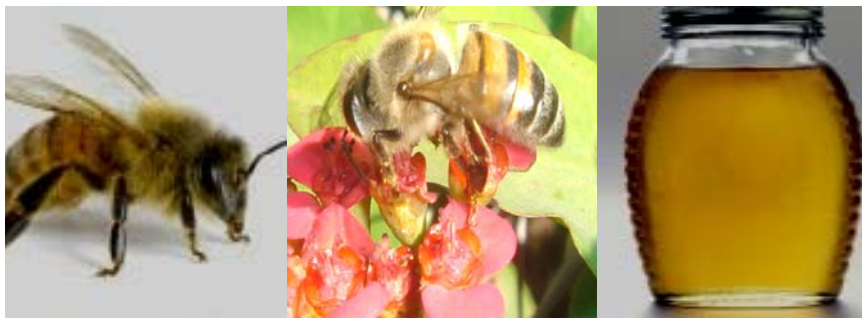


Quality Assurance Food Safety and Traceability In Honey Supply Chain



From Bee-to- Bottle

Western and Central Tanzania

Presented to UNIDO by;

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1. The Business Promoter

I am a business promoter conversant with the ISO standards on food safety management systems. I am Certified Food Safety Consultant/Auditor by the International Registration and Certification (IRCA –UK) with concentration in supply/value chains training and market linkages for agro processors and SMEs. I am a Secretary General to Victoria Environmental and Fishery development Association – Tanzania (VEFDA-T). My involvement in the fish food projects with Victoria Environmental and Fishery Development Association - VEFDA-Tanzania gave me an opportunity to participate to the steering committee for traceability and value addition solution to Tanzania agricultural, agro-industry sector of Tanzania. I was so, a founder and subscriber member of the newly formed company Traceability-T Limited in 2007. Since then I have done projects for capacity building trainings and traceability trainings and surveillance to fruits and vegetable producers, bee-keepers, dairy processing (small-scale industries) and honey processors and buyers (small scale). I am currently developing a business linkage plan for the sunflower producers in Singida region in central Tanzania. With a background in microfinance and community economic development, I hope also to link the SMEs and farmers to the modern methods for micro-financing especially the *micro-agro technology* to bridge the gap of capital accessibility with innovative venture capital financing. From the current charity structure of organization development, I will champion for establishment of the **Agro-EXPO**. The Enterprise will provide solutions for access to lucrative markets including local upper markets and exports.

2. The Food safety Quality Assurance and Traceability for Honey by Public-Private Partnership

Traceability-T Limited a private entity collaborated with the Ministry of Natural Resources (Forestry and Beekeeping) department to implements valued addition services in agro-food sector through training, food safety and quality assurance and traceability. The trainings involved building capacity for bee-keepers, processors and traders of honey and bi-products to improve quality production and safety control so that they can penetrate local and international markets. From 2007-08 we implemented trainings to beekeeper's associations, processors and traders in eight districts in western and central Tanzania regions. The training involved more than 600 beekeepers in the districts of Kibondo in Kigoma, Mpanda and Nkasi (Rukwa), Kahama and Ushirombo (Shinyanga), Pemba (Zanzibar) and Manyoni (Singida). The core objectives of the trainings were modern bee-keeping methods and practices, food safety in honey, quality assurance of honey and introduction of traceability systems in honey supply-chain. The overall aim was to improve production, standards and value addition in the honey production line. The trainings also intended to raise awareness on the international regulations that can enable our producers in the whole chain increase access to local and exports markets.

Honey Processing Equipment and Packaging Materials at UKI-Kibondo



3. Identified a Gaps and Opportunities

In the sub-Saharan Africa, Tanzania was leader in honey production. The high production of bee produces in Tanzania is mainly due to presence of a high population of bee colonies that are estimated at 9.2 million, and also due to presence of high number of vegetation that are preferred by bees in many areas of the country (Kihwele *et al.*, 2001; Latham, 2001; Mbuya *et al.*, 1994).The honey cooperative model was adapted to other countries such as Zambia in late 80s. However, Tanzania has lagged behind on production and quality enhancement in sector. Tanzania does so little in honey production despite the potential of bee colonies. The country is currently producing 4,860 tones of honey and 324 tones of beeswax per year, which represents only 3.5% of the annual production potential of the country. Although this data finding lack reality due to the survey of bee colonies that as done lately in 1957. The recent findings indicate that there is un-utilized potential for 138,000 tones while the actual production is between 9,200 tones (**NBP 1998 and Mwakatobe, 2006**). This is hardly 7.2% of the potential honey production utilization. In 2000 Tanzania honey sector also was rated among best six country exporters of bees-wax to EU after China, Russia, Ukraine and Austria, the sixth being Vietnam. Beeswax is currently destined to South Africa, Zimbabwe, Botswana and Mauritius.

