Opportunities for Zambian moringa

Commissioned by the Netherlands Enterprise Agency
Opportunities for Zambian moringa
Feasibility of producing moringa in Zambia for export to the Netherlands

ABSTRACT
A study on European market potential of moringa and opportunities for the growing number of commercial moringa suppliers in Zambia

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Summary

Moringa products are relatively new products on the Dutch and other European markets. Only few buyers already know moringa. Over the next years, this situation is likely to change as many companies from different countries are promoting moringa in Europe. They are making use of the opportunities offered by the growing European market for ‘superfoods’ (moringa leaf powder) and exotic vegetable oils for natural cosmetics (moringa seed oil). Teas (moringa leaves), fresh and preserved vegetables (moringa pods) and animal feed (moringa leaf powder and seed cake) may provide additional market opportunities.

The size of the current European market for moringa is still very limited. Total exports from leading supplier India to the world amounted to €2 million in 2015. The USA is the leading import market with Europe often following the trends in the USA. Within Europe, the United Kingdom and Germany are among the leading markets. The Netherlands is following trends in these markets and is still a small player in global moringa trade. Total imports by the Netherlands were estimated at less than 50 tonnes in 2017. Most of these imports are re-exported to other European markets. European moringa imports from Zambia are still insignificant.

As is common in markets for new healthy food products, the current range of moringa leaf products in the Netherlands is limited to typical food supplements. Companies mostly offer leaf powder and to a lesser extent capsules. New Product Development in other European countries will stimulate sales of moringa in the next years. Breakfast cereals, smoothies, nutritional shakes, snack bars and soups are particularly promising consumer applications for moringa leaf powder.

Cosmetics manufacturers in Europe consider moringa seed oil as an exotic ingredient. They are using moringa oil mostly in creams and lotions for skin conditioning and shampoos for hair conditioning.

Zambian moringa suppliers can only benefit from opportunities in the European market if they can provide a globally competitive offer. First of all, this will require leaf powder suppliers to comply with European food safety standards. Other major buyer requirements are related to colour and taste of leaf powder, chemical composition of seed oil, quality consistency and prices. Organic certification offers a major opportunity for Zambian suppliers to avoid direct competition on price with Indian suppliers.

The feasibility of exporting moringa products from Zambia to Europe depends on the success of Zambian companies in addressing several challenges in production and processing of moringa. Many Zambian companies lack essential knowledge on producing and processing moringa in compliance with European quality standards. Particularly access to knowledge on food safety management in out-grower schemes and knowledge on organic moringa farming is limited. Lack of access to capital constrains the necessary investments in scaling-up, certification of food safety management and organic farming, and export promotion.

Zambian moringa companies will need support from other stakeholders in their value chain to overcome their challenges:

- NGOs, farmer associations and MDAZ can support establishment of out-grower schemes and training of out-growers in cooperation with companies.
- ZABS can stimulate the improvement of quality by establishing a standard for moringa and providing reliable testing services. This may require additional accreditation.
- The Ministry of Agriculture can help to create an enabling environment for moringa exports by providing efficient procedures for assessing conformity to food safety standards.
- ZDA and CEEC can promote investments in moringa companies.
• ProFound can organize trade fair participation by moringa exporters with facilitation by ZDA.
• MDAZ will require capacity building to represent moringa companies effectively in discussions with the Ministry of Agriculture and other government institutions such as ZDA.

Before trying to enter the demanding European market, Zambian companies are recommended to develop their value chains in cooperation with above stakeholders. In the meantime, they can benefit from strong demand for moringa products in Zambia and South Africa.
1. Introduction
Consumers in the Dutch market are very interested in food supplements and other health foods. Many of the ingredients for food supplements and health foods including moringa are not produced in Europe and have to be imported from other countries.

In Zambia, many farmers are considering to grow moringa for sale on the local market and for exports. They will grow moringa to generate income and for nutrition security. The documentary about moringa in Zambia of the Zambia National Broadcasting Company (ZNBC) shows the actual interest in Zambia.

As moringa is a relatively new product on the European market and Zambia does not yet export significant quantities of moringa, both European buyers and Zambian suppliers need detailed information about the feasibility of developing successful moringa exports to the European market.

In addition, Dutch investors, consultancies and NGOs with an interest in supporting development of the Zambian moringa value chain could also benefit from such information.

In response to these information needs, the Dutch Enterprise Agency (RVO) commissioned this study which aims to promote trade and investment between Zambia and the Netherlands. The study was conducted by ProFound, which is specialized in trade promotion for natural ingredients.
2. Product definition

*Moringa oleifera* (synonym: *Moringa pterygosperma*) is indigenous to the sub-Himalayan regions of northern India and Pakistan. The plant is now distributed across tropical zones in Africa, Asia, the Pacific and Caribbean Islands, and South America. Besides being cultivated, the tree has also become naturalised in the wild in many areas of the world.

<table>
<thead>
<tr>
<th>Table 1: Classifications of moringa products</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Moringa leaf powder</strong></td>
</tr>
<tr>
<td>Harmonised System</td>
</tr>
<tr>
<td><strong>Moringa seed oil</strong></td>
</tr>
<tr>
<td>CAS no.</td>
</tr>
<tr>
<td>European Community Number</td>
</tr>
<tr>
<td>Harmonised System</td>
</tr>
<tr>
<td><strong>Moringa pods</strong></td>
</tr>
<tr>
<td>Harmonised System</td>
</tr>
<tr>
<td><strong>Moringa extract</strong></td>
</tr>
<tr>
<td>CAS no.</td>
</tr>
<tr>
<td>European Community Number</td>
</tr>
<tr>
<td>Harmonised System</td>
</tr>
</tbody>
</table>
3. Potential uses of moringa worldwide
The moringa tree produces several products with multiple uses.

Table 2: Potential uses of moringa worldwide including uses which are not allowed in the Netherlands

<table>
<thead>
<tr>
<th>Part of tree</th>
<th>Processing method</th>
<th>Product</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leaves</td>
<td>No processing</td>
<td>Fresh leaves</td>
<td>Vegetables</td>
</tr>
<tr>
<td></td>
<td>Drying</td>
<td>Dried leaves</td>
<td>Herbal tea</td>
</tr>
<tr>
<td></td>
<td>Pulverisation (i.e. grinding) of dried leaves and sieving</td>
<td>Leaf powder</td>
<td>Health products (incl. food supplements and fortified foods)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Herbal tea</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cosmetics</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Plant growth enhancers</td>
</tr>
<tr>
<td>Roots</td>
<td>Drying, pulverisation (i.e. grinding) and sieving</td>
<td>Root powder</td>
<td>Culinary herb (i.e. seasoning for foods)</td>
</tr>
<tr>
<td>Young pods (also known as drum sticks)</td>
<td>No processing or drying and pulverisation (i.e. grinding)</td>
<td>Fresh or dried pods</td>
<td>Vegetables for consumption</td>
</tr>
<tr>
<td>Seeds</td>
<td>De-husking of seeds</td>
<td>Seed shells (i.e. husks)</td>
<td>Biofuel</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Seed kernels</td>
<td>Raw material for further processing</td>
</tr>
<tr>
<td>Seed kernels</td>
<td>Cold-pressing</td>
<td>Seed oil (also called Behen or Ben oil)</td>
<td>Cosmetics (e.g. soaps, body lotions, facemasks, shower gels and pre-shampoo hair cleansers)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Vegetable oil for food</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Seed meal / oil cake</td>
<td>Animal feed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fertilizer</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Coagulant for water purification</td>
</tr>
<tr>
<td>Exudate from bark</td>
<td>No processing other than cleaning</td>
<td>Gum resin</td>
<td>Hydrocolloid for different applications</td>
</tr>
</tbody>
</table>
3.1. Uses in cosmetics in the Netherlands

Dutch cosmetics manufacturers refer to the Cosmetics Ingredients database (CosIng) for registered functions of their ingredients. Registration in CosIng greatly enhances the uptake by cosmetics manufacturers, because the registration confirms that other companies have already investigated the potential function of the ingredient. Refer to table 7 for examples of cosmetics in the European market with moringa as an ingredient.

Table 3: Uses of moringa products registered in CosIng database of EU

<table>
<thead>
<tr>
<th>Moringa product by INCI name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>MORINGA OLEIFERA SEED EXTRACT</td>
<td>Skin Conditioning</td>
</tr>
<tr>
<td>MORINGA OLEIFERA BARK EXTRACT</td>
<td></td>
</tr>
<tr>
<td>MORINGA OLEIFERA LEAF EXTRACT</td>
<td></td>
</tr>
<tr>
<td>MORINGA PTERYGOSPERMA SEED EXTRACT</td>
<td></td>
</tr>
<tr>
<td>MORINGA PTERYGOSPERMA SEED OIL</td>
<td></td>
</tr>
<tr>
<td>MORINGA OIL/HYDROGENATED MORINGA OIL ESTERS</td>
<td></td>
</tr>
<tr>
<td>HYDROLYZED MORINGA OLEIFERA SEED EXTRACT</td>
<td></td>
</tr>
<tr>
<td>MORINGA OLEIFERA FRUIT POWDER</td>
<td>Abrasive</td>
</tr>
<tr>
<td>MORINGA OLEIFERA SEED OIL</td>
<td>Skin conditioning and emollient</td>
</tr>
<tr>
<td>MORINGA PTERYGOSPERMA OIL</td>
<td>Emollient</td>
</tr>
</tbody>
</table>

Source: CosIng
3.2. Uses in foods in the Netherlands

Only leaves (incl. dried and powdered) and pods (containing the seeds) are allowed in foods in the Netherlands and other European countries. The listing of the leaves of *Moringa oleifera* Lam. in the Inventory List of Herbals Considered as Food implies that they are also used in herbal teas (i.e. infusions). Other moringa products including root powder, seed oil and extracts are subject to Novel Food legislation. In 2015, the Food Standards Agency of the United Kingdom made the following statement on moringa seed oil: “we do not hold any information relating to the use of Moringa oil in foods before 15 May 1997. We would advise that this oil may be novel unless a significant history of consumption can be demonstrated.”

According to EU Regulation 2015/2283, Novel Food is defined as food that had not been consumed to a significant degree by humans in the EU before 15 May 1997. Novel Foods such as moringa oil and root powder require authorisation before they can be placed on the EU market. The authorisation procedure includes a safety evaluation by the European Food Safety Authority (EFSA). In the case of traditional foods from third countries such as moringa oil or root powder, safety of the traditional food can be established on the basis of evidence of a history of consumption in the third country. As moringa has a long history of use in India and Nepal, a Novel Food application based on the history of use in these countries is more likely to be successful than an application based on the history of use in Zambia. Furthermore, according to an expert of ProFound on vegetable oils, it is unlikely that Dutch buyers will show significant interest in moringa seed oil as a vegetable oil for food. He discourages large investments in a Novel Food application for seed oil.

The gum resin from the bark of the moringa tree is not allowed in foods in the Netherlands either. Moringa gum resin will first have to be authorised as a food additive. Authorisation requires a safety assessment which may cost more than a hundred thousand Euros depending on the required testing. Properties of moringa gum are similar to those of tragacanth gum. As the market for tragacanth is very small, the expected size of the market for moringa gum is too small to justify any large investments in authorisation as a food additive.

3.3. Uses in medicines in the Netherlands

*Moringa oleifera* is not permitted in herbal medicinal products in the Netherlands and other European countries. European legislation prohibits medicinal claims for moringa. In this study, the market for moringa for medicines will not be further discussed.

