

# *“OMV Oasis for Development and Cooperation” (Kharwa Camp, Block S2 / Shabwa)*

*Preliminary Analysis and Recommendations for the Project Implementation*

*(24.12.2009-16.01.2010)*

*final report by Daniela Siebeck*



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## EXECUTIVE SUMMARY

In September 2009, OMV Exploration & Production GmbH and Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH joined forces by signing a frame contract, in which OMV assigns GTZ to contribute its institutional experience, regional and technical know-how in order to support the efficiency and sustainability OMV's CSR strategy.

As part of its Cooperate Social Responsibility strategy in Yemen, OMV plans to supply staff and the local communities with *moringa oleifera* trees and other utilizable plants by establishing a green zone on the Kharwa Camp territory located in 'Arma District / Shabwa governorate.

*Moringa oleifera* trees, more widely known as "miracle trees" provide a wide range of exploitable benefits: Their leaves are rich in vitamins, proteins and amino acids, their seeds may be used for water purification or oil production and their bark as firewood. Apart from that the trees may grow in dry hot regions with only a moderate need of water.

By providing *moringa oleifera* trees and other utilizable plants for community at a later stage OMV intends to contribute to the improvement of health conditions, income generation and expansion of self-employment job profiles and hence on a long run increase motivation for social acceptance of OMV's presence in the neighborhood.

The Kharwa Camp green zone will serve as a "pilot project of a pilot project". It is what in empirical research is called a **pretest**, which

should help to evaluate the potential, feasibility and acceptance of the planned pilot project titled "OMV Oasis for Development and Cooperation".

In case of success the **pretest** (first phase) will be followed by the second phase, the handing over of moringa and other utilizable plants to community. The lessons learned, best practice and experience from phase one and two again may provide the basis for the preparation of similar projects in other OMV oil exploration countries.

It is the herein presented study's purpose to provide a preliminary analysis and recommendations regarding this first phase while including the following tasks:

- *Provision of a summary on Moringa oleifera (DS)*
- *Technical definition of adequate plants, availability and minimum needs (AT & DS)*
- *Definition of potential socio-economic benefits from plantation (DS)*
- *Definition of measures enhancing local acceptance (DS)*
- *Definition of appropriate location and design (AT, DS)*

Apart from these aspects, the potential of the green zone to improve living conditions for the staff and / or to enhance the communication between staff and neighbors should be observed.

In order to cover the botanical-technical as well as the social aspects of a successful project implementation the preliminary

analysis is carried out by an interdisciplinary research team: GTZ-IS assigned local botanic and agricultural experts from Al-Thuraya Agricultural Consulting and an international consultant specialized in conflict sensitive development cooperation and communication who is in charge of joining and synergizing the benefits of interdisciplinary research, filling gaps and presenting its results in the final report.

Research activity included analysis of secondary literature, interviews and group discussions in Sana'a as well as during field trips to Shabwa and Tihama.

During a 5 day field trip to Tihama (Adel Sallam & Dr. Abdulwali Al-Khulaidi, Al-Thuraya), the existence of naturalized (imported) moringa trees could be confirmed, connections to the local agricultural office and local nurseries could be established, that may be of benefit for

multiplying *moringa oleifera* seedlings in future.

For security reasons the author, being a foreigner, had to split the intended 3-4 day visit to OMV Kharwa Camp into two separate one day visits: The first visit served informing Kharwa field management about the project and a workshop for determining potential locations for the test plot as well as for gathering background information on CSR needs and visiting potential sites. The second visit, now together with the experts from Al-Thuraya, served the discussion of the OMV Oasis draft design (single interviews with questionnaires) and CSR approach at OMV.

Interim results were presented to OMV and GTZ on the 16<sup>th</sup> of February at OMV. The final report will be presented to GTZ-IS, OMV Management in Sana'a and Kharwa Field Management.

## SUMMARY OF KEY FINDINGS:

### BOTANICAL – TECHNICAL

- *Moringa oleifera* is not an indigenous plant in Yemen, however *moringa oleifera* trees are reported to have been introduced (naturalized) by the British (Aden, Abyan) and by Russian road constructors (Tihama) as wind breaker. The existence of a small number of *moringa oleifera* could be confirmed in Wadi Surdud (Tihama). Locals use the trees as sun shelter in their backyards and call it “Shajarat Al-Hadiqa” (Garden-tree) or “Shajarat Al-Tuyur” (Bird’s tree). Its nutritional and / or medical benefits are not known by community.
- Almost every part of the *Moringa oleifera* except for its root’s bark is edible and highly beneficial to health. While leaves, flowers and fruits contain a healthy set of vitamins, amino-acids, and proteins, the root’s bark contains toxic alkaloids (0.105 %), hence should be avoided.

- Moringa peregrina, a plant sharing similar medical and nutritious characteristics as *moringa oleifera*, is indigenous in Yemen. Moringa peregrina trees are reported to grow in Hagdah (west of Taiz), Bayt al Faqih (Tihama), Aden, Dunaf Island, Harib (Marib Governorate), Lahj, Hadhramawt and Shabwa. The existence of moringa peregrina could be confirmed in Wadi Ahmad and Wadi Dharwa, both in Shabwa governorate. Local community members call the tree “Ban”. While in neighboring Saudi Arabia Bedouins of Khawaj region use the tree for medical purposes, local community in Shabwa seemed not to be informed about its nutritional and / or medical benefits.

- Both species *moringa oleifera* and *moringa peregrina* growing in Yemen are rare, most of the *moringa oleifera* found in the Tihama are in a weak condition. Both species are threatened by extinction.

#### RECOMMENDATIONS

- Site A: It is better to use Kharwa water rather than the Habban type because of the lower content of sodium.
- ‘Washing out’ treatment before planting: irrigating the planting pits before planting (500 liters/hole each time)
- Cultivation has positive long term effect on reducing salinity

→ Using organic manure continuously (dosage depending on age of plants) for improving the soil’s physical and chemical characteristics (i.e. pH values, balance the effect of basic ions to some extent.

→ Using minimum amount of chemical fertilizers of acidic type i.e. ammonium sulfate not urea

- Monitoring: Periodical analysis and adaptation should be carried out to observe the level of salinity and sodicity to set preventive measures to enhance the quality of planting and growing conditions

#### SOCIO- ECONOMIC BENEFITS

- Socio-economic benefits arising from *moringa oleifera* include a high potential of fighting malnutrition, improving livestock products (milk, meat), to a lesser extent improving equal access to clean water, as water purified with moringa seed still needs to be boiled to fully eliminate bacteria. As OMV already has distributed water filters, promoting moringa seed for human drinking water purification would reduce the credibility of the former project.

More feasible socio-economic benefits are health, saving income, and generating income through self employment



- Farming/Animal Husbandry:
  - ✓ increase of milk production and health of livestock
  - ✓ increased production of crops, milk, meat may enable to sell excess of these products
- Household:
  - ✓ free, fast re-growing alternative to increasingly expensive and rare gas moringa oleifera can grow 60-90 cm in 4-6 months. Only 19% of the Shabwani population has access to gas. Gas prices vary between 700-1500 RY for a refill, depending on availability
- Individual Health Care:
  - ✓ improvement of human health condition
  - ✓ fighting malnutrition
  - ✓ Possibility of increased immunity against infections.
- Moringa leaf powder, when stored in a dry, airtight bag becomes a 'take a way' food which is crucial for Bedouin families' benefit. They could be supplied with trees in certain stations on their routes and integrate Bedouin into the group of beneficiaries.
- Self employment opportunities:
  - ✓ Production of moringa oil income generation and extension of income generating fields.
- Presently income is derived mainly from farming, livestock, salt

collecting, small-scale building construction, bee-keeping and revenues from abroad.

- ✓ To these several professions related to the production of cosmetics, oil and natural medical cures may be added if training on the job is provided.
- A market research should be carried out to investigate possible feasibility of moringa products from Shabwa at a later stage (i.e. soap, perfume, oil, tea).
- Some of these products could be marketed through Sana'a based women's NGO's (Our House for Cultural Heritage and Development) or honey shops (i.e. Moringa-Sidr Honey-Goat-Milk soap).
- OMV may also consider supporting the marketing of fair trade products abroad.

#### **SOCIAL ACCEPTANCE**

- Shabwa is one of "ignored" or "underserved" governorates in Yemen; Arma district is one of the poorest districts in Shabwa.
- Arma is inhabited by about 10 000 people. Local community of Kharwa camp neighborhood are mainly Bedouins and inhabitants of small settlements who live from livestock farming, rain fed agriculture, bee-keeping, and building construction related jobs

- The security situation is marked by an emerging reportedly Al-Qaida affiliated terrorist movement that has made headlines in the past months. Tribal warfare may impact on project performance but does not target OMV in general. High expectations from community sometimes are communicated in combination with threats, which together with kidnappings may impact on OMV asset, and staff security. Risks arising from high expectations may be mitigated by creating a human connection and eventually social acceptance.
- Government is perceived as absent, Oil companies are present, they make profits, they are reachable and through the flare pits seen from far away.
- A classical security strategy of international organizations is keeping a “low profile”. That however doesn’t mean that one has to be anonymous. In fact creating a human connection with the neighborhood needs having an individual profile. Local community projects are meant to balance out the negatively perceived impact on environment and disappointment with the fact that the company cannot employ everyone living in the region. Until now negatively perceived impacts are visible and because of their location immediately linked to the company while the company’s link to positive aspects such as community projects is only known

by those who immediately were involved in setting up a project. By integrating OMV corporate identity colors, by presenting itself as an individual neighbor (from the Alps) OMV can create such a human connection and increase a positive perception of the company’s presence.

Adding to that the European origin if the company should be emphasized to prevent being taken responsible for in the region unpopular US American political or military decisions

- Social acceptance is not only important for security but also for sustainability of a project. In order to gain social acceptance this study recommends an approach that has been newly developed and is based on the consensus and input from community members of tribal regions and donors. This approach (CIRES) suggests that Credibility, Integration, Responsiveness, Equality, and Self-sufficiency are the key aspects of social acceptance (examples provided in this presentation).

**MEASURES ENHANCING CIRES DURING THE TEST PHASE ARE:**

- Association with the native and positively perceived plants *moringa peregrina* (ban), appreciated *ziziphus spina christi* (sidr). In respect to religious affinity to the tree the latter should not be cut down unless studying local tree management confirms cutting down as accepted practice.



- Introducing project as park for staff with secondary goal of seeing if trees will be beneficial will underline that project is not financed by funds dedicated for local projects. Transparently communicate that.
- Communicating that test plot is a test plot, enable community to watch its development, get attached to the project, involving in dialogue about the project, seriously considering suggestions for further project implementation. Seeking continuous community and local government consultation.
- Creating link to OMV CSR- focus on water, health, education, animal husbandry & beekeeping (moringa oleifera: water purification, nutrition, medical properties, agricultural training, animal fodder, link with ziziphus spina christi)
- Inviting small groups of selected visitors, school classes, health unit staff, farmers – carry out joint activities that are linked to the project (drawing: design of info-boards related to the tree plantation and benefits arising from trees, generation dialogue activities on traditional medicine, water management, agriculture and beekeeping)
- Working with a community group of direct implementing partners (women) and beneficiaries.
- At an initial stage and later on project could be presented as low profile though having great potential (vegetable oil): trees should be distributed to households
- Later: Possible cooperation with Social fund for Development training when trees are handed over to community
- Choosing, training income generation activities that fit with existing traditions: agricultural skills, producing cosmetics and soap at home (women). Offering trainings that respond to traditional gender roles and perceptions.
- Training in the production of those moringa products that do not demand high tech equipment, create new needs.

**RESEARCH RECOMMENDATIONS (IN COOPERATION WITH CSR STAFF):**

- Practical assessment on potential of linking with traditional cosmetics, crafts related to plants, oil, medicine
- Stakeholder analysis INCLUDING relationships between (especially local) stakeholders.
- Local market analysis on potential of moringa products, health and quality standards in case of such / marketing strategy for abroad

**CHOICE OF LOCATION AND TEST PLOT DESIGN**

- Plot A known close to stallion security emerged as the favorite test

plot location: Here all botanic – technical, social, practical and security conditions are met. Lack of soil and water quality may be mitigated by improving planting conditions.

- The test plot may apart from being a pilot plantation serve as a (1) recreational facility for OMV staff. Presently visitors to the camp have to sit outside the berm with CSR staff. Not being able to invite a guest to a comfortable seat, shade, and some tea contrasts with traditional hospitality and security relevant trust-building. Hence the test plot may be (2) utilized by CSR for receiving selected visitors, inform about / and support CSR staff in seeking participation from community with regard to the future handing over of trees. By specific activities, community input may help to adapt the project to community needs, concerns and conditions. Being a pilot the test plot if successful (3) may serve as a prototype for future projects and hence should be of aesthetically attractive for internal or external reporting.
- There are six local species that could be planted in addition to *moringa oleifera*: *Acacia campoptila*, *Acacia ehrenbergiana*, *Anogeissus bentii*, *Balanites aegyptiaca*, *Boswellia sacra*, *Ziziphus leucodermis* and *Ziziphus spina-christi*. The latter of these (Christ’s Thorn / Sidr) seems to be the most promising candidate as associate plant, as it is highly

appreciated in the region (economic, medical and religious reasons).

- The design hence should include the following elements: (1) a two unit caravan that could be utilized as CSR office and reception area with a “divan”. Through large windows guests can see the plantation and enquire about it while step by step getting acquainted with the project. Guests will understand that a recreational area that also serves testing the trees is not coming from community project budget. (2) information boards on the tree (visually attractive - little text, understandable also for weak readers); (3) benches and tables with sun-shelter (until trees are fully grown). Landscaping may follow different aesthetic perceptions either natural distribution of trees or “order” as long as security needs (proper sight, no hiding places) are met.

#### WEAKNESSES OF STUDY

- In response to the security situation as well as to the project’s phase the tasks of carrying out a stakeholder mapping / interviews with community members had to be taken off the original ToR. In consequence community related parts are fairly theoretical. To fill the gap additional research in coordination with CSR field staff will be needed during the test-phase implementation

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## ACRONYMS

OMV	formerly Österr Mineralöl Verwaltung AG (ÖMV), since 1995, today OMV exploration & Production GmbH
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit GmbH
GTZ-IS	GTZ-International services
TDA	Tihama Development Authority
CPF	Central Processing Facility
EPF	Early Production Facility
CIRES	Credibility-Integration-Responsiveness-Equality-Selfsufficiency-Approach for social acceptance
CSR	Corporate Social Responsibility
Ca	Calcium
CEC	Cation Exchange Capacity
CSR	Corporate Social Responsibility
Cr	Critically Endangered
EC	Electrical Conductivity
EC mS	Electrical Conductivity millisiemens
EN	Endangered
Ex	Extinct
K	Potassium
LS	Loamy Sand
mEq	milliequivalent
Mg	Magnesium
mS	millisiemens
N	Nitrogen
Na	Sodium
NT	Near Threatened
OM	Organic Matter
P	Phosphorus
pH	Hydrogen ion concentration
ppm	Part per million
RSC	Residual Sodium Carbonates
S	Sand
SAR	Sodium Adsorption Ratio
SL	Sand Loam
Tex	Texture
vu	vulnerable



## ACKNOWLEDGEMENTS

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Special gratitude is owed to all those, who with their advise, support and readiness to sacrifice their spare-time for interviews and who contributed to the quality of this study.

