

# KALAHARI MELON SEED DEVELOPMENT PROJECT 2008/09

## FINAL REPORT

Period: August 2008 – August 2009

Submitted to IPTT (UPDP Funds) and NAB

Prepared by CRIAA SA-DC, September 2009

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## **1. INTRODUCTION**

### **1.1 Contractual procedures**

A one-year project proposal and budget were submitted and endorsed at the 53<sup>rd</sup> meeting of IPTT held on 9 April 2008. CRIAA SA-DC was asked to work out a more detailed proposal for entering into contract with the Namibian Agronomic Board (NAB). A detailed action plan and budget for the 2008/09 Kalahari Melon Seed Development Project was prepared in July 2008 (see *Annex I*). The project retained the priority elements of the strategy and action plan<sup>1</sup> which could be implemented during this first year, covering the marketing season (2008) and the cropping season (2008/09) until harvest.

The priority components for implementation in the 2008/09 period were defined as follows:

1. Development of the KMS oil industry forum
2. Promotion of KMS supply and training of producers' groups and service providers
3. Monitoring the supply chain of KMS and its quality and reputation features
4. Preparing and organising the field-testing of the first line(s) of improved planting seeds from the KMS Breeding Project.

The project contract was signed with NAB on 6 August, for a 10-month duration from August 2008 to May 2009 (IPTT/UPDP funds: N\$350'000 + VAT = N\$371'973.43). The contract stipulated the presentation of regular briefings and submission of progress reports to the IPTT meetings.

These were done as summarised below, with the indication of IPTT approvals:

- 55<sup>th</sup> IPTT meeting (15 October 2008): briefing note circulated and verbal update presented
- 56<sup>th</sup> IPTT meeting (9 December 2008): briefing report circulated
- 57<sup>th</sup> IPTT meeting (25 February 2009): interim project report circulated and presented; IPTT approved the report (and 2<sup>nd</sup> payment) and endorsed a no-cost extension till end June 2009
- 58<sup>th</sup> IPTT meeting (29 April 2009): briefing report circulated and verbal update presented
- 59<sup>th</sup> IPTT meeting (8 July 2009): briefing note and field testing update report circulated, and verbal update presented; IPTT approved a final no-cost extension till end August 2009.

This document is the final project report submitted to the IPTT for approval. It covers the entire implementation period from 6 August 2008 to 31 August 2009 (13 months).

### **1.2 Structure of the report**

The activities implemented and results achieved are presented in the second section of the report and follow the four components of the project as listed above. The reported activities are not necessarily presented in a chronological order. The activities already presented in the interim report of February 2009 are summarised in this final report.

The third section of the report discusses and concludes on the project results, and summarises the recommendations for further development of the Namibian KMS oil industry.

The various reports on activities and field trips are only listed and not annexed to this final report unless they have not been circulated to IPTT before or they are of particular relevance. However, these reports remain available on request.

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<sup>1</sup> From the report to IPTT/UPDP "Kalahari Melon Seed Development Proposal" (June 2007), which contains a detailed strategy and action plan over 5 years addressing the development constraints of the KMS industry in Namibia.

## 2. ACTIVITIES IMPLEMENTED AND RESULTS ACHIEVED

The project team of CRIAA SA-DC consisted of Padelia Phillipus (Project Officer) and Michel Mallet (Project Co-ordinator). Close collaboration has been maintained in the implementation of the project with:

- The High Value Plant Species (HVPS) component of the ICEMA project especially for conservancies in the Kavango and Caprivi Regions
- NNFU-Oshakati and affiliated Regional Farmers' Organisations (RFOs) through their project (funded by NAB in 2008) for co-operative marketing of crops (mahangu, maize and KMS). At regular intervals, the two Gain Marketing Promoters (GMPs) of the RFOs have supported the CRIAA team in its field-work in the North Central Regions (NCRs)
- The Eudafano Factory in Ondangwa (particularly through its Manager), to which most of the marketed KMS was sold
- PhytoTrade Africa (PTA) for international marketing issues and scaling up the supply of Namibian KMS from small-scale farmers in the NCRs (some activities reported below were actually funded by PTA and the expenses obviously not included under the IPTT project).

### 2.1 Development of the KMS oil industry forum

The two planned KMS Industry Stakeholders' Meetings took place at the Ongwediva RDC on 2-3 December 2008 and on 28-29 July 2009 respectively, both with a very good attendance, and producing interesting discussions and resolutions.

The two workshop reports were printed, distributed to participants and also electronically circulated to IPTT members:

- *KMS Industry Stakeholders' Meeting No 2 (2-3 December 2008), report prepared by M. Mallet & P. Phillipus (CRIAA SA-DC), reviewed by S. Carr (NBRI), January 2009*
- *KMS Industry Stakeholders' Meeting No 3 (28-29 July 2009), report prepared by M. Mallet & K. Fleissner (CRIAA SA-DC), reviewed by S. Carr (NBRI), August 2009*

#### 2.1.1 Industry Stakeholders' Meeting No 2

In the Industry Stakeholders' Meeting No 2 of December 2008, important issues for the industry and challenges faced by producers and processors were debated and captured in a "way forward":

- Increased production and marketing of KMS is achievable in the NCRs and Caprivi, with continued support
- Improved marketed volumes and prices will provide better returns to producers
- Quality and reputation management along the supply chain are essential and need to be strengthened through information/training/extension to producers, elaboration of quality "standards" and adherence to a code of "good practice" in the trade
- A strategic stock of KMS/oil should be constituted by processors to cope with the unavoidable inter-annual variations in the KMS production
- The local marketing of KMS oil requires more attention in order to reduce the dependency on foreign markets, which may be affected by the current financial crisis
- Commitment was given by the stakeholders present to support the testing on farmers' fields of the improved crosses of the Breeding Project in the NCRs and Caprivi.

### 2.1.2 Industry Stakeholders' Meeting No 3

The Industry Stakeholders' Meeting No 3 of July 2009 took place in a less optimistic frame of mind following the impact on KMS oil export demand of the current global recession and the announcement by TBSI of discontinuing the use of KMS oil in its Community Trade product range by 2011, despite an excellent marketing season with over 53.5 tonnes of KMS marketed in 2008/09.

The meeting also reviewed the farmers' field testing of improved KMS crosses from the IPTT Breeding Project, which took place during the last cropping season and provided valuable results even though the growing season was plagued with late and heavy rains and floods.

Against this background, the stakeholders resolved the following:

#### **Breeding Project and access to planting seeds by farmers:**

- The IPTT Breeding Project should continue, its aims remain valid and its results should benefit both producers and processors
- The farmers' testing trials of the new crosses should continue in 2009/10 (with 3 new crosses), but the logistics to bring the planting seeds before the 2009 Christmas might be a challenge
- Attention should also be paid to the traditional cultivars, the access of northern farmers to planting seeds (improved and traditional), and the maintenance of biodiversity

#### **Seed extraction technology:**

- Seed production being labour intensive and KMS price not high enough, there is a need to look into small-scale technology(ies) for improving the productivity of seed extraction, without ignoring the potential socio-economic impact on poorer and marginalised producers

#### **KMS marketing and KMS oil market development:**

- In 2009 the KMS supply chain should be kept alive although on a reduced scale with no producer price increase, on account of its economic development importance for rural producers
- A strategic stock of KMS oil should be kept by processors (within the limits of their financial capabilities) to respond to new market opportunities when they arise
- New markets should be looked for and producers kept informed about developments
- Supply chain certification (organic, fair trade) might also be a way forward to look into for developing export markets, and the MCA-INP project could support it
- The local marketing of KMS oil products should be researched and tested, and possibly promoted based on its credentials and qualities
- The last actions of the KMS Development project in August 2009 should focus on analysing the quality and safety of KMS oil for local marketing as a food and skin care oil

#### **KMS industry development:**

- The KMS industry forum should continue to pursue its current path and tackle the challenges being faced
- A KMS development support and action plan should be formulated and presented to IPTT, MCA or other bodies for funding.

However, the tight agenda of the two stakeholders' meetings and the crucial issues to be discussed did not leave time to deal further with the institutionalisation of the KMS industry body.

## **2.2 Promotion of KMS supply and training of producers' groups and service providers**

### **2.2.1 Training workshop on KMS collective marketing in the NCRs**

A training workshop took place on 20-21 August 2008 at the Ongwediva ELCIN Centre with a total of 27 participants. The objectives of the workshop were:

- To share knowledge and experience on KMS marketing between experienced marketing centres and new local groups
- To equip participants with the required tools to manage collective marketing of KMS (organisation, management of intakes, quality control, recording forms, bookkeeping etc.)
- To plan the marketing campaign, back-up support, and monitoring and evaluation.

The main conclusions from the workshop were:

- More on-site training and back-stopping of associations and local centres (LCs) in bookkeeping and recording of KMS intakes will be needed, especially for the new LCs
- LC committees which have well managed the marketing of KMS should receive a small incentive payment for their effort from the LC logistics margin included in the price to be paid by Eudafano Factory.

The workshop report was printed, distributed to participants and also annexed to the project interim report of February 2009

- *Proceedings of the Workshop "Marketing Information and Practical Training for Local Centre Co-ordinators Involved in Collective Marketing of Kalahari Melon Seeds, held on 20-21 August 2008", prepared by P. Phillipus & M. Mallet, September 2008.*

### **2.2.2 Review workshop in Caprivi**

The first "Regional Workshop on Melon Seeds for Caprivi and East-Kavango" was held at Bumhill Campsite on 22 October 2008. The workshop was co-organised with the ICEMA project, which covered most of the workshop participants' costs.

The 42 participants were representatives of communal conservancies (CCs) and community forests (CFs) in east- and west-Caprivi, and east-Kavango, support institutions (CEDP, IRDNC, NNF, DED/CFN-DOF Katima and Rundu) and Likwama Farmers' Union (LFU).

The main outcomes from the workshop are summarised below:

- KMS production and marketing are still very new in both regions, but could represent valuable cash income opportunity for rural producers if promotion and pilot marketing initiatives are supported
- CEDP in the Kwando-Mashi area of east-Caprivi (Mudumu North Complex) has piloted the marketing of KMS in 2007 and 2008, but on a small scale. The availability of planting seeds has been an issue and KMS collected in 2008 were kept for replanting (124 farmers interested) as part of the 'conservation agriculture' initiative of CEDP
- Wild melons are getting scarce in Caprivi and not economical to harvest. Elephants are a threat to crops including melons, but CCs and CFs have means and programmes to manage the conflicts with wildlife. In Kavango wild melons seem to be weeded out from cultivated fields or fed to domesticated animals. The interest from farmers and the potential for KMS production are not known in this Region
- Sweet watermelons and cooking melons are cultivated in Caprivi and seeds from these traditional cultivars could be marketed if their suitability for oil export is confirmed (this is

being investigated, see below in § 2.3.4). In any case, the access to KMS planting seeds (multiplication and distribution) should be part of the programme in this region

- The current producer price in the NCRs (i.e. N\$3.00/kg) is considered too low for Caprivi (CEDP feed-back) and N\$4.00/kg or above would be more acceptable to farmers
- This will constrain the financial viability of KMS marketing to Ondangwa because of transport costs. Project support will have to be organised and financed at the early stage of scaling-up of KMS production and marketing, at least in Caprivi
- The longer term strategy for Caprivi would be to process oil from KMS locally if and when the volumes marketed are sufficient to make it financially viable
- The following communication channels for KMS development were decided:
  - East-Caprivi: CEDP will be the focal organisation for KMS promotion and marketing, channelling communication with IRDNC, MET, CFN and LFU
  - West Caprivi: IRDNC and MET
  - Kavango: CFN, MET and NNF.

The workshop report was printed, distributed to participants and also annexed to the project interim report of February 2009

- *Proceedings of the 1<sup>st</sup> Regional Workshop on Melon Seeds for Caprivi and East-Kavango (22 October 2009), prepared by P. Poncelet & M. Mallet, 30 October 2008.*

### **2.2.3 Planning and training workshop for the 2009 marketing season**

A specific planning and training workshop in view of the 2009 KMS marketing season did not take place as such but was combined with the 3<sup>rd</sup> Stakeholders' Meeting held in July 2009, which dealt with the issues arising for the 2009 marketing campaign (*see §2.1.2 above*).

The 3<sup>rd</sup> KMS Industry Stakeholders' Meeting was actually organised for a much larger audience (42 participants attended) than the 2<sup>nd</sup> Meeting of December 2008 (26 participants). The 3<sup>rd</sup> Meeting invited most active marketing group representatives, who were also involved in the field testing of improved KMS varieties (crosses) being selected by the Breeding Project. The KMS Breeder, Bianca Braun, was also invited to participate in the Meeting.

Consequently the costs of the 3<sup>rd</sup> Meeting were higher than budgeted, but the additional expenses were covered under this planning and training workshop budget line.

### **2.2.4 General information and extension materials**

The information and extension materials on KMS marketing were produced in a written form, as much illustrated as possible with digital pictures. These were distributed to stakeholders at the different workshops as well as during field visits of the Project Officer.

Besides the thematic documents for the various workshops, specific materials developed included:

- *KMS marketing recording: Form 2-A KMS Local Centre Intake & Payment Record and Form B Product Transport & Delivery Record*
- *KMS Marketing Guidelines (May 2009) English and Oshiwambo versions*

## **2.3 Monitoring the supply chain of KMS and its quality and reputation features**

### **2.3.1 Field trips**

Field trips in the NCRs were conducted by the Project Officer (PO), most often with one or two of the GMPs (Sofia Johannes and Johanna Uupindi). Some field trips overlapped with the preparation and monitoring of the field testing of improved KMS lines as reported in the next section.

The activities included:

- Further information and field training of LCs in KMS marketing
- Backstopping of LCs and monitoring of intake and selling of KMS
- Preparation and follow-up of workshops
- Collection of samples for laboratory analysis (see § 2.3.4 below)
- Liaising with KMS buyers, particularly Eudafano factory
- Documenting KMS extraction methods (see § 2.3.3 below).

The following field trips were undertaken in 2008 (and already reported in the interim report):

- 4 - 16 August 2008: field training and information visits to 12 LCs, including 9 new LCs (not involved before in KMS marketing). Travel costs were shared with the NNFU-NAB Mahangu and KMS marketing project when the LCs visited were part of RFOs. (trip report in Appendix 5 of the interim report)
- 11 September - 4 October 2008: field training and back-stopping of 20 LCs with the GMPs and follow-up with EWC and Factory on 5-6 Oct. (trip report in Appendix 6 of the interim report)
- 24-28 October 2008: follow-up on KMS marketing by LCs to Eudafano factory
- 12 - 15 November 2008: information meeting at Omeege (Oshana Region) (meeting report in Appendix 7 of the interim report) and follow-up with EWC
- 4-6 December 2008: follow-up with EWC and factory at Ondangwa following the Stakeholders' Workshop.

