IPTT

Indigenous Plant Task Team

Promoting the Sustainable Utilisation of Namibia's Indigenous Plant Resources

Promoting Indigenous Plants in Namibia:

KALAHARI MELON SEED DEVELOPMENT PROPOSAL

FINAL REPORT

Consultancy contract

Administered by the Namibian Agronomic Board (NAB)

With funds from UPDP

Prepared by M. Mallet, CRIAA SA-DC
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List of acronyms and abbreviations

AET	Agricultural Extension Technician
ALS	Analytical Laboratory Services cc.
AT	Appropriate Technology
CBNRM	Community-Based Natural Resources Management
CIF	Cost Insurance Freight
CRIAA SA-DC	CRIAA Southern Africa Development and Consulting
CT	Community Trade
DART	Directorate of Agricultural Research and Training (MAWF)
ERSC	Eco-Regional Satellite Centre (of IPTT)
EWC	Eudafano Women Co-operative Pty Ltd
FLO	Fair-trade Labelling Organisation
FOB	Free On Board
FT	Fait Trade
GI	Geographical Indication
ha	Hectare (10'000 m²)
ICEMA	Integrated Community-based Ecosystem Management (Project)
IPTT	Indigenous Plant Task Team
IRDNC	Integrated Rural Development and Nature Conservation
KAP	Katutura Artisans' Project
KM	Kalahari Melon
KMS	Kalahari Melon Seed
KNC	King Nehale Conservancy
M (N$)	Million (N$)
M&E	Monitoring and Evaluation
MAWF	Ministry of Agriculture, Water and Forestry
MCA	Millennium Challenge Account
NAB	Namibian Agricultural Board
NACSO	Namibian Association of CBNRM Support Organisations
NBRI	Namibian Botanical Research Institute
NCAs	Northern Communal Areas
NCRs	Northern Communal Regions (Ohangwena, Omusati, Oshana, Oshikoto)
NGO	Non-Governmental Organisation
NP	Natural Product
OC	Organic certification
OOP	Oontanga Oil Producers cc
OVI	Objectively Verifiable Indicator
PIF	Promotion of Indigenous Fruits
PPP	Public Private Partnership
PSDF	Plant Sector Development Forum
PTA	PhytoTrade Africa (the Southern Africa Natural Products Trade Association)
QC	Quality Control
R&D	Research and Development
RFC	Regional Farmers' Co-operative
RPRP	Rural Poverty Reduction Programme
SADC	Southern Africa Development Community
SSO	Statfold Seed Oils Ltd (UK)
t	(metric) tonne
TBSI	The Body Shop International plc
TK	Traditional Knowledge
TTP	Tulongeni Twahangana Project
UPDP	Useful Plant Development Project

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Introduction

1. This report presents the results of a desk-top work aimed at defining a programme intervention, to be endorsed by the Indigenous Plant Task Team (IPTT), for developing the supply of Kalahari Melon Seed (KMS) oil from Namibia. The need for preparing this programme intervention was decided by the IPTT at its 40th meeting held on 26 January 2006. Draft terms of reference were circulated for discussion at the 41st IPTT meeting held on 4 April 2006 and finalised thereafter (see Terms of Reference in *Annex 1*). CRIAA SA-DC was contracted on 2 May 2006 by the Namibian Agronomic Board (NAB) on behalf of IPTT with funds from the Useful Plant Development Project (UPDP).

2. The objective of the consultancy were defined as to prepare a written programme proposal, which would address, in a sustainable manner, the KMS supply crisis and restore the confidence of international buyers of KMS oil from Namibia. The proposal should consist of an action plan of priority activities and resources needed, and an indicative budget, for funding by the IPTT and/or other source(s). These other sources of funding could include the US government funded Millennium Challenge Account (MCA) and possibly other public and private sources.

3. The Plant Sector Development Forum (PSDF), a public private partnership (PPP) initiated by the Ministry of Agriculture, Water and Forestry (MAWF) with national stakeholders in the plant sector, endorsed at its meeting held on 12 July 2006 the KMS development programme as one of the priority project to be presented for funding, particularly to the RPRP[1]. An attempt was made by CRIAA SA-DC consultant (M. Mallet), with the support of PricewaterhouseCoopers' consultants, contracted by PSDF, to prepare in emergency a project submission to RPRP for the 1 August round. Unfortunately, the short delay did not make it possible to finalise on time the project proposal submission, the requirements of which are complex and demanding. However, some preliminary programme design and write up was achieved. This process also revealed that a comprehensive KMS development programme may not fit well within the requirements of a sole funding scheme. A holistic KMS development programme will include multi-faceted interventions with different targets and beneficiaries, objectives and timeframes, actors and means required, which may need to be articulated in different action components.

4. Since the inception of the IPTT, KMS has been placed in the top priority list of plant species of the commercialisation "pipeline approach" of the IPTT programme - Promotion of Indigenous Plants in Namibia. Together with Marula kernel oil, KMS oil has been the early Namibian success story of reaching international niche market access in the lipid oil cosmetic ingredient industry. In preparing this development programme proposal, the question arose as whether KMS should stand on its own in a specific project or be part of a wider programme focussing on a basket of natural product (NP) opportunities, or at least the lipid oil NPs. The answer may not be one-sided. It is the opinion of the consultant that some project intervention components need to be specific to KMS (with specific budget allocations), while others should fit into broader sectoral approaches (and larger budgets).

[1] The Rural Poverty Reduction Programme (RPRP) is part of the European support to Namibia in the framework of the 9th European Development Fund.

5. The strengths of a specific KMS development intervention approach are assessed as follows:

a. The unique genetic diversity of *Citrullus lanatus* in Namibia (the Kalahari desert being the very probable centre of origin of the species, and the adjacent areas - particularly today's Namibia - one of the major centres of domestication of the watermelon).

b. Namibia is the leading supplier in the SADC Region of Community-Traded KMS oil, with the appellation Kalahari Melon Seed Oil being recognised and used (although the "Geographical Indication" (GI) is not yet formalised).

c. Although KMS shares some similar features with other lipid oil NPs from tree fruit kernels (Marula, Ximenia, Baobab…), it is an annual inter-cropped plant harvested by and large from cultivated fields. In this way it shares common production, promotion and marketing constraints with other annual crops from small-holder farmers in communal areas, such as Mahangu (pearl millet), sorghum and pulses.

d. It is typically an "underutilised crop", which has been part of the traditional cropping systems for a long time, at least in the North Central Regions (NCRs), with a long history of traditional use and traditional knowledge (TK) still in use. It is a multi-purpose crop, cultivated and/or harvested as a human food (cooking watermelon and sweet watermelon cultivars), as an oil seed (traditional ointments), as an animal fodder (whole plants and fruits, fruit skins and pulp) and more recently as a cash crop, the agronomic production and socio-economy of which is not well documented and lacks agricultural extension support.

e. The current and projected international demand for KMS oil makes KMS a crop diversification opportunity for a large number of communal farmers, beyond the presently restricted demand and supply of other natural oils, such as Marula oil from Eudafano Women Co-operative (EWC) members or *Ximenia* oil still at an infant commercial development stage.

f. KMS oil extraction with standard mechanical oilseed expellers does not require particular technological innovations for producing quality crude oil within the specifications of international buyers. However, it needs specific attention because KMS is a very tough and abrasive raw material for the oil expelling parts of the machinery.

6. The weaknesses of a KMS-centred development approach can be summarised as:

g. The limited annual income potential of a single NP compared to a basket of opportunities, and consequently the relatively limited economic impact to primary producers and the national economy. This is particularly the case for KMS oil on the international market, which has to compete in price with other similar oils and consequently KMS as a raw material, which has a much lower oil content than Marula and *Ximenia* kernels and currently fetches a much lower producer price per kg (but still higher than Mahangu).

h. The lower economies of scale of developmental interventions centred on a single resource compared to a broader basket of NPs opportunities, which may also contribute to reducing the "fundability" of the project proposal with international donors. The rural primary producers of KMS could generally (but not always) be producers of other NPs and cash crops.

i. The need to demonstrate environmental sustainability when submitting project proposals to major funding schemes, which may be more suited by a broader NP programme approaching natural resource management in a more holistic manner.

7. However, a KMS development programme with intervention components standing on their own and/or part of a broader approach would have the following strong developmental features:

- A demonstrable contribution to poverty alleviation through a reliable and regular income distribution to rural producers, additional rural-based employment and improvements of farming returns in the small-holder sector.
- A self-evident pro-poor bias as Kalahari melons are harvested and seed extracted with minimum tools, representing an affordable and labour intensive economic opportunity for poor rural people since the up-front costs are minimal.
- A development programme that is demand-driven by the need and aspiration of rural producers to diversify their cash income opportunities from farming activities.
- A clear gender agenda as rural women are the main traditional producers of agricultural and natural products.
- A definite impact on developing the nascent NP industry of Namibia and the national economy in line with Vision 2030 and National Development Plans.
- A market-led development based on confirmed market demand and an existing supply chain that needs to be scaled up.
- Documented baseline data against which the programme impact can be measured, which is essential for project funding justification, as well as impact Monitoring and Evaluation (M&E) and "logframing", e.g. the Objectively Verifiable Indicators (OVIs).
- Confirmable multiplier effects in rural producers training and farming productivity upliftment, producers' organisations capacity building, rationalising supply chains from rural areas to local processors, raising agricultural and NP quality standards, developing traceability and ecological and ethical certification, strengthening PPPs, and contributing to strengthening Namibia's position as a reliable supplier of value-added natural products.

