**PROJECT R8827 [FTR PART 5]**

**APPENDIX 4: Socio-economic and M & E surveys**

**Achievements**

A study was conducted by Mrs Hamza, the social scientist at NARI, in order to asses the knowledge on CBSD and its control in district extension offices and among village extension workers.

A total of 62 extension officers from districts and villages were interviewed, Questions were administered by researchers to respondents (Extensionists) by using a prepared check list (Appendix 1) the interviews were conducted in district extension offices and village extension offices and in the homestead areas of some respondents.

In the village the researchers were guided by one of the district staff members and village leaders where possible. Nine councils were involved in this survey and respondents which are as shown in the Table 1.

**Table A6.1: district visited and the number of respondents**

| District | No. of respondents | | |
|---|---|---|---|
| | Males | Females | Total |
| Mtwara (R ) | 1 | 6 | 7 |
| Mtwara (U) | 1 | 2 | 3 |
| Newala | 5 | 0 | 5 |
| Tandahimba | 6 | 0 | 6 |
| Masasi | 6 | 2 | 8 |
| Tunduru | 8 | 2 | 10 |
| Nachingwea | 7 | 0 | 7 |
| Ruangwa | 5 | 0 | 5 |
| Lindi(R ) | 5 | 3 | 8 |
| Lindi(U) | 1 | 2 | 3 |
| TOTAL | 45 | 17 | 62 |

**Table A6.2: Food crops grown in order of importance**

| Crops | Average | Rank order |
|---|---|---|
| Cassava | 51 | 1 |
| Maize | 45 | 2 |
| Sorghum | 31 | 3 |
| Rice | 19 | 4 |
| Pigeon peas | 5 | 5 |
| Cowpeas | 2 | 6 |
| Millet | 1 | 7 |

**Table A6.3: Cash crops grown in order of importance**

| Crops | Average | Rank order |
|---|---|---|
| Cashew | 63 | 1 |

| | | |
|---|---|---|
| Sesame | 32 | 2 |
| Groundnuts | 18 | 3 |
| Maize | 8 | 4 |
| Cassava | 8 | 5 |
| Rice | 6 | 6 |
| Coconut | 6 | 7 |
| Horticulture | 5 | 8 |
| Tobacco | 3 | 9 |
| Bambaranuts | 2 | 10 |

Cashew appeared to be the most important cash crop followed by sesame and groundnuts. cassava was ranked no. 5 out of 10 crops Table 3.

Knowledge of level of understanding were established by looking at the following criteria:

- Mentioned pest if knows any pest 5%  2pests=10%
- Mentioned diseases any disease 5% 2disease=10%
- Recognise CBSD 5%
- Recognise CMD %5
- Mentioned any symptom of CBSD 5%, 4symptoms=20%
- Mentioned any CMD symptoms 5%,  4 symptoms=20%

If knows any control method 5%

- Mentioned any control method 5%, 4 control methods=20%
- Mentioned  where to get resistant variety 5% 2mentioned=10
- If knows serious damage5%

MAXIMUM TOTAL 100%

Each factor was given a mark (scored) 5% which contributed to his/her total score. Those who scored 0-45% were regarded as a group, which had little knowledge, more than 45% were regarded as people with more knowledge on Cassava Brown Streak Disease (CBSD).

Results: Those with excellent and very good knowledge i.e. those who scored 46% and above about 23% of respondents.

Although 72% of respondents said they could recognise CBSD and 87% for CMD, only 24% and 29% were actually able to give a good description of the symptoms. Only about 30% of interviewed extension officers new how to control CBSD [Table 5]. The most important control methods for both diseases were mentioned to be: uprooting and burning of infected plants, use of disease free planting materials, use of resistant varieties followed by field sanitation and crop rotation. About 73% of respondents knew where they could obtain resistant planting material. Naliendele Agricultural Research station was ranked number one in supplying resistant varieties of cassava followed by farmers own materials, and lastly, Mkumba research sub-station. The extension workers also knew where to get the information concerning CBSD control strategies. About 37% of respondents said was from NARI while 20% said it was from training/colleges, 17% from farmers fields, 17% from DALDO`s office, 7% from Mkumba, seminars 1% and meetings 1%.