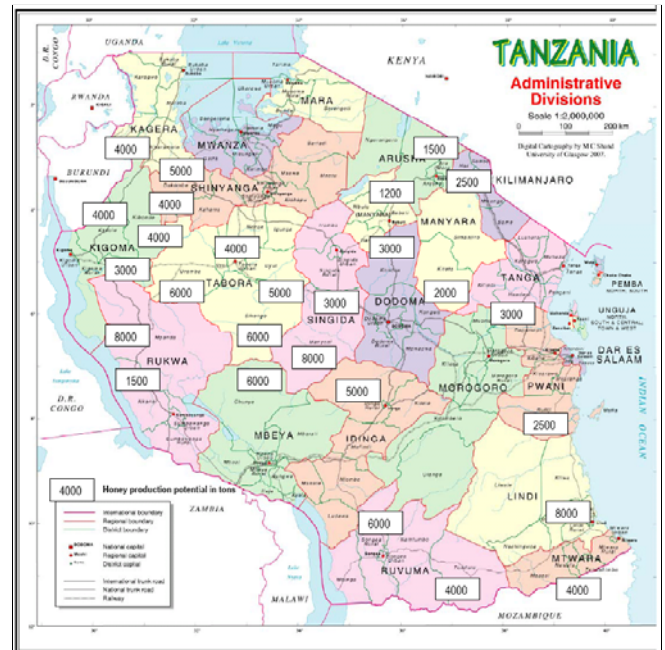
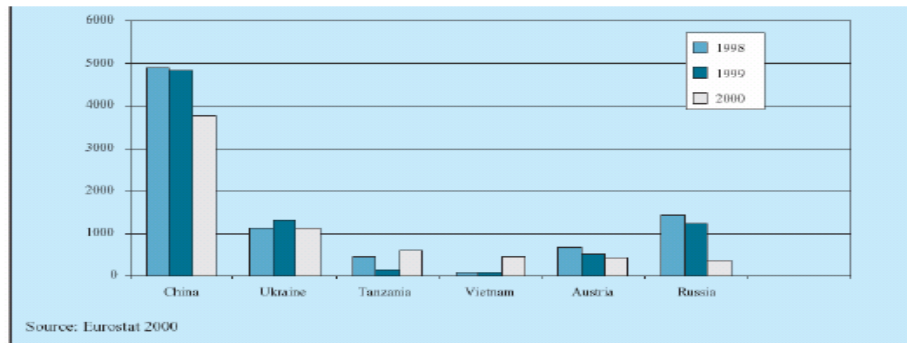


Figure 4: Leading suppliers of crude beeswax and other insect waxes to the EU, 1998 – 2000 (US\$ 1,000)



Source: Market Survey – Honey and Beeswax - CBI 2002, page 22.

3.1. Constraints

There are also other constraints in the sector such as;

- extreme use of traditional bark hives and harvesting method increases number of foreign matter and pollen in the honey and reduces its quality,
- poor honey quality as Tanzania honey has undesirably smoke smell and this reduces marketability,
- poor hygiene conditions Hygienic conditions in due to lack of well designed collection and processing areas which result to extreme lack of safety control and the quality assurance of the product
- Despite presence of national standards for honey most beekeepers are not aware of and don't test their produce prior to sale due to not only lack of access of the standards but also low awareness on the standards
- Limited access to new beekeeping technologies and low adaptation of modern production methods among producers and processors make Tanzania bee products less competitive in the region and global markets.
- Though we started promoting modern beekeeping production technologies, there is need for consistent and wider disseminated initiatives which are based on professional delivery hence adoption on the modern bee keeping practices will be reached as a result improvement in productivity and quality.