Nonetheless, there has been scientific research on potential health benefits of moringa. A study published in the journal *Phytochemistry* found that moringa contains substances called isothiocyanates, which have been shown to potentially boost human resistance to cancer. A paper published in the journal Molecular Nutrition & Food Research also found that the isothiocyanates present in moringa can aid in lowering blood pressure, ultimately reducing the risk of heart disease and stroke.

3.4. Uses in animal feed in the Netherlands

The moringa meal/cake after oil pressing classifies in the Netherlands as “Oilcake and other solid residues, whether or not ground or in the form of pellets, resulting from the extraction of vegetable fats or oils”. These can be used for animal feed.
4. Dutch market for moringa from Zambia

4.1. Dutch demand for moringa from Zambia

The Dutch market for moringa is still a young and underdeveloped niche market. To illustrate, in the more developed German market, moringa was only introduced in 2008. Introduction to the Netherlands has probably taken place after that.

One of the few moringa powder importers, Z-Company, estimates that the Dutch consumer market could be as small as 5 tonnes of moringa powder annually. Dutch retail chain Erica confirmed that this estimate is representative of the size of the Dutch market. However, German importer Africrops estimates the Dutch market to be considerably bigger. Africrops already imports several containers to Germany annually of around 20 tonnes each.

As the Dutch moringa market is small, Z-Company and another Dutch importer NutriBoost re-export most moringa to other European countries. In general, the Netherlands is a major re-exporter of food ingredients to other European countries. This implies that Dutch importers can play a major role in moringa imports from Zambia to Europe despite the small size of the Dutch consumer market. Total trade by Dutch importers is estimated to exceed 30 tonnes.

The French importer of vegetable oils Olvea confirms that the estimate of 30-50 tonnes for the European market for moringa oil is representative of the order of size of this market. The role of the Netherlands in European vegetable oils trade (incl. moringa oil) is estimated to be smaller than in the food ingredients market.

Imports of moringa

Dutch and other European customs do not register trade in moringa separately from other products. Imports of leaf powder, the main moringa product, are registered under the same code as many “other dried vegetables, whole, cut, sliced, broken or in powder”. Imports of moringa seed oil are registered under the same code as many “other fixed vegetable fats and oils (including jojoba oil) and their fractions, whether or not refined, but not chemically modified”.

India is the main supplier of moringa to the Netherlands and other European countries. According to Dutch importer NutriBoost, India currently exports around 500 tonnes of moringa to the global market annually. Export data for India provide an indication of total moringa imports by the Netherlands. Based on these export data from India, the Netherlands imported roughly 7.4 tonnes of moringa products from India in 2016. The total value of these imports amounted to € 54 thousand (Zauba, 2017).
Although compared to other European markets, such as the United Kingdom and Germany, the Netherlands is a small market for moringa, the Dutch food sector usually follows trends in the United Kingdom, the USA and Germany. The adoption of novel ingredients such as moringa is likely to follow a similar development as in these trendsetting markets. According to the German company Naturex, the USA is a much bigger food supplements market than Europe. Naturex estimates the size of the organic moringa market in the USA at 50-100 tonnes.

The adoption rate in the Netherlands depends to a significant extent on promotion by importers, retailers, food bloggers and the media. Articles in popular blogs such as De Betere Wereld (translated: The Better World) and magazines such as Jan can lead to wider recognition amongst consumers and stimulate demand. In the USA, the popular magazine Vogue picked up on moringa in 2017 and stimulated demand in the USA.

Indian media reported that the global moringa market amounted to around € 363 million in 2016. They expect this market to reach € 626 million by 2020. The country's exports of Moringa oleifera amounted to € 2 million in 2015 and are reported to grow by 26-30% annually.

Because Moringa oleifera doesn’t grow in continental Europe, demand needs to be met by imports. The only known European producers of Moringa are Moringa Garden based on the island of Tenerife which belongs to Spain, and Moringa Andalucia in Spain.

4.2. Trends and segments in the Dutch market for moringa from Zambia

Food supplements segment
Most demand for moringa in the Netherlands comes from the food supplements segment. Dutch consumers are highly interested in healthy lifestyles including healthy nutrition. They consume health products to prevent diseases and feel good. Particularly the ageing population and increasing healthcare costs encourage a more preventive approach to healthcare in the Netherlands. Rising knowledge on the benefits of food supplements is another driver of demand for food supplements.

In 2017, Euromonitor forecasted a growth of 3% annually for the Dutch food supplements market in the next few years. According to data by Nutraingredients, the Dutch food supplements market
would even grow by 19% annually between 2014 and 2019 to €169 million. Nutraingredients estimated that the Netherlands would be one of the fastest growing markets in Europe.

Consumers appreciate the high nutritional value of moringa, which contains high concentrations of:

- Vitamin A (approximately ten times the amount found in carrots)
- Vitamin B
- Vitamin C (at least eight times the amount present in oranges)
- Minerals (in particular iron)
  - Calcium (at least four times the amount obtained from milk)
  - Potassium (at least three times that gained from bananas).
  - Selenium
  - Phosphorus
- Sulphur-containing amino acids methionine and cystine
- Essential fatty acids: omega-3 and omega-6
- Antioxidants
- Protein
- Fibre

Sources: CBI, 2016; Moringa Andalucia, 2018; GiZ, 2013; USDA Food Composition database, 2018

In the Netherlands and other European countries, foods with a high nutritional value are often marketed as ‘superfoods’. Nonetheless, the term superfood is not an authorised health claim in Europe. European companies can only use this term on their product label if it is part of their brand name.

EU legislation does not allow producers of food supplements to make medicinal claims. Examples of non-medicinal health claims allowed to be used in the Netherlands and other European countries for supplements containing Moringa oleifera are:

- “Moringa is a nutritional powerhouse containing mineral calcium, phosphorous, iron, potassium, magnesium, manganese & Vitamins A, B complex, C, D, E and K.”
- “Naturally boosts and sustains energy levels.”
- “Supports weight management.”
- “Moringa supports anti-inflammatory function, healthy immune system function and healthy metabolism to aid weight management program.”
- “The moringa tree is also known as the miracle tree.”

In the Netherlands and other European countries, breakfast cereals, smoothies, nutritional shakes and capsules are particularly promising consumer applications. As many consumers are not familiar with moringa yet, information on such applications can stimulate consumer adoption.

Table 4: Examples of food supplements with moringa on the Dutch market

<table>
<thead>
<tr>
<th>Product name</th>
<th>Claims</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Image of Organic moringa powder (brand: Hanoju)]</td>
<td>Natural source of multi-vitamins</td>
</tr>
<tr>
<td>Product</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Absolute Moringa Blad Poeder</td>
<td>Organic, ‘destress’, no sugars or sweeteners, raw, health support</td>
</tr>
<tr>
<td>Biologisch Raw (brand: Mattisson)</td>
<td></td>
</tr>
<tr>
<td>Livomap tablets (brand: Maharishi Ayurveda)</td>
<td>Detoxification and freshness - a topical issue for every season. Especially in the spring, the liver plays an important role in energy management.</td>
</tr>
<tr>
<td>Moringa oleifera pure powder (Brand: Jacob Hooy)</td>
<td>N.a.</td>
</tr>
<tr>
<td>Moringa 100% raw powder (brand: Biotona)</td>
<td>Moringa leaves have a broad nutritional profile, are rich in proteins and contain a wealth of phytonutrients.</td>
</tr>
</tbody>
</table>

The Netherlands often follows trends in bigger markets such as the United Kingdom, Germany and the USA. In Germany, the natural ingredients company Naturex has developed a moringa powder standardized to 1% omega-9 and 600 ppm vitamin E. Such standardised ingredients are particularly useful for food, beverage and nutraceuticals manufacturers. This can stimulate the adoption of moringa by these manufacturers and boost the market.

In the USA, major food manufacturers have already taken up moringa. For example, the venture capital fund of Kellog Company recently invested in the moringa products manufacturer Kuli Kuli. The products of Kuli Kuli include Moringa Superfood Bars, Pure Moringa Powder and Moringa Green Energy Shots. Dutch manufacturers are likely to use these examples for development of similar moringa-based products instead of developing completely new products.

New Product Development can stimulate sales of moringa. Especially when major food manufacturers start using moringa as an ingredient in their products, sales can quickly increase. For example, the UK-based company Aduna developed a Moringa Energy Bar and the Swiss company Eattam developed a Moringa Soup.
According to Ms. Mattucci, Global Food Science Analyst at research company Mintel: “moringa could be used in anti-aging beauty food products” (Nutraceuticals World, 2016). The high concentration of anti-oxidants in moringa allow for the positioning of moringa as an anti-aging product. As such health claims are not allowed, manufacturers will need to use different wording in their marketing.

**Herbal tea segment**

At this moment, the Dutch market for herbal teas such as moringa tea is still quite small. Between 2011 and 2015, the Dutch market for herbal and fruit infusions remained relatively stable at 2.0 thousand tonnes. The European market is dominated by Germany (39 thousand tonnes) (Tea & Herbal Infusions Europe, 2018).

In the next years, the tea market and particularly the herbal tea market is expected to grow. The market for specialty tea including herbal teas is expected to follow a similar path of development as the specialty coffee market. In the past decade, the market for specialty coffees experienced rapid growth. A growing number of consumers is becoming more interested in different flavours, the coffee or tea’s origin and even brewing techniques. They are interested in the story behind the coffee or tea to make the drinking of these beverages an authentic experience.

The health trend is another major driver behind the growth of the tea market. Tea is generally perceived as a healthier drink than coffee and many suppliers of premium tea use herbs with health benefits in their products. Manufacturers of moringa tea or tea with moringa benefit from the health trend by applying the same claims in their product promotion as manufacturers of moringa powder. They refer to the high nutritional value of moringa. Moreover, as many consumers do not appreciate the taste of moringa tea, the nutritional value makes a better sales argument. Nonetheless, taste is subjective and some consumers find the taste of moringa tea, which is said to resemble nettle, appealing.

**Table 5: Examples of herbal teas with moringa on the Dutch market**

<table>
<thead>
<tr>
<th>Product name</th>
<th>Claims</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theezakjes moringa oleifera (brand: Jacob Hooy)</td>
<td>According to scientists the most nutritional tree on earth</td>
</tr>
</tbody>
</table>
Moringa thee (brand: Hanoju)

It is purely plant-based, ayurvedic and purely organically grown

Miracle Moringa (brand: Teastreet)

The leaves contain large amounts of calcium, iron, proteins and antioxidants such as vitamins A, and C. It is rightly a superfood

Wellness tea (brand: Van Bruggen Thee)

Wellnessthee 'Slim' is ideal for drinking with a diet. Because of the many antioxidants in the green matcha tea, drinking this tea contributes to a healthy lifestyle. *Moringa is only one of the ingredients in this tea

Vegetables segment

The current market for fresh and preserved moringa pods and leaves in the Netherlands is estimated to be negligible. Although the Netherlands is one of the largest importers of beans, peas and other vegetables from developing countries, only one importer has moringa leaves in its assortment: Mitro Fresh.

Other Dutch importers of exotic vegetables including Nature’s Pride, Tropical Fruit Company, BUD Holland, Paul Leegwater, Yex, Roveg and Bel Impex do not have moringa pods or leaves in their assortments. At the Fruit Logistica 2018, the major European trade fair for fresh fruits and vegetables, the only company offering fresh moringa pods was FreshConnect from Thailand.

In general, Dutch consumers do not know moringa pods. Consequently, importers of fresh vegetables will have to develop this market before they can import significant volumes. They must educate consumers about the benefits and uses of moringa and this requires costly marketing efforts.