8. The report is divided into the following sections

- Section 1 characterises the problem areas and analyse the possible causes of the supply shortage of KMS recently experienced in Northern Namibia, and identify remedial measures to understand better the problems, address the supply shortage in the short-term and increase the supply of KMS in the longer term on a sustainable basis.
- Section 2 presents a programme of key actions for sustainably and economically developing the supply of KMS and the production of KMS oil for Namibia's niche export market.

The terms of reference are shown in *Annex 1*.

Annex 2 provides a background of KMS development efforts and results over the past years, and presents a summary of the current situation in mid-2006 as baseline references for potential development interventions in the coming 3 to 5 years.

Relevant bibliographical references are provided in *Annex 3*.

I. PROBLEM AREAS, POSSIBLE CAUSES AND POTENTIAL REMEDIAL MEASURES TO THE SHORTAGE OF KMS

1. The **background** to this Section of the report is provided in *Annex 2*. In order to present as shortly and concisely as possible the characterisation of the problem areas, the analysis of the possible causes of the supply shortage of KMS and the identification of remedial measures, a summarised table has been compiled, which should serve as a guide to the elaboration of the programme of prioritised key actions for sustainably and economically developing the supply of KMS and the production of oil for Namibia's niche export market.

The summary table presented below (*Table A*) is structured in 3 parts as follows:

- Three levels of problems are characterised:
  - Kalahari melon production by farmers (rural producers)
  - Marketing supply chain of KMS (from producers to processors)
  - Processing and export marketing of KMS oil.

- For each problem area, possible causes are listed, potential remedies presented, and actions discussed and prioritisation highlighted in the adjacent columns.

2. **The overall problem to be addressed by the project** remains that the demand for KMS oil in the existing niche export market is not matched by the Namibian supply, the main underlying cause being a low and unpredictable volume of KMS marketed.

- The international market demand for KMS oil has expanded:
  - TBSI requires at least 10 tonnes of KMS oil in 2007/08, which represents at least 80 tonnes of KMS
  - The other main buyer, Aldivia, is constrained in its marketing efforts due to the lack of consistent supply
  - The total demand for KMS oil could rapidly grow to at least 25 tonnes annually if not constrained, which would be equivalent to an annual production of over 200 tonnes of KMS.

- The marketed volume of KMS dropped in 2006, which was not a particularly good agricultural production year in the NCRs:
  - 12.5 tonnes of KMS have only been procured by EWC Factory, which would produce around 1.5 tonnes of KMS oil
  - The supply from the largest organised producers' group in Omuthiya, i.e. the King Nehale Conservancy, collapsed with around 3.5 tonnes marketed in 2006 from an annual average of 25 tonnes in the previous years; the reasons behind remain unclear.

  However, Regional Farmers' Co-operatives in the NCRs have entered the supply chain in 2006 on a small-scale and remain interested to diversify their collective marketing services beyond mahangu.

Table A-1. "On-farm" Kalahari melon (KM) and KM seeds production

Problem areas	Possible causes	Potential remedies	Discussion and prioritisation
1.1 Under-developed KM production system(s) as seed cash crop in traditional production areas (NCRs)	a) Potential of KM for multiple uses not fully realised b) KMS as new cash crop not well promoted c) Agro-ecological limitations to crop production in NCRs	i) Integrated research, promotion and development approach (see below)	. **NCRs priority area** for promoting KMS production and marketing . Unavoidable inter-annual production variations with high degree of unpredictability
1.1.1 Limited volume of KM produced on average by small-holder farmers	a) Staple crops (mainly cereals) given priority b) KM seeds not actively planted; unconfirmed seed germination problem (?) c) Low KM plant density in fields intercropped with mahangu d) 'Mono-cropping' and more intensive KM production exceptional	i) Understand better 'traditional' crop production system(s) & KM potential ii) Study further seed germination and natural recruitment issues iii) Provide planting seeds of selected breeds and monitor field results iv) Conduct on-farm trials of alternative/improved KM production v) Include KM production in agricultural extension actions	. Short term and longer term research and extension actions needed . Identify, sample and describe interesting KM landraces to feed in the breeding programme . Food security issues not to be ignored but to be balanced with the income generation potential of KMS . Integrate breeding project results into KM agronomy promotion
1.1.2 Limited quantity of KMS produced on average by small-holder farmers	a) KM left in fields after mahangu harvest for livestock to graze on b) Labour intensive harvesting and seed extraction, c) KMS kept on-farm for own use as oilseed and animal feed d) Unconfirmed post-harvest quality and quantity losses (?)	i) Understand better the competition in uses and investigate feasible alternatives ii) Document harvesting and post-harvesting practices iii) Increase farm-gate price for KMS iv) Improve seed extraction methods and post-harvest practices	. Stresses the need for better understanding of small-holder production systems . TK and productivity of seed extraction to be better documented . KMS price to properly remunerate on-farm labour . Appropriate Technology R&D for improved on-farm productivity of KMS production
1.1.3 Limited number of farmers producing KMS surplus	a) Limited number of farmers aware of this diversification opportunity b) Not all areas well suited for KM production (soils and size of fields) c) Not all farmers are crop surplus producers	i) Inform and promote KM crop diversification opportunity ii) Map areas according to production potential	. Priority for immediate action . Promotion efforts may have to take different forms in high and low potential production areas

1.2 Under-utilisation of KM for seed production in other regions	a) Limited/decreasing/absent traditional use of KMS as oil seed b) KMS production and cash crop opportunity not (well) known	i) Assess potential and constraints of KMS production in these regions ii) Identify, describe and sample potentially interesting KM breeding lines from local cultivars & landraces iii) Promote KMS as new opportunity iv) Train producers in post-harvest handling and KMS production where needed	. Second priority areas to expand KMS production and improve reliability of marketed volumes
1.2.1 Under-utilised KM from cultivated fields	a) KM often considered as a weed b) Sweet and cooking watermelon cultivars preferred (same species as KM) and actively planted c) Lack of KMS production experience by small-holder farmers d) No 'commercial' production on private farms	i) Understanding better crop production system(s) and KM potential ii) Ascertain KMS from these cultivars suitable for processing and oil acceptable to market iii) Provide extension messages and training on KMS production iv) Investigate profitability of more 'intensive commercial' production	. Kavango, Caprivi and Northern Otjozondjupa to be prioritised . Sampling of KMS for oil content and fatty acid profile . Identify, describe and sample interesting KM local cultivars for potential breeding . Continue supporting pilot 'commercial' production, such as at Oros farm (Otjiwarongo)
1.2.2 Under-utilised wild harvested KM	a) Wild KM grazed by wild and domesticated animals b) Labour- (and transport-) intensive KM harvesting from the veld c) Lack of experience in KM harvesting, KMS extraction and marketing by potential producers	i) Document TK, present practices and uses of KM in these areas ii) Assess potential impacts of KMS commercialisation on wildlife iii) Evaluate potential for special niche marketing for wild KMS with sustainable harvesting credentials iv) Assess potential for propagation and fenced-off semi-cultivation v) Prepare extension messages and train producers where feasible and when needed	. Careful approach required to minimise environmental impact risks . Ascertain cost-effective KMS production from the wild . Potentially interesting genepools to be identified in wild KM population . Potential synergies with small-holder Devil's Claw cultivation in communal and conservancy areas

Table A-2. Marketing supply chain of KMS (from producers to processors)

Problem areas	Possible causes	Potential remedies	Discussion and prioritisation
2.1 Difficult market access for individual farmers	a) Limited market information available to farmers b) High costs of marketing for an individual producer in remote area (low volume, high transport costs) c) Few decentralised buying points in rural areas	i) Provide marketing information (prices, buyers, quality, volumes etc.) ii) Improve factory-gate prices of KMS delivered to processors iii) Promote network of organised producers' groups/associations iv) Promote collaborative, co-operative and private buying centres	. 'General public' and targeted info. through all appropriate channels including AETs, EWC associations, conservancies & farmers' organisations branches . Different possible options: from organised marketing groups to mobile private traders
2.2 Undeveloped network of intermediaries for KMS marketing	a) KMS marketing a new business	i) Built on experience in NCRs with EWC associations and other groups	. Mahangu marketing experience of Farmers' Co-ops also useful
2.2.1 Limited number of marketing intermediaries in NCRs	a) Supply network historically restricted to 'Community Trade' (CT) suppliers b) Low margin for organised marketing groups c) Unattractive business proposal for producers' associations, farmers' co-ops and private operators	i) Support expansion of supply chains while keeping CT credentials and Fair Trade (FT) practices ii) Improve price structure and marketing margins for organised groups and intermediaries iii) Promote and support FT cash payment system at collection points	. Field KMS Marketing Promoters' scheme to be piloted . Niche marketing requires un-exploitative intermediaries and transparent transactions . Price structure of EWC (and possibly OOP) to be adapted to expanded supply network . Requires careful plan, management, QC and monitoring
2.2.2 Unclear potential to extend supply chain to other regions (in Namibia and possibly bordering countries, i.e. north-west Botswana and south-west Zambia)	a) Lack of experience and references in these regions b) High transport costs from other regions to Ondangwa c) Unclear economics (volume vs. costs)	i) Support marketing trials in selected areas through local service providers ii) Document & monitor pilot marketing schemes iii) Study options & feasibility for processing facilities in other locations	. To be piloted in Caprivi & Kavango (& possibly in N-W Otjozondjupa) in collaboration with development partners in these regions . Processing economies of scale an issue, KAP in Windhoek an option.
2.3 Undeveloped supply of quality-assured and certified KMS	a) So far limited to some EWC associations b) Fair Trade certification system not yet finalised c) Organic certification (OC) only piloted in Uukwaluudhi area	i) Support the extension of traceability and quality assurance to the expanded supply network ii) Continue KMS FT accreditation through PhytoTrade (PTA) & EWC iii) Expand pilot OC project to other production areas	. Requires technical guidelines, training and monitoring . FLO accreditation progressing, FT standards and training to be developed for Namibia . Strengthen collaboration with NGOs/service providers

