



A STUDY ON CASSAVA PROMOTION IN ZAMBIA

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**For
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Utilisation**

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1. Executive Summary

1. Background

Cassava production in Zambia has grown rapidly in the past decade, particularly in northern zones (AEZ 3) where it is the principal food staple. Elsewhere, in AEZ 1 and 2 where maize is the current staple, cassava production holds significant potential to improve drought year and lean season food security for vulnerable households. Yet in spite of considerable resources spent to promote cassava production there, these potential gains have not yet materialized. Lessons from the past decade of promotion efforts suggest lessons for improving cassava expansion efforts in the future.

2. Past promotion strategies

In AEZ3, where cassava is the principal food staple, promotion efforts have centred on two main activities: a) long-term investments in cassava research which have resulted in the release of two waves of improved varieties, 3 in 1993 and 4 in 2000; b) distribution of planting material for these improved varieties. Because yields of the new varieties roughly triple those of traditional varieties, farmers have adopted the new varieties rapidly from seed multiplications sites and subsequently through farmer-to-farmer distribution of improved cuttings. As a result, production has grown rapidly (at a compound rate of 9% per year over the past decade) in the northern provinces. Future growth of cassava in this zone is constrained by a) limited commercial markets for additional production and b) the collapse of the government cassava breeding program and consequent failure to develop a future pipeline of new varieties that will be essential in maintaining yields in the face of constantly evolving disease and pests.

In the primarily maize-consuming zones (AEZ 1 and 2), the great bulk of promotion efforts and resources have focused on distribution of cassava cuttings to food-insecure households for their subsistence consumption. With a few notable exceptions, these efforts have largely failed to establish cassava as a significant food security crop in this zone. Mainly late delivery of planting material, failure to distinguish varieties and limited on-farm extension support have resulted in planting of only about 20% of distributed material. Today, probably less than 0.3% of the 600,000 farmers who received cuttings are still growing cassava.

3. Future priorities.

In both zones, priority for future cassava development should focus on: a) building commercial markets for cassava and b) reviving cassava research necessary to sustain future production gains. Market development will need to focus on both commercial trade and upstream industrial processing industries (for prepared convenience foods, livestock feed and industrial starch) which benefits from low-cost cassava starch. Establishment of standards will be essential if cassava markets are to expand and efficiently supply required materials to processing industries. Some testing and research on processing characteristics of local varieties will also be necessary in establishing feed rations and industrial processing of starch. In AEZ 3, processing industries may include both convenience foods for human consumption as well as livestock feeds and industrial starches. In AEZ 1 and 2, commercial processing will most profitably focus on livestock feed and industrial starches. As commercial markets expand, they will motivate farmers to increase cassava production as a cash crop. The availability of Zambia's new cassava varieties has made significant farm production increases possible. Expanded cassava markets and commercial incentives are necessary to elicit that production response. As production and markets grow in AEZ 1 and 2, household food security will improve in both drought years and in the lean season.

Table 1 Summary of main findings and recommendations

| | Input provision | Production & on-farm processing | Trade | Processing | Marketing |
|------------------------|---|--|---|---|--|
| Opportunities | <ul style="list-style-type: none"> • appropriate varieties available • Available resources (land and human) | <ul style="list-style-type: none"> • large potential for production all over the country • processing technology is developed | <ul style="list-style-type: none"> • existing trade network to Soweto market • Potential trade within the region (SADC) abroad. | <ul style="list-style-type: none"> • Technology is available in Zambia or the region (West-Africa, Uganda...) | <ul style="list-style-type: none"> • Growing interest in Cassava as a substitute in animal feed, human food / beverage and also construction industry |
| Risks | <ul style="list-style-type: none"> • Pests and diseases outbreak • Loss of parent planting material Brain drain from research | <ul style="list-style-type: none"> • spread of diseases with increased production using uncertified varieties • HIV-Aids pandemic | <ul style="list-style-type: none"> • unscrupulous trades disadvantage producers and consumers through inflated prices | <ul style="list-style-type: none"> • Cassava toxicity if not properly processed • Short shelf life if not processed | <ul style="list-style-type: none"> • Poor cassava production statistics • Cassava gluts with no market |
| Limitations | <ul style="list-style-type: none"> • Number of cassava varieties for different AEZs • Quantity of improved variety planting material limited • Dissemination of extension information • Poor staffing in extension & research | <ul style="list-style-type: none"> • Low price for Cassava in remote areas → lack of incentive to grow • Limited access to technology in remote areas • No local capacity to built & repair machinery | <ul style="list-style-type: none"> • High cost of transportation → bulky crop even when processed • FRA buys only small quantities | <ul style="list-style-type: none"> • High fluctuation of amount of and price for Cassava on the market • Markets not well developed / organised | <ul style="list-style-type: none"> • Lack of standards and grades • Low cassava quality from farmers |
| Challenges | <ul style="list-style-type: none"> • local / farm level production of planting material | <ul style="list-style-type: none"> • low yields due to inappropriate agronomic practices • insufficient on-farm processing | <ul style="list-style-type: none"> • trade is mostly uncoordinated → no organised markets in the industry • poor information on supply and demand | <ul style="list-style-type: none"> • Local production of processing equipment | <ul style="list-style-type: none"> • Continuous supply of raw material • Price fluctuations • Quality standards |
| Recommendations | <ul style="list-style-type: none"> • Setting up of village seed / stick multiplication system | <ul style="list-style-type: none"> • Better inclusion of Cassava in MACO extension service | <ul style="list-style-type: none"> • Establish database of actual production base (supply) and demand from industry | | |

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Consultant

1.2. Acronyms and abbreviations

| | |
|---------|--|
| AEZ | Agro-ecological zone |
| CEO | Camp Extension Officer |
| CFU | Conservation Farming Unit |
| CLUSA | Cooperative League of the United States of America |
| DACO | District Agriculture Coordinator |
| DRP | Drought Rehabilitation Programme |
| FAO | Food and Agriculture Organisation of the United Nations |
| FRA | Food Reserve Agency |
| GTZ | Germany Agency for Technical Cooperation |
| HCN | Hydrogen cyanide |
| JICA | Japanese International Cooperation Agency |
| LLFSP | Luapula Livelihood and Food Security Project |
| MACO | Ministry of Agriculture and Cooperatives |
| MAFF | Ministry of Agriculture Food and Fisheries |
| MATEP | Market Access, Trade and Enabling Policies Project |
| MBT | Micro Bankers Trust |
| MDSP | Multiplication and Distribution of Improved Seed and Planting Material |
| MFI | Micro Financing Institutions |
| MT | Metric Tonnes |
| NGO | Non Governmental Organisation |
| NRDC | Natural Resources Development College |
| PAM | Programme Against Malnutrition |
| RTIP | Root and Tuber Improvement Programme |
| SADC | Southern Africa Development Community |
| SARRNET | Southern Africa Root Crops Research Network |
| SCRB | Soils and Crops Research Branch |
| SHAPES | Smallholder Access to Processing, Extension and Seed |
| SHEMP | Smallholder Enterprise and Marketing Programme |
| SIDA | Swedish International Development Agency |
| UNDP | United Nations Development Programme |
| UNZA | University of Zambia |
| WVI | World Vision International |
| ZARI | Zambia Agriculture Research Institute |
| ZBS | Zambia Bureau of Standards |

2. Introduction

It is estimated that 30% of the Zambian population depends on cassava as a major staple food. The population that depends on cassava is increasing every year due to the escalating production cost of the tradition staple, maize, as well as the increase in drought incidence.

Table 2 presents the contribution of cassava to the country's food basket in 2002 consumption year. Out of a total of 2733 metric tons food requirement, cassava contributed 35% and 2% for sweetpotato. A combination of sweetpotato and cassava accounted for almost 37% of the total food consumption requirement of the country.

A majority of the country's population depending on cassava as a staple food, is largely from Region III (Northern, Luapula, Copperbelt, Northwestern) and Western provinces. The rest of the country, including Copperbelt and Lusaka provinces, cassava is largely eaten as a snack in roasted form together with roasted groundnuts. Although the national statistics is scant and unreliable, there is an increase in number of cassava consumers on the Copperbelt and Lusaka; mixing cassava and maize flour when cooking nshima, the country's staple dish (SARRNET, 1999).

They further indicated an increase (40%) in cassava production of 682, 000 MT in 1991 to 950,000 MT in 2001 with an average yield of 6t/ha. However, these figures could have been grossly underestimated since both the hectareage under production and total production of root crops showed sharp increase in 1990 due to recurring droughts during that season, accelerating cassava production in favour of maize because of its relative drought tolerance. Secondly, the erosion of smallholder farmer capital base caused by drought recurring and animal diseases, coupled with the deterioration of the country's economy made the fertilizer unaffordable for small scale farmers.

Table 2 Projected annual balance sheet for 2002 consumption year (MT dry weight)

| | Maize | Cassava | Wheat | Sorghum & Millet | Sweet potato |
|-----------------------------|-------|---------|-------|------------------|--------------|
| A. Opening stock | 630 | | | | |
| B. Production | 602 | 950 | 75 | 54 | 53 |
| C. Total availability (A+B) | 1232 | 950 | 75 | 54 | 53 |
| D. Staple food requirement | | | | | |
| (1) Human consumption | 1384 | 902 | 145 | 14 | 48 |
| (2) Stock feed | 40 | | | 3 | |
| (3) Seed | 22 | | 1 | 1 | |
| (4) Export/trade | 5 | | 4 | | |
| (5) Losses | 81 | 48 | 3 | 27 | 5 |
| Total requirement | 1532 | 950 | 153 | 45 | 53 |
| E. Surplus /deficit (-) | -300 | 0 | -78 | 9 | 0 |

Source: FAO 2002

2.1. Background

2.1.1. Planting materials

The main source of improved cassava planting material is from the Research stations in the Luapula and Northwestern provinces (Mansa and Mutanda). However, some farmers have been involved in multiplication of these materials and sell to NGOs. In some provinces such as Northwestern, Northern, Southern and Western provinces, ZAMSEED's Multiplication of Improved Seed and Planting Material Project (MDSP) was actively involved in multiplication of the material. In turn, these farmers were selling the planting material to the public.

Traditionally, farmers in villages share or pass the planting material to each other as a way of distributing the material.

Multiplication and distribution of improved cassava varieties by research stations has been limited by the resources and needs external support. However, in non cassava producing provinces (Southern, Central and Eastern) it was mainly the NGOs (PAM, World Vision etc) who used to buy cassava planting material from the research stations and distributed it to those areas but suffered massive losses due to long distances and poor handling in transit.

2.1.2. Cassava input requirements and its merits

Cassava production in Zambia is gaining popularity because of its low requirement of fertilizer and grows on a wide range of soil types with high yields on marginal and poor soils. The crop is tolerant to common pests and diseases. It has low labour requirements, stores well in the soil, produces more energy per unit area compared to cereals. Cassava is compatible with many intercropping systems practised by most of the small scale farmers in the country. It is the raw material for a lot of domestic and industry products and all the parts of the plant are useful for utilisation and consumption (roots, stems and leaves).

2.1.3. Cassava market chain

The market chain for cassava may be classified into two forms depending on the type in which the product is sold to the final consumer (SARRNET, 1999). The first channel is in fresh form commonly practised within the production areas. The second channel is in processed products (chips and flour). The distance for fresh cassava to the market should be short since cassava has a short shelf life. Processed cassava consists of dried chips or flour in which form it is storable and can be transported on long distances. However, even in the processed form cassava is a bulky commodity and its transport is costly.

2.1.4. Market information

Market information is a critical component for the survival of any enterprise. The government in particular has a crucial role to play in ensuring that marketing information is readily available to the farmers. However, a majority of traders get market information from friends, relatives, business colleagues and own observations not from any government agency or institution. The relevance to cassava has to come out stronger. There is virtually no cassava market information available. This limits the utilisation of cassava in the industry.

2.1.5. Consumer profile

Surveys earlier conducted by SARRNET (1999) indicated a large number of processed cassava buyers come from low income and have below college level education.

2.1.6. Processing and storage

Cassava is generally processed into flour for nshima, scones or munkoyo. Dried cassava is also toasted and eaten as a convenience food. Processing of cassava is time consuming and difficult due to lack of proper equipments. Cassava flour is usually stored before consumption. In urban areas since the quantity purchased from the market is small, the flour may be stored for few days compared to rural areas where it is in larger quantities. Storage may be more crucial during the rainy season (December to March) due to the cloudy weather condition for drying. Hence most of what has to be consumed during the rainy season should be processed and stored before the on-set of the rainy season. Loss of quality in the product due to rotting and breaking is the major problem.

2.1.7. Cassava traders

A trader is referred to that player selling cassava to either consumer or other traders who ultimately sell to consumers. In Soweto market, most the traders are men aged in the range of 26 to 45 years. This may be due to the physical strength required to travel around the country lifting these bags and loading them on to the trucks when transporting to the market. Women are usually found at local markets in the townships where they sell small quantities of the commodity.

2.1.8. Mode of transportation

Buses and trucks are commonly used for long distance haulage of cassava. In case of short distances, bicycles and manually carrying bags on the head are the most common modes of transportation. Three years ago, the cost of transporting a 50kg bag of cassava chips over an average distance of 279 km was around US\$0.38 (SARRNET, 1999).

2.2. Objective

Cassava offers considerable potential to contribute to house hold food security and income generation among Zambian small holder farming community through commercialisation and industrial utilisation. Despite past effort to promote cassava in the drought prone regions of central and southern parts of Zambia, the crop has not enjoyed the anticipated popularity. However, cassava is traditionally grown in northern and spreading to the east of the country. Nevertheless, its utilisation seems to be restricted to the household level. Widespread and strong commercialisation of the crop has not yet taken off despite existing potential and effort by various players.

In order to accelerate the utilisation of cassava in Zambia, a Task Force has been formed. The Task Force aims at developing a comprehensive Road Map starting from supply of appropriate planting materials, production at smallholder level and on-farm processing to developing linkages between smallholder producers and the livestock feed industry as well as food industry

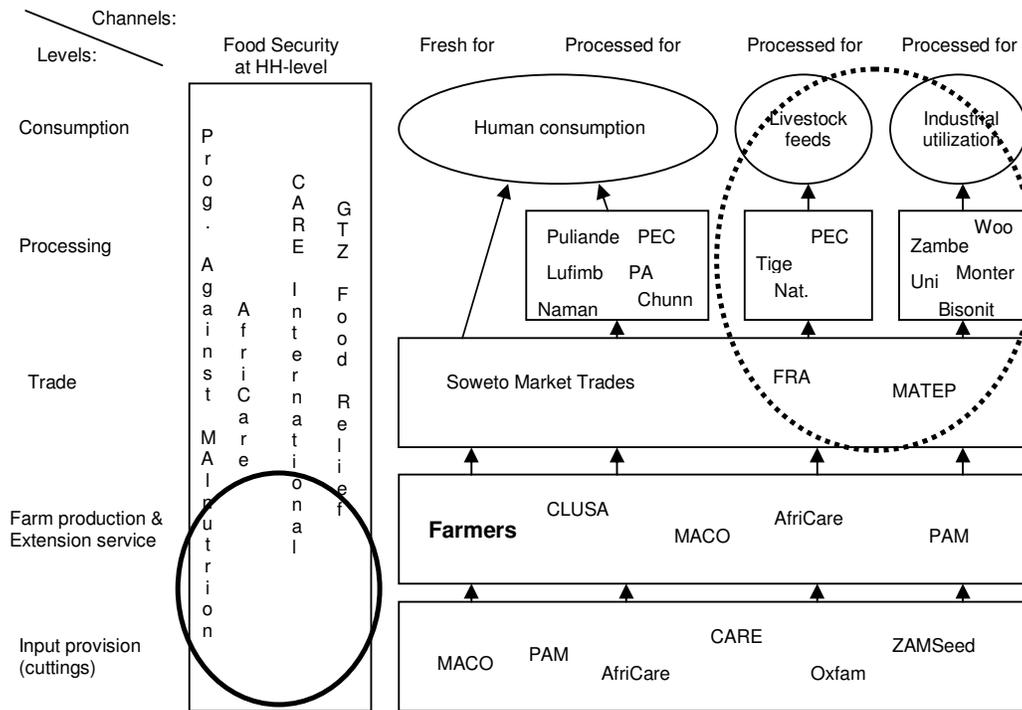
The overall objective of the Task Force is to develop a comprehensive Road Map for the Acceleration of Cassava Utilisation (ACU) in Zambia. The specific objective of this consultancy is to contribute to the overall objective by establishing a baseline of past cassava promotion interventions in various parts of the country, their adopted approach, their successes/failures and experienced constraints.