As consumers expect continuous availability, successful trade in fresh vegetables requires frequent deliveries. Fresh moringa pods and leaves are perishables and importers thus require deliveries two or three times per week to offer continuous availability to consumers. Currently, demand for moringa pods and leaves is too small to justify two or three deliveries per week of lots of a significant size, such as a pallet. Zambian suppliers may address this specific problem for importers by consolidating orders of different vegetables. As Zimbabwe is a significant supplier of vegetables to the Netherlands (3,000 tonnes of peas, snaps and other vegetables in 2016), Zambian moringa suppliers may consider such consolidation in Zimbabwe.

Price levels are another challenge for suppliers of fresh moringa pods and leaves to the Dutch market. In general, price levels for fresh vegetables can only reach an acceptable level when the scale of imports is the size of full pallets or containers. This allows for distribution of overhead costs such as transport and administrative costs over a large number of units and thus a lower price per unit. As the market for fresh moringa pods and leaves is still negligible, the scale of imports will be small and prices will be high.

The United Kingdom offers more opportunities for moringa pods. According to
people with an Asian background, primarily Indian. These people often look for foods from their countries of origin, such as moringa pods.

**Cosmetics segment**

The cosmetics industry in the Netherlands is highly interested in using moringa seed oil and moringa extracts. The value of moringa oil stems largely from the chemical composition. Moringa oil is made up mainly of mono-unsaturated fatty acids and saturated fats. It has an exceptionally high oleic acid (omega-9) content (67-76%).

**Table 6: Fatty acids composition**

<table>
<thead>
<tr>
<th>Fatty acids (%)</th>
<th>Moringa</th>
<th>Almond</th>
<th>Apricot</th>
<th>Avocado</th>
<th>Jojoba</th>
<th>Rosehip</th>
<th>Palm</th>
<th>Marula</th>
<th>Baobab</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myristic</td>
<td>C14:0</td>
<td>0.1</td>
<td></td>
<td></td>
<td>0.1-0.3</td>
<td>0.5-6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Palmitic</td>
<td>C16:0</td>
<td>3.5-6.9</td>
<td>3-9</td>
<td>3-6</td>
<td>&lt;3</td>
<td>3.4-4.4</td>
<td>35-48</td>
<td>9-12</td>
<td>18-30</td>
</tr>
<tr>
<td>Palmitoleic</td>
<td>C16:1</td>
<td>1.1</td>
<td>&lt;2</td>
<td>&lt;1.4</td>
<td>2-10</td>
<td>&lt;1</td>
<td>0.1-0.18</td>
<td>0.05-0.15</td>
<td></td>
</tr>
<tr>
<td>Margaric</td>
<td>C17:0</td>
<td>4.3-8.3</td>
<td>0.5-3</td>
<td>&lt;2</td>
<td>0.1-2</td>
<td>&lt;1</td>
<td>1.5-2.5</td>
<td>3-7</td>
<td>5-8</td>
</tr>
<tr>
<td>Stearic</td>
<td>C18:0</td>
<td>67-76</td>
<td>60-75</td>
<td>55-70</td>
<td>55-75</td>
<td>5-15</td>
<td>14-16</td>
<td>35-50</td>
<td>70-78</td>
</tr>
<tr>
<td>Oleic</td>
<td>C18:1</td>
<td>0.4-3.5</td>
<td>20-30</td>
<td>20-35</td>
<td>9-17</td>
<td>&lt;5</td>
<td>43-46</td>
<td>6-13</td>
<td>4-7</td>
</tr>
<tr>
<td>Linoleic</td>
<td>C18:2</td>
<td>0.1</td>
<td>0.4</td>
<td>&lt;1</td>
<td>0.1-2</td>
<td>&lt;1</td>
<td>31-34</td>
<td>0.1-0.6</td>
<td>1-3</td>
</tr>
<tr>
<td>Linolenic</td>
<td>C18:3</td>
<td>3.72</td>
<td>0.2</td>
<td>&lt;1</td>
<td>&lt;0.5</td>
<td>&lt;0.5</td>
<td>0.1-0.9</td>
<td>0.3-0.7</td>
<td></td>
</tr>
<tr>
<td>Arachidic</td>
<td>C20:0</td>
<td>2.3-2.6</td>
<td>0.2</td>
<td>65-80</td>
<td>&lt;0.5</td>
<td>0.1-0.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eicosenoic</td>
<td>C20:1</td>
<td>6.7-9</td>
<td>0.2</td>
<td>&lt;0.5</td>
<td>&lt;0.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Behenic</td>
<td>C22:0</td>
<td>1.0</td>
<td>10-20</td>
<td>0.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Erucic</td>
<td>C22:1</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Highlands Essential Oils

The fatty acid composition including the high oleic acid content make moringa oil particularly suitable for skin conditioning and moisturising. According to the CosIng database, skin conditioning and emollient (i.e. moisturising) are the primary functions of moringa seed oil and extracts (see table 3). This makes moringa oil and extracts suitable for applications such as creams, lotions and gels.

According to a report from 2012 by the Joint Research Centre of the European Commission, the Netherlands is one of the smaller producers of hair conditioners in Europe. The need for product distinction by cosmetics manufacturers is another potential driver of moringa oil sales. Manufacturers look for unique ingredients such as speciality exotic vegetable oils to distinguish their products from those of their competitors. Moringa oil from Zambia is potentially such a unique ingredient.

In both the skin conditioning and hair conditioning markets, demand for products with moisturising properties is estimated to grow particularly fast. In 2012, 66% of all new product launches in the global skin care market and 32% of all new product launches in the global hair care market were asserted to be moisturising or hydrating (Mintel, 2013).
The consumer trend to buy more products with natural ingredients instead of synthetic ingredients further stimulates demand for moringa oil and other natural ingredients. Many consumers perceive natural ingredients to be safer than synthetic ingredients, whether scientific studies demonstrate this or not. This trend has given rise to ‘natural cosmetics’. Natural cosmetics are often defined as containing a certain amount of natural ingredients.

Vegetable oils with a low rancidity factor and that only require a limited degree of further refinement, such as moringa, are of particular interest in natural cosmetics, as fewer preservatives are needed.

Table 7: Examples of cosmetics with moringa on the European market

<table>
<thead>
<tr>
<th>Product name</th>
<th>Claims</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Natural Moringa Anti-Oxidant Face Oil</strong></td>
<td>Natural Moringa oil is an excellent cleanser and moisturiser as it contains high levels of natural anti-oxidant as well as oleic acid, vitamin A and vitamin C. It is ideal for preventing free radicals and other skin damaging agents.</td>
</tr>
<tr>
<td><strong>Moringa oil (brand: Hanoju)</strong></td>
<td>Hydrating and cleansing properties for skincare and haircare.</td>
</tr>
<tr>
<td><strong>GLOSS &amp; REPAIR Shampoo (brand: neobio)</strong></td>
<td>Organic Lily extract and Moringa Seed Extract protect and improve the signs of stressed hair while giving shine and smoothness.</td>
</tr>
<tr>
<td><strong>Moringa Hand Cream (brand: Body Shop)</strong></td>
<td>Infused with the scent of crisp, floral moringa, the light, gel-cream formula absorbs quickly, helping to soften and protect the hands. • Hand cream • Nourishes hands • Light, non-greasy texture • Leaves hands feeling softer and smoother • Hands and cuticles will be left feeling silky soft</td>
</tr>
<tr>
<td><strong>Charity Pot Hand &amp; Body Lotion (brand: Lush)</strong></td>
<td>Moringa is a medicinal species that is used to treat malnutrition in many African countries. We use the light and antioxidant-rich oil, which is pressed from the moringa seeds.</td>
</tr>
<tr>
<td><strong>Shower gel moringa (brand: Bioturm)</strong></td>
<td>Mild cleaning and relipidizing substances care for the skin while taking a shower and provide for a velvety soft skin feeling. Our shower gel with a tropical fresh fragrance of moringa is ideal for daily, especially mild cleaning of your skin.</td>
</tr>
</tbody>
</table>
Cosmetics manufacturers use both moringa oil and moringa extracts. The extracts are mostly based on proprietary technology of European companies. These companies develop extraction methods to obtain extracts with specific properties as required for their cosmetic products. In few cases, suppliers in the countries of origin develop their own extracts. For example, the Indian manufacturer Vidya Herbs offers a supercritical moringa extract.

Segment for fertilizers, animal feed and water purification
In the Netherlands, there is no reported use of moringa powder in fertilizers, animal feed and water purification. However, the Netherlands has a large livestock industry which can potentially benefit from fortification of animal feed with moringa powder.

Opportunities in the Dutch animal feed industry for moringa seed cake are more limited. Animal feed manufacturers can use other oilcakes, such as those from olive oil extraction and soya beans, which are widely available at low costs.

4.3. EU legal requirements for moringa
This chapter provides information on legal requirements for moringa products with a significant market demand, as identified in above chapter: food supplements, tea and cosmetics.

Legislation for food
Moringa for supplements, fortification, herbal teas and other foods must be safe for human consumption and packaged safely to enter the European market. Zambian exporters must have a food safety management system in place to become successful in the Netherlands. Buyers demand proof of your product’s safety and proof that your product meets their quality requirements before they will buy from you. Certification for compliance with ISO 22000 or higher standards is strongly recommended.

Food safety – traceability, hygiene and control
Food safety is a key issue in European Union food legislation. The General Food Law is the legislative framework for food safety in the European Union.

To guarantee food safety and to allow appropriate action in cases of unsafe food, food products must be traceable throughout the entire supply chain. Every company must have a traceability system in place with information on their supplier of each lot of products. When all companies do this, the product becomes traceable from consumer back to the producer.

Important for the control of food safety hazards throughout the whole supply chain is the implementation of food safety management based on Hazard Analysis Critical Control Points (HACCP) principles. HACCP planning consists of consecutive steps to:

- identify food safety hazards;
- determine how you can control them (the so called Critical Control Points or CCPs) and
- setting corrective measures for when you cannot guarantee safety of the foods produced.
Also important is subjecting food products to official controls. If European companies or authorities find out that the safety of your moringa cannot be guaranteed, they will take the product off the market. Your moringa will then be registered in the European Union’s Rapid Alert System for Food and Feed. In most cases, European importers will not pay for the product or demand their money back. Additionally, a food safety issue will damage your reputation on the market.

Tips:

- Establish a traceability system and keep samples for each of your suppliers to trace the origin of the moringa in case a problem with quality occurs.
- Keep your facilities clean by setting strict operating procedures, such as cleaning schedules for your processing equipment. See the Codex Alimentarius for detailed information on food hygiene.
- If you target the herbal tea market segment, then follow the Guidelines for Good Agricultural and Hygiene Practices for Raw Materials used for Herbal and Fruit Infusions (GAHP).

Contamination

To be safe for consumption moringa must not be contaminated by:

- physical elements (e.g. plastic residues, metal and dirt);
- chemical elements (e.g. pesticides and polycyclic aromatic hydrocarbons)
- biological elements (e.g. bacteria and moulds).

According to European Union’s Rapid Alert System for Food and Feed, the most common food safety issue for moringa leaf powder is contamination by the pathogenic micro-organism Salmonella. In 2016, an outbreak of Salmonella in the US stressed the importance of hygienic processing of moringa.

The European Union has set Maximum Residue Levels (MRLs) for pesticides (EC Regulation 396/2005), heavy metals (EC Regulation 1881/2006) and polycyclic aromatic hydrocarbons (PAH) (EC Regulation 2015/1933) in food products. Moringa products containing pesticides, heavy metals or PAHs above the permitted level will be withdrawn from the market.