Table A-3. Processing of KMS oil and niche-marketing

Problem areas	Possible causes	Potential remedies	Discussion and prioritisation
3.1 Weak management of KMS procurement by processors	a) Lack of pro-active procurement b) Lack of qualified human resources	i) Management mentoring of EWC & training of key staff at Factory	Priority for EWC, unconfirmed need for OOP
3.1.1 Insufficient marketing promotion towards KMS producers	a) Lack of information on KMS buying scheme b) Buying price not sufficiently advertised and explained	i) Support the organisation of annual information & promotion campaigns for KMS marketing ii) Discuss, revise & advertise KMS price structure annually	. To be initiated by project in collaboration with EWC, and to be taken over in future by EWC & other buyers/ processors
3.1.2 Poor linkages with producers' groups	a) No clear planning of annual procurement season by buyers b) Insufficient liaison with existing & potential organised producers' groups	i) Support formation of a forum between producers' groups and buyers to efficiently plan and organise marketing season	. Step-by-step process to be supported through annual planning and review meetings/workshops before institutionalising such forum
3.1.3 Inadequate organisation at factory(ies) for larger KMS intake volumes	a) Inadapted work organisation to deal with larger volumes b) Insufficient working and storage space c) Inadequate price premium payment system for higher quality and certified KMS	i) Support better work organisation and train staff ii) Assist in extending building for intake handling and KMS storage iii) Design and support premium price payment system and adequate certified KMS stock handling	. The current system at EWC Factory has been more or less appropriate for relatively small volumes of KMS handled and stored, but will become inadequate with the much larger volumes envisaged
3.2 Profitability of KMS oil processing low	a) Export pricing not consistent with production costs	i) Re-align all export prices to PTA-negotiated price (FOB)	. Currently under discussion, costs of production to be better documented
3.2.1 Technical difficulties in processing	a) High wear & tear on small-scale expellers (KMS very abrasive) b) Critical repairs require services of professionals not available in North c) Insufficient stock of expeller spare parts	i) Organise professional back-up repair services ii) Upgrade training of processing staff in maintenance & basic repairs iii) Order essential spare parts and improve management of stock	. Professional back-up repair services available in Windhoek . EWC ordering a 2nd expeller (to be commissioned at Factory) . EWC & OOP combined processing capacity increased with 4 expellers
3.2.2 Processing costs currently high	a) Sub-optimal processing efficiency (technical and organisational) b) Raw material and seed oil content remain major cost factors c) Financing costs of stock-holding raw material and KMS oil not insignificant	i) Optimise extraction yield and productivity of work ii) Increase annual KMS oil production iii) Monitor processing costs and assess processing economics iv) Assess need of financing stock	. Possible economies of scale with higher annual processing turnover to be monitored and confirmed . Research into improved and more cost effective processing technologies to be envisaged . Fair Trade financing an option

3.3 Low capacity of EWC in export management and niche marketing of KMS oil	a) Lack of professional experience b) Lack of qualified human resources	i) Recruitment, training and mentoring of an EWC Factory management staff	. CRIAA SA-DC and PTA support available
3.3.1 Erratic management of export shipments	a) Small export volumes (too low for containerisation in Ondangwa) b) Export packaging below standards c) Low capacity to manage export shipments and closely liaise with international buyers	i) Optimise export schedule with increased production ii) Decanted/filtered oil in food-grade steel drums iii) Train and mentor key staff and EWC leadership	. Consolidated shipments with range of oils from different producers so far successfully organised (it remains an economical option) . PTA membership provides access to support services & market facilitation
3.3.2 Niche marketing constrained	a) International buyers' confidence eroded by insufficient oil quantities b) Namibian KMS oil price high compared with similar oils from other producing countries	i) Restore confidence with KMS development plan and increased production volumes ii) Continue defending credentials of Namibian KMS oil (CT, FT, OC & environmental/sustainable) iii) Assess when conditions ready for decreasing KMS oil price with sufficient economies of scale	. Increased production volumes requires enlarging the KMS industry beyond the currently registered CT suppliers, i.e. EWC & KNC . Option of defending credentials of Namibian/SADC KMS oil though Geographical Indication/Appellation of Origin ('Kalahari'?), re. Duras project

3. In addition to the general agro-ecological limitations to crop production in northern Namibia (erratic rainfall, low soil fertility etc.), the **major causes of the KMS supply problem** as analysed in *Table A* above seem to be as follows:

- KM and KMS production remain labour intensive in the "traditional" production system and the farm-gate prices so far offered have been considered too low by farmers
- KMS as a new "cash crop" opportunity for small-holder farmers has not been sufficiently promoted across the NCRs and other potential producing regions
- Market access is difficult (remoteness, high marketing costs) for individual farmers each producing small quantities
- The existing supply chain remain undeveloped even in the NCRs with a limited network of marketing intermediaries, i.e. Eudafano women's associations, other organised producers' groups, farmers' co-ops, conservancies and very few mobile traders
- The margins paid to marketing intermediaries has remained too low to properly cover the marketing costs (collection at assembly centres, recording and quality control, transport and other expenses) and provide a sufficient incentive for the efforts of local marketing co-ordinators or traders
- The management of KMS procurement by processors (EWC Factory and OOP) has been weak, with limited promotion and publicity outreach to producing areas
- The profitability of KMS oil processing remains low with the current CT export price around N$60/kg FOB), which limits the means and motivation of KMS buyers/processors to invest further into developing the KMS business.

4. The **potential remedies to the situation and the challenges ahead** are summarised below:

- The problems are inter-linked along the supply chain and require an integrated programme of actions, which should include:
  - Interventions from on-farm production of KM to the processing/marketing of KMS oil
  - A combination of short-term and longer-term research, promotion, extension, training and capacity building efforts, as well as technical, managerial and marketing support
  - The expansion of the supply-chains to other northern regions
  - The involvement of a range of relevant developmental actors, public and private including non-governmental organisations
  - The support to more regular and consistent interactions between primary producers and processors, which could lead to the formation of a KMS industry body.

- KMS supply expansion has to (at least) maintain (if not strengthen) the existing quality credentials of the product in the market:
  - Its main features are its traceable, quality-assured, ethical and eco-friendly trade practices
  - Certification (fair trade, organic or equivalent) and possibly Geographical Indication (GI) should be a crucial tool to sustain the marketability of KMS oil.

- Pricing along the value-chain has to be improved while keeping the end-product marketable through:
  - A better remuneration of rural producers and marketing intermediaries
  - An increased export price of KMS oil until economies of scale are achieved (KMS supply logistics and oil processing) and KMS oil price can be stabilised and possibly rendered more competitive without having to reduce the farm-gate price of KMS.

5. The **strategy** proposed articulates short-term priority actions (1 to 2 years) and medium-term actions (3 to 4 years) with quantified targets and longer-term expected results (after 5 years of project's actions). The range of figures presented in the first rows of the Table is indicative to show quantified targets realistically achievable and the corresponding (rough) financial returns expected.