3. Methodology of the study

The study aims at understanding the whole chain of cassava production at all stages from production to the final product in all parts of the country where cassava is being produced. This mainly refers to the country agro-ecological zones (AEZ) of Zambia, Zones I, II and III.

However, most of the information reported in this study was collected from public and private sector players interviewed in Lusaka. Figure 1 illustrates the cassava value chain and the presence of stakeholders in each step.

Figure 1 Overview of stakeholders in the Cassava value chain



Note: The solid circle indicates areas of past promotion efforts with limited success in AEZ region 1 & 2. The dotted circle indicates areas for future focus to stimulate commercial incentives for increased farm production.

Along the chain of interventions, different key players who have been involved at various stages of the process were identified. Three areas of intervention were identified as, first, cassava production. For many years, the Research Branch of the Ministry of Agriculture has been developing improved cassava varieties. These were later multiplied and distributed to the farmers. The question asked is how far these materials have spread to increase cassava production in the country. How much of the cultural practice technologies have reached the farmers along with the new improved varieties available.

The second area is the public promotion of processing and trade. Cassava tuberous roots have a short shelf life, hence need for processing and adding value to the product. Because of the high content of hydrogen cyanide (HCN) in cassava, there is need for processing the product before can be utilized for HH food security consumption.

Thirdly, the responsibility of processing and trade for industrial utilisation could be intervened by interested private sectors investing into business.

All these need to be identified and linked up to the chain of cassava production, processing and marketing.

Following these concepts, a questionnaire for each of the above mentioned section was drawn as shown in Appendix 3 at the back of the report.

In addition to the information collected during the interviews, reports and publications from different organisations were collected, reviewed and analysed. The collection of information for the study could have been extended to rural provinces where cassava is a major crop, but this was not feasible due to limited time of the study and logistics.

4. Findings of the study

The presentation of the study findings will follow the value or processing chain of Cassava. In each chapter on a particular step in the value chain the actors from the public and the private sector are introduced according to their agro-ecological regional focus. A general overview on the involvement of main stakeholders along the various Cassava value chains is given in Appendix 3.

4.1. Provision of Cassava planting material (Cuttings)

4.1.1. Cuttings in AEZ 1 & 2

Table 3 summarises the inventory of the public sector players involved in promotion of production and provision of cassava planting material in agro-ecological zones 1&2 during the past five years.

Table 3 Inventory of public sectors that intervened in the production and distribution of cassava planting material (cuttings)

| Name of Institution | Year of intervention | Interventions | Objective | Provinces of intervention |
|---------------------|----------------------|---|---|---------------------------|
| PAM | 2000 - 2004 | -seed multiplication -processing /storage -crop diversification | -improve seed multiplication -promote improved processing technologies | S, E, C, W. & Lsk |
| CARE Int. / FAO | 2000-2008 | -food security -market linkages | -improve food security in drought prone areas | S and W |
| AFRI-CARE/ FAO | 2003 - 2005 | -seed multiplication | -promotion of crop diversification in drought prone areas | S |
| OXFAM | 2003 – 2005 | -crop diversification. | -improve food security in drought prone areas | S & W |
| CLUSA/ PROFIT | 2002/03 | -seed multiplication | -food security -income generation | C/b, C, L, W & S |

Note: Under the province column, S-Southern, E-Eastern, L-Luapula, C-Central, W-Western, N-Northern, C/b-Copperbelt and Lsk-Lusaka

4.1.1.1 Public sector

Programme Against Malnutrition (PAM)

PAM implemented the Drought Rehabilitation Programme (DRP) between 1995 to 2000 following recurrent droughts that affected food security in the country. The objective of PAM at that time was to rehabilitate productive farmer's productive capacity whose assets were destroyed by recurrent droughts and floods through informal seed supply.

Later in 2000, PAM formed the Small Holder Access to Processing, Extension and Seeds Project (SHAPES). SHAPES' overall objective was to encourage smallholder farmers to increasingly cultivate food security crops in selected districts.

Table 4 Distribution of cassava planting material by PAM & EDRP to promote production

| | 2000 | 2001 | 2002 | 2003 | Total |
|-----------------------------|------------|-----------|------------|-----------|------------|
| No. of distributed cuttings | 7,770,300 | 9,664,503 | 17,892,472 | 7,878,120 | 43,205,395 |
| No. of households targeted | - | - | - | - | |
| No. of cuttings /household | - | - | - | - | - |
| Varieties | Improved | Improved | Improved | Improved | |
| Certified | Certified. | Cert. | Cert. | Cert. | |
| Month distributed | Dec. | Dec | Dec | Dec. | |

PAM/SHAPES played a major role in the promotion of cassava in Regions I and II during the lifespan of the project. Between 2000 and 2004, PAM alone distributed a total of 43,205,395 cassava cuttings in the country (Table 4). The largest consignment being that of 2002/2003 constituting 17,892,472 cuttings followed by 2001/02 with 9,664,503 cuttings. If all that material would have been established, PAM could have been proudly claiming to have assisted the farmers establishing a total cassava area of 4,321 ha in the country.

PAM has promoted cultivation of cassava in drought prone provinces as a complementary crop in case of maize failure during that particular rainy season.

Due to fears of cassava poisoning from high hydrogen cyanide content in some of the varieties, the strategy used for cassava distribution was based on distributing sweet varieties in non –cassava growing areas and bitter but high yielding varieties in cassava growing areas (SHAPES Annual report,2000/2001).

In 1997, PAM and CARE International supplied drought tolerant crops like sorghum, millet and cassava in Southern province and began promoting their cultivation and utilization through MACO's Extension Services. In terms of adoption, cassava ranked least among these crops in the three districts of Gwembe, Choma and Namwala. The reasons cited for this was the poor extension services and lack of coordination among stakeholders (Hamazakaza and Mwanza, 2002).

A study carried out in Kazungula district of Southern provinces shows that, despite all these cassava planting material distributed by PAM to the district, the households interviewed (85%) consider the amount of cuttings received not adequate. Only 15% said they had received adequate amount of cuttings (Zulu 2004).

He further indicated that the amount of cassava distributed by PAM to the district had been declining since 2002/03. However, CARE steadily increased the amount distributed over the same period.

PAM's objective was to have 600,000 farmers grow the crop by 2003/04. This was on assumption that each beneficiary would pass some cuttings (equal to the amount of cuttings received from the organisation) to next generation of beneficiaries after harvesting. However, the problem of cuttings received late (January) compounded by pest problem undermined the program (Zulu, 2004). Only a cumulative total of 1,883 households received cuttings during the life span of the project, representing 0.3% of the project target.

At Kazungula, termites, cassava mealy bug and scale insects are reported to be the major pests of the crop affecting the crop during the dry spells and dry season (Zulu, 2004). In addition to the pest, the farmers experience severe problem of goats and cattle grazing and trampling the crop.

The failure by PAM to reach the target of 600,000 farmers by 2003/04 season supports the farmer's view that the amount of cuttings distributed was not enough. This could be attributed

to the fact that most of the cuttings arrived in a dried state due the long distance between Kazungula and Mansa or Solwezi where most of the materials were procured (Zulu, 2004).

The seriousness of the pest and animals implies that farmers are not able to retain enough planting material for the following season and have to acquire more planting materials from the concerned organisations each season.

Although Zulu's study covered a small area where PAM was operating, the study was very detailed allowing extrapolation to other PAM's catchment areas and thus depicting a true picture of constraints in cassava planting material distribution has undergone in the field.

CARE International/FAO

The two organisations are working in partnership in parts of Southern and Western provinces with the objective of improving food security, agricultural inputs for commodity assets and market linkages. During the 2004/2005 season, CARE's focus was on cereals (sorghum and millet), legumes (groundnuts) and root crops (cassava and sweetpotato).

Table 5 Distribution of cassava planting material by CARE International to promote production

| | 2000 | 2001 | 2002 | 2003 | Total |
|-----------------------------|------|-----------|-----------|-----------|-----------|
| No. of distributed cuttings | - | 1,200,000 | 500,000 | 300,000 | 2,000,000 |
| No. of households targeted | - | 10,000 | 1,000 | 1,500 | 12,500 |
| No. of cuttings /household | - | 120 | 500 | 200 | 820 |
| Varieties | - | Improved | Improved | Improved | |
| Certified | - | certified | certified | Certified | |
| Month distributed | - | Nov-April | Nov-April | Nov-April | |

Table 5 above summarises the contribution CARE and FAO have made in Southern and Western provinces. A total of 2 million cuttings were distributed to 12,500 farmers. Most of the planting materials were procured from either the seed growers or sourced from the Research stations. Therefore the seed material was of improved cassava varieties.

In both Southern and Western provinces, the farmers growing cassava as a food security crop are reported to be much better off than their counterparts without cassava in the cropping system (Douglas Mwasi personal communication). Some of the farmers were reported to have more cassava planting material that did not have a market.

CARE Int. has tried to procure and distribute the cassava planting materials on time to their farmers. However, they have been limited due to variation in time of planting. For example, Sesheke plants cassava throughout the year therefore cassava planting material had to be delivered before the rainy season as requested by those farmers.

Sinazongwe/Siavonga farmers prefer to plant their crop when it is dry and hot, leading to heavy losses due to termite damage during that time.

At Kalomo and Kazungula, the farmers have reported to CARE that if the crop is planted in November to January, it does not establish because at that time the cuttings are dormant. They therefore prefer to plant cassava towards the end of the rainy season (March or April).

Apparently, CARE has also tried to follow the same distribution programme as requested by the farmers. CARE is seeking for Zambia Agriculture Research Institute's (ZARI) intervention when they are conducting training courses for both extension staff and farmers.

Except for cassava planting materials received from MDSP farmers (Mbole Cooperative), the planting materials from DACO's office were of mixed varieties, of which the receiving farmers complained since they wanted pure improved cassava varieties.

CARE/FAO project had procured 70,000 cuttings that could have been planted on 7.0 ha. From that, 5.5 ha .were actually planted with a loss of 21.4%.The actual final establishment was 4.6 ha. One farmer's field was reported having completely failed to establish due to long dry spells, termite and livestock damage at Siavonga district.

Like the case of PAM, the problem of planting material losses in Southern province is surfacing not only with planting materials coming from long distances but also from local nurseries.

Because of the long distance of haulage (500-1300 km) of planting materials often under intensive hot weather (October/November), coupled with poor packaging and poor transit storage, only 20-40% of the shipped cassava cutting and sweet potato vines finally got planted by Region 1 farmers. The transported planting materials arrived in withered, dried or fermented state. Out of this surviving material (20-40%), only 10-20% of the planted material survived attacks from termites and domestic animals - goats, pigs and cattle (JICA, 2003).

Challenges/Constraints

Despite the losses due to late planting, termite and livestock damage, farmers are still determined to continue and improve on their nursery management and cassava production.

Extension information on cassava cultural practices and other related areas in promotion of the crop is not flowing between the extension services and the farmer.

There is no close link between CARE Int. and relevant institutions to address some of the farmers' problems. For example, the case of termite damage needs the attention of ZARI experts, similarly since cassava production is increasing in the province, there is need to link up with others for cassava processing and promotion.

AFRICARE/FAO

Like CARE Int., Africare works in partnership with FAO addressing the problem of poor availability of seed input to the small scale farmers of Southern province; caused by previous droughts and support them by expanding the cropping area under cassava through establishment of cassava nurseries. The aim of Africare was to enhance household food security in the drought prone areas of Southern Province by assisting farmers to grow cassava in addition to the staple crop, maize.

Table 6 Distribution of cassava planting material by AFRICARE/FAO to promote production

| | 2000 | 2001 | 2002 | 2003 | Total |
|-----------------------------|------|------|------|-----------|--------|
| No. of distributed cuttings | - | - | - | 88,875 | 88,875 |
| No. of households targeted | - | - | - | 22 | 22 |
| No. of cuttings /household | - | - | - | 4040 | 4040 |
| Varieties | - | - | - | Improved | |
| Certified | - | - | - | Certified | |
| Month distributed | - | - | - | Nov/Dec | |

Within the areas of Africare/FAO operation (Namwala, Siavonga, Sinazongwe and Gwembe), it was found that farmers had a limited knowledge on utilisation, processing technologies and production of cassava, limiting the expansion of the fields.

The farmers in those areas had inadequate knowledge of the cassava varieties available and management practices of cassava nurseries. Consumption of cassava was limited to boiling and chewing as a snack.

Out of 200,000 cassava cuttings distributed, only about 44% were effectively planted in the four project sites (Table 6) due to a shortfall attributed to the following:

- a) Drying up of immature soft cuttings (poor planting material quality).
- b) Insufficient planting material supplied.
- c) Inadequate knowledge on irrigation systems of cassava, pests and diseases control.
- d) Limited knowledge on storage, preservation and marketing of cassava.

OXFAM

Oxfam works through local NGOs operating in drought affected parts of Southern and Western provinces towards mitigating food security. Oxfam focuses on distribution of cassava planting materials to those areas.

Table 7 Distribution of cassava planting material by OXFAM to promote production

| | 2000 | 2001 | 2002 | 2003 | Total |
|-----------------------------|------|------|-----------|-----------|---------|
| No. of distributed cuttings | | | 230,000 | 600,000 | 830,000 |
| No. of households targeted | - | - | 230 | 600 | 830 |
| No. of cuttings /household | - | - | 1000 | 1000 | 1000 |
| Varieties | - | - | Improved | improved | |
| Certified | - | - | Certified | Certified | |
| Month distributed | - | - | Dec | Dec | |

Oxfam distributed cassava cuttings for crop diversification to drought affected areas of Southern and Western Provinces (Table 7). Oxfam also distributed cuttings to some farmers in Kafue and American International School through Rotary Club. They conducted training courses for farmers in conjunction with the operational organisations within those areas.

Generally, there was an increase in number of farmers growing cassava in those areas, but acceptability of the crop seems to be slow especially in Southern province where maize is the only food crop. Processing should be improved and increase the number of cassava products for the crop to be widely accepted in traditionally non cassava producing areas.

Supply of cassava cuttings from AEZ 3 was one of the constraints due to long distances. Extension services to the farmers is very poor. The nutritional status of the crop should be improved for people to accept it in their diet.