Tips:

- Refer to the European Union MRL database to identify the Maximum Residue Levels (MRLs) that are relevant for moringa. You can find MRLs for moringa pods (nr. 0260030-005), seeds (0401070-001) and leaves (0632030-003).
- See the European Trade Helpdesk for more information on MRLs.
- Reduce the amount of pesticides on your moringa by applying Integrated Pest Management (IPM). IPM is an agricultural pest control strategy which uses complementary strategies, including chemical management.
- Apply good drying practices such as indirect heating to keep PAHs below maximum levels:
  - Benzo(a)pyrene: 10 μg/kg
  - Sum of benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene and chrysene: 50,0 μg/kg

Food supplements legislation

Suppliers of moringa-based food supplements such as capsules or consumer-packed moringa powder need to comply with food supplements legislation. This is not relevant for suppliers of leaf powder who sell their powder in bulk packaging.
Directive 2002/46 lays down a harmonised list of vitamins and minerals that may be added for nutritional purposes in food supplements (in Annex I to the Directive). Annex II of the Directive contains a list of permitted sources (vitamin and mineral substances) from which those vitamins and minerals may be manufactured.

The Directive also lays down rules on labelling of food supplements to ensure that consumers are not provided with misleading information.

Legislation for feed
All animal feed (including ingredients such as moringa powder) imported into the European Union is subject to the General Food Law. Although both food and feed are covered under the General Food Law, the specific hygienic requirements for these two categories are described under different provisions. Regulation (EC) No 183/2005 lays down the requirements for feed. The regulation also introduces HACCP principles for feed business operators. European Union legislation on undesirable substances in animal nutrition contains maximum levels of specific substances permitted in feed. As humans consume meat from animals, the maximum levels of specific substances are strict to prevent a danger to human health.

Legislation for cosmetics

EU Cosmetics Regulation
The Cosmetics Regulation 1223/2009 covers the safety and efficacy of cosmetic products including claims. The regulation requires Dutch cosmetics manufacturers to prepare a ‘Cosmetic Product Safety Report’ and ‘Product Information File’ for their products.

The regulation includes requirements (physical-chemical, microbiological and toxicological) for substances/ingredients to be included in each ‘Cosmetic Product Safety Report’ and ‘Product Information File’. Dutch cosmetics manufacturers and ingredient producers are increasingly making compliance with this regulation the responsibility of their suppliers.

The regulation also requires cosmetics manufacturers to substantiate claims. Therefore, data on efficacy (performance) increases the value of your moringa. Manufacturers are very interested in data that substantiate claims of certain cosmetic benefits resulting from a certain concentration of moringa (or component of an ingredient) in a finished product.

Tips:
- You need to give your Dutch buyers detailed product information. Buyers need to include this in a ‘Cosmetic Product Safety Report’ and a ‘Product Information File’. You need to provide information on the physio-chemical (physical and chemical), microbiological and toxicological characteristics of your moringa oil or extract.
- By building a technical dossier for your moringa oil or extract, you can improve your offering for Dutch buyers in the cosmetics industry. The Center for the Promotion of Imports from developing countries provides a workbook for preparing a technical dossier for cosmetic ingredients. Moringa oil is comprised of fatty acids. Other oils have different compositions with regard to their fatty acid profiles. Different profiles perform differently in cosmetics. Hence the fatty acid profile is one of the most important parameters to include in your dossier.

REACH
REACH (Registration Evaluation and Authorisation of Chemicals) legislation is designed to manage the risks of chemicals manufactured and used in the European Union. Cosmetic ingredients (including natural ingredients) are considered chemicals. In principle, these need to be registered with the
European Chemicals Agency (ECHA) by the importer or manufacturer of the ingredient. However, moringa oil is exempt from registration, because it is considered a non-chemically modified vegetable oil. In contrast, moringa extracts are subject to REACH and must be registered by the importer unless volumes remain lower than 1 tonne per importer per year. Registration is a costly process for which your Dutch business partner will usually require you to supply safety data. As moringa extracts are not on the list of registered substances of ECHA, this indicates that current imports of moringa extracts remain below 1 tonne per importer per year.

**Classification, Labelling and Packaging for extracts**

Moringa extracts are considered chemicals and subject to European legislation on Classification, Labelling and Packaging (CLP). CLP legislation sets requirements for packaging and labelling of chemical substances to warn users in the supply chain of safety risks. Depending on the classification of the substance, suppliers must include certain risk symbols and warning phrases on their labels. However, no hazards have been classified for moringa extracts, which means that there should not be a need to include any risk symbols or safety phrases on your label.

4.4. Specific requirements of Dutch buyers for moringa from Zambia

**Food Safety Certification for moringa for foods**

Food safety is a top priority in all Dutch food sectors. You can therefore expect Dutch buyers to request extra guarantees in the form of certificates. Many buyers require certification of a food safety management system based on HACCP.

The most commonly used food safety management systems in the Netherlands and other European countries are:

- **Food Safety System Certification** (FSSC22000)
- **British Retail Consortium** (BRC)
- **International Food Safety** (IFS)
- **Safe Quality Food** (SQF)

FSSC 22000 is most relevant for suppliers of ingredients which will be further processed. BRC, IFS and to a lesser extent SQF require more advanced management systems. They are particularly relevant for suppliers of end-products to retailers.

**Tips:**

- Check with your buyers if they require certification of food safety management and check which food safety management systems they prefer.
- Refer to the Global Food Safety Initiative (GFSI) for more information on internationally recognised food safety management systems.

**Quality management for moringa for cosmetics**

Dutch buyers of moringa oil and extracts for cosmetics expect you to follow Hazard Analysis & Critical Control Points (HACCP) principles in your processing facilities. Using these principles prevents hazards for food safety, but also helps ensure product safety for cosmetic applications. While HACCP certification is not obligatory, it will give you a competitive advantage.
Good Manufacturing Practices (GMP) are not obligatory for cosmetics ingredient producers, but compliance can provide a competitive advantage. The European Federation for Cosmetic Ingredients has developed GMP guidelines to help you implement GMP in your company.

Purity

Adulteration (the intentional addition of undeclared substances to a product) is a common concern in the natural ingredients trade. In many cases, the product becomes useless for the buyer. It will not have the properties anymore to perform the required function and purification is often impossible or too expensive. Strict controls are in place in the Netherlands and other European countries to detect potential adulterants. In case of detection, suppliers have to pay for the damage. They will not be paid for their products and loose business with the buyer.

Dutch buyers generally send samples to laboratories to analyse their purity. These laboratories continuously improve their techniques for detection of adulterants. If there are undeclared substances in your product, it is very likely they will be detected.

Tips:

• Only purchase raw materials from suppliers that you can trust. Explain to suppliers that mixing their materials with other materials is not allowed.
• When you add any substances to your product for preservation for example, inform your buyer by clearly indicating this in your product documentation.

Quality requirements for moringa powder

In addition to food safety and a high purity as explained above, Dutch buyers have specific requirements on composition and nutritional profile. Buyers will usually request a Certificate of Analysis to verify that your moringa meets their quality requirements.

Table 8: Template for Certificate of Analysis

<table>
<thead>
<tr>
<th>Type of specification</th>
<th>Example of specification</th>
<th>Explanation of specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Fine powder</td>
<td></td>
</tr>
<tr>
<td>Colour</td>
<td>Green</td>
<td>The dried powder must look ‘fresh’</td>
</tr>
<tr>
<td>Flavour</td>
<td>Characteristic</td>
<td>Flavour is subjective</td>
</tr>
<tr>
<td>Moisture content</td>
<td>8-10%</td>
<td>A low moisture content prevents mould and browning</td>
</tr>
<tr>
<td>Particle size</td>
<td>50-100 μm</td>
<td>Particle size preferences differ between buyers</td>
</tr>
<tr>
<td>Heavy metals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lead(Pb)</td>
<td>&lt;3.0 mg/kg</td>
<td>Legal limit for food supplements</td>
</tr>
<tr>
<td>Cadmium(Cd)</td>
<td>&lt;1.0 mg/kg</td>
<td>Legal limit for food supplements</td>
</tr>
<tr>
<td>Mercury(Hg)</td>
<td>&lt;0.1 mg/kg</td>
<td>Legal limit for food supplements</td>
</tr>
<tr>
<td>Microbiological activity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total plate count</td>
<td>Max 1,000 cfu/g</td>
<td>n.a.</td>
</tr>
<tr>
<td>Yeast and moulds</td>
<td>Max 100 cfu/g</td>
<td>n.a.</td>
</tr>
<tr>
<td>Salmonella</td>
<td>Absent</td>
<td>n.a.</td>
</tr>
<tr>
<td>E.Coli.</td>
<td>Absent</td>
<td>n.a.</td>
</tr>
</tbody>
</table>
The moisture content must be around 8-10% to prevent mould and browning. The buyers appreciate high levels of nutrients in moringa and especially high levels of anti-oxidants. The nutritional profile is the main sales argument for moringa powder.

Growing, harvesting, processing and packaging all influence the nutritional profile of moringa powder. The drying process has a particularly large effect on nutrients in moringa. Therefore, buyers will prefer drying methods which preserve a maximum amount of nutrients. Lower temperatures (~40 degrees Celsius) and shorter exposure to heat (<24 hours) generally result in preservation of more nutrients.

**Quality requirements for moringa oil**

In addition to high purity as explained above, Dutch buyers have specific requirements on the composition of moringa oil. Buyers will usually request a Certificate of Analysis to verify that your moringa meets their quality requirements.

**Table 9: Template for Certificate of Analysis**

<table>
<thead>
<tr>
<th>Type of specification</th>
<th>Example of specification</th>
<th>Explanation of specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Clear liquid</td>
<td>n.a.</td>
</tr>
<tr>
<td>Colour</td>
<td>Pale yellow</td>
<td>n.a.</td>
</tr>
<tr>
<td>Odour</td>
<td>Characteristic</td>
<td>n.a.</td>
</tr>
<tr>
<td>Acid value</td>
<td>&lt;2 mg KOH/g</td>
<td>n.a.</td>
</tr>
<tr>
<td>Saponification value</td>
<td>175-200 mg KOH/g</td>
<td>n.a.</td>
</tr>
<tr>
<td>Iodine value</td>
<td>60-75 g/100g</td>
<td>n.a.</td>
</tr>
<tr>
<td>Oleic acid content</td>
<td>65-80%</td>
<td>Many buyers appreciate a high oleic acid content</td>
</tr>
<tr>
<td>Behenic acid</td>
<td>5-7%</td>
<td>n.a.</td>
</tr>
<tr>
<td>Stearic acid</td>
<td>4-6%</td>
<td>n.a.</td>
</tr>
<tr>
<td>Palmitic acid</td>
<td>5-6%</td>
<td>n.a.</td>
</tr>
<tr>
<td>Linolenic acid</td>
<td>0-1%</td>
<td>n.a.</td>
</tr>
<tr>
<td>Others</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td>Free Fatty Acid content</td>
<td>0.5-3%</td>
<td>n.a.</td>
</tr>
</tbody>
</table>

**Tips:**

- Standardise and minimise significant variations in your moringa’s quality. Monitor harvest and post-harvest practices. Develop Standard Operating Procedures (SOPs) and train farm and processing staff. Use incentives to ensure that they follow your specifications on harvesting and post-harvest processes. See examples of SOPs for moringa growing and processing from the [Moringa Association of Ghana](http://morningagassociation.org) and the [Africa Moringa Hub](http://africanmoringahub.com).
- Work together with a local university such as Rusangu University or laboratory such as [University Teaching Hospital](http://universityteachinghospital.com) to test your moringa product. They can help determine the chemical composition of your product. This needs to be included in your product documentation.
- When you add any substances to your product for preservation for example, inform your buyer by clearly indicating this in your product documentation. Otherwise, the addition of such substances will be perceived as adulteration.
Labelling requirements
Your product label for bulk moringa products must include:

- Product name (INCI name for moringa oil)
- Batch code
- Place of origin
- Name and address of exporter
- Date of manufacture
- Best before date
- Net weight
- Recommended storage conditions

If you supply organic moringa products, your label needs to include the name/code of the inspection body and certification number.