**Table A6.5: Extension workers knowledge on CBSD and its control**

| Districts | Recognition of [say they know] | | Are able to describe Symptoms of | | Know how to control |
|---|---|---|---|---|---|
| | CBSD(%) | CMD(%) | CBSD(%) | CMD(%) | CBSD(%) |
| Mtwara(R ) | 71 | 100 | 14 | 29 | 29 |
| Mtwara (U) | 100 | 100 | 44 | 33 | 56 |
| Tandahimba | 50 | 83 | 6 | 39 | 6 |
| Newala | 100 | 100 | 40 | 47 | 27 |
| Masasi | 63 | 88 | 17 | 29 | 25 |
| Tunduru | 80 | 80 | 23 | 17 | 23 |
| Nachingwea | 57 | 71 | 19 | 24 | 24 |
| Rwangwa | 60 | 80 | 20 | 20 | 40 |
| Lindi (R ) | 67 | 67 | 30 | 19 | 42 |
| Lindi (U) | 67 | 100 | 22 | 33 | 33 |
| **MEAN** | **72** | **87** | **24** | **29** | **30** |

The most important sources of information for extension officers to update their knowledge were:
Workshops/seminars (18%), books (18%), newspaper (14%), radio 13% and leaflets (8%).
: Frequency of attending refresher courses

attending refresher courses was very low. Figure6 shows that about 47% of respondents attended refresher course only once, while 21% attended twice. The rest attended three times (5%), Four times (11%), Five times (8%) and 8-11 times (8%). It is very important that short courses should be emphasized in order to update extension workers with new research findings.

Conclusions - Extension officers do not know the economic importance of CBSD. If you try to follow the chain of information from researcher to end users (farmers), there is a communication breakdown which makes it difficult for farmers to receive messages about agricultural innovation. This is because most of the time research findings bypass MATIs [Ministry of Agriculture Training Institutes] and extension [District Extension Offices]. The best route would be for information to travel from research institutes through MATIs and from there to extension. Finally it has to go to farmers. Monthly training sessions (MTS) have stopped been funded by the national agricultural extension project (NAEP II ) and extension staff do not normally receive research reports. Village Extension Officers were not confident in advising farmers on control of CBSD. There is an urgent need for VEOs to undergo retraining in cassava IPM and this could be combined with training in post-harvest management and utilisation. There should be closer integration of ARIs, MATIs and district Extension offices.

Activity 7.2. This activity was modified slightly from the original activity described in the PMF but resulted in a more thorough description and evaluation of the knowledge dissemination and training given to teachers, extension workers and farmers.

**Achievements**
[Report prepared b y the projects social scientist at NARI, Mrs Halima Kwikwega]

**DEPARTMENT OF RESEARCH AND DEVELOPMENT**
**SOUTHERN ZONE**

# KNOWLEDGE DISSEMINATION OF CASSAVA BROWN STREAK DISEASE AND ITS CONTROL STRATEGIES.

**HALIMA KWIKWEGA**

**2004**


**Agricultural Research Institute Naliendele,**
**P. O. Box 509, Tel 023 2333 836**
**Fax. 023 2334 023, E-mail utafiti@makondenet.com**
**MTWARA.**

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The Zonal Research director for Research and Development (S), is highly acknowledged for his full participation and support in all undertaken activities in Naliendele Agricultural Research Institute (NARI).

The author also thanks the Zonal Research coordinator for his support in preparation and implementation of our activities.

Farmers and District councils are participation are always appreciated.

Finally, all NARI staff are highly acknowledged for their cooperation whenever we were conducting these activities which have lead to the success of this project.

**EXECTUTIVE SUMMARY**

Cassava brown streak disease (CBSD) dissemination activities were conducted using different methods or approaches e.g. training, radio broadcasting use of choirs, use of leaflets and posters, multiplication and distribution of cassava tolerant planting materials. Also the dissemination meetings were conducted in 6 project villages. Cassava multiplication was done through secondary schools which were situated near farmers. Also Farmer Research groups (FRGs) were used to multiply planting materials. The research stations (Naliendele and Nachingwea) were also used for multiplication of planting materials. Before this activity,
trainings to farmers, Ministry of Agricultural Training Institute (MATI) tutors, extension workers, Headmasters and District education officers were conducted to equip them with the knowledge on CBSD and its control measures.

Leaflets and posters were distributed in all district offices and villages where different studies and trainings were conducted. Also leaflets were distributed to many Naliendele Agricultural Research Institute visitors. The distribution of these materials was also done during dissemination meetings farmer field days and shows where most farmers (>500) and other stakeholders were given.

Choirs were also sang during different occasions e.g. field days and show to educate farmers on CBSD and its control strategies.

Therefore, chapter 1 of this report will give the general introduction of dissemination activities. Chapter 2 gives a report of different activities conducted. Chapter 3 gives the conclusion and recommendation.