CLUSA/PROFIT

Apparently the information got from the Cooperative League of the United States of America (CLUSA) was for one season only. The project is no longer dealing with distribution of planting material and there was no follow up on the planting material delivered during that season

Table 8 Distribution of cassava planting material by CLUSA/PROFIT to promote production

| | 2000 | 2001 | 2002 | 2003 | Total |
|-----------------------------|------|------|------|--------------------------|----------------|
| No. of distributed cuttings | - | - | - | 15,010 bundles | 15,010 bundles |
| No. of households targeted | - | - | - | 15.010 | |
| No. of cuttings /household | - | - | - | 1 bundle/hh (100 sticks) | |
| Varieties | | | | Improved | |
| Certified | | | | Certified | |
| Month distributed | | | | Sept –Feb | |

Table 8 present the total number (15,010 bundles) of cassava cuttings distributed by CLUSA in 2002/03 season only. CLUSA sourced all the planting materials from Kaoma and distributed to Southern, Lusaka, Central and Copperbelt. Most of the materials (Nalumino) were supplied by the MDSP seed growers in the province.

CLUSA was particular with the time of distribution by making early arrangements with their staff at the site who organised the farmers for land preparation before the arrival of the planting materials at the site. Unlike what has been reported by the previous NGOs, CLUSA reduced huge quantities of planting material losses through a well organised system between the source and the receiver.

The cassava planting materials were delivered between September and February of the season. Each targeted house hold was supplied with a bundle of 100 long cuttings (1 m long). After planting, only Mumbwa was reported having poor establishment (58%) of the crop due to delayed delivery of planting material from Kaoma.

Germany Agency for Technical Cooperation (GTZ)

Following the drought experienced last year in Southern province, the Zambian Government has requested GTZ to provided assistance to the implementation of an Emergency Food Aid Relief Programme to be carried out from September 2005 until February 2006.

After close consultations between GTZ and the Provincial Agricultural Coordinator, it was agreed that three districts (Choma, Sinazongwe and Kalomo) will be covered by the programme.

The programme aims at overcoming the current food shortages in selected areas of the province by providing a sustainable food supply and balanced nutrition based on the planting of drought resistant and diverse crop varieties which contain sufficient protein.

It is therefore planned to provide food as incentive for conservation farming activities to be carried out before planting of the next crop takes place. The inputs provided will be seeds of drought tolerant crops with a focus on cassava and cow peas.

The scope and inputs of GTZ Relief Programme will assist 5,500 households in the selected areas of Sinazongwe, Kalomo and Choma districts.

On the first ration, each household will receive 25 kg maize /cassava meal mix and 50 kg maize grain. The food mixture is being sourced from Kalundwe Estate which is responsible for sourcing the raw material.

The food should enable the farmers to carry out soil conservation activities in their fields and plant 5kg maize seed, 2.5kg sorghum, 2.5 kg Cowpea and 150 cassava cuttings of 1 meter long (sufficient for up to 500 cuttings). These operations have to be done within the month of October 2005.

The cassava planting material (Bangweulu and Nalumino) shall be sourced from Chalimba Farm in Itezhi Tezhi. The second ration of a 50 kg maize grain bag shall be issued to each farmer in December 2005 to January 2006 for weeding and other crop management operations.

Training of farmers and camp extension officers shall be done in a group of 30 people. Processing of cassava will be one of the major topics covered during the training.

4.1.1.2 Private sector

Multiplication and Distribution of Improved Seed and Planting Material Project(MDSP)

The Multiplication and Distribution of Improved Seed and Planting Material Project (MDSP) under ZAMSEED was initiated in 1997 by MAFF and funded by SIDA to accelerate the

provision and use of improved varieties by developing a sustainable multiplication and distribution system

Table 9 Inventory of private sectors (ZAMSeed/MDSP) that intervened in the production and distribution of cassava planting material (cuttings) by ZAMSeed/MDSP

| Year of intervention | Intervention | Objective | Provinces of intervention |
|----------------------|--------------------------------------|---|---|
| 1997-2002 | -seed multiplication by seed growers | -distribution of improved seed varieties of traditional crops in rural areas. | Northwestern Northern Western Southern |

Table 9 summarises MDSP cassava planting material interventions in the four provinces of Zambia. The main objective of MDSP was to promote a system for the distribution of improved seed varieties of traditional crops in the rural areas on a sustainable basis in order to enhance household food security, raise farmer incomes and increase opportunities for the development of rural entrepreneurs.

The project focused on accelerated use of improved varieties of small grains (sorghum, pearl millet and finger millet), food legumes (groundnuts and cowpeas) and root and tuber crops (cassava and sweetpotato).

Table 10 Distribution of cassava planting material by ZAMSeed/MDSP to promote production

| | 1997/98 | 1998/99 | 1999/00 | 2000/01 | Total |
|-----------------------------|-----------|-----------|-----------|-----------|-----------|
| No. of distributed cuttings | 1,016,125 | 1,137,500 | 817,500 | 5,022,500 | 7,993,625 |
| No. of households targeted | 549 | 1,361 | 682 | 7,500 | 10,092 |
| No. of cuttings /household | 1,851 | 836 | 1,199 | 670 | 792 |
| Varieties | Improved | Improved | Improved | Improved | |
| Certified | Certified | Certified | Certified | Certified | |
| Month distributed | Dec | Dec | Dec | Dec | |

Table 10 presents the total planting material (7,993,625 cuttings) produced by MDSP seed growers (10,092) in Northern, Northwestern, Western and Southern provinces during the five year lifespan of the project.

Amongst other crops grown by the project, cassava was one of the crops with the largest area planted and in high demand by the farmers in all the provinces because of its ability to give high yield even under dry conditions (MDSP Project Completion Report, 2003).

It was further reported that cassava scored low achievement (67%) due to poor supply of planting materials during the first two seasons, financial constraints by some seed associations to procure sufficient planting materials for their members especially during the last two seasons of the project when they had to buy their input without the project support. About 10 million cassava cuttings (enough to plant 1000 hectares) were produced and marketed.

Field inspections involving licensed Seed Inspectors trained and stationed in the project districts greatly improved the quality of cassava planting materials produced and distributed by the seed growers (Hichaambwa, 2003)..

In 2001/02 respondents having MDSP as seed source had increased to as much as ten fold compared to 1997/98 season in Northern province. The highest was for cassava which increased from 3% to 33% (Kapekele and Yamanda, 2002).

One of the major activities of the project was facilitating the formation of seed associations in all project areas. This was achieved by creating awareness among seed growers about the advantage of working in groups rather than individually. Formation of these associations led to responsibility sharing between seed farmers and project/extension staff. During the end of project review workshops, it was found that on average, two associations out of the three in each province were strong enough to continue in seed entrepreneurship after the project support.

The impact study carried out found that use of improved seed by the farmers increased agricultural productivity per unit area through shorter cropping periods, higher yields per unit area and reduced losses due to pest and diseases. Further, the availability of seed for various food crops other than maize, such as cow peas, beans, sweetpotato, millet and sorghum led to increased crop diversification reducing the dependency on maize alone (Hichaambwa, 2003).

MDSP had a positive impact on seed growers who recorded a number of benefits such as: increased income (cash) from seed sales, support to school-going children, procurement of household goods (bicycles, radios, roofing sheets, including cattle) increased food production and general increase in standard of living.

Conclusions

Seed multiplication by small farmers has not effectively reached most areas of Zambia. Some seed projects undertook a delivery system that lacked entrepreneurship and such initiatives ended with the closing of a respective project. Since seed entrepreneurship was still at its infancy, some of the weak associations are likely to collapse after the project support.

One of the major successes achieved by MDSP was the promotion of cassava as an important food security crop other than maize. Both government and NGOs are now distributing cassava as part of the food security pack for small scale farmers due in part to the effectiveness of MDSP. Another important achievement was the changing of farmers' attitudes to take farming as a business. In this regard, selling of cassava cuttings which traditionally were not a business transaction, became a million kwacha business which families were guarding with keen interest.

4.1.2. Cuttings in AEZ 3

Zambia Agriculture Research Institute/SARRNET (ZARI/SARRNET) basically refers to the background role played by the Research Branch of the Ministry of Agriculture in developing and promoting the importance of cassava as food security crop in the country. The objective of the programme was to develop cassava varieties that are high yielding, resistant to pests and diseases as well as developing improved cultural practices and processing technologies.

4.1.2.1 Public sector

Table 11 Inventory of public sectors that intervened in the production and distribution of cassava planting material (cuttings) AEZ 3.

| Name of organisation | Year of intervention | Interventions | Objectives | Provinces of Intervention |
|----------------------|----------------------|---------------------------------------|--|---------------------------|
| ZARI/SARRNET | 1979 | -breeding -agronomy -processing | To develop varieties agronomic & processing technologies | L & NW (national wide) |

Note: Under the province column, L-Luapula and Nw-Northwestern.

The low yield of cassava from the farmers was mainly attributed to the use of low yielding traditional varieties coupled with poor cultural practices. In 1995, Luapula Livelihood and Food Security (LLFSP) and Southern African Root Crops Research Network (SARRNET) (Table 11) embarked on intensive on-farm multiplication of newly released cassava variety planting materials and training of extension staff (Chitundu, 1998). That resulted into rapid self sufficiency in planting materials and adoption of the most popular cassava variety (Bangweulu) in Luapula. It was also found that community multiplication of cassava planting materials was more effective than by individual farmers.

Following the liberalisation of Zambia's economy and the recurring droughts early in 1990s, MACO through the Research Stations experienced an increase in demand of cassava planting materials by farmers and NGOs. The demand of cassava planting materials was further increased when the Research Branch, for the first time released improved and high yielding varieties in 1993.

Table 12 presents the distribution of cassava planting materials in 1988 to 2004. It is observed that during that period, there was a sharp increase of 62,000 to 613,000 cuttings distributed from the Research stations. Initially the distribution was restricted to Luapula or the nearest areas of the source and later started spreading to other provinces in small quantities.

Table 12 Cassava Planting Materials distributed to the provinces by Root and Tuber Improvement Programme (RTIP) (x 1000 cuttings 25 cm long)

| Year | PROVINCE | | | | | | Total |
|---------|----------|---------|----------|---------|-----------|----------|---------|
| | Luapula | Central | Northern | Western | N/western | Southern | |
| 1988/89 | 62 | | - | - | - | - | 62 |
| 1989/90 | 160 | | - | - | - | - | 160 |
| 1990/91 | 160 | | - | - | - | - | 160 |
| 1991/92 | 165 | | - | - | - | - | 165 |
| 1994/94 | 60 | | 52 | 10 | 118 | 175 | 415 |
| 2003/04 | 105,000 | 15,000 | - | - | 492,000 | - | 612,000 |
| Total | 105,607 | 15,000 | 52 | 10 | 492,118 | 175 | 612,962 |

(Source: RTIP Annual reports 1988-95)

After the establishment of MDSP (2004), the Research stations acted as primary sites to supply parent seed material to the project while they at the same time continued supplying NGOs and individuals looking for cassava planting materials. The progress of distribution of cassava planting material was further dramatised by the public and private sectors as discussed under section 4.1.1 above.

Challenges and constraints

1. Unlike the grain crops, it takes a long time before one can release a cassava variety. Usually it takes two seasons to the time of collecting yield data and more than five years to evaluate cassava clones, already that would take not less than ten years.
2. The Research stations could not meet the increasing demand of planting materials by the farmers.
3. After the major Donor (SIDA) stopped supporting the project, the Team experienced serious financial difficulties as they had to depend on SARRNET and a small amount from MAFF.
4. Insufficient man power to run the programme leading to threats of losing developed potential material as well as some of the released varieties.

4.1.2.2 Private sector

This section may be referred again to ZAMseed in Northern and Northwestern where MDSP multiplied cassava planting materials in those provinces (section 4.1.1.2).

4.1.3. Conclusion on cuttings

- Due to long distances of transportation and handling from either Luapula or Northwestern provinces, only about 10 – 20% of the material distributed to the farmers established in the field while the rest was wasted as dried up cuttings. Establishment of cassava seed nurseries close to area of production was the only answer to reduction of cassava cuttings losses and high cost of transportation from AEZ 3.
- Most of the cassava cuttings distributed were delivered to the farmers late (January) and were severely attacked by pests while some were destroyed by domestic animals. On farm multiplication of newly released cassava variety planting material and training of extension staff resulted into self sufficiency in planting material and adoption of the varieties by the farming communities.
- Low cassava adoption rate was recorded in drought prone areas of the country because of poor extension services and coordination resulting to farmers practising the traditional cultural methods of growing cassava since most the extension officers did not have training material developed by the Research branch for teaching the farmers.
- The availability of seed for various food crops other than maize, led to increased crop diversification and reduced dependency on maize, that was supported by release of newly improved cassava varieties by Research branch and when the farmers became aware of these varieties, there was sudden increase in demand for cassava planting material in drought prone parts of the country. Households growing cassava in those areas are better off in food security than those without cassava.
- Field inspection by Seed Inspectors greatly improved the quality of cassava planting material produced and distributed by the Seed Growers. Inspectors would also help to control the spread of diseases and pests from one area to another especially during the distribution of the cuttings.
- Formation of Seed Associations helped with the continuation of seed entrepreneurship after the project and these became more effective than individual farmers that also improved the seed grower's living standard for income generation.
- To sustain a high production of cassava into agro- industries, the research branch would require continuous support from the public and private sectors to develop more high quality varieties that are resistant to pest and diseases and also adaptable to a wide range of agro-ecological conditions in the country. The programme should be well staffed with highly qualified personnel.
- Cassava has toxic substances which could be poisonous if not properly processed and created a negative social and health impact. Therefore, only sweet cassava varieties with low HCN content should be distributed to non- cassava growing areas and bitter but high yielding varieties in cassava growing areas.

4.2. *Cassava production at smallholder farm level*

4.2.1. Production in AEZ 1 & 2

Cassava does not require much input for its cultivation hence the popularity it is commanding compared with other crops. However, one of the reasons the crop had been yielding so low is because farmers have been practising the traditional methods of cultivating the crop for years. No extension officer had assisted these farmers with the improved technology.

As a package together with the new improved cassava varieties, most of the key players in the distribution of cassava planting materials have emphasised on training of both extension officers and the farmers.

4.2.1.1 Public sector

Programme Against Malnutrition (PAM)

During the life span of PAM project, new farmers were being identified each year to participate on the project. The strategy was to build on the farmers left under the previous project in the first year and identify good farmers from the crop diversification in the following year. These farmers were identified by the Camp Extension Officers. With the formation of Seed Associations, farmer selection involved both the Association (through the contact farmers in each camp) and the Camp Extension Officer.

All the farmers that participated in this component were trained in seed multiplication and entrepreneurship project staff in collaboration with MACO district, block and camp level staff. Topics regarding land selection, isolation, rotation, rouging, seed processing, quality control and entrepreneurship were covered. Table 13 below presents the number of farmers trained and participated on the project between 2000/2001 season and 2002/2003. In 2003/2004 some of the 2002/2003 farmers were facilitated with foundation seed as part of the exit process in winding up the project. The project did not recruit new farmers in 2003 /2004 season.