Table B Quantified targets, strategic actions and expected results

TARGETS	**After 1 to 2 years**	**After 4 to 5 years**	**After year-5**
KMS marketed & oil production	KMS: 80t-100t KMS oil: >10t-12t Extraction yield: >12%	KMS: 185t-225t KMS oil: >25t-30t Extraction yield: >13.5%	KMS: >300t KMS oil: >45t Extraction yield: >15%
Pricing: **KMS:** **. Farm-gate price:** **. Factory-gate price:** **KMS oil:** **. FOB export price:**	KMS & oil prices increased to (range): . N$2.50 – N$3.50/kg . N$3.50 – N$5.00/kg . N$85/kg (±€9.0/kg)	Economies of scale in KMS marketing & oil processing Farm-gate price increased, factory-gate & export prices lower (FOB N$76/kg ±€8.0/kg?)	Prices stabilised Quality standards & quality premiums introduced Significant % of production certified
Financial returns p.a. **. Producers:** **. Intermediaries:** ***Sub-total:*** **. Processors:**	 . N$0.25M – N$0.28M . N$0.10M – N$0.12M *N$0.35M – N$0.40M* . N$0.85M – N$1.02M	 . N$0.65M – N$0.80M . N$0.25M – N$0.34M *N$0.90M – N$1.14M* . N$1.90M – N$2.28M	 . > N$1.05M +premiums . > N$0.45M *> N$1.50M* . > N$3.5M
STRATEGIC ACTIONS	**Short-term (project phase-1)**	**Medium-term (project phase-2)**	**Expected results after year-5**
1. On-farm production systems	Inform & promote KM crop diversification opportunity in NCRs and pilot areas in other regions	Extend information and promotion to all regions having production potential	All potential producers aware of opportunity
1.1 Improvement of KM cultivation systems	. Study 'traditional' cropping systems, understand better competition in use	. Conduct on-farm trials and assess more intensive cultivation systems . Develop extension messages	Improved KM cultivation promoted by agricultural extension services
1.2 Development and dissemination of superior cultivars of KM	. Support 2nd phase of breeding scheme . Test new cultivars on-farm . Identify, describe and sample interesting KM landraces to feed in breeding scheme	. Continue breeding scheme . Continue test and evaluation of new cultivars . Multiply new cultivars seeds . Integrate new cultivars in agronomy extension	Improved KM cultivars available to farmers
1.3 Improvement of post-harvest practices and seed extraction	. Document harvesting and post-harvesting practices, including quality & productivity of seed extraction	. Conduct R&D to improve KMS extraction quality and productivity . Test improved technology and prepare dissemination	Practices improved and simple technology innovations disseminated
1.4 Wild-harvested KMS feasibility	. Research and consult on environmental, technical, economical issues	. Assess potential (if any) of sustainable harvesting and develop specific actions, including possible semi-cultivation	To be confirmed

Abbreviations: p.a. per annum; (N$) M million

Table B (continues)

STRATEGIC ACTIONS	**Short-term (project phase-1)**	**Medium-term (project phase-2)**	**Expected results after year-5**
2. KMS supply chain development	. Scaling-up in NCRs & piloting in other regions	. Scaling-up in all producing regions	KMS supply chains developed in all regions
2.1 KMS market information dissemination	. Develop KMS market information and pilot dissemination in NCRs	. Facilitate KMS market information dissemination in all regions	Market information routinely provided by KMS buyers/processors
2.2 Marketing intermediaries network development	. Promote network of organised producers' groups and collection centres in NCRs . Develop & provide training . Support & monitor pilot marketing trials in other regions	. Promote extended marketing network to all regions . Provide training, back-stopping and monitoring . Promote and support FT cash payment system at collection points	Network of marketing intermediaries established in all producing regions
2.3 Quality-assured, traceable and certified supply development	. Build capacity of organised producers' groups and collection centres in NCRs, & pilot areas in other regions . Finalise with PTA the KMS FT accreditation at FLO and support EWC certification . Expand organic certification to 3 new producing areas	. Support the extension of traceability and quality assurance to the whole supply network . Expand fair trade (FT) and organic certifications in all regions	The supply chains in all regions close to be entirely traceable, quality-assured and certified
3. KMS oil processing & niche-marketing	Focus on EWC (TBSI niche market)	Expand support to other processor(s) (OOP…)	Viable oil processing businesses
3.1 Improvement of KMS procurement by processors	. Support annual marketing campaigns in NCRs . Mentor EWC & train staff . Assist in extending KMS storage capacity	. Support formation of a forum between producers & buyers/processors for KMS marketing management	Forum institutionalised into an integrated KMS industry
3.2 Improvement of profitability of KMS oil processing	. Improve oil processing efficiency with expellers . Train processing and management staff . Monitor processing costs and assess processing economics	. Investigate more efficient oil processing technologies . Confirm economies of scale achievable and oil price reduction . Promote and support more profitable processing	KMS oil processing businesses profitable
3.3 Development of capacities for managing exports and niche-marketing of KMS oil	. Assist in recruitment, training and mentoring of factory management staff . Improve quality and schedule of exports . Strengthen credentials of KMS oil in niche markets and continue collaboration with PTA . Continue GI project for KMS oil	. Assess feasibility of new oil expelling businesses in other regions . Back-stop and continue training . Develop niche markets and improve competitiveness of Namibian KMS oil . Strengthen co-operation with other KMS oil producers in SADC region	KMS oil processing industry self-managed
4. Project management			
4.1 Project co-ordination & reporting	. CRIAA SA-DC & partners/ associates with IPTT	. MCA requirements?	
4.2 Monitoring and evaluation	. Develop M&E system	. Implement M&E system	Results evaluated
4.3 Mainstreaming HIV /Aids & gender issues	. Propose plan for next phase	. To be confirmed	
4.4 Publicity, visibility and publications	. Propose plan for next phase	. To be confirmed	

6. The direct financial returns of KMS oil development efforts may appear relatively modest with an expected annual turnover of a few N$ Millions after Year-5. But **other significant benefits and spin-offs** are expected from scaling-up the commercialisation of KMS:

- Small cash income but spread over thousands of rural producers, especially women
- Synergies with marketing of other agricultural products, particularly mahangu
- Capacity building of rural institutions involved in promoting, quality-controlling and marketing of KMS and other products
- Development of more diversified, drought-resilient and profitable small-holder cropping systems
- Valorisation of the biodiversity of the KM species, *Citrullus lanatus*, which Namibia is a major centre of genetic diversity and where farmers are managing a diverse range of cultivated landraces
- Option for further local value-adding in the KMS oil industry.

II. PROGRAMME OF KEY ACTIONS

1. Summary of the programme

Title: Improved Commercialisation of Kalahari Melon Seeds (KMS)

Overall objective:

The livelihoods of rural producers are enhanced and their agricultural income opportunities diversified through the commercialisation of the oilseeds from the indigenous Kalahari Melon and the sustainable management of this under-utilised plant resource by small-holder producers/harvesters in farming areas of Namibia.

Specific objective:

Namibia strengthens its position as a quality, reliable, eco-friendly and ethical producer of KMS oil as a cosmetic industry ingredient for the international and local market.

Expected results:

1. The on-farm production of KMS and income to producers are significantly increased:
- Production of KMS sustainably expanded (number of producers and regional coverage)
- Sales of KMS increased (in volume) by 7 to 8 times in Year 5 (200t-300t) from current level (average 30t-40t p.a.)
- On-farm KMS extraction productivity increased (+20%-25%) and quality improved (quality "standards" met for over 80% of marketed quantities, average oil content increased from current level of 20% to 25% in Year-5
- Farm-gate price increased and cash returns to farmers improved by 25%-50%.

2. The supply chain of KMS (from producers to processors) is expanded and efficiently managed:
- KMS market information readily available to producers
- KMS Producers' marketing groups and other intermediaries efficiently organised
- Improved remuneration of marketing intermediaries and their costs covered better
- Full traceability and quality assurance achieved along the supply chains
- Ethical and environmental certification achieved in most production areas (Fair-trade and organic certifications).

3. Improved processing and marketing of KMS oil:
- Procurement of KMS by oil processors pro-actively and efficiently managed
- KMS oil export price consistent with production costs to ensure profitability
- Production of KMS oil at least multiplied by 4 in Year-5 compared to 2005/06
- Improved oil extraction yield from current level of 12%-13% to over 15% in Year-5
- Full traceability and quality control of raw materials and products along the supply chains
- Ethical and environmental certification of processors (at least one, i.e. EWC)
- Improved supply of KMS oil to customers (timely and in volume), improved quality (according to market specifications), packaging and price (certification), a strategic stock of a few tonnes constituted as a buffer for years of drought.

Location:

- Mainly in the Omusati, Ohangwena, Oshana and Oshikoto Regions (NCRs), as well as in Caprivi and Kavango Regions
- And marginally in Otjozondjupa and Omaheke Regions, where the Kalahari Melons grow and can be harvested and/or cultivated.

Target groups:

- The small-holder producers/harvesters, mainly women but also men, in communal areas and Conservancies (and possibly in resettlement areas).

Final beneficiaries:

- The organised producers/harvesters groups/associations/co-operatives in communal areas and in Conservancies
- The King Nehale Conservancy in Omuthiya (Oshikoto Regions)
- The Eudafano Women Co-operative (EWC) in the NCRs as a women producers' organisation and as a processor/exporter of KMS oil
- The Natural Products industry sector of Namibia, including the processors, exporters and local users of KMS oil.

Duration:

- A first phase of one to two production and marketing seasons (20-24 months), but longer term actions may need at least 5 years.

Project proponent and co-ordinator:

- CRIAA SA-DC (first phase)

Partner organisations in implementation:

- EWC
- NNFU (and affiliated RFCs)
- ICEMA (HVPS component in Conservancies)
- Relevant IPTT members, including ERSCs, KMS breeding project, OOP and IRDNC

Collaborating institutions and organisations:

- IPTT
- NAB
- Rössing Foundation (KNC)
- NACSO member organisations
- MAWF DART including NBRI
- MAWF DEES & DOF (particularly in North Central and North East Divisions)
- PhytoTrade Africa (+ Aldivia & TBSI)

Main activities:

1. KMS supply chain development

1.1 Information, promotion and education campaigns:
- Pre-planting and pre-harvesting annual campaigns targeted at individual farmers/harvesters, through media and producers' organisations
- Pre-marketing campaigns targeted at marketing groups (existing and emerging) and potential private operators

1.2 Training programme:
- Developing training content (on-farm harvesting & post-harvesting, off-farm marketing organisation…)
- Training of trainers (KMS promoters) within marketing groups and other potential intermediaries
- Area-group training

1.3 Expanding the supply chain to other regions:
- Investigating most promising areas
- Trial intakes
- Integration into training programme and supply chain

1.4 Monitoring and evaluation of supply chain development:
- Annual volumes, distribution, number of groups and of farmers/harvesters …
- Marketing group management: recording, QC, traceability, cost effectiveness …
- Supply matching demand.