## 1. INTRODUCTION.

Cassava (*Manihot esculenta)* is an important subsistence food crop in Tanzania and is mainly grown by smallholder farmers with little financial resources in mixture with other crops. In Southern Zone, cassava features prominently as a major staple food in all the Farming System Zones in Mtwara and Lindi regions and Tunduru district in Ruvuma region. Cassava is particularly important in south Masasi and in West Makonde plateau where 93 and 96% of households respectively grow cassava. (Katinila, et al., 2001). Cassava is a major crop in Southern Tanzania. It is grown primarily as a food crop and is the most important staple in the Southern zone. It is also an important cash crop in the zone. Though cassava is suitable and adaptable to all the traditional farming and food system of the zone, production and productivity of cassava is still low due to lack of improved planting material and poor management practices.

Cassava brown streak disease [CBSD] is the main biotic threat to food security in the coastal areas of eastern and southern Africa, where cassava is the staple. Building on work done in earlier phases, the project is promoting control measures for the

disease in combination with a campaign to disseminate to extension services and farming communities, knowledge on the biology and control of CBSD. Results from studies conducted in Tanzania reported that losses in root weight of up to 70% may be attributed to CBSD in a highly sensitive cultivars, severe stem necrosis and dieback. Hillocks *et al.* (2001). Apart from the viral diseases, other factors like, insect pest and weed infestations were identified as factors that might constraints the productivity of the cassava in farmer's fields. (Hillocks R.J *et al.,* 2003). On the other hand, processing of cassava is another important aspect to ensure storable products and reduce the amount of toxic components.

Roots and tuber research section has been doing research with farmer research groups in different villages of Mtwara rural, Tandahimba, Masasi and Lindi districts. Some cassava planting materials were sent to farmers. At least ten farmers from each selected village have been participating in these activities.

This project began in January 2003 and represents phase three under funding from DFID Crop Protection Programme (CPP) that began in 1996. The present phase is concerned primarily with promotion of control measures for cassava brown streak disease (CBSD). There are two main components: 1. Multiplication and distribution of CBSD-tolerant cassava cultivars. 2. Knowledge dissemination on biology and control of CBSD through education training.
The promotion of the knowledge on cassava brown streak disease (CBSD) and its control is being done through a variety of ways. These methods includes; making education and training programs, radio broadcasting, multiplication and distribution of CBSD free and tolerant planting materials. Also leaflets and posters were used. It was assumed that, since the introduction of CBSD control strategy project, there should be some sort of technology transfer from one point to another or from one farmer to another. For this case, it was expected that cassava planting materials from research might have been spreading to other farmers. This study therefore aims at finding out how the planting materials have been passed/ spreading/diffusing from one point to another. All these activities were aimed at creating more awareness and imparting more knowledge concerning CBSD and its control strategies to a wide range of societies apart from the project areas in the six selected villages of Ziwani, Mtiniko, Madaba, Chisegu, Mtua and Tulieni.

In the due course, farmer and extension workers knowledge assessment on CBSD and its control strategies were done. The results showed that these people (farmers 6 extension workers) had little knowledge. This led to researchers take more actions to look into ways which may lead to:

1. Multiplication and distribution of CBSD – tolerant cassava cultivars
2. Knowledge dissemination on biology and control of CBSD through education and training.

## 2. 0 RESULTS

### 2.1 Training

Farmer knowledge assessment and extension workers assessment studies were conducted. These studies came out with recommendations that extension officers and farmers need to be trained. Also headmasters and district education officers were trained for sensitization on CBSD and its control strategies before sending cassava planting materials to their schools for multiplication (Annex 1). Also farmers were also trained before they were given more planting materials for multiplication purpose. The training involves theory and more practicals. Table one shows the participants trained and the time they were trained

**Table 1: Participants trained and dates for training**

| Participants | Venue | Date | Remarks |
|---|---|---|---|
| 9 M.A.T.I tutors | NARI – Conference room | 1st Apr – 2nd Apr 04 | |
| 6 Headmasters, 6 District education officers | NARI – Conference room | 20th June, 2003 | |
| 44 Extension workers | NARI – Conference room | 22nd July, 2003 | |
| | Tandahimba | 5th May, 2004 | |
| | Masasi | 7th May, 2004 | |
| 186 Farmers | Project villages | October, 2003 | Dissemination meetings conducted in respective 6 project villages |

**School approach:**

In approaching to the use of secondary schools for dissemination purpose, the Regional education officer for Mtwara Region was consulted and told the need to use those schools. The idea was accepted and he helped in the selection of schools. The selection criteria for

Schools was based on the fact that:

1. The school was situated in cassava growing area.
2. Another criteria which did not apply to all school was that, the schools were had an agricultural discipline; although one or two schools did not fall in this; but it was put as one of the projects in schools. It was observed that, most of the schools were day schools hence, hoped that, students will be passing on information on daily basis to their parents for whatever they will be tought by their teachers. Therefore, after meeting the Regional education officer, schools were visited in May/June 6 September.This was aimed at making arrangement with headteachers for conducting a workshop after introducing the idea of planting materials multiplication to them. The trip was also aimed at seing whether it was possible to make presentations to secondary schools covering cassava topics like:

- Cassava and its uses
- Cassava virus diseases
- Control of CBSD and CMD

The headmasters had to give me the go ahead and agree on:

- Time in a term (time per term) to teach the topics,
- How much time have to be used to teach the topics and
- To develop real teaching materials.