New field trips undertaken during 2009 were as follows:

- 24 January - 10 February 2009: preparation and logistics for the field testing of improved KMS crosses by farmers in NCRs and follow-up on KMS marketing with EWC and EWMM at Ondangwa (field-trip report available)
- 21 March - 8 April 2009: monitoring and backstopping of farmers' field testing in NCRs
- 25 May - 9 June 2009: monitoring and backstopping of farmers' field testing in NCRs and follow-up with EWC and factory at Ondangwa (back-to-office report available)
- 28 June - 5 July 2009: documenting traditional and improved seed extraction methods with Festus Kapembe (JPO-ICEMA) in the NCRs, follow-up visits at Eenhana, Afoti and Eudafano factory (International Co-op. Day) with PC.

### **2.3.2 Marketing of KMS results**

Table-1 below summarises the results achieved by the project by early June 2009. The buying of KMS by Eudafano factory from LCs was interrupted in November/December 2008 and part of January 2009 due to congestion in intakes (and lack of storage facility) and the annual closure.

By the beginning of June 2009, some 7 LCs were still waiting to market their KMS, most often small or unconfirmed quantities that did not mobilise Eudafano factory to go and buy. It is however possible that some of these LCs marketed their KMS afterwards, when producers did not get disappointed and took their seeds back.

All the LCs marketed their KMS to EWC factory except one to Oontanga Oil Producers cc (OOP) also in Ondangwa. The project did not have access to the buying records of OOP and thus cannot quantify any additional buying of KMS by this company.

**Table-1. Marketing of KMS by local centres (LCs) supported by the project (2008/09 season)**

Region/LC	Type of LC for KMS	Buyer	Date of buying	Kg sold	No. of producers			Transp. by
					Total	M	F	
<b>Oshikoto:</b>								
Onankali	LC (OCT)	EWC	7 Oct 08 8 Apr 09	6'266 659	129 22	29 5	100 17	buyer
Omuthiya	RFC/KNC	EWC	13-14 Oct 08 8 Jan 09	3'616 5'779	49 184	8 30	41 154	buyer
Uukete	new LC	OOP	19 Sep 08	162	8	0	8	buyer
Ontana	RFC/new LC		pending					
Uudhiya	RFC/new LC		pending					
Onkumbula	RFC/new LC	-	no KMS	-	-	-	-	-
<b>Oshana:</b>								
Eheke	RFC/new LC	EWC	22 Sep 08 30 Mar 09	810 239	32 12	1 0	31 12	buyer
Omeege	new LC	EWC	7 Jan 09	238	14	2	12	LC
Omapopo	RFC/new LC		pending					
Onkani	new LC		pending					
<b>Ohangwena:</b>								
Okongo-Onalusheshete	new LC	-	no KMS	-	-	-	-	-
Omulonga-Ongulayanetanga	new LC		pending					
Eehnana-Onamugolo	LC (TTP)	-	no KMS	-	-	-	-	-
Omundangilo	RFC/new LC	-	no KMS	-	-	-	-	-
Omauni	RFC/new LC	-	no KMS	-	-	-	-	-
<b>Omusati:</b>								
Eunda-Onesi	EWC/LC	EWC	28 Aug 08	127	?			?
Tsandi	EWC/LC	EWC	29 Sep 09	110	3	0	3	buyer
Afoti	RFC/LC	EWC	3 Oct 08	2'556	45	1	44	buyer
Omuthitugwalami	EWC/new LC	EWC	19 Oct 08	457	33	1	32	buyer
Otamanzi	new LC	EWC	8 Dec 08	1'054	38	0	38	buyer
Okalongo	RFC/new LC	-	no KMS	-	-	-	-	-
Okahao-Omukondo	new LC		pending					
Onkani	new LC		pending					
Onemanya	New LC	EWC	3 Jun 09	220	8	0	8	buyer
<b>TOTAL:</b>	<b>24 LCs</b>	<b>2</b>	<b>11 LCs sold KMS</b>	<b>22'293</b>	<b>577</b>	<b>77</b>	<b>500</b>	
					Avg./producer: 38.6kg		13%	87%

**Comments on Table-1:**

- The 18 new local centres (LCs) out of 24 are the centres organised and trained by the project, which had not marketed KMS before. These include LCs of Regional Farmers' Co-operatives (RFCs) which may have marketed Mahangu in previous years through the NNFU-GMP project, but not KMS.
- Out of the 24 LCs that have been supported by the project, 10 are affiliated to RFCs (8 new LCs for KMS), 3 are EWC association branches (1 new LC) and 11 are not affiliated LCs (9 are new LCs).
- 5 new LCs did not collect this year, either KMS was not available (flood) or the LCs were not organised early enough. In Ohangwena, all the LCs did not market KMS (to our knowledge).
- According to the project's records, a total 22.3 tonnes of KMS were marketed by end-June 2009, which falls short of the 30 tonnes anticipated in the interim report.

- 3 'old' LCs marketed the bulk of the KMS (85%), i.e. Omuthiya (9.4t), Onankali (6.9t) and Afoti (2.6t). These 3 LCs have many years of experience in organising collective marketing of KMS (and other products).
- The average quantity of KMS marketed per producer is approximately 40kg (38.6kg), a figure that is consistent with the records of previous marketing seasons. The 2008/09 average ranges from 14kg per producer (Omuthitu) up to 57kg (Afoti) and even 74kg for Omuthiya's 1<sup>st</sup> intake.
- The total number of producers might be slightly overestimated especially if some producers participated in the 2 intakes at Onankali and Omuthiya (and would have been counted twice).
- The gender of KMS producers is quite clear, 87% being women.

These KMS marketed quantities shown in Table-1 above do not include the other deliveries made to Eudafano factory during the same marketing season amounting to 32.6 tonnes: 24.9t from 11 EWC associations (excluding Onesi, Tsandi and Omuthitu branch), an additional delivery of 1.3t from Omuthiya and 6.4t from individual sellers.

The total quantity of KMS marketed in the 2008/09 season can thus be estimated at around **55 tonnes** (excluding the volume marketed to OOP - not documented), representing a total income of N\$165'000 to producers (at N\$3.00/kg). After processing, the 55t of KMS would theoretically produce around 6.75t of oil with an export value of at least N\$700'000, i.e. €67'500).

The Eudafano factory commented very positively on the additional KMS deliveries facilitated by the project (as shown in the interim report in Appendix 8). All the KMS marketed as recorded in Table-1 have been paid at N\$3.00 per kg, which was the minimum producer price agreed on for the NCRs for the 2008/09 marketing season, bringing a total income of **N\$66'900** to project producers directly.

However, the LC marketing margin (N\$0.50/kg) has not been paid (yet?). It is feared that a delay or a non-payment of these margins would have a demobilising effect on LCs, especially new ones. This margin is crucial not only to cover the logistical and marketing costs of LCs, but also to reward LCs for their effort and keep them motivated for the future as discussed at length in the various KMS industry forum meetings. The LC margin would represent a significant additional benefit to LCs (consistent with fair trade practices) but a small overall amount for the buyer (i.e. N\$11'150 only for the 22.3t marketed) in view of the export sale value of the oil.

### **2.3.3 Survey of traditional and improved KMS extraction methods**

The survey results were presented and discussed at the 3<sup>rd</sup> KMS Industry Stakeholders' Meeting held in July 2009 (see §2.1.2 above) and the illustrated report was widely circulated (including in the proceedings of the July 2009 Meeting). It is nevertheless shown in **Annex 2**.

- *“Methods of extracting melon seeds: case studies in Omuthiya, Ongha, Oshitayi and Onheleiwa areas” by P. Phillipus and F. Kapembe, July 2009*

The study concluded that even though the traditional melon seed extraction methods in the NCRs have been improved, there is still need for further development to render the work easier and faster. It was noted that the option of developing a KMS extracting machine is worth considering. The producers suggested that having access to a machine would enable them to reduce their workload and improve the quality of seeds extracted. However, the costs of purchasing and maintaining a machine, and the potential effect of reducing the price of mechanically extracted KMS (and hence on the remuneration of labour) need to be assessed. The study recommended that further research be conducted for developing a simple and efficient technology for extracting KMS from the fruits.

### 2.3.4 Sampling and testing

#### 2.3.4.1 Samples procured

As accounted in the interim report, 16 samples of melon seeds were procured in September and October 2008 for laboratory analysis (oil content and fatty acid profile). The types of seeds sampled were not the usual KMS from the NCRs but were from other varieties or other regions. The aim was to evaluate the suitability of these varieties (from the same species *Citrullus lanatus*) for inclusion into the mainstream marketing of KMS by checking if the oil content was sufficient and the oil composition within the accepted specifications of the main overseas buyer. This exercise was also a response to demands from producers in the NCRs and in Caprivi whether the seeds from other traditional cultivars (particularly cooking melons and sweet watermelons) could be marketed.

The 16 melon seed samples originated from:

- 8 samples from the NCRs: 2 from sweet watermelons and 6 from cooking melons
- 1 sample from wild KM harvested near Opuwo (courtesy of Peggy Poncelet/ICEMA)
- 7 samples from East Caprivi (courtesy of CEDP): from a range of edible and non-edible varieties which were harvested by the CEDP project and the seeds kept for re-planting.

During 2009, the following samples were taken by the project for laboratory analysis:

- 5 KMS samples from the NCRs taken from EWC factory in April for oil content monitoring
- 8 KMS oil samples for quality analysis: Acid value (Av), Peroxide value (Pv) and microbiological profile (microbio contamination); the oil samples originated from:
  - KAP oils from 2005 and 2007 (2 samples analysed in June) to assess the storability of KMS oil (in cold storage) for extended periods (Av & Pv only)
  - EWMM oils recently processed (5 samples) to evaluate the microbiological quality and suitability as a food oil (microbio only analysed in June and August, Av & Pv were already analysed as routine factory procedure)
  - OOP oils (2 samples) processed in May 2008 and January 2009 to assess the quality and storability in drum storage at room temperature (samples analysed in August).

In addition, 2 bags of fresh Kalahari melons (around 80kg) were procured in August 2009 from the Okongo-Eenhana area to be used for the technology design of improved seed extraction device(s) as recommended at the 3<sup>rd</sup> KMS Industry Forum meeting (see §2.1.2 above). It is expected that a technical R&D concept paper will be elaborated from preliminary tests with the fresh fruits, for further funding and prototype development. But this will go beyond the timeframe of this project.

#### 2.3.4.2 Results of analysis

##### Oil content:

As accounted in the interim report, the analysis of the 16 seed samples gave the following results:

- Results from ALS in Windhoek showed oil contents ranging from:
  - 17% to 23% for the 8 NCRs samples, with sweet watermelon seeds having higher oil content than cooking melon seeds, contrary to expectations
  - 21% to 24% for the 7 Caprivi samples (often mixed seeds from different varieties) with one sample at 29% (large elongated melons).
- Results from the AgriLab of MAWF were as follows:
  - An oil content of 17.5% for the Opuwo seed sample
  - Slightly different results for the same NCRs samples (21%-23% as compared to 17%-23% for ALS) and not showing exactly the same trend in oil content.

As previously reported, these differing results brought up 3 important issues:

- Different analytical methods may explain these variations in the results from 2 different laboratories, including possible variation in the moisture content of seeds analysed
- The most probable reason for these variations relates to the sub-sampling of seeds taken for analysis from the main sample. An analysis from a too small quantity of seeds (less than 100g) may not be representative enough; such an analysis should be repeated 3 times to reduce the margin of error
- A single analysis result from a small sub-sample should be taken with caution and in any case be rounded since the decimal figures may be meaningless.

The results of the oil content analysis of the 5 KMS samples (from the NCRs' harvest of 2008: Omuthiya, Ondangwa, Ongenga, Omuntele and Nakahale) taken from EWC factory in April 2009 showed usual oil content, i.e. **21% to 22%** (the analyses conducted by ALS were on sufficient sample sizes of 200g each, they are shown in *Annex 3*).

#### Oil composition:

As previously accounted in the interim report, an alternative laboratory in Pretoria (PPBEC, recommended by ALS) was tried for the fatty acid composition analysis of the 16 samples (quicker and cheaper results than from Europe).

The results from all the samples were within the Aldivia specifications, which is very promising news. Linoleic acid (C18:2) content varied between 59.7% and 67.7%. These fatty acid profiles were similar to those of 5 other samples (from NCRs and Caprivi) provided to Aldivia earlier in 2008.

We can conclude at this stage that the different varieties and cultivars of melons (from the same species *Citrullus lanatus*) seem to have very similar fatty acid profiles matching the export market specifications (Aldivia). This is concluded with a good level of confidence - although not the highest possible because of the limited number of samples analysed. Further sampling (on a broader geographical basis) and analyses should be carried out in future.

#### Oil storability and quality:

The new analysis results are also attached in *Annex 3* and bring the following conclusions:

- Storability analysis of KAP oil from 2007 and 2005: the oil Av has been kept within acceptable limits for both samples (1.2 and 3.7 respectively), the Pv of the 2007 sample is still acceptable, i.e. 13.3 (below 15.0) but not for the old 2005 samples (Pv of 26.6). These analyses (limited in scope) tend to prove that KMS oil could be stored for 2 years in refrigerated conditions provided the initial quality of the oil is good.
- Microbiological contamination and quality of KMS oil as food oil: the mould & yeast counts and the total bacterial colony counts in EWMM and OOP oils were acceptable (but could be improved). The Coliform and E. Coli counts are low but not nil, showing direct human contamination through handling and/or inadequate hygiene control. The Av and Pv levels are excellent, predictably for fresh oils. However, the results from the 2 OOP samples are too close to be originating from two different production batches and seem too good to be from oils stored in room condition for 8 and 16 months respectively. A mixing or mis-labelling of samples is suspected as those analysed seem to have been more recently produced.

## **2.4 Field-testing of KMS improved crosses from the Breeding Project**

The IPTT KMS Breeding Project selected 3 lines (crosses) of improved KMS to be tested by farmers in northern Namibia during the 2008/09 cropping season. The 3 crosses were multiplied during the second part of 2008 at Farm Jena by B. Braun. The objective of the field testing was to evaluate the performance of the 3 selected crosses in comparison to the traditional varieties (farmers' cultivars). The results of the field testing would assist the breeding project in its further selection programme.

### **2.4.1 Preparation of field testing**

As explained in the interim report, it was decided at the KMS Stakeholders' workshop held in December 2008 that there will be two categories of KMS testing farmers:

- “Full test farmers” who were able to follow the full testing protocol and record data at each steps of the growing cycle until harvesting and seed extraction
- “Qualitative test farmers” who would provide a qualitative evaluation of the performance of the improved crosses.

Farmers' field testing guidelines were prepared by the project and distributed to testing farmers and support institutions in January 2009 (see Appendix 10 in the interim report).

The 175 sets of testing seeds (30 seeds per cross) packed and labelled, were delivered by B. Braun to CRIAA SA-DC in Windhoek in early January 2009. The testing cross seed sets (and testing guidelines) were dispatched by courier (Caprivi and some places in the NCRs), or provided to support institutions, or brought directly by the PO to the NCRs (see field trip report in *Annex 4*).

Some 600 marking pegs for the testing plots were also provided to the “full test farmers”. More pegs would have been needed in view of the number of farmers interested in testing, but the pegs proved to be difficult to procure in sufficient numbers in Namibia (even if some pegs were “contract-made” in Katutura).