Certification of organic production
A small, but growing group of Dutch buyers requires third-party certification of sustainability. Particularly organic certification is becoming more important for moringa powder. Organic moringa is produced and processed by natural techniques (e.g. crops rotation, biological crop protection, green manure, compost).

To market moringa in the Netherlands and other European countries as an organic product, you need to implement organic farming techniques and have your facilities audited by an accredited certifier. These requirements are specified in the European Union Regulation 834/2007.

Examples of organic certifiers with activities in Zambia:
- Ecocert: Provides certification services from its office in South Africa (+27(0)21 883 2299 / office.southafrica@ecocert.com)
- Kiwa BCS Oeko Garantie (BCS): Provides certification services from its office in South Africa (Contact person: Ralph Peckover; +27 86 544 9718 / bcs.southafrica@kiwa.de)
- Soil Association: Provides certification services from its UK offices.

Fairtrade certification
The market for fair trade certified vegetable oils including moringa in the Netherlands and other European countries remains very small. However, increasing consumer awareness of social responsibility and connectedness to producing communities has had a positive impact on this niche segment.

Fairtrade International is the leading standard-setting organisation for Fairtrade. FLO-Cert is the certifier for Fairtrade. Products which carry the Fairtrade label indicate that producers are paid a Fairtrade Minimum Price, including some vegetable oils such as moringa oil, argan oil, shea butter and olive oil. Currently, 9 moringa suppliers from India, Sri Lanka and Egypt have a Fairtrade certificate (FLO-Cert, 2018).

Other fair trade standards available in the European market are Fair Trade Ecocert and Fair for Life. Currently, 5 moringa suppliers have a Fair for Life certificate.

4.5. Competitive advantages and disadvantages of Zambia in the Dutch moringa market
Globally, India is the largest producer and supplier of Moringa oleifera. India supplies around 80% of the market needs for moringa leaf powder worldwide. Its strong market
position has to do with the country’s long tradition of including moringa in people’s diets. Today, moringa leaf powder is produced in large plantations at a comparatively low price. Exports by India give a good indication of the growing market for *Moringa oleifera*.

As the plant grows in various regions worldwide, there is a potential for smaller producers if they can create a Unique Selling Proposition (USP) for their product compared to supplies from India. Smaller producers entering the global market include various African countries, such as South Africa, Kenya, Burkina Faso and Mozambique.

Organic and/or fair certification is one of the USPs that Zambia could offer. According to the German moringa importer Pfannenschmidt, sourcing organic moringa in India is challenging. Strict control of trade by the responsible authorities leads to delays in the process. German importer Galke and Dutch importer Z-Company confirmed the problems with organic moringa from India. According to Z-Company, several supplies of organic moringa from India contained pesticides which are not allowed according to European legislation on the organic market. These problems have resulted in stricter control on organic moringa supplies.

In some other countries, moringa production focuses on domestic nutrition security. In these countries, moringa production often takes place by small-scale farmers with a few trees per farmer. These farmers are dispersed over large areas. Exporters in these countries who need large volumes, high quality and organic certified moringa, face difficulties in the collection, standardisation and certification processes. Due to the small scale and dispersion of the farmers, collection and inspection are too expensive. Moreover, it is difficult to achieve a uniform quality.

South Africa is one of Zambia’s main competitors in the European moringa market. South Africa has a relatively strong moringa sector. Many stakeholders are member of the *Moringa Development Association of South Africa*. South African exporters benefit from their domestic market for moringa products. They can grow their business on sales to South African consumers before targeting the more demanding European market. This enables South African companies to use the income from domestic sales for investment in development of their business to meet requirements in Europe.

4.6. Market channels for moringa from Zambia to the Netherlands

*Most common market channel for moringa powder*

Most moringa enters the Dutch market through an importer based in a nearby European country. The importer focuses on the import of large volumes of moringa and distribution in smaller lots to a food supplements manufacturer. The manufacturer distributes their products through other retailers.
Figure 2: Market channels for Moringa for supplements

The figure above shows that farming, processing and exporting activities in Zambia and other countries of origin are often combined in the same company. Similarly, many European importers combine different activities. They can often pack moringa in consumer packaging under their own label or under the label of their customer.

Importers are indispensable in the current moringa market in the Netherlands. The market is still very small and consists of many small retailers and manufacturers. These companies are generally not interested in importing themselves. They need small volumes and prefer to purchase from reputable importers which can offer low prices.

When the moringa market grows and retailers and manufacturers scale up their moringa sourcing, direct trade with these players will become more feasible. Economies of scale will then lead to lower prices.

Annex 1 provides a list of importers and other potential buyers of moringa powder.

Most common market channel for moringa oil

Most moringa oil enters the Dutch market through a vegetables oil importer based in a nearby European country. The importer focuses on the import of large volumes of different crude vegetable oils, refining and distribution in smaller lots to a cosmetics manufacturer. The manufacturer distributes their products through other wholesalers and retailers.

Figure 3: Market channels for moringa oil
Some of the larger cosmetics manufacturers import moringa oil directly from origin. Their volume requirements are of sufficient size to justify development of a supply chain. Direct sourcing also allows them to tell the story behind their moringa oil to consumers. By controlling the supply chain, they can work together with the supplier to create a transparent chain and provide information to consumers about the production conditions including the farm, the people and the environment.

Annex 1 provides a list of importers and other potential buyers of moringa oil.

**Market channel for moringa-based end-products**

Dutch companies are generally not interested in purchasing moringa-based end-products directly from manufacturers in Zambia. As many consumers do not know moringa, Dutch companies will have to invest a lot of resources into promotion of moringa products with a significant risk of failure when consumer interest appears to be small. More importantly, Dutch companies prefer to either manufacture end-products themselves or purchase end-products from established companies based in Europe. They put more trust in companies which are under the control of European authorities.

### 4.7. Prices for moringa powder from Zambia in the Netherlands

The import price (FOB) for large lots (>1 tonne) of organic certified moringa powder is around € 4-7 /kg. The import price of small lots (< 1 tonne) of organic certified moringa powder can reach up to € 10-12 /kg. Prices of moringa leaves are somewhat lower than for powder.

Prices of moringa from Dutch online retailers (i.e. webshops) range between € 30 and € 135 per kg (incl. VAT). Most of the online retailers offer prices closer to € 135 than to € 30. Different factors determine the wide variations in prices. The volume of sales by the online retailers and the efficiency of their logistics are some of the major factors.

**Table 10: Indicative price breakdown for 1 kg moringa powder from Zambia in Dutch retail**

<table>
<thead>
<tr>
<th>Price component</th>
<th>Share in €</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exporter</td>
<td>5</td>
</tr>
<tr>
<td>German importer (incl. freight)</td>
<td>10</td>
</tr>
<tr>
<td>Import tariff (0% under Generalised Scheme of Preferences)</td>
<td>0</td>
</tr>
<tr>
<td>Dutch importer (incl. freight)</td>
<td>10</td>
</tr>
<tr>
<td>Packer and distributor</td>
<td>20</td>
</tr>
<tr>
<td>Online retailer (incl. delivery costs)</td>
<td>49</td>
</tr>
<tr>
<td>VAT (6%)</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

### 4.8. Prices for moringa seed oil from Zambia in the Netherlands

The import price (FOB) for large lots (>1 tonne) of organic certified moringa oil is around € 20-30 /litre. The import price of small lots (< 1 tonne) of organic certified moringa oil can reach up to € 50 /litre.

Retail prices for moringa oil in the Netherlands reach up to € 200 /litre.
5. Moringa value chain in Zambia

5.1. Production of moringa in Zambia

Moringa has been grown across different regions in Zambia for decades. However, until some 5 to 10 years ago, moringa had little commercial value. Farmers could not find a market for moringa products and used the moringa for own consumption, as animal feed and as natural fences.

Commercial moringa production in Zambia takes place in two different farming systems:

- Large-scale plantations with intensive farming
- Out-grower schemes with small-scale farmers with extensive farming

**Table 11: Comparison of two typical farming systems**

<table>
<thead>
<tr>
<th></th>
<th>Large-scale plantations</th>
<th>Out-grower schemes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Activities</strong></td>
<td>Combination of all nursery, cultivation, drying, grinding, packaging and marketing activities in one company</td>
<td>Out-growers cultivate and dry the leaves. The aggregating company performs grinding, packaging and marketing</td>
</tr>
<tr>
<td><strong>Scale of farming</strong></td>
<td>10-100 hectares of land</td>
<td>1-10 hectares of land per out-grower</td>
</tr>
<tr>
<td><strong>Intensity of farming</strong></td>
<td>Intensive farming with 400,000-600,000 moringa trees /ha and mechanised irrigation systems</td>
<td>Extensive farming with 10,000-20,000 moringa trees /ha and no or manual irrigation systems</td>
</tr>
<tr>
<td><strong>Employment</strong></td>
<td>Tens or even hundreds of people mainly as workers</td>
<td>Families with a few people per farm. Up to 800 out-growers in one scheme</td>
</tr>
<tr>
<td><strong>Equipment</strong></td>
<td>Imported equipment for drying and grinding</td>
<td>Appropriate technology manufactured locally</td>
</tr>
<tr>
<td><strong>Quality management</strong></td>
<td>GAP and HACCP based food safety management system</td>
<td>Standard Operating Procedures by out-growers controlled by the aggregating company. Quality control for supplies to company. HACCP based food safety management system only at processing site of company</td>
</tr>
</tbody>
</table>

**Breeding and multiplication**

According to MDAZ, 4 moringa species are currently growing in Zambia. Most, if not all, commercial farmers are growing *Moringa oleifera*.

No major breeding programmes are currently being carried out in Zambia. According to MDAZ, ZARI has expressed interest in establishing a breeding programme if funding becomes available. A breeding programme may lead to better yielding trees, trees which are more resilient to the Zambian climate and higher quality moringa products.

Moringa is propagated either by stem cuttings (limb cutting) or by seed. Many companies are currently propagating by seed. They use the seeds from mature trees to produce new seedlings in nurseries. Several of these companies sell part of their seeds or seedlings to other farmers.

According to members of Sakaximbi Foundation (SF), SF (previously) imported seeds from Kenya (MPK-1 and MPK-2 varieties). They are currently producing their own seeds. The seeds from SF cost 6,000
Kwacha (€ 512) for 1 hectare of extensive moringa cultivation (~15,400 plants /ha).

**Cultivation practices**

For intensive (commercial) leaf production the spacing of the plants should be 15 x 15 cm or 20 x 10 cm (~500,000 trees /ha), with conveniently spaced alleys to facilitate plantation management and harvests (Saint Sauveur and Broin, 2010). This intensive system requires careful crop management. For semi-intensive leaf production plants are spaced 50 cm to 1 m apart. This is more appropriate for small-scale farmers and gives good results with less maintenance. For fruit or seed production the spacing must be at least 2.5 x 2.5 meter in order to achieve good yields (Saint Sauveur and Broin, 2010).