Table 13 Number of PAM seed farmers trained and participated in seed multiplication 2000/2001 to2003/2004

| PROVINCE | PARTICIPATING FARMERSS | | | | | | | | | |
|----------|------------------------|------|-----------|------|-----------|------|-----------|------|--------|------|
| | 2000/2001 | | 2001/2002 | | 2002/2003 | | 2003/2004 | | TOTAL | |
| | Female | Male | Female | Male | Female | Male | Female | Male | Female | Male |
| Lusaka | 49 | 29 | 69 | 69 | 164 | 253 | 112 | 91 | 304 | 442 |
| Southern | 7 | 84 | 35 | 121 | 166 | 383 | 99 | 246 | 307 | 834 |
| Central | 21 | 38 | 31 | 75 | 102 | 195 | 51 | 125 | 205 | 433 |
| Western | 0 | 0 | 0 | 0 | 59 | 86 | 23 | 79 | 82 | 165 |
| Eastern | 24 | 60 | 56 | 79 | 147 | 286 | 78 | 158 | 305 | 583 |
| TOTAL | 101 | 211 | 191 | 344 | 638 | 1203 | 363 | 699 | 1203 | 2457 |

Note: the total number of beneficiaries was calculated from the 2000/2001 and 2002/2003 as those for 2001/2002 and 2003/2004 were captured under the 2002/2003 as second year farmers while 2000/2001 dropped out in 2002/2003 season.

Field Days

The field days were aimed at promoting the adoption of the technologies being demonstrated by the project and also supporting the rural seed system. The technologies promoted included crop rotation, early planting and conservation farming under the crop diversification component. Other aspects include the promotion of food processing as a vehicle for improving food security through enhanced access to food at household level and income generation through mechanical processing.

As an impact of the project on the communities where the project was implemented, 80% of the farmers were retained in seed production and marketing.

All the farmers are still producing and marketing seed while the ten (10) farmer associations are registered.

The Small scale farmers (male, female) trained in crop diversification are estimated at 28,000 by the impact assessment.

Under the promotion of improved food processing, utilisation and storage techniques for small scale farmers especially women, the project trained 427 groups by 2004 of which 79% of the members were female.

All those trained were reported practising at least one of the processing methods (Nthani and Hikeezi, 2002).

SHAPES achievements are summarised in appendix 2 at the back of the report.

CARE International/FAO

Training:

The Conservation Farming Unit under Zambia National Farmers Union was contracted to undertake the training. The Ministry of Agriculture Staff, particularly the Crop Husbandry Officers and the Block Extension Officers were the chief facilitators in the farmer training. In addition, CARE staff trained in conservation farming in the past CARE programmes, offered additional technical support in the field. The training was conducted in two days with the first day being for theory and the second day for practical instructions.

Each trained contact farmer was subsequently expected to train about 40 farmers in their respective farming areas. The topics covered basically were all on concepts of Conservation Farming. Table 14 presents the number of farmers trained in 2002/03 by CARE.

Table 14 Number of farmers trained by CARE /FAO in 2002/2003 Southern province

| Operational districts | Number of trained lead farmers | Expected trained farmers |
|-----------------------|--------------------------------|--------------------------|
| Kalomo | 80 | 3,200 |
| Sinazongwe | 65 | 2,600 |
| Siavonga | 64 | 2,560 |
| TOTAL | | 8,360 |

Field days

There were two field days conducted specially for promotion of cassava, these were, one at satellite and district levels. The Muzya satellite field day convinced many people that their soils can support and produce a good crop of cassava and most of them promised to plant cassava in the following rainy season.

While in the field, farmers appreciated the advantage that cassava exhibited over maize or any cereal crop especially in Southern province where droughts do recur almost every season.

The newly introduced cassava varieties (Kapumba, Nalumino and Bangweulu) were highly appreciated by the farmers. The multi-purpose potential of the crop and its less demand for manure highly impressed the farmers. The demand for cassava planting material in the following season was higher than experienced before, indicating a more staple food base with households hence sustainable food security.

The field day held at district level focused on conservation (potholing and ridging), promotion of root and tuber crops (cassava and sweetpotato) as well as demonstrations on rice cultivation.

The major factors affecting the rate of adoption of cassava are the amount of cassava cuttings a farmer receives, the time the cuttings are received, the problem of cassava pests, exposure to the growing of cassava before the programme and the amount of publicity of the programme by the agencies (Zulu, 2004).

AFRICARE/FAO

Training

Several follow up visits were undertaken to all eight project sites to monitor crop performance. During these field visits technical advice was given to the farmers which included gapping, weeding, irrigation and spacing.

A cassava production workshop attracted 29 farmers and 6 MACO staff. The main objective of this course was to impart knowledge in cassava production, treadle pump operation and Zamwipe use to farmers and extension staff in the project area. The resource persons were drawn from CLUSA, Conservation Farming Unit (CFU) and MACO. The 29 participants were drawn from Siavonga, Gwembe, Sinazongwe and Namwala districts. who were supplied with cassava cuttings. While the extension staff were those from the listed districts.

The second workshop was for cassava utilization, processing and marketing where 9 MACO Extension staff and 48 farmers attended a two day workshop in Monze. The participants were beneficiaries drawn from Namwala, Siavonga, Gwembe and Sinazongwe districts. Others were non participating farmers from these project sites. The objective of the course was to impart knowledge in cassava utilization, processing and marketing skills. The workshop was facilitated by an Agricultural Consultant with the assistance of two other resource persons hired by FAO.

The farmers appreciated the course as it was an eye opener in terms of cassava utilization, processing and marketing. It gave them an insight to know that cassava was a very profitable crop to grow.

The course introduced new dishes to farmers for better nutrition. There was overwhelming response from participants to grow cassava. The course offered business opportunities in the community in selling of cassava snacks which proved popular among the locals.

The project made a tremendous impact in terms of household food security at the project sites. Some beneficiaries were able to harvest some cassava roots from the early maturing varieties in the nurseries.

4.2.1.2 Private sector

ZAMSEED/ Multiplication and Distribution of Improved Seed and Planting Materials Project (MDSP)

Promotions

Distribution of demonstration plot inputs- seed farmer or other contact farmer in strategic locations was chosen to manage demo plots. The plots were farmer owned.

Conducting field days – the project's role was to facilitate the holding of the field days, by way of providing funds to extension staff for their logistics. Farmers largely provided food and drinks to participants.

Conducting seed fairs – these were organised by farmers with assistance from the project in form of transport and lunch for participants.

Preparation of production guides –these were done at the beginning of the project and materials were given to farmers.

Radio advertisement– this was also done in the first two years of the programme to assist farmers gain confidence in the locally produced seed. Farmers themselves did the actual seed sales.

Loan recoveries

Since MDSP provided farmers with inputs on loan, loan recoveries were part of the project activities in the first two seasons. In the last two seasons, seed associations took over the responsibility of input distribution and loan recoveries

Training

To build capacity among farmers as seed growers, seed training and simple business principles were given to farmers by the project. The training was either out sourced from some organisations or provided by the project staff and other stakeholders.

Facilitate Formation and Management of Seed Association.

The formation of seed growers association was facilitated by the project as an exit strategy, so that farmers could continue receiving services even after donor support.

Coordination of informal seed sector

- MDSP was providing financial support to SCCI to monitor the informal seed sector.
- A national seed meeting was also organised annually for all stakeholders.
- The seed regulations were also improved upon (e.g. the development of Root and Tuber Standards with support of MDSP)

Impact on farmers' lives

The project had a positive impact especially on seed growers who recorded a number of benefits such as: increased income (cash) from seed sales, support to school going children, procurement of household goods (bicycles, radios, roofing sheets, including cattle etc.), increased food production and a general increase in standard of living.

Farmers who accessed seed from MDSP seed growers generally recorded an increase in food production. According to diagnostic impact study done, 47% of households in MDSP operational areas experienced improvement in their food security status since 1997/98 compared to only 35% in non – project areas. The major factor that contributed to this status was better access to improved seed as seen in Table 15 below.

Table 15 Factors contributing to improved household food security

| FACTOR | PERCENT RESPONDENTS BY CAMP TYPE | |
|--------------------------------|----------------------------------|--------------------------|
| | Participating camp | Non – Participating camp |
| Better access to improved seed | 34.2 | 11.1 |
| Increased area cultivated | 21.8 | 11.1 |
| Better farming practices | 19.4 | 16.1 |
| Improved access to loans | 0.0 | 4.5 |
| Better weather conditions | 3.4 | 3.2 |

Source: MDSP Impact Diagnostic Study, 2002

4.2.2. Production in AEZ 3

4.2.2.1 Public sector

ZARI/SARRNET

In addition to cassava germplasm and technology development, the other specific objectives of the Research branch were capacity building and establishment of Root and Tuber Crops Commodity Research Team.

MAFF with assistance of SIDA invested in utility vehicles, laboratory equipment, plant protection structures such as screen houses for rearing of predators used for the control of cassava mealy bug when the pest had threaten the crop in the 1980s.

Late 1990s SARRNET established a processing laboratory in Kasama and SIDA had recruited a Food Processing Technologist to run that laboratory.

SIDA sponsored some of the Root and Tuber Improvement Programme staff for first degree and PhD level to reinforce the Team. That staff helped in developing the released varieties spreading in the country. Other members of staff were sent to IITA for short training course in root and tuber crops.

- Extension and farmer training short courses were conducted by the team to disseminate the new technologies developed by the researchers.
- Demonstration plots and field days were also conducted at the stations.
- Training of farmers was conducted at these demonstration sites covering topics on cassava varieties released, land preparation, planting, weeding, harvesting and processing (Table 16).

Table 16 Number of farmers trained in mobile courses 2003/04

| District | Site | Number of farmers trained | | | Collaborating partners |
|------------|---------------|---------------------------|--------|-------|------------------------|
| | | Male | Female | Total | |
| Solwezi | Mutanda | 0 | 24 | 24 | Extension+PAM |
| | Kyabankaka | 5 | 15 | 20 | |
| | Kankuwa | 6 | 17 | 23 | |
| Mwinilunga | Kanongesha | 25 | 20 | 45 | WVI, PAM + Extension |
| | Kanyikomboshi | 17 | 5 | 22 | |
| Kasempa | Nkenyauna | 9 | 12 | 21 | PAM+Extension |
| Samfya | Mwewa | 12 | 19 | 31 | Extension |
| | Lubwe | 25 | 21 | 46 | |
| | Katanshya | 12 | 14 | 26 | |
| Nchelenge | FTC | 8 | 29 | 37 | FAO +Extension |
| Mansa | Mabumba | 12 | 14 | 26 | Extension |
| TOTAL | | 131 | 190 | 321 | |

MAFF and SARRNET hosted two international scientific workshops in Lusaka on root and tuber crops. During that time, the Minister of Agriculture and other policy makers in the ministry were invited to participate and realise the importance of cassava as a food security crop in SADC.

The impact the Research Branch has made could be attributed to the released improved cassava varieties, well trained staff managing the programme and sound funding by the donors.

4.2.2.2 Private sector

This section is referred to section 4.2.12 of AEZ 1&2

4.2.3. Conclusion on production

- PAM identified and trained new farmers in seed multiplication and entrepreneurship of various crops including cassava and sweetpotato. They also conducted field days aimed at promoting adoption of the technologies being demonstrated by the project and supporting the rural seed system.
- PAM had over 80% farmer retention in seed production and marketing by the end of the project and all the 10 farmer associations founded were registered. The small scale

- farmers trained in crop diversification were estimated at 28,000 by the impact assessment
- Under the promotion of improved food processing utilization and storage techniques for small scale farmers PAM trained 427 groups by 2004 (79% women) and all those trained are practising at least one of the processing methods (Nthani and Hikeezi 2002, impact assessment 2004).
 - The demand for cassava planting material in the following season was higher than experienced before indicating a more stable food base with household and sustainable food security.
 - The rate of cassava adoption was affected by the amount of cassava cuttings a farmer received, time cuttings were received, cassava diseases and pests, exposure to growing of cassava before PAM came on board and the publicity of the presence of the project by the agencies.
 - The cassava utilization, processing and marketing training by AFRICARE/FAO offered the farmers business opportunities of selling cassava snacks to the communities that would encourage more households to produce more cassava in region 1 and 2 for the future.
 - In AEZ 1 and 2 cassava production is still low although more households are adopting the crop in their cropping system, however, there is still need to promote the crop by training them how to process the crop as PAM was doing and also establishing nurseries within the regions and avoid the wastage of planting material as experienced by these NGOs in the past.
 - AEZ3 already has achieved high levels of cassava production. However, not all households use the new improved cassava varieties which could have even increased the production if more farmers were using the varieties. As observed from the market as well as those who have already started the industrial utilisation of the crop, the region needs to be linked up to potential agro-industries for the outlet market. Once they realise that there is market for their produce, production will increase greatly.

4.3. Trading of Cassava

This section attempts to analyse the information collected from the Food Reserve Agency and Market Access, Trade and Enabling Policies Project (MATEP) under the public sector in both AEZ 1&2, while the Soweto Market Traders will be covered under the private sector for both AEZs.

4.3.1. Trading in AEZ 1 & 2

Details of the above mentioned sectors are covered in the section below.

4.3.1.1. Public sector

Food Reserve Agency, FRA

The Food Reserve Agency (FRA) was established in 1996 through the Food Reserve Act, 1995. The Agency has the mandate to perform the following functions:

- Establish and manage the National Food Security Reserve.
- Establish a marketing information system.
- Promote grade and weight standards for the marketing of food commodities.
- Manage and lease out government-owned storage facilities and equipments.

Table 17 Inventory of public sectors who intervened in trade and cassava promotion

| Name of Institution | Year of intervention | Interventions | Objective | Provinces of intervention |
|---------------------|----------------------|-----------------------------|---|---------------------------|
| FRA | 2003 | -cassava purchase and sales | -establish and manage national food security reserve -establish a marketing information system | N, L, NW. Lsk (national) |

Note: Under the province column, S-Southern, E-Eastern, L-Luapula, C-Central, W-Western, N-Northern and Lsk-Lusaka

The National Food Security Reserve

The Agency purchases and sells limited quantities of designated commodities i.e. those grain commodities which are regarded to be essential to food security in the country, for purposes of meeting the country's food requirements.

The purchases and sales are conducted through an open tender system. Tenders that are advertised in the local print media, call for deliveries to be made or taken to specific locations where the Agency stores the reserve stock.

The reserve stocks will be released on the market in situations where the private sector is unable to meet the local demand. The stocks may also be released on the export market when market conditions allow.

Designated Commodities

Commodities which are deemed essential to the food security of the nation are designated at the beginning of each marketing year by the Ministry of Agriculture. These commodities are published in the National Gazette.

Market information

The Agency collects marketing information on grain trading, processing, stocks and prices on the local and international markets and disseminates for the purpose of meeting requirements of Government, consumer, producers, processors, traders or other persons interested in the designated commodities.

The Agency has also to monitor and publish information concerning the quantities of maize and other cereals imported or exported in order to monitor the overall food security situation.

In order to obtain marketing information, the Food Reserve Act, 1995 provides that traders and processors will register with the Food Reserve Agency. The objective being facilitating the work of the Agency in collecting information on stocks and prices of the commodities.

Market Development

In consultation with other collaborating partners, the Agency will promote internationally acceptable weight and grade standards for grain commodities. The objective is to assist producers, traders and processors to adequately market their food commodities complying with uniform grade and weight standards. This will encourage farmers and traders to deal mainly with first grade quality food products demanded on the export markets.

Management of State – Owned Storage Facilities and Market Equipment

The Agency is responsible for managing and leasing of state – owned storage facilities and equipment to the private sector. There are over 700 storage facilities throughout the country with a total capacity of almost 2,000,000 metric tonnes. The capacity of these storages facilities ranges from 20 to 5,000 metric tonnes. The equipment includes stacking machines, scales, weigh bridges and bagging machines.

