Oilseed Processing Technologies Adoption Survey - Case of Yenga Oil Press Technology in Southern Province of Zambia

The survey report was prepared for the Integrated Support to Sustainable Development and Food Security Programme (IP) in Food and Agriculture Organization of the United Nations (FAO) by Hamazakaza, Hamusimbi, Kadimba, Kapunda and Ndambo, Farming Systems Association of Zambia, January 2002

Executive Summary

Survey Objectives
The survey objectives included among other things the following:

- Carrying out of a comprehensive collaborating stakeholders appraisal in order to assess the effectiveness and efficiency of the Yenga oilpress technology transfer linkages.
- Assessing the appropriateness of the Yenga oilseed processing technology in meeting the needs of the resource poor women, men and youth farmers.
- Developing appropriate extension strategies for collaborating stakeholders on the Yenga oilpress technology transfer based on the constraints and impacts identified during the survey.
- Assist develop recommendations on conditions necessary for possible Yenga oilpress technology replication at both national and regional level.

Factors Considered
The Oilseed Processing Technology Survey assessed the effectiveness and efficiency of the Yenga Oilpress technology transfer linkages, technology appropriateness for smallholder farmer income generation and nutrition security, and sustainability of the promotion of engendered oilseed processing technologies among the resource poor farmers in Zambia.

Study Design
Adoption study involved the desktop study for review of project secondary data, structured field study among smallholder farmers and selected personal interviews with key personnel who were involved in the implementation of the project that included Government (MAFF), NGO (Africare) and private sector involved in the manufacturing of the Yenga Oilpress and marketing of oil seeds. Data collected was analyzed using SPSS and MS Excel and provided basis for statistical justification of field survey findings and recommendations.

Study Findings
Africare Oilseed Processing Project (AOPP) aimed at improving the nutrition and income levels for the ever-increasing numbers of rural Zambians, especially women through the establishment of a market driven rural on-farm oilseed processing industry stressing rural entrepreneurship.

Despite tremendous promotion and dissemination efforts of the technology, current status show withering adoption of what was initially a very popular enterprise. Stakeholders concerned have accrued suspicions on effectiveness of the existing technology transfer linkages.

It is this that the Adoption Survey of the Oilseed Processing Technology on Household Food and Nutrition Security was conducted to assist stakeholders in coming up with technology dissemination strategies necessary for sustainable Yenga oil press adoption and utilization at national and regional levels.

The Project concentrated on the development and dissemination of village level oil processing technologies to improve nutrition security and economic well being of mostly women headed households most vulnerable to food and nutrition security problems.
Sunflower growing belts and areas with critical potential in oilseed village processing were selected as project areas. Selection was done with the guidance of the Crop Diversification Project and the Red Cross.

Promotion and distribution of Yenga oil presses was done through on-farm demonstrations, farmer groups training and organized field days, focusing on technical aspects of press maintenance, seed processing and appropriateness of seed varieties, and an agronomic package for sunflower and other oilseeds production.

Collaborative promotions with other NGOs with established development structures were initiated. Private manufacturing companies were contracted to meet certain Yenga oilpress and spare part needs based on field performance tests and farmer preferences. The project also promoted a seed multiplication programme for improved farmer access to composite seeds.

There has been a general decline in the number of farmers acquiring the Yenga oilpress in Southern province following the phasing out of the Africare Oilseed Processing Project. About 70% of the farmers who do not own Yenga oil presses cited high Yenga purchasing prices while 29.8% cited lack of dealers in their respective areas where they can purchase Yenga presses as the limiting factors to owning Yenga presses.

Most Yenga oilpress sales to smallholder farmers in the province were done through Africare Oilseed Processing Project. Of the total number (424) of Yenga oilpresses sold in Southern province between 1992 - 1998 period, 56.4% were sold by the project office while 43.6% were sold through various marketing agents in the districts.

Marketing agents in the districts included; (1) Mazabuka Marketing Company in Mazabuka district; (2) ZATCO and Star Services in Monze; (3) ZATCO in Choma; (4) D.C.L and Elvina Enterprise in Kalomo and; (5) G.A.S in Livingstone.

About 55% of stopped using the oil presses due to low sunflower yields resulting into non-availability of sunflower seed for oil extraction while 36.4% indicated that their presses had broken down and lacked spare parts to repair them whereas. About 9% of the farmers sold off their Yenga oil presses after failing to make money out of the oilseed processing business.

The two major oilseed crops grown in Southern province include sunflower and groundnuts. Groundnuts are only used to a lesser extent for oil extraction. Farmers are financially better off selling groundnuts as seed grains as opposed to processing and marketing by-products.

Production estimates indicate a marginal downward trend in area and production of Sunflower in Southern province over the six-year period from 1992 to 1998 while the area and production of Groundnut have gone up by 120% (to 215,528 ha) and 60% (to 625 mt) respectively during the same period.

Sources of sunflower seed in the study area include commercial seed marketing companies outlets and agents found in major towns, and non-governmental organizations like PAM (SHAPES), Africare, and Care International, WVI and many other.