- Underdeveloped production and lack of product differentiation of other bee products (propolis, queen's jelly, pollen, and even bees wax) due to limited technology and finances; reduces income from bee products.
- There is low investment on equipment and technology for processing, transportation and cold chain facilities especially from the private and international stakeholders, which demoralize human intervention and production by bee-keepers who are paid desperation prices
- As buyers come from remote areas mainly Dar es Salaam City, the farmers are forced to sell at cheaper prices either to smugglers from neighbor countries or sell to destructive local brew processors who arrive timely or are located proximity to their villages
- Beekeeping in Tanzania is mainly rural-based practiced by local beekeepers in villages.
- Public-private partnership on the sector is still inadequately promoted despite the current supportive policy by the government.
- Unproved scientific organic honey certification and higher costs of organic certification despite the reality that Tanzania Honey is potentially organic nature.

3.2. Opportunities

3.2.1. The government's National Beekeeping Programme (NBP, 2001 -10)

The programme emphasized on stakeholders' participation in the management, ownership and sustainable utilization of bee resources for poverty eradication, improved biodiversity development and environmental conservation. This and the review of Bee-keeping Development Programme 2007 – 2010 provides for bee-keeping revamping the bee-keeping training and research centers of Tabora and Njiro Arusha respectively. To acquire the extension services for modern technologies in the industry and scaling-up bee-keeping development projects in 30 districts countrywide.

3.2.2. The Bee-keeping Act No.15 of 2002

It has the following objectives;

- To make provisions for the orderly conduct of beekeeping;
- To improve the quality and quantity of bee products;
- To prevent and eradicate bee diseases and bee pests, and
- To improve revenue collection.

3.2.3. Quality Assurance Guidelines October 2007

A draft of honey quality assurance guidelines prepared by Ministry of Natural Resources and Tourism (MNRT) – Department of Forestry and Bee-keeping is ready and available for public consumption after funding from the Danish International Development Agency - the Small and Medium Enterprises Competitive Facility (SCF).

4. Innovative about this solution

Uniqueness of the Idea

The uniqueness of the idea includes hands-on training to bee-keepers, localized ICT training through use of local methods bee-keepers are now aware of traceability and other technical barriers to trade. Farmers will be linked to the TFDA and TBS for food safety and laboratory tests and quality standards of their honey. We have innovated the local methods for identification of used the bee-keepers associations in eight districts to conduct training on match-making procedure whereby they had to contribute in kind for the training without a fee. The following were innovations about the programme;



- The bee-keepers in kind contribution was the venue and chairs for the trainings. While the programme provided for the training materials and book-lets of honey quality assurance.
- A PPP concept in bee-keeping was revealed by the regional department for Forestry and Bee-keeping of Western region – Kigoma provided for a van to facilitate transport and access to rural based bee-keepers groups and associations. Other collaborators were the parastatal company Small Industries Development Organization (SIDO) Central region who participated in the training of Singida. The 60 members from Ndalambwe Bee Farmers participated in the quality assurance, safety and traceability training for honey sector.
- We participated at the National Honey Show (NHS) exhibitions to show- case the applicability of traceability of honey, quality assurance and food safety for honey whereby hands on trainings was provided.
- Honey product exhibitors participation involved a competition of good quality honey and bi-products exhibited at the NHS
- Rural-based women and the elderly the remotely located bee-keepers such as those from western Nkasi District in Rukwa region participated in the trainings.
- We link the access local markets for instance Ndalambwe bee-keepers of Itigi Singida region bee-keepers have started selling their honey in local super markets PATCO and Shoprite. The later will lead in selling local honey products at an order approximately of 1800 kgs. (or 2 tones) per month.
- The initiative includes design of internationally acceptable labels and linking them to GS1 for accessibility of traceability technology the bar coding system.

5. Areas of Impact

5.1. Trade

In order to comply with local and international trade regulations and standards for honey and bee-products. Both local and international trade regulations have requirements such as traceability and compliance to food safety requirements. Packaging and labeling requirement are necessary to provide relevant information of the product to end users. Of the four areas trained on international labeling standards, one bee-keeper farmers association at Sanjara in Itigi are accessing upper markets Shoprite and PATCO Supermarkets in the city of Dar es Salaam

5.2. Quality assurance and safety standards

Despite the fact that Tanzania honey is certified to be sold to EU markets, the awareness of local producers is still inadequate. The concern for food safety by the consumers is high necessitating high safety and abiding to the set standards such as codex Alimentarius, global standards and good agricultural practices. From the traditional bee-hives (as seen on photo) bee-keepers now are moving from bark hives to modern bee-hives such Tanzania TTB and Kenyan Bee Hives (KTB). There is also a room to go commercial bee-keeping and adopt hives that are meant for commercial honey although it reduces yields for bees-wax.