Table 18 Summary of FRA answers for the questionnaire to the Public Sector Trade and Processing

| Target group | Objective | Trade stimulation | Sustainability |
|--|--|------------------------------|---------------------------------------|
| Small-scale farmers are targeted but all are free to sell to FRA | -procure dried cassava roots and chip from producers -to promote production of cassava products and establish standards like any other crop marketed. | Extension services and radio | Difficulties of selling the commodity |

In Table 18 FRA's target group is the small scale farmer. It was reported by the Agency that marketing season is always publicized on the radio and television. The extension service of the Ministry of Agriculture also plays a big role in sensitizing the public. The purchase of cassava is still on experimental basis since FRA is still learning how to handle the commodity therefore the sustainability of FRA as a major market can not be assessed yet. .

Demand

Table 19 Summary of FRA answers for the questionnaire to the Public Sector Trade and Processing

| Products | Who do you sell to? | Key markets | Quantity/yr. | Potential of market |
|------------------------------|--|---|--|---|
| Dried cassava roots or chips | Millers only but could be extended in future | No specific market since on pilot basis | 2002/03-160 m.t 2003/04 - 0 2004/05 – 553 m.t 2005/06 – 2,000 m.t (planned) | A lot of potential but needs to be processed in many products |

FRA only buys the processed dried form of cassava (roots or chips) and sells it only to millers (Table 19). In 2004/05 season, Choma Milling Company is reported to have purchased most the cassava acquired by FRA and mixed it with maize in the ratio of 70% maize and 30% cassava. GTZ in Choma used the consignment of flour as a relief food (Food for Work Project) in the district. Apparently, the people adopted the product and never complained of the cassava mixture. This season, GTZ has tendered for 137.5 metric tonnes of cassava.

This year FRA intends to purchase 2,000 metric tonnes of cassava. This will depend upon the flow of funds from the government. To date the Agency has only purchased a total of 171 metric tonnes of cassava and the marketing season is almost closing.

Supply

Table 20 Summary of FRA answers for the questionnaire to the Public Sector Trade and Processing

| Source of cassava | Varieties | Purchase price Price for dried cassava | Transport cost | Pricing in a season | Farmer linkage |
|----------------------------|--------------|---|--|---|--|
| Luapula Northern N/western | Not specific | 2005/06- K500/kg 2003/04 – K700/Kg | K450/m.t./km 20 bags (50kg) = 1m.t. | The price is the same throughout the marketing season | Linkage through the extension services |

FRA has been in business of purchasing cassava for the past three years. They started with Kawambwa District in Luapula province and have now covered the whole province and extended to Northern and Northwestern Provinces (Table 20).

The purchasing price for this marketing season is at K500 per kilogram, which is K200 lower than what they were offering in 2003/04 season. Transport cost is one of those areas of the trade discouraging most of the traders wishing to venture into haulage of the commodity. This is due to its bulkiness and also the form in which it is after processing. During the long distance of haulage from Luapula to Lusaka the product ends up crumbling and can often not be marketed, leading to big losses.

In addition to transport cost, FRA incurs storage fees per metric tonne, there is also fumigation cost as cassava is reported to be more susceptible to storage pests. These costs are contracted to other companies. The FRA buying price of cassava does not change during the marketing season.

Impact

FRA has indicated the potential of cassava for food security due to recurring droughts. The Agency could not confirm the volumes of cassava that will be purchased because of uncertainty of the flow of government funds during the financial year. However, they try to dispose of all what they purchase during the season to avoid heavy costs of storage mentioned above. It was also highlighted that cassava business may not be ideal as of now due to uncertainty of the market and also the production.

Constraints

- The commodity is difficult to sell because only a few people are involved in cassava business.
- It is bulky and expensive to transport for long distance.
- Limited technical know-how of handling the commodity in the storage experiencing more pest problems than cereals.
- Poor funding by the government.

Market Access, Trade And Enabling Policies (MATEP)

The Market Access, Trade and Enabling Policies Project (MATEP) is a new 5-year USAID – funded project for promoting exports from Zambia’s agricultural and natural resources sectors. The objective of MATEP (Table 21) is to help increase Zambia’s non traditional exports to \$600 million by 2010, a \$200 million increase over the 2004 baseline. To achieve this objective, MATEP works closely with the Export Board of Zambia, producer associations and exporting companies in the country. MATEP is initially focusing on eight core value chains: horticulture, coffee, livestock, cotton, honey, paprika, maize and cassava. Activities promoting other export products will be considered if they show good potential to result in substantial near-term export receipt.

Table 21 Inventory of public sectors who intervened in promotion of cassava trade and processing.

| Name of Institution | Year of intervention | Interventions | Objective | Provinces of intervention |
|---------------------|----------------------|---|--|---------------------------|
| MATEP | 2004 | - export market for non traditional exports | - promote non-traditional export (agric. & natural resources.) | National |

MATEP has four project components. The Market Access Component helps identify foreign markets for Zambian products and assists Zambian exporters to complete export transactions in those markets (including regional, European, American and Asian markets).The Policy Component addresses domestic policy and regulatory barriers to exporting as well as trying to

maximise benefits from Zambia's profile as an international trade agreements. The Tourism Component works to improve and diversify tourism products available in Zambia. In the Finance Component, MATEP has a short – term fund and a medium term fund, both operated through financial institutions, to meet capital needs of exporters.

The questionnaire was not applicable to MATEP as they are just establishing. However, they expressed dire interest in promoting cassava market both at home, regionally and abroad.

Contacts are already in place within some SADC (South Africa, Angola and DRC) countries, China and India for cassava market. China has already requested for available volumes from the country.

Within the country MATEP is studying PAM's achievements and identifying areas of intervention. In Northern province there was a report of the Coffee Producers Association going into cassava processing.

The countries contacted so far are requesting for detailed information on the form of cassava products the country can offer.

Conclusion:

One of the major constraints for the production of cassava is the market for the produce. MATEP is making a very good move for creation of cassava market, be it at home or abroad. However, the national statistics on production and area of cassava in this country is very unreliable and needs more effort put into it to confidently tell the prospective buyers how much cassava is being produced in the country.

4.3.1.2. Private sector

The market chain for cassava is in two forms, depending on the type of product that is sold to the final user. Fresh cassava, which is restricted to the area of production is one channel. The other channel is for processed products (chips and flour), which can be transported and stored.

Fresh Cassava Market Chain

The market for fresh cassava is basically rural and restricted to the area of production. The distance has to be short due to the short shelf life of fresh cassava. For this reason, urban markets are unattractive because of long distances involved from areas of production.

Within the overall chain for fresh cassava, there are two distinct channels. The first one is where the farmer sells directly to the final rural consumer and does not involve intermediaries. It is the shortest channel and the farmer either transports and sells in the market at retail price or sells directly to consumers at a farm gate price. The second channel involves intermediary in rural areas, in most cases these are women in the markets or road sides. They buy from the farmer and sell to final consumers in small quantities at retail prices. The quantities these traders buy are just enough to be sold within a day or so to avoid loss due to deterioration in quality.

Processed Cassava Market Chain

Processed cassava consists of dried chips or flour constituting the predominant form cassava is marketed. These cassava products are storable, lighter and can be transported for long distances. This market chain involves three channels.

First is a direct channel in which a farmer processes the product and sells it directly to final consumers. These consumers could be from the area of production or coming from local markets. The second channel involves the farmer transporting and selling directly to the urban consumer. The third channel makes use of middlemen and traders. The middlemen can either be urban business or rural business persons. The middlemen buy in bulk from many different farmers and sell the products in much smaller quantities to traders who in turn sell to final urban consumers. The traders sell in central markets, mini-markets or along the streets.

Soweto market traders

This constitutes the middle man who goes to the farmer to purchase cassava products and either sells it personally to the consumer or retailer. Within the market are also found depot owners for storage of cassava coming from the traders. However, some of the farmers are also part of the trade. They use part of the cassava products for their household consumption and sell the rest to processors, traders, retailers and consumers directly.

During the study, a few people involved in cassava trade were interviewed in Soweto market just to have an idea of cassava's role on the market. Table 22 gives a summary of the information that was collected from the cassava traders. This information may not be representative since is from a small sample of respondents interviewed, therefore the analysis should be treated with caution.

Table 22 Inventory of private sectors who intervened in trade and cassava promotion

| Name of Institution | Year of intervention | Intervention | Objective | Provinces of intervention |
|---------------------|----------------------|---|--|---------------------------|
| Soweto traders | 5> Years | Purchases, sales and storage of cassava | -trade for income generation -to supply the commodity on the market for food security | N,L,C&Lsk |

Note: Under the province column, N = Northern, L= Luapula,C=Central and Lsk= Lusaka provinces.

During the two visits of the Soweto market in Lusaka in the middle of September, there was a lot of cassava selling on the market in both fresh and dried form coming from Northern, Luapula, Central and Lusaka provinces. Apparently, an increase in volumes of cassava on the market has been observed in the recent past five years or more due to maize meal shortages in the country.

Table 23 Summary of answers for the questionnaire by Private Sector Trade and Processing in Soweto market traders

| Target group | Objective | Trade stimulation | Sustainability |
|--|-------------------|--|---|
| Retailer in township markets within Lusaka | Income generation | Increase in production from the source (rural areas) | It is sustainable but depends upon availability of supplies |

The main objective of these traders is to generate income. They are targeting Lusaka market retailers, which seems to have a huge volume considering other township markets within Lusaka (Table 23).

The business was reported to be sustainable but only active during the dry season since there is no cassava coming in big quantities during the rainy season due to difficulties experienced in processing cassava at that time.

It is also difficult to access cassava from the villages in the rainy season due to poor conditions of the roads. The cost of transportation from AEZ 3 is prohibitive for any businessman aspiring into the venture.

Demand

Table 24 Summary of answers for the questionnaire by Private Sector Trade and Processing in Soweto market

| Products | Who you sell? | Key markets | Quantity/yr. | Potential of market |
|---|--------------------------|---|---------------|--------------------------------------|
| -dried roots -dried chips -flour -fresh root | -retailers within Lusaka | -Soweto, some from other township markets | Not available | Everybody assures there is potential |

The most common product observed in large quantities was dried roots that was stored in cassava depots visited (Table 24). Dried chips are also reported to be available. Individual retailers buy the dried roots and take it to a miller for grinding into flour and later bring it back on the street market.

Large quantities of fresh roots were on the market on one of the days visited. The supply of fresh roots is mainly from the local farmers within Lusaka and it has to be disposed of before it deteriorates. Some of the fresh root traders bemoaned the losses incurred if their commodity is not sold within a day or two.

Apparently most of the traders do not seem to keep records of their orders. Or if they do, they are reluctant to reveal that information as a business secret.

SHEMP (2003) listed the internal factors affecting trade demand as: awareness of cassava products, awareness of suppliers, willingness to buy, price sensitivity, product preference and lack of price information. The external factors include income, availability to buy, competing products, non standard measurements, packaging foreign exchange exposure, price and quality.

Supply

Table 25 Summary of answers for the questionnaire by Private Sector Trade and Processing in Soweto market

| Source of cassava | Varieties | Purchase price | Transport cost | Pricing in a season | Farmer linkage |
|---|--|--|---|---|----------------|
| -Serenje -Mwense -Lufunsa -Mkushi -K/Mposhi -Mongu -Kabwe | Most of the names given were for local varieties | Ranges from K10,000 to K20,000/bag depending on source | Ranges from K10,000 – K20,000 depending on source | May-June =K25,000/bag Aug-Nov =K18,000 | Direct |

The small sample of respondents from Soweto market indicated that the cassava that was selling came from Central, Luapula, Lusaka and Western provinces (Table 25). The cassava varieties given were generally of local names although the respondents expressed ignorance on the varieties, but it seems a bit of the improved varieties could have reached the farmers themselves.

Depending on where cassava was purchased, the price varies. The lowest farm gate price was reported from Lufunsa and Kapiri, K10,000 / bag while Serenje had the highest at K20,000/bag.

The transport cost ranged from K10,000 to K20,000 per bag (50kg) for a distance of about 600 to 700 km. In addition to that there is also a storage charge demanded by the owners of the depots in the market which ranged from K1,000 to K1,500 per bag.

The traders confirmed the seasonality of the supplies of cassava during the year. Cassava tends to be expensive at the beginning of the marketing season in May to June and cheaper towards the end just before the beginning of the rainy season. In February or March cassava would have the highest price, in any case the commodity is scarce due high processing cost involved in the rains. These traders go directly to the farmers where they buy their cassava.

Under supply SHEMP (2003) further illustrated the internal factors as: the number of hectares grown by farmers and yields obtained, the processing techniques, marketing ability, lack of storage facilities, processing time and lack of funds including working capital for investment in increased production. The external factors include the availability of finances, disorganised market structure, lack of price information, lack of transport and/or high transport cost, limited market, high market fees and low retail prices.

Impact

It was difficult to get some of the information from the respondents as they treated the information as a business secret. However, the cassava volumes brought on the market by individuals ranged from 40 bags with the largest consignment of 200 bags per trip.

Constraints

- Poor supplies of cassava on the market during the rainy season requiring improved processing technology.
- Poor road network in rural areas to access the commodity during the rainy season.
- Lack of marketing statistics
- Lack of price information
- In rural areas households soak, ferment and sundry their cassava, there is need to improve on processing techniques by providing them with small processing equipment being promoted by the NGOs.
- Cassava is susceptible to fungal infection in storage affecting the quality of the commodity. Storage facilities will have to be established if the commodity will be required in big quantities to agro-industries.

Conclusion

- Generally there is increase of cassava production from the producers and this is evidenced by the amount of cassava coming on the market today. It would be advantageous to the nation if the quantities could be monitored during the year and build a good statistical baseline for the purpose of national planning.
- However, issues affecting the supply and demand need to be addressed.

4.3.2. Trading in AEZ 3

4.3.2.1. Public sector

Refer to section 4.3.1.1 above.

4.3.2.2. Private sector

Refer to section 4.3.1.2 above

4.3.3. Conclusion on trading

- FRA is not well funded making it very difficult for them to purchase more cassava during the season.
- FRA buys only dried cassava roots or chips which they sell to the millers and sensitization of the marketing season is done by the extension services and NAIS on the radio. FRA is still undergoing a learning process of cassava marketing and handling.

- The price offered to farmers by FRA (K500) is more attractive for the producer/farmer (K25, 000 /50kg bag) since the agency is paying about double what the farmers receive from private traders.
- MATEP's role is to help identify foreign markets for Zambian products and assist Zambian exporters to complete export transactions in those markets.
- There is an increase in the amount of cassava coming to Soweto market from cassava producing areas.
- The cassava market in Soweto is informal but much organized considering that they are organising themselves right from the rural areas to the market without involvement of any institution. However, they need to be provided with standards to improve on the quality and the hygiene necessary.
- The cassava traders could also be linked up to potential agro-industries as it appears that the industries are not aware of the cassava on the market, neither are the traders aware of the cassava demand by the industries.
- The seasonality of availability of cassava on the market especially during the rainy season could be a serious bottleneck for the agro-industries since cassava would be require al round the year, however that could be improved by promotion of the processing equipment to the producers in rural areas.
- The high transport cost from AEZ 3 to either Copperbelt or Lusaka, could equally bee reduced if cassava was processed from the source to reduce the bulkiness of the commodity and transport dried or final product to industries.

It is evident from past experience that food production alone can not be an end in itself to achieve improved food security. There is need to promote improved storage and processing methods and nutrition practices among the rural households to reduce food wastage and improve the health status of the vulnerable but viable farm households.

4.3.4. Processing in AEZ 1&2

This section attempts to look at the role played by different organisations as public sector players in the processing of cassava in AEZ 1&2. The main organisations are PAM, CLUSA and AFRICARE as shown in the inventory (Table 26).