Seeds must be fresh to achieve high germination rates. Seedlings must be protected from termites and other pests. When the trees become mature, they are more resistant to pests.

Pinching the terminal bud on the central stem is necessary when the tree attains a height of 50 cm to 1 m (Saint Sauveur and Broin, 2010). This will trigger the growth of lateral branches which need to be pinched too. Regular pinching will encourage the tree to become bushy and produce many leaves and pods within easy reach and helps the tree develop a strong production frame for maximizing the yield (Fugli and Sreeja, 2011).

Maintenance pruning is also required. This can be done at each harvest (i.e. if the leaves are removed). In fruit and seed producing farms, pruning helps induce more fruits, as well as larger fruits (Saint Sauveur and Broin, 2010).

Moringa trees do not need much water and can germinate and grow without irrigation if sown during the rainy season (January-June in Zambia). The roots will develop in about twenty days and allows young plants to endure drought (Saint Sauveur and Broin, 2010; Fugli and Sreeja, 2011). It is however advisable to irrigate regularly to ensure optimal growth and continuous yield, especially in arid conditions.

Moringa trees will generally grow well without adding very much fertilizer, but in order to achieve good yields the soil needs to provide enough nitrogen and minerals to the plant. Before seeding / planting, manure or compost can be mixed with the soil used to fill the planting pits. Afterwards it is important to apply manure or compost at least once a year, for instance before the rainy season, when the trees are about to start an intense growth period (Saint Sauveur and Broin, 2010).

Weeding must be done regularly to avoid competition for nutrients, especially for nitrogen. Weeding must be more frequent when the plant is young and the trees are small. Mulching can be applied (covering the soil with e.g. crop or weed residues) in order to reduce the loss of soil moisture, minimize irrigation needs and also reducing weed growth.

Pest control is a particular challenge in Zambia. Especially for organic farming systems. Farmers have reported problems with termites, aphids and army worms amongst others. ZABS has a standard for organic farming and production with a code of practice and information on organic pest control that can be purchased at around ZMW 700.

Harvest the pods before they split open and seeds fall to the ground. Seeds should be extracted from the pods, bagged, and stored in a dry shady place. Harvesting of the leaves can be done by cutting shoots and leaves or by only removing the leaves, picking them directly off the tree. In this case it is
advisable to apply pruning after the harvest of the leaves in order to ensure again a vigorous growth (Wageningen UR, 2015).

The yield of seed production varies tremendously between countries and farms. Seed production depends on location, soil type, vegetation and climate conditions. In Nigeria, seed production has been reported to vary from 4 to 24 tons of seeds/hectare. According to another source, each tree produces between 15,000 to 25,000 seeds annually depending on water and manure management (Foidl, makkar, & Becker, 2001).

Oil extraction

Moringa seeds contain approximately 35-40% oil. With cold-pressing technology, at ambient temperature, yields of extraction average around 65%. This means that cold-pressing of shelled seeds yields approximately 26% oil from the total weight of the seeds.

Seeds of different maturity produce different quality oils. Oil producers require sorting and grading of seeds to manage their quality.

The seeds contain a high amount of proteins (around 31%). These proteins are a source of microbiological activity. Moreover, Dutch buyers consider such proteins as impurities. Removal of these proteins require filtration of the extracted oil. According to the Technical Development & Advisory Unit (TDAU) of UNZA, this can be done with a cloth and hydraulic pressure.

Equipment for cold-pressing does not have to cost more than 5,000 USD. TDAU offers a screw press for around USD 800 and a yenger press for around USD 1,100 which are suitable for small-scale processing.

Drying

Processing fresh leaves into leaf powder produces between 12.5% to 15% of leaf powder per unit of fresh leaves.

Since all important methods of food dehydration employ heat, and food constituents are sensitive to heat, compromises must be made between maximum possible drying rate and maintenance of food quality.

According to the European companies Naturex and Galke, the temperature for drying moringa should be no more than 40 degrees Celsius. Higher temperatures will lead to product degradation and loss of valuable nutrients. Lower temperatures may not be sufficient to reduce moisture fast enough to prevent growth of micro-organisms (e.g. mould).

A constant airflow is required to achieve good results of the drying process. The airflow will reduce the time needed to reduce moisture in the leaves to 8-10%. Total drying time should not exceed 24 hours. The leaves need to be turned several times during drying for optimal results. During the rainy season in Zambia, the drying process must be adapted to obtain good results.

Simple drying equipment such as a solar-heated chamber with fans and rooftop windows for airflow can deliver good results when the producer manages quality effectively. The solar dryer can be made from different materials such as polyethylene panels or a sea container. Costs of such equipment may remain within USD 10,000. The heat source may also be a fire if the air is heated indirectly and kept clean before it enters the dryer.

The air heated directly by the fire must not enter the dryer, as fumes from the fire may contain foreign matter including PAHs.
TDAU offers a solar dryer which cost USD 750 in 2012 (request a quotation for current prices). Their standard solar dryer has a capacity of 50 kg wet leaves, but TDAU can offer equipment with a higher capacity. The dryers come with fans which must be operated manually. According to TDAU, the drying time for moringa leaves with this equipment is approximately 3 days.

More sophisticated technology to obtain higher quality moringa powder (e.g. industrial ovens) is available in the Netherlands. Dutch Manufacturers of Machines for Food Processing and Packaging can supply equipment if this is not available in Zambia. Contact details: +31 88 400 85 37 / gmv@fme.nl.

Grinding and sieving
Grinding equipment produces a powder from the dried leaves. The friction by metal parts of screw presses or hammer mills may cause pieces of metal to contaminate the product. A metal detector can take out these pieces of metal.

Sieving ensures that all particles in the powder comply with the required size.

5.2. Roles of stakeholders

Farmers Union
Farmers associations across Zambia are united in the Farmers Union. The farmers association in Solwezi has a total of 3,000 members of which around 1,000 are active members. The association can provide advice to its members about markets for their crops and how to grow different crops, and the association provides guarantees to banks for farmer loans. They are also involved in organising out-grower schemes and publish a monthly magazine.

Leading moringa farmers and processors
Below list of companies is non-exhaustive:

- Moringa Initiative: produces moringa on own farm, processes moringa according to high standards and sells different moringa products under own brand
- Burlsfied Agriculture: large-scale farm for moringa seed oil production
- Highland Essential Oils: large-scale farm with intensive moringa production
- Moringa Wonder Plus: Zambian moringa brand currently using imported moringa powder.
- Sakaximbi Foundation: out-grower scheme
- Sylva Food Solutions: food manufacturer which uses an out-grower scheme to source raw materials and provides training to their out-growers. The company also developed a cookbook with moringa-based recipes and remedies
- Moringa Foods Group: manufacturer of moringa products sourcing from small-scale farmers.

Chambers of Commerce
According to Mr. Mutumbi of the Chambers of Commerce in Solwezi, they can link companies to service providers such as PUM and partners such as the farmers union. The Chambers of Commerce can also organise a forum with producers, processors and other stakeholders.

Patents and Companies Registration Agency (PACRA)
PACRA is part of the Ministry of Commerce. Every business in Zambia must be registered by PACRA.
**Zambia Revenue Authority (ZRA)**
After registration by PACRA, companies will receive a mandatory tax identification number from the Zambia Revenue Authority.

**Zambia Development Agency (ZDA)**
ZDA was formed from 5 government institutions including Enterprise Development, Investment Promotion and Export Promotion.

ZDA prioritises export promotion for agricultural products and aims to organise the moringa sector, which currently consists of dispersed farmers.

ZDA can provide support for market access, facilitate Joint Ventures and support access to finance.

**Moringa Development Association of Zambia (MDAZ)**
MDAZ was established in 2017 to organise and strengthen the moringa sector in Zambia. MDAZ seeks strategic collaboration with all relevant government bodies, NGOs and private companies. The association envisions development of an internationally competitive moringa industry contributing to rural development, poverty reduction and women socio-economic empowerment.

Priority intervention areas identified by MDAZ:

- Access to affordable high quality moringa seeds for farmers.
- Access to technical support (incl. region specific protocols and guidelines for planting, harvesting, processing, controlling pests and diseases)
- Access to markets (incl. local and international certification)
- Research programme (e.g. seed development and control, product development)
- Enabling government policies and regulatory framework for protection, consumption, commercialisation and export of moringa

MDAZ aims to set up central processing facilities in every district to process moringa from outgrowers in compliance with international standards.

Additionally, MDAZ aims to establish cooperation with the Malawi moringa association and the South African moringa association (MDASA).

Mr. Ernest Nyambe is the president of MDAZ. He has a Masters in supply chain management from Bolton University (UK) and worked for Nestle in 4 African countries and for trader Louis Dreyfus Commodities.

**Africa Moringa Hub (AMH)**
AMH was established in 2016 as an Africa-wide platform for educational and promotional purposes. AMH has a relatively large amount of Zambian members, as they did not have a national platform before establishment of MDAZ.

AMH provides the following services for free:

1. Moringa updates are provided
2. Summarised presentations from Experts
3. Technical support on Q&A
4. A Calendar of upcoming events across Africa is provided.
5. Summarised reports on events/workshops/conferences across Africa will be posted.

Paid members can benefit from the following additional services:
1. **Business opportunities** - (Buyers, projects, investments) would be first posted here as and when we receive;
2. We shall support resource persons with airtime credit (bundle) for research and presentation. None hub members with Technical expertise would be invited to make presentations and later removed;
3. Summarized presentations will be posted across all our platforms with presenters picture, products, (Raw/value addition);
4. Stakeholders will benefit from all forms of communication via any opted medium they desire;
5. CR’s or member would be delegated and communicate the same events/workshops/conferences within Africa and report to the house;
6. We shall have an event once a year organised by stakeholders;
7. Q&A services available.

*Zambia Agricultural Research Institute (ZARI)*

ZARI is part of the Ministry of Agriculture and has the mandate from the government to provide phytosanitary certificates to companies. These certificates are mandatory for moringa exporting companies. The certificates are issued based on sample analysis. Samples are submitted by the respective companies themselves and ZARI does not inspect the companies.

ZARI expressed interest to MDAZ to breed and multiply standardised seeds for moringa trees.

ZARI is based at the Mount Makulu Research Station of the Ministry of Agriculture.

*University Teaching Hospital (UTH)*

UTH has a Food and Drug laboratory which also performs analyses for the Ministry of Health. UTH can analyse moringa products for validation and delivers analysis reports. Analysis by UTH is optional.

*Golden Valley Agricultural Research Trust (GART)*

GART is a scientific research centre linked to ZARI. GART is partly owned by the government and partly private. They encourage and train people to grow moringa and are involved in multiplication of moringa seedlings. In the period January-March 2018, GART supplied 11,000 seedlings to farmers. GART target small-scale farmers with on average 5 seedlings per farmer. These farmers mainly use the moringa leaves for own consumption, (chicken) feed and sales at village level.

GART is based in Chisamba.

*Zambia Bureau of Standards (ZABS)*

ZABS provides the following services:

- Standards development
- Laboratory analysis and certification
- Training on hygiene, quality assurance and occupational health and safety

ZABS is currently in the process of adopting a product standard for moringa products. The South Africa National Standard (SANS) 1683: 2015 standard for moringa is being reviewed by the Technical Committee on Traditional Medicines of the Southern African Development Community (SADC). Zambia has already approved the standard and according to Mr. Brian Mweemba of ZABS, SADC is expected to adopt the standard in 2018.