2. KMS oil processing and marketing development

2.1 Technical support and training to processors (at least EWC):
- Processing technology and storage improvement, QC, traceability, packaging, export …
- Factory certification

2.2 Business development support to processors (at least EWC):
- Costing and pricing updates (including certified products)
- Business planning review
- Market liaison

2.3 Monitoring and evaluation of processing and marketing:
- Supply-demand matching
- Technical, managerial and financial performances.

3. On-farm KMS development

3.1 Improving on-farm productivity and quality of seed production
- Field survey in NCRs (traditional cultivation areas): production patterns (inter-cropping / monoculture), agronomy, yields, crop harvesting, seed extraction, seed drying and cleaning (winnowing), visual quality control
- R&D into improved seed extraction (from the fruits)
- Preparation of simple extension messages (for training programme)

3.2 Certification (Fair Trade and Organic):
- Incorporating results of field survey into Fair Trade certification process
- Supporting pilot organic certification at Onesi
- Supporting extension of organic certification into at least 2 more areas in NCRs

3.3 Developing improved Kalahari Melon planting seeds cultivars (based on local landraces)
- Breeding (sub-contracted)
- Evaluation of oil content and fatty acid profiles (lab. analysis …)
- On-farm multiplication of planting seeds and distribution to cultivators

3.4 Research-action into developing harvesting and cultivation of Kalahari Melons in non-traditional cultivation areas:
- Understanding better potential in other areas (North-Eastern and Eastern Namibia)
- Supporting controlled wild harvesting
- Supporting planting and cultivation
- Linking producers to supply chains

3.5 Monitoring and evaluation of on-farm KMS development:
- Technical
- Economic
- Environmental.

4. Project management

4.1 Project co-ordination with partners and associates and reporting to IPTT

4.2 Monitoring and evaluation

4.3 Mainstreaming HIV/Aids, gender and environment issues (if budget allows)

4.4 Publicity, visibility and publications (if budget allows).

5. Budgets

The activities have not been budgeted in details on account of likely cost-sharing with broader projects supporting the commercialisation of a broader basket of opportunities, including KMS.

However, the specific KMS project activities are estimated to cost around N$ 2 to3 Millions over 4 years, or an equivalent of N$0.5 M to N$0.75 M per annum.

Phase-1 is being budgeted in details as part of a project proposal submitted to IPTT for funding.

2. Detailed description of activities

(Adapted from the project document drafted with PriceWaterhouseCoopers in July 2006)

The project activities are targeted at the different levels of the KMS supply chain - from rural producers to processors of the KMS oil. The activities are also designed along annual cycles to match the seasonality of on-farm and off-farm operations, i.e. crop production and harvesting, on-farm post-harvest operation and KMS marketing. It is therefore essential to recall the annual timing of these operations (see Table below), in which the project activities must fit.

Operation	**Timing**	**Comments**
On-farm:		
Melon crop growing season	November/December to April/May	Timing depends on the rain patterns
Melon fruit harvesting	June to August	Together or after Mahangu harvest
On-farm maturing of fruits	June to August	Harvested fruits are generally heaped at the homesteads' to ripe fully
Seeds extraction and drying	July/August to September/October	Generally done after Mahangu threshing
Off-farm:		
Seeds marketing	August to October/November	Seeds store well and can be marketed even later
Oil processing (and marketing)	August to July	All year round, if stock level allows

Activity 1: Support to annual KMS marketing campaigns in the 4 NCRs

This activity is designed from the successful experiences gained in the NCRs from mahangu marketing campaigns organised by regional farmers' organisations (as from 2002) and from the pilot marula kernels intakes from the EWC women associations (1998-2002).
The actions under this activity are spread over an annual cycle and divided into 5 sub-activities. The project team will be implementing this activity.

Sub-activity 1.1: Regional "pre-planting" information and promotion campaigns
These are annual broad-based information and promotion campaigns targeted at KMS producers on the onset of the rain-fed cultivation season
- To provide simple market information (demand, price, timing, quality etc.) to farmers to make decision on time and encourage production based on market demand
- To promote the joining of marketing groups
- Additional technical advices and extension messages will be fed in Year 2 and Year 3 from the experience and results obtained by the initial phase of the project.

Messages will remain simple and be translated in local language. Means of communication will be multi-fold:
- Printed guidelines to assist further verbal decentralised information dissemination
- Printed leaflets with the summarised information
- Local radio announcements and talk shows
- Relay of information to farmers through marketing groups, farmers' organisation branches, agricultural extension offices etc.

Sub-activity-1.2: Marketing campaign planning (and training of trainers) workshops
These are one-week long annual planning and training workshops to be organised at a central regional place (initially in the NCRs only), to review project progress, plan the marketing season, and provide technical information and training to key actors in the field (and expose them to the "broader picture" of the entire value-chain). The workshops are targeted at producers' marketing group representatives (co-ordinators), project field staff ("training of trainers") and buyers of KMS (processors). In addition, active field agricultural Extension Officers and possibly representatives of Local Development Committees will be invited to participate. The number of participants to such workshop is estimated at around 40 to 50. Workshop reports will be prepared and distributed to participants and interested stakeholders (around 100 copies). It is not excluded to invite the participation of stakeholders from other regions to these workshops, especially if these persons represent groups willing to join the supply chain of KMS.

Sub-activity 1.3: Pre-marketing information, promotion and education campaigns
A "repetition" of the pre-planting information and promotion campaign adapted to preparing farmers to the marketing season and updating market information, focussing on post-harvest processing, marketing arrangements, quality requirements etc. Preparation of the campaign message campaign will be prepared at the planning workshop (sub-activity 1.2).

Sub-activity 1.4: Marketing campaign follow-up and back-stopping
Project field staff will follow up on the progress of the marketing campaign (M&E) and provide field support services to marketing groups on demand and as the need arise.

Sub-activity 1.5: Marketing campaign evaluation workshops
These are one-week long annual workshops with the same key actors as in the planning workshops aimed at a participatory evaluation of the completed marketing campaign and preparing the next. Workshop reports will be prepared and distributed to participants and interested stakeholders (around 100 copies).

Activity 2: Capacity building of producers' marketing groups (active and emergent)

Training materials shall be developed by the project management team and shall be addressed to take into consideration all literacy levels. The training shall cover the importance of proper post-harvesting techniques, and basic activities relating to the extraction of melon seeds. In addition, modules shall be prepared on basic finance and accounting, people management, supply management and marketing in order to provide an all-rounded approach to doing business. This aspect of the training may be discretionary on the part of the trainee, since it assumes basic education in reading, writing and arithmetic.

Training shall be provided to at least 2,000 individuals with regard to proper on-farm post-harvesting techniques. The issue of traceability shall be addressed which is essential for quality assurance and control to ensure there is no contamination. The groups are required to keep up-to-date records of producers, villages/farms, volumes marketed and dates of marketing (this is an essential first step in the quality control process).

It is anticipated that organised marketing groups will be around 20 in Year-2, gathering an average of 100 KMS producers (with obvious variations in number between the groups, some larger and some smaller).

Sub-activity 2.1: Field-training
Provision by project field staff of participatory training targeted at marketing groups' leadership (typically management committees) and interested group members (all group farmers cannot be expected to attend). This will be a follow-up of the annual planning and training workshops to reach the grassroots. Training sessions will be organised around 3 modules (taking between ½ day to 1 day each):
i) On-farm post-harvest handling, quality requirements and screening (visual), quality assurance and traceability, etc.
(ii) Group marketing arrangements (intake planning, recording, weighing/measuring, bag marking, bagging and stacking, short-tem storage of bags, liaison with buyer(s) etc.)
(iii) Financial management: basic bookkeeping, transparency and accountability to group members, payment to group members for KMS supplied and paid by buyer(s), management of the marketing margins generated etc.
Training and guideline hand-outs will be provided together with copies of recording forms.

Sub-activity 2.2: Provision of basic marketing equipment
As an incentive to marketing group formation and attendance to training, one portable hanging clock scale and a set of calibrated containers (for correlating the traditional volumetric measurement with approximate weight, as a back-up to the scale) will be donated to each group.

The marketing follow-up and back-stopping service provision (sub-activity 1.4) will provide the practical field follow-up to support the implementation of the training recommendations and back-up the marketing group co-ordinators.

Activity 3: Building of small rural marketing depots

Typically a rural marketing depot is an open and roofed structure (around 130 m^2) with a small secured and lockable office/storeroom build with dry walls (1 door and 2 windows). The main structure consists of a strong flat concrete slab on foundations and a 2-slope roof on pillars to provide shade and rain protection to the structure (although no marketing activities are planned during the rainy season). Additional side shading (protection from sun and dust) is added. The depot is erected on a cleared plot that must be fenced. (Some local branches of regional farmers' co-operatives affiliated to NNFU have the plan to build such facilities with funds from NNFU and MSTT; one has done so in 2005).

