

WAMI RIVER RANCH

Moringa Oil



A SUSTAINABLE MORINGA OIL PROCESSING PROJECT IN TANZANIA WITH SMALLHOLDER VILLAGE FARMERS





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1. EXECUTIVE SUMMARY

J.T. Ranching Company is developing a Moringa Oil extraction plant on their farm, Wami River Ranch, to supply cold-pressed moringa oil to the food, cosmetic and perfume industries. The company is growing organic moringa trees for their oil, and is developing a Moringa Tree out-growers programme with neighbouring smallholding farmers. This will increase the supply of moringa seeds to the factory, and assist the villagers with marketing their seeds at over four times the price they are currently getting.

The moringa tree has a unique range of properties that have led to it being called the “miracle tree.” The leaves contain phenomenal nutritional properties that are being used to combat malnutrition in poverty-stricken countries, and as a superfood supplement in the developed world. Medical practitioners are exploring its use in the prevention of cancer, and alternative energy companies have developed a process to produce biofuels from the seeds.

The nutritional and medicinal benefits of moringa are undisputable, but the use in cosmetics of the essential oil extracted from moringa seeds dates back centuries. The moringa tree was highly valued in the ancient world, with the Romans, Greeks and Egyptians extracting the oil from moringa seeds for use with perfumes and lotions.

Although using the same species of moringa tree, the cultivation for oil and for leaf production differs greatly. For oil production, which the company is focusing on, the trees are grown to maturity and produce seeds from between one year old to 25 years old. For leaf production the trees are planted with very close spacing and grown as a bush which is coppiced bi-annually as the leaves are harvested, and replanted every one to two years.

Wami River Ranch has elected to cultivate the moringa tree purely for its oil content as the worldwide demand for the oil has steadily increased for decades. The company is providing a cash income-earning opportunity to its smallholder neighbours where previously there has been little or no cash income, thereby helping to improve standards of living and the ability to purchase more and better quality food.

Wami River Ranch has several distinct advantages that make it well positioned to process high-quality, organic moringa oil for a significant export and domestic market, and to expand a local out-growers programme to complement its own moringa plantations:

- **Proximity to Dar es Salaam:** The commercial capital has both an international shipping port and an international airport. Wami River Ranch is only 150 km from Dar es Salaam.
- **Potential for organic certification:** Organic moringa oil fetches a premium price in both the food and cosmetics categories. Wami River Ranch is virgin land that has never been cultivated and thus has not been exposed to chemical inputs; and the traditional village growers lack the money for expensive chemical inputs. This means a much shorter time for organic certification to be awarded, as opposed to the usual five or six years for land treated with chemical fertilizers, herbicides and insecticides.
- **Out-growers of smallholder village farmers:** There is a worldwide customer preference in the developed world for products grown by small-scale or smallholder farmers, producing under fair trade conditions. Wami River Ranch is actively promoting neighbouring villagers to be part of the moringa out-growers scheme, supplying them with tree seedlings and buying their produce at over four times the current market value. Fair Trade Certification is being sought.
- **No direct competition with food crops:** The moringa tree grows in marginal soil with little attention or water needed to survive. It has no direct competition with food crops or farmland as it is both an edible source of food and livestock feed, and can be used in intercropping schemes where the moringa tree provides crop protection as a windbreak and living fence. The tree foliage is wispy and thin and thus the level of semi-shade cast over crops is beneficially cooling rather than a hindrance to sunlight for crop growth.