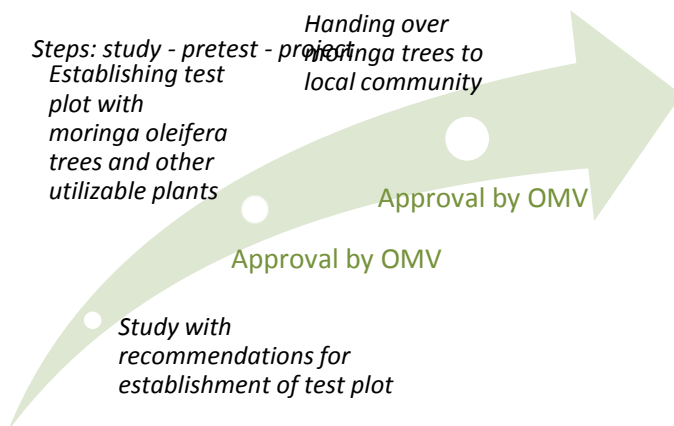
Special thanks to OMV Sana'a and field management for supporting the team during this study:

- to Sam Loli for providing literature of past studies, sharing background information on CSR projects, providing contacts to field staff
- to Karim Al-Gasimi, and all field management members, Kharwa Camp for saving time for a workshop on an extremely busy day, for an interesting discussion, all participants of the questionnaire on the test plot utilization and design
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## 1. THE PROJECT: IDEA, TARGET GROUPS, LOCATION

OMV is committed to contribute to enhancing better living conditions in the neighborhood of Block S2 Kharwa Camp. Since two years ago the company's CSR section is running about 12 community projects per year which include services such as improvement and maintenance of school buildings or mosques, and water collection facilities. Additionally OMV offers emergency care for neighboring community at its field clinic of Kharwa Camp.



Independently of these projects (and their funds) OMV wants to supply community with *moringa oleifera* trees. *Moringa oleifera* trees ("miracle trees") have been used in development projects around the world as they provide a wide range of exploitable benefits ranging from medical use to the production of cosmetics; they may be used for fighting malnutrition, as a

fast growing source of firewood or for biological water purification.

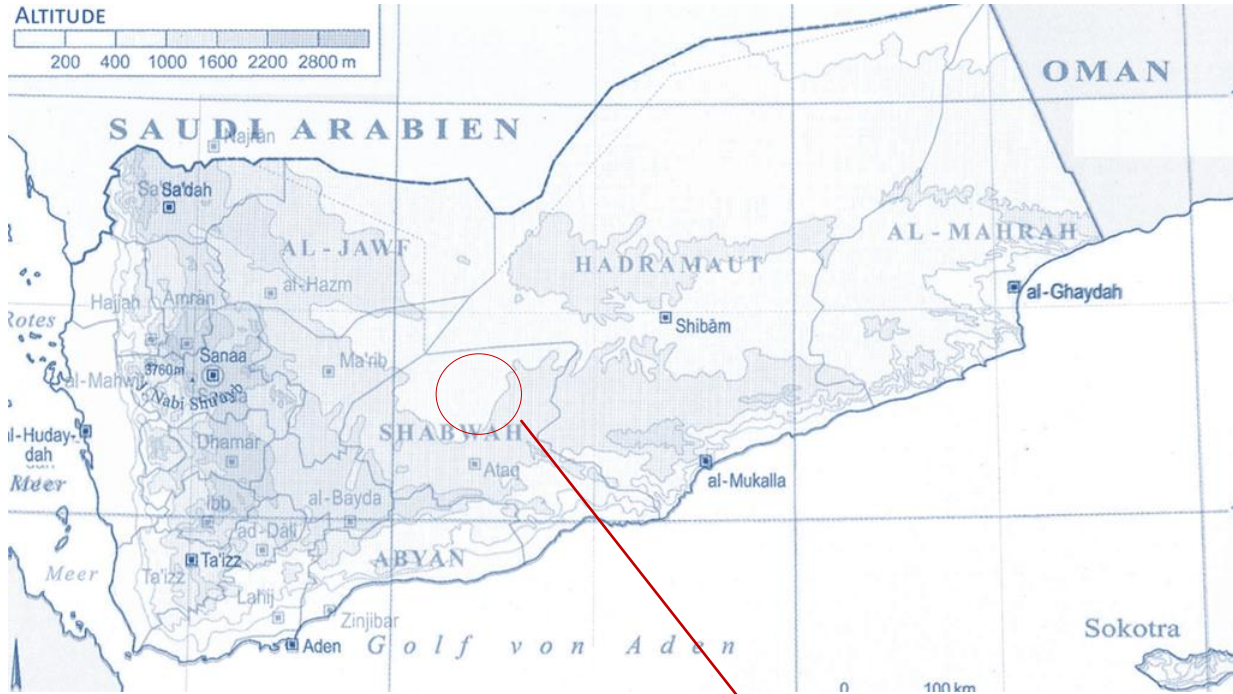
The aspired long term community benefits of the moringa oleifera and other trees to be tested in plantation are the improvement of health conditions and income generation (see 3. Potential Socio-Economic Benefits).

In return the project is expected to contribute to an increased social acceptance of OMV's presence in its neighborhood. In contrast to the previous community projects, this project could be beneficial for community at individual household level: By distributing trees at a later stage every family could be supplied with its own part of an OMV project.

Adding to community benefits, providing the Camp with a green zone - the test plot – will improve living conditions at Kharwa Camp until the new CPF with its residential area is established. It may additionally be useful for enhancing communication between staff and / or community.

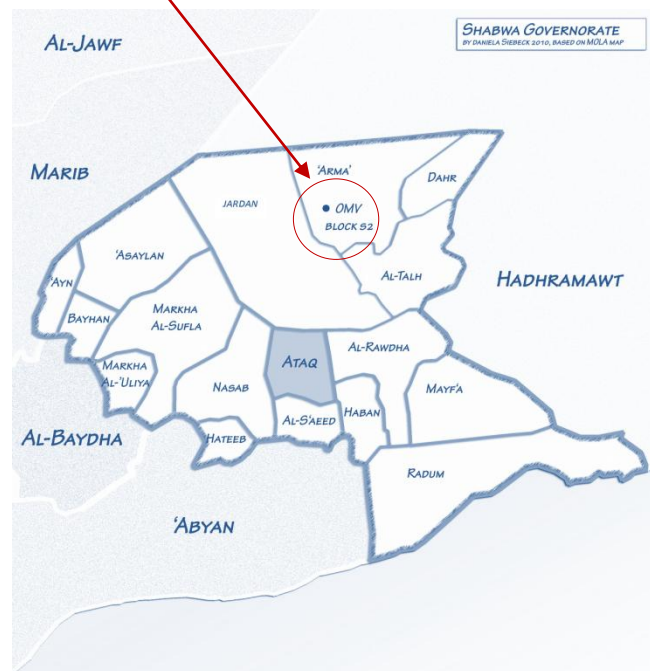
During the first steps staff may benefit from the test plots recreational value, while consulting with selected local community members on how to at a later stage local community may benefit from the project.

The CSR project in Yemen is considered as a blueprint for the establishment of similar projects in other OMV exploration countries.



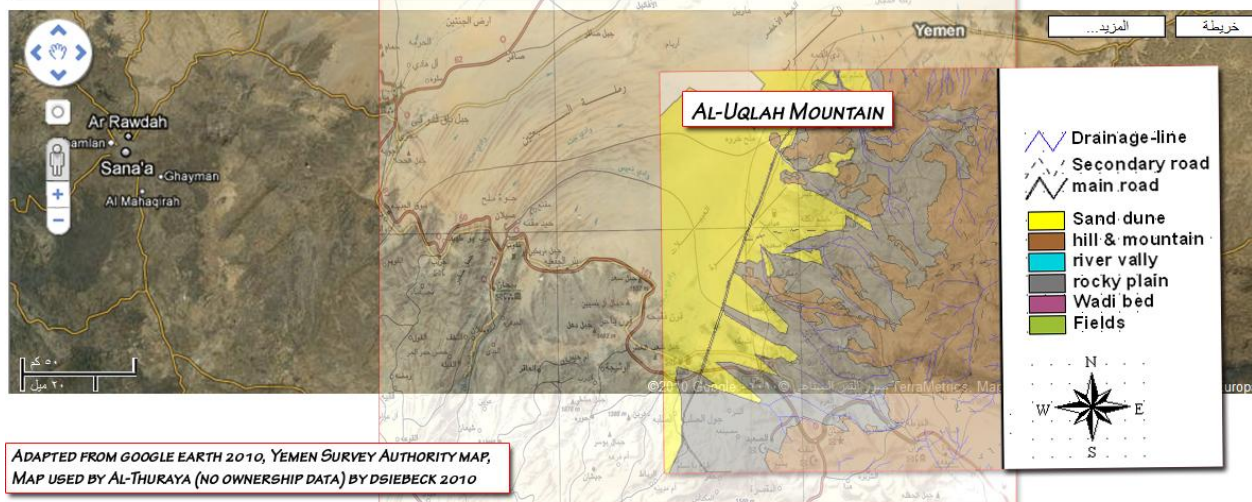
Block S2, Kharwa camp lies in Arma District of Shabwa Governorate about 400 km South East of Yemen's Capital Sana'a in the Ramlat Al-Sabatayn desert. Arma District lies in the North East of Shabwa Governorate (km from Ataq). The administrative district borders with Hadhramawt Governorate in the North, with Jordan district in the West, Dahr districts in the East and with Al-Talh district in the South. The average population density is nearly 7 inhabitants / km<sup>2</sup>.

Though vegetation is sparse the land around Kharwa Camp is mainly used for livestock grazing and small scale rain-fed agriculture along Wadi beds.





## TOPOGRAPHICAL CHARACTERISTICS



The altitude ranges between 800 and 1400m above sea level. The main topographical units of the OMV camp and surrounding areas are<sup>1</sup>:

- Rocky plain with numerous drainage lines and channels
- Limestone mountains and Plateau
- Sand stone hills
- Sand dune area
- River valleys (Wadis)

Arma district is characterized by an arid climate with and limited rainfall (0 – 100 mm/year). Hence it is located in zone 13 of the agro-climatic zonation.

Seasonal rainfalls however (during January – June) may lead to the sudden flooding of the region. Such floods where reported on in 1996 and more recently in 2009.

The daily evapotranspiration level varies between 3.5 – 4.0 mm/day during the winter season (November – January) and 9.5 – 11.0 mm/day during the hottest summer months (July & August) with an annual level of approximately 2700 mm.

The monthly maximum average temperature ranges between 27.5 – 30 C, during the cool months (Nov. – January) while temperatures go up to 40.0 41.0 C during the warmest months (June –August).

The monthly minimum average temperature is 11 C in the cool months and 25 C for the warmest months (June – August).

However, winter temperatures may decrease to freezing level (up to -4) during the nights in December & January. During these months the difference between day and night temperatures may go up to 30 C.

## 2. ADEQUATE PLANTS, AVAILABILITY AND MINIMUM NEEDS

While the focus of the plantation lies on *moringa oleifera* the possibility of including other utilizable plants was to be considered in this study<sup>ii</sup>. This to some extent was motivated by the need to avoid classical monoculture risks (such as the easy spread of pests specialized in one species) as well as to have alternatives in case *moringa oleifera* would not grow under the given circumstances.

Seven tree species that were named by local community as native to Shabwa where recommended by Al-Thuraya Team: *acacia campoptila*, *acacia ehrenbergiana*, *anogeissus bentii*, *balanites aegyptiaca*, *bos-*

*wellia sacra*, *ziziphus leucodermis*, and *ziziphus spina-christi*<sup>iii</sup>.

With regard to the availability of information on the species, the small scale test plot and a shared characteristic of the trees that could be communicated to outsiders as a rationale, apart from *moringa oleifera* two tree species shall be introduced in detail: *Moringa peregrina* and *ziziphus spina christi*.

They all have in common that they are multipurpose “medical trees” with a potential of offering a variety of socio-economic benefits to local community.

### 2.1. MORINGA OLEIFERA: CHARACTERISTICS, AVAILABILITY, NEEDS

*Moringa oleifera*, often referred to as “miracle tree” is the most famous species out of the 13 member moringaceae ‘plant family’. It has been attributed with this name for its high value of vitamins, amino acids, proteins and iron which makes it one

of the most nutritious trees worldwide (see 3. socio – economic benefits).

Being spread all over the world the tree bears several names ranging from “morunggay” (Philippino), “saragwa” (India), or “drumstick tree” in allusion to the shape of its fruits, to “horseradish tree” (English) or “Meerrettich Baum” (German), in allusion to the taste of its roots. These in where used small quantities as a substitute to the ‘original’ horseradish, which comes as a small shrub.



### BOTANICAL CHARACTERISTICS: *MORINGA OLEIFERA* (*MORINGACEAE*)<sup>1</sup>:

- A deep rooted graceful, deciduous tree with sparse foliage and a typically umbrella shaped crown up to an 8 m high and a 60 cm diameter stem
- Soft wood, dark grey colored, bark resembles cork
- Leaves: dark green (top), pale white (under surface), up to about 90 cm long, with opposite pinnae, with a slightly larger terminal leaflet. Single leaflets are often rounded-elliptic and rarely as much as 2.5 cm long.
- Sweet smelling, white-greenish, bisexual, flowers throughout the year
- The fruits (pods) are up to 90cm large, 15cm broad and easily recognized. They are slightly constricted at intervals, gradually tapering to a point, 3 angled, with 2 grooves on each face
- Seed: rounded blackish and oily, each with 3 papery wings

### MINIMUM NEEDS

Originally native to the sub-Himalayan region in India, *Moringa oleifera*, is found in Africa, Arabia, South East Asia, the Pacific and Caribbean Islands and South America (see map in chapter 3. Socio-Economic Benefits). It has adapted to various different environments ranging from tropical to semi arid regions. This high ability to adapt in different environments may have motivated the creation of its Senegalese nickname “Never Die Tree”<sup>iv</sup>.

*The ideal circumstances for moringa oleifera are:*

- Temperatures: from 25°C to 35°C
- Altitude: between 500 – 1200 above sea level
- Soil: well-drained sandy loam or loam soil, tolerates clay
- Water / drought tolerant: between 250 to 1500 mm/year
- prefers slightly acidic soils

*Threats:*

- Temperature: more than 48°C in direct sunlight<sup>v</sup>, less than - 4, however re-grows quickly

- Soil quality: muddy soil / prolonged water soaked soil
- Soil - pH values: tolerates between up to 9 pH<sup>vi</sup>

Pests that may impact on the condition of the tree are rare. Insect pests include termites, aphids, leaf-miners, whiteflies, and caterpillars are reported to affect it<sup>vii</sup>. Yet the use of chemical pesticides should be held low if the plant’s products are utilized for medical or nutritional purposes.



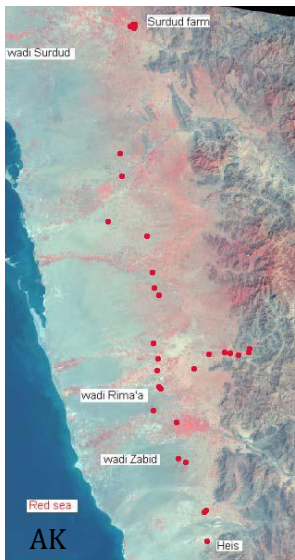
*Pests: Mites cause general yellowing of leaves; close-up of caterpillar consuming leaf tissue<sup>viii</sup>*



## AVAILABILITY: *MORINGA OLEIFERA* IN YEMEN

During two field trips carried out by Al-Thuraya team the existence of two members of the moringaceae “family” could be confirmed in Yemen: *moringa oleifera* and *moringa peregrina* (see next chapter).