ZABS must prevent the sales of products on the Zambian market which do not comply with their compulsory standards. However, the moringa standard will be a voluntary standard.
In addition to the moringa standard, the ‘Zambian standard on organic farming and production’ is also relevant for organic moringa producers. The Code of Practice (ZS 725:2009) is available from ZABS for around 700 ZMW (~70 USD).

The laboratory of ZABS can analyse moringa products and issue a Certificate of Analysis. ZABS is accredited by the Southern African Development Community Accreditation Services (SADCAS) for mass metrology, volume metrology, dimensional metrology, temperature metrology, chemical and physical analysis. According to Mr. Mweemba of ZABS, ZABS is also accredited for microbiology and pesticides analysis. However, this was not substantiated with certificates.

A typical moringa analysis of ZABS contains information on:

- Vitamins (A + C)
- Minerals (iron, magnesium, potassium, calcium)
- Heavy metals (lead, cadmium)
- Pathogenic bacteria (salmonella, staphylococcus)
- Physical parameters (moisture)

Technical Development & Advisory Unit (TDAU) of the University of Zambia

TDAU has 2 departments:

- Production unit where they manufacture small-scale mechanical equipment for agro-processing
- Consultancy unit which provides consultancy services to food processors for selection and operation of (imported) equipment.

TDAU has some experience with supplying equipment to small-scale moringa farmers. They offer a screw press (off-the-shelf) for draining water from washed moringa leaves and a solar dryer. The solar dryer is currently being used by the company of retired professor Tomson Sinkala. Mr. Sinkala has a moringa out-grower scheme and previously worked with TDAU.

Citizens Economic Empowerment Commission (CEEC)

CEEC supports SME development through knowledge/expertise provision and credit (Citizens Economic Empowerment Fund). However, according to a study on demand for and supply of risk capital for agrifood SMEs in Sub-Sahara Africa, their resources are limited. As an alternative, CEEC identifies venture capitalists to invest in Zambian SMEs. In 2017, CEEC organised a venture capital symposium together with SensXAfrica.

Youth Development Fund (YDF)

YDF may also provide funding under certain conditions. YDF grants are open to youth associations, youth NGO’s and any other youth focused organisations whose work or activity contributes to the empowerment and mainstreaming of the youth. Application forms (including a YDF operations manual and a guarantor’s form) are available from the Ministry of Youth and Sport headquarters, all provincial youth development offices, District Commissioner’s offices and youth resource centres throughout the country.

5.3. Rules and regulations

Informal moringa trade at village level is not regulated. Farmers and local traders are free to trade moringa without a need to obtain legal documents.
Any entrepreneur in Zambia wishing to trade moringa in the formal market must register the business with PACRA and obtain a tax identification number from ZRA.

Many of the retail chains in Zambia require their suppliers to have a Certificate of Analysis from a recognised laboratory, such as ZARI, UTH or ZABS. The Certificate of Analysis shows if the quality of the product complies with the specifications of the retailer.

A phytosanitary certificate from the Ministry of Agriculture (phytosanitary department at Mt. Makulu research station or at the airport) is mandatory for exporters. The phytosanitary certificate confirms safety of the product for human consumption. According to Mable Mudenda, a plant health inspector at Mt. Makulu research station, companies are requested to obtain a plant import permit from the National Plant Protection Organisation (NPPO) in the Netherlands which stipulates the phytosanitary requirements. Based on these requirements, the phytosanitary department of the MoA will determine what they must inspect before they can issue a certificate. However, European authorities (NPPOs) only issue plant import permits for certain protected plants. Moreover, European authorities do not require a phytosanitary certificate for moringa powder and oil, as these are not listed in Part B, Annex V of Directive 2000/29/EC. Therefore, it remains unclear what Zambian companies need to deliver to the phytosanitary department.

Mrs. Mudenda could not say if on-site inspection is mandatory for moringa. In case the inspector determines a need for on-site inspection, the company will have to pay 150 ZMW (~USD 15) and costs for transport, accommodation and per diem of the inspector. Companies will also need to submit a sample to the phytosanitary department of the MoA for analysis of their product to obtain a certificate. In case the laboratory of MoA does not have capacity to analyse a specific parameter, such as Salmonella, they will require another government institution such as the veterinary department to perform the analysis.

The SADC moringa standard will be a voluntary standard. This implies that moringa companies are not required to comply with the standard by law. As long as the moringa product meets food safety requirements of the MoA, any quality or grade can be sold on the domestic market or exported.

Companies exporting to Europe must meet the European market requirements as described in the respective chapter above. In addition, they will have to provide a Certificate of Origin (EUR-1 form) and a declaration form of the ZRA with every consignment.

5.4. Investment license

Companies with a plan to invest at least USD 250,000 in a 5-year period can apply for an investment license. Companies with an investment license can receive support from ZDA with obtaining a permit to stay in Zambia from immigration authorities for the employer/employees. ZDA will also provide advisory services relating to land acquisition and licensing.

In addition to the above ZDA services, companies which invest at least USD 500,000 can receive tax incentives. ZDA provides 2 types of tax incentives:

- Tax-free import of equipment for a duration of 5 years
- Accelerated depreciation of equipment (1 year instead of 5 years)

Procedures and guidelines for obtaining an Investment Licence in Zambia
Anyone wishing to apply for an investment licence must submit the following documents:

- Completed formal application form from the Zambia Development Agency;
- Certified copy of certificate of Incorporation/Registration;
- Certified copy of certificate of share capital;
- Certified copy of an official list of shareholders and/or directors;
- Business plan or and feasibility study;
- Verifiable evidence of project finance;
- Non-refundable application processing fee of K1,280,000;
- Licence fee of K7,670,000 (payable only upon collection of licence).
- Any promoter seeking approval to establish an enterprise, under the Zambia Development Agency (ZDA) Act No. 11 of 2006, should include in their proposal, a clear and concise statement on how the enterprise, if approved is likely to contribute to the country’s economic growth and development.

The Investment Licence is valid for ten (10) years from the date of issue. The investor may apply for renewal of the investment licence before the date of its expires (Source: Ministry of Commerce, Trade and Industry, 2018).
6. Challenges in Zambian moringa export sector

6.1. Acquiring knowledge on moringa growing and processing

Many entrepreneurs are interested in growing moringa commercially. They need knowledge on growing and processing moringa. Without sound knowledge on managing diseases and pests for example, many trees will die. This is the experience of entrepreneurs who have been learning how to grow moringa by trial and error.

Farmers around the world have been growing moringa for many years and have probably identified solutions for many of the problems that Zambian entrepreneurs are now facing. Some of this knowledge is available online through websites such as www.moringanews.org. However, many entrepreneurs are unable to find the required solutions to their specific problems.

According to a representative of the Ministry of Agriculture, ZARI has knowledge on moringa growing and can do additional research. This knowledge can be made available to entrepreneurs through extension services. However, some of the large-scale companies are not convinced that ZARI can provide the necessary knowledge.

TDAU is a leading knowledge institute for agro processing technology. However, they focus on appropriate technology for small-scale farming. TDAU has limited knowledge on international food safety management standards. In practice, entrepreneurs must research processing technology themselves to identify solutions that will be acceptable for European buyers.

6.2. Organic certification for leaf powder

The European market mainly requires organic moringa leaf powder. India dominates the market for conventional leaf powder, but has difficulty to meet the strict European requirements for organic moringa. Supplying organic certified moringa to Europe is an opportunity for Zambian producers.

At this moment, there are no reported Zambian producers of organic certified moringa. Many small-scale farmers produce organic by default. They do not use any chemical inputs, because they cannot afford them. However, European buyers will require certificates as evidence of organic farming.

Zambia does not have a strong organic sector, as illustrated by the inactivity of OPPAZ, the lack of representation at the Biofach trade fair in Germany and the lack of certifiers in the country. There is little knowledge available on organic moringa production according to the EU standard and Zambia’s leading moringa producer Moringa Initiative foresees a particularly big challenge in organic weed and pest control. Without the use of chemicals, yields may drop considerably as many moringa trees will not survive. Moreover, inputs allowed in organic farming, such as neem oil for pest control, are not widely available in Zambia.

6.3. Certification of food safety management by large-scale companies

Europe has the highest food safety requirements in the world. Buyer requirements usually exceed the already strict legal requirements. They increasingly require suppliers to have an advanced food safety management system such as ISO 22000 in place.

At this moment, there are no reported Zambian moringa processors with a certified advanced food safety management system. This is not due to a lack of knowledge on food safety management. Most of the large-scale farmers have sound knowledge on food safety risks and measures to address them. Until now, there has been little incentive to invest in certification, as this is not required for the local and regional market.
6.4. Food safety management in out-grower schemes

After harvesting moringa leaves, they must be dried within hours to prevent the growth of micro-organisms (i.e. moulds). This poses a challenge for small-scale out-growers. They are often too far away from the aggregating company or do not have access to fast vehicles to bring their fresh leaves there within hours after harvesting. Drying by small-scale farmers themselves is generally not feasible due to the resources required for drying in compliance with international standards. Suitable small-scale dryers cost at least around a thousand Euros. More importantly, drying requires a thorough understanding of food safety management. Most small-scale farmers are unaware of the strict buyer specifications in Europe.

6.5. Access to capital

According to a study about demand for and supply of risk capital for agrifood SMEs in Sub-Saharan Africa, “access to finance – both loans and capital – for agrifood SMEs is more difficult in Zambia and Mali than in Kenya and Tanzania”.

Due to high interest rates of >30% on bank loans, many Zambian SMEs including moringa producers are looking for alternative financing. However, investment funds often find costs of due diligence and management too high for small investments of USD 50,000 to USD 1 million. To illustrate, AgDevCo in Zambia recently raised its minimum investment size from USD 250,000 to USD 1 million. This leaves Zambian moringa companies with very few financing options.

6.6. Export promotion

Many potential buyers in the Netherlands and other European countries do now know moringa. They need education about the benefits and uses of the product besides information on quality and prices. Existing buyers and other more informed buyers are often not aware of the opportunities for sourcing moringa in Zambia. When looking for new suppliers, they will focus on the more established countries such as India.

Zambian exporters must get exposure on the European market to promote their companies and products. However, they lack knowledge on the European market to prepare for trade fair participation and trade missions. Zambia Development Agency has a mandate to promote exports, but lacks necessary resources.
7. Recommendations

The following recommendations on a value chain upgrading strategy, a market entry strategy and opportunities for different Dutch and Zambian stakeholders can help to design a programme or projects to develop the Zambian moringa value chain.

7.1. Value chain upgrading strategy

Zambian stakeholders can use the following recommendations to upgrade their moringa value chains to internationally competitive value chains and make the export of moringa products to the Netherlands and other European countries feasible.

Organising out-grower schemes

Successful exports to the Netherlands and other European countries require considerable investments in processing equipment, food safety management, certification, R&D, promotion and other business development. Individual small-scale farmers do not have (access to) the financial (and human) resources necessary for such large investments. These investments are only feasible to make for large-scale processing companies including large-scale farmers.

Processors are in the best position to lead the organisation of out-grower schemes and provide such technical assistance. It is in the processor’s direct interest to continuously improve the product quality and productivity of the out-growers and to build long-term partnerships. NGOs or farmer associations can support the processors with establishment of out-grower schemes. They are often more aware of the interests of small-scale farmers and are in a better position to inform farmers about the benefits of participation in out-grower scheme and related risks and obligations.

Establishment of new out-grower schemes requires expectation management to prevent disappointments and defaulting. Standardised contracts between out-growers and processors can facilitate expectation management. Contracts can specify price (incl. payment terms), quality and services by the processor (e.g. training, organic certification, delivery of seeds and/or packaging material, transport to processor).