2. GOALS OF THE MORINGA PROJECT

- a. **Development of out-growers scheme:** In 2001/2002 Smallholder farmers in the neighbouring village were given seedlings and encouraged to grow moringa trees by an international organisation. Sadly, the project fizzled out, perhaps due to lack of funding or lack of on-the-ground management once the organisers left Tanzania. However, the smallholders still own an average of 8 trees each that are producing an average yield of 0.9 kg seed per tree. Currently the villagers are offered TZS1,200 per kg for seed by middlemen buyers, which amounts to an average earning of TZS8,640 per farmer twice per year – not an incentivising income that any of the villagers find encouraging. Wami River Ranch aims to more than double the number of trees per smallholder farmer, increase their yields to a minimum of 2 kg per tree, and to offer them up to TZS5,000 per kg for seed. This is potentially 24% of the GDP per capita of Tanzanians for each farmer.
- b. **Smallholder farmers' current situation:** At present, most of these smallholders are subsistence farmers, and their cash income-generating activities are minimal or non-existent. They farm maize (their staple diet) during the rainy season and a few individuals farm sesame seed (very bad for soils) for cash. Because Moringa Trees can be farmed in conjunction with maize, and also aid in redressing the problem of deforestation, it is the ideal cash crop for these smallholder farmers.
- c. **Production:** The cultivation of moringa trees needs to be expanded to achieve economies of scale in the production of moringa seeds both on-farm and with the already existing smallholder village farmers. Viable, clean and disease free seedlings will be produced in the Wami River Ranch tree nursery and sold to village farmers at cost. The on-farm moringa plantation will be increased from 3 hectares to 10 hectares within the next year. There are potentially 1,250 village farmers in the area of the farm that can potentially or are already growing moringa trees.
- d. **Nutrition:** Moringa trees grown for seed production are not used for food. However, the cash generated from the harvesting of the moringa seeds can be used to purchase better and more food, thereby improving the nutritional standards of the smallholder farmers.
- e. **Yields:** Wami River Ranch will move to simple irrigation for their moringa plantations to improve yields and double harvesting times per year. Smallholder yields will be increased through education and training programmes to encourage improved farming techniques. Yields of 4kg of seeds per tree are the average that is being aimed for on-farm, and an average of a minimum of 2kg of seeds per tree is aimed at for smallholder village farmers.
- f. **Training:** will be conducted on the farm by the Taylors and in conjunction with the government farm agronomists in the villages. The company already has a successful "farm school" for increasing and improving vegetable production by smallholder farmers. This platform can be expanded to include moringa cultivation.
- g. **Processing:** The Company will build a small processing plant on-farm to cold-press the moringa seeds to produce moringa oil (also known as Benoil). The plant will be operated to a high hygienic standard to meet international market requirements. Both the farm's and the smallholders' production of moringa seeds will be processed for the moringa oil at the plant.
- h. **Commercialisation: Export markets:** The Company will undertake the selling of the moringa oil to international food and cosmetic companies. Early approaches to a few international companies have been favourable. At the time of this document writing, a small oil press has been imported to Tanzania and sample oil pressings have been delivered to SGS Tanzania (an International Agricultural/ Food Analysis Laboratory) and the TFDA (Tanzania Food & Drug Administration). These analyses are necessary to gain entry into the EU and American markets.
- i. **Commercialisation: Domestic market:** Wami River Ranch has participated in two Farmers' Markets in Dar es Salaam. The company is looking into the viability of producing a small range of organic skincare products with Moringa Oil as the primary ingredient.





3. COMPANY DESCRIPTION

J.T. Ranching Company Ltd. is a registered limited liability company incorporated in Tanzania. The company is unencumbered and owns a 98-year Derivative Title from the Tanzanian Investment Centre for a 2,000-hectare (5,000-acre) farm property, called the Wami River Ranch, where the cold-press moringa oil factory will be built, and where the farm's moringa plantations are.

Majority shareholders and Directors, Jonathan and Lynn Taylor, reside on the property and manage the farm. They are developing the farm into a large commercial mixed farm, implementing an integrated farming system of livestock, crops, fruit and vegetable production.

Jonathan Taylor has applied for Tanzanian Citizenship, which should be achieved by mid 2018.

J.T. Ranching Company Ltd. and Wami River Ranch are registered with the Tanzanian Investment Centre. This certification brings with it a guarantee from the World Bank under the MIGA agreement (Multilateral Investment Guarantees Agency).

