



GI will provide strategic planning down to micro level assessments of particular development sites or planning issues. as follows:

- strategic & urban development planning
- master planning and urban design
- public consultation

#### PROJECT MONITORING AND PATHWAY SERVICES

GI will provide independent project monitoring service as a Lenders Consultant to review a project development to ensure the commercial objectives of a project are in line with the lending Institutions mandate. As follows:

- Compliance and quality of documentation
- Confirm project completion in accordance with the project requirements
- Identify issues of concern and potential financial and operational risks throughout the
- Project's operational phase.
- Provide operational audits with a comprehensive review, which include services focusing on the General state of the building/ asset.

GI will also provide a Pathway Assessment service of new projects either on behalf of sources of finance or potential partners in new joint venture developments. Part of this service can be in the actual preparation of documentation required for introducing new projects to potential partners and source of finance to taking a project owner through the process of contracting with banking or other financial institutions.

#### DEVELOPMENT ANALYSIS

GI will assist in shaping strategy, planning investment, exploring feasibility, assessing impact or addressing certain specific

technical needs, GI provides independent professional consultation to deliver analysis that carries value to bringing a project forward. This can include:

- feasibility reports
- business planning
- strategic policy making
- technical assessment
- operational planning
- environmental and sustainable assessment
- optimisation
- risk, reliability and safety management



Ørestad, Copenhagen Denmark

## 7.7. Health

Swiss Tropical and Public Health Institute,  
Basel Switzerland



### MANFRED ZAHORKA, MD, MPH, QM Auditor

is a Senior Public Health Expert, family physician, epidemiologist and project manager currently working at the Swiss Tropical and Public Health Institute (Swiss TPH) in Basel, Switzerland. Dr. Zahorka has worked for more than 30 years in development cooperation's in Sub-Saharan Africa, Central & Eastern Europe and Central Asia managing and evaluating health systems support projects in the area of maternal and child health with a focus on family health and community health systems, sexual and reproductive health as well as organizational development with a focus on quality assurance and quality management in health.

He continues to provide managerial and implementation support, training, supports operations research activities, conducts and supports quality assurance and quality management

processes at a systemic and institutional level.

He lived and worked for 10 years in West-Africa, mainly Benin and Gambia, and continues to manage and support public health programs in the East African Community (Rwanda, Burundi, Tanzania, East RDC since 2007), and Eastern Europe (since 2002). His present focus is on family health and integrated people centred care to address non-communicable diseases in Eastern European countries and the Balkans.

Manfred and his team will analyse the health system situation in and around the planned Agroforestry area and will implement a sustainable health system for the employees of the Agroforestry area as well as the local population.

With its service department, Swiss TPH acts as a health advisory, support and implementation agency for a variety of local, national and international funding bodies and clients. Further, Swiss TPH features a contract research organization that plans, assists and conducts clinical research trials for academic and non-academic clients, in particular, in low-resource countries.

For two decades, the Swiss TPH has been acting as an implementing agency for large-scale health sector support projects, for example in Tanzania, Burundi, Rwanda, Chad, Albania, Kosovo, Moldova, Tajikistan and Kyrgyzstan. In each country, these programs target several 100'000 people and contribute to substantial gains in life expectancy and a reduction of child mortality.

The idea of the cooperation with The Asjeba Group is to aim at the implementation of universal health coverage. This means that the entire population should have access to affordable, preventive and curative health services as well as health promotion according to their needs, and in sufficient quality. The second priority is to assess the impact of Agroforestry area work on the health of the workers (occupational health) and the communities around the Agroforestry area sites, as well as the specific needs of the Agroforestry area's workers regarding service delivery.

## 7.8. Business development

### Africa



#### RICARDO LUMENGO

Born in Angola, Mr. Lumengo has lived in Switzerland since 1982 and acquired the Swiss Nationality in 1997.

Mr. Lumengo studied law at the University of Fribourg, Switzerland and worked as lawyer in the field of international law and integration of foreigners and migrants. In 2004 he was elected as Member of the Council of the City of Biel / Bienne (Member of the Municipal Parliament), in 2006 he made his entry to the Grand-Conseil of the Canton of Bern (Member of the Regional Parliament) and in 2007 he was elected as Member of the National

Council (Member of the National Parliament of Switzerland).

Since 2014, Mr. Lumengo has been involved in and as of 2015 become a member of the Board of Directors of the Asjeba Group, that has the ultimate goal to establish agricultural projects in Africa to support sustainable development of rural areas.

Ricardo has been and will be responsible for future expansion in African countries.