1. Field Visits: Mr Silas Ng'habi (left) and Mr. Elias Kahabi Current Bee-Keeping Practices in Kibondo that need Improvement



2. Bee Hive Destruction: The traditional Bee-Hive above is seen demolished by thieves as witnessed by team in Kakonko.



3. Traditional Bee-Hives: Made from tree peelings and dead trees can be useful for bee-keepers in Kibondo district.



4. Tanzania Top Bar Hive (TTB) is currently adapted by beekeepers in the Village reserves at Kifura & Kakonko

6. Challenges

- Inadequate of extension services to train farmers on good bee-keeping practices, quality production and traceability
- Low awareness of good bee-keeping practices (GBP)
- Lack of quality and hygienic bee-harvesting practices such as use of bee-clothes, smoker equipment and
- Absence honey moisture testing equipments and lack of knowledge to use those based human-based testing skills
- Absence of value chain quality assurance control measures knowledge of the bee-to-bottle (see below)



- Lack of good management practices in the honey value-chain
- Absence of tested/best practice bulking method (honey bank, warehouse receipt system, etc.) makes it difficult for processors and traders to bulk enough honey to meet increased order demands.

7. Critical Success Factors in Honey

- Educating farmers to use of human sensory organs for honey in testing and evaluation of honey quality
- Collaboration of Traceability-T and the MNRT was a good sign of Public-Partnership partnership
- We have printed educative posters honey standards, food safety, commercial bee-keeping tools and honey value chain model.
- Distribution of the bee harvesting clothing and smokers as model for the members (semi-skilled labourers) to produce the same materials. For instance the carpenters can make the Tanzania Top Bar (TTB – ‘Langstroth’ bee-hive American adapted model)
- Hives, the smelters can make the bee-smokers and tailors can produce the clothing for good harvesting practices to happen.

- Two educative bee-keeping good practices books were sponsored to all eight districts.

8. How the Solution was financed

The financing for the solution was through a matching grant from SME Competitiveness Facility -SCF. The Traceability-T as private company paid time in the projects while beneficiaries contributed in kind to the implementation of the programme. Traceability had received from SCF a total of USD 133,000 for value added trainings, outreach to bee-keepers in eight districts and support for bee-keeping and harvesting kits and administration. Traceability-T purchased the booklets for Quality assurance from MNRT whereby more than 600 booklets were distributed to all participants at training sessions.

9. Scaling-up and Replication

- Farmers can establish collection centres for honey to facilitate sound control of quality honey and good processing practices
- Quality Production of Honey good and food safety of honey can be promoted at the established collection centers
- The training for Honey cooperative banks can be established to tackle social risks of members before sale of their commodities and costs associated to production e.g. packaging
- Traceability implementation is possible through manual record keeping and retaining honey samples as provided in the regulations in honey sector
- The educative posters will be used for replication training to other bee-keepers and other 22 districts potential for honey production.
- There is possibility for attracting investors to tackle the potential of Tanzanian bee colonies and organic natural honey.
- In order to reduce influence of un-authorized buyers of honey and smugglers, the need to have contractual farming / honey burrowers agreements with the prospect investors is necessary

- Scaling-up can be realized through implementation of synergies with local and international honey processing and trading companies.
- The bee-keepers 'honey banks' can enable implementation of traceability, quality control and safety of honey to happen. There is possibility for stability of honey prices and more product separation of the bees-wax and other bee-products such as propolis etc.



10. Resources needed to scale up and/or replication

10.1. Good Bee-keeping Practices

The good bee-keeping practices will enable adopting to the codex Alimentarius standards set a critical chemical residue limits in liquid honey and bi-products can be realized by adopting to adaptation to good bee-keeping practices and good agricultural practices GAPs by farmers near apiary sites. The Codex Standard for Honey (*Codex Stan 12- 1981 Rev 1 1987 Rev2 2001*) defines honey and lays down rules on its essential composition and quality. This worldwide standard has been internationally agreed by around 167 Codex countries which participate in Codex. The Standard contains certain provisions relating to *contaminants*, hygiene, labeling and methods of analysis. The Standard covers all honey produced by *Apis mellifera* honey bees and all styles of presentations that are processed and destined for direct consumption. The current process of quality control should involve the whole supply chain of honey production from farm to table or as the case of honey 'from bee-to bottle'. The trainings of bee-keepers on quality assurance and good bee-keeping

practices, good harvesting practices and good management practices necessitates for setting appropriate solutions available to bee-keepers as basic solutions.