A rural depot provides the clean and secure conditions for farmers to deliver their KMS for group marketing. It is where the KMS delivered are screened for quality, weighed or measured, recorded, and stored (in bags) till transported to the buyer and sold. Additionally, the depot can serve as a multi-purpose building for the marketing of other agricultural and natural products (mahangu grain, marula kernels etc.), as well as for community meetings and other activities.

The project will build 3 new depots or, alternatively, built 2 new depots and renovate/extend 2 existing structures, with the same budget.

There are minimum requirements for an area to be a suitable site for such depot:
- High production potential of Kalahari melons and production of KMS

- Accessibility of the location (particularly by trucks)
- Well organised group to properly manage and maintain the premises.

The exact sites for building the depots are to be confirmed during the project implementation. However, two sites would fulfil the above minimum requirements: Omuthiya (King Nehale Conservancy) and Omuntele (EWC association), which are already organised groups located in two of the highest KMS production areas.

The construction of the depot will be the responsibility of the partner Rössing Foundation, which has relevant experience in this activity. Local building contractor(s) will be selected and supervised.

Activity 4: Technical and business development support to processors (at least one: EWC factory)

EWC factory in Ondangwa is fully owned by the Eudafano Women Co-operative (EWC), but operates with its own staff and management, and bank accounts. It is sufficiently resourced in working capital to purchase upfront the volume of KMS aimed by the project's Phase-1 and finance both oil processing and export. EWC holds international market access for KMS oil, exclusively to The Body Shop International (TBSI) as its "Community Trade" supplier, and preferentially to a French commercial partner through PhytoTrade Africa. EWC s the main supplier of "community" KMS oil to the international cosmetic ingredients industry not only in Namibia but also in Southern Africa. The EWC factory started operating in August 2005 with the technical assistance of CRIAA SA-DC from its own funds and through the NASSP Co-operative Mentorship programme (the latter was, however, too short and too limited in scope to contribute to a meaningful impact). EWC and its factory require a renewing of technical and business development support to strengthen its position as the leading supplier of quality KMS oil on the market and be in a position to commercially sustain the procurement of KMS from the supply chain to be developed by the project.
The support will be provided by the CRIAA SA-DC team, which has already been involved (to a limited extent) in the set up and operationalisation of EWC factory. Technical assistance and training will be "on-the-job" and delivered at the factory to the technical staff and management.

Sub-activity 4.1: Technical support to oil processing and training
EWC factory has the financial resources for the equipment and materials required. The project will provide the technical assistance (human resources) to build the technical capacity to efficiently manage the oil production operations.

4.1.1 Technical support to raw material handling:
- Training for improving the KMS quality control, recording and traceability system
- Technical assistance to design and implement improved and extended storage of bagged KMS required for annual processing.

4.1.2 Technical support to oil processing:
- Technical assistance to import a second oil expeller (Tinytech, India), possibly a third one if needed, and commission it/them at the factory

- Training to improve the oil extraction yield to a normal level (13.5% from 11.5% achieved in 2005) and the production efficiency (optimum should be at least 250kg of KMS processed per day, i.e. 50 t per annum and per machine)
- Training to improve the oil quality control system, recording and traceability, packaging and storage.

4.1.3 Technical support to the organic certification of the factory
- Training to ensure that organically certified raw materials and processed products are handled, recorded and stored separately from non-certified products, and can therefore be marketed as such at a premium price
- Technical assistance for overall compliance at the factory, registration and liaison with Certifier agency.

Sub-activity 4.2: Business development support
This support will be a continuation of the mentorship initiated in 2004/05, but provided in a more integrated and systematic manner to strategically develop the business.

4.2.1 KMS business planning review and implementation:
- Technical assistance and training to review and effect the EWC Co-operative and Factory business plans, matching supply and demand (including the constitution of a strategic stock), costing and pricing, and integrating the KMS price premiums to be paid to producers' groups for Fair Trade and Organic certified products.

4.2.2 KMS oil export management
- Technical assistance and training to manage the export packaging (food-grade drums), the containerisation (sea-freight shipment through Walvis Bay harbour), liaison with shipping agent and the preparation of the export documentation (packing lists, invoices, bank forms, EUR1 forms, Customs forms, certificate of origins, certificate of analysis etc.)
- Technical assistance and training to liaise directly with PhytoTrade Africa and international buyers (follow up on demand forecast, shipping delivery planning and follow-up, payment follow-up, addressing the (often unavoidable) problems, delays and quality issues that may arise, etc.).

Activity 5: Improving on-farm KMS production and quality of seed production

Sub-activity 5.1: Field research and surveys
The agricultural production of semi-cultivated Kalahari melons in the NCRs (the traditional production area), the post-harvest handling and the Traditional Knowledge (TK) of small-holder farmers is fragmentally documented and poorly understood. These limitations constitute a serious limitation to any effort to improve the on-farm production of Kalahari melons and KMS. This is not entirely surprising in the case of KMS, which can be considered as a typical example of an "under-utilised crop species". The project will seek to redress this situation through field research and surveys in order to provide the necessary ground and baseline for any improvement.

During the cultivation, harvest and post-harvesting seasons, field surveys will be conducted to understand and document TK and practices, in a limited but representative sample of major production areas. The detailed methodology will need to be refined and assistance from NBRI will be sought. The important elements to be surveyed include:

- Production patterns (inter-cropping / monoculture), agronomy aspects, fruit yields, fruit harvesting practices, animal grazing, seeds replanting etc.
- Post-harvest practices: fruit ripening, seed extraction, seed drying and cleaning (winnowing), visual quality assessment of seeds, storage, traditional use etc.
- Socio-economic aspects: labour and income distribution, gender issues etc.

The field research results will also be important to feed in the project M&E component and practically document current farmers' practices, which are critical to Fair Trade evaluation (particularly for evaluating if the work remuneration is in line with national minimum remuneration standards).

In addition, it will be important to qualitatively assess the main geographical area of current and potential production of Kalahari Melons to guide the efforts of the project.

Sub-activity 5.2: Improved method of seed extraction
The entirely manual process of seed extraction is very labour intensive (which makes KMS a pro-poor commercial opportunity). Productivity and seed quality could be improved to benefit producers with limited means. Furthermore, there is anecdotal evidence that TK on seed extraction and use is progressively been lost in some areas, particularly among the younger rural generation. Building on the results of the KMS field research and experience gained with other natural products and grains, the project will embark of the following:
- R&D into appropriate technology (AT) to improve the productivity of seed extraction (from the fruits), to be conducted by an experienced technologist.
- Development of an AT hand-operated mechanised "prototype" or improved manual method (the best approach can only be seen from the results of the R&D)
- Participatory testing of AT "prototype" or improved method with beneficiaries in the field (1 or 2 sites)
- Improvement of the AT "prototype" or improved method
- Dissemination in the field: (i) either manufacturing of the AT in a small series or (ii) preparation of extension material to illustrate and practically recommend the improved method
- Pilot dissemination in the field and field evaluation

Sub-activity 5.3: Extension recommendations for the production of quality KMS
From the results of the field research and R&D (sub-activities 5.1 & 5.2), simple extension messages will be prepared, as far as possible in an illustrated form with digital pictures (as it has been already done for Mahangu) with minimum text (and a minimum need for translation into vernacular).

Sub-activity 5.4: Sampling and analysis of KMS landraces
By its regional coverage, the project will be in a unique position to collect samples of traditionally cultivated Kalahari Melon landraces with promising traits with the aim of feeding these samples into the national plant breeding programme of MAWF (NBRI). This will be an essential contribution to the long-term sustainability and improvement of KMS production in Namibia, which is recognised as the centre of genetic diversity for the species *Citrullus lanatus* (and one of its major centres of origin and probably domestication). At the same time, the collection of samples and their analysis will enable the project to monitor critical economic characters of the KMS annual production in the NCRs.

The samples of KMS will be evaluated for:

- Oil content (which can vary from a low 16% to a very high 30% and possibly above): by solvent extraction in a laboratory (services available in Namibia)
- Oil fatty acid composition (which is part of the specifications of international buyers): which requires more sophisticated laboratory facilities and protocols (not currently reliably available in Namibia).

Annexes

ANNEX 1

IPTT INDIGENOUS PLANT TASK TEAM

Promoting the Sustainable Utilisation of Namibia's Indigenous Plant Resources

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Preparation of a Project Proposal for Developing the Supply of KMS Oil

Terms of Reference

(As presented at IPTT meeting of 4 April 06, with no comments received by 12 April 06)

Introduction

1. The IPTT is a national body of public and private sector institutions established in 2000 to co-ordinate the development of economic opportunities based on indigenous plants. The main task of IPTT is to develop and co-ordinate the implementation of a national strategy for the promotion of indigenous plants and products derived from indigenous plants aiming at: strengthening household food security; creating income, employment and livelihood opportunities; improving agricultural diversification; and developing agro-industries.