## 7.9. Sustainability, Quality & Control, Investor Relations



### JOACHIM GANSE

was Director of Sustainability Services for KPMG from October 2010 to May 2017. He has also been Managing Director of KPMG Cert GmbH since 2011. Prior to joining KPMG, Mr. Ganse worked at Deloitte & Touche as Director of the Service Line “Extra Financial Issues”/“Corporate Responsibility & Sustainability”, Country Leader Climate Change & Sustainability Services as well as Managing Director of Deloitte Cert Umweltgutachter GmbH.

Previously, Mr. Ganse worked as Managing Director of Gerling Cert Umweltgutachter GmbH and as Managing Director of Gerling Sustainable Development Project GmbH, a venture capital company. Joachim Ganse has extensive experience in setting up and certifying Integrated Management Systems (IMS).

Joachim Ganse is an active member of various bodies such as the Environmental Committee of the Chamber of Commerce, the Emissions Trading Group at the BMU, the DIN Advisory Board on Standardization Issues “Fundamentals of Environmental Protection” as well as the Working Group on Energy and Environment and Green Economy of the International Chamber of Commerce (ICC). Joachim Ganse is the author and co-author of numerous publications

on the topics of eco-audit, environmental risks and environmental liability, occupational safety, certifications, etc.

#### Qualifications

Diploma engineer, University of Krefeld; Accredited auditor according to EMAS, ISO 9001, ISO 14001, ISO 45001, ISO 50001

#### Professional strengths

- Set up and certify integrated management systems

- Development of RM systems as well as monetization and KPI development in the SD area (Coaching C-area) Development and testing of international performance management systems (Environment, Safety, Quality and Health)
- Evaluation of companies based on performance indicators in e.g., due diligence projects (risks/opportunities) Selected projects
- Development of an integrated quality, environmental, occupational safety management system for an energy supply company.
- Accompanying a chemical park operator in the definition of core business processes including quality management and KPI's
- Testing of an integrated management system (quality, environment, energy and occupational safety) at a chemical company as part of the Global Risk Controlling system.
- Examination of various emission inventories on a statutory (EU-ETS) basis and voluntary

Joachim stands for transparency and communication of Asjeba's values and projects with investors in different sectors of the economy and civil society to make sustainable development and economics a global success story

## 7.10. Africa Continent

Philippus Karel Breytenbach (Flip),  
Pietermaritzburg, South Africa

Flip established Afrequip in 2006 and created a forward-thinking company that aims to provide role players in the African Forestry Industry with modern mobile equipment that out performs all other equipment! They are the leader in the Southern African region for Forestry Mechanization - offering both Consultancy and System Solutions backed by the World's Leading Brand Names such as Tigercat, Log Max, Morbark and CSI.

They provide equipment ranging from Feller Bunchers, Skidders, Harvesting Heads, Harvesters, Loaders, Forwarders, Biomass Grinders and Chippers to the African Market. Their Services include Sales, Maintenance, Product Support and all

relevant training courses designed and proven to enhance operator productivity. They are constantly increasing their base of Loyal Customers through Excellent Sales and Service Support.

Flip has visited over 100 Agroforestry areas in African countries over the last decade, know their management and quality of work and had to work out business plans for every piece of equipment offered. A lot of these Agroforestry area managers would like to become part of the Asjeba Group assisting in "building" Africa, because they believe in the Asjeba concept.

Flip is advisor for African related questions.

### Ghana



#### LUCY AKUA KYEREDE QUAINOO

Ms. Quainoo is a Global Goals Advocate and Consultant with over 19 years experience in the Development Sector specifically in the areas of Management, Entrepreneurship and Innovation, Investment Finance, Trade and International Business.

Lucy holds an MBA in International Business and Management from the Hanze University, Groningen, The Netherlands and an MA in International Business from the Anglia Ruskin University, UK. She also has a Bachelor in Entrepreneurship (First Class Honours) from the Greenhill College, GIMPA, Accra.

She is also a Leading member of EBAFOSA (Ecosystem based Adaptation for Food Security Assembly, Ghana a UNEP Voluntary organisation aimed at tackling Climate Change and Food Security issues).

She is currently the Director for External Relations and International Trade at MEL Consulting Ltd. A

Co-founder of Agribusiness Value Chain Federation, Ghana, MEL Business Solution Center and Shea Naturals , Ghana.

She is currently a member of the Advisory Board for the African Council for Organic and Sustainable Agriculture (ACOSA) as well as the the West African Chamber of Agribusiness and the Chamber of Agribusiness, Ghana. Digiext, Business Advisory Services Providers Association of Ghana (BASPAG) and Young Visionary Leaders Ghana and a Patron of Peace for Progress Alliance.

She won the Country (Ghana) and West African Award for CEO Global Magazine South Africa's Pan African Awards for the Most Influential Woman in Business and Government 2019/2020 in SMEs and Agriculture sectors. She is continental winner award for Africa in the SME sector in 2020.

Lucy will represent Asjeba on the Board of the local foundation on behalf of the local population and design future's strategy of the foundation.