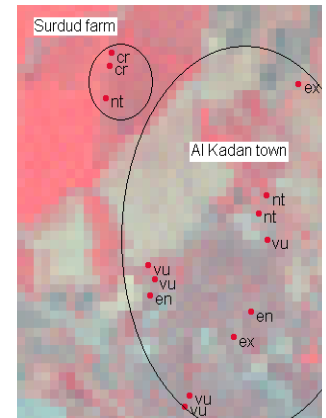
*Moringa oleifera* trees were found in the Tihama, a governorate lying on the Red Sea Coast in Western Yemen. As can be seen in the image below the field trip included several stations along the Taiz - Hudayda Highway (red spots), which was built by Russian road constructors in the 60s. Indeed these road constructors are believed to have brought the trees to Tihama in order to use them as windbreaker or - as they are sensitive to wind more likely- as fencing tree<sup>ix</sup>. Other records mention Hagdah (Taiz Governorate) Bayt al Faqih (Tihama Governorate), Aden, Dunaf Island, Harib (Marib Governorate) and Lahj as regions where *moringa oleifera* were naturalized<sup>x</sup>.



Local community members in Tihama were not informed about possible traditional medical or culinary utilization of the *moringa oleifera* trees. They cultivate single *moringa oleifera* trees in their backyards as ornamental tree or sunshade and refer to it as “Garden Tree” (arab. shajarat al-hadiqa / شجرة الحديقة) or “Birds Tree” (arab. shajarat at-tuyur / شجرة الطيور).

The majority of the small number of trees, only 14, was found in Wadi Surdud and Al-

Kadan town (see left). Most of them were in poor condition (vu: vulnerable; nt: near threatened; en: endangered; cr: critically endangered; ex: extinct)<sup>xi</sup>. In spite of that condition the trees produced seed that could be collected, grown and used for multiplying moringa seedlings under improved circumstances (provision of adequate soil, water, botanical supervision).



As a single *moringa oleifera* tree’s yield in pods is calculated as an average of 50-70 kg/year in favorable circumstances<sup>xii</sup>. With regard to the trees’ condition found in the Tihama one may assume a smaller number. However as can be seen in the picture (below) some prospering trees were found, too. One of the many pods seen on it contains about 15-20 seeds, which illustrates that one healthy tree may already carry sufficient seedlings for starting up a new plantation. The small number of presently existing trees hence does not significantly impact on the availability of enough seed for the test plot (estimated 300 seeds).



The possibility of such an arrangement was discussed with the Tihama Development Authority manager (Mr. Abdulla Seif) who signaled readiness to cooperate and to prepare a plot of land as an interim *moringa oleifera* nursery<sup>xiii</sup>.

## 2.2. MORINGA PEREGRINA: CHARACTERISTICS, AVAILABILITY, NEEDS

### CHARACTERISTICS

Moringa peregrina, together with other moringaceae, is referred to as “Ben-Tree” which to some extent may be confusing. In Shabwa the tree is called “Ban”

Less prominent than its famous relative, it shares similar medical properties with *moringa oleifera* and hence may be the optimal “plan B” in case *moringa oleifera* does not prosper in the region.

Moringa peregrina belongs to native trees that are considered vulnerable to extinction, hence planting and promoting the utilization of these trees also is a



contribution to preserving biodiversity, anti-desertification and preservation of medical plants in the region.

### **BOTANICAL CHARACTERISTICS MORINGA PEREGRINA (FORSK) FIORI (MORINGACEAE)**

- *Deciduous tree*
- *3-10 m high,*
- *Erect trunk with greenish-white bark.*
- *Leaves: up to 30 cm long, the axes are persistent with early deciduous leaflets. Each leaf is formed of 3 pairs of long, slender junctiform pinnae [wing-shaped like seen in ferns].*
- *Leaflets are remote, small, oblong*
- *Flowers and fruits appear (February-April) before leaves (May)*
- *The pendulous pods ripen in October.*
- *The pod contains angled, nut-like white seeds (behen nuts) which are of bitter sweet taste and rich in oil (ben oil).<sup>1</sup>*

In ancient history, Romans, Greek and Egyptians used oil<sup>xiv</sup> from the tree’s seeds for making perfume and skincare products. In traditional medicine leaves, flowers and seeds were used as painkiller, against burns, constipation, fever, and as laxative. The bark of the tree was used to remove

freckles. The wood is seen as a good source for firewood and charcoal.

Moringa peregrina grows even in harsh conditions and is draught resistant. Being a native tree in the region it is adapted to

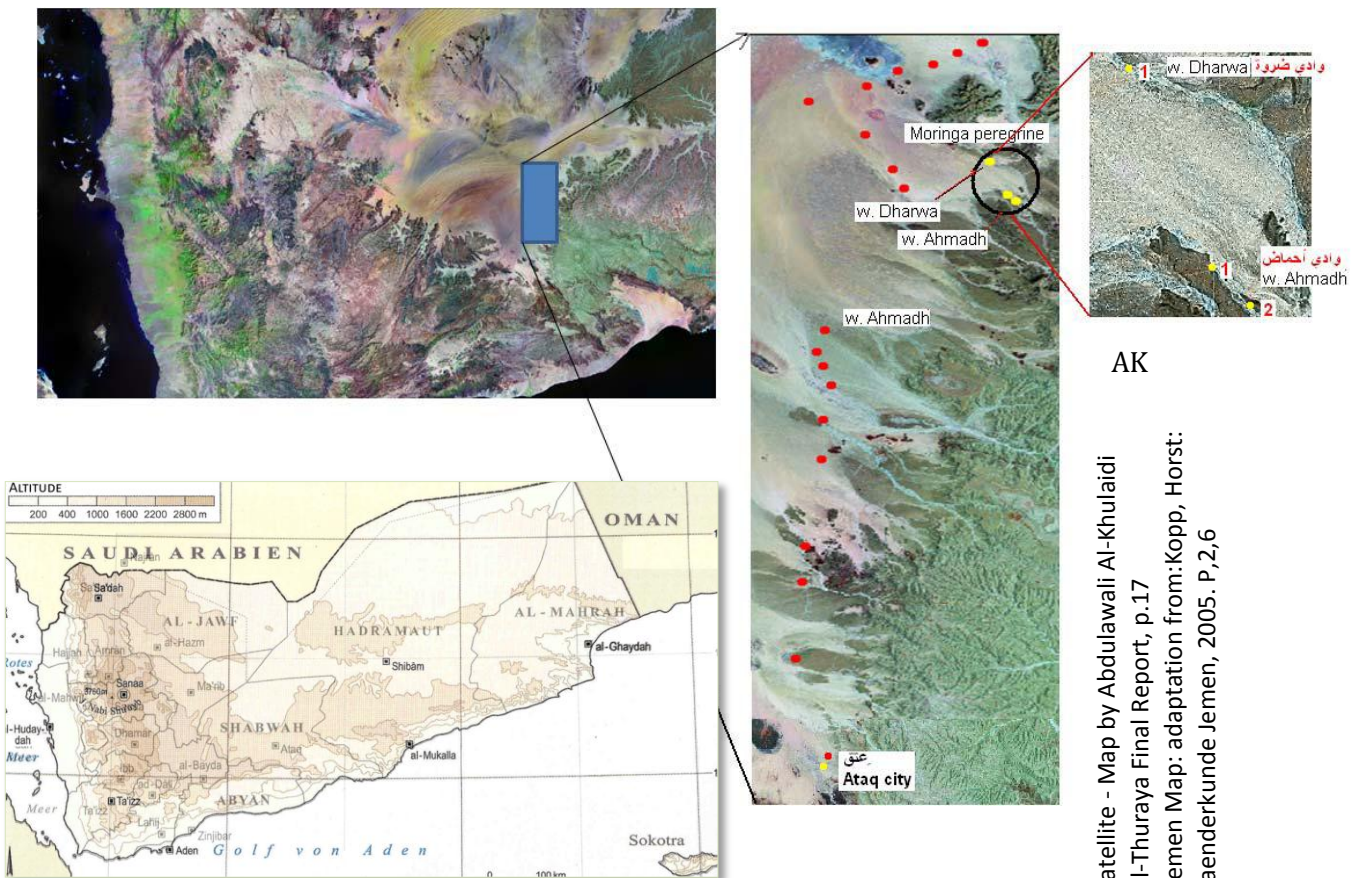


high soil salinity, hot temperatures and little water.

*Moringa peregrina* (Ban) was found in 2 sites, 2 species in Wadi Ahmadh and 1 species in Wadi Dharwa. The species were found at the edge of flooded wadis. According to the Bedouins of the area, both Wadis were full of *moringa peregrina* until a severe flood destroyed the trees in 1996.

Generally the remaining trees are threatened and may be extinct in near future. The following map (Fig.12) shows investigated sites including *moringa peregrina* sites.

Seed may be collected from the wild and multiplied with assistance from Ataq Agricultural office.



AK

Satellite - Map by Abdulwali Al-Khulaidi  
 Al-Thuraya Final Report, p.17  
 Yemen Map: adaptation from:Kopp, Horst:  
 Laenderkunde Jemen, 2005. P,2,6



## 1.1. ZIZIPHUS SPINA CHRISTI (SIDR/سدر) - THE TREE OF PARADISE<sup>xv</sup>

### **Botanical characteristics: *Ziziphus spina christi* (Rhamnaceae):**

- shrub, sometimes a tree, reaching a height of up to 20 m and a diameter of 60 cm;
- bark light-grey, very cracked, scaly; trunk twisted; very branched,
- crown thick; shoots whitish, flexible, drooping; thorns in pairs (...)
- Flowers in cymes, sub-sessile, peduncle 1-3 mm.
- leaves large, ovate-lanceolate (...), 2.5-8.5 cm long and 1-3.5 cm wide, margins slightly crenate, 3 strong veins from the base, lateral veins inconspicuous;
- flowers many per cyme, peduncle up to 1.5 cm; fruit 2 cm in diameter (...)"  
(AGROFORESTRY DATABASE: A TREE REFERENCE AND SELECTION GUIDE VERSION 4.0<sup>1</sup>)

*Ziziphus spina christi*, more widely known as *Christ's Thorn* enjoys great popularity in the Middle East and Gulf region. The Latin name is an allusion to Jesus' "crown of thorns" mentioned in the Bible<sup>xvi</sup>.



The tree, called "Sidr" (arab. سدر) in Arabic, also appears in the Quran: Here it is mentioned as a survivor of the great flood that marked the end of the Sabaeen kingdom, hence the beginning of the new Islamic era<sup>xvii</sup>. Apart from that, scholars consider either *Zizyphus spina christi*, *Zizyphus lotus* and the *Lebanese cedar* to be identical with the Quranic "Lote, the tree of paradise"<sup>xviii</sup>.

That planting *Sidr* was recommended by community to the agricultural experts during the field trip to Shabwa<sup>xix</sup> however



may have more practical and worldly reasons: Pure Sidr honey from Shabwa and Hadhramawt is the most expensive honey dealt with on international level (may cost

200USD and even up to 800 USD per Kilogram), hence is appreciated as an opportunity to increase income.

*Sidr* honey is not only consumed as a meal but also used for a variety of medical purposes. Together with black sesame and warm water it relieves from sore throats and colds and supports the immune system. Applied on skin it is said to reduce pimples and even burns<sup>xx</sup>.



Yemeni Sidr honey has similar medical properties to New Zealand's Tea-Tree honey (Manuka). The efficiency in killing bacteria of both honey types has attracted the interest of international medical research:

Researchers singled out three types of bacteria that are considered 'drug-resistant' (i.e. against penicillin) and cause dangerous – even fatal – infections in humans and compared the efficiency of Sidr honey and Manuka honey.

The bacteria are:

- MSSA: "methicillin-susceptible staphylococcus aureus"

- MSRA: “methicillin-resistant staphylococcus aureus”

Both MSSA and MRSA are causing dangerous - even lethal – chronic sinusitis and other infections. The latter in addition is resistant to the antibiotic methicillin.

- PA: “Pseudomonas aeruginosa” causes dangerous infections of the lungs, urinary tract and kidneys

While the former was discovered in Britain and seems not to have reached Yemen the latter (PA) is spread over the world and may be transmitted by contaminated water.

The efficiency of both honey types was striking<sup>xxi</sup>:

- Sidr honey was 63% effective in killing MSSA bacteria (Manuka 82%)
- Sidr honey was 73 % effective in killing MRSA bacteria (Manuka 63%)
- Sidr honey and Manuka honey are 91% effective in killing PA

Apart from *Sidr* honey, the tree’s fruits and leaves are as well used for traditional

medical treatment: *Sidr* leaves are applied for soothing pain for reducing hemorrhoids; its fruits are called “dawm”: They contain 14.16% sugar and about 1.6% vitamin C / per fruit and are eaten as a cure for diarrhea.



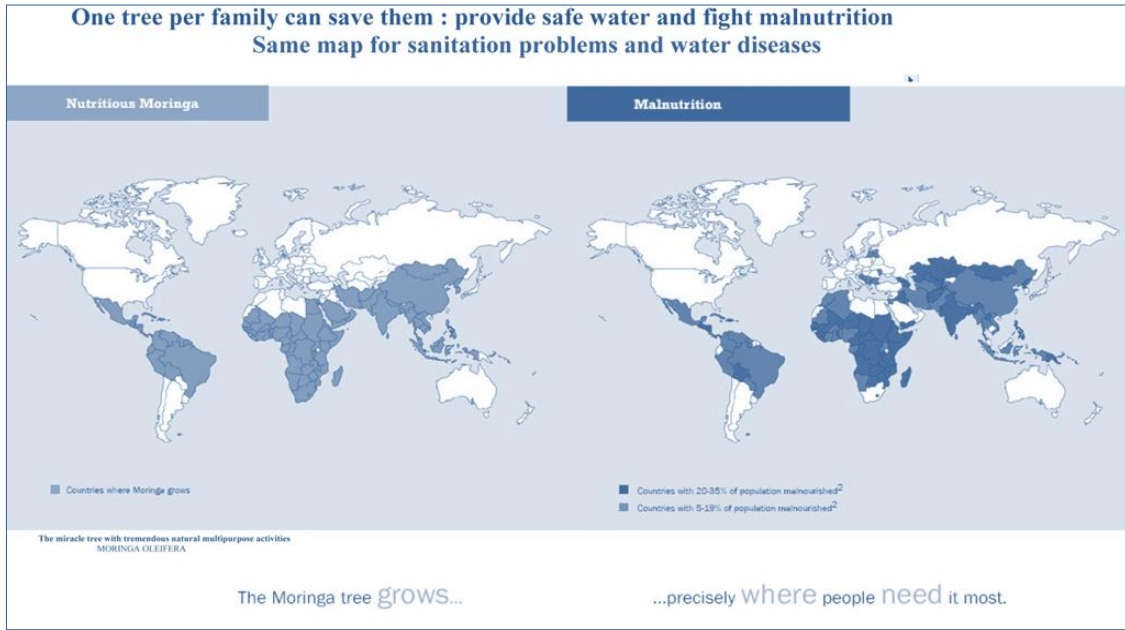
Bark and roots, too, are reportedly used in folk medicine<sup>xxii</sup>.

In contrast to both moringa types *Sidr* wood can be used for fencing and even furniture production<sup>xxiii</sup>. However before considering that it would be necessary to evaluate local perception of cutting the tree as according to the “ahadith” the records of the Prophet Muhammad’s deeds and sayings that anyone cutting the tree will go straight down to hell<sup>xxiv</sup>.