A total of 157 testing cross seed sets were allocated for testing in the NCRs, Caprivi and Kavango, as well as in the Nyae Nyae and N#u Jaqna Conservancies (see Appendix 11 in the interim report).

The testing protocol, which was preliminary discussed at the December workshop, was explained to testing farmers directly or through support institutions (DEES in NCRs, CEDP, ICEMA...) either by phone (Caprivi) or face-to-face. For the NCRs, Caprivi and Kavango, a total of 23 farmers were registered for full-testing while a total of 76 farmers are engaged in qualitative testing (see Appendix 12 in the interim report).

### **2.4.2 Field testing monitoring and results**

The crosses KMS07-02, KMS 07-17 and KMS 06-27 were tested by the farmers in Northern Namibia and Caprivi during the 2008/09 cropping season. The performance of the three crosses in comparison with the traditional varieties (farmer's cultivars) was evaluated by the farmers.

Monitoring and back-stopping visits to farmers (and support institutions when needed) was carried out by the PO in the NCRs, especially for the full-test farmers (see field trips in §2.3.1 above).

Harvesting and seed extraction were done during the field trip of the PO from 24 May to 9 June, because the melons were starting to “rot” (getting over-ripe) and could not be kept for so long. But

not all the melons could produce seeds since they did not reach full maturity. Quantitative information was obtained from 22 out of 23 full testing farmers. From the qualitative test farmers who were expected to provide information on the performance of the crosses, only 5 out of the 76 selected farmers could do so. This was because the growing season was short and bad due to floods not allowing most farmers to grow the crosses successfully. Some farmers were also not willing to actually provide feed-back information.

The quantitative results of the tests were not as comprehensive as it was expected:

- The planting of the cross seeds could only take place towards end-January/early-February 2009. After a relatively long dry-spell between December 2008 and January 2009, the following rains were heavy and eventually stopped early at the beginning of April giving a relatively short growing season for a crop planted late.
- Germination and plant growth were poor due to heavy rain and flood water, which also induced damages by pests. In Caprivi, animals destroyed the plants and fruits in the testing plots that survived the heavy rains and floods.
- Most testing plots could not reach the fruiting stage and the few fruits that could be harvested did not all reach full maturity. Consequently, a very limited quantity of seeds could be harvested.
- The small quantity of seeds harvested from the test plots and their limited statistical significance did not warrant conducting any oil analysis.

**KMS 06-27:**



**KMS 07-02:**



**KMS 07-17:**



The full results of the field testing (see field update report in *Annex 5*) were thoroughly discussed at the 3<sup>rd</sup> KMS Industry Stakeholders' Meeting of July 2009, the participants of which generally agreed with the results.

Participating farmers who could obtain matured fruits on their testing plots observed that the improved crosses planted had the following positive characters:

- Higher number of seeds per fruit
- Good quality and larger seeds (bigger kernels)
- Same fruit size as traditional cultivars.

However, the testing farmers also observed that the improved crosses gave fruits with softer and thinner skins compared to traditional cultivars. This resulted in fruits getting over-ripe (“rotting”) quicker and needing seed extraction earlier, which may interfere with mahangu harvesting and threshing.

The IPTT Breeder, Bianca Braun, stated that although the quantitative data were limited, the qualitative information was very interesting as it was gathered by a large number of farmers. For her, the most important findings were:

- Germination was differentiated in that KMS 07-17 and KMS 07-2 germinated earlier than traditional varieties while KMS 06-27 showed later and poorer germination
- The influence of soil type was not clear (future field testing by farmers should be carried out in plots with the same soil type as far as possible)
- The selected crosses flowered earlier than the traditional varieties
- The selected crosses had shorter runners than most of the traditional varieties
- Fruiting and fruit maturity was earlier than in the traditional varieties
- No clear information on the differences in the number of fruits per plant
- All varieties were equally tolerant to dry spells
- All varieties were equally susceptible to flooding
- All varieties were attacked by pests
- KMS 06-27 showed segregation in terms of fruit shape and seed colour.

B. Braun reckoned that the Breeding Project would:

- Eliminate the KMS 06-27 cross (due to poor germination and segregation of the seed colour character)
- Make the selection for germination more stringent
- Try to provide the seeds for testing earlier so that the growing season is longer, although the timing will be very tight to make the testing cross seeds available to farmers before Christmas.

On this last point as B. Braun explained, it is first needed to multiply the next selected crosses under irrigation to produce the seeds for testing. This takes 4 months from planting up to seed extraction, drying and packing. However, before multiplying these seeds they must be selected and one important element of selection is the composition analysis of the oil which was to be conducted in an accredited laboratory in South Africa in August<sup>2</sup>.

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<sup>2</sup> The results eventually came late August.

The participants of the 3<sup>rd</sup> KMS Industry Stakeholders' Meeting brought the following recommendations for the KMS Breeding Project:

- The Breeding Project should continue with its selection objectives and strategy
- Field testing by farmers of improved crosses should continue next season and start earlier in December before Christmas if possible
- Farmers' field trials should be conducted in plots with the same soil type
- Traditional cultivars should be preserved, multiplied and planting seeds made available to farmers who need them
- Both traditional and improved varieties should be made available to farmers (especially in flooded areas).

#### **2.4.3 Field testing in the next season 2009/10**

There will still be 3 crosses to test, which will be the next generation of improved Kalahari Melons selected during the first half of 2009 and multiplied in the 2<sup>nd</sup>-half of 2009.

As discussed at the 3<sup>rd</sup> KMS Industry Stakeholders' Meeting, it was felt that the high number of participating farmers during last season's testing was very positive but created logistic problems which contributed to the delay in seed distribution. It was proposed to reduce the number of participating farmers and streamline the distribution channels of the cross seeds to be tested, since the current project was coming to an end and direct support from CRIAA SA-DC or B. Braun during the next season might be limited.

The participants agreed on a limited number of distribution centres, which will receive the seeds to be tested from Windhoek and will dispatch them to testing farmers. These distribution chains were listed as:

- MAWF in Ongwediva: to dispatch to ADCs and then to farmers
- Eudafano Factory in Ondangwa: to dispatch to EWC association and members
- OOP Factory in Ondangwa: it can also dispatch from there to farmers.

A registration list for participating in the next field-testing was circulated among participants and is shown in *Annex 6*. It was proposed that SMS and radio messages be sent out to the registered testing farmers once the seeds are available.

## **2.5 Project management**

### **2.5.1 Project coordination, additional travel and reporting**

The project team consisted of Padelia Phillipus (Project Officer - PO) and Michel Mallet (Project Co-ordinator -PC). The PO resigned by the end of July 2009 to join the government service.

The project was extended with a 3 month no-cost extension. Its duration was eventually 13 months against the 10 months originally planned. However, significant savings in the travel expenses of the PC permitted to extend the remuneration period of the project team to July/August 2009 without significantly exceeding the budget line.

## 2.5.2 Budget, income and expenditure statement

The Table below presents the summarised income and expenditure statement of the project (inclusive of VAT) from August 2008 to August 2009 (13 months).

The Table also indicates the itemised variance of the expenses against the contract budget and, in the last column on the right, the variance in percentage for each budget item.

The entire budget was spent. As per contract, the 10% outstanding balance is due on acceptance of the final narrative report by IPTT and detailed financial report by NAB.

**Table-2. KMS Development Project (IPTT/UPDP) Income & Expenditure Statement (N\$) at 31 August 2009**

No	Budget item / activity	Budget	Income/expenses	Variance/budget	%
	<b>INCOME:</b>				
	Funds received from NAB (90%)		334'776.09		
	<b>TOTAL INCOME:</b>	<b>371'973.43</b>	<b>334'776.09</b>	<b>- 37'197.34</b>	
	<b>EXPENDITURE:</b>				
<b>1.</b>	<b>KMS Industry Forum Development</b>				
1.1	Stakeholders' meeting No2	33'802.50	32'986.73		
1.2	Stakeholders' meeting No3	35'492.63	36'629.00		
	<b>Total KMS Industry Forum Devt:</b>	<b>69'295.13</b>	<b>69'615.73</b>	<b>320.60</b>	<b>0.5%</b>
<b>2.</b>	<b>Promotion &amp; training</b>				
2.1	Training workshop (Aug. 08)	25'587.50	26'422.30		
2.2	Caprivi workshop (Dec. 08)	13'500.00	13'975.00		
2.3	Planning & training workshop (2009)	26'866.88	15'366.50		
2.4	Info & training materials	7'360.00	2'584.00		
	<b>Total promotion &amp; training:</b>	<b>73'314.38</b>	<b>58'347.80</b>	<b>- 14'966.58</b>	<b>-20.4%</b>
<b>3.</b>	<b>Monitoring KMS supply chain</b>				
3.1	Sampling & analysis	20'033.23	21'481.49		
3.2	PO field travel	8'700.00	7'743.81		
	<b>Total monitoring KMS supply chain:</b>	<b>28'733.23</b>	<b>29'225.30</b>	<b>492.07</b>	<b>1.7%</b>
<b>4.</b>	<b>Field testing of improved crosses</b>				
4.1	Preparation of field testing	24'300.00	21'576.81		
4.2	PO monitoring & field travel	10'700.00	16'544.09		
	<b>Total field testing of crosses:</b>	<b>35'000.00</b>	<b>38'120.90</b>	<b>3'120.90</b>	<b>8.9%</b>
<b>5</b>	<b>Co-ordination, travel &amp; reporting</b>				
5.1	Project co-ordinator (PC) time	46'000.00	62'100.00		
5.2	Project Officer remuneration	55'540.00	66'123.76		
5.3	PC per diems	5'000.00	1'500.00		
5.4	PC travel	22'500.00	10'355.00		
	<b>Total co-ordination:</b>	<b>129'040.00</b>	<b>140'078.76</b>	<b>11'038.76</b>	<b>8.6%</b>
<b>6</b>	<b>Administration &amp; office costs</b>	<b>36'590.69</b>	<b>36'584.94</b>	<b>- 5.75</b>	<b>0.0%</b>
	<b>TOTAL EXPENSES:</b>	<b>371'973.43</b>	<b>371'973.43</b>	<b>0.00</b>	
	<i>Balance funds received less expenses</i>		<b>- 37'197.34</b>		
	<b>LAST PAYMENT DUE (10%)</b>		<b>37'197.34</b>		

### 3. DISCUSSION, CONCLUSION AND RECOMMENDATIONS

The Namibian KMS oil industry is facing a critical challenge in its development following the announced withdrawal of its major international customer, coinciding with a global economic recession. With the view to revive the Namibian KMS oil trade, new actions need to be applied and renewed approaches may need to be envisaged. This exercise will best be performed by taking stock of the situation, revealing the notable achievements of the Namibian KMS oil industry, analysing its strengths and weaknesses, and reflecting on future options.

#### 3.1 KMS oil marketing

The major international buyer of Namibian KMS oil, The Body Shop (TBSI), announced to EWC earlier this year that it will discontinue using KMS oil in its community trade (CT) product range by 2011. However, TBSI committed itself to purchase the whole KMS oil stock of Eudafano from the 2008/09 production, amounting to approximately 6.5 tonnes and representing a value of around N\$700'000 (ex-factory).

The reasons behind the discontinuation of the use of KMS oil as a cosmetic formulation ingredient by TBSI have not been spelled out clearly. The high price of the oil (purchased at €10.00/kg crude from Namibia) has been given as a major factor. TBSI using refined oils in its products, which means a higher cost after refining, the fact is that there are other similar refined cosmetic oils available on the international market at half the price of KMS oil. Other contributing factors may have been the current economic recession, an adjustment in the marketing strategy of TBSI (now part of the L'Oréal group, the world leader in cosmetics and beauty products), and the revamping the CT programme of TBSI, through which products and ingredients are sourced from community organisations with preferential terms of trade (including price) but with demonstrable community benefits (social and financial). A revised CT programme policy has been formulated bringing it closer to the international fair trade standards and requiring external certification.

By the year 2011, KMS oil will have been used for 10 years by TBSI after launching it in the international market, registering the oil as a cosmetic ingredient and giving it an international reputation. It must also be recalled that EWC never managed to supply sufficient volume of KMS oil as required by TBSI (around 10t to 12t per annum) and that this bottleneck was the main justification for embarking on this project, presently being reported.

The summary of KMS oil exports to Aldivia/TBSI over the past 5 years is shown in the Table below. Most of the KMS oil exported was refined (by Aldivia from 2005 and SSO up to 2004) for use by the contract manufacturers of TBSI products. The role of OOP as back-up supplier to EWC (and contract processor in 2004 when Eudafano factory was not yet established) is to be noted.

**Table-3. Namibian KMS oil exports to TBSI / Aldivia (and SSO in 2004)**

Marketing year	KMS oil exports	EWC processing	OOP processing	Comments
2004/05	8'387 kg	± 4'280 kg *	± 4'107 kg	* contract processing at OOP
2005/06	3'487 kg	2'384 kg	1'103 kg	OOP as back-up supplier
2006/07	1'313 kg	144 kg	1'169 kg	(Nov. 2006)
2007/08	-	-	-	
2008/09	7'370 kg	4'004 kg	3'366 kg	
<b>Total:</b>	<b>20'557 kg</b>	<b>10'812 kg</b>	<b>9'745 kg</b>	

*Marketing year: approximately July to June*

For the records, if the pre-cleaned KMS exported from 2001 to 2003/04 for processing in UK at Statfold Seed Oils (SSO) are taken into account, i.e. 148.4 tonnes of KMS (equivalent to around 23t of oil at an extraction yield over 15%), as well as the 2009 production of EWC of 6.5t, these would represent a total of 50 tonnes of KMS oil produced over the last 9 year for the overseas market.

Most of the KMS oil has been refined and used by TBSI leaving to Aldivia very small quantities (a few hundred kg per year) to be promoted to other customers, which was certainly not sufficient. It is therefore not coherent to claim that the marketing strategy followed by PTA and EWC (and CRIAA SA-DC and IPTT) was not consistent by targeting only one export customer. In other words, one customer is better than none, and one privileged customer is certainly better than two unsatisfied customers, because it could easily result into zero if both give up due to erratic supply.

To address the marketing issues of the Namibian KMS oil and define a way forward, the following options and recommendations are proposed.

In the very short-term (2009/10):

- EWMM to follow-up with TBSI (and Aldivia as TBSI importer and refiner) on the practical arrangements for selling the current stock of KMS oil (with the assistance of PTA and CRIAA SA-DC if needed)
- EWMM to keep a strategic stock of KMS oil (from the 2009 KMS marketing season) to be able to respond to new market opportunities when they arise.

In the short-term (2010/2011):

- To assess with EWMM (and OOP) if a lower export price for KMS oil (say €8.00 to 9.00 per kg FOB) would make KMS oil more attractive in international markets without compromising the processors' viability and undercutting producers' price for KMS
- To revive the interest of Aldivia into promoting KMS oil again (in a refined oil form and/or in 'Ubuntu ®' or derivatives) with the assistance of PTA
- To develop the domestic market for KMS oil as a skin care product, massage oil and possibly as a food oil, even if the Namibian market would remain small at a current price around N\$80 to N\$100 per litre
- To explore new markets including in South Africa, especially if the Aldivia/PTA marketing route does not take off.