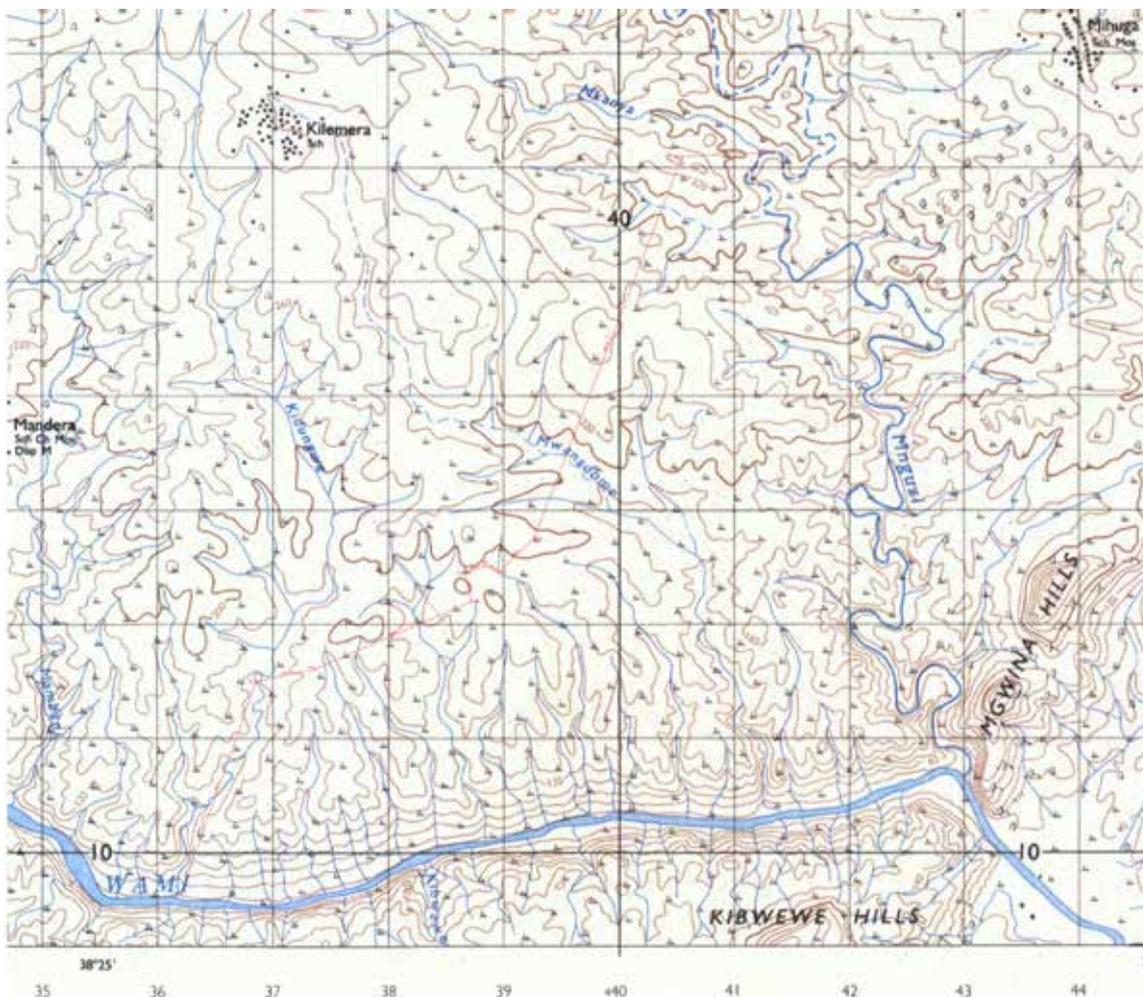
WAMI RIVER RANCH MORINGA PLANTATION

The Company currently has the following moringa trees growing on the property:

- 1 hectare of 19-month old trees (producing)
- 2 hectares of 10-month old trees (starting to produce)
- 2 hectares new tree seedlings planted out September 2018

The company intends to expand the moringa plantation on Wami River Ranch to 10 hectares within the next year.