**Course Outline.**

The course outline was divided into three sessions. Session 1 Theory, Session 2 Field practical and Session 3 Practical for cassava processing

- Importance of cassava
- Cassava cultivation and husbandry management
    - Important pests and diseases
- Practical on identification of Cassava pests and diseases
- Procedures on cassava processing and storage

**MATI Tutors:**

M.A.T.I was also contacted through principal and the academic officer. After a discussion there was an agreement on the date to conduct a training for tutors concerning CBSD and its control strategies. The principal of this institute admitted that, the training was very valid to them because, root and tubers are already included in their syllabus. MATI tutors are responsible for training extension officers Apart from extension workers, they are also responsible for training different groups of farmers and other stakeholders e.g. NGOs and CBOs. In regard to the above points, tutors were seen as part and parcel in the process of technology dissemination.

**M.A.T.I tutors, Extension workers, farmers, District education officers, Headmasters of selected secondary schools.**

The training for tutors, secondary schools headmasters, District education officers, Extension officers and farmers based on general knowledge dissemination on improve Technologies on cassava production and utilization. In cassava production, the topics covered included:

- Cassava and Ecological needs
- Cassava cultivation and crop husbandry management
- Knowledge on important cassava pests
- Knowledge on diseases with more emphasis on CBSD symptom identification an Its control strategies.

Utilization of cassava crop involved training on general uses of cassava for humans, livestock and industrial uses. Post- harvest processing techniques were also part and parcel of the training package whereby, tutors were shown two types of motorized cassava processing machines: A grater and a Chipper. These machines are labour saving technologies because they are efficient and effective in their use. The capacity of each machine is that, they can process a ton of fresh cassava per hour by using only one litre of petrol. The product from these machines takes from 2hrs to 2 days to dry as compared to traditionally processed cassava which can take up to 10 days depending on the weather condition. The qualities of products from the two processing methods are different. Improved processing machines gives a top quality flour which is marketable, and it secures high prices of Tshs. 250/= to 300/= per kg as compared to Tshs. 100/= to 150/= per kg of traditionally processed cassava flour. Before any training was done, invitation letters were sent to proposed participants. The Venue was Naliendele and any other agreed place like Tandahimba venue for extension workers from Mtwara (R), Mtwara (U), Newala and Tandahimba district, where as Masasi was a venue for extension officers from Masasi, Lindi ( R ), Lindi (U) and Nachingwea district. After the training, cassava planting materials were distributed to schools and villages.

**Extension workers training**

This objective of this workshop was to train the extension staff on cassava production and processing so that they deliver similar information and knowledge to the smallholder farmers to fight against poverty.

**Team**

- Dr. Louis Kasuga Agronomist, representative of the ZDRD
- Ms. Halima Kwikwega Socio-Economist

- Mr. Eliuter F. Halla Technician
- Mr. Muksin Driver

**Participants and Training venue**

- Extension staff from Mtwara Urban, Tandahimba and Newala district. The training venue was in Tandahimba at CCM Hqrts
- Extension staff from Masasi, Nachingwea, Lindi Urban and Lindi Rural. The training venue was in Masasi at Masasi Folk Development Centre (FDC).

**Opening speech by the Guest of honour**

The guest of honour at Tandahimba workshop was the Acting Acting District Executive Director, Mr J. B. S. Kavuta. In Masasi the guest of honour was the Deputy Chairperson for Masasi District Council. Both guest of honour had a common massage to workshop participants that they should take the workshop as an important session to gain new knowledge and clear their doubts about cassava production and processing problems. They emphasised that each participants should take the given opportunity to learn seriously so as to be able to deliver similar massage to those who did not get the opportunity to attend the workshop. They should bear in mind that cassava is the main subsistence crop for the majority of people in Southern Zone however production and productivity is still low. They opened the workshop by wishing success to all the participants.

**Participants.**

At the Tandahimba venue a total of 14 participants attended the workshop. All the invited participants turned up for the workshop (Table ….).