A less risky benefit is that thanks to the strong wood, *Sidr* could protect the comparatively less wind resistant *moringa oleifera* trees

### 3. DEFINITION OF POTENTIAL SOCIO-ECONOMIC BENEFITS (*MORINGA OLEIFERA*)

#### 3.1. HEALTH: IMPROVING HUMAN NUTRITION



XXV

Moringa oleifera is a multipurpose highly nutritious plant that interestingly grows where it is most in need.

Moringa oleifera trees have been used to fight malnutrition, especially infant malnutrition and malnutrition or anemia in pregnant and nursing mothers<sup>xxvi</sup>. Three NGOs have gathered prominence in promoting the utilization of moringa trees for combating malnutrition: Trees for Life, Church World Service, and Educational Concerns for Hunger Organization.

In traditional Indian medicine is believed that Moringa can cure 300 diseases. Finding out if it can keep the promise and (as some publications suggest) heal from cancer or HIV/AIDS may need a lot of research. What can be said already is that the tree is a

resource of nutrients that surely contribute to an improved health condition.

***Moringa leaves are highly nutritious, healthy and have the advantage that they may be - depending on individual taste – be eaten fresh, cooked like spinach or in the form of dried leaf powder (used either as ‘spice’ in soups or as tea).***



**Leaf-powder offers a healthy mix of vitamins, minerals, and amino acids:**

**Vitamin A** acts as an antioxidant and is important for the shaping of the retinal form (hence vision), gene transcription, immune function, embryonic development and reproduction, and bone metabolism. It protects from eye and skin diseases, heart ailments, and diarrhea.

Dietary Recommended Intake: 9 mg/day  
Moringa oleifera leaf-powder: 16.3 mg/100g<sup>xxvii</sup>

**Vitamin B1 (thiamine)** is an important nutrient supporting nervous system and heart. Thiamine deficiency can lead to severe fatigue of eyes and myriad problems including neurodegeneration and death.

Dietary Recommended Intake: 1.2 mg/day<sup>xxviii</sup>  
Moringa oleifera leaf-powder: 2.64 mg/100g<sup>xxix</sup>

**Vitamin B2 (riboflavin)** is an easily absorbed micronutrient that maintains health in humans and animals. In humans, signs and symptoms of riboflavin deficiency include cracked and red lips, inflammation of mouth and tongue, mouth ulcers, cracks at the corners of the mouth, and a sore throat. A deficiency may also cause dry and scaling skin, fluid in the mucous membranes, and iron-deficiency anemia. The eyes may also become bloodshot, itchy, watery and sensitive to bright light. In animals, riboflavin deficiency results in lack of growth, failure to thrive, and eventual death.

Dietary Recommended Intake: 1.3 mg/day<sup>xxx</sup>  
Moringa oleifera leaf-powder: 20.5 mg/100g<sup>xxxi</sup>

**Vitamin B3 (niacin)** is an essential human nutrient. In pharmacological doses, niacin has been proven to reverse atherosclerosis by reducing total cholesterol, triglyceride, very-low-density lipoprotein<sup>xxxii</sup>. Niacin deficiency leads to “pellagra disease”. Symptoms of this disease are dementia, dermatitis, and diarrhea. If untreated it eventually leads to death. This disease often occurs in regions where people rely on maize as staple food<sup>xxxiii</sup>.

Dietary Recommended Intake: 16 mg<sup>xxxiv</sup>  
Moringa oleifera leaf-powder: 8.2 mg/100g<sup>xxxv</sup>

**Vitamin C (ascorbic acid)** strengthens the immune system and is effective against colds and flu. Scurvy is a reaction to lack of vitamin C that may appear in humans and animals. Symptoms in humans are of liver spots on the skin, spongy gums, and bleeding from all mucous membranes. A person with Scurvy looks pale, feels depressed, and is partially immobilized. In an advanced stage the patient suffers from open suppurating wounds, loss of teeth and eventually may die.

Dietary Recommended Intake: 90 mg/day<sup>xxxvi</sup>  
Moringa oleifera leaf-powder: 17.3 mg<sup>xxxvii</sup>

**Calcium** is a mineral and an important nutrient that in early life it builds strong bones and teeth and later helps preventing osteoporosis<sup>xxxviii</sup>. Calcium also is needed for cell permeability, blood coagulation, transmission of nerve impulses, and normal muscle contraction. Lack of Calcium may result in arm and leg muscles spasms, softening of bones, back and leg cramps, brittle bones, rickets, poor growth, osteoporosis (a deterioration of the bones), tooth decay, depression<sup>xxxix</sup>.

Dietary Recommended Intake: 1000 mg/day  
Moringa oleifera leaf-powder: 2,003 mg

**Copper** Aids in the formation of bone, hemoglobin, and red blood cells; promotes connective tissue formation and central nervous system function; works with Vitamin C and zinc to form elastin, a chief component in skin tissue and muscle fibers; is involved in the healing process, energy production, hair and skin coloring, and taste sensitivity; is important for the formation of collagen, one of the fundamental proteins making up bone, skin and connective tissue. Deficiency in copper may result in general weakness, impaired respiration, skin sores.<sup>xi</sup>

Dietary Recommended Intake: 9 mg / day<sup>xii</sup>  
Moringa oleifera leaf-powder: 0.57mg / 100mg

**Iron** (mineral) is an essential nutrient that is needed for the formation of hemoglobin, a metallo-protein that transports oxygen in the red blood cells. In case of iron deficiency the patient may suffer from 'iron deficiency anemia'. Symptoms are constipation, sleepiness, tinnitus, abnormal heartbeat, hair loss, fainting or feeling faint, depression, breathlessness on exertion, itchiness, twitching muscles or burning sensations, missed menstrual cycle or heavy menstrual period, inflammation of the tongue or the mouth's corners, spoon-shaped or weak nails, poor appetite.

Dietary Recommended Intake: 8 mg / day<sup>xiii</sup>  
Moringa oleifera leaf-powder: 28.2mg / 100g<sup>xliii</sup>

In 1997 to 1998, a test was conducted in Senegal to examine the ability of Moringa leaf powder to prevent or cure malnutrition

in pregnant or breast-feeding women and their children. This test was carried out in cooperation of *Church World Service*, whose Senegal representative was moringa expert Mr. Lowell Fuglie, and the Senegalese organization *Alternative Action for African Development (AGADA)*. It showed that taking Moringa leaf powder helped Children to maintain or increase their weight and to improve their overall health condition. Pregnant women recovered from anemia and had babies with higher birth weights<sup>xliiv</sup>. In an interview with Aisha Al-Awadhy Fugli described his observations: *"For pregnant and breast-feeding women, Moringa leaves and pods can do much to preserve the mother's health and pass on strength to the fetus or nursing child. One 100 g portion of leaves could provide a woman with over a third of her daily need of calcium and give her important quantities of iron, protein, copper, sulfur and B-vitamins"*<sup>xliiv</sup>

**Magnesium** (mineral) is necessary for Calcium and Vitamin C metabolism; converts blood sugars into energy; regulates the neuromuscular activity of the heart, and improves energy production within the heart. It helps to decrease cholesterol deposits, to heal stomach ulcers. It relieves symptoms of rheumatoid arthritis; prevents acne outbreaks and promotes a healthy immune system as well as healing of wounds. Deficiency of magnesium is associated with the development of a number of human illnesses such as asthma, osteoporosis, and even Attention Deficit Hyperactivity Disorder.

Dietary Recommended Intake: 400 mg /day<sup>xliiv</sup>  
Moringa oleifera leaf-powder: 368mg /100mg



**Proteins** are organic compounds made of amino acids which again are essential for building an organism's cells. Most proteins are enzymes that again initiate and support the processes of biological reactions, of breaking down organic material to win energy and processes of using energy to produce cell's components. Proteins are crucial for immune response in humans and animals.

Dietary Recommended Intake:  
 men 56g/day, women 46g / day<sup>xlvii</sup>  
 Moringa oleifera leaf-powder: 27.1g /100g

**Potassium** (mineral) is an extremely important electrolyte which is essential for a healthy nervous system and a regular heart rhythm. It helps to prevent strokes, supports proper muscle contraction, and works with sodium to control the body's water balance. It keeps the blood pressure stable and transmits electrochemical impulses and regulates the transfer of nutrients through cell membranes. A shortage of potassium may cause symptoms such as muscle weakness, paralysis of intestines which results in blocking of food passage through these; decreased reflex response and in severe cases respiratory paralysis; reduction of hydrogen in arterial blood and abnormal heartbeat.

Dietary Recommended Intake: 4 mg / day<sup>xlviii</sup>.  
 Moringa oleifera leaf-powder: 1,324 mg / day<sup>xlix</sup>

Apart from its importance for human health it is also needed by plants and an important ingredient of fertilizers.

**Zinc** is an important mineral for the brain, for muscles, bones, kidney, liver, prostate and the eye. Over 300 enzymes in the body

need zinc to order to function properly; is needed to make important antioxidant enzymes; is essential for protein synthesis and collagen formation; It is important for the development of reproductive organs and efficient learning. Zinc deficiency affects about two billion people in the developing world<sup>l</sup> and is associated with many diseases. In children zinc deficiency causes growth retardation, delayed sexual maturation, diarrhea, and infection susceptibility which contributes to the death of about 800,000 children worldwide per year.

Dietary Recommended Intake:  
 women 8 mg/day, men 11 mg/day  
 (should not exceed 20mg/day)<sup>li</sup>.  
 Moringa oleifera leaf-powder: 2.5 mg / 100g<sup>lii</sup>

Leaves can be eaten fresh or dried: Making fresh leaf salad or cooking moringa leaves may not be accepted by local community if the taste differs from what people are accustomed to.

By using leaf powder that can be added to local meals one can benefit from moringa while enjoying ones traditional food.

Apart from that moringa leaf powder, when stored in a dry, airtight bag becomes a 'take a way' food which is crucial for Bedouin families' benefit. They could be supplied with trees in certain stations on their routes and integrate Bedouin into the group of beneficiaries.



Dried leaf<sup>liii</sup>



## HARVESTING / DRYING

- ✓ Moringa leaves can be harvested any time once the tree is established
- ✓ If you want to use other moringa products, only pick leaves from some branches
- ✓ Put damaged or discolored leaves aside (they can be used for animal feed or compost)
- ✓ Take stems of
- ✓ Rinse leaves in clean water or a very weak bleach solution (1:100) to kill germs
- ✓ Put leaves in a mosquito net bag (or qat drying bag), hang it in a dark and dry place, about 20°C.

- ✓ Don't expose it to light as this causes loss of vitamins
- ✓ Store in air tight bag in dark, dry place
- ✓ Add to any dish: salad, vegetables or use for moringa leaf-Tea

## MORINGA LEAF-TEA

- ✓ Boil water, cool down for 10minutes
- ✓ Mix 2 teaspoons of moringa leaf powder with water
- ✓ Leave it for 10-15 minutes
- ✓ Add a bit of fresh lemon juice
- ✓ Drink warm or as Ice Tea<sup>liv</sup>

## 3.2. INDIVIDUAL UTILIZATION AND SELF-EMPLOYMENT OPPORTUNITIES<sup>liv</sup>

There is a wide range of potential socio-economic benefits arising from moringa oleifera trees as almost every part of moringa oleifera can be utilized for a variety of purposes. It provides healthy nutrition, home relief medicine, can be processed to biodiesel, used for dyeing textiles or for making skincare products.

Some of these benefits may be appreciated members of one culture while members another culture may not be perceive them as beneficial. This may be especially the case in regard to food and beverages: Green tea (peppermint tea) for example, a popular drink in Morocco, in Yemen is only rarely offered. In India moringa oleifera pods are prepared as a popular vegetable meal, but will Shabwa community like the taste which is said to be similar to asparagus? Will Shabwa community also appreciate the mushroom-

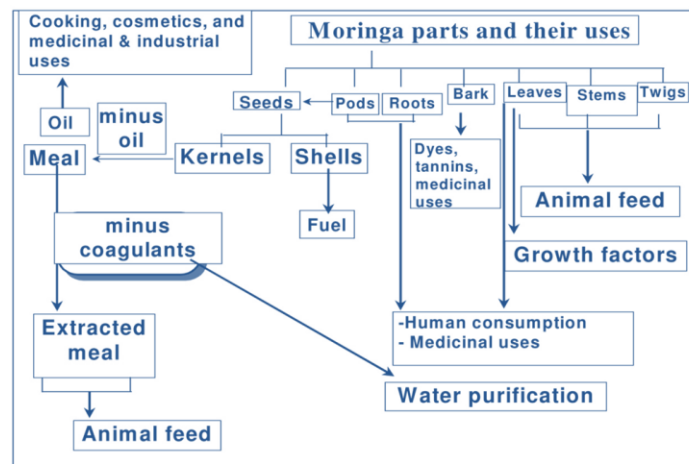


Figure 7: Uses of different parts of *M. oleifera* (Foidl et al., 2001).

like taste of cooked moringa oleifera flowers?

This can only be tried out by the community. Depending on individual taste the new meal may be perceived as “benefit” or as a “never-to-make-again-experience”, it may succeed or fail.

In contrast to the fresh moringa dishes leaf-powder may have more chances to be accepted and perceived as benefit, as it may be added to a traditional dish; its taste may be covered by local spices.

The promotion of using *moringa oleifera*, *moringa peregrina* or *ziziphus spina christi* for 'home relief' medical products depends on the local knowledge of such.

If local community applies traditional medical products harvested from any of the native trees; if community is confident in traditional medicine, has gathered positive experience and expertise introducing the benefits of *moringa oleifera* will be more feasible than if community expects medication only in form of tablets and injections.

***Around the world moringa leaves, flowers, pods and seeds are used for traditional medical treatment<sup>lvi</sup>:***

Leaves:

- Are rubbed against the temple to relieve from headaches
- Poultice from fresh leaves is applied on shallow wounds to stop bleeding
- Are applied on insect bites, to stop itching
- Are applied as anti-inflammatory, and antibacterial, anti-fungal skin treatment
- Leaf tea is used against gastric ulcers and diarrhea

Flowers:

- Flower juice is used by breastfeeding mothers
- Flower juice is used for urinary system problems

Pods:

- Raw pods are eaten as de-wormer, or against pain in joints
- Are eaten cooked as nutritious meal

Seeds:

- Seeds oil is used against arthritis, rheumatism, gout, cramp, some sexually transmitted diseases
- Roasted seeds and oil encourage urination
- Have a relaxant effect

Again only positive experience may result in trust in the plant's medical efficiency.

Before eating something unfamiliar, before giving it to one's precious animals, positively perceived observations of the new tree need to be made.

Hence in an agriculturally oriented society two characteristics of moringa may be most effective entry point for enhancing the perception of benefit.

***Moringa oleifera grows fast, and makes other plants grow faster. This can be observed by community at the Kharwa Camp plantation without risking their own crops: In times of gas crisis moringa oleifera can be used as fast growing firewood and Plant Growth enhancer (leaves).***

Moringa leaves contain a substance that enhances plant growth (Zeatin / Cytokines Group). The juice won from fresh moringa leaves hence can be used to produce an effective 'plant growth enhancer' which increases yields by 25-30% for nearly any crop: onions, bell pepper, soya, coffee,

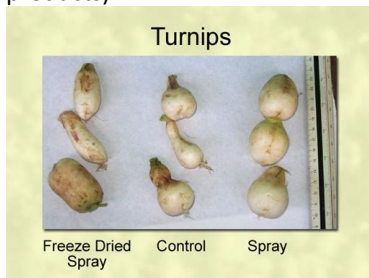
**maize and sorghum** both of which are agricultural crops in Shabwa.