4. MORINGA OIL PROCESSING PLANT

J.T. Ranching Company is currently building a small factory, which will be finished and fitted to European Union sanitary requirements, in order to process both on-farm moringa seeds and those of surrounding smallholder village farmers.

Currently, and with a small domestic press, the company can produce up to 2 litres of oil per day from 15 kg of unshelled seed. This then takes 2 weeks to manually settle and filter the oil.

With the new machinery the company is importing, the company will be able to process up to 20 litres of oil per hour.

The machines and equipment that the company has ordered is as follows:

- Dehulling machine
- Cold Press Oil Extraction machine
- Filtering machine
- Brackets/spares/specialized oil for the machines
- Packaging and glass bottles for the oil

The plant will grow to be fully utilised through three expansions in the harvest of seeds:

- The company will expand its own plantation to 10 hectares by the end of the first year.
- The company has already started expanding the smallholder village outgrowers capacity by providing viable tree seedlings to the farmers, and helping them to increase their yields through simple improvements to their current farming methods such as using waste water to irrigate their trees, and adding farm animal manure to fertilise them.
- The company will seek to expand their outgrowers reach into other villages in the region.





5. SMALLHOLDER VILLAGE FARMERS: OUT-GROWERS PROJECT

An out-growers scheme is being developed to both complement and increase the supply of moringa seeds for the processing plant, as well as to provide a new and increased source of income for our neighbouring villagers.

Tanzania has the 5th fastest deforestation rate in the world with smallholder farmers often feeding directly into a negative cycle of environmental degradation through their current agricultural practices of slash-and-burn. By providing smallholder farmers with sufficient incentive to incorporate productive tree crops with their existing crops, Wami River Ranch will help smallholder farmers restore tree cover, increase their annual cash income and improve their livelihoods.

The Ward (local Government entity) surrounding the farm comprises six (6) villages. The population of this area is approximately 7,500 people. There are approximately 1,250 smallholder farmers that could potentially join the out-growers scheme.

The company has undertaken a survey of a small number of these farmers (150 farmers) and the response has been an overwhelming interest in joining the out-growers scheme.

All of the 150 farmers surveyed already grow from between 1–40 moringa trees, with an average of eight trees per farmer. Their yields are very low - 0.970 kg seed per tree, and the price they currently get from middlemen buyers is TZS 1,200 per kg.

This extremely low price could be the reason for the villagers' lack of incentive to either increase their moringa plantings, or obtain higher yields through better cultivation practices. Currently, all of the farmers interviewed pay their moringa trees absolutely no attention, leaving them completely to nature, and only harvesting whatever pods happen to be on the trees when the buyers come around infrequently.

The Wami River Ranch out-growers scheme will generate jobs and reduce poverty in the rural, undeveloped areas surrounding the farm. Small-scale producers will move from income insecurity and poverty to economic self-sufficiency.

Wami River Ranch will provide farm inputs and agricultural training to all small-scale farmers and ensure a consistent, growing demand for the moringa oil through aggressive marketing both in Tanzania and internationally.

Wami River Ranch will be giving the small-scale farmers a more than fair price for their moringa seed that has been agreed upon by both parties. The company will pay cash for the out-growers' seed and will pay an equal price to all farmers, whether they are male or female.



Wami River Ranch is developing an out-growers scheme in several ways:

- The company is expanding the on-farm nursery to produce viable, pest and disease-free moringa tree seedlings, for sale to the smallholder farmers at cost.
- Each farmer who is a member of the out-growers scheme will be encouraged to increase his moringa plantation to a minimum of 20 trees.
- Where necessary, the cost of the tree seedlings will be offset against future smallholder farmers' harvests.
- Training and education sessions will be held for member farmers' to introduce best farming practice and increase yields for the farmers.
- The company is incentivising farmers to join the scheme and cultivate moringa trees through buying their seed at TZS5,000 per kg.