Table 2 Names of the participants at the Tandahimba venue.

| No. | Name | Title | Station |
|---|---|---|---|
| 1 | Patrick Nnunduma | AFO | Mtwara U |
| 2 | Mohamed A. Nachonde | AFO | Newala |
| 3 | Abraham P. Sagatwa | LFO | Mtwara |
| 4 | Mrope M. R. | PLFO | Mtwara U |
| 5 | Mustafa O. Mtemba | LPO II | Mtwara R |
| 6 | Onesmo B. Hava | AFO II | Mtwara R |
| 7 | Omary w. Gululy | SAFO I | Mtwara U |
| 8 | peter Y Mwera | AFO II | Tandahimba |
| 9 | Suleiman B. D. Yussuf | PAFO I | Tandahimba |
| 10 | Isabella Dismas | SAO | Tandahimba |
| 11 | Saidi M. Awadh | AFO | Kitama |
| 12 | Ally H. Linjenje | AFO II | Chilangala |
| 13 | S. S. Kapange | CO | Tandahimba |
| 14 | Ally A. Mohamed | AFO II | Mkwedu |

**Workshop activities in pictures**

**Theory classes at Tandahimba and Masasi venue.**

Plates 1-8 shows some of the activities conducted during the workshop at both venues. The theory classes were conducted in classes where different methodologies were used to emphasise points. the workshop facilitators used any convienient ,

The theory and practical classes were conducted by Ms Halima Kwikwega and Mr Eliuter Halla (Plate 2 and Plate 5). During the theory class participatory approach was used for discussions. Workshop participants shared experiences and exchanged ideas. The class sessions was just active like the practical session just because , a long service staff with the Root and Tuber Section.

**Practical Session**


Plate 1 Workshop participants taking notes during theory class session in Tandahimba

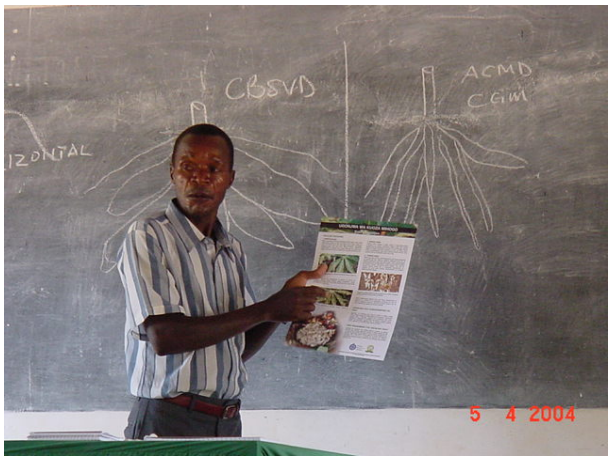


Plate 2. Mr Halla illustrating a point on a poster during theory class in Tandahimba

Plate 3. Mr Halla with workshop participants during practical session in Tandahimba district.

Plate 4. Workshop facilitators with participants during cassava processing practical session

**Masasi district**

Table 3: Names of participants

| No. | Name | Title | Station |
|---|---|---|---|
| 1 | Hassan A. Katuli | PAFO I | Lindi Rondo |
| 2 | Rashid B. Makanila | AFO I | Nachingwea |
| 3 | Rainery J. Duwe | AFO | Masasi |
| 4 | Kambogoro S Rashid | SAFO I | Mtama |
| 5 | Jafarani H Mohamed | LFO | Sudi |
| 6 | Idrisa A Mpojola | LFO IV | Nachingwea R |
| 7 | Abubakar M Sinani | AFO IV | Nachingwea U |
| 8 | George A. Banda | AFO III | Lindi Mjini |
| 9 | Amina M. Pemba | SAFO I | Lindi Mjini |
| 10 | Simon Masese | AFO I | Lindi Mjini |

| | | | |
|---|---|---|---|
| 11 | Veneline Umbella | AFO II | Masasi |
| 12 | Amiri K. Mshana | AFO II | Masasi |
| 13 | Njowele H. I | SAFO | Masasi |

Theory
The theory session was conducted in classroom.

**Practical**


Plate 5. Mr Halla talking to workshop participants during theory claa session at Masasi FDC

Plate 6. Workshop participants taking notes during theory class session at Masasi FDC.

Plate 7. Workshop participants discussing about cassava diseases in Masasi District.

Plate 8. . Mr Halla with workshop participants during practical session in Masasi district.