Most farmers opted for open pollinated sunflower varieties whose seed could easily be recycled by small-scale farmers without losing significantly in both grain and oil yields for some time. Record seed variety was preferred by most farmers because of its high oil yield (an average of 15 bottles x 750ml for a 50kg bag) and softness of the seed when crushing. Non-availability of sunflower seed locally (49.2%) and high prices of sunflower seed (8.5%) are the major problems farmers are facing when acquiring seed.
Farmers have diversified target oilseeds covering, new crops like sesame and pumpkin/squash seeds. Farmers however, face problem when extracting the new oilseeds due to poor adaptability of the present model of Yenga oil press to these crop seeds newly included on the crushing list.

Majority of the Yenga press owners (38.9%) crush on average one bag of sunflower per day. About 15% of the farmers crush at least two bags of sunflower daily while 5.5% and 1.5% of the farmers crush three and four bags of sunflower per day respectively. The average yield of cake per bag was estimated at 37 kilograms. Average production period is 6 months.

Most of the oil extracted (87.0%) is sold on both local markets and in nearest towns. About 9% of the oil extracted is retained for home consumption. Despite the high market potential for other extracted oil products like home made soap and jelly, farmers expressed ignorance on how to make such products.

Price determination is based on prevailing market price (30.0%), production costs (4.6%). Average price of a 750ml bottle of Yenga extracted cooking oil is ZMK2, 958 on average translating into ZMK44, 370 per 50kg bag of sunflower. Most of the sunflower cake realized is used for livestock feeding. However, only 21.5% of the farmers in oil extraction business were trained on livestock feed formulation by the Small-scale Oilseed Processing Project.

Major costs attributable to the Yenga oil press processing technology are classified as Technology Promotion costs, Entrepreneurship training costs, Yenga Press and Seed Distribution and Adoption costs.

The promotion of the Yenga oil press has contributed to enhanced demand for improved cultivars of sunflower seed, effective demand for Yenga presses and enhanced national and regional stakeholder collaboration. The technology has also assisted in narrowing the cooking oil deficit gap in the country.

At household (micro) level the technology has impacted positively on the lives of the beneficiaries at two levels; (1) the Yenga press owners through income and improved nutrition and; (2) the consumers through improvement in nutritional status and affordable sources of cooking oil.

Cost benefit analysis reveals that the Yenga press business is still a profitable undertaking. At the current level of operation it is possible for an entrepreneur to net K1, 314 400 (US$355) in 6 months.

A cost benefit ratio of 0.5 is thus possible given the current level of output and the prevailing prices. For every Kwacha invested in the business there is a corresponding return of half a Kwacha. The ratio can be much more if the entrepreneurs increase their level of output. The assumption in the analysis is that the majority are operating for only 20 days.

The return to labor is 0.64 indicating that for every Kwacha invested in the business there is a corresponding return of a K0.64. This is still attractive considering the fact that the opportunity cost of labour at the time when the Yenga press is fully utilized is off-season and that no competing enterprises were identified at the time of this study.

Efficiency could be attained to the fullest if farmers and Yenga press owners can increase their production of sunflower and by increasing the economies of scale and a vigorous search of an outside market away from the local areas.

Despite efforts made by the project in establishing institutional linkages for an enhanced Yenga oil press technology promotion and transfer, the existing linkages between the technology generation and transfer are not sufficient and effective enough to sustainably promote and transfer the oilseed processing technology among smallholder farmers.
The project placed special emphasis on encouraging women farmers and women clubs participation, as most vulnerable households to food and nutrition security problems in rural areas.

No serious cultural beliefs affected the promotion of the technology apart from isolated incidences of poor quality oil produced by some of the farmers (black, with a bad odor), which partially affected customer confidence and preferences.

Yenga Oil Press Technology has minimal negative effect/impacts on the environment with respect to deforestation and soil degradation.

The major problems threatening sustainability of the Oilseed Processing Technology include: (1) lack of human and institutional capacity by collaborating stakeholders to continue the technology promotion beyond project period; (2) lack of adequate sunflower seed for crushing due to poor yields; (3) poor Yenga spare parts back up; (4) lack of start up capital requirements for establishing oilseed processing enterprise and; (5) lack of leadership qualities and poor accountability among farmer clubs.

**Conclusions**

Promotion of the Yenga oil press has contributed to enhanced income and improved nutrition to the Yenga press owners and affordable sources of cooking oil for the local consumers at household level. There was also increased demand for improved cultivars of sunflower seed, Yenga presses and enhanced national and regional stakeholder collaboration. The technology assisted in narrowing the cooking oil deficit gap in the country.

Cost benefit analysis reveals that the Yenga press business is still a profitable undertaking with a possibility of an entrepreneur netting K1, 314 400 (US$355) in 6 months. A cost benefit ratio of 0.5 is achievable at the current level of output and the prevailing prices. For every Kwacha invested in the business there is a corresponding return of half a Kwacha. The return to labor (0.64) indicates that for every Kwacha invested in the business there is a corresponding return of a K0.64.