## Nigeria



### GEORGIOS RADOGLOU

“Clean Energy Transition advocate – Circularity fanatic – Sustainability Pioneer – Mentor”. Senior Managing Executive with entrepreneurial spirit. Versatile in P&L / overall financial management. Pioneer & public speaker / lector in Sustainable Development, Energy, Environmental Sustainability, Supply Chain Management, Project Management, Environmental – Social – Health & Safety Governance, Security, Capacity development. Experience in multi-national organisations, integrating sustainability into planning & strategic positioning. Over 25 years’ experience, having worked for organisations across a wide range of industrial sectors including oil & gas, energy, chemical, power plant construction, mining, metal & general manufacturing. Working experience including sustainable projects in Tunisia, South France, Greece, Romania & West Africa. German chartered expert on Occupational Health & Safety for all industry branches (FASI BMAS accreditation).

Ten years’ experience in Greenfield project development from design to scale up phase of Renewable Energy projects (Photovoltaic, Geothermal Biomass & Heat pump technology, stand-alone on&off grid and/or building integrated). Fund & grants management, Investor relationship, public stakeholders, policy creation, licensing, O&M. Renewable Energy project development, Risk management, Energy resources management, Energy efficiency, Safety & Environmental due diligence & compliance auditing under all international standards (ISO 14001, 18001, 26001, 45001, 50001). Sector Team leader Covenant of Mayors Sub Saharan Africa – CoMSSA Clean energy transition initiative (September 2020)

Georgios will work out a franchise contract of the Asjeba concept for Nigeria

CLIMA-X provides platforms to achieve sustainable investment & business objectives by maximising:

- (social) investment returns
- sustainability and quality performance & rating
- Carbon offset whilst minimizing your Carbon footprint

In the context of a decarbonising world, being sustainable will be a prerequisite for a business to receive a license to operate and for an investment to be eligible for financing & grants.

This is where CLIMA-X starts. Experienced teams analyse the status of a new project or business and work on a consistent strategy to achieve full decarbonisation towards 2050.

This is achieved by setting up business that contributes to maintaining / restoring a balance with Nature.

CLIMA-X assists a project owner to:

- become a Leader in Sustainability & Innovation in their industry”, i.e. transforming to a new

“Corporation 2020” business paradigm, whilst cutting cost and increasing profit.

- compensate CO 2 emissions / Carbon footprint and
- achieve higher ratings in sustainability rankings.
- comply with all legal and stakeholder requirements with “Integrated (Inclusive ) P&L” <IP&L TM > reporting and be eligible for UN and World Bank / IFC programs.

CLIMA-X assists corporations to:

identify business opportunities, define priorities and accelerate action, & access financing.

Define methods of risk management

develop sustainable agendas, strategies and pathways with appropriate action plans and projects

## 8. Finance executive summary

### Overview

Finance is considered in main tranches:

- Start-up funding: circa \$3.0 million (refer to chart below)
- The main Agroforestry project development: in 2 tranches of \$60 & \$40 million respectively

The business plan forecasts entry into profitable revenue generation between years 3-4. At year 7, with a fully developed bio-infrastructure, an Agroforestry project of 75'000 hectares will produce about 8,000 tons of Ricinus oil, 40,000 tons of Moringa leaf powder, 4,000 tons of Jatropha oil, 4,000 tons of Acrocomia oil (pulp and kernel). Projected revenues will be about USD 160 Million for one Agroforestry project of 75'000 hectares, depending on the market price of the agricultural commodities and their processed products. As of year 14, production will be 40,000 tons moringa leaf powder, 13,000 tons of Jatropha oil and 33,000 tons of Acrocomia oil, generating approximately USD 180 million yearly incomes for the rest of the lifetime of the trees. The financial forecast is based on very conservative estimates and of one Agroforestry project only.

The project owners have initially focused on one Project for a detail Finance plan that demonstrates that Project can be viewed as an independent Finance Vehicle (SPV) for investment capital ( note: this document is further supported by more detail inputs which can be made available on request).

The project owners have however brought forward a summary overview of the larger and longer-term programme of projects (projects 1-7) which is the ultimate ambition for this business case.

Currently this programme has been considered as a roll-over model of capital transfer from preceding projects towards proceeding projects. However, the project owners are of the opinion that each project may also be considered as stand-alone SPVs or Business cases in their own right which would therefore require a Equity – Debt finance model taking capital gained from other projects as equity into each proceeding project and taking on additional debt finance.

Nonetheless, in the opinion of the project owners, both models provide positive IRR and NPV results with gains after the start of each project in years 6-7 of each project period.

The IRR and NPV figures in the summary indicate a more than positive outcome for the initial Capital Investment of €100,000,000.

Finance costs have been considered within a conservative level, but it would be expected to review this in more detail together with future funding sources.