**Training evaluation results:**

**2.1.1. <u>M.A.T.I tutors</u>**

**Lessons learnt:**

- Learnt improved cassava production methods e.g planting material selection
- Known the importance and potential of the crop

- Improved cassava varieties which are tolerant to diseases
- 2 types of cassava (Bitter and Sweet) vars and their implications to food safety
- Important pests and diseases of cassava crop
- Known how to identify CBSD & cassava mosaic disease & their control strategies
- Learnt practically by visiting cassava research fields (Pathology & breeding) experiments.
- Learnt cassava post – harvest processing techniques (chipper and grater motorized processing machines.
- Learnt how to store cassava.
- Made demonstration on cassava product development where as things like cakes, doughnuts, chin chin and biscuits were made by using cassava flour.
- By making bites from cassava flour, one may save some money.

### 1.1.2 Extension workers

All participants to the workshop unanimously congratulated the research team for organising such a workshop which was very useful for improving their knowledge on cassava production and processing. They suggested that such workshops should be held regularly so as to update the Extension staff with new information and skills. However, their major concern was that the number of days for the workshop should be increased so that more time is devoted for practical and less for theory.

**Lessons learnt:**

- Extension workers have increased their knowledge in many aspects.
- It was the best opportunity to see the improved motorized cassava processing machines (chipper and greater) and get some demonstrations on how to operate them.
- This course has helped to remind extension officers on their field of work, (agriculture and human nutrition) after leaving college for a long time.
- This could be a very good assistance to the cassava processing groups which are going to be established if the district councils will facilitate.
- Improved storage and product qualities of cassava.
- Extension workers will be confident when educating farmers on all cassava topics.
- Diversification on the uses of cassava more than the traditional use of cassava flour for making a thick porridge (ugali).
-

### 2.1.3. <u>Importance of the course/training to participants</u>

The course was important to tutors and the communities as a whole because:

- It has helped tutors to become confident especially when they will be training on cassava topics because, they have updated their knowledge.
- This knowledge acquired when used properly, will help tutors to become entrepreneurs hence economic development by generating more income from using cassava technologies.
- Participants may use this knowledge to improve the nutrition status of their families.
- It is a good way of technology dissemination model (Figure1).

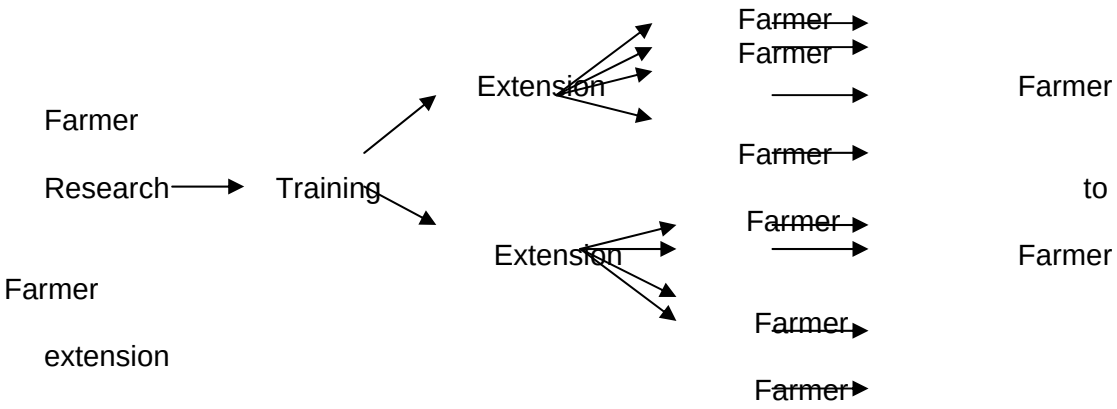


*Figure1: Technology dissemination model*

**2.2 DISSEMNATION MEETINGS IN VILLAGES**
**Farmers**

After farmers knowledge assessment, dissemination meetings followed whereby, all farmers in the project villages were invited. During these meetings, farmers were trained on CBSD symptom identification and its control strategies. This training strategy was accompanied with distribution of leaflets and posters to farmers. A total of 186 farmers were trained in six project villages(Table 4). Extension officers from each district were invited for these meetings which were also regarded as planning meetings. We also intended to make something like handing over of activities from research to Extension service.

Table 4: Participants for training courses on CBSD control strategies

| S/No | Village | Number of farmers who attended | | | Remarks |
|---|---|---|---|---|---|
| | | Males | Female | Total | |
| 1 | Ziwani | 27 | 18 | 45 | |
| 2 | Mtiniko | 20 | 12 | 32 | |
| 3 | Madaba | 31 | 15 | 46 | |
| 4 | Chisegu | 5 | 3 | 8 | ONJAMA operation |
| 5 | Mtua | 19 | 12 | 31 | |
| 6 | Tulieni | 11 | 13 | 24 | |
| Total | | 113 | 73 | 186 | |

In Chisegu, the attendance was not good compared to other villages because there was a coincidence between the village operation on ONJAMA business with the district authority and NARI staff. ONJAMA emphasized that each farmer should have at least an acre of cassava. Therefore, FRG leaders were requested to continue with the training to their fellow farmers.