2. At its 40th meeting on 26 January 2006 (see minutes § 6.15 page 7), the IPTT decided to fund a consultant for drafting a full project proposal for developing the supply of Kalahari Melon Seeds (KMS) in Namibia on a sustainable basis, which will address the shortage of processed KMS oil for export experienced during the 2005/06 season. KMS is a successful product but is in the middle of a supply crisis, the causes of which are likely to be multi-folded. Namibia is currently the only supplier of community-traded / fair-traded KMS oil and has a confirmed market for at least 14 tonnes of oil annually, and potentially 40 tonnes.

Objective

3. The objective of the consultancy is to prepare a written programme proposal for endorsement by the IPTT, which will address, in a sustainable manner, the KMS supply crisis and restore the confidence of international buyers of KMS oil from Namibia. The proposal shall consist of an action plan of priority activities and resources needed, and an indicative budget, for funding by the IPTT and/or other source(s).

Specific Tasks

4. The consultant shall complete the following tasks:

- Characterize the problem areas and analyse the possible causes of the supply shortage of KMS recently experienced in Northern Namibia
- Identify remedial measures to understand better the problems, address the supply shortage in the short-term (2006/07 season) and increase the supply of KMS in the longer term (3 to 5 years)
- Propose and elaborate on key actions that will constitute a programme for sustainably and economically develop the supply of KMS and the production of KMS oil for Namibia's niche export market
- Indicate clearly how the key actions should contribute to solving the current supply shortage and expanding the KMS supply

- Formulate a prioritised action plan with human, material and financial resources to be mobilised, with a detailed timeframe and expected results.

Scope of Service and Outputs

5. The consultant will be remunerated for 10 days work (@N$2’300 VAT included).

6. The consultant shall present a draft project proposal document of not more than 20 pages (excluding annexes) for comments to the IPTT (to be electronically circulated). On receipt of the comments, the consultant shall produce the final report.

7. The consultant is expected to be available for IPTT meeting(s) to present the findings of the work.

ANNEX 2

SITUATION ANALYSIS OF KMS MARKETING IN NAMIBIA (2006)

1. Background

A high-value niche market for KMS oil as a cosmetic ingredient has been established in 2000 with The Body Shop International (TBSI). This resulted from research and development efforts undertaken by CRIAA SA-DC in the mid-/late-1990s in collaboration with the rural women producers' associations, which later formed EWC. The preliminary work included trial intakes of KMS from EWC associations, processing R&D and production of oil samples, and overseas market development work (du Plessis 2002).

KMS oil is appreciated for its skin moisturising properties and its high linoleic fatty acid content (over 60%). Quality specifications for cold-pressed KMS oil as an ingredient to the cosmetic industry have been developed by international buyers and have been matched by the Namibian suppliers. The traditional knowledge and long historical use of KMS oil Namibia as a safe food and skin and hair products has helped to go through the initial international market development stages. The appellation Kalahari Melon Seed has been used from an early stage in order to differentiate (and protect) the Namibian (and Southern African) product in the international market.

There has been more than five years of KMS and KMS oil ethical trading and export experience in Namibia. TBSI has been (and is still) the major buyer of KMS oil from its "Community Trade" (CT) supplier - EWC, which was backed up in years of short supply by a private processor "Oontanga Oil Producers" (OOP) in Ondangwa.

During the first three years (2001/02 to 2003/04), community traded KMS seeds were bulked up by EWC/CRIAA and exported after pre-cleaning and quality control to Statfold Seed Oils in the UK, which acted as contract processor and oil refiner for TBSI. The un-processed seeds[2] were exported at the time as a raw material because it was considered that investing in local processing technology (and facilities) was not financially justified at this early stage of market development. The establishment of a supply chain for KMS from organised producers' groups and individual farmers was considered a more important priority, due to the fact that EWC associations' women-members were more vested in Marula kernel supply than KMS (and some EWC associations are only marginal growing areas for melons). Omuthiya has been the major producing area of KMS and, through the King Nehale Conservancy committee, the major community supplier. The other important organised marketing groups of KMS have been in located in Omuntele (later joined EWC as an association), Onankali, Onaanda and Eenhana. It must be noted that this KMS trade and export business was self-financed except for a limited support provided by IPTT through a PIF field project implemented in 2001/02. However, no major resources were invested into broadening the supply base and significantly scaling up the volumes of KMS marketed.

The past two years saw the development of local processing and the export of locally processed KMS oil. In 2004/05 contract processing of community traded KMS was

[2] The KM seeds were nevertheless quality-controlled, traceable, pre-cleaned and community-traded, which constituted a significant value-addition compared to a low-value oilseed raw material.

preformed at OOP. An attempt was made by CRIAA with IPTT funds to scale up the supply of KMS to respond in emergency to an expanding demand of KMS oil, when EWC factory was being built (and only became operational the next year in August 2005) and EWC associations performed very poorly. In 2005/06 most of the CT oil was processed at EWC factory at Ondangwa. In both years, export shipment of EWC and OOP oils to SSO (and to a limited extent to Aldivia) were consolidated in joint sea-freight shipments to save costs.

Table 1 below summarises the annual volumes and origin of KMS marketed in North Central Namibia over the past five years and *Table 2* shows the annual volumes and value of exports. However, these two tables only provide the data related to the "community trade" scheme of EWC and excludes the additional production of OOP (except when acting as a back-up supplier of EWC), the data of which are not readily available (and are believed to be limited).

Table 1 - Annual marketing of KMS in North Central Namibia over 5 years (2001/02-2005/06)

Marketing Year	Total KMS marketed	Origin of KMS marketed (t)				Marketing scheme
		EWC	Omuthiya	Other groups	Individuals	
2001/02	45.52 t	12.35	22.39	6.93	3.85	CRIAA/EWC pilot (1) + PIF (IPTT)
2002/03	48.58 t	14.80	29.52	2.66	1.60	CRIAA/EWC pilot (2)
2003/04	57.27 t	13.40	34.19	7.37	2.31	CRIAA/EWC pilot (3)
2004/05	32.10 + 30.80* = 62.90 t	0.28 -	17.48 ?	14.34 ?		IPTT support & contract processing at OOP + OOP private supply* consolidated oil export shipments
2005/06	21.0 + 8.3* = 29.30 t	13.0 t -	8.0 8.3 (?)			EWC factory processing + OOP private supply*
5-year total	**243.57 t**	**53.83**	**189.74**			
Average/year	**48.71 t**	**10.76**	**37.95**			

Data source: CRIAA SA-DC records [Marketing year: May/June to April/May]

Table 2 - Annual export of KMS & KMS oil: volumes and value over 5 years (2001/02 - 2005/06)

Marketing year	Export scheme	Quantity exported	Value N$ export CIF	Income N$ producers	Income N$ prod. org. *	Total prod. + prod. org.
2001/02	KMS pre-cleaned	44.31 t	N$ 351'800	91'000	2'500	93'500
2002/03	KMS pre-cleaned	43.85 t	N$325'400	97'200	11'100	108'300
2003/04	KMS pre-cleaned	60.20 t	N$ 414'900	114'500	13'700	128'200
Sub-total:	***Seeds***	***148.36 t***	***N$ 1'092'100***	***302 700***	***27'300***	***330'000***
2004/05	KMS oil	8'387 kg	N$ 508'700	125'800	6'100	131'900
2005/06	KMS oil	3'487 kg	N$ 217 200	58'600	3'250	61'850
Sub-total:	***Oil***	***11'874 kg***	***N$ 725'900***	***184'400***	***9'350***	***193'750***
Total:			**N$ 1'818'000**	**487'100**	**36'650**	**523'750**

Data source: CRIAA SA-DC records [Annual quantity exported do not necessarily match quantity marketed (in Table 1) due to pre-cleaning losses (+/-2%) and stock balance brought forward to the next marketing year.]
* Margin for producers' organisations, excluding KMS transport/delivery costs.

To alleviate the fear of the sceptics who may feel that this niche export market demand might not be sustained for long (products having a life cycle of a few years on retail shelves), it must be emphasised that TBSI is already marketing a second generation of KMS oil-based products

and its demand is expanding fast. A second international buyer (Aldivia), a French speciality lipid oil formulator to the cosmetic industry introduced through PhytoTrade Africa, has become particularly interested in KMS oil, especially for the rapidly growing Fair Trade and Organic certified market segments, but could not get so far sufficient supply from Southern Africa and Namibia in particular.

2. Baseline situation

The records over the past five years (see *Table 1* above) provide some useful baseline reference on the actual marketed volumes of "community traded" KMS supplied from the NCRs and particularly on the inter-annual variations. Low and high hypothesis of annual baseline marketed production are estimated (see *Table 3* below) to illustrate the variability of the crop production in the NCRs due to agro-ecological factors, mainly the rainfall and pest damages to the fruits in the fields. A medium hypothesis is based on a realistic average over five years and used as baseline reference.

Table 3 - Baseline annual volume of KMS marketed in the NCRs

	KMS marketed/year	**Number of producers**	**Average/producer**
Low hypothesis	30 t	800	37.5 kg
High hypothesis	60 t	1200	50 kg
Medium hypothesis	48 t	1000	48 kg

It is more difficult to extract from the marketing records data on the number of rural producers who were involved in supplying KMS in the NCRs, the records being either unavailable or incomplete in most years. However, the 2004/05 records provide the most accurate indication thanks to the project's documented intakes (Den Adel 2006). Taking into account the fact that producers may market KMS in more than one annual intake, it was calculated that the 32 tonnes of CT KMS marketed in 2004/05 was supplied by 650 producers (marketing on average 49kg of KMS each, ranging from 2.3kg to 894kg). *Table 4* below shows the variation of quantities of KMS supplied from a range of production areas and different types of community organised producers' groups.