4.3.4.1. Public sector

Table 26 Inventory of Public Sector Intervention in Cassava Trade and Processing

| Name of organisation | Target group | Objective | Activities | Trade/ Processing Stimulation | Processing Sustainability |
|----------------------|-----------------------------|---|--|---|--|
| PAM | Small scale farmers (women) | -promote improved food processing, utilization and storage techniques | -Training of trainers - Identification & training of new groups -Proc. of food processing equip - Commercialisation of processed products -Training of cassava farmers -Collaboration | Motivate participants to ensure effective implementation activities | Development of new products and market |
| CLUSA | Small scale farmers | Improving rural livelihood and income generation | Training of cassava processing | Motivation and creating awareness | Cassava production |
| AFRICARE | Small scale farmers | -organize beneficiaries to participate in any related training | -training of farmers and extension staff in cassava processing, utilization and marketing | Motivation of farmers | Market for the farmers' produce |

Programme Against malnutrition (PAM)

Food Processing and Storage Component

This sub-section of PAM covers the activities of women and youth groups under the Food Processing and Storage component. The main activities are, training of trainers, identification and training of new groups, procurement of food processing equipment, commercialisation of processed products, training of cassava farmers and collaboration.

Training of trainers

During the life span of SHAPES, training of trainer workshops was conducted for women and youth officers from the Ministry of Agriculture and Cooperative and partner NGOs from each of the participating districts. Facilitators were drawn from the SHAPES project, Post-Harvest unit under Soils Crops Research Branch (SCRB) and Africare. Among other specific objectives was to re-orient participants on the important aspects of food processing and storage based on community needs identified in each district.

A total of 243 extension officers (Block and Camp) were trained in food processing covering cassava, sweetpotato and cowpea to strengthen the monitoring capacity of component activities at camp level. The Food Processing Specialist facilitated the workshop in Southern and Eastern provinces while the Women and Youth Officers facilitated the rest of the catchment area. The districts were grouped as presented below while the number of participants is as shown in Table 27.

Table 27 Total number of extension officers trained in food processing by PAM

| Districts | Venue | Extension officers | | |
|--|---------|--------------------|-----------|------------|
| | | Male | Female | Total |
| Siavonga, Namwala, Sinazonwe and Monze | Monze | 50 | 14 | 64 |
| Lundazi | Lundazi | 19 | 4 | 23 |
| Nyimba and Katete | Katete | 31 | 7 | 38 |
| Kaoma | Kaoma | 17 | 3 | 20 |
| Chibombo, Kafue, Mumbwa and Chongwe | Chongwe | - | - | 98 |
| Grand Total | | 117 | 28 | 243 |

Note: Chongwe and Kafue did not disaggregate the data by gender hence only the total figure for the four districts given.

As part of the exit strategy of the last phase of SHAPES, the project conducted a training of trainer (ToT) workshop for women and youth officers as well as NGOs in implementing the food –processing component. Others included staff from Ministry of Community Development and Social Services and Ministry of Education. NGOs that sent participants included CINDI, the Catholic Diocese and CLUSA. The Training of Trainers (ToT) workshop was held at the In-Service Training Trust (NRDC) in Lusaka and aimed at refreshing and re-enforcing staff’s knowledge and skills in food processing and storage technologies. All the 12 operational districts participated and a total of 30 participants (16 female) attended the workshop.

The facilitation was provided by a team of various experts in the food production industry that included Sylva catering, Motivation Speakers, the Post – harvest Unit in Soils and Crop Research Branch of MACO, AFRICARE and project staff. The workshop emphasised on practical and also undertook a field visit to PECO Enterprises, a supermarket that makes and sells cassava flour and biscuits. The workshop concluded with a display of processed products.

Identification and training of new groups

The women and youth Officers and partner NGOs in collaboration with CEOs identified participating groups. Each district selected 10 new groups each year giving a total of 35 groups per district. The training of groups was based on the needs assessment report. Information from the reports provided the basis for developing training modules specific to the needs of the group. These modules were centrally developed by the project and disseminated to the districts for training of the groups by the trained trainers. The topics of training were based on each group’s specific needs earlier determined. Processing equipment for the various crops was also demonstrated during the group trainings.

Procurement of food processing equipment

The project procured various pieces of equipment (manual and motorised chippers, graters and pressers) for food processing. The pieces of equipment were demonstrated in each of the operational districts during training of the groups, field days, products promotions and shows. On average 10 demonstrations were held in each of the districts on food processing equipment and their distribution. The Southern Africa Root Crops Research Network (SARRNET) procured 5 manual chippers and petrol driven type through Mt Makulu Food Storage and Conservation Unit, as a result of the collaboration with the project.

The project also pursued avenues to foster linkages between the women groups and sources of finance to acquire processing equipment. Micro – financing Institutions (MFI) such as Micro Bankers Trust (MBT), ECLOF and World Vision International (WVI) were approached. Kanabombe in Kaoma mobilised their own resources and procured a cassava screw press.

The handicap was that these efforts trickled in at a slow pace and the benefit may be realised well after the project period. Fabricators on the other hand increased their capacity to fabricate equipment even for crops that were not of mainstream business lines like cassava.

Commercialisation of processed products

The women and youth group were trained on how to process and package quality products that were on demand in the operational districts and Lusaka. The products included sweetpotato fritters and chips; cassava chips, flour, gari, biscuits, chinchin and cakes, dried vegetables; jam and peanut butter. Using some of the products as example, the groups were trained in simple record keeping, planning, costing and price determination.

The project conducted a survey on marketable products to assist groups to make products that sold. In Lusaka, intermediaries for products like gari, cassava flour and dried vegetables were identified. These included Chunno Agri-Group Ltd, Sylva Catering and True Value Super Market. The project further enhanced linkages of the groups with the intermediaries by holding a number of product promotions at restaurants in various towns. The aim of the promotion was to promote cassava, sweetpotato and cowpea as complementary foods to maize.

Various utilization options were prepared and promoted to the public during the promotion. Some of these promotions were conducted in Chipata, Lusaka, Choma and Kabwe. These promotions were targeted at marketers. Two days were dedicated to training them in food processing covering processing, preservation, utilisation and marketing before holding a public display of the processed products. Retailers and restaurant owners were invited to the display.

The net effect of the above mentioned effort and that of promoting cassava products after training is that commercial linkages were beginning to develop. For example Fajema cakes and Restaurant where the project promoted cassava products is now buying gari from the women group to meet the demand from the consumers. Other restaurants are reportedly having included cassava products on their daily food menu.

To enhance this process of commercialisation, SHAPES has been testing various processed food products for quality assurance and shelf life with the Food Science and Technology laboratory at the University of Zambia, School of Agricultural Science, as a way of winning consumer confidence. The project also developed a logo for packaged products identifying the products promoted by the project through the women groups. The packaging material also carries recipes on the backside and an HIV/AIDS message on the front side.

On the efforts of Food Security Pack Project under PAM, the project has recently been working with three bakeries in Lusaka that were encouraged to produce composite bread and buns blended with cassava flour.

A sensory evaluation was conducted to assess the acceptability of blending bread by the consumers. The evaluation was done at Unza and Chilenje market for a day with the participation of not less than 60 consumers (gender balanced) at each location. The samples were for 10% cassava blend, 15% and the standard wheat bread of 100% as a control which were evaluated for colour, texture, flavour and taste by way of a questionnaire and rating them using a hedonic scale.

Putting aside the preferred wheat bread, it was established that for all the attributes, the 10% blend was preferred to the 15% blend at UNZA. At Chilenje, the opposite was true and the percentage liking was significantly different among consumers, 21% of the consumers preferred all the 15% attributes in comparison with 10% blend. The results showed a big difference in the consumption patterns of the consumers. It can be speculated that Chilenje community is more accustomed to eating minimal processed foods than the UNZA community.

All the consumers, except one, could not detect cassava flavour in the blended bread. As for those in Chilenje, the salty/sour taste in the 15% was appreciated and consumers thought the taste was a result of prolonged fermentation. They could not associate that unusual taste to the inclusion of cassava.

It was evident therefore that both composite bread of 10% and 15% were accepted by the consumers in both locations except that the level of acceptability varied. Both products can be on demand as long as texture and colour are improved especially with the addition of a little bit more oil and marketed as “Cassava Enriched Bread”

Training of cassava farmers

In recognition of the contribution cassava can make in complementing maize for household food security and the danger cassava can cause if not well processed, the project embarked on training of cassava growers in cassava processing from within the operational districts of SHAPES. Apart from the SHAPES supported farmers, the training also included farmers supported by other projects and those that have just been growing the crop. However, due to budgetary limitations, an average of 30 farmers was trained per target district. Where possible, a husband and his wife were trained together to enhance household knowledge and awareness in cassava processing. In Lundazi, Home economics teachers were also included in the training. Pupils and teachers from the International School of Lusaka were trained on request

The aim of the training was to strengthen knowledge and skills in processing and utilisation of cassava and ensure household food security. Topics covered included cassava production, processing, storage, utilisation, entrepreneurship and malnutrition. Cassava production covered the available varieties, crop management and sanitation; while utilisation included preparation of cassava flour, (for nshima, fritters, biscuits, cakes, chinchin, doughnuts, bread and buns), chips (as snack, fried or roasted), grating (for gari) and preparation of cassava leaves for relish.

At the end of each training workshop a number of stakeholders were invited to attend the display function for cassava products. These included restaurant owners, marketeers, farmers, government officials, NGO staff and owners of agricultural equipment outlets.

Cassava processing and utilisation workshops were conducted in Kaoma, Mumbwa and Itezhi Tezhi to strengthen quality control during processing of gari and promote diversified use of cassava for food security and increase income. The workshops focussed on processing of cassava into “gari”, a West African food. This is reported to have been emanated from interest expressed by Chunno Agri Group Ltd. and Chukwuemeka mines in marketing the product.

Some members of Kanabombe women group are experts at making gari and they are highly recommended to spearhead farmer to farmer extension and ensure sustainability of the activity

Outside the SHAPES operational areas, the project facilitated cassava processing training for women and youth groups Itezhi Tezhi under FAO supported programme through the area Food Security Committee at the request of the stakeholders. The training was to back up the massive cassava production in those two areas.

SHAPES project in collaboration with PAM –FAO Emergency Agricultural Intervention project organized a Cassava Processing, Utilisation and Marketing Training of Trainers Workshop at Mwanabinyi Motel in Senanga. Participants were from the Area Food Security Committee that covers a total of 10 to 15 villages per committee.

Collaboration

The project collaborated with the MDSP in promoting seed processing equipment and food product in two districts (Solwezi and Mwinilunga) of Nothwestern province. The project demonstrated processing and utilisation of sweetpotato and cassava for MDSP farmers. Again there was a cassava product display.

There is great potential in boosting the cassava utilization industry. What Zambia needs is more of resource support to research and market infrastructure development. The demand for cassava flour within the country is quite high; the missing link is information and market linkages for farmers to scale up production and processing. Zambia needs cassava –

processing centres in the form of cooperatives or farmers' group that would process and package cassava flour into 10- 25 or 50 kg bags.

The sure market is for the private sector to agree on substituting 10% wheat with cassava flour in bakery products and boarding schools to procure 20% cassava flour for blending with mealie meal. This would raise the farmers and rural processors' incomes. The animal feed, wood / paper and food / beverage industries are potential growth points.

Cooperative League of the USA (CLUSA)

Gari is a product produced in Western province by Chunno Agri with support from CLUSA. CLUSA has assisted in the setting up of two gari processing plants. The first gari plant is based in Kaoma and has produced over 30 mt of gari, which was sold to CARE International and used as part of their relief food programme. The second gari plant is based in Mansa and is running as a smaller operation. The owners have a ready supply of cassava which they are processing themselves and marketing in the Copperbelt where there is a sustainable market for the product.

CLUSA would like to expand the cassava processing project to set up further 8 gari processing units in Northern, Serenje, Luapula, Kaoma. The units would be capable of producing 350 kg of gari per day, or approximately 650 mt per annum. The market for the product would be World Food Program to promote a diverse food production base and instant food which would be useful for home based care or orphan feeding programs.

The benefits to the project are various:

- Diversification of food production and the stimulation of economic activity in isolated rural districts with a cassava surplus but no market.
- Creation of employment (each gari unit would require at least 35 staff) with related income flow to rural areas.
- Women participation (almost all employees of the two plants are currently women).
- Provide a market for CLUSA farmer's excess cassava with in situ added value.
- Provide suitable convenience food for home-based care or orphans feeding programs and an alternative domestic origin of food for WFP.

AFRICARE/FAO

Facilitate training of farmers and extension officers in cassava processing, utilization and marketing

As part of training, the project conducted cassava utilization, processing and marketing workshop that attracted 9 MACO extension staff and 48 farmers who attended a two day workshop in Monze. These participants came from the project operational area in Southern province. The main objective of the workshop was to impart knowledge in cassava utilization, processing and marketing skills. Details of this training were covered under section 4.2.1.1.

4.3.4.2. Private sector

Table 28 presents a summary of the private sector involved in or aspiring to utilize cassava products in their industries in AEZ 1&2.

Table 28 Inventory of private sectors and interventions in cassava promotion of cassava trade and processing.

| Name of Institution | Year of intervention | Intervention | Objective | Provinces of intervention |
|--------------------------|----------------------|--|---|---------------------------|
| PECO Enterprises Ltd | 1983 | -cassava biscuits -cassava flour -poultry feed | -substitute wheat flour in biscuits and reduce production cost -substitute maize with cassava chicken feed | Luapula Lusaka |
| Tiger Animal Feeds | On plan | Livestock feed | -substitute maize with cassava in stock feed and reduce cost | National |
| National Milling Company | On plan | Poultry feed | Substitute for maize in stock feed | National |
| Chunno Agri | | Cassava flour Gari | Business investment | Western & Lusaka |
| Breweries | On plan | Brewery | Substitute for maize in brewery | National |

PECO Enterprise Ltd

PECO Enterprise Ltd is one of the oldest private sector organisation that has been involved in cassava business. The business is reported to have been on and off since early 1980s due to erratic supplies of cassava in the past, although now there is an increase on the volumes coming on the market.

The main intervention of the Enterprise is on the use of cassava flour in the biscuit industry and to reduce the quantities of imported wheat into the product. The Enterprise is also aiming at use of cassava for chicken feed in Mansa. By using locally produced raw material in these areas, it is hoped that PECO could reduce on the cost of production and the consumer price.

Table 29 below summarises the answers of the Enterprise to the questionnaire. PECO's target group is mainly the retail shops in Lusaka, but can be extended to other towns in future. The business could have been encouraged if the supply of cassava was consistent and reliable through out the year. As earlier mentioned, in the past, the business used to close due to lack of cassava. The business could be sustainable if only the production, quality and supply of cassava from the farmers could improve. The scrupulous middleman takes advantage of the farmer by paying less for the commodity at the farm and inflates the price to the industry; that may also affect the sustainability of the industry.

Table 29 Summary of answers for the questionnaire by Private Sector Trade and Processing (PECO Ent. Ltd)

| Target group | Objective | Trade stimulation | Sustainability |
|--|---|---|-----------------------------------|
| Retail shops for now, in future aim at export market | -substitute wheat flour in biscuits and reduce production cost -substitute maize with cassava chicken feed | Availability of cassava from the producer | Improvement in cassava production |

PECO produces biscuits and cassava flour which goes in super markets for nshima. In Mansa, the Enterprise is also producing chips that are used in the formulation of chicken feed on their company farm, but they intend to start supplying others wishing to use their product. The Enterprise is also looking at the possibility of exporting dried chips.