**2.3 LEAFLETS AND POSTERS:**

Socio economic unit was supposed to liase with the Zonal communication officer. The Zonal communication officer had the mandate of preparing the messages for radio broad-casting and leaflets in collaboration with the roots and tubers staff as well as socio-economic unit staff. The posters were prepared at UK by NARI staff in collaboration with NARI staff. The message was prepared in English and translated by NARI staff into Swahili version.

Posters and leaflets depicting CBSD symptoms and control measures were distributed to farmers and extension personnel in project and non project villages through the zone. A total of 4000 copies of leaflets and 50 posters were produced and distributed to farmers, village and district authorities, NGOs Extension worker, tutors and many other stakeholders. The distribution was done either during training, agricultural shows and exhibitions and farmers field days. These were also distributed to the visitors of NARI whenever they were visiting the place.

**Conclusion:**

These were useful in educating farmers and other stakeholders and CBSD and its control strategies since the pictures and the messages reflected to their real problem. Some farmers were able to read but even those who could not read were farmers and stakeholders have admitted that, leaflets and posters are very good sources of information and have been very useful in educating farmers and other stakeholders, farmers were also requesting the same other crops other than cassava.

**2.4 RADIO BROADCASTING**

**CBSD – Radio Broadcasts**

The procedures for preparing radio programs were developed by Mr. Fakhi as follows:-

1. It was agreed that, three documentary radio programmes were prepared and broadcasted by Radio Tanzania. The programmes were about
   - Introduction (Disease description- magnitude, economic importance, areas affected crop loss etc by both farmers and scientists)
   - Effects of the disease (Farmers situation)
   - Disease management (control measures, recommendations and responsibilities)

2. Source of information.
   To make the programmes more educational and interesting, various sources of information and voices were incorporated during the programme preparation and presentation.

Farmers:-

Farmers in CBSD on farm trials were interviewed concerning:-

- History of the disease.
- Indigenous knowledge on the disease management/control.
- Best practical approaches in disease management (ITK/ Scientific knowledge).

Scientists:-

Scientists within Tubers/Roots department of ARI Naliendele were interviewed and give their recommendations on disease control – using cultural practices or chemical (if any), use of resistant varieties, control of the vector etc.

A total of 3 programs were broadcasted three times each for both Radio Lindi and radio Tanzania.

**Radio broadcasting results:**

Three radio programmes were prepared and broadcasted on the national radio (Radio Tanzania Dar es Salaam – RTD) for six weeks running towards the end of September 2003 for general awareness countrywide with a major focus to other project areas like Tanga and coastal regions. The same programmes were then broadcasted at the Zonal level in October and November on Zonal radio (Radio Lindi) to concide with cassava planting season.

The contents of the programmes included; - introduction – definition of the disease, symptoms, damage and economic importance, efforts to control the disease, farmers perception and knowledge and recommendations under methodology

**Radio broadcasting follow up**

A Mini-survey was done as a follow up to the radio broadcasting issue. Farmers from 15 villages were randomly selected and interviewed whether they have heard of the radio news concerning CBSD and its control strategies. A total of 98 farmers were interviewed. A sample six per village was estimated to be 5 people.

Data collection was done through interviews, by using a checklist. Data were processed and summarized in tables and charts.

**2.4.1 Radio broadcasting follow up results**

**2.4.1.1. Radio Ownership:**

Radio broadcasting was done before the new planting season in November 2003. A total of 98 farmers were interviewed. Out of these about 67% were man and 33% were women. From this sample, about 58% owned radios. The respondents were asked about the radio channels which they preferred to listen.

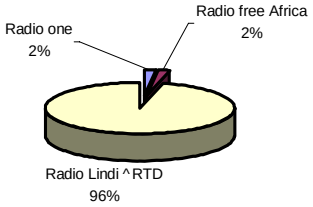


**Figure 2: Radio channels preferred by farmers**

Figure 1 shows that about 96% liked radio Lindi and Radio Tanzania Dar es Salaam (RTD); while 2% liked Radio Free Africa and 2% liked Radio One. The majority of farmers seen to be listening to Radio Lindi and Radio Tanzania Dar es Salaam simply because, these channels are ones which can be heard clearly everyday up to their villages compared to radio one and Radio Free Africa. On top of that, other channels are new compared to Radio Tanzania Dar es Salaam. Therefore most farmers are used to listen to their traditional radio programme which is Radio Tanzania Dar es Salaam (RTD).