Table 4 - Range of KMS marketed from different production areas and producers' groups

Type of production area and producers' group (2004/05 marketing season)	**KMS marketed**	**Average /producer**	**Number of producers**
High production area, large producers' group [1]	17'600 kg	118 kg	150
Medium production area and producers' group [2]	4'800 kg	48 kg	100
Low production area, individual or semi-organised producers' groups [3]	9'600 kg	24 kg	400
Total CT intake:	**32'000 kg**	**49 kg**	**650**

[1] Typically Omuthiya and Omuntele. [2] Represented by areas and groups such as in Onankali, Eenhana, Onaanda and some EWC associations in Onesi, Okahao, Tsandi (Omusati), Ondangwa and Onathinge (Oshana/Oshikoto). [3] Typically from the rural areas with high population density and smaller fields (Cuvelai areas), including a number of EWC associations (Endola, Ongenga …) and from individual producers in all Northern Regions.

It is also difficult to estimate, even roughly, the hectarage under which Kalahari melons are grown in the NCRs (and ascertain the potential for expansion) in the absence of reliable data from field surveys in representative areas. Estimates are rendered problematic for the following reasons, which are inherent to Kalahari melons production patterns in the NCRs:

- Kalahari melons (KM) are mostly inter-cropped with mahangu and there are only anecdotic evidence of plots (portion of communal farm fields) being mono-cultivated.
- Inter-cropping density of KM plants (number of plants per ha) seems highly variable, farmers weeding out some KM plants depending on how the other crops (principally mahangu, but also pulses) perform. As an indication, the range of plant density documented by observation and interviews varied between plant spacing of 15m x 15m (around 44 plants per ha) to 2m x 5m (1'000 plants per ha).
- The whole cultivated area of a communal farm is generally not inter-cropped with KM, in particular the parts of the field prone to water logging.
- The number of harvestable fruits per plant would considerably vary depending on the annual agro-ecological condition of the production area and agricultural practices of the farmer. As a guess estimate, one plant could produce between 0 and 5 matured fruits.
- Farmers do not harvest all the KM fruits from their field, leaving a varying portion as a nutritious feed for animal grazing on mahangu stalks (and as a source of seeds for the next season).
- The size and weight of fruits, and seed content are variable. However, the variation range and averages have been measured (Gamond 2002) on some samples giving a matured fruit weight ranging between 1.3kg and 2.0kg (with obvious lower and higher extremes) and averaging 1.65kg, and dry seed weight ranging between 56g and 74g per fruits, 65g on average, i.e. 4% (w/w) seed/fruit ratio.

The only field data available to our knowledge are derived from the farm mapping (GPS based) and farmers' interviews conducted in the Uukholonkhadi area (Omusati region) for the organic certification pilot project covering 297 farms. The preliminary figures of this "medium" KMS producing area are shown in *Table 5* below. It must be noted that the average KMS production per hectare calculated in the Table refers to the total area cultivated, which has not necessarily been all inter-cropped with Kalahari melons.

Table 5 - Farm data and KMS production estimates in the Uukwaludhi area (2006)

	Number of farms/farmers	Average farm size	Average cultivated area	Estimated total KMS production	Average KMS production/farm	Average KMS / ha
KMS producers	107	10.9 ha	4.76 ha	2'700 kg	25.2 kg	5.3kg/ha
% of total	36%	100%	44%			

Source: preliminary figures from the Uukwaludhi pilot organic certification farm survey (CRIAA SA-DC / Rössing Foundation)

Using this grossly estimated average, the annual baseline production of 48 tonnes of KMS marketed would represent a total cultivated area of around 9'000 ha in the NCRs, which tends to indicate that there is ample room for expansion of the KMS marketed production in the NCRs (where the total area under mahangu production is around 225'000ha). However, this does not mean that the KMS volume marketed could be easily multiplied by a factor 25 (from 9'000 ha to 225'000 ha). Many constraining factors would be faced, particularly the distance of farms to the market (a similar constraint as for mahangu marketing) or to the nearest KMS assembly point, the competition between KMS as a cash crop and other crops for food security or KM as a fodder crop, and the labour intensity of harvesting and the traditional techniques of seed extraction from the fruits.

In this regard, farm-gate price of KMS and labour productivity of seed extraction may be the key elements.

The traditional seed extraction techniques (and seed drying) have been documented (Amutse & Mallet 2001, Gamond 2002, Du Plessis 2002, Schall 2002) and are not repeated here. However, productivity measurements of the various traditional techniques of seed extraction from the fruits are limited, and there is no improved technological innovation that has been made available to Namibian farmers (provided a ready-to-use and affordable innovation does exist). The only reliable indication of productivity available from the NCRs is from EWC, whose experienced members state that a woman can easily produce around a lata of KMS per day, sometimes more, but less experienced persons would do less (there are anecdotic evidence of traditional knowledge being lost by the younger generations). A lata (volumetric measurement using a 20 litre container) of KMS weigh on average 12.5kg (ranging between 11 kg and 13kg). At the price of N$2.00 per kg at the closest marketing point, KMS seed extraction, drying and winnowing would fetch a remuneration of N$25 per day (say between N$2.50 and N$3.12 per hour) but that remuneration would exclude marketing and production costs (minimal apart of harvesting time and effort), and the value in kind of the by-products of seed extraction (fruit skin and pulp, small seeds), which are fed to animals (pigs in particular).

The producer price of N$2.00/kg introduced by the CRIAA/EWC pilot marketing initiatives was considered as "not too bad" by producers at that time (comparable with mahangu grain price in the informal trading sector and slightly over formal market price, but much lower than the price of Marula kernels that EWC members can get, i.e.N$17.00/kg). However, EWC has increased in 2006 the KMS producer price to N$2.50/kg (equivalent to a lata at N$30 to N$33) with the aim of encouraging producers to produce and market more.

The current buyers of KMS are the two oil processors based in Ondangwa, the factory of EWC (equipped with two expellers), which mainly buys from its associations and other community producers, and Oontanga Oil Producers (equipped with two expellers). The installed production capacity and oil extraction yields (2005 for EWC, verbal communication for OOP) are shown below in *Table 6*. With our baseline volume of 48 tonnes of community traded KMS, EWC factory would only be running at 48.5% capacity and the two current processors' combined capacity would only represent 29% of marketed KMS[3]. This illustrates the current situation where the supply of KMS has been the limiting factor of KMS oil production and not the installed processing capacity.

Table 6 - Current installed production capacity of KMS oil processors in Namibia

Processors	Number of expellers	Capacity KMS/day	Capacity KMS/year[1]	Extraction yield (crude oil)	Capacity KMS crude oil/year
EWC	2*	450 kg	90 t	12.44%[2]	11'200 kg
OOP	2	500 kg	100 t	13.33%[3]	13'300 kg
Total	**4**	**950 kg**	**190 t**	**12.9%**	**24'500 kg**

* EWC expellers: 1 Tinytech from India (seed processing capacity 250kg/day, same as OOP) and 1 Rutec expeller from RSA (capacity around 200kg/day). [1] Based on 200 work-days per annum in single shift. [2] Rutec expeller yield (of crude oil) measured in 2005 as 11.34% and Tinytech expeller optimum yield estimated at 13.33%. [3] Based on crude oil/seed ratio of 1kg/7.5kg.

Oil processing outputs are not only dependent on the extraction technology and performance of the enterprise but also on the oil content of the raw materials. Oil content analyses have

[3] This might be underestimated as the KMS volumes bought by OOP has not been fully documented and has generally been outside the CT scheme.

been carried out on samples of KMS marketed over the past 5 years, the results of which are shown in *Table 7* below.

Table 7 - Results of KMS oil content analysis (NCRs and other regions)

Marketing year	Origin of samples	No. of samples	Average oil content	Oil content range
2001	NCRs (traditional landraces)	19	23.3%	21.4% - 25.9%
2001	Omaheke (Tsamma landrace)	1	32.1%	-
2002	Caprivi (sweet water melon)	1	17.5%	-
2002	NCRs (traditional landraces)	8	22.38%	21.5% - 23.0%
2005	NCRs (2004 seeds sold in 2005)	1	19.1%	-
2005	NCRs (traditional landraces)	3	21.3%	21.2% - 21.4%

Source: CRIAA SA-DC (analysis results from Analytical Laboratory Services, Windhoek)

The above results (not conclusively representative samples) tend to show the following features:

- The average oil content of KMS from traditional landraces in the NCRs may slightly vary by a few percent depending on the year (and probably its prevailing agro-climatic conditions).
- "Old" seeds from a previous year may see their oil content reduced.
- Seeds from sweet water melon cultivated varieties have slightly lower oil content than traditional KMS landraces from the NCRs.
- Some landraces of KM have higher oil content, which is one important criterion for selecting high oil yielding lines for breeding improved varieties (Kolberg 2004).

ANNEX 3

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