In the medium-term:

- To decrease further the export price of standard KMS oil (without undercutting the KMS producer price) through:
  - introducing more efficient oil extraction technologies (extraction yield over 15%)
  - processing a larger proportion of KMS from improved varieties having a higher oil content (30% against 22% for traditional cultivars)
  - realising economies of scale in processing by scaling up KMS oil production
- To certify the KMS oil supply chain as organic and Fair Trade, with the view to unlock access to the growing market for certified natural products
- To carry on documenting the good properties of KMS oil for skin care (and possibly food), as well as its poverty alleviation credentials.

As it is presently been argued and critically discussed within PhytoTrade Africa, the right marketing strategy might be through greater product differentiation, with a wider variety of end-product grades and prices for different markets. In any case, on account of the relatively limited production potential of KMS in Namibia (some hundred tonnes of seeds?), KMS oil volumes produced will remain moderate and most suited to speciality niche markets than large commodity markets.

Niche marketing does not imply scaling down production if economies of scale are to be realised. It just means that large volume and low price typical of agricultural commodities (e.g. soya and sunflower oils valued at around €2.00/kg) will not be achievable targets. Furthermore, Namibian producers cannot rely on additional KMS oil production from neighbouring countries to demonstrate a larger regional supply base to potential international customers. At this stage, the efforts of PTA to promote KMS production amongst its membership and beyond in Botswana, Zambia and Zimbabwe have not been concretised. The main constraints have been the high price demand for seeds extracted from wild harvested melons and the questionable profitability of local processing based on low volumes of raw materials.

### 3.2 Strengths and weaknesses of the KMS oil supply chain

A summary of the strong and weak points of the Namibian KMS oil supply chain is presented in Table-4 below.

**Table-4. Summary of the strengths and weaknesses of the KMS oil supply chain**

Strength	Weakness
<b>Kalahari melon (KM) production</b>	
Traditional production integrated in and adapted to the cropping systems in the NCRs	Potential in Caprivi and Kavango yet unproven (as well as from other regions)
KM adapted to agro-ecological conditions in northern Namibia and relatively drought resistant	KM production remains vulnerable to severe droughts and floods
Wide range of traditional cultivars, including cooking and sweet watermelons as a potential source of oilseeds for KMS oil processing	Relatively low oil content of traditional cultivars Lack of planting seeds reported (especially in areas affected by floods)
KMS Breeding project close to releasing one improved KMS variety, strong interest and involvement of farmers and other stakeholders	Multiplication of improved variety still to be organised Breeding and testing must be a continued process adequately funded
<b>KMS extraction and marketing</b>	
Traditional knowledge of KMS extraction in the NCRs	KMS extraction labour intensive, relatively low price of KMS for manual work
An organised supply chain in the NCRs with a backbone of experienced collective marketing centres	Time & efforts needed to bring new LCs in the supply chain on a significant scale Logistics and transport arrangements from new and remote LCs costly and time-consuming for KMS buyers
A cash crop appreciated by small-scale farmers, especially women, as an additional source of diversified income	KMS price is not following inflation and revalorisation of farm labour minimum wage levels
Potential of KMS in poverty alleviation and community development	No benefit sharing and limited financial incentives from buyers to organised marketing centres beyond EWC association members
<b>Quality and reputation management</b>	
Minimum quality requirements for KMS agreed by industry stakeholders	Traceability incomplete, limited field training and quality control, no quality grades and no quality price bonus
Key elements of a strong reputation for KMS oil discussed and understood by stakeholders	No certification (organic, fair trade)
A KMS industry stakeholders' forum established	Forum still very young and not formalised
<b>KMS oil processing and marketing</b>	
Two KMS oil processors in Ondangwa with a total of 4 expellers (Tinytech)	Supply of KMS remain unpredictable year on year Processors running below production capacity Extraction yields sub-optimal
Minimum strategic stock of KMS oil constituted	Storability of oil limited, storage space constrained
Reputation of KMS oil acquired internationally	Processors not GMP/HACCP compliant and not certified
Potential of KMS oil as a food oil	Higher quality and certification required

The weaknesses of the KMS oil supply chain are not deliberately overemphasised. They are highlighted to stress the priority areas for development and improvement. These priorities are aimed at making KMS oil price more competitive, maintaining the option to scale up the volumes of KMS marketed, improving the quality of products and managing the reputation of Namibian KMS oil.

### **3.3 Kalahari melon production**

The first recommendation is to continue and possibly strengthen the promotion of the traditional cultivars of *Citrullus lanatus*, i.e. Kalahari melons, cooking melons, sweet watermelons, seed melons (“Eeshu”), based on the following strengths:

- These are crops well adapted the agro-ecology of northern Namibia (low-fertility sandy soils, relatively drought resistant plant etc.)
- Melons are multipurpose crops for food security, selling and livestock feed, as well as a valuable intercrop providing soil cover during the agricultural season helping to reduce soil erosion and weed growth
- Seeds from KM and other cultivars can be marketed as oilseeds
- There is an important biodiversity represented by traditional cultivars to maintain.

The above points are not only applicable to the North Central Regions but also particularly relevant to the North East Regions.

The second set of recommendations is drawn from the 3<sup>rd</sup> KMS Industry Stakeholders’ Meeting concerning the KMS Breeding Project (see above in §2.4):

- The Breeding Project should continue with its selection objectives and strategy
- Field testing by farmers of improved crosses should continue next season (and start earlier if possible) with fewer and better targeted participants
- Traditional cultivars should be preserved, multiplied and planting seeds made available to farmers who need them
- Both traditional and improved varieties should be made available to farmers (especially in flooded areas).

The anticipated key impacts on the KMS oil industry from releasing an improved variety from the KMS Breeding project remain two-fold:

- Higher oil-content seeds improving the efficiency of oil processing
- Allowing more farmers needing planting seeds to engage in this cash crop.

In the meantime, Eudafano factory and/or EWC should package and retail to needing farmers planting seeds from its stock of KMS and traditional varieties supplied during the last marketing season.

### **3.4 KMS extraction and local marketing**

The producer price for KMS has always been a debated issue between sellers (producing farmers) and buyers (processors), but price increases have been agreed upon over the years as shown in Table 5 below.

However, Namibia remaining a relatively high inflation economy (around 10% per year), the KMS producer price has hardly kept up with the rising costs of living. Nevertheless, the producer price has roughly followed the minimum farm labour wage level over the years, assuming that one adult person can extract between 10kg and 13kg of KMS per day (approximately 1 lata per day), making at the 2008/09 price a daily remuneration between N\$30 and N\$39 (or an equivalent of N\$3.75 to N\$4.90 per hour)<sup>3</sup>.

**Table-5. KMS price evolution**

<b>Marketing season:</b>	<b>2001/02</b>	<b>2004/05</b>	<b>2005/06</b>	<b>2008/09</b>
Producer price (N\$/kg)	2.00	2.25	2.50	3.00
Margin (N\$/kg) for association or group	0.20	0.25	0.25	0.25-0.50
Total (N\$/kg)	2.20	2.50	2.75	3.25-3.50

These considerations bring a typical dilemma. Should the producer price be re-valorised every year to follow the inflation rate and the minimum wage level in the farming sector with the risk of rendering the KMS oil uncompetitive? Or, should the efficiency of KMS oil processing increase steadily to absorb the rising costs of the raw material? Or, should the efficiency of KMS extraction by primary producers increase to restrain the price rise expectations? A combination of all these options is probably the answer.

The latter option has been discussed and endorsed as a recommendation at the 3<sup>rd</sup> KMS Industry Stakeholders' Meeting (see above in §2.3.3):

- Further research to be conducted for developing a simple and efficient on-farm technology for extracting KMS from the fruits to reduce the workload and improve the quality of seeds
- And evaluating the potential socio-economic impact of such mechanisation on the marginalised producers who may not have access to such technology.

### **3.5 Quality and reputation management**

Minimum quality requirements for KMS to be marketed have been discussed and agreed amongst industry stakeholders. This is an important step. However, some elements of the traceability and quality management system need to be strengthened. This is a responsibility that should fall under the buyers/processors of KMS in consultation with industry stakeholders, particularly representatives of primary producers of KMS.

- The traceability recording of KMS from Local Centres to buyers has very much improved, at least for Eudafano factory. What remains to be improved are the records of LCs for the deliveries by producers and the payment records made by LCs to each producers, which needs to be fully transparent
- Refresher training and field monitoring of LC co-ordinators should continue on a routine basis every season
- A price premium should be paid for high quality KMS and fully traceable supply by LCs as an incentive. This price “bonus” should be shared between producers and LC co-ordinators.

Certification may become a key element for marketing of KMS oil in higher-value niche markets. Organic certification may not be appropriate to all LC production areas, especially if KMS is the only marketed product to eventually be certified. Fair Trade certification of the KMS supply chain may have to be considered again since the Fair Trade Labelling Organisation (FLO) would be

<sup>3</sup> This calculation does not account for the time and costs of producing and harvesting KM.

resuming its work on defining FT standards for cosmetic oils. KMS production costing would then need to be updated from the ground work carried out 2 years ago with PTA.

The KMS Industry Forum has met 3 times since its inception in March 2008 and it has proved to be a valuable platform for discussion and resolutions amongst Stakeholders. The Forum remains very young and has not formalised itself beyond being recognised by the IPTT.

The minimum roles of the KMS Industry Forum should include:

- Consultations between producers and buyers/processors on the KMS marketing season management
- Negotiations on the price of KMS, quality premium, margins for organised LCs and any form of benefit-sharing between buyers/processors and KMS producers
- Arranging the testing of new technologies and improved varieties, and providing feed-back
- Managing and defending the reputation of the Namibian KMS oil industry.

### **3.6 KMS oil processing and marketing**

The key factor to reducing the price of KMS oil without undermining the viability of processing and undercutting the KMS price is improving the efficiency of processing. Realising economies of scale might not be a realist solution in the short term due to the depressed market situation.

However, some technical improvements would improve the economics of processing:

- Increasing the extraction yield of processing (ratio kg oil to kg seeds) through either using a more efficient expeller (more expensive to acquire and maintain) or carrying out maintenance and repair more frequently on the existing model of expeller (Tinytech). From experience, the Tinytech expeller can reach a net extraction yield of 14% (and more depending on the oil content of the raw material) but wears off relatively quickly due to the very abrasive nature of KMS, which results in the yield dropping to 10% only.
- Using a more efficient crude oil filtering technology to minimise the losses during decantation and filtering, and improving the quality of the oil (the plate and filter cloth machines are problematic: difficulty to clean the filter cloth, residual oil left in the machine and in the filter rising the risk of contaminating the next filtering batch).

It is further recommended that two by-products of KMS oil processing be better valorised:

- The oilcake currently been sold as animal feed should fetch a better price since it is in high demand and has excellent feeding qualities
- The decanting (and/or filtering) residue should also be packed (in plastic containers) and retailed as animal feed (most preferably as pig feed).

Lastly, KMS oil processors have to seriously consider achieving audited and certified manufacturing standards, such as Good Manufacturing Practices (GMP) and/or HACCP (Hazard Analysis and Critical Control Points). The latter is essential for the production and export marketing of KMS oil as food oil.

## ACRONYMS AND ABBREVIATIONS

ALS	Analytical Laboratory Services cc (Windhoek)
Av	Acid value (in mg KOH/g)
CBNRM	Community-Based Natural Resource Management
CCs	Communal Conservancies
CEDP	Community Economic Development Project (Caprivi)
CFN	Community Forestry in Namibia
CFs	Community Forests
CRIAA SA-DC	Centre for Research, Information, Action in Africa - Southern Africa Development & Consulting
DED	German Volunteer Service
DEES	Directorate of Extension & Engineering Services (MAWF)
DOF	Directorate of Forestry (MAWF)
EWC	Eudafano Women Co-operative Pty Ltd
EWMM	Eudafano Women Marula Manufacturing Pty Ltd (Eudafano factory company)
GMP	Grain Marketing Promoter
HVPS	High Value Plant Species
ICEMA	Integrated Community-based Ecosystem Management (Project) (MET)
INP	Indigenous Natural Product(s)
IPTT	Indigenous Plant Task Team
IRDNC	Integrated Rural Development and Nature Conservation
JPO	Junior Professional Officer
KM	Kalahari Melon
KMS	Kalahari Melon Seed
KNC	King Nehale Conservancy (Omuthiya)
LC	Local Centre
LFU	Likwama Farmers' Union (Caprivi)
MAWF	Ministry of Agriculture, Water & Forestry
MCA	Millennium Challenge Account - Namibia
MET	Ministry of Environment & Tourism
MTI	Ministry of Trade & Industry
NAB	Namibian Agronomic Board
NACSO	Namibia Association of CBNRM Support Organisations
NBRI	National Botanical Research Institute
NCRs	North Central Regions (i.e. Omusati, Oshana, Ohangwena, Oshikoto)
NNF	Namibia Nature Foundation
NNFU	Namibia National Farmers' Union
OCT	Onankali Community Trust
OOP	Oontanga Oil Producers cc
PC	Project Co-ordinator
PO	Project Officer
PTA	PhytoTrade Africa (The Southern Africa Natural Product Trade Association)
Pv	Peroxide value (in mEq O <sub>2</sub> /kg)
R&D	Research and development
RDC	Rural Development Centre
RFC	Regional Farmers' Co-operative
RFO	Regional Farmers' Organisation
SSO	Statfold Seed Oils (UK)
t	tonne (1'000kg)
TBSI	The Body Shop International plc
TTP	Tulongeni Twahangana Producers (Eenhana/Epembe)
UPDP	Useful Plant Development Project (IPTT)
VAT	Value added Tax

## KALAHARI MELON SEED DEVELOPMENT PROJECT

### DETAILED ACTION PLAN AND BUDGET 2008/09

Funded by UPDP/IPTT through NAB  
Prepared by CRIAA SA-DC, July 2008

#### 1. Background and justification

The background and justification for this project have been prepared in the Final Consultancy Report to IPTT/UPDP “Kalahari Melon Seed Development Proposal” (June 2007), which contains a detailed strategy and action plan over 5 years addressing the development constraints of the KMS industry in Namibia. The overall problem to be addressed by the strategy and action plan 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.

A budget of N\$350'000 has been earmarked by IPTT from the UPDP funds to kick start this programme. The broad elements of a 1-year project were presented and endorsed by IPTT at its meeting on 9 April 2008. However, the IPTT requested a detailed proposal (activities and costs) for CRIAA SA-DC to enter into contract with the Namibian Agronomic Board (NAB).

This detailed proposal is presented herewith. It retains the priority elements of the strategy and action plan which can be implemented during the forthcoming year. It also incorporates the recent inputs received from Stakeholders at the First KMS Oil Industry workshop held in Ongwediva on 26-27 March 2008 (sponsored by project DURAS, which has now ended).

#### 2. Project's purpose

The priority components for implementation during the 2008/09 period are as follows:

1. Development of the KMS oil industry forum
2. Promotion of KMS supply and training of producers' groups and service providers
3. Monitoring the supply chain of KMS and its quality and reputation features
4. Preparing and organising the field-testing of the first line(s) of KMS improved planting seeds from the Breeding Project.