The key markets in Lusaka are Melisa, Rendezvous, and Castle Super markets. Due to poor supply of cassava in the past, the Enterprise has not started establishing a proper business

recording system, therefore could not give the quantity on demand in a year, but indicated that there is potential for the market.

Demand

Table 30 Summary of answers for the questionnaire by Public Sector Trade and Processing (PECO Ent.LtD)

| Products | Who do you sell to? | Key markets | Quantity/yr. | Potential of market |
|-----------------------------------|---------------------|---|--|--|
| Cassava flour, biscuits and chips | Retailer shops | Melisa, Rendezvous, Castle Supermarkets | No data because of erratic supply of cassava | There is a potential if supply assured |

PECO procures most of the cassava used in the industry from Luapula cassava farmers with a bit of it from Soweto market (Table 30).The industry is not specific on the type of cassava variety as long as it is processed and sold in form of dried roots or chips.

Supply

It is difficult for the farmers to process their cassava during the rainy season. As a result of this, there is a poor supply of the commodity and also the quality is low affecting the price as well. Due to short supply in the rainy season, the price tends to be high and falls back in the dry season.

Table 31 Summary of answers for the questionnaire by Public Sector Trade and Processing (PECO Ent.LtD)

| Source of cassava | Varieties | Purchase price | Transport cost | Pricing in a season | Farmer linkage |
|---------------------------------|---------------------------------|--|-------------------------|-----------------------------------|----------------|
| Luapula also from Soweto Market | Both sweet and bitter varieties | high from traders but low from farmers | -high for long distance | Changes depending on availability | Direct link |

The price offered by the traders always tends to be prohibitive. PECO would prefer to buy cassava direct from the producer. The transport cost is always high (Table 31) and that led the Enterprise to open up another handling plant in Mansa and reduce on the quantities transported to Lusaka.

Impact

PECO Enterprise has been making a profit of about 20%, although that information is a business secret and not sure of its reliability.

They also claim the patent ownership of the biscuit industry, meaning not anybody can just go into that business any how, and they are legally protected.

Conclusion

PECO's determination in the business may be an indication of the potential the business has. However, the problem of erratic supplies and quality of cassava to the industry seem to be one of the constraints to increase the productivity of the biscuit plant.

Chunno Agri-Group Ltd

The garification plant started in 2001 with the support from CLUSA at Kaoma and has an administrative office at the Show grounds in Lusaka. Chunno is targeting both the local and international markets (Table 32) to promote the utilisation of cassava for industrial purposes.

Zambia has abundant resources and environment for production of cassava, but these resources are not being utilized, yet Zambians have no food and have to depend on relief food. That alone is a trade stimulation to prompt Chunno to venture into industrial utilisation of the commodity. The industry is sustainable but requires some government support in form of establishing basic infrastructure

Table 32 Summary of answers for the questionnaire by Private Sector Trade and Processing (Chunno Agri-Group LTD)

| Target group | Objective | Trade stimulation | Sustainability |
|---------------------------------|-------------------------------------|--|-------------------------|
| Local and international markets | Promoting cassava use in industries | Potential of cassava production in the country | Production and policies |

Chunno's main products are gari and cassava flour. However, they intend to expand into chip production for export and also for livestock feed (Table 33). These products are being sold to the general public. They intend to be exporting surplus gari to countries such as Gabon and some SADC member countries targeting the West Africans living in those countries.

In Lusaka, the customers go to buy the commodity from the Show Grounds while some of it is being supplied to Super markets such as Melisa in Kabulonga. Arrangements are being made for South African markets. The Zambians are still learning to incorporate gari in their diet menu hence the demand for gari is still very low.

Demand

Table 33 Summary of answers for the questionnaire by Public Sector Trade and Processing (Chunno Agri-Group LTD)

| Products | Who you sell? | Key markets | Quantity/yr. | Potential of market |
|---------------|----------------|--------------------|---------------|---------------------------|
| Gari Flour | General public | Melisa Supermarket | 1000 -3000 kg | Yes, but not quantifiable |

Efforts were made to produce yellow gari like in Nigeria, but the palm oil obtained from the Democratic Republic of Congo could not meet the requirements. Therefore their clients have resorted to the white gari.

When the project started in 2001 the demand for gari was about 1000 kg and has risen to about 3000 kg to date. Although there is an increase in production (2000 kg), the returns have not been impressive considering the investment put into the business. However, there is potential for the business.

The aim of opening up the Kaoma plant was to have it as close to the source of cassava production as possible and reduce the cost of transportation (Table 34). The common cassava varieties grown by farmers are Bangweulu, Nakamooya, Ngoma and George.

The variety does not really matter as long as it is processed and is in dry form. However, some varieties tend to have low dry matter yields affecting the total output of the final product. Bangweulu, Nakamooya and Kapumba are all good varieties, but Ngoma is watery. The ratio of output is supposed to be 5:1 i.e. five bags of fresh cassava to one bag of gari.

Supply

Table 34 Summary of answers for the questionnaire by Public Sector Trade and Processing (Chunno Agri-Group LTD)

| Source of cassava | Varieties | Purchase price (fresh wt). | Transport cost | Pricing in a season | Farmer linkage |
|-------------------|---|----------------------------|--|--|--------------------------|
| Kaoma | Bangweulu Kapumba Ngoma George | K300/kg | A truck load of fresh cassava costs K150,000 for 50km ie. K3000/km | High in rainy season and low in dry season | Direct link with farmers |

At Kaoma, farmers are selling their fresh cassava at K300/ kg. Comparatively this price is high for cassava. The reason for the high price may be attributed to the low production of cassava in the country.

Transport is one of the most expensive aspects in this industry. Hauling a load of cassava would cost K150,000 for 50 km. In some cases there are no roads leading to the cassava field.

Kaoma has a diesel generated power system, at times there is no fuel to run the processing equipment and the high cost of transport, all these factors put together lead to big losses when operating the cassava processing plant. Owning transport for such purpose would in a way reduce the transport cost.

The cassava prices are seasonal, prices being high during the rainy season when it is difficult for farmers to process their cassava and even the quality is poor. However, the prices are low in the dry season. Like other private sectors, Chunno has a direct link with the farmers.

Impact

Currently Chunno Agri has not been in full function for some time and is difficult to assess the impact. However, they intend to resume the operations soon.

Conclusion

The potential of cassava is unlimited. However, the government could support the cassava industry in form of subsidies for purchase of small pieces of equipment for the small scale farmers. The government could create incentives and encourage small processing industries in rural areas.

Tiger Animal Feeds

The nutritionist in the company was interviewed who expressed interest in cassava as a substitute for maize. Like any other company approached, the main concern is the supply of the commodity to sustain the industry, as well as the quality and its nutritive content.

Cassava could be a good substitute for maize as long as it will be cheaper than maize. The company is also targeting the small scale farmer in the country.

The company suggested that farmers could organise themselves and form cooperative depots for collection of cassava. In that way, it would reduce the cost of going round to individual farmers on these poor roads in rural areas.

At that time they were planning to get a sample to be sent to South Africa for analysis which is the same story that has been coming from Tiger to those who had approached them before over the same.

Following that, the consultant organised for cassava from some one who had a large consignment from which they wanted to get a sample. On 5th October 2005, when the nutritionist was contacted on telephone, he confirmed having sent the sample to South Africa and they are now waiting for the results.

National Milling Company

The National Milling Company is interested in a substitute for maize in livestock feed. Maize is the best ingredient with the next best candidates being sorghum and millet, particularly for chicken which is the major industry for their feed. But when there is a shortage of maize in the country, the company has to import maize, therefore cassava would be an ideal substitute. However, it was reported that cassava tends to be sticky for chicken because of its high starch content.

The use of cassava in the industry would depend on the cost and supply of the commodity. Since they also asked the consultant for the source of cassava, they were linked to the suppliers and hope that they will be able to do the trials and give a feed back soon.

Zambian Breweries Group

The Technical Director (Mr Ian Mackintosh) was met and gave his brief experience on the potential of cassava in the production of beer in Uganda. His friend was doing a feasibility study after his departure from that country. They have not really started using cassava in Uganda either.

Mr Mackintosh is collaborating with UNDP who are also linking up possible users of cassava to the producers. In this case every thing is still on plan and requires a lot more time.

Meanwhile, they would like to have the statistics of the crop production. How much cassava is being produced and which part of the country, what varieties are being produced and all the base line information for the sustainability of the industry if they wish to utilize the crop.

4.3.5. Processing in AEZ 3

Table 35 below summaries the role the Research branch together with SARRNET have played in promoting the utilization and commercialization of cassava in AEZ 3

Table 35 Inventory of Public Sector Intervention in Cassava Trade and Processing (MACO/SARRNET)

| Name of organisation | Target group | Objective | Activities | Trade/ Processing Stimulation | Processing Sustainability |
|----------------------|---------------------|--|---|--|----------------------------|
| MACO/ SARRNET | Small scale farmers | Improving rural livelihood and income generation | -market opportunity -pilot processing and production sites | Demonstrations of equipment & Training | Flow of cassava production |

4.3.5.1. Public sector

MACO/SARRNET

The Zambia Agricultural Research Institute (ZARI) with SARRNET, have been conducting a project called “Improving Rural Livelihoods in Southern Africa.” The project aims at improving livelihoods and rural income through the introduction of market – led cassava crop technologies including improved planting materials, value adding and agro-enterprise development approach.

The activities are conducted in collaboration with various stakeholders such as private sector, extension services, farmers, NGOs and Community based organizations.

The main activities under cassava processing are:

- Market opportunity identification and quantification.
- Setting up pilot production and processing sites for high quality cassava flour and chips for industrial use.
- Strengthening the processing and marketing linkages of cassava sub sector.

Market Opportunity Identification and quantification

The Food Reserve Agency had contracted Sable Transport to buy cassava chips from Kaoma farmers in 2003. Sable bought close to only 2 metric tonnes within a month at K400/kg of dried chips. FRA discontinued the purchase despite the fact that farmers still wanted to sell their produce.

An informal market in Lusaka’s Soweto market was also identified. The local demand for cassava at that time was reported low and the business was not lucrative.

The main producers of cassava flour (those supplying supermarkets) are located in Lusaka, Copperbelt and Luapula provinces. These are Namando Investment, PECO Limited, Puliandale Farm, Mwinilunga Farm products and Lufimba Enterprises (Table 36). All of them process cassava chips into flour. The chips were sourced from Luapula, Western and Northwestern provinces and flour sold to super markets on the Copperbelt towns and Lusaka. In Lusaka, the retail price for cassava flour varied from K2, 900 to K3, 600 per kilogram.

Table 36 Potential Producers of cassava flour

| Producer | Location |
|--------------------------|--------------------------|
| Namando Investment | Lusaka West |
| PECO Enterprise | Lusaka (Great East Road) |
| Mwinilunga Farm products | Copperbelt Province |
| Lufimba Enterprise | Luapula Province |
| Puliandale Farm | Lusaka |

Potential Markets

Most of the potential buyers of cassava are situated on the Copperbelt Province, either in Kitwe or Ndola. There are also a number of food and non – food processing plants in the same towns such as Zambezi Paper Mills, Monterey, Printing and Packing company, Wood Processing, Basonite and Unity Packaging (Table 37). Most of these companies use starch as a raw material in the manufacturing of their products.

Monterey printing and packaging company utilizes cassava in the production of carton boxes. Cassava starch was found better and cheaper than imported corn starch. This firm also uses cassava flour in the production of packing materials.

Table 37 Companies that can provide potential markets for cassava

| Industry | Location | Source of raw material | End products | Cassava requirement | |
|----------------------------------|-------------------|--------------------------------------|---|---------------------|--|
| | | | | Type | Quantities /year (mt) of dried cassava |
| Zambezi Paper Mills | Ndola, Copperbelt | Individual supplies from Ndola | Tissue paper | Flour | 20 |
| Monterey Printing &Packaging Co. | Ndola, Copperbelt | Individual supplies from Mansa,Ndola | Packaging materials (boxes) | Flour | 100 |
| Basonite | Ndola, Copperbelt | Individual supplies from Ndola | Particle boards for building and furnisher finishing (milenine) | Flour | 20 |
| Wood processing | Ndola, Copperbelt | Individual supplies from Ndola | As glue for joining particle boards | Flour | 24 |
| Unity Packaging | Ndola, Copperbelt | Individual supplies from Mansa | Packaging materials (boxes) | Flour | 80 |
| Tiger Animal Feed | Lusaka | N/A | Feed formulation | Chips and flour | 3,600 |
| Total | | | | | 3,844 |

Zambezi Paper Mills makes various products from recycled paper with the major ones being white, khaki and tissue paper. Cassava flour is used in the production of khaki paper.

The supply of cassava flour is very erratic and of poor quality compelling the companies to either procure in bulk at a certain period or look for alternative source of starch outside Zambia. However, it may not be ideal to procure in bulk especially if the produce is to be stored for a long time. On the other hand, importation of a product such as cassava, which has a high potential of being produced and processed locally may not be the best option for an undeveloped economy such as of Zambia.

Tiger Animal Feeds, a stock feed company based in Lusaka has already been covered above although MACO/ZARI had earlier contacted them also.

Set-up of Pilot Production and Processing Sites for High Quality Cassava Flour and Chips for Industrial Use.

The production and processing sites are Kaoma in Western and Northwestern provinces. Luapula (CFC), Northwestern and Western (Kaoma) provinces are the major producers of cassava and contribute 60% of the cassava production in Zambia.

The choice of sites was done in collaboration with various stakeholders. The priority areas were those where previous work was done by RTIP to improve cassava production practices and have access to reliable market. Access to market was another important factor because of the current emphasis on income generation and commercialisation of cassava and its products.

Local cooperative unions that are currently active are a better option to manage the purchasing of the roots from farmers, process and make the marketing arrangements to sell the product to the urban market as opposed to individual business persons. However, the

cooperatives will be required to undergo a thorough training in entrepreneurship skills in order for them to operate as a sustainable and viable venture.

The area for the processing site in Kaoma is on a virgin land, where electric power can be tapped from the existing buildings about 400m away. The water source from the council is about 1 km hence the best would be drilling a borehole.

In Northwestern province, the local authorities recommended that the processing plant should be located in Kabompo because of its high production and proximity to other production areas. However, it is important to note that in Kabompo, the road network is poor, power is diesel generated which is usually regulated and the district is about 560km away from the potential industrial market on the Copperbelt. Solwezi happens to be a suitable district as it has electric power and close to the Copperbelt markets.

Cassava flour grades and standards are to be developed by the various stakeholders in close collaboration with the Zambia Bureau of Standards (ZABS). Specific on safety levels, packaging, transportation, storage and labelling requirements will be outlined. DRSS has collaborated with ZABS in the development of standards for other crops like maize. This activity has not been finalized due to delays in release of funds from the SARRNET office in Malawi.

Strengthening the processing and marketing linkage of the cassava sub sector

This activity involves dissemination of cassava production and processing technologies to extension staff, NGOs and farmers, through training courses, demonstrations and workshops.

Demonstrations were conducted by Mt Makulu Research Station during field and open days. The field day held at Mt Makulu Research station attracted about 500 people. Out of that number 60 were extension staff, 40 from the private sector, 10 policy makers, 35 researchers and 355 farmers. Two hundred and eight five were male and two hundred and fifteen were females (215).