6. BUILDING SUPPLIER CAPACITY

Through improvements in farming techniques, Wami River Ranch is increasing moringa seed yields for both the out-grower village farmers and the on-farm plantation. The company will improve harvesting and storage processes and enhance logistic efficiencies so that the maximum oil yield is achieved from all moringa seeds grown and purchased.

By amalgamating the small-scale farmers' production with the on-farm production, Wami River Ranch is able to give the small-scale farmers a predictable price for small-scale supply.

By increasing the supply capacity of the small-holder village farmers and the on-farm production, the company will ensure increased incomes for all participating farmers. The project will be sustainably managed using energy efficient technologies, while minimising the environmental impact through utilization of waste streams such as the press cake for livestock feed.



7. FARM LABOUR

Wami River Ranch currently employs 41 full-time farm workers from the neighbouring and surrounding villages.

The company promotes a safe and healthy working environment that is free of exploitative practices, harassment and discrimination. It complies with all national and local laws as well as International Labour Organisation conventions on health and safety, working conditions and labour laws.

8. PRODUCT: ABOUT THE MORINGA

Moringa Oleifera is a species of moringa tree that can be found all over the sub-tropical and tropical regions of Tanzania. Originally native to Northern India, Pakistan, Bangladesh and Afghanistan, the moringa tree is now naturalised in many parts of Africa and elsewhere in the world.

The moringa tree is highly resilient and has very low requirements in terms of nutrients, water and management, making it possible to grow moringa even on marginalised soils. The tree grows very fast, is easy to propagate and is resistant to drought, diseases and pests.





9. MORINGA OIL

Moringa oil is cold-pressed from mature moringa seeds yielding an odourless, brilliant yellow oil with a slightly nutty, bitter flavour.

Although highly nutritious, unrefined pure Moringa oil is completely unpalatable to humans as it has a bitter taste. The company has no plans to invest in a refining plant as such a plant would be extremely expensive and once refined, the oil would lose much of the potency of its active ingredients.

Moringa oil is highly coveted by international cosmetic companies for its excellent properties as an ingredient in fragrance and skin care products. Due to its high levels of oleic acid, moringa oil absorbs rapidly into the skin, moisturising it and providing it with important antioxidant nutrients with rejuvenating qualities. The Body Shop, Garnier and Redkin are just a few of the mainstream companies that have recently launched various product lines containing moringa oil.

Moringa oil has a high-quality fatty acid composition that gives it a notable resistance to oxidative degradation – in other words it doesn't go rancid, so has an enduring shelf life.

Processed moringa oil is odourless but has the ability to absorb and retain even the most volatile scents – hugely important for perfume manufacturers that employ the enfleurage process.

Finally, moringa oil contains antiseptic and anti-inflammatory properties that help heal minor skin complaints.

10. COLD PRESS Vs SOLVENT EXTRACTION

The oil obtained by cold pressure extraction is higher in viscosity and acidity than that obtained by solvent extraction; and the waste by-product is a press cake that is highly nutritious for stock feed.

Solvent extraction leaves inedible press cake and chemicals that would require specialised disposal, which is why the company has chosen not to use this method for extraction.

Furthermore, cold-pressed moringa oil has a higher market value than that obtained with heat.