This project complements and integrates the on-going initiatives contributing to the development of a KMS oil industry in Namibia:

- The NNFU/NAB project “Marketing of Mahangu, Maize and Melon Seed by Small Scale Farmers in 6 Northern Regions”, a capacity building effort over 4 years towards the NNFU-affiliated Regional Farmers' Organisations for strengthening collective marketing of crops
- The IPTT-sponsored KMS Breeding Project (“Improvement of Seed Oil Characteristics in Selected Namibian *Citrullus lanatus* Lines to Support Increased Production of Kalahari Melon Seed Oil”), implemented at Farm Jena by Bianca Braun, which has now reached the stage of field-testing the first most promising KMS lines
- The High Value Plant Species component of the ICEMA project (MET/FFEM) focusing on rural Conservancies, some of which in Northern Namibia are potential producers of KMS
- The PhytoTrade Africa initiative geared towards linking and co-ordinating NPs producers in different countries across the SADC Region, and developing for them the bulk volumes required sustaining market niches whilst achieving significant economies of scale in terms of production, processing, transport and quality control.

#### 3. Objectives

This project will contribute towards achieving the objectives of the overall programme as defined in the report to IPTT/UPDP “Kalahari Melon Seed Development Proposal” (June 2007). These objectives are recalled below.

### **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.

## **4. Time frame**

- Project duration: **10 months**
- Starting time: **August 2008**
- Completion time: **May 2009**

The provisional time schedule of activities is presented below.

Months /Activities	Aug. 08	Sep. 08	Oct. 08	Nov. 08	Dec. 08	Jan. 09	Feb. 09	Mar. 09	Apr. 09	May 09
<b>1) Devt KMS Oil Industry Forum:</b>										
1.1) Stakeholders' meeting No 2										
1.2) Stakeholders' meeting No 3										
<b>2) Promotion &amp; training:</b>										
2.1) Regional training workshops										
2.2) Promotional & training manuals										
<b>3) Monitoring KMS supply chain:</b>										
3.1) Sampling & analysis										
3.2) Monitoring field travel										
<b>4) Field testing of KMS lines:</b>										
4.1) Preparation										
4.2) Monitoring field travel										
<b>5) Co-ordination &amp; management:</b>										
5.1) Co-ordinator/Manager										
5.2) Project Officer										
5.2) Reporting to NAB & IPTT										

## **5. Activities, means and outputs (expected results)**

### **5.1 Development of the KMS oil industry forum**

Building on the momentum initiated at the first KMS Oil Industry Stakeholders' workshop held in Ongwediva on 26-27 March 2008 and at the request of participants, two more industry forum workshops will be organised.

#### **5.1.1 Stakeholder's Meeting No 2:**

##### **\* Main focus:**

- Follow-up on Stakeholders' Meeting No 1 and Forum institutional building
- Review of progress of the 2008 KMS marketing campaign
- Planning of the field-testing of the first improved KMS lines
- Preparing KMS cultivation promotion campaign

**\* Timing:** 2 days, in October 2008

**\* Participants:** 30 participants, representatives of organised KMS producers, KMS oil processors, NGOs/service providers and relevant GRN departments (MAWF, MTI, MET)

**\* Means:** (see detailed costing in budget)

- Venue, accommodation, catering (at Ongwediva RDC or ELCIN Centre)
- Participants public transport to & from (excluding NGO/GRN-sponsored participants)
- Workshop stationery and hand-out documents
- Preparation, facilitation (including travel to venue) and reporting

\* **Outputs:** workshop report, Forum resolutions, field-testing plan developed.

#### 5.1.2 Stakeholder's Meeting No 3:

\* **Main focus:**

- Follow-up on Stakeholders' Meeting No 2 and institutional building of the Forum
- Review of the 2008/09 marketing and processing year
- Review of progress of the field-testing of the first improved KMS lines
- Planning the 2009 marketing campaign

\* **Timing:** 2 (to 3) days in March 2009

\* **Participants:** 30 participants, same as above

\* **Means:** as above

\* **Outputs:** workshop report, Forum constituted, action plan for the 2009 marketing campaign.

### 5.2 **Promotion of KMS supply and training of producers' groups and service providers**

Three practical training workshops will be organised in Northern Regions for producer groups, stakeholders and service provider active in the field, including DEES.

#### 5.2.1 Training workshop on KMS collective marketing in NCRs:

\* **Main focus:**

- Organisation and management of KMS collection centres
- KMS quality control and traceability
- Marketing logistics
- Recording and bookkeeping

\* **Timing:** 2 days at end-August 2008

\* **Participants:** 25 participants, Local Centres' Co-ordinators (LCCs), mainly from NCRs but also from Kavango (especially from newly established centres)

\* **Means:** as above in 5.1.1

\* **Outputs:** workshop report, training materials tested, LCCs trained.

#### 5.2.2 Review workshop in Caprivi:

\* **Main focus:**

- Evaluation of the 2008 pilot marketing campaign in Caprivi
- Review of specificities of KMS in Caprivi
- Plan for promoting KMS cultivation in 2008/09 and marketing in 2009

\* **Timing:** 1 day in October/November 2008

\* **Participants:** approximately 15-20 participants

\* **Means:**

- Local costs of participants (to be covered by ICEMA/FFEM)
- Workshop stationery and hand-out documents (to be covered by ICEMA/FFEM)
- Preparation, facilitation (including travel time to venue) and reporting

\* **Outputs:** workshop report, promotion plan for 2008/09.

#### 5.2.3 Planning and training workshop in NCRs:

\* **Main focus:**

- Lessons from the 2008 marketing campaign in NCRs and Kavango
- Planning the 2009 marketing campaign
- Complementary practical training on marketing and recording

\* **Timing:** 2 days in April 2009

\* **Participants:** 25 participants, Local Centres' Co-ordinators and DEES

\* **Means:** as above in 5.1.1

\* **Outputs:** workshop report, practical marketing campaign plan for 2009, LCCs trained

#### 5.2.4 General information and extension materials:

A budget allocation is made for the preparation and printing of simple illustrated information and extension materials on KMS production and marketing, including quality requirements, for farmers in Northern Namibia:

- Design and editing of materials
- Printing of materials.

### **5.3 *Monitoring the supply chain of KMS and its quality and reputation features***

The scaling-up of KMS supply 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 trade and eco-friendly practices). In order to ensure these expectations, the project shall regularly monitor the development of the supply chain of KMS.

The following areas are of particular importance:

- Routine sampling and quality analysis of KMS supplied to processors
- Sampling and analysis (oil content, fatty acid profile) of different traditional cultivars of watermelon to assess their marketing suitability (cooking melons, cultivars in Caprivi and Kavango, which have not been tested so far)
- Verifying that local marketing centres follow the recommended practices, including quality control, traceability and ethical trade
- Applying corrective measures where necessary and improving training and extension delivery.

#### **5.3.1 Sampling and analysis of KMS:**

\* **Timing:** Sampling mainly during the marketing season (opportunities may arise at any time in the year); fatty acid analysis require more time than routine laboratory analyses.

\* **Means:**

- Procurement of KMS samples (0.2 to 0.5 kg per sample) and packaging
- Local laboratory analysis for moisture and oil content, acid- and peroxide values
- Lab preparation (Windhoek) by solvent extraction of the oil samples for GC
- Gas chromatography in a reputable laboratory for fatty acid profile (Aldivia is the preferred option)
- Samples dispatch to overseas laboratory (Aldivia).

#### **5.3.2 Monitoring field trips:**

To save on travelling costs, monitoring visits will be combined with workshops and meetings as much as possible. However, this will not always be possible and additional travel by the Project Officer - PO (and/or Project Co-ordinator - PC) is budgeted, especially for the period Aug.-Dec. 2008.

### **5.4 *Preparing, organising and monitoring the field-testing of the first line(s) of KMS improved planting seeds from the Breeding Project***

The first improved KMS lines resulting from the Breeding project (assumed to be between 1 and 3 lines, to be confirmed) will be test-cultivated in selected farmers' fields in northern Namibia (NCRs and possibly in Caprivi). Willing and suitable farmers will be selected before the planting season. Farmers will be assisted to monitor and record the growing, fruiting and harvest of Kalahari Melon lines.

#### **5.4.1 Preparing and organising the field-testing:**

- Technical design of the on-farm testing and consultation with experts (MAWF-DART, NBRI, Bianca Braun ...)
- Travel costs to the on-farm sites (PC)

#### **5.4.2 Monitoring the field-testing:**

- Farmers' allowances for recording progress and results of the on-farm tests
- PO's monitoring travel to the on-farm testing sites.

NB: The costs associated with the cultivation by farmers, the interpretation of the test results and the laboratory analyses are not included in this budget.

### **5.5 *Co-ordination, additional travelling and reporting***

5.5.1 Project Co-ordinator (PC): Mr Michel Mallet (over 10 months)

- Project co-ordination, management and reporting: an average of 2 days per month (excluding workshops and meetings, field trips and additional activities)

5.5.2 Project Officer (PO): Ms Padelia Phillipus (over 10 months)

- Daily project implementation, liaison with stakeholders, regular field work, project logistics and administration: monthly gross salary (including PAYE & SSC)

5.5.3 Additional PC's field travel to and in regions: (mainly NCRs but also Kavango/Caprivi)

- Per diems for accommodation and DSA
- Travel from Windhoek to Regions (vehicle km, Air Namibia, public transport)
- Local travel in and between Regions (vehicle km)

5.5.4 Reporting:

- Regular progress briefings to IPTT meetings (exact schedule of meetings unconfirmed)
- Interim narrative and financial report to NAB/IPTT by Month-5 (Dec. 2008/Jan. 2009)
- Final completion and financial report to NAB/IPTT by month-10 (May/June 2009).

**5.6 Administration of funds and office costs**

An allocation of 10% (excluding VAT) of the direct costs is budgeted to cover the following costs:

- Financial administration: bookkeeping, invoicing, financial reporting
- Office costs: Windhoek office costs for the PC and PO, and contribution to the organisation's overheads.

**6. Budget and payments**

**6.1 Detailed budget:** see spreadsheet attached

The detailed costing has been prepared for each component, which should make reporting on activities and expenses easier.

- Total budgeted costs (VAT excluded): N\$350'000.00
- VAT (15%) chargeable: N\$ 21'973.43
- Total budgeted costs (VAT included): N\$371'973.43

The maximum budget allocation, excluding VAT, is N\$350'000.

The budget costing has been prepared at today's costs and 5% cost escalation has been included for the workshops to be conducted in 2009.

The budget does not include a contingency provision (for unforeseen costs and inflation). It is therefore assumed that any savings (or moderate over-spending) made on a budget item can be used for (or deducted from) another budget item, when needed.

**6.2 Payments:**

6.2.1 Proposed payment schedule:

- |                                |     |            |                                 |
|--------------------------------|-----|------------|---------------------------------|
| ▪ Contract signing             | 50% | N\$175'000 | + estimated VAT (N\$10'986.72)  |
| ▪ Acceptance of interim report | 40% | N\$140'000 | + adjusted VAT (+/-N\$8'789.37) |
| ▪ Acceptance of final report   | 10% | N\$35'000  | + adjusted VAT (+/-N\$2'197.34) |

6.2.2 Financial reporting and invoicing:

- CRIAA SA-DC will issue vatted invoices at the 3 stages of payments
- The interim and final financial reports will include a breakdown of claimable input VAT.

## **Report on Kalahari Melon Seeds Survey - North Central Regions**

By: Padelia Phillipus and Festus Kapembe, July 2009

### **Methods for Extracting Melon Seeds: Case studies in Omuthiya, Ongha, Oshitayi and Onheleiwa areas**

#### **1. Introduction and General Background**

Melon seeds extraction has been exercised in North Central part of Namibia. Kalahari Melons naturally grow in the fields when eaten by livestock and grow the following season depending on where the livestock has dropped the seeds off. In the past, there used to be an abundant Kalahari Melon Seeds (KMS) in the fields that people could not finish collecting as priority was first given to staple foodstuff such as Mahangu, Sorghum and Beans.

Those years, some farmers could leave KMS to dry on its own or to be eaten by livestock without really processing and extracting the most valuable seeds that could create livelihood for rural communities. However, it is generally known that KMS is traditionally used to feeding the households when roasted (*Eenhanga domukokotwa*) or making the traditional pup (*Epwati*) for the family. This happens mostly at times of drought and hunger, as KMS is being regarded as nutritional and was often the only foodstuff left that people could feed on. KMS is also used to feed livestock such as Pigs, Dogs and Chickens.

This survey was aimed at examining the different methods of extracting seeds that people in North Central are using and explore ways of improving those methods. The survey has documented the various traditional and improved traditional methods that people are using when extracting melon seeds. The paper shall also outline the various steps involved in the improved methods of extracting KMS and state what changes have been made in improving the traditional methods.

Traditionally, and in some societies, seeds extraction was looked at as women oriented jobs and this has changed significantly with a progressive number of men entering and taking up KMS marketing challenge. For instance, both the informants who displayed the traditional improved methods were lead by men.

#### **2. Methodology**

The study used open interviews with four sample groups of KMS producers from Omuthiya (Oshikoto Region), Onheleiwa (Omusati Region), Oshitayi (Oshana Region) and Ongha (Ohangwena Region). About 20 informants participated in the survey from the four respective areas and each has given their experience with regard to KMS extraction.

### 3. Traditional Methods

Farmers would gather melons and let them dry before extracting the seeds. When melons dry they would pound and winnow them to separate seeds from the pulps. Even though all the traditional methods involve winnowing of the pounded melons to remove skins and pulps, this method (drying) is efficient even though most producers are not familiar with it. It reduces labor, time and it does not require the use of water in cleaning the seeds.

Another traditional method is by pounding fresh melons and after pounding the producer will either (a) dry the crushed melon or (b) wash them in water and then separate the seeds from the residue and dry them separate. In part (a) one need to pound the pulp and winnow again in order to get the seeds clean.

### 4. Improved Methods

The research found that some KMS producers implemented some initiatives in order to make the extraction process easier and more effective. The improved methods are not entirely different from the traditional methods but have replaced some of the steps in order to reduce time, labor and also improve the quality of seeds extracted.

It is important to outline the steps involved in the improved method of extracting seeds.

**4.1** According to Mr. J. I. Shali, the following is the preferred method that he is using.

*Equipments used:*

1. Panga for cutting the melons
2. Old tires cut
3. Buckets for washing pounded melons with water
4. Sheet for drying seeds
5. Pounding stick
6. Sieve for taking seeds from the water

#### Step 1:

The first step is to collect melons and gather them at the processing site. This is usually done after finishing with the Mahangu harvesting. Picture 1 shows melons gathered waiting to be processed



Picture 1: Melons gathered at one place either in the house or at the Mahangu Ground” (Oshipale)

#### Step 2:

At this stage melons are cut into small pieces to make it easier for pounding. There are two ways to follow from here:

- 2.1 Drying pieces of melons or
- 2.2 Pounding pieces of fresh melons



Picture 2: Cutting melons into small pieces

#### **Drying melons:**

After the melons have been dried, they can be pounded and winnowed thereafter to separate the seeds from the residues. This process does not require water to be used, however one need to wait for about four days for the melons to dry properly.