Assuming that small-scale farmers do not have access to sufficient financial resources, establishment of cooperatives of small-scale farmers for processing leaves or seeds for export will require grants to make the necessary investments. In addition, qualified personnel must be found to manage the cooperative.

Improving access to knowledge on moringa production and processing

Training on propagation, cultivation, harvesting and post-harvesting by out-growers can greatly enhance their productivity and quality. Processors with their own farms are usually in the best position to train out-growers. Several of the existing large-scale farms in Zambia have already developed good practices through trial and error which they can share with out-growers. NGOs can facilitate training of out-growers by organising
training sessions with technical expertise from the processor or alternatively from ZARI. In addition, NGOs can develop practical training materials such as booklets. For the production of these training materials, they may be able to use existing training materials (from other countries) such as those from the Moringa Association of Ghana and the Africa Moringa Hub.

Knowledge on organic moringa production will have to come from foreign experts as OPPAZ is inactive. NGOs can play a role in hiring organic experts and organising respective training. The training must aim to prepare the processor and out-growers for certification of compliance with the EU organic standard. Some of the main issues that need to be addressed in the training include organic pest and weed control.

Processors of moringa powder need certified food safety management systems such as ISO 22000. The training and certification may be supported through co-financing by donors or ZDA. The investment licenses of ZDA can also promote investment in processing plants through tax incentives including duty free import of technology.

**Improving access to finance**

Promotion of investment in moringa businesses is needed to establish export-oriented moringa companies. ZDA and CEEC both have mandates to promote investments and can play a role in linking potential investors to moringa companies looking for investment. In addition, they can support moringa companies with preparation of their applications or partner with other organisations which have the necessary expertise for such services, such as the Dutch BiD Network or the Private Enterprise Programme Zambia (PEPZ).

PEPZ funds support to Zambian SMEs for application for Private Equity/Venture Capital. The support is provided by Open Capital Advisors and Kukula Finance. The service includes the production of investor documents, such as an investor pitch. Kukula Capital, Incluvest and Business Partners’ Zambia SME Fund are some of the few investment funds in Zambia. Dutch NGO HIVOS with an office in Zambia has a Food & Lifestyle Fund. Other Dutch investors with activities in Zambia include the following members of the Inclusive Finance Platform: Cordaid, FMO, Triodos and Rabobank Foundation.

ZDA and CEEC can also set up business plan competitions such as the Nyamuka Business Plan Competition. In this particular competition, winning proposals get access to finance by the Africa Enterprise Challenge Fund (AECF). AECF provides between USD 250,000 and USD 1.5 million in funding. The winning proposals are selected on the basis of their commercial viability, innovation and potential development impact on the rural poor. Grantees co-finance a minimum of 50 percent of the total cost of the project.

**Establishment of national standard for moringa**

A national standard for moringa powder can support domestic market development. Leading retailers in Zambia are already demanding certificates of analysis to prove the quality of products. A national standard will provide a strong incentive to leading suppliers to comply with the standard and secure access to the leading retailers. These moringa suppliers will then be able to use the domestic market as a stepping stone to the more demanding European market.
ZABS is already in the process of adopting the SADC standard for moringa. They may still consult representatives of the moringa sector to ensure that the standard is suitable for Zambia.

**Accreditation of laboratories**

Depending on the quality parameters defined in the national standard, national laboratories must be able to offer respective testing services. This might require additional accreditation for ZABS or other laboratories.

Dutch and other European buyers will often require testing of (pre-shipment) samples in European laboratories and not accept test results from Zambian laboratories only. Therefore, accreditation of Zambian laboratories for testing of product characteristics outside the scope of the national standard is not deemed a high priority.

**Dissemination of information on procedures for sanitary certification**

A clear explanation of the procedures for issuing phytosanitary certificates will help moringa exporters to prepare accordingly. During interviews for this study, both ZDA and the phytosanitary department of the MoA were unable to provide clarity on the need for on-site inspection and the exact quality parameters to be assessed for conformity. The phytosanitary department of the MoA is responsible for these procedures and dissemination of relevant information on these procedures. In addition to publication on the website of the MoA, dissemination of this information can also take place through MDAZ.

By using an accredited laboratory for testing samples, the phytosanitary department can reduce the need by companies for multiple sample analyses. The companies can then use the test results from the phytosanitary department to assess their quality.

**Strengthening MDAZ**

MDAZ is a useful platform for sector action planning. Through an online platform and/or regular meetings their members can identify common problems in the sector relating to propagation, cultivation, processing, organising out-grower schemes and other moringa business aspects. The exchange of good practices to address these problems is a valuable service for members. Through involvement of national institutions such as the government and research institutions, MDAZ can represent the interests of the sector on national level and influence government policies and the research agenda of institutions such as ZARI. ZDA and AgriProFocus have both shown willingness to host stakeholder meetings by MDAZ.

Development of an (online) database of members by MDAZ can help its members to find business partners such as seeds suppliers or processors. These linkages are crucial for building value chains.

### 7.2. Market Entry Strategy

Zambian suppliers of moringa products can use the following recommendations to increase their chance of successful entry to the Dutch and other European markets.

**First local market then Europe**

Zambian moringa suppliers with the ambition to export to Europe can benefit from the existence of a local market for moringa in Zambia. They can use the local market as a stepping stone to the very
demanding European market with high quality requirements and strong competition. By first selling locally, companies can gradually develop their business and make profits to finance the investments necessary to become competitive on the European market.

Developing successful long-term exports to Europe requires time. Particularly European buyers of large volumes (>5 tonnes of powder annually) usually take time to do their due diligence and build a relationship with a new supplier. This process often takes more than a year, especially when the supplier still needs to improve quality and quality consistency of products. For example, development of the optimal drying process to achieve quality in compliance with international standards may take considerable time. During this time, moringa suppliers need to continue financing their operations and necessary investments. For companies without a large amount of starting capital, sales on less demanding markets can provide valuable income to finance further development of their business.

Besides the Zambian market, there are several other interesting markets in the region. Particularly South Africa offers additional market opportunities which Zambian companies can use to generate sales for financing of business development.

Focus on European market as a whole
Due to the small size of the Dutch market, Zambian exporters of moringa products are recommended to widen their geographic scope. Other countries in Europe, such as the United Kingdom, Germany and France have bigger markets. While business cultures in these countries may differ, requirements of importers are similar. Importers often operate Europe-wide, as is clearly seen at major international trade fairs.

Quality first
As many European buyers rapidly lose their interest when a new supplier delivers a low quality product, suppliers have one chance to convince these buyers. They must invest in the quality of their products before entering the market. This implies that Zambian suppliers have at least a HACCP system in place for food safety management and that they can show compliance of their product with international standards supported with a certificate of analysis. The certificate of analysis must represent the quality that suppliers can supply consistently.

Organic certification for product distinction
Exporters focusing on moringa leaf powder for food supplements have a much higher chance of success when they have an organic certificate. The organic certificate offers opportunities to avoid direct competition with Indian suppliers. The organic certificate supports claims that the moringa powder is natural and from a sustainable production system. Moreover, the organic certificate strengthens the image of the products as a healthy, raw food.

The organic certificate has slightly less value in the tea market. While the healthy and natural trends are also influencing the tea market, tea is not only a health product. For many people, tea is a common beverage that tastes good. Substantiation of claims related to the natural and health properties of moringa leaves is not as crucial as in the food supplements market. The Netherlands and other European countries have a large market for conventional tea products. Taste is a more decisive factor for successful entry to the tea market. As many consumers do not appreciate the taste of pure moringa, blending with other ingredients will be important to convince consumers to purchase moringa tea.
Story telling is a valuable tool for promotion

Story telling will help Zambian companies to develop the young European market for moringa products. The high nutritional value of moringa powder may not be sufficient for many European buyers to include the product in their product range. Several other green, natural, healthy, nutritional powders are already on the market. The story behind moringa can convince European buyers that moringa is a unique product which has more to offer than its nutritional contents.

The history of use is one of the most interesting elements of the story behind Zambian moringa. The importance of moringa for combating malnutrition amongst children in Zambia and other African countries will raise the interest of European buyers. Stories that show how moringa has been part of the solution for such a major problem are valuable for promotion. Evidence to support these stories make them more convincing.

Other interesting story elements are mostly centred around the concept of sustainability. Particularly suppliers working with out-grower schemes can make claims related to fair trade by telling how the trade in their moringa products contributes to the improvement of livelihoods of producers. Suppliers of moringa from organic farming systems or other types of sustainable farming systems can benefit from consumer concerns about environmental degradation by addressing such issues in their stories.

Product development for market development

Development of moringa-based products and knowledge on potential applications is important to help buyers with European market development. They need education on moringa uses to effectively promote moringa and widen the interest in the European market for moringa. Suppliers can show the traditional uses of moringa powder in Zambia such as soups and provide samples of moringa-based products.

Furthermore, market development requires European trade partners who are willing to actively promote moringa in Europe. Preferably, they have experience in promoting relatively new products such as moringa.

Participation in international trade fairs

Participation in international trade fairs is crucial for success in the European market. Participation offers two opportunities:

- Companies learn about the European market through discussions with potential business partners and their competitors.
- Promotion at trade fairs results in many valuable business contacts to develop into business through follow up after the trade fairs.

Companies which are new to the European market usually require several participations to establish trade. European buyers of large volumes (>5 tonnes annually) are generally reluctant to purchase products from new trade fair participants. They only start buying from new suppliers after meeting them several times.
The most relevant trade fairs for suppliers of moringa powder:

- **SIAL**
- **ANUGA**
- **BIOFACH** (requires organic certificate)
- **Food Ingredients / Natural Ingredients** and **Health Ingredients / Natural Ingredients**
- **Vitafoods**

The most relevant trade fairs for suppliers of moringa oil:

- **In-Cosmetics**
- **Vivaness**

### 7.3. Opportunities for different stakeholders

**Producers and exporters**

- Use the recommendations above to build a successful moringa business
  - Target the local market first before entering export markets and pay particular attention to food safety management during drying
- Approach potential buyers as listed in Appendix 1
- When ready to export your organic produce, you can meet buyers at the annual Biofach in Germany. Apply for easy and hassle free participation at the [Organic Africa Pavilion](#).
- Entrepreneurs with a plan to invest more than €250,000 in a moringa business can approach ProFound to explore co-funding opportunities.

**Importers**

- Contact ProFound or MDAZ to identify potential moringa suppliers in Zambia and to get help with establishing a sustainable source of moringa with small-scale farmers.

**Investors**

- As buyers are forecasting fast growth in the moringa market, there are ample investment opportunities in the Zambian moringa sector, including possibilities to leverage the investment for access to grant funding. Contact ProFound, CEEC or ZDA for details.
  - Apply for an investment license with ZDA to receive the benefits as described in this study

**NGOs**

- Use the business cases for moringa (powder or oil) production for export as presented in this study to apply for funding for establishment of out-grower schemes. Contact ProFound or the trade attaché of the Dutch consulate to explore funding options.
8. Appendix 1

List of buyers that showed interest in receiving offers from Zambian moringa suppliers

- Z-company: interested in organic moringa powder, oil and seeds
- Pfannenschmidt: interested in organic moringa powder
- Africrops: interested in organic moringa powder. Can import up to 50 tonnes over the years, starting with 5-10 tonnes.
- Olvea: interested in organic moringa seed oil
- Galke: only interested in small quantities (< 1 tonne) of organic moringa