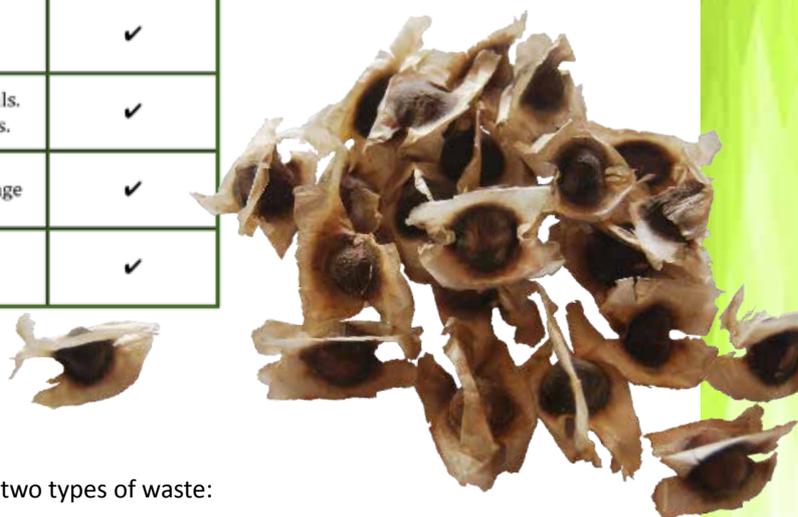


ECOLOGICAL BONUS OF THE WAMI RIVER RANCH MORINGA PROJECT

Tanzania is currently ranked as having the fifth fastest deforestation crisis in the world. By planting moringa trees, and encouraging and enabling smallholder farmers to see real-time cash benefits from planting and expanding tree plantations, the company is making a quantifiable, sustainable difference to the ecology of the area.

ECOLOGICAL REQUIREMENTS FOR MORINGA

REQUIREMENT	OPTIMAL RANGE	COMMENTS	WAMI RIVER RANCH MEETS REQUIREMENTS
Climate	Tropical or Sub-tropical	Likes high solar radiation	✓
Altitude (m)	0 – 600 metres	Likes lower elevations but can grow in up to 2,000 metres	✓
Temperature (°C)	20° - 35°	Likes high average daily temperature. Growth slows significantly below 20°C	✓
Rainfall (mm)	700 – 2,000 mm	Likes well distributed annual rainfall	✓
Soil Type	Loamy, sandy, sandy-loam	Likes well-drained soils. Does not like clay soils.	✓
Soil pH	5.5 - 7	Likes a neutral pH range	✓
Soil Salinity	Low (<4 dS/m)		✓



11. MORINGA COLD-PRESS WASTE

After extracting the moringa oil through cold-pressing, there are two types of waste:

1. Press cake, which comprises 61% protein.
2. Pod Shells, which are used for mulching trees and other crops.

The company has sent some of this press cake to a research laboratory in South Africa to establish what process would make the high-protein press-cake can be best utilised in animal feeds.

The moringa press cake can also be used as a protein rich plant fertilizer and as a rich nitrogen complement for crops.

Wami River Ranch intends to use the moringa press cake that is produced at the processing factory as a supplementary animal feed for its cattle and free-range chickens, and have undertaken research with a South African Livestock Laboratory into how best to do this.

12. MARKET ANALYSIS

The current volume of moringa sold internationally is not sufficient to qualify it as a commodity on the global market, and hence the trade statistics for moringa products are only available in an aggregated form. The global market for moringa products is considered substantial, however, with current estimates of over US\$4 billion a year (CJP, 2013).

While moringa is used for a wide variety of purposes, the company will be focusing on moringa oil as an ingredient for cosmetic products. Moringa oil has consistently been in use for centuries, and over the past decade – where natural products have experienced strong growth – demand for moringa oil has been growing.





This demand is mainly driven by consumers in developed economies (particularly the US and the EU), who are increasingly seeking out dietary supplements and cosmetics derived from natural sources, using fair trade practices and cultivated in a sustainable manner. The moringa oil produced by the company meets all of these requirements.