#### Proposed Start-up Budget Asjeba in Diocese Techiman, Ghana

duration : estimated period: 4 - 6 months **Total cost €**

Management total fees (6 persons)	540,000
Flights Europe, Ghana, South Africa	162,000
Accommodation	98,400
Local travel	33,000
Main Feasibility & Market Appraisal	500,000
Environmental, Social & Health Impact Assessment	480,000
Land survey (terrain & soil sample)	135,000
Safety and Security Audit	90,000
Obtaining approvals by local staff	90,000
Comm/Mediation w. local people	90,000
Legal Compliance and contracts	90,000
Tax and auditing	60,000
<i>Industrial zone negotiation</i>	<i>60,000</i>
Outline Design of plantations, infrastructure & facilities/settlements	120,000
Business plan Revision	252,000
Incidental Costs	57,510
<b>total</b>	<b>2,857,910</b>
Contingency	142,090
<b>total</b>	<b>3,000,000</b>

## Gain and Value

It is anticipated that the performance of Project 1 will provide the capital to start Project 2 between Year 10 and 11 of its operation. Any capital transfer would only be implemented on completion of managing the original investment for Project 1 (currently anticipated at €100,000,000) and would be sequentially added to for proceeding projects as and when free cash-flow becomes available.

As each project develops and revenues generated from the harvests profit will be assessed when a certain volume of net value is anticipated. Approximately 50% of the project's profit can be allocated thereafter for Social Support Projects according to an agreed schedule with the local parties. It should be stressed that this concept will also be dependent on the Finance model agreed with any incoming investors.

## Social Support Investments (SSI)

As set out in the Asjeba manifest profit gained by each Agroforestry project will be used to:

- A: re-invest into the Plantation business itself and
- B: provide investment in Social Support projects across the country.

Our goal is to create an ecosystem which provides the foundation for new businesses, new jobs and an increase in local productivity, and which quickly develops into broad array of further opportunities in the areas of education, health, farm support and much more.

We believe that the most efficient and effective way to reach this goal is by facilitating a commercially viable project, which offers the local population an individual, sustainable, and attractive long-term economic growth perspective – for themselves as well as for generations to come.

In our programs we see the following direct individual benefits:

- secure jobs,
- housing,
- access to fresh water,
- food and sanitation,
- access to social welfare,
- access to energy,
- long-term possibility to acquire farming expertise with an aim to build small individually owned farms,
- the opportunity to be part of a stable and well-working community, etc.

We believe the programs we are planning to put in place will have the most lasting effect in the combination of education and the out-grower scheme planned to kick off after a few years.

The out-grower scheme we are planning to encourage will co-ordinate commercial relations between dedicated individuals (or groups of farmers), processors, and end-users through long term purchase contracts, leading to a vertical integration of the agricultural value chain and direct access to various market worldwide.

We are aware of the fact that these smallholder-based contract farming schemes are not easily implemented and may take time to set-up and to run successfully. However, the long-term interest of the Agroforestry project in the well-being of its employees represents an extraordinarily promising starting point for the development and long-term implementation of the out-grower scheme.





## Carbon credits

Summary AR estimations (Jatropha & Acrocomia) by South Pole (June 22, 2022) Total Carbon with 20% Buffer discount + 10% Leakage tCO <sub>2</sub> e/year												
Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	1 - 30+ years total
50,208	100,417	150,625	200,834	251,042	301,250	351,459	401,667	401,667	401,667	401,667	401,667	9,439,177

This summary reflects only the biomass stored into the ground for Jatropha and Acrocomia. The zero CO<sub>2</sub> balance of the generated vegetable oil in comparison to fossil oil has not been included, neither have all the other elements of the agroforestry project; for example: cover crop sequestration, renewable energy powerplants, Ecovillages, the use of synthetic fuel for all vehicles, generators etc. owned by the SPV.

### IHS Markit Carbon index demonstrating historic growth



The above chart serves as an overview of the Carbon Credit Market (CCM) price index globally, showing the steady rise over the last decade. CDM projects in Africa have been growing over the last decade but still full short of that in say the ETS market. After years of steady if slow growth, there are clear signs that the African carbon market is starting to take off. • There are 234 projects either registered or under validation in Africa. • Over US \$4.5 billion has been invested in registered African CDM projects to date. • At the same time, the timely issuance of credits from already registered

projects has been lagging in Africa. This may be related to capacity limitations and financing gaps to get CDM projects to financial close. • Four out of every fifth multi-country CDM "program of activity" is hosted in Africa.

The Asjeba project is part of the new vanguard to accelerate the CCM in Africa.

GLOBAL INITIATIVE FOR RESTORATION OF DEGRADED SOILS  
THE UN DECADE OF RESTORATION  
ASJEB A PROJECT SUMMARY DECEMBER 2022



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