#### **Fresh melons:**

In this method small pieces of melons are pounded while still fresh see figure 3. Thereafter, the mixture will be mix with water to allow seeds to settle down while the residues will float on top. This is shown in figure 4.

The pulp and immature seeds will then be taken out and dried to be processed later as food for livestock. Good quality seeds often sink and settle on the bottom of the container still with some solid pieces of pulps (see figure 5 and 6). The next step is to take out the seeds and take out the unwanted materials to ensure that the seeds are clean.



Picture 4: Mixing with water to allow seeds to sink



Picture 3: Pounding crushed melons



Picture 5: Drying of residues



Picture 6 Drying of seeds

#### 4.2 Second method by Mr. Hasheela

- Equipment:*
1. Pounding stick
  2. Drying sheets
  3. 4 x sticks for making a small fence
  4. Sheets for fencing

According to Mr. H.H. Hasheela from Onheleiwa, he uses the same method for pounding the seeds while they are still fresh. However, the design is a little bit different as he prefers to construct a small fence that would keep the seeds inside when they are pounding. He said this method would work easier because seeds will not fly away but be trapped inside the fence.

##### *Step 1:*

The first step is to collect melons and gather them at the processing site. Similarly Mr. Shali, collection of melons also done after finishing with the Mahangu harvesting. Picture 1. above shows melons gathered waiting to be processed

##### *Step 2:*

Construct a closed off space with round fence that will act as barriers to keep the seeds inside. One can use nets or any sheet materials that can catch or trap seeds inside.

##### *Step 3:*

In step three, when the melons are gathered together, one start pounding the melons and seeds will pop out together with the pulp. After the seeds pop out there are two ways to extract the seeds from the pulp: one way is to use water similarly to Mr. Shali and the other way is to carefully take out the seeds without using water and dry them.

##### *Step. 4:*

The last step is to dry the seeds and give the residues to the livestock.

### 5. Data Analysis

The sample data collected covers three of the four northern regions of Namibia namely: Oshana, Oshikoto and Ohangwena. All together, 20 informants were randomly selected for the survey; 8 participants from Omuthiya, 1 participant from Onheleiwa, 7 participants from Ongha and 4 participants from Oshitayi. Therefore, data covers almost the whole northern regions.

To the question whether there are variations between wild Kalahari melons Seeds and the domesticated melon seeds, about 30 percent of the informants indicated that they do not know if there are melons collected outside the field. They also indicated that all they know is only the melons that grow in the field together with the Mahangu and other crops. About 35% indicated that they are aware of the wild and domesticated melons and responded that there are no differences between the melons harvested from the field and those that grow outside the fields in terms of colour, shape; however, they were not sure about the oil content. Another 35% indicated that melons grown in the field are better than the one grown out of the field because the one in the field are taken care of by removing weeds while the one outside compete for water and nutrients with weeds.

Due to heavy rain and flood in the northern and eastern part of Namibia, was there any change experienced in the quantity of seeds collected last year? Producers responded as follows: 40% of all responded indicated that the harvest for KMS was good because their melons were not affected by water. Another 20% indicated that they were heavily affected by rains and flood and thus could only extract few seeds as there were not enough melons. Another 40% could not quantify the number of seeds as they did not account for what they have taken.

To the question If farmers noted any difference between the current methods of seeds extraction and the traditional methods, only 10% of the informants indicated that they knew the improved methods (Mr. Shali and Mr. Hasheela experiences) and that it is much faster than pounding “full” fresh melons. The other 90% could not indicate which methods was the preferred as they only knew the traditional method which is slow, takes time and labour intensive, although this has not been completely proven as no measurements were taken.

### **Constraints**

- One of the constraints for using the traditional methods for extracting seeds is that it requires more time and work compared to the improved one. Therefore, a lot of time will be wasted on work needed and also on the number of people required to complete the work.
- It has been indicated that the time it takes for the producers to complete the whole melon seeds extraction from collecting seeds to pounding and winnowing them does not align with compensation one get when selling the seeds. In other words, KMS producers feel that the market price of KMS is not worth the labor and time they invest, and they have claimed that it is discouraging to participate in the production and marketing of KMS where their expectations are not met.

### **6. Conclusion and Recommendations**

In conclusion, the study has characterized the different methods that are being used in the extracting of KMS in the North Central Regions. The study has found that even though the existing methods have been improved, there is still a need for further improvement in order to make work much easier and faster. It has been noted that KMS producers have implement various initiatives to enhance the extraction seeds from melons. The possibility of implementing KMS extracting machine is worth considering. As proposed by the producers that at least having access to a machine would enable them to leverage their work as well improve the quality of seeds extraction. However, one needs to note the constraints of the machine, that it might affect the remuneration of labour and also the cost for maintaining the machine. Therefore, the study recommends that a further study could be done to research the possibility of implementing a machine for extracting seeds.

**KMS LABORATORY ANALYSIS RESULTS**

# ANALYTICAL LABORATORY SERVICES

P.O. Box 86782 Eros, Windhoek, Namibia  
Tel (061) 210132 Fax (061) 210058 email analab@mweb.com.na

## TEST REPORT

To: CRIAA SA-DC  
P.O. Box 23778  
Windhoek

Date received: 27-Nov-08  
Date required:  
Date completed: 10-Feb-09

Attention: Michel

**Your Reference:** Melon seed oil FAC  
**Lab. Reference:** I081095

### Type of Sample(s)

Melon seed oil solvent extracted

### Samples Received

16 samples received on the 27/11/2008

### Test(s) Required

Fatty acid profile, C12-C24

### Test Method(s) used

The work was outsourced to PPECB; no further details are given on their analytical certificate with regards to the test methods that were used to obtain the results

### Results

Following results are as per PPECBs' analytical certificate, certificate number 84905 ANLA 1208  
Fatty acid profile (g fatty acid per 100g of total fatty acids)

Description	C12:0	C16:0	C18:0	C18:1	C18:2	C18:3	C20:0	C22:0	C24:0
1. Kayumo/Choi no 2	0.01	10.50	8.40	15.79	63.04	0.11	0.34	0.08	0.08
2. Eheke	0.01	10.94	8.61	16.38	62.19	0.09	0.36	0.14	0.14
3. Omuthiya	0.00	9.39	8.34	13.81	66.20	0.11	0.32	0.07	0.23
4. Ongula (Omulonga)	0.00	10.10	8.19	12.68	66.95	0.11	0.33	0.08	0.15
5. Tsandi	0.00	11.01	10.88	13.11	63.30	0.14	0.40	0.07	0.19
6. Onankali	0.00	9.78	8.06	12.90	67.09	0.11	0.30	0.07	0.30
7. Afoti	0.00	10.70	10.62	13.14	63.44	0.14	0.40	0.08	0.16
8. Omundangilo	0.00	10.77	7.60	12.77	67.07	0.10	0.30	0.08	0.25
9. KMS Opuwo	0.01	10.12	9.93	12.29	65.54	0.12	0.39	0.09	0.09
10. Omuthitu	0.01	9.49	8.22	12.70	67.68	0.11	0.32	0.07	0.17
11. Sangwali no 3 Tanyangombe	0.01	10.33	8.59	16.55	62.29	0.10	0.36	0.08	0.13
12. Sangwali no 1 mixed seeds	0.01	10.81	9.48	17.69	59.69	0.12	0.40	0.09	0.16
13. Sangwali no 2	0.01	10.77	8.84	16.77	61.21	0.11	0.36	0.09	0.22
14. Namushasha, Kongola	0.01	10.18	8.51	13.88	65.10	0.11	0.35	0.09	0.16
15. Kayumo/Choi no 3	0.00	10.53	8.37	14.99	63.66	0.11	0.35	0.08	0.16
16. Kayumo/Choi no 1	0.00	10.70	8.32	14.27	64.48	0.11	0.34	0.09	0.18

### Remark

The concentration range of the following fatty acids is as follows (the concentration range is applicable to all 16 samples):

C14:0 0.05-0.08 g/100g of total fatty acids

C16:1 0.07-0.10 g/100g of total fatty acids

C20:1 0.08-0.21 g/100g of total fatty acids

C22:1 0.02-0.13 g/100g of total fatty acids

C18:1 is oleic acid, C18:2 is linoleic acid and C18:3 is linolenic acid including both alpha and gamma linolenic acid

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S. Rügheimer

Section Head: Microbiology and Food Chemistry

Kalahari Melon Seed Development Project 2008/09 – Final Report to IPTT, CRIAA SA-DC September 2009

# ANALYTICAL LABORATORY SERVICES

P.O. Box 86782 Eros, Windhoek, Namibia  
Tel (061) 210132 Fax (061) 210058 email analab@mweb.com.na

## TEST REPORT

To: CRIAA SA-DC  
P.O. Box 23778  
Windhoek  
criaawhk@iafrica.com.na

Date received: 21-Apr-09  
Date required:  
Date completed: 08-May-09

Attention: Ms. P. Phillipus

**Your Reference:** KMS oil analysis  
**Lab. Reference:** I090452

**Type of Sample(s)**  
Melon seeds

**Samples Received**  
Five samples received on the 21/04/2009

**Test(s) Required**  
Oil content

**Test Method(s) used**  
Deutsche Einheitsmethoden zur Untersuchung von Fetten, Fettprodukten, Tensiden und verwandten Stoffen, 1994  
DGF B-I 5 (87) oil content, extraction: petroleum ether bp. 40-60°C for 4h  
Sample preparation: bulk sample prepared in the blender and a sub-sample thereof used for the extraction

### Result

Sample I.D.	Test	Oil content g/100g ('as is' basis)
1. Omuthiya, 200g		21.3
2. Nkuwoyepongo, 200g		22.2
3. Diinina, 200g		22.0
4. Omuntele, 200g		21.2
5. Gwamiitayi		21.5

**Remark:**

\_\_\_\_\_  
S. Rügheimer  
Section Head: Microbiology and Food Chemistry

# ANALYTICAL LABORATORY SERVICES

P.O. Box 86782 Eros, Windhoek, Namibia  
Tel (061) 210132 Fax (061) 210058 email analab@mweb.com.na

## TEST REPORT

To: CRIAA SA-DC  
P.O. Box 23778  
Windhoek  
criaawhk@iafrica.com.na

Date received: 19-Jun-09  
Date required:  
Date completed: 22-Jun-09

Attention: Michel

**Your Reference: KMS oil**  
**Lab. Reference: I090623**

### Type of Sample(s)

Melon seed oil

### Samples Received

Two samples received on the 19/06/2009

### Test(s) Required

Acid value, Peroxide value

### Test Method(s) used

Deutsche Einheitsmethoden zur Untersuchung von Fetten, Fettprodukten, Tensiden und verwandten Stoffen, 1994  
DGF C-V 2 (81), acid value, titration, indicator: phenolphthalein

Deutsche Einheitsmethoden zur Untersuchung von Fetten, Fettprodukten, Tensiden und verwandten Stoffen, 1994  
DGF C-VI 6a (77) peroxide value, Wheeler

### Result

Sample I.D.	Test	Acid value mg KOH/g	Peroxide value mEq O <sub>2</sub> /Kg
1. KMS KAP 2007		1.2	13.3
2. KMS KAP 2005		3.7	26.1

### Remark:

\_\_\_\_\_  
S. Rügheimer  
Section Head: Microbiology and Food Chemistry

# ANALYTICAL LABORATORY SERVICES

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Tel (061) 210132 Fax (061) 210058 email analab@mweb.com.na

## TEST REPORT

To: CRIAA SA-DC  
P.O. Box 23778  
Windhoek  
criaawhk@iafrica.com.na

Date received: 19-Jun-09  
Date required:  
Date completed: 22-Jun-09

Attention: Michel

**Your Reference: KMS oil**  
**Lab. Reference: I090623**

### **Type of Sample(s)**

Melon seed oil

### **Samples Received**

Two samples received on the 19/06/2009

### **Test(s) Required**

Acid value, Peroxide value

### **Test Method(s) used**

Deutsche Einheitsmethoden zur Untersuchung von Fetten, Fettprodukten, Tensiden und verwandten Stoffen, 1994  
DGF C-V 2 (81), acid value, titration, indicator: phenolphthalein

Deutsche Einheitsmethoden zur Untersuchung von Fetten, Fettprodukten, Tensiden und verwandten Stoffen, 1994  
DGF C-VI 6a (77) peroxide value, Wheeler

### **Result**

Sample I.D.	Test	Acid value mg KOH/g	Peroxide value mEq O <sub>2</sub> /Kg
1. KMS KAP 2007		1.2	13.3
2. KMS KAP 2005		3.7	26.1

### **Remark:**

\_\_\_\_\_  
S. Rügheimer  
Section Head: Microbiology and Food Chemistry

# ANALYTICAL LABORATORY SERVICES

P.O. Box 86782 Eros, Windhoek, Namibia  
Tel (061) 210132 Fax (061) 21 email analab@mweb.com.na

## TEST REPORT

To: CRIAA SA-DC  
P.O. Box 23778  
Windhoek

Date received: 16-Jun-09  
Date required:  
Date completed: 22-Jun-09

Attention: Michel

Your Reference: **KMS oil**  
Lab. Reference: **I090609**

### **Type of Sample(s)**

Melon seed oil

### **Samples Received**

One sample received on the 16/06/2009 and tested on the 17/06/2009

### **Test(s) Required**

Mould and yeast count  
Total colony count  
Coliform and E. coli count

### **Test Method(s) used**

Tween 80 was used as emulsifying agent for the primary dilution

Methods for the microbiological examination of foods (American Public Health Association)

Enumeration of moulds and yeasts

Cfu/g

Spread plate method

Dichloran rose bengal chloramphenicol agar, 25°C/5 days

Methods for the microbiological examination of foods (American Public Health Association)

Enumeration of aerobic mesophilic organisms

Cfu/g

Spread plate method

Plate count agar, 35°C/48h

Enumeration of presumptive coliform and E. coli organisms

Cfu/g

Pour plate method

Chromogenic E.coli/coliform agar, 37°C/24-48h

### **Duration of Test(s)**

17/06/2009-22/06/2009

### **Result**

Test	Mould and yeast count, cfu/g	Total colony count cfu/g	Coliform count cfu/g	E. coli count cfu/g
Sample I.D.				
1. Melon seed oil 2009, drum 55, Omuntele Ass.	<20 estimated	400 estimated	10 estimated	<10 estimated

Cfu/g = colony forming units per g

### **Remark**

S. Rügheimer  
Section Head: Microbiology and Food Chemistry

# ANALYTICAL LABORATORY SERVICES

P.O. Box 86782 Eros, Windhoek, Namibia  
Tel (061) 210132 Fax (061) 21 email analab@mweb.com.na