- Wami River Ranch is growing its moringa trees to organic certification standards
- The smallholder farmers engaged in the Wami River Ranch out-growers programme are already growing organically as they cannot afford costly chemical fertilizers and pesticides
- Wami River Ranch will be contracting with their smallholder farming neighbours to purchase their moringa seed at a fair price (over four times the price they are currently receiving)
- Wami River Ranch will be assisting their smallholder farming neighbours to expand their moringa orchards with viable, clean and disease-free moringa tree seedlings at cost, and will help to improve their yields through best-practice farming techniques
- The moringa trees, whether on-farm or grown on smallholder farms, are not in direct competition with food crops. They are being grown as intercrop trees to provide windbreaks and/or partial shade to more vulnerable crops, or being planted on marginal soils that cannot support other crops.
- The moringa trees are being planted in open areas that have already experienced deforestation, thus helping to reverse soil erosion and restore tree cover.



THE MULTIPLE USES OF MORINGA

- **NUTRITIONAL SUPPLEMENT:** fresh and dried leaves are a source of:
 - Highly digestible protein
 - High levels of vitamins (incl. Vit C, A)
 - High levels of minerals (incl. iron, calcium, potassium)
 - High levels of amino-acids (incl. carotenoids)
- **HIGH GRADE OIL:** seeds
 - Used in cosmetic products (base oil for perfumes, body care)
 - High quality, food-grade vegetable oil
 - Lubrication of fine machines
- **WATER PURIFICATION:** seed cake
 - Can be used to replace alum ...
- **MEDICINE:** all plant parts
- **BIO FUEL:** biogas & biodiesel gained from leaves and seeds
- **AGRICULTURAL USES:**
 - Animal feed stock (leaves and treated seed cake)
 - Biomass production (alley cropping)
 - Bio-pesticide (soil incorporation of leaves to prevent seedling damping off)
 - Fencing (living trees)
 - Fertilizer (seed cake)
 - Foliar Nutrient (juice expressed from the leaves)
 - Green manure (from leaves)
- **OTHER USES:**
 - Domestic cleaning agent (crushed leaves)
 - Blue dye (wood)
 - Gum (from tree trunks)
 - Honey and sugar cane juice clarifier (powdered seeds)
 - Honey (flower nectar)
 - Pulp (wood)
 - Rope (bark)
 - Tannin for tanning hides (bark and gum)

13. MARKETING STRATEGY

The company has already contacted a few European moringa oil buyers in the cosmetics industries. The interest has been immediate, and requests for samples and laboratory analyses were made.