10.1. (b) Collection Centres

The proposed collection centers will provide answers to quality control and traceability implementation in the honey production line. The farmers lack recommended extraction equipments other than using the plastic utensils of which quality assurance is not easily proved. The improvement of quality production will involve availability of test equipments such as the refractometer and harvesting clothing made by the community entrepreneurs. The local quality control, safety and FDA certification bodies are currently the Tanzania Bureau of Standards (TBS) and Tanzania Food and Drugs Authority (TFDA). We plan to have linkage services with these firms in order that the collection centers hygiene and safety standards are evaluated and certified. The former TBS will provide standards certification to the honey and bee-products acceptable countrywide.

10.2. Extraction Equipments

Synergies between equipment traders, parastatal such as the SIDO who administer manufacturing of equipment for bee-keepers provide an opportunity for the each collection centre with *extraction equipments* if the resources are available. Such equipments and bees-wax extractor can enhance quality and yield the bee-keepers association higher yields.

10.2. (b) Full Traceability Implementation

Traceability means the ability to trace and follow a food, feed, food-producing animal or substance intended to be, or expected to be incorporated into a food or feed, through all stages of production, processing and distribution; (EC resolution 178/2002 page 8 item 14) In the case of the *bee-chain*, this information process begins with the conformation of each beehive and its unique identification. The information

either generated manually or by the IT systems can enable the origin of honey raw produce to be known to the final consumer. The traceability is also a tool for the processes control that allows to determine all the variables associated to the elaboration of a certain product, and to take suitable remedial actions making the process more reliable. In order to implement a traceability system there will be information developed manually which are then amplified in the system of generation and control. A traceable registries of all the activities that are made in each one of the production stages, *bee—hive placements, harvests, Honey Extraction Room, segmentation of bi-products, sale, export and sale to the final consumer* need to be established. The rural Tanzania areas where bee-keepers are located are inconvenienced by lack of electricity which makes difficulty for installation of computerized traceability systems. However with renewable sources of energy like solar can be used for the purpose. Available *Trace-Software* as one used by *Apitrack* in Argentina and that one supplied by GS1 bar codes are useful but still expensive for one single farmer to develop.

10. 3. The Honey Banks

The experience has shown that bee-keepers desperately opt for honey smugglers who pay low prices due to lack of financial solution especially during harvests and where they have to solve their social-related crises and meeting the cost of production such as payment of school fees for their children and purchase of packaging materials respectively. For the later, the situation is tougher when the bee-keeper has harvested enough tons of honey (for instance 3-6 tons), they therefore need packaging materials which are expensive. As a result opt for a short-cut wholesale to the illegal (un-registered by authorities or MNRT) black market traders who smuggle honey to neighbor countries of Burundi, Uganda and Kenya. The honey banks in form of a savings and credit cooperative associations (SACCOs) will be registered by local authorities to collect shares from bee-keepers and a certain percentage of sales will be agreed to establish the fund and for

sustainability. Through the honey associations, it can be possible for beekeepers to collectively opt for technology for traceability and organic certification through Participatory Guarantee Systems (PGS) which are assurance based on internal quality “control” / co-responsibility system of a group or network of operators and interested parties in the production, distribution and consumption or use of the product or service (IFOAM 2007)

10.4. The Marketing Company

This is an inception for a company that will provide solutions for honey and other organic honey other perishable produce such as fruits and vegetables and horticulture products market facility. Tanzania had a parastatal company such as Genera Agricultural Products Export (GAPEX) which collapsed in the 1990s. Through the public-private partnerships and synergies with stakeholders this facility can be realized for an easy market access. Farmers will be able through such facility to participate in trade exhibitions for show casing their commodities and and agricultural produce. In case of honey, the national honey show has not done better. Agro-Expo is a more powerful company with experts coming from education institutions, private sector and donor community with representation of farmers associations.

Conclusion

The honey sector in Tanzania can contribute towards enabling the rural communities to chase away poverty. The solution for quality assurance, food safety in honey and traceability will also contribute to ecological, social and economic sustainability.