The above mentioned demonstrations were conducted on the use of motorized and manual cassava chipping machines. Various products using cassava flour were also made like cakes, biscuits, meat pies, scones etc.

Training course for local fabricators of cassava processing machines is still scheduled to take place in Zambia with the assistance from SARRNET head office.

4.3.5.2. Private sector

PECO Enterprise Ltd

In Mansa the Enterprise has just started formulating chicken feed from cassava chips for their chickens at the farm. It is envisaged that soon the product will be on sale to the general public. For further details refer to section 4.4.1.2 (PECO Enterprise).

4.3.6. Conclusion on processing

- PAM trained the staff, women and youth groups in food processing and packaging quality products on demand that developed a wide variety of cassava products. These women and youth groups were linked up to cassava product intermediaries and financial institutions for the sustainability of the impact of the project.
- PAM started motivating local fabricators to fabricate more processing equipment and conducted demonstration of new cassava processing equipment but more equipment and training are still required in production areas to expedite the processing aspect and increase the quantities of cassava to the agro-industries
- PAM also promoted cassava as complementary crop to maize and ensure household food security with the surplus to supply potential industries. Currently cassava supply is

erratic and insufficient for running of a business especially during the rainy season and is also of poor quality. Cassava has potential in the private sector industries although the transport cost is high from production areas to the agro industrial centres.

- There is increasing demand for gari and other cassava products. The released cassava varieties are all high in dry matter content and good for gari and flour.
- Animal feed companies require more information on production, quality and form of product to the industry. However, for cassava to be adopted in these industries, it should be cheaper than maize. There is also need for the farmers to organise cooperatives in rural areas and facilitate collection points for their cassava and minimise the transport cost of travelling to individual farmers through those bad roads.

4.4. *Bottlenecks in the promotion of Cassava utilization along the value chain*

4.4.1. Production and provision of planting material

- Low cassava adoption rate was recorded in Southern province due to poor extension services and coordination.
- Recommended cultural practices by Research branch have not been widely disseminated by the extension services to farmers in Southern province. This was supported by the request from CARE that Research branch could intervene in training of their farmers since teaching information on the crop is limited from their office
- Most of the cassava cuttings distributed were delivered to the farmers late (January) and were attacked by pests while some were destroyed by their domestic animals if the crop was not fenced.
- PAM and other NGOs used to source their cuttings from either Mansa or Mutanda Research Stations. Due to long distances of transportation and handling, these cuttings dried up and had poor establishment (of less than 20%) in the field.
- Farmers in Southern province could not retain their cassava planting material because of animals browsing and damaging the standing crop in the field if not fenced. This led to a perpetual dependency of planting material on supply from NGOs.
- Some planting material distributed by the DACOs' offices were mixed and discouraged the farmers since they were looking for improved varieties only.
- Poor financial and staffing support to Research branch is retarding more technology development and staff innovation.

4.4.2. Cassava production at smallholder farm lever

- The rate of cassava adoption was affected by the amount of cassava cuttings a farmer received, the time when cuttings were received, cassava diseases and pests, exposure to growing of cassava before PAM came on board and the publicity of the presence of the project by the agencies.
- Low yields of cassava have been experienced by the farmers because the crop has been cultivated under traditional cultural practices. Therefore field days and training courses were aimed at promoting the adoption of the new technologies developed such as crop rotation, early planting, spacing, selection of good planting material etc.
- Like for cassava cultural practices, traditionally, processing involved soaking and drying to flour which limited the products for food security. Promotion of improved food processing, utilization and storage techniques has broadened the number of products produced and even put into business for income generation.
- In the past, cassava farmers were using their own local varieties that are susceptible to pests and diseases as well as of low yield. The establishment of cassava nurseries closer to the producer has greatly improved the yield and increased the hectareage of the crop. However, the spread of improved varieties has not yet reached a significant population of cassava growers in the country.

4.4.3. Trading of cassava

- FRA is not well funded making it very difficult for them to purchase more cassava during the season and is still undergoing a learning process of cassava marketing and handling.
- The cassava market in Soweto is informal although it seems to be well organized without any institutional intervention.
- Cassava prices are seasonal being high during the rainy season and low in the dry season, by improvement on the processing and utilization of the crop, cassava products could be available on the market throughout the year.
- Traders complained of the high transport charges when bring cassava to the market.
- Poor market information, product preference, lack of price information, competing products, income levels, lack of storage facilities and processing time.

4.4.4. Processing of cassava

- Cassava supplies to potential industries are erratic and insufficient for running a business especially during the rainy season.
- Poor quality of cassava from the farmers leading to extra cost of cleaning it when it is brought to industrial plant.
- Poor road infrastructure in cassava producing areas prohibiting accessibility of the produce more especially during the rainy season.
- Animal feed companies require more information on quantities of cassava production, quality and form of product to the industry.
- Cassava should be cheaper than maize to attract the livestock feed industry that could be dependent on total annual production. High annual production would automatically reduce the price on the market and that could be easily attained with the release of improved cassava varieties but requires more planting material distributed to a large number of producers. .
- The price of locally produced chipper is prohibitive and small scale farmers can not afford. Most of the equipment on demonstration has been imported from either Nigeria or Zimbabwe. There is need to promote fabrication of the equipment by encouraging more fabricators to be involve in production and reduce the price.
- Cassava has a low socio economic appeal among urban consumers, is bulky, expensive to transport and store but processing reduces all these bottlenecks.

5. Conclusion & recommendations

5.1. *Input provision (cuttings)*

- Resuscitation and motivation of the extension services to disseminate newly developed cassava technology would improve yield and production of the crop in the production areas.
- Early distribution and preparation of receiving cassava planting material by the farmer during the season could reduce loss and poor establishment of planting material in the field.
- Establishment of cassava seed nurseries in each province would reduce the losses due to dehydration and high cost of transportation from Mansa or Solwezi (AEZ 3).
- The survival of a cassava crop in Southern province where livestock is part of the farming system is by guarding or fencing their fields.
- Field inspection by Seed Inspectors greatly improved the quality of cassava planting material produced and distributed to the farmers.
- To broaden up the scope of improved cassava varieties to the grower, all the newly released varieties need to be multiplied at a large scale in all the provinces, as of now the material is still in small plots at the Research stations threatened to be lost due to poor staffing.

- The support to the Research Branch by both the government and private sector should be continuous in anticipation of the growing interest from private sectors to utilize the crop for industrial purposes.
- Sweetpotato equally deserves the promotion of the Task Force. A few years ago, the production of sweetpotato in Zambia had reached international recognition such that some of it was informally being exported to the neighbouring countries in the region. Sweetpotato takes only 3 to 4 months to harvest, therefore it could be a better candidate for the drought affected parts of the country, even better than cassava.

5.2. Production at smallholder farm level

- Training of both the farmers and extension service staff should be a continuous process updating and imparting new technologies developed by the research branch aimed at promoting adoption of the technologies being demonstrated and supporting the rural seed system.
- More farmers in rural areas should be reached and trained in technologies of cassava production, processing and utilization by the extension services and NGOs involved and avoid repeating supporting the same group of an area by more than one NGO at a time.
- Technologies promoted should include crop rotation, early planting, weeding, selection of clean planting materials, conservation farming and emphasising on presence of cyanogens in roots and leaves that should be reduced to safe levels by means of processing.
- Cassava is deficient in some nutrients but rich in others especially energy. Cassava flour is a cheap source of energy comparable to maize and rice since its production cost is lower. The cassava leaves are richer in protein and energy than rape, a commonly acceptable urban vegetable. Cassava indeed has toxic cyanogenic glucoside substances but these can be removed through careful processing and use of sweet varieties.

5.3. Trade of cassava

- A prolonged and sustained increase in cassava production can only be achieved with better market opportunities created by increased demand in urban markets through domestic and industrial use.
- Development of standards and grades of cassava and improve on the quality and form of cassava coming on the market. FRA and the Research branch have already indicated the responsibility invested in the two institutions to make follow ups.
- FRA could share the experiences of other countries that have been in the business of handling big volumes of cassava in warehouses to reduce the losses.
- The public and private sectors should assist to promote awareness of the availability of cassava and encourage industrial utilization of cassava and food security by publicizing on the media.
- The public and private sectors could be a catalyst to the government to make deliberate policies of cassava utilization in some of the institutions such as livestock, starch industries, schools and prisons, as a substitute for maize.
- Improve on production information and market linkages for farmers to scale up production and processing requirements.
- Although MATEP is in its infancy, it could play a big role in encouraging establishment of rural industries for cassava processing and avoid the transportation of cassava raw materials to be processed in Lusaka or Copperbelt. Only final products should be coming to Lusaka.
- The public and private sectors could subsidise establishment of basic infrastructure in a hygienic Soweto environment or new market for cassava.
- Traders were clear on need to be done to commercialise cassava by more education campaign, getting it to appeal to the young generation (children) by mixing it with other foods, informing people who are unused about nutritious aspect and preparation as well as promoting production and preparation in non tradition areas (FAO, 2005).

5.4. Processing

- There is need to create and raise public and consumer awareness about the potential business opportunities that are found in cassava. There is also need to close this yield gap through yield enhancing interventions, providing support to small and medium scale processors and entrepreneurs to acquire processing equipment kits and integrating cassava into agric-business.
- Establishment of processing centres in form of cooperatives or farmers group that would process and package cassava flour.
- Promotion of substituting 10 – 15% wheat with cassava flour in bakery products could help to utilize a lot of cassava produced and create market for the commodity.
- More efforts to promote cassava are required through improvement of statistics, increased political will, tax and investment incentives for industries that demonstrate adequate integration of cassava as a raw material in their product. It is important to encourage all food relief agencies and institutional boarders (schools, hospitals, prisons, refuges etc) to use a proportion of cassava in their diet.
- Efforts should be made to promote adoption and integration of cassava into industrial products in companies such as Milling Companies, Zambezi Paper mills, Unity Packages, Peco Ltd, Wood Processing Industry, Trishul Company Ltd and Monterey Printers

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7. Appendix

Appendix 1: Quantity of cuttings delivered and received, number of beneficiary households and area of cassava per season

| Agricultural season | Organisation | Quantity delivered | Beneficiary household | Quantity /beneficiary (30cm sticks) | Area planted /beneficiary (ha.) | Total area planted |
|---------------------|--------------|--------------------|-----------------------|-------------------------------------|---------------------------------|--------------------|
| 1997/98 | PAM | 5,100 | 17 | 300 | 0.75 | 13 |
| 1998/99 | PAM | 3,830 | 49 | 100 | 0.25 | 12 |
| 1999/00 | PAM | 86,000 | 860 | 100 | 0.25 | 215 |
| 2000/01 | PAM | 175,000 | 175 | 100 | 0.25 | 44 |
| 2001/02 | PAM | 215,000 | 430 | 500 | 1.25 | 563 |
| | CARE | 27,000 | 55 | 500 | 1.25 | 70 |
| 2002/03 | PAM | 155,000 | 155 | 500 | 1.25 | 194 |
| | CARE | 193,000 | 1,932 | 100 | 0.25 | 483 |
| 2003/04 | PAM | 147,100 | 147 | 100 | 0.20 | 184 |
| | CARE | 250,000 | 500 | 500 | 1.25 | 625 |
| AVERAGE | | 125,703 | 432 | 280 | 0.695 | 240.3 |
| TOTAL | | 1,257,030 | 4,320 | | | 2,403 |

Appendix 2: Achievement attained by PAM in 2002 to 2004

| Intervention/Component | Target | Achievement | Variance |
|--|-------------------------------------|-------------|----------|
| Seed Multiplication | | | |
| Training in Seed Multiplication and marketing | 900 | 2153 | 1253 |
| Retention of Seed Entrepreneurship | 60% | 80% | 20% |
| Formation of Seed Growers Associations | 10 | 12 | |
| Crop Diversification | | | |
| Training in early planting, minimum tillage, rotational cropping and use of improved seed. | 5,000 | 5,749 | 749 |
| Exposure of additional farmers to Crop Diversification Methods | 15,000 | 28,745 | 13,745 |
| Food Processing and Storage | | | |
| Training in food processing, pest control and improved storage | 300 | 427 | 127 |
| Utilisation of taught methods | 50% utilization at least one method | 100% | 50% |

Appendix 3: Methodology frame work of study.

Cassava Promotion in Zambia:
Overview of Past Interventions

1. Framework

2. Who has intervened?

- 2.1. Cutting distribution to promote production
- 2.2. Private sector trade and processing
- 2.3. Public promotion of processing and trade

| | AEZ 1&2 | | AEZ 3 | |
|-----------------|---|--|---|--|
| | public | Private | Public | Private |
| Processing | <ul style="list-style-type: none"> • PAM • CLUSA • MACO/SARRNET • Africare | <ul style="list-style-type: none"> • Brewery (beer, sweeteners) • Feed companies (Tiger, Nat.mil) • Peco (biscuits) | <ul style="list-style-type: none"> • MACO/SARRNET • Africare • MATEP | <ul style="list-style-type: none"> • Peco (poultry feed) • |
| Trade | FRA | <ul style="list-style-type: none"> • Soweto market wholesalers and traders | FRA | |
| Farm production | <ul style="list-style-type: none"> • CLUSA | | <ul style="list-style-type: none"> • MACO | |
| Cuttings | <ul style="list-style-type: none"> • PAM • CARE • Oxfam (ICAZ, etc) • CLUSA | <ul style="list-style-type: none"> • Zamseed | <ul style="list-style-type: none"> • MACO | |

3. Interview guidelines

- 3.1. Cutting distribution to promote production
- 3.2. Private sector trade and processing
- 3.3. Public promotion of processing and trade

3.1. Cutting distribution to promote production

a) Interventions

| Cuttings | Year 1 | Year 2 | Year 3 | Year n |
|-----------------------------|--------|--------|--------|--------|
| No. of cuttings distributed | | | | |
| # households targeted | | | | |
| cuttings per household | | | | |
| Variety? | | | | |
| Certified? | | | | |
| Timing of distribution | | | | |
| year | | | | |
| month | | | | |

Extension support?
Agronomic advice,
courses
trainees

b) Impact

households growing cassava
following distribution
today
area planted in cassava today by recipient households
Yield attained
production per recipient household
following distribution
today
% consumed
% sold
source of planting material for recipient
households growing cassava today

3.2. Private sector trade and processing

a) Interventions

Demand
What final product do you produce?
Who do you sell to?
Which are your key markets?
How has your sales volume changed over time?
Quantity sold each year
Future growth potential of this market

Supply
Source of cassava
What varieties
Purchase price
Transport cost
Price seasonality
Does price vary throughout the year?
High month? Price?
Low month? Price?
Normal month? Price?
Do you have any direct link with cassava farmers?

b) Impact

Volumes of cassava purchased
Now
Potential

3.3. Public sector trade and processing

a) Objective
Target group?
Objective?

b) Project activities
What did you do to stimulate trade or processing?
What will make these processing businesses sustainable?

c) Interventions

Demand

What final product do you produce?

Who do you sell to?

Which are your key markets?

How has your sales volume changed over time?

Quantity sold each year

Future growth potential of this market

Supply

Source of cassava

What varieties

Purchase price

Transport cost

Price seasonality

Does price vary throughout the year?

High month? Price?

Low month? Price?

Normal month? Price?

Do you have any direct link with cassava farmers?

d) Impact

Volumes of cassava purchased

Now

Potential

Volumes of product sold

Profit per unit of sales

Is this activity commercially viable in the private sector?

Will private processors and traders continue when your project ends?

Appendix 4: Contact persons

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