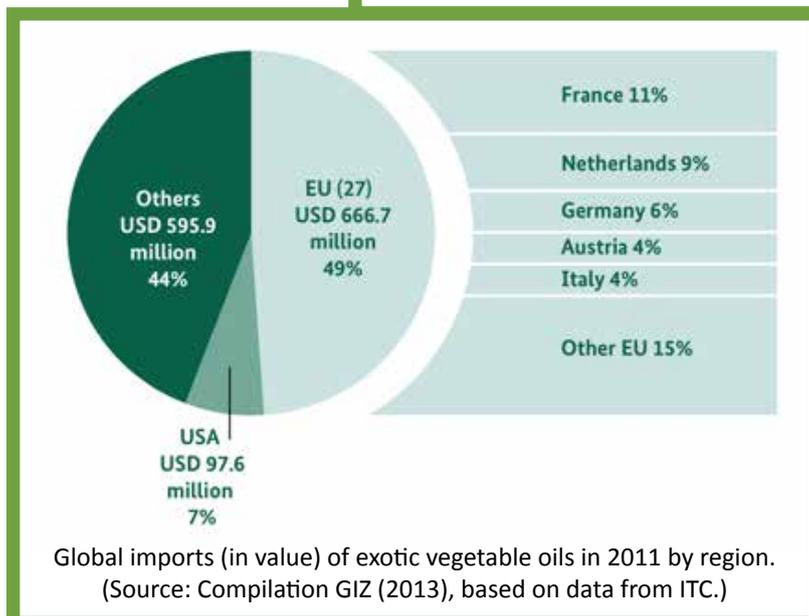
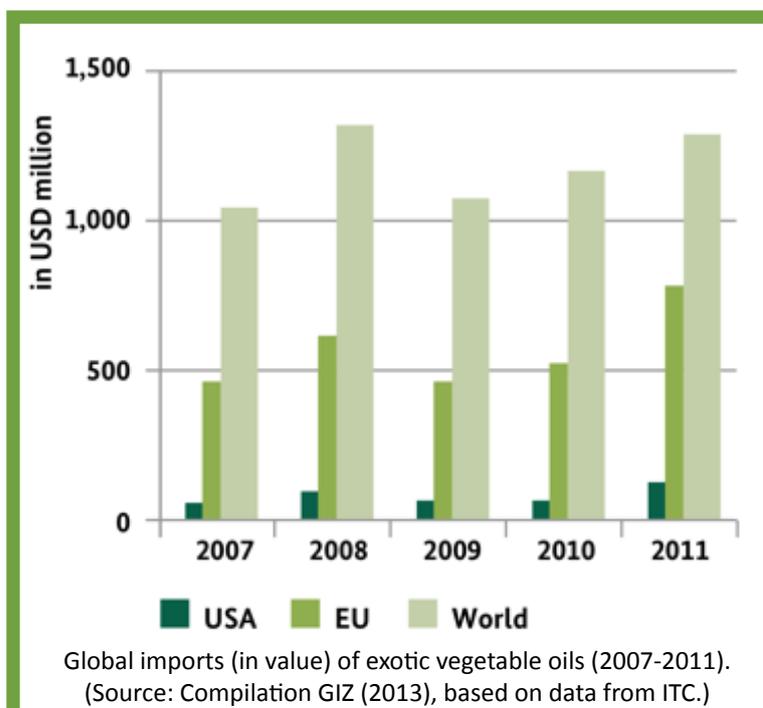
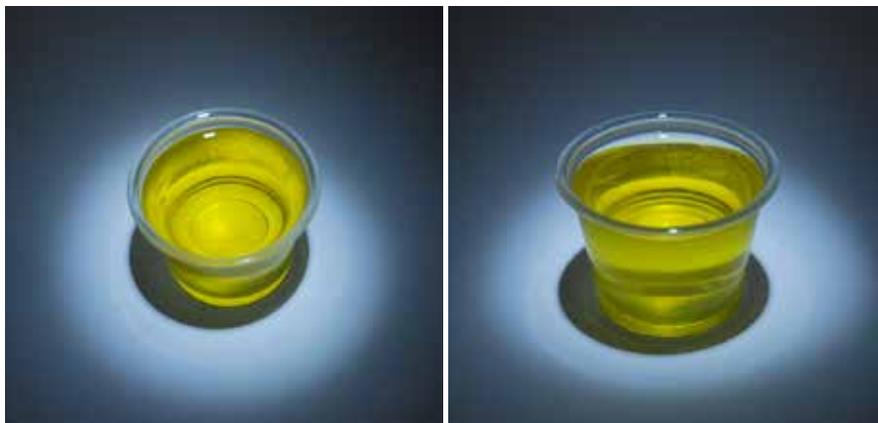
The company has purchased the equipment to fit their Moringa Oil Press Plant which will have the capacity to produce 20 litres of oil per hour.

The company has begun extracting and filtering moringa oil from both the on-farm trees, and from seed purchased from the smallholder village farmers. A sample has been given to SGS Tanzania and to the TFDA laboratory for analysis. This analysis and samples of the moringa oil will be sent to the

cosmetic companies already contacted, as well as a short list of other similar companies with an interest or product line using moringa oil.

Follow up visits in person to these cosmetic houses/moringa oil buyers may be made, with attendance at trade shows such as Vitafoods, In-Cosmetics, Flavorcon and the World Perfumery Congress to be considered.

Moringa Oil could potentially become a key export product for Tanzania.





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