In test trial carried out by *Nikolaus and Gabriele Foidl at BIOMASA (an agricultural research program located in Nicaragua that has studied various aspects of moringa for over six years)* using this spray increased maize yields from 60 to 130 sacks per hectare<sup>lvii</sup>.

***Effects of moringa leaf extract on crops:***

- Accelerates growth of young plants
- Plants are firmer, more resistant to pests and disease
- Longer life-span
- Heavier roots, stems and leaves
- Produce more fruit
- Larger fruit
- Increase in yield 20-35%

(The description how to make leaf extract is included in chapter 3.3. “Low-tech” making of moringa products)



lviii

Once the growth enhancing impact on other plants is observed, community members may be motivated to try it out on their own crops. If community perceives the extract as added value one may move on suggesting leaves as animal fodder.

***Cattle, sheep and goats whose diet includes moringa oleifera leaves gain more***

***weight and produce more milk than other livestock.***

Foidl found that adding Moringa leaves to cattle feed increased their daily weight gain by up to 32 %. Both Foidl and Reyes also experimented with Moringa and milk cows. Foidl supplemented with 15 to 17 kilograms of fresh Moringa leaves daily, and the cattle’s milk production increased by 43 %. Reyes supplemented his milk cows’ feed with 2 kg dry matter of Moringa per day, and milk production increased by 58 %. Then he supplemented with 3 kg dry matter per day, and milk production increased by 65 %.<sup>lix</sup>

***Once the positive impact on cattle is established one may move on to the possibility of promoting nutritious leaf-powder as “healthy spice” for local food and tea.***

*Moringa spice is said to go well with Mediterranean food (here mozzarella and tomato), if it goes with Yemeni Asid, Sahawak or other dishes will have to be tested by local community<sup>lx</sup>.*



A great potential of being used for culinary purposes, or medical - cosmetic applications lies in the oil from moringa oleifera and moringa peregrina seeds.

***Moringa oleifera oil moistens and disinfects skin, it reduces wrinkles and irritations and enhances skin repair***

*Moringa oleifera* seeds yield 38–40%, *moringa peregrina* even up to 50% edible oil. The refined oil is clear, odorless, and

resists rancidity at least as well as any other botanical oil. The seed cake remaining after oil extraction may be used as a fertilizer or as a flocculent to purify water.

Oil may be directly applied on skin (treatment, massage), it may be used for fine mechanical maintenance (moringa oil is used by watchmakers, in Shabwa context it may be considered for cleaning / maintaining guns). Oil furthermore can be used as basis for producing perfumes, soap, creams and shampoo.

Moringa oleifera oil soothes and softens the skin. Moringa oleifera oil helps to reduce wrinkles, lack of elastics, dryness, and sagging of skin which are caused by the impact of sunlight. Apart from damaging the DNA of skin, ultraviolet light hampers the skin's repair mechanisms.<sup>lxii</sup> It is rich in oleic acid with excellent moisturizing, cleansing and nourishing properties. Thus it is ideal for use in skincare, hair care, soap and massage products.<sup>lxiii</sup>

A combination of vitamins and antioxidants (> 46) contained in moringa oil help reducing such effects commonly known as "aging", and to regain repair mechanisms. Vitamins A, C and E have the following effects important for cosmetic or medical skin treatment:

#### **Vitamin A (Retinol)**

- ✓ *enhances peeling characteristic*
- ✓ *helps building collagen fibers within the skin*
- ✓ *reduces wrinkles.*

#### **Vitamin C**

- ✓ *acts as an antioxidant*

- ✓ *aids in stabilizing collagen, hence wound repair*
- ✓ *reduces fine lines and wrinkles*
- ✓ *lessens the severity of sunburns.*

#### **Vitamin E**

- ✓ *antioxidant*
- ✓ *has anti-inflammatory effects on the skin.*
- ✓ *improves moisturizing, softness and smoothness*
- ✓ *provides modest photo protection.*

Due to the synergetic effect of different antioxidants, having a substance that contains a number of antioxidants is more effective than having the same amount of a substance that only contains one antioxidant. Hence "*moringa oleifera oil is a very stable carrier which is highly nutritious to the skin and similar in composition to olive oil but much lighter. It is a powerful natural antioxidant with excellent skin smoothing properties.*"<sup>lxiii</sup>

The potential socio-economic benefits arising from Moringa oleifera and moringa peregrina hence are income saving, income generating (including self employment) and health improvement:

- ✓ **Farming/Animal Husbandry:** improvement of livestock health, increase of milk production
- ✓ **Income generation:** increased production of crops, milk and meat may enable to sell excess of these products
- ✓ **Household:** free, fast re-growing alternative to increasingly expensive and rare gas (only 19% of the Shabwani population have access to gas. Depending on availability prices

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for a refill vary between 700-1400 YR)

- ✓ Individual Health Care: improvement of human health condition, fighting malnutrition, possibility of increased immunity against infections

(infections have been noted as major health problems in the region)

- ✓ Self employment opportunities: production, packing, selling of seed, oil, cosmetics

### 3.3. “LOW-TECH” MAKING MORINGA PRODUCTS

In the following some easy “low-tech” methods of using moringa oleifera products (leaves, seed), and processing them are introduced. They have in common that they do not need any sophisticated equipment.



Moringa leaves can be consumed fresh, cooked or dried. Since dried Moringa leaves retain their nutrient content, it is possible to convert them into leaf powder and add them to any dish. Moringa leaf powder can be made and stored easily. Liquid leaf extract may be used in agriculture as plant growth enhancer:

#### MAKING LEAF EXTRACT<sup>lxiv</sup>

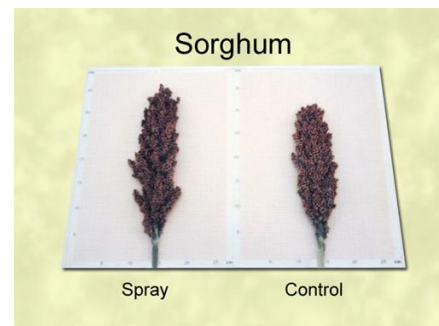
- ✓ Make an extract by grinding young moringa shoots (not more than 40 days old) together with a bit of water (about one liter per 10 kg fresh material).
- ✓ Filter the solid out of the solution. This can be done by placing the solution in a cloth and wringing out the liquid (or gravey separator). The solid matter, which will contain 12-14% protein, can be used as livestock feed.
- ✓ Dilute the extract with water at a 1:32 ratio and spray directly onto plants (if the extract is not going to be used within five hours, it is best stored in a freezer until

needed). Apply about 25 ml per plant.

- ✓ The foliar spray should be applied 10 days after the first shoots emerge from the soil, again about 30 days before plants begin to flower, again when seed appears and finally once more during the maturation phase.



GRAVEY SEPERATOR (USD 3.50<sup>lxv</sup>)



COMPARISON OF MORINGA PLANT GROWTH ENHANCER, MORINGA PRESENTATION, TREES FOR LIFE JOURNAL<sup>lxvi</sup>



## MORINGA OIL

Moringa oleifera as well as Moringa peregrina seeds may be used for extracting oil.



In order to extract oil from seeds moringa peregrina trees to obtain so called “Al-Yassar” oil

Saudi Arabian Bedouin boil the seeds in water, leave it overnight and collect the oil that appears on the water surface<sup>lxvii</sup>.

Oil can be used be nutrient: in can serve as salad oil; meat fried with some drops moringa oil does not as easily burn as when other oil is added cooking

Cold pressed oil is considered to be more valuable quality than hot processed oil as many of its valuable ingredients are lost when heated. Moringa oleifera and moringa peregrina oil is reportedly highly esteemed by watchmakers as lubricant, and appreciated by perfumers as highly efficient in absorbing and retaining “even the most fugitive odors”<sup>lxviii</sup>

A more ‘high tech’ way to extract oil could be by using an oil press that needs little maintenance.

As its prices range from 1400-2000 USD it is an investment that should be preceded by research on the feasibility of the product (market analysis / chemical analysis of the Shabwani moringa seed quality) and careful preparation in establishing a community entity that could be given the responsibility of the project (i.e. a women’s organization

in order to minimize the possibility of men taking away the gadget as private property).

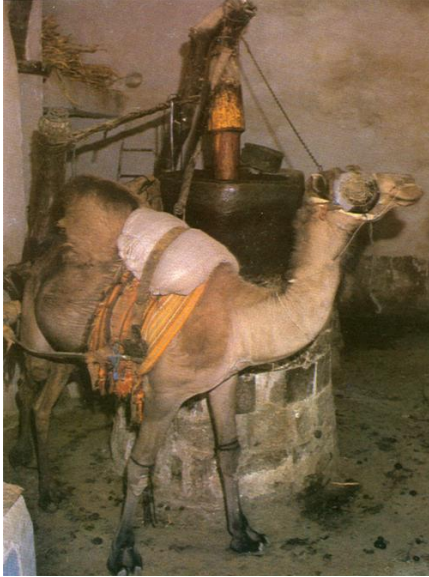


Rotary Cold Press by Tinytech<sup>lxix</sup>

Tinytech, an Indian manufacturing company describes its rotary cold press as follows: *“Rotary Cold Press is suitable to expel oil from oil seeds like white and black sesame, (..) almond, and other soft oil seed. The extraction of oil is less compared to expellers but the advantage is that the oil has better aroma and fragrance, better nutritional value suitable for application of carrier oil for massage oil, herbal preparation and better therapeutic value.*

*TINYTECH machine is the most scientific and most modern piece of technology. It is a compact machine accommodated on 600mm x 600mm base frame. 2 HP electric motor drives vertical mortar revolving at 12 RPM through reduction gear box. Pestle and mortar are so much robust that practically there is no maintenance. Pressure increasing device is through heavy spring and screw. Shipping dimensions are 30" x 36" x 48" (750mm x 900mm x 1200mm).*<sup>lxx</sup>

A 'low-tech' method of extracting oil from soft oil seed such as sesame oil is the camel driven mill, known throughout Yemen.



Camel driven mill, Sanaa<sup>lxxi</sup>

*The left over press-cake makes a good fertilizer as it contains protein*

### SOAP:

Making soap is not difficult however one should be aware of the risks when working with lye / base. Protective goggles, gloves and long sleeves should be worn against possible injury.

Beginner 4.5 pound Soap Recipe - makes just under 4.5 lbs of soap

Needed:

500ml Canola Oil, 500ml Coconut Oil, 500ml Palm Oil, 6.9oz Lye (5% super-fatted), 500 ml Water

- Replace Oil with moringa seed Oil and frankincense oil

- ✓ *Suit up in safety goggles, gloves and long sleeves.*
- ✓ *Add the lye to the water. Stir well taking precautions to not breathe in the fumes. Set the mixture to the side and allow it to cool to approximately 40-50°C. You can put the lye water mixture outside if you are not in a well ventilated area.*
- ✓ *Add all your oils together and melt. Allow them to cool to approximately 40-50°C, or within 5 degrees of the lye water.*
- ✓ *Add the lye water mixture to the melted oils, carefully. Stir vigorously until trace occurs. Trace looks like a thin pudding. A stick blender will help speed trace along. If you are stirring by hand, these recipes may take up to an hour to trace.*
- ✓ *Pour your traced soap mixture into your molds*
- ✓ *Pop out after 3 to 5 days and allow sitting for a full 4 to 6 weeks to cure and finish the saponification process.*

### EASY RECIPE: MILK AND HONEY CREAM

Needed: high vessel, mixer, small cream vessel, 50ml full fat Milk, 100 ml good vegetable oil (i.e. Almond oil, Moringa oleifera or peregrina seed oil), ½ tea spoon honey (for example Sidr / *ziziphus spina christi*), 10 – 20 drops of frankincense oil

- ✓ *Mix milk with for 2-3 minutes, add vegetable oil first in drops then pour into the milk while mixing, keep on mixing even if liquid becomes thicker, crème will become smooth and white*

- ✓ Add the honey, keep mixing, then add the frankincense oil which gives it a good fragrance
- ✓ Fill into the small cream vessel and keep in a cool place

#### WATER PURIFICATION WITH MORINGA SEEDS

- ✓ Collect mature *Moringa oleifera* seed pods, remove seeds from pods.
- ✓ Remove seed coat to obtain clean seed kernels, discard discolored seeds.
- ✓ Determine quantity of kernels needed based on amount and turbidity of water; in general one seed kernel will treat 1 liter of water.
- ✓ Crush appropriate number of seed kernels (using grinder, mortar & pestle), sift the powder through a screen or small mesh.
- ✓ Mix seed powder with a small amount of clean water to form a paste.
- ✓ Mix the paste and 250 ml (1 cup) of clean water into a bottle and shake for 1 minute to activate the coagulant properties and form a solution.
- ✓ Filter this solution through a fine mesh screen and into the water to be treated.
- ✓ Stir treated water rapidly for at least 1 minute then slowly (15-20 rotations per minute) for 5-10 minutes.

- ✓ Let the treated water sit without disturbing for at least 1-2 hours.
- ✓ When the particles and contaminants have settled to the bottom, the clean water can be carefully poured off (make sure it doesn't mix with the lower sediments).
- ✓ The clean water can then be filtered or sterilized to make it completely safe for drinking: Sand Water filters<sup>lxxii</sup>, Solar sterilization<sup>lxxiii</sup>, Chlorination: 1-2 drops / liter (1.056 qt), Boiling: minimum 5 minutes

Though being probably the most striking characteristic of *moringa oleifera* seeds water purification may be of little benefit for household based water purification.

As OMV has already supplied community with water filters offering seeds for the same purpose may create confusion regarding the quality of the filters.

However water purification with moringa seeds may be of interesting value when it comes to education and could make a topic for a school project.

Apart from that the possibility of treating large amounts of grey water with *moringa oleifera* seed could become important at a later stage when the new CPF is established and a larger amount of trees are grown. The feasibility of this however would have to be clarified by experts on biological wastewater treatment.

## 4. DEFINITION OF MEASURES ENHANCING LOCAL ACCEPTANCE

### 4.1. COMMUNITY: LIVING CONDITIONS

Arma district, inhabited by 10188 residents, is considered to be the second poorest district of Shabwa<sup>lxxiv</sup>.

Formerly Shabwa Governorate belonged to the People’s Democratic Republic of Yemen (1967-90). During the British Colonial rule in Aden, it was part of the Western Aden Protectorates (1914-64). With the change of regimes Shabwa’s citizens experienced major changes of policy that impacted on the society and perception of social structures.

While the British followed a ‘divide and rule policy’ however supported tribal structures by concluding peace treaties with major tribal figures, integrating loyal tribes into their military, and training sons of Sheikhs, the Marxist-Leninist regime tried to break the tribal system. It partly succeeded doing so by the land reform and violent harassment of traditional upper class members, to which tribesmen belong.

This resulted in emigration of many tribes-members who after the unification returned to Yemen to reclaim their land. Thus one generation has - while living abroad - lost some of the traditional collective memory of tribal customs, tribal identity, values and customs such as methods of dispute resolution. These have been weakened, however, were revived after the unification.

Today government shifts between ostentatiously trying to win sympathy of

great sheikhs (with financial gifts or positions) while - as tribes-members from Marib, Al-Jawf, Khawlan and Shabwa perceive it - some of its representatives in a hidden sphere are in charge of implementing the ‘divide and rule’ strategy with smaller tribal units<sup>lxxv</sup>.