## TEST REPORT

To: CRIAA SA-DC  
P.O. Box 23778  
Windhoek

Date received: 13-Aug-09  
Date required:  
Date completed: 23-Aug-09

Attention: Michel

Your Reference: **Melon seed oil**  
Lab. Reference: **I090791**

Type of Sample(s): Melon seed oil

### Samples Received

One sample received on the 13/08/2009 and tested on the 17/08/2009

### Test(s) Required

Mould and yeast count  
Total colony count  
Coliform and E. coli count

### Test Method(s) used

Tween 80 was used as emulsifying agent for the primary dilution  
Methods for the microbiological examination of foods (American Public Health Association)  
Enumeration of moulds and yeasts  
Cfu/g  
Spread plate method  
Dichloran rose bengal chloramphenicol agar, 25°C/5 days  
Methods for the microbiological examination of foods (American Public Health Association)  
Enumeration of aerobic mesophilic organisms  
Cfu/g  
Spread plate method  
Plate count agar, 35°C/48h  
Enumeration of presumptive coliform and E. coli organisms  
Cfu/g  
Pour plate method  
Chromogenic E.coli/coliform agar, 37°C/24-48h

Duration of Test(s) 17/08/2009-22/08/2009

### Result

Test	Mould and yeast count, cfu/g	Total colony count cfu/g	Coliform count cfu/g	E. coli count cfu/g
Sample I.D.				
1. Melon seed oil 2009, drum 8 & 10 Omuntele Ass.	60 estimated	600 estimated	<10 estimated	<10 estimated
2. Melon seed oil 2009, drum 19 Onankali & Individuals	20 estimated	<100 estimated	<10 estimated	<10 estimated
3. Melon seed oil 2009, drum 3 Omuthiya	200 estimated	<100 estimated	<10 estimated	<10 estimated

Cfu/g = colony forming units per g

### Remark

S. Rügheimer  
Section Head: Microbiology and Food Chemistry

# ANALYTICAL LABORATORY SERVICES

P.O. Box 86782 Eros, Windhoek, Namibia  
Tel (061) 210132 Fax (061) 210058 email analab@mweb.com.na

## TEST REPORT

To: CRIAA SA-DC  
P.O. Box 23778  
Windhoek  
criaawhk@iafrica.com.na

Date received: 31-Aug-09  
Date required:  
Date completed: 03-Sep-09

Attention: Michel

**Your Reference: KMS Devt Project**  
**Lab. Reference: I090837**

**Type of Sample(s)**  
KMS oil

### **Samples Received**

Two samples received on the 31/08/2009

### **Test(s) Required**

Acid value and peroxide value

### **Test Method(s) used**

Deutsche Einheitsmethoden zur Untersuchung von Fetten, Fettprodukten, Tensiden und verwandten Stoffen, 1994  
DGF C-V 2 (81), acid value, titration, indicator: phenolphthalein

Deutsche Einheitsmethoden zur Untersuchung von Fetten, Fettprodukten, Tensiden und verwandten Stoffen, 1994  
DGF C-VI 6a (77) peroxide value, Wheeler

### **Result**

Sample I.D.	Test	Acid value mg KOH/g	Peroxide value mEq O <sub>2</sub> /Kg
1. OOP KMS 1 May 2008		0.9	6.0
2. OOP KMS 2 Jan 2009		0.8	6.0

### **Remark:**

\_\_\_\_\_  
S. Rügheimer  
Section Head: Microbiology and Food Chemistry

# ANALYTICAL LABORATORY SERVICES

P.O. Box 86782 Eros, Windhoek, Namibia  
Tel (061) 210132 Fax (061) 21 email analab@mweb.com.na

## TEST REPORT

To: CRIAA SA-DC  
P.O. Box 23778  
Windhoek

Date received: 31-Aug-09  
Date required:  
Date completed: 08-Sep-09

Attention: Michel

**Your Reference:** KMS Devt Project  
**Lab. Reference:** I090837

**Type of Sample(s)**  
KMS oil

### **Samples Received**

Two samples received on the 31/08/2009 and tested on the 03/09/2009

### **Test(s) Required**

Mould and yeast count  
Total colony count  
Coliform and E. coli count

### **Test Method(s) used**

Tween 80 was used as emulsifying agent for the primary dilution

Methods for the microbiological examination of foods (American Public Health Association)  
Enumeration of moulds and yeasts

Cfu/g

Spread plate method

Dichloran rose bengal chloramphenicol agar, 25°C/5 days

Methods for the microbiological examination of foods (American Public Health Association)  
Enumeration of aerobic mesophilic organisms

Cfu/g

Spread plate method

Plate count agar, 35°C/48h

Enumeration of presumptive coliform and E. coli organisms

Cfu/g

Pour plate method

Chromogenic E.coli/coliform agar, 37°C/24-48h

### **Duration of Test(s)**

03/09/2009-08/09/2009

### **Result**

Sample I.D.	Test	Mould & yeast count, cfu/g	Total colony count cfu/g	Coliform count cfu/g	E. coli count cfu/g
1. OOP KMS, 1 May 2008		<100 estimated	<100 estimated	50 estimated	<10 est.
2. OOP KMS, 2 Jan 2009		<100 estimated	<100 estimated	50 estimated	<10 est.

cfu/g = colony forming units per g

S. Rügheimer  
Section Head: Microbiology and Food Chemistry

## KALAHARI MELON SEED (KMS) OIL DEVELOPMENT PROJECT

### FARMERS' FIELD TESTING OF IMPROVED KMS CROSSES, 24 JAN-10 FEB 2009

#### 1. Introduction

The Kalahari Melon Seed (KMS) Breeding Project has selected 3 lines (KMS07-2, KMS 07-17 and KMS 06-27) (crosses) of improved KMS to be tested by the farmers in Northern Namibia and Caprivi during the 2008/9 cropping season. The main objective of this field testing is to evaluate the performance of the 3 selected crosses in comparison to the traditional varieties (farmer's cultivars). The results of this testing will assist the breeding project in its further selection programme.

The field testing is ongoing and it is conducted with two categories of farmers

1. 23 "Full testing farmers" who are expected to follow the full testing protocol and record data using KMS recording forms at each steps of the growing cycle until harvesting and seed extraction. Recording is done with the assistance of the Agricultural Extensionists / CRIAA SA-DC.
2. 74 "Qualitative testing farmers" who are expected to provide a qualitative evaluation of the performance of the improved crosses (could also record information along the growing season).

This first trip of field testing of improved KMS crosses took about 16 days (from 24 Jan- 10 Feb 2009) whereby farmers who are participating in the testing of improved seeds and the extensionists have been visited (see attached field trip programme). A special visit was also paid to EWC to discuss some issues like logistic, radio programme and the KMS marketing information for 2008/9.

During this visits clarification and translation of the protocol has been provided to the farmers and extensionists for the basic requirements to be followed by testing farmers, and mainly, the "full testing farmers".

#### 2. Testing Plots and Planting of Test Crosses

Testing plots and the planting of the crosses have been prepared as follows:

- Each of the 3 crosses has been planted in different small plots, not too close to each other. Some farmers have planted the seeds in different areas of their field
- Two seeds have been planted per planting spot, having 10 planting spots for each cross but some farmers planted up to 9 planting spots only. This also left farmers with enough seeds for replanting in case some germination fails or for comparing with the newly harvested seeds at the end of the testing.
- Farmers space the planting spots by approximately 5 meters intra-row and 5 meters between rows. However, farmers could not accurately measure the spacing because the measurement was done manually without a measuring device
- The expected size of the plot is 250 square meters to 375 square meters, but due to the fact that no measuring device has been use, there is no accuracy in the size of plots
- Farmers have used the provided large pegs to mark the testing plots, so that they can note and identify clearly which cross is planted in which plot
- Spots where the improved cross seeds are planted have been marked with strong pegs by some farmers while other farmers have used sticks to mark the planting spot, (as small marked pegs could not be provided to all of the "full test farmers" and they might also be not too strong enough, so farmers were advised to make their own pegs out of strong wood or metal bars.
- It was up to the farmers to decide whether to do a mono-cropping of these improved seeds or inter-cropping with Mahangu. Although, inter-cropping with Mahangu and beans was almost the only option for farmers because when improved seeds were delivered, farmers had ploughed their fields already and had no space left for mono-cropping.
- Farmers are requiring to record information along the growing of the plants using the provided forms.

As indicated earlier in this report, nearly hundred farmers are involved in the field testing of improved KMS crosses, a list of participants is found below:

### Field Testing of KMS improved crosses in the Northern Namibia: list of participants

Region	Organisation & Village	Name of farmer	Contact Number	Full-testing /qualitative		
<b>Oshikoto</b>	KNC, Omuthiya	J. I. Shali	813136561	Ft		
	MTI Omuthiya	A Uusiku	081 3395369;065-263105	Ft		
	Kuupenda Ass.	S Ekandjo			Qt	
	Onalunike	S Amadhila	065-248980	Ft		
	Onakalunga	W Niigambo		Ft		
	Onakalunga	P Likius		Ft		
	other farmers through DEES-Ongwediva					<5
<b>Oshana</b>	Uukwiyu Uushona	A Sakalia	081 2201638	Ft		
	Ompundja	W Samuel	081 3118919	Ft		
	RFCs, Eheke	M Nuukongo	065-241951	Ft		
	other farmers through DEES-Ongwediva					<13
<b>Ohangwena</b>	Eenhana	A Ngolo		Ft		
	EWC, Ondobe	K Nekongo	081 2913490		Qt	
	EWC, Ongha	M Kautwima	081 2969768			
	TTP / DEES, Eenhana	E Weyulu	081 2598197	Ft		
	Omauni DEES	J Shipena		Ft		
	DEES, Eenhana Omundaungilo	E Immanuel	081 2510240	Ft		
	Ongula	R Eliasel	0811 278190	Ft		
	Ongula	F Nembiya	811278190	Ft		
	RFCs, Mandume, Omauni	R Shilongo	081 127 7156		Qt	
	other farmers through DEES-Eenhana					<9
<b>Omusati</b>	RFCs, Onheleiwa	H Hasheela	081 2148442	Ft		
	DEES, Okahao	L Hanguwo	081 2892338		Qt	
	Uutota	E Shipweya	82 2892338	Ft		
	Oshitwa	M Sheehama	83 2892338	Ft		
	DEES, Okalongo	Kauna	081 2807455	Ft		
	Onandjaba	L Kalomo	82 2807455		Qt	
	Ohendjeno	F Sheetekela	83 2807455		Qt	
	other farmers, DEES-Okahao & Okalongo					<19
	Olwiili	Velonica Haimbodi	84 2807455		Qt	
<b>Caprivi</b>	Lubuta	C Mukena		Ft		
	Kayuwo	V Mwindi		Ft		
	Singalamwe	E Yalezo		Ft		
	Sobbe	H Kaine		Ft		
	other farmers through R Sihani					21
<b>Kavango</b>	G. Mukoya Conservancy	Simon? (Chairman)	c/o ICEMA-HVPS		Qt	
	M. Nyangana Conservancy	Alex? (Chairman)	c/o ICEMA-HVPS		Qt	
<b>Total</b>				<b>23</b>	<b>76</b>	
				<b>99</b>		

- Total number of farmers = 99 + 20 (EWC), this makes about +/- 119 farmers

Improved testing seeds were given out to the farmers in the last week of January and farmers confirmed that planting was completed by the first week of February. Caprivi also acknowledged receiving the seeds a bit late, but farmers managed to plant the seeds in the first week of February.

### **3. Traditional varieties**

For the purpose of comparing the behavior of the selected crosses and the traditional varieties, it would have been better to plant them at the same time, but crosses were only made available to CRIAA early January. Although the farmers generally know the behavior of the traditional varieties already it could have been a sensible idea to plant them at once. Unfortunately, when the improved seeds were delivered to the farmers for planting, traditional seeds were already sown, starting to germinate and at some areas were in the process to flowering. *See the picture below*



*Meme Ruth from Ongulayanetanga tending her traditional KMS plants*

Further, Eenhana reported that five of their full testing farmers could manage to demarcate four plots including one plot for the traditional variety. Therefore, Eenhana is looking forward to attain results for comparison purpose.

### **4. Follow up made on the germination of the testing crosses**

Testing farmers from Eenhana, Ongha, Omuthiya, are experiencing a problem with the KMS 06-27 cross which has not germinated after a heavy rain at the NCRs. Only et Eheke in Oshana region, a farmer has given a positive report on the germination of this cross.

Testing seeds were sent to Caprivi- Kongola on the 22<sup>nd</sup> of January and were received seven days after. Caprivi also reported that the seeds have been planted within the first week of February, with four full testing farmers only, under the supervision of Mr. Richard Sihani. Other sachets of seeds were also distributed to farmers to do a qualitative testing and evaluate the performance of the improved seeds on their own, although they might also record as much information as they can along the growing season using recording forms.

### **5. Monitoring and backstopping**

Follow up backstopping visits will be provided to the full testing farmers only to:

- a) *Check how the testing seeds germinated*
- b) *Check the general performance of the seeds after they have been planted and*
- c) *How seeds/plant doing after the heavy rain*
- d) *Assist the farmers with the recording in forms*

Priority areas for visits	Follow up by telephone
<b>Oshikoto</b>	
Omuthiya I Shali A Usiku	Kuupenda Ass
Onakalunga x 2	
Onalunike	
<b>Oshana</b>	
Uukwuyu Uushona	
Ompundja	
Eheke	
<b>Ohangwena</b>	
Ongha	Ondobe Ass
Eenhana x 2	Omauni
Ongulayanetanga	Omauni
<b>Omusati</b>	
Okahao x 2	Olwiili
Okalongo x 2	Okahao
	Ohendjeno
	Onandjaba
<b>Caprivi</b>	Caprivi: 4 people

## 6. Meeting with EWC

A short meeting was held on the 9<sup>th</sup> February 2009 between CRIAA SA-DC, the Chairperson of EWMM Ms Haufiku and the manager of EWMM Mr. Ndjelekeni. The purpose of the meeting was to discuss the logistic that have to be paid to the KMS producer groups by EWC. Discussions went on in the meeting. CRIAA advised the factory not to cut off the logistic because it may discourage the producers and producers may also be tempted to look for other buyers which is also not bad. Thus, CRIAA SA-DC highlighted two options: either, to increase the logistic of EWC associations by N\$ 0.20 or to keep the current logistic of N\$0.50 for all the centers involved in the marketing of KMS. The board members are expected to sit on Friday the 27 /02 / 2009 and will report back to CRIAA SA-DC on any decision made regarding the KMS logistic.

**Radio programme** – decision taken from the previous EWC board meeting was not satisfactory to CRIAA because EWC is not convinced to talk about the KMS prices in the radio, hence the Board together with the co-operative mentor have to look into this matter again.

The logistic issue has been communicated to the co-operative mentor Mr. Victor Mufita, and will give CRIAA (Padelia) a feedback on the decision made by the co-operative board members.

## 7. Challenges and recommendation

- Transport could be a predicament to some of the agricultural officials, as they are claiming that their Ministry normally assigns limited vehicle km, which would not permit them to maintain appropriate supervision with their respective testing farmers. On that note CRIAA should probably establish direct contacts (telephonic, although site visits will be important) with the farmers particularly with full testing farmers.
- There has been much rain in the North Central areas which may hamper the growing of the plants.
- Some farmers could not get the traditional varieties to be planted at the same time with the improved cultivars. Therefore, a comparison between the traditional and the improved seeds might not attain the intended outcomes.
- Flood in the Northern Namibia has affected regions like Omusati, Oshana and part of Ohangwena. This made some areas inaccessible like, Uukwiyu Uushona Ompundja; Okahao can only be reached with a big pickup vehicle. However, areas which have not been slapped by the flood may produce provide results.