Efficiency could be attained to the fullest if farmers and Yenga press owners increased sunflower production and sunflower the economies of scale and a vigorous search of an outside market away from the local areas.

Despite efforts made by the project in establishing institutional linkages for an enhanced Yenga oil press technology promotion and transfer, the existing linkages between the technology generation and transfer are not sufficient and effective enough to sustainably promote and transfer the oilseed processing technology among smallholder farmers.

The project operation placed special emphasis on encouraging women participation and had no serious cultural beliefs, which affected the promotion of the technology. There was minimal if all any significant negative impacts on the environment with respect to deforestation and soil degradation.

Sustainability of the project is threatened by lack of human and institutional capacity for technology development, lack of adequate sunflower seed for crushing, poor spare parts back up, lack of start up capital required Yenga Oilseed Processing, lack leadership skills and poor accountability among farmer clubs members.

There is need to come up with technology dissemination strategies necessary for sustainable Yenga oilpress replication at both national and regional level for enhanced economic well-being and nutrition security of resource poor smallholder farmers. There is need to strengthen human and institutional capacity in promoting technologies like Yenga Oilpress processing if Zambian small-scale agriculture is to rise above subsistence levels and assume a business orientation.
Recommendations
For enhanced/sustainable up take and utilization of Yenga oil processing technology among smallholder farmers in peri-urban and rural areas at both national and regional levels, there is need to create conducive conditions for establishing the Oilseed Processing Business. Based on the adoption survey results and the stakeholder consultative/feedback workshop the following are the recommendations made for improved and sustainable Oilseed Processing Technologies in Zambia and to some extent the sub-Saharan region.

Seed Supply
In order to minimize the problems of non availability of sunflower and other oil crop seeds among smallholder farmers, there is need to; (1) establish seed banks in rural areas among smallholder farmers through on-farm oilseed multiplication and farmer training in oilseed production; (2) promotion of open pollinated oilseed varieties among smallholder farmers and; (3) strong collaboration and operationalization of links between the oilseed processing promoters and the Oilseed Research Team of the Soils and Crops Research Branch of MAFF for the development of improved/high yielding, diseases and pests resistant varieties. There should also be deliberate efforts to encourage local oilseed dealership among smallholder farmers. A lot can be learnt from the Oilseed on-farm multiplication scheme in Siavonga where oilseed multiplication is currently doing fine. A comprehensive Seed Needs Assessment for oilseeds in all target areas should be conducted.

Yenga Oil Press Acquisition and Accessories Back-up Services
For easy and affordable Yenga press acquisition and smooth accessory back-up services, manufacturers and promoters must establish local outlets (through sales agents) in high potential areas at district levels. Farmers can easily purchase their Yenga presses and accessories in nearest towns.

Standardization of Yenga presses and accessories and promotion of local artisans for service back-ups will assist easy the problems on unaffordable and non-available spare parts for Yenga press owners. Acquisition of Yenga presses could be made more affordable to farmers through establishment of Hire purchase schemes for able eligible smallholder farmers. Manufactures and promoters must also encourage production of training manuals on maintenance and repairs for each and every oil press model. Feedback mechanisms on oil press performance between manufacturers and users should be maintained to assist in fine-tuning the oil press efficiency.

Oil and Seed Cake Marketing
In view of the dwindling cooking oil market prices as a result of cheaper cooking oil from other countries, there is need Yenga press owner and promoters to embark on Yenga extracted oil/product development and promotion among local consumers. There is immediate need to train farmer in the oilseed processing business, improved aspects of labeling, packaging and product storage. This should be supplemented by education/information tips on nutritional factors of Yenga pressed cooking oil comparatively to industrial produced cooking oils. There is need for improved processing for improved oil quality. The Integrated Support to Sustainable Development Programme and Food Security Programme (IP) could assist on these aspects.

Knowledge of market and consumer trends is very vital for the oil producers if they are to keep themselves in business. As such there is need for national and regional edible oil market surveys. This will assist in knowing the area specific consumer demands and preferences. Market research must be a pre-requisite for establishing oilseed-processing business at both the farmer level and promoter level. There is also need to diversify in the oilseed product range to include; (1) essential oil extraction and; (2) peanut butter production. Rural farmers must consider exploring and exploiting outside markets for their Yenga pressed oil.

National and Regional Oilseed Processing Technology Replication
For sustainable national and regional replication of the oilseed processing technology, there is need to document and disseminate the field survey findings highlighting the lessons learnt. This will assist in fine-
tuning the technology promotion and application strategies and make them more adaptive among the manufacturers, promoters and end users.

There is need to conduct regular market surveys for oilseed products and seed needs assessments to help determine the economical oilseed production and expected processing levels.

There is still need for capacity building through training on promising technologies and extension methodologies for grass root and broad based institutions involved in promotion of on-farm processing technologies as a way of adding value to smallholder farmers produce.

Following the Oilseed Processing Technologies Adoption survey, there is need to disseminate the survey results and publish conditions and recommendations necessary for establishing Oilseed Processing Business among Rural and Peri-urban Entrepreneurs.