Apart from the Pre-Colonial time when today’s Shabwa consisted of small sultanates and tribal local authority the

#### *Some numbers illustrating the situation in Shabwa<sup>1</sup>*

- 470440 residents, 580 beds in 15 operating hospitals (2008)
- 50-60 % of the Shabwani population live in poverty
- 19 % of the Shabwani population have access to gas
- 30 % of the Shabwani population are unemployed
- 20 % of the Shabwani population analphabets (during PDRY alphabetization classes were carried out in the rural and urban centers successfully)

governorate has always been far from the centers of government (Aden, Sana’a) and hence been perceived as periphery.

Consequently some of the developments that occurred in these centers did not reach rural areas of Shabwa; services available in the urban centers did not reach the countryside, and until today chances of rural Shabwani citizens to equal access to public resources, especially in terms of education, health and justice are very limited: Shabwa until today belongs to the “ignored governorates” (a term used by citizens of Marib, al-Jawf, Shabwa, Al-Baydha and Tihama describing their home-governorates) or “underserved” gover-

norates of Yemen -as the experts from Synergy put it<sup>lxxvi</sup>.

Poverty and lack of services to some extent explain why oil companies face high expectations from local community in the region. Additional factors that contribute to being asked to provide services that regularly are perceived as ‘the government’s job’ lies partly in visibility and the territory’s past ownership:

- Tribal land traditionally belongs to the whole tribe, not to the sheikh. ‘Government’ showed up when marking the blocks of tribally owned land. ‘Government’ marked the land as “ard baydha” (free land) and rented it out to Oil companies. Some major sheikhs may have been presented with financial gifts to keep calm, the majority however did not benefit.
- Due to the lack of public services the government is perceived as “not there”.
- Oil companies “are there”. They are visible, make profit and most important are in reach

The situation of Kharwa Camp neighborhood community is similarly difficult as in many rural regions in the governorate: As only 25% villages have access to public electricity during 4-5 hours per day most rely on small diesel-generators. The neighboring settlements are connected by tracks; there are no asphalted roads. Only 1/3 of the population has access to well water, the remaining relies on rainwater harvesting.

There are 6 Primary Health Care Units in Arma District which may provide preventive services, first aid, and treatment of simple illnesses (most common diseases are diarrhea and upper respiratory infections, both may be caused by drinking contaminated water).

There are 2 primary schools located in the vicinity of Block S2 (Aster and Old Shabwa). Due to the lack of available local and qualified teachers<sup>lxxvii</sup> most school teachers and travelling teachers hired by Bedouin communities come from outside the region. There are no female teachers in the area. There is no secondary school in the neighborhood of Kharwa Camp.

Major sources of income are:

- Rain fed agriculture (i.e. sorghum)
- Honey production & animal husbandry: goats, sheep, camels
- Basic building construction
- Iron work, and carpentry
- Salt mining
- Remittances from abroad

The security situation is marked by emerging terrorist activities of groups that associate themselves with the international Al-Qaida network. The possibility of oil companies becoming a target for such when taking revenge for military airstrikes or interventions has to be considered, security measures are adapted.

Tribal feuds, employment-demand driven threats from community and kidnappings constitute comparatively less dangerous threats that may be mitigated by measures that enhance local acceptance and consequently local protection.



## 4.2. ENHANCING SOCIAL ACCEPTANCE - CIRES APPROACH

CIRES stands for the intertwined principles **Credibility, Integration, Responsiveness, Equality, and Self-Sufficiency** as criteria that need to be fulfilled in order to archive social acceptance. It is based on the conviction that if a project succeeds in creating a benefactor-beneficiary ownership social acceptance, hence participation and protection are secured<sup>lxviii</sup>.

The CIRES approach has been developed during a social impact study of an educational project in Marib for students from Shabwa, Al-Jawf and Marib and is based on community and donor contributions, recommendations and concerns (890 questionnaires). Although this approach seems new it contains principles that have been considered as factors of success before. However by connecting these it provides with guidelines to assess a project along the principle – criteria from which its name is derived.

**CREDBILITY** stands for the established trust between beneficiary (Community) and benefactor (project donor/implementer)

In order to archive *credibility* project intentions, methods and their link to the project activities have to be clear, financing and distribution of financial resources, and responsibilities have to be transparent, and both project partners should perceive that they are taken seriously by the other.

Credibility further more is linked with visibility. The partner has to be known as such and associated with previous positive experience. This also explains why OMV should be identified with its community

projects (see 4.5. Low profile but not anonymous)

**INTEGRATION** stands for enhancing the creation of connectors rather than dividers (cooperative rather than conflictive attitudes, actions and agents) by integrating the project into community and community into the project.

*Integration* is archived if the project is not perceived as threat to traditions, beliefs, character of community, if the project is not perceived as threat to hegemonies, if the project is perceived as fitting to community's environment (i.e. Weed Risk Assessment). Community should be consulted about its needs, suggestions taken seriously and may impact on project shaping.

Beekeepers who benefit from Sidr may perceive the project with a new species (hence potential trade) as a threat (competition) if they are not included.

**RESPONSIVENESS** stands for the established perception that Project is perceived as directly responding to the needs and character of the project community and setting

*Responsiveness* is archived if the project leads to visible and tangible results that respond to the needs perceived by community. OMV CSR already concentrates on water, health, education, animal husbandry and bee keeping hence responds to perceived needs and environment.



Due to the existing problems of malnutrition, scarce access to clean water, the project's long term potential of improving health, saving as well as -to some extent- generating income through self employment and enriching job profiles is comparatively high.

Yet the expectation shared by a large part of community to be provided with jobs by OMV may become a challenge. By concentrating on women as immediate implementing 'partners' while all are beneficiaries, this expectation in regard to the project (however not in general) may be dimmed as traditionally men of the region will not expect their female family members to get employed at OMV.

**EQUALITY** stands for the establishment of equal access to the project's benefits irrespective of sex, of social and economic status and political affiliation

In order to archive the notion of equality cooperation and coordination should not exclusively be carried out with local council or any 'government representing authority', however on political and community level during the test phase. Again by addressing women as implementing partners may provide with the chance to get around male politicians trying to dominate the project.

While the distribution of (short term) employment though the local Labor Office has triggered grievances for community members who felt disadvantaged (treated unequally) now OMV has the opportunity to directly reach every household with a project that bears the potential of improving living conditions and even in small scale income generation<sup>lxxix</sup>

As being elected into a local council or other political office often depends on economic resources (i.e. the ability to buy election cards and even votes) it needs to be kept in mind that cooperating exclusively with Local council will be perceived as unfair.

**SELF-SUFFICIENCY** stands for the establishment of a project that has a realistic potential of supporting itself on the long run.

*Self-Sufficiency* is archived if the project's implementation does not create new needs that cannot be fulfilled in the near future or create an asymmetry between those who can afford new arising needs and those who cannot. A realistic potential of funding from within the project or a and third party should be secured.

Growing the trees does not need specific or expensive equipment. Production of moringa product however may need more. Hence with regard to income generation training focus should lie on such products that do not need high-tech equipment, but with the equipment that people already have. With regard to producing oil a cold press may be needed or the local version, a traditional camel – run stone mill may be an adequate alternative.

At a later stage OMV may not be able to provide as many positions for community members as expected by them however it may be able to market some of the products. This however would need a market assessment with regard to selected moringa products.

On a local / regional level seeds, oil, crèmes, and nicely packed honey may be marketed by local NGO's (possible cooperation with

Women’s NGO ‘Our House for Traditional Heritage and Development’ Sanaa) or honey shops.

Measures enhancing CIRES during the test phase are:

- Associating *moringa oleifera* with the native and positively perceived plants *moringa peregrina* (ban), appreciated *ziziphus spina christi* (sidr) Ziziphus should not be cut down
- Introducing project as park for staff with secondary goal of seeing if trees will be beneficial will underline that project is not financed by funds dedicated for local projects. Transparently communicate that.
- Communicate that test plot is a test plot, enable community to watch its development, get attached to the project, involve in dialogue about the project seriously consider suggestions for further project implementation. Seeking continuous community and local government consultation.
- Creating a link to OMV CSR- focus on water, health, education, animal husbandry & beekeeping (*moringa oleifera*: water purification, nutrition, medical properties, agricultural training, animal fodder, link with *ziziphus spina christi*)
- Inviting small groups of selected visitors, school classes, health unit staff, farmers – carry out joint activities that are linked to the project (drawing: design of info-

boards, generation dialogue activities on traditional medicine, water management, agriculture and beekeeping)

- Working with a community group of direct implementing partners (women) and beneficiaries.
- Presenting the project at an initial stage as low profile (firewood, fodder, food) though having great potential (vegetable oil): trees should be distributed to households. For Bedouin “green stations” may be established.
- Later: Possible cooperation with Social fund for Development training when trees are handed over to community
- Choosing, training in income generation activities that fit with existing traditions: agricultural skills, producing cosmetics and soap at home (women). Offering trainings that respond to traditional gender roles and perceptions.
- Training in the production of those moringa products that do not demand high tech equipment, create new needs.

Research Recommendations (in cooperation with CSR staff):

- Practical assessment on potential of linking with traditional cosmetics,

crafts related to plants, oil, medicine.

→ Stakeholder analysis INCLUDING relationships between (especially local) stakeholders.

→ Local market analysis on potential of moringa products, health and quality standards in case of such / marketing strategy for abroad

### 4.3. ACCEPTING *MORINGA OLEIFERA*

Two rumors illustrate the risks of introducing a plant to a region the community of which is fairly suspicious to anything new – especially if introduced by foreigners: foreigners taking pictures of beehives where be considered responsible for a later bee disease; the breakout of disease – for local community was triggered by the tourists' flashlights.

Saysaban (*Sesbania*) a tree, said to be introduced by the British and/ or British Indian are considered “devil trees” as they easily spread and dominate other plants, even in harsh conditions. Again the widespread belief takes it that the tree was introduced to eliminate locally utilized plants (At Kharwa Camp there are a few of this species. Their impact on the plantation has to be assessed and preventive strategies considered).

Making sure that the plant grows and prospers is not enough. It is just as equally important that the tree will not become a source of possible harm to local environment, animals or community. Such potential harms need to be evaluated and eliminated.

- Does moringa oleifera become a weed?

- Does moringa oleifera contain toxics easily reached by animals or humans?
- Does moringa oleifera attract parasites that affect local plants?
- 

Thanks to the University of Hawaii Manoa and Australian Weed Assessment checklist data regarding the ‘import’ of moringa trees could be retrieved.

Hawaii like Australia has experienced significant threats to their original ecosystem by imported species (plants, and animals). In order to reduce such risks an assessment tool, the so called “weed risk assessment” (WRA) has been developed.

By answering 49 questions - based on the species' biology, geographic origin, and pest status in other countries as well as published information on the species - a score is obtained. A high scoring plant poses a high risk of becoming an invasive pest. A low score means that importing the species poses only little risk.

**Moringa oleifera has passed the test with a total of “1”** indicating that it bears the least amount of risk, to either not prosper, or to become a weed or to pose a threat to plants, animals and humans. Hence was approved for import.

Moringa oleifera:

- Has neither weedy races nor dominates other plants, it is not parasitic
- Almost all parts of moringa oleifera are edible, the bark of roots is toxic though not easily reached, no allergies have been reported on moringa products until today
- Moringa oleifera may be attacked by parasites though does not attract those significantly

(see Weed Assessment for all 49 questions and answers, enclosed in Attachments Chapter)

After making sure that the tree will not involuntarily harm the company’s image instead of promoting it, one can move on to considering how to promote the image of the new tree: The herein recommended approach is to

- Associate the tree with well known and well-reputed trees known in the region (now as it is secured that the species does not harm others)
- Inform about moringa oleifera and its benefits
- Include community step by step to experience benefits from the tree

#### 4.4. “LOW PROFILE BUT NOT ANONYMOUS” – CHANGE OF STRATEGY

Ever since the increase of attacks on foreign institutions keeping a ‘low profile’ has become an important principle of international organizations’ security strategy. In practice this means avoiding publicity and prominence hence “public visibility”.

This may be possible if ‘public visibility’ easily can be reduced by choosing a low profile neighborhood for the office, limiting news reports about the organizations’ representatives meetings / their involvement with high government authorities, using private cars (blue number plate) and so forth in order to seem less ‘important’ and hence a less attractive target.

Being ‘invisible’ however - at present – is difficult as oil companies due to the smoke coming from the flare pits are easily spotted from afar, remain in place for a long period and have to be frequented by far distance



transport vehicles. Thus ironically the negatively perceived aspects are directly linked to the company while the positively perceived aspects (community projects) only for those immediately involved are linked to the company’s name.

This should be changed (also see 5.2. *INTEGRATING OMV CI COLORS*). By directly marking community projects with OMV CI colors also those who benefit from a community project, however have not been in the region during its establishment (i.e

travelling Bedouin) will connect the project to the company.

Furthermore the OMV should emphasize its European origin: Previous studies have observed that often – especially in marginalized regions any foreign DC institution is considered US American, as NDI and ADRA where the first organizations that entered tribal, marginalized regions close to strategic locations (Saada, Al-Jawf, Marib, Shabwa, Abyan). Being considered US American may impact on security, local protection and social acceptance<sup>lxxx</sup>.

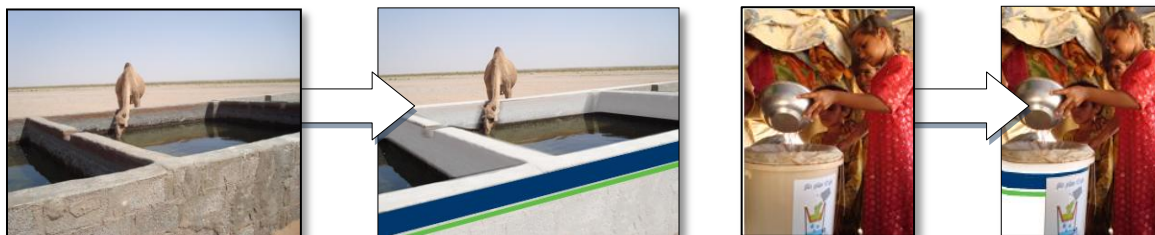
As the likeliness of Austria taking an (in the Arab world) unpopular political decision is less than that of USA doing so, it is important to emphasize aspects of Austria that cannot be mixed with other countries. Creating an individual profile further more add to creating a human connection which

makes it more difficult to be considered an impersonal “item of guarantee”, or “enemy” but rather the “neighbors from the Alps” (see also Chapter 5. Design of green zone).

In case of OMV Kharwa Camp two of these characteristics will be limited: As it is planned to reduce the environmental impact of smoke by re-induction of gas, the smoke will disappear by 2012. The transport vehicles (more than 36 a day) that presently deliver oil to Safer (Marib) will be replaced by a pipeline, which may be less offensive than expected<sup>lxxxii</sup>.

Using CI colors support the recognition of OMV social engagement and furthermore has the advantage that OMV can photo-document its CSR projects and again use these images for PR purposes.

**Connecting between community projects and OMV by integrating the OMV CI color sheme (also see 5.2 Integrating OMV CI colours), Original photos: Sam Loli**



## 5. DESIGN OF GREEN ZONE

As agreed upon by the members of the first brainstorming workshop (06.10.2009<sup>lxxxii</sup>) it is the project's primary purpose to test planting *moringa oleifera* in Shabwa. Apart from that, further potential benefits for staff and / or community arising from the green zone should be evaluated.

The following potential benefits for staff and community were defined.

Mitigating lacks / responding to needs:

- OMV staff interim residence is lacking of a recreational common space
- CSR is lacking of a separate office
- Visiting community members have to sit outside the berm if they want to discuss with CSR
- In combination with these needs the test plot's primary purpose may be extended to
- Testing if moringa trees grow and prosper
- Inviting selected community members to discuss the tree's benefits, discussing their expectations, concerns, and conditions with regard to the project
- Providing a common recreational space / meeting point for staff

Hence the park design is developed by including the three aspects of communication (between staff, between CSR and community), information (i.e. about moringa benefits provided for invited community members) and recreation (meeting point for staff).