## KALAHARI MELON SEED DEVELOPMENT PROJECT 2008/09

### UPDATE ON FARMERS' FIELD TESTING OF IMPROVED KMS CROSSES: HARVESTING & SEED EXTRACTION

**P. Phillipus (PO), CRIAA SA-DC, 11 June, 2009**

#### **Background**

The Kalahari Melon Seed (KMS) Breeding Project selected 3 crosses (KMS07-02, KMS 07-17 and KMS 06-27) of improved KMS to be tested by the farmers in Northern Namibia and Caprivi during the 2008/9 cropping season. The main objective of this field testing was to evaluate the performance of the 3 selected crosses in comparison with the traditional varieties (farmer's cultivars). The results of this testing will assist the breeding project in its further selection programme.

The field testing was planned with two categories of farmers

3. 23 "Full testing farmers" who were expected to follow the full testing protocol and record data using a special form at each steps of the growing cycle until harvesting and seed extraction. CRIAA Project Officer (PO) and/or local Agricultural Extensionists were to assist testing farmers in recording data, when needed.
4. 76 "Qualitative testing farmers" who were expected to provide a qualitative evaluation of the performance of the improved crosses (but they might also record information along the growing season).

#### **Results**

Harvesting and seed extraction were done during the last field trip of the PO (24 May – 09 June 2009). This was done because melons were starting to rot and could not be kept for so long. However, not all the melons could produce seeds due to the fact that some melons did not reach full maturity. Quantitative information obtained from 22 out of 23 full testing farmers are presented in the Annexes A and B. From the qualitative test farmers who were expected to provide information on the performance of the crosses, only 5 out of the 76 selected farmers could do so and their comments are included in the Annex B. This was because the growing season was short and bad due to floods not allowing most farmers to grow the crosses successfully. Some farmers were also not willing to actually provide feed-back information.

#### **Conclusions**

The crosses KMS07-02, KMS 07-17 and KMS 06-27 were tested by the farmers in Northern Namibia and Caprivi during the 2008/9 cropping season. The performance of the three crosses in comparison with the traditional varieties (farmer's cultivars) was evaluated by the farmers. However, the quantitative results of the tests are not as comprehensive as it was expected.

- The planting of the cross seeds could only take place towards end-January/early-February 2009. After a relatively long dry-spell between December 2008 and January 2009, the following rains were heavy and eventually stopped early by the beginning of April giving a relatively short growing season to crops planted late.
- Germination and plant growth were poor due to heavy rain and flood water, which also induced damages by pests. In Caprivi, animals destroyed the plants and fruits in the testing plots that survived the heavy rains and floods.
- Most testing plots could reach the fruiting stage. The few fruits that could be harvested did not all reach full maturity. Consequently, a very limited quantity of seeds could be harvested.
- The small quantity of seeds harvested from the test plots and their limited statistical significance does not warrant conducting oil analysis.

A photographic record of cross seeds harvested compared to the planting materials is provided in Annex C.

The performance of the field tested crosses was affected primarily by timing, from which testing farmers suggested that it would be better if the trial could be done for the second time in the next season with planting starting around November-December, should there be a chance to do so.

<b>Summary of the farmers test results</b>			
	<b>KMS06-27</b>	<b>KMS07-17</b>	<b>KMS07-02</b>
<b>Total No. of “full testing farmers”:</b>	<b>22</b>	<b>22</b>	<b>22</b>
- Oshikoto	5	5	5
- Oshana	3	3	3
- Ohangwena	6	6	6
- Omusati	4	4	4
- Caprivi	4	4	4
No. of plots planted	22	22	22
<b>Total No. of seeds planted</b>	<b>460</b>	<b>480</b>	<b>478</b>
No. of seeds replanted	+30	0	0
No of seeds planted per plot (range)	20-30	20-30	18-30
<b>Total No. of seeds that germinated</b>	<b>160</b>	<b>303</b>	<b>312</b>
<b>% germination</b>	<b>35%</b>	<b>63%</b>	<b>63%</b>
No. of plots with no germination	1	1	0
No. of plots with $\geq 50\%$ germination	19	18	16
No. of plots with 100% germination	2 (Caprivi)	3 (Caprivi)	6 (4 NCRs)
<b>No. of plants growing after germination</b>	<b>82</b>	<b>134</b>	<b>156</b>
as % of seeds planted	<b>18%</b>	<b>28%</b>	<b>33%</b>
as % of seeds germinated	<b>51%</b>	<b>44%</b>	<b>50%</b>
No. of plots that failed after germination	3	5	5
<b>No. of plots with surviving plants</b>	<b>2</b>	<b>5</b>	<b>8</b>
No. of plots with $\geq 50\%$ surviving plants / planted seeds	2 (2 Caprivi)	4 (3 NCRs)	8 (5 NCRs)
<b>No. of plots that produced fruits &amp; seeds</b>	<b>2</b>	<b>4</b>	<b>2</b>
Location of plots:	(NCRs) Omuthiya Eenhana	(NCRs) Onakalunga Uukwiyu Omuthiya Eenhana	(NCRs) Onakalunga Eenhana
<b>No. of fruits harvested and processed</b>	<b>5</b>	<b>21</b>	<b>15</b>
g of fruits processed	80g	1078g	590g
<b>g of dried seeds produced</b>	<b>24g</b>	<b>111g</b>	<b>59g</b>
as % of dried seeds/ fruits (w/w)	30%	10%	10%

2. Plants growth		Details and Comparison with Traditional Cultivars			
Cross No:		KMS 07-17	KMS 07-02	KMS 06-27	Traditional Cultivars
2.1	Plant growth	- KMS 07-017 & KMS 07-2 germinate faster than the traditional cultivars		-Traditional cultivars germinate faster than KMS 06-27	
		<ul style="list-style-type: none"> <li>- Grow differently depending on the type of soil and the amount of water</li> <li>- Water logging affect the growth of plants (crosses &amp; traditional cultivars)</li> </ul> <p>NB: Based on the recordings made by the farmers, tested crosses grow better in loamy soil while traditional cultivars grow better in sandy soil. Although with some other farmers it is otherwise.</p>			
2.2	Plant flowering	<ul style="list-style-type: none"> <li>- Crosses take a shorter time to flower</li> <li>- Do not stretch long (short runners) compared to the traditional cultivars which grow longer runners</li> </ul>			
2.3	Plant fruiting	<ul style="list-style-type: none"> <li>- Fruiting quickly after flowering</li> <li>- Fruits grow faster than traditional cultivars</li> <li>- Season was too short to determine how many fruits one plant could produce. So it is still not clear as to which traditional/crosses produce more fruits than the other plant. Tested varieties seem to bear more fruits than the traditional cultivars according to the farmers</li> </ul>			
2.4	Plant resistance to dry spell & heat (any damages observed?)	- Resistant to dry spell			
2.5	Plant resistance to excess rain & flood (any damages observed?)	<ul style="list-style-type: none"> <li>- Vulnerable to excess rain &amp; flood water</li> <li>- Stunted plants due to excess rain and flood water, same as traditional cultivars</li> </ul>			
2.6	Plant resistance to pests (any pests causing damage?)	<ul style="list-style-type: none"> <li>- Fruits have been damaged by the pests: melon bug (<i>oinghili/Iinkili</i>) &amp; other insects (worms)</li> <li>- Pests (worms) lay their eggs into fruits causing poor growth of the fruits and sometimes fruits can go bad early before the extraction period. Many fruits had signs of deformity that may be a result of insects attacking the immature fruits. The affected fruits could hardly produce seeds, this was the same case with the traditional cultivars</li> </ul>			
2.7	Plant resistance to disease (any disease causing damage?)	<ul style="list-style-type: none"> <li>- NCRs: no diseases observed</li> <li>- Caprivi: diseases observed (fruits had "wounds" but causes was not confirmed)</li> </ul>			

<b>3. Fruit harvested</b>		<b>KMS 07-17</b>	<b>KMS 07-02</b>	<b>KMS 06-27</b>
<b>3.1</b>	Fruit maturing on plot (early, normal, late compared to traditional varieties)	Fruit mature early compared to traditional varieties, since crosses were planted late but could still produce some fruits.		
<b>3.2</b>	Fruit harvesting date(s) on plot	Late May - early June		
<b>3.3</b>	Number of fruits harvested on plot	Minimum 1 & Maximum 8 fruits/plot		
<b>3.6</b>	Shape of fruits harvested: round, elongated (number or %)	NCRs: tested crosses produced elongated fruits Caprivi: elongated and round fruits produced, although no seeds could be extracted because fruits had been destroyed by livestock.		

<b>4. Seed extracted &amp; yield</b>	<b>KMS 07-17</b>	<b>KMS 07-02</b>	<b>KMS 06-27</b>
<b>4.1</b> Date of seed extraction	<b>05/06/09 &amp; 08/06/09</b>		
<b>4.2</b> Number of fruits harvested & processed (date of harvest)	Omuthiya 7 fruits (26/05/09) Eenhana 7 fruits (12/05/09) Onakalunga 4 Fruits (27/05/09) Uukwiyu 3 fruits(29/05/09) <b>Total: 21 fruits</b>	Eenhana 8fruits (12/05/09) Onakalunga 7fruits (27/05/09) <b>Total: 15 fruits</b>	Omuthiya 1fruit (26/05/09) Eenhana 4fruits (12/05/09) <b>Total: 5 fruits</b>
<b>4.3</b> Total g of fruits harvested & processed	<b>1078g</b>	<b>590g</b>	<b>80g</b>
<b>4.4</b> Fruit processing, seed extraction compared to traditional cultivars	Covering (skin) of the test fruits are soft, so extraction of the seeds was easier compared to traditional cultivars.		
<b>4.5</b> g of fresh extracted cross seeds 05/06/09 & 08/06/09	Omuthiya: 132g Eenhana: 45g Onakalunga: 39g Uukwiyu: 38g	Eenhana: 120g Onakalunga: 89g	Eenhana: 16g Omuthiya: 39g
<b>4.6</b> Total g of fresh seeds produced	<b>254g</b>	<b>209g</b>	<b>55g</b>
<b>4.7</b> as % of total fresh seeds produced / g of fruit harvested	24%	35%	67%
<b>4.8</b> g of dried seeds extracted (weighed on 12/06/09)	Eenhana: 21g Omuthiya: 66g Onakalunga: 14g Uukwiyu: 10g	Eenhana: 36g Onakalunga: 23g	Eenhana: 6g Omuthiya: 18g
<b>4.9</b> Total g of dried seeds produces as % dried seeds / g fruits	<b>111g</b> 10%	<b>56g</b> 10%	<b>24g</b> 30%
<b>4.10</b> Size of harvested cross seeds compared to planted seeds	Some seeds are smaller, while some are of the same size with the panted seeds		
<b>4.11</b> Size of harvested cross seeds compared to traditional cultivars	Same to bigger sizes		
<b>4.12</b> Colour of harvested cross seeds (are all seeds of the same colour?)	Different colours (See picture)	Different colour (See picture)	Some seeds are darker (See picture)

5.	Overall evaluation of the cross	Details (and comparison to traditional cultivars)
5.1	Strong points of the crosses tested	<ul style="list-style-type: none"> <li>- Crosses grow better on the loamy soil, although farmers explain that it is also important to use manure</li> <li>- Better stand with too much water because all the traditional varieties planted on the same dates died from heavy rains and flood water.</li> <li>- Flower easily</li> <li>- High fruiting speed compared to traditional cultivars</li> <li>- Resistant to dry spell</li> <li>- Resistant to diseases</li> <li>- Crosses &amp; traditional varieties both are vulnerable to heavy rain and flood water</li> </ul>
5.2	Weak points of the cross tested	<ul style="list-style-type: none"> <li>- Affected by Pests</li> <li>- Soft skins, reduces the waiting time of the seeds to be extracted</li> </ul>
5.4	Planting of these harvested seeds next season by the farmers?	Farmers comment, re-do the trial next season, insisting that planting was done late that might had affected the results of the test. Also flood situation probably would not be the same as the first trial. Caprivi- seeds kept for planting in the next season
5.5	To the question whether farmers would want more seeds of the same cross to plant next season?	Most of the full-test farmers indicated that they would need more seeds of the crosses to plant on their fields next season, hoping to have planting done on time and rain to be average, to see if there will be some changes regarding performance of the varieties

FIELD TESTING OF IMPROVED KMS - FARMERS REGISTER					
NAME/ EDHINA	CONTACT NUMBER/ ONOMOLA YONGODHI	PLACE/ EHALA	CONSTITUENCY/ OSHIKANDJOHOGOLOLO	REGION/ OSHIKOTOPOLWA	CLOSEST ADC/OMBELEWA YUUNAMAPYA YILI POPEPI
I.S Johannes	081 31365 61	Omuthiya	Omuthiya	Oshikoto	Okashana RDC
Venasiu Fabian	081 36629 19	K. N. Conservancy	Omuthiya	Oshikoto	Okashana RDC
Salmi Kaulinge	081 12922 52	Several	Several	Oshikoto/Ohangwena	
Merjam Kautwima	081 29697 68	Ongha	Endola	Ohangwena	EWC
Kristofina Nekongo	081 23827 80	Ohaukelo	Omulonga	Ohangwena	EWC
Linda Iyambo	081 23890 62	Ohalumbele	Onesi	Omusati	Onesi Agriculture
Johanna N. Iileka	081 29955 20	Otamanzi	Otamanzi	Omusati	Okahao Agriculture
Wilhelmina Samuel	081 31189 19	likuku	Oshati East	Oshana	NNFU / (Ompundja)
Josuah Sheyavali	081 29142 90	Ontana	Eengodi	Oshikoto	Onankali Agriculture
Martha Nuukongo	081 3309112 / 065-241951	Eheke	Ondagwa	Oshana	Ondangwa
Aune Justus	081 22016 38	Ohaziwa	Uukwiyu	Oshana	Uukwiyu Agriculture
Rauna Kafidi	081 29187 99	Ohangwena	Ongenga	Ohangwena	EWC
Selma Ekandjo	081 29709 46	Omulondo	Onayena	Oshikoto	EWC
Teovilia Martinus	081 39129 57	Afoti	Otamanzi	Omusati	NNFU
Uugwanga Sylvia	065-240068	EWMM	Ondagwa	Oshana	EWC
Ester Nashima	081 31090 60	Omuthitugwalwani	Elim	Omusati	EWC
Veronica Nghishidimbwa	081 27928 56	Onankali	Onyaanya	Oshikoto	DEES
Padelia Likius	081 32484 03	Onakalunga	Omuntele	Oshikoto	Ilteni Tulongeni Project
Selma Amadhila	081 29205 94	Onalunike	Omuthiya	Oshikoto	EDEN Project
Wilcka Niigambo	081 30299 66	Onakalunga	Omuntele	Oshikoto	Ilteni Tulongeni Project
Henock H. Hasheela	081 21484 42	Onhelelwa	Etayi	Omusati	NNFU
Ephraim H. Weyulu	081 25981 97	Eenhana	Eenhana	Ohangwena	DEES