While keeping in mind that OMV is planning to implement similar projects in Asia and Middle East if the pilot project is successful another need emerges, that at first sight may be overseen. In case of success the test plot will serve as the prototype, and possible used for PR purposes. Hence it should not only be practicable but also aesthetically attractive while promoting OMV corporate identity.

In order to respond to all aspects the test plot's location and design needed to meet the following requirements

- Closeness to staff residence
- Short distance to main entrance
- Sufficiency of utilizable space (50m x 50m)
- Availability of adequate soil and water quality
- wind-shelter for moringa trees
- Security conditions (see below)
- Practicability, low budget and aesthetic attractiveness



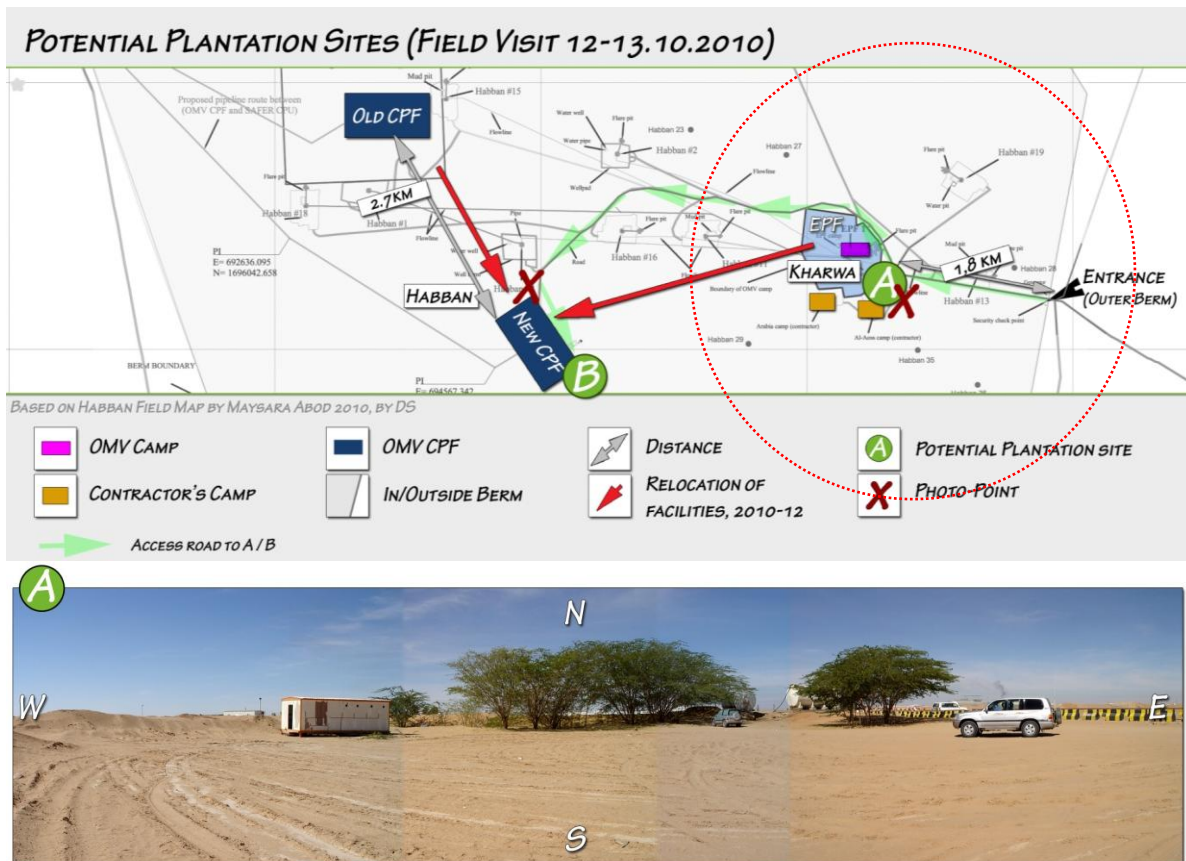
## 5.1. DEFINITION OF APPROPRIATE

### LOCATION

In coordination with OMV Sana'a and field based management initially two potential test plot sites were identified: Site "A" is located close to the present residential area of Kharwa camp and "B" at the construction site of the new CPF (estimated completion by 2012).

(where weapons and ID cards have to be handed over). The place is easily recognized by the "Saysaban" (sesbania) trees which represent the only green spot on the access road.

Site "A" provides enough space for the test plot: a rectangular space of about 40m x 60m. In the north west and south light elevations (small berms) shelter from wind.



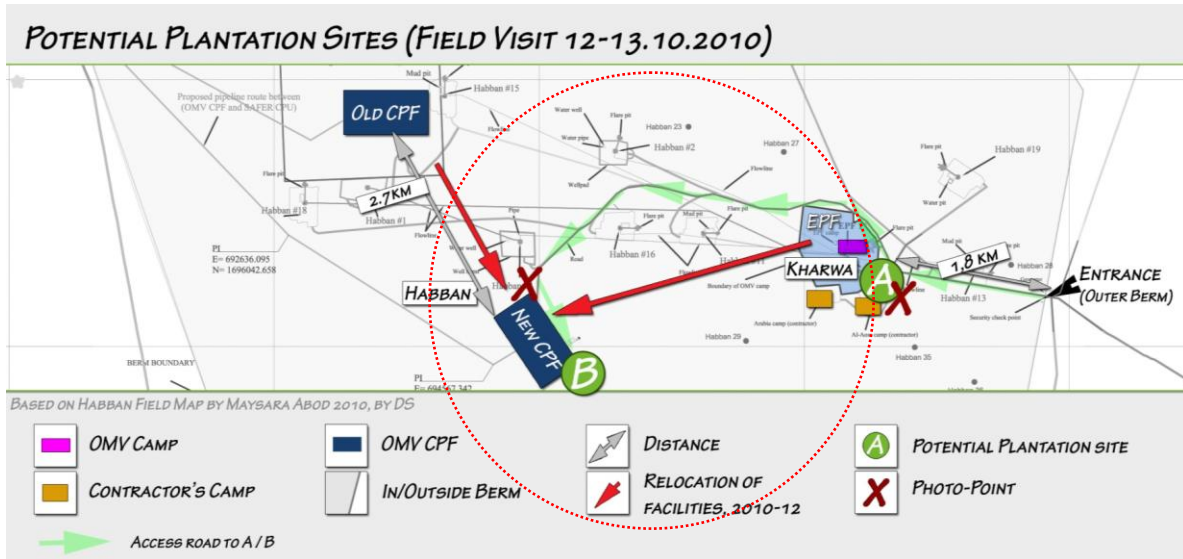
Site "A" is located on the left side of the access road (green arrows), east of the field clinic and about 200 meters from the residential area of OMV staff and contractors.

It is reached by entering the main entrance, driving 1,8 km towards the camp until arriving at the stallion security checkpoint

The access road - hence road blocks - marks its northern border. Water supply is close by (Kharwa well). Neither on the way to, nor from the site strategic buildings and infrastructure can be overseen. The sight on the nearby flare pit is limited by the inner berm and may be mitigated by plantation design. The place is appreciated as potential meeting point by OMV staff, stallion security and contractors. Stallion security

staff members are using the trees' shelter during break-time and started planting a few young palm trees next to the water tanks as their pastime.

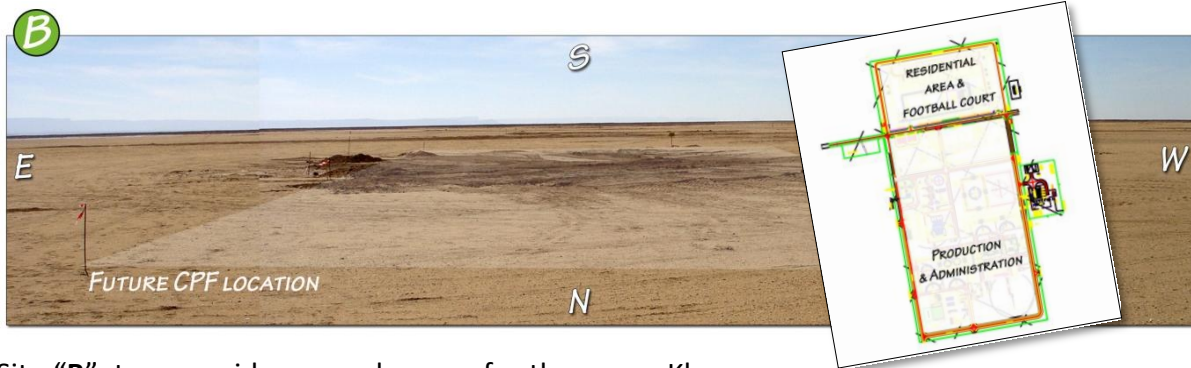
larger area. Wells however are further away (more than 800m) hence irrigation with grey water may be considered once the CPF (including the wastewater-system) is fully established. Construction works and traffic



Site "B" is located in the south of the new CPF construction site. It is reached via the access road that first passes site A, then the residential area. After turning south west and driving on for ca 3 kilometers to the new CPF construction site. Nothing much can be seen yet as the construction works just started: The suggested area for the test plot lies at the southern end of the future CPF (see sketch below, right), close to the residential area.

from east (CPF) and west (OMV- SAFER pipeline) however may negatively impact on the trees, as these will include traffic of heavy duty vehicles.

During several consecutive meetings advantages and disadvantages of both sites were discussed. The major points of concern were security of location (choice of location, utilization and design should not endanger safety and security of



Site "B", too, provides enough space for the test plot and may be even extended to a

Kharwa (camp), botanical and technical and social feasibility.

When comparing both sites and keeping in mind that the project implementation should start as early as possible A emerged as the clear favorite location for OMV Oasis test plot (see attachments for table: *Comparison of characteristics of site A and B*)

“A” is immediately available for project implementation, it is not affected by temporary increase of traffic / construction works. It is not endangered of being deserted after completion as it lies close to the main entrance that will remain in place and it provides the necessary characteristics for a safe and feasible project implementation.

“B” may become an option at a later stage when the CPF is completed: It could serve testing if wastewater from the residential area (“grey water”) can be used for watering the plantation. At present however there are too many “unknown” factors that may threaten the project’s success. As the new CPF includes recreational facilities this aspect may become irrelevant for the test plot’s utilization. Apart from that B may not be utilized as reception area for visitors, as reaching it provides too much insight: The access road passes the later deserted EPF area, 5 flare pits and the new CPF before reaching “B”.

For the utilization of “A”, design and location the following conditions were defined:

- Security: The trees / facilities should not reduce sight of the location, in order to be easily observed by security. The site should not be open to any visitors at any time. Instead

visitors should be selected / invited by CSR.

- Botanic technical: water, soil quality need to fit the plants needs, water well should be nearby to reduce running costs.
- Social / socioeconomic: The number of trees should be enough to demonstrate the benefits, the design should create a friendly, welcoming atmosphere where guests can be received and information easy to understand.
- Being a pilot with the potential of becoming a ‘prototype project’ as model for similar projects in other oil exploration countries the design should be attractive and representative for internal / external reporting and publication.

## 5.2 WATER & SOIL QUALITY<sup>lxxxiii</sup>

Two soil samples (pits no 1,2) were taken in site-A close to the Stallion Check point.



For technical aspects (moringa roots go deep) two depths were sampled from each soil pit (depths 0 – 25 and 26 – 50 cm). A third pit (pit no.3) was taken from the site close to the clinic in order to compare the observed soil characteristics of “A” with that of soil that has served for cultivated since one year ago. Thus the impact of plants, the available water on soil quality was assessed.



Water samples were taken from Kharwa well (which is used irrigating the existing trees in the camp) and from Habban-2 (B). Soil and water samples were sent for test to a professional laboratory (Laboratory of the Agricultural Research and Extension Authority /AREA in Dhamar).

Soil samples were analyzed for the following parameters: pH & EC (based on Saturation Paste), CaCO<sub>3</sub>%, OM %, available Phosphorus (ppm), Total Nitrogen %, soil fraction distribution % (Texture), Cation Exchange Capacity (CEC meq/100 g soil) and Exchangeable Potassium (meq/100g). Soluble anions and cations as well as exchangeable sodium were determined in the samples that have an EC value of more than 3.5 mS/m.

### RESULTS

- The soil type of the site has high level of salts but will be improved by cultivation of plants.
- Soil texture is coarse, poor in fertility parameters as organic matter content, nitrogen (0.032 %) phosphorus (1.8 – 4.1 ppm) and cation exchangeable capacity (3.2meq / 100g).
- Moringa oleifera, as a nitrogen fixing plant will enhance the soil quality on the long term<sup>lxxxiv</sup>
- The pH of both water samples is alkaline and was 8.1 for the Kharwa and 7.7 for Habban-2. This pH

measure is reflected to the soluble ions which mainly have an alkaline effect.

- Kharwa water (A) is classified as C4S2 according to US Salinity Laboratory System while the Habban-2 (B) comes under C4S3 class.
- The Kharwa water (A) contains about 1984 mg/l (3.1 mS/m) as total salts while Habban-2 water (B) has 1600 mg/l (2.5 mS/m). Both water samples are classified as ‘group 4’ according to the US Salinity Laboratory Classification system. This type of water could be used for certain crops which are tolerant to salinity. This applies to all three *moringa oleifera*, *moringa peregrina* and *ziziphus spina christi* however the extent of their capacity to tolerate salt depends on soil quality.

### RECOMMENDATIONS:

- Site A: It is better to use Kharwa water rather than the Habban type because of the lower content of sodium.
- ‘Washing out’ treatment before planting: irrigating the planting pits before planting (500 liters/hole each time)
- Cultivation has positive long term effect on reducing salinity
- Using organic manure continuously (dosage depending on age of plants) for improving the soil’s physical and chemical characteristics (i.e. pH



values, balance the effect of basic ions to some extent.

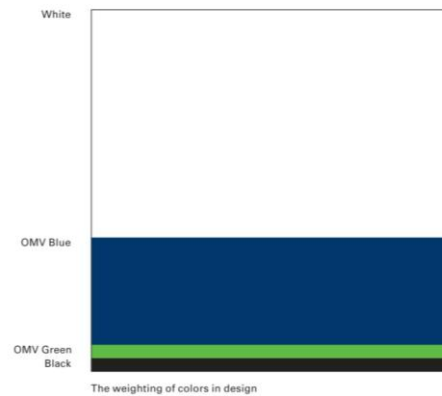
- Using minimum amount of chemical fertilizers of acidic type i.e. ammonium sulfate not urea
- Monitoring: Periodical analysis and adaptation should be carried out to observe the level of salinity and sodicity to set preventive measures to enhance the quality of planting and growing conditions

## 5.2. INTEGRATING OMV CI COLORS <sup>lxxxv</sup>

By integrating OMV corporate identity colors (CI) the camp’s reception area and community projects – hence the company - becomes linked with its community project, which also should be marked with these colors to ensure that the company’s positive impact on community living conditions is immediately associated with the company.



As not every community member in the region may be familiar with Latin letters, “OMV” alone may not as easily identified and thus recognized. However if additionally the colors / and distribution of colors are used as a mark of i.e. an OMV sponsored Kareef (water collection pool), a renovated school, or pump.



Apart from that colors work on wide distance which, especially region that is inhabited by Bedouin may be most efficient.

## 5.3. DESIGN ELEMENTS

The herein presented plantation design includes the following elements: a caravan, several sun-sheltered table-bench ensembles, information boards, and the selected trees. Apart from that simple landscaping (tracks leading to caravan, parking area) could complete the park-like design of the green zone. All items (caravan, benches, plates reflecting OMV corporate identity colors to support recognition of community projects outside the camp.

*A CARAVAN consisting of two cabins: one cabin serves as CSR office and one accommodates a divan for receiving invited members of community. The caravan is located in the western border of the plot and faces south- hence does not provide sight to the flare pit (east) but on the plantation (see sketch below).*

Inside posters pointing out parallels between Austria and Shabwa region could be displayed: i.e. beekeeper in Austria, beekeeper in Shabwa, cows in Austria camels in Shabwa, creating the notion of a common affinity to tradition and customs.



OMV staff pointed out that an empty caravan next to the entrance of the residential area could be used for that purpose.



With a few changes, such as new paint (in OMV CI colors white with small green and dark blue accents) a wide window providing sight on the plantation, and (optionally) attached flower boxes as allusion to OMV home country Austria, giving it a friendly outlook and unique profile.



### INFORMATION BOARDS

Visitors coming to the plantation are informed about the project and the utilization of trees by information boards that again reflect OMV corporate identity colors. The descriptions and explanation in these boards should be self explanatory images that are equally understood by people with reading difficulties and those who are experienced readers.



Designing the boards could be carried out by an expert in visual communication or – if a more participative approach is aspired - in cooperation with school classes.

Activity example: Ask pupils to carry out a small research on why clean water is

important – link this the possibility of cleaning water with moringa oleifera seeds, carry out an experiment with a local physics or chemistry teacher or health unit staff and ask students to illustrate the topics (clean water, cleaning water with moringa oleifera seed, see project suggestions).

### SUN-SHELTER, BENCH AND TABLES ENSEMBLE

For OMV staff expressed the need for a common space where colleagues can meet, chill out and communicate in the open air.

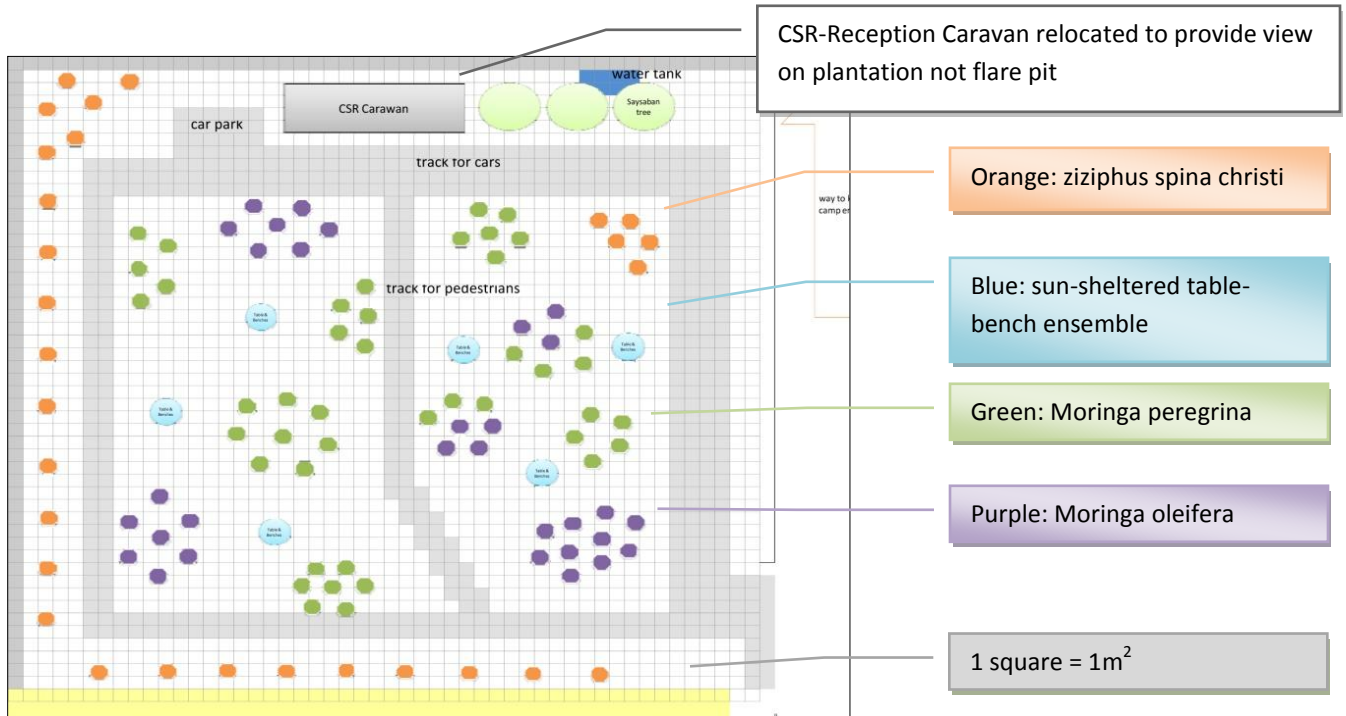
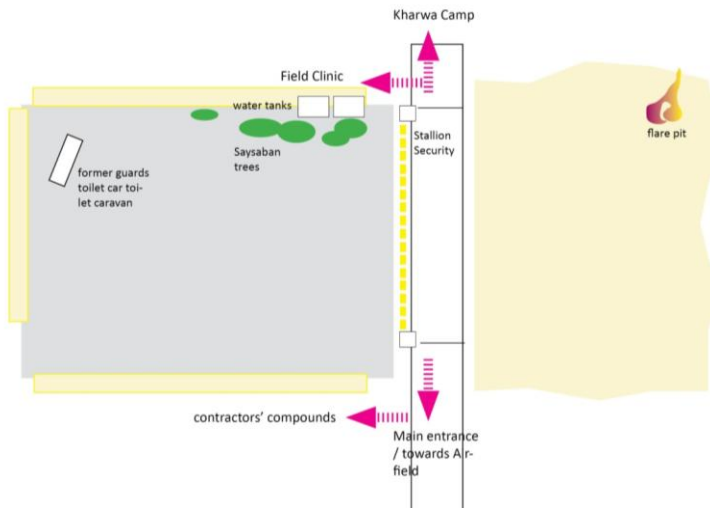


Such could be provided by sun-sheltered seating areas similar to those already existing at the Camp. Small add-ons could be a ‘chess board drawing’ in OMV colors (OMV green and OMV blue on the white table) surface that motivate to a chilled out challenge among colleagues.

Thus CI colors communicate decently the attachment to OMV and hence subtly motivate feeling of integration as one team among colleagues of different origin.

### THE TREES

By distributing the trees in small groups security conditions (regarding sight) and aesthetics and practical conditions are met (protecting the less resistant moringa oleifera with the stronger moringa peregrina and ziziphus spina christi) while creating a cozy atmosphere (symbols, right: *moringa peregrina*, *ziziphus spina christi*, *moringa oleifera*).



# Moringa Oasis for Development and Cooperation

## Block S2 Kharwa Camp Shabwa

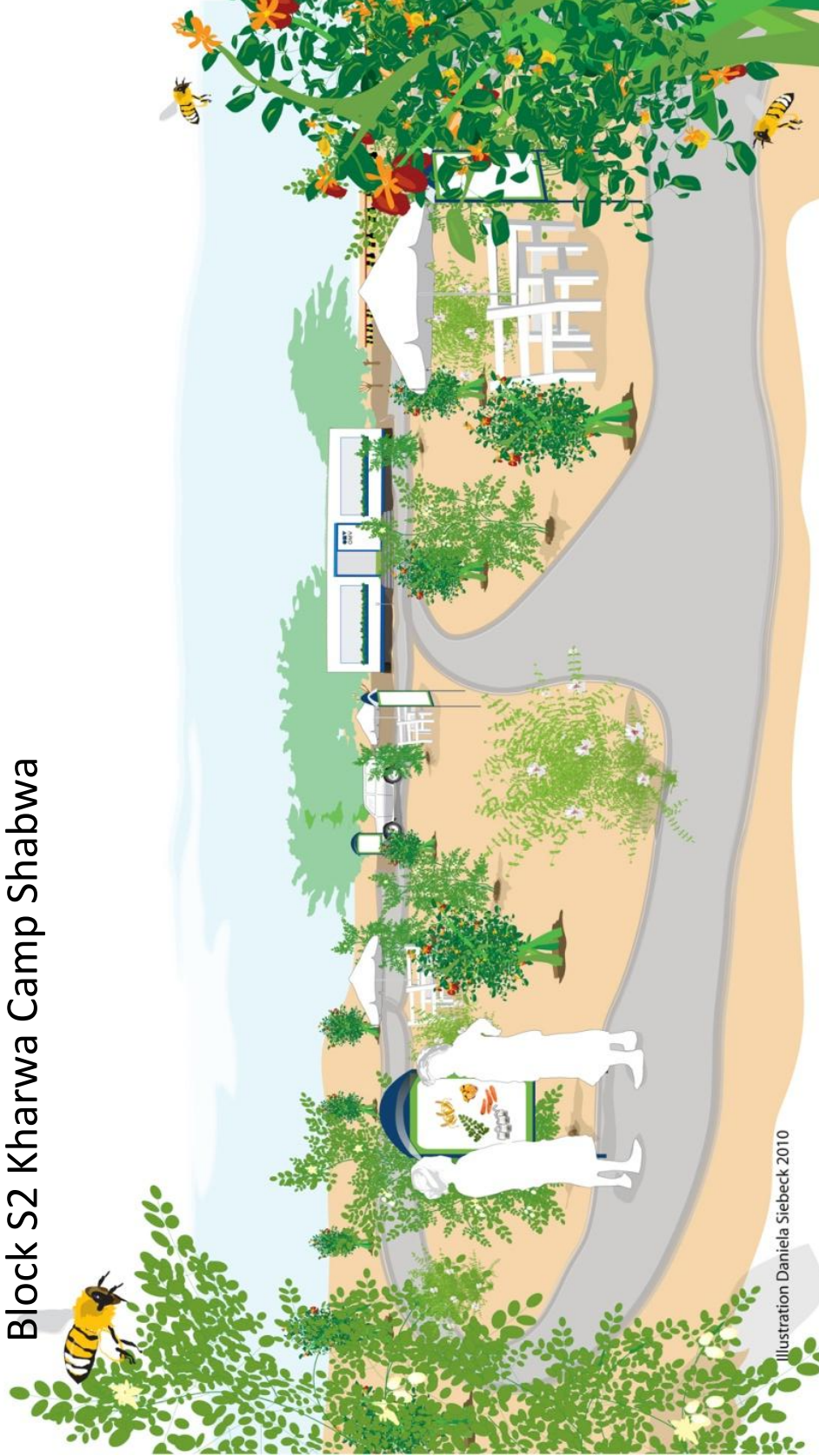
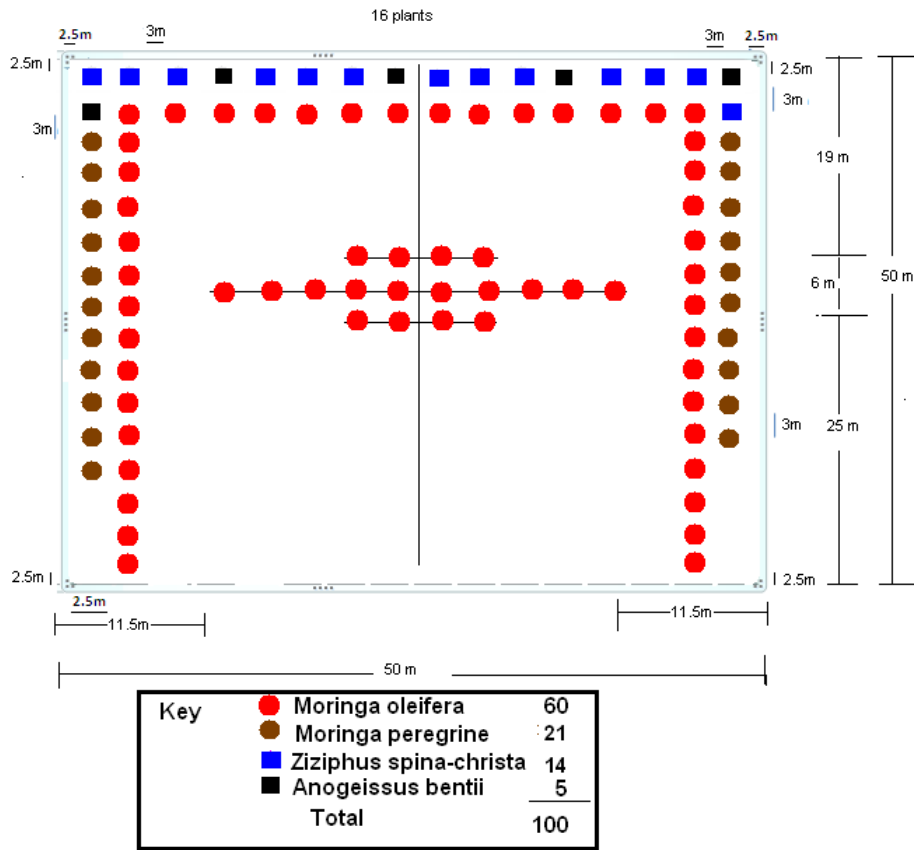


Illustration Daniela Siebeck 2010

ALTERNATIVE DESIGN DRAFT BY AL-THURAYA



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## FINAL REMARKS / CONCLUSION:

As part of its Cooperate Social Responsibility strategy in Yemen, OMV plans to supply local community of Block S2 Kharwa Camp with moringa oleifera and other utilizable plants in order to contribute to the improvement of their living conditions while on the long run enhancing motivation to perceive the Company's presence positively.

The herein presented study was to assess the feasibility of creating a test plot at Kharwa camp and provide the company with recommendations regarding the implementation of the test phase.

The news is better than expected! *Moringa oleifera* is not 'as foreign' to Yemen as anticipated in the beginning of this study. The naturalized tree grows in the Tihama and shows a high adaptability to different soils and climatic zones. And more: *moringa oleifera* has a close relative *moringa peregrina* who is native to Shabwa region and grows not far from Kharwa Camp. Both trees are similar in their benefits while moringa oleifera is considered the more efficient – hence famous “miracle tree”.

The advantage of finding the close relative however lies in the opportunity to enhance acceptance for the new tree species by associating it with well known and positively perceived trees, like *moringa peregrina* (which in case *moringa oleifera* does not prosper may be a good alternative to it) and the native famous “Sidr-Honey” tree

*ziziphus spina christi*. The trees have in common that they are medical multipurpose trees that have the potential of improving living conditions in a variety of aspects ranging from agricultural benefits, to health, to income generation and saving income.

The *OMV Oasis for Development and Cooperation* pre test is a unique initiative that provides OMV with the opportunity to “try out” not only if the trees grow in Shabwa but also to ‘try out’ local community response on the project by inviting selected community representatives and seeking constant dialogue and community input (also in external locations) that may contribute to the further shaping of the project. Thus while the trees start growing the communication with community and trust may be doing so, too.

‘Trying out’ does not mean that funds are ‘wasted’ for a test: While serving the purpose of testing the trees the green zone may be used as recreational park for OMV staff, who until the establishment of the new CPF in 2 years time have no such facilities.

Apart from that the test plot provides OMV with the opportunity to present itself as European, (non anonymous) individual neighbor by integrating Austrian and CI elements into the design and community projects that will enhance the recognition of OMV outside the berm, too.



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