### 2.4.1.2 Farmers benefited from established CBSD on radio programs:

It was been observed that; 58% of respondents owned radios, while 47% of farmers who owned radios, have benefited from the established radio programs on CBSD and its control strategies. Therefore, 28% of interviewed farmers (98), have benefited from these radio programs. This indicates that 72% of respondents did not hear the messages.

Table 5: Farmers benefited from radio broadcasting

| | Frequency | | | Percentage | | |
|---|---|---|---|---|---|---|
| | Men | Women | Total | Men | Women | Total |
| Total interviewed | 66 | 32 | 98 | 67 | 33 | 100 |
| Radio ownership | 44 | 13 | 57 | 45 | 13 | 58 |
| Benefited | 26 | 13 | 39 | 27 | 13 | 40 |

Farmer benefited from established CBSD radio programs. Some of determined farmers who head the radio programs for CBSD control strategies gained knowledge and have used that knowledge in their fields. But there were cases which also indicated that, radio programs did not lead to implementation of the knowledge to some farmers because, some of these farmers who heard the messages did not take it serious because they used to see extension officers demonstrating to them. Therefore they did not work on the messages.

Other farmers who are implementing the knowledge in CBSD and its control strategies got the information from different sources including radio broadcasting.

About 18% of respondents had some information on other farmers who have heard of the radio programs on CBSD and its control strategies.

**2.4.1.3. Time:**
Regarding the time which was used for CBSD radio program broadcasting, about 32% of respondents said it was good for radio listening to farmers while the majority of them (68%); said it was not a good time for farmers because of various reasons which include;

- Some farmers were still busy with field works at that time, hence not possible for them to hear the news.
- Others especially women said that, this was not a good time for them because at this moment women were still so busy with other household chores e.g. Food preparation for dinner, water fetching and fuel wood collection.

**Conducive time for radio news listening:**

Farmers had their own opinions with regard to the conducive time for radio listening.

Table 6: conclusive time for radio listening to farmers.

| Time | Percentage of farmers |
|---|---|
| 4.00 pm. – 6.00 pm. | 31.6 |
| 6.00 pm. – 8.00 pm | 35.7 |
| 8.00 pm. – 10.00 pm. | 32.7 |
| TOTAL | 100.0 |

6.00 pm. – 8.00 pm. was highly preferred by 36% of respondents, followed by 8.00 pm. – 10.00 pm. which was preferred by 33% of respondents while 32% preferred 4.00 pm. – 6.00 pm.

The reasons for preferring the above mentioned time included:

- Most of the farmers are at home
- Farmers are resting after field work waiting for their evening meals hence easy to hear the news from the radio

**2.4.1.4**. Language:
The language used in radio broadcasting was easy and understandable.
These messages seemed to be relevant to the day to day farmers activities because; 40% of respondents have benefited from established radio news on CBSD control strategies.

A listener survey conducted in May this year revealed that, farmers were interested on the programmes. They pointed out that, they were educational and informative. However, it was noted that, lack of radio sets (ownership) amongst target groups was a limiting factor to this method.

**Conclusion**

About 28% of respondents managed to hear the radio news concerning CBSD and its control strategies. It was discovered that only 58% of respondents owned radios. Not all the farmers who owned radios have heard of the news, only 40% of farmers who owned radios have benefited from established programs, while 18% of them have heard of other farmers who heard about CBSD radio news. This was a good starting point because with more awareness creation strategy before radio broadcasting, more and more farmers may hear from the news for a short time. Even those farmers who do not have radios may stay closer to their neighbors/relatives who own radio and listen to the news, with a good timing preferable 6.00 pm - 8.00 pm. Therefore, this tool if used properly may lead to a wider range of coverage to rural communities.

About 73% of farmers mentioned that, the radio message on CBSD was relevant to farmer' day to day activities whereby every one of them owns a cassava field; and CBSD is their major problem in cassava production. It came at the right period i.e. before planting time for cassava which starts form November to January.

A listener survey conducted in May 2004 revealed that, Farmers were interested with the programmes because they were educational and informative. However, it was noted that, lack of radio sets (ownership) amongst target groups was a limiting factor to this method.

## 2.5 MULTIPLICATION AND DISTRIBUTION OF CBSD – TOLERANT CASSAVA CULTIVARS*.*

### Dissemination of tolerant cassava planting materials to Cassava Brown Streak Disease (CBSD) to selected villages and Secondary schools of Southern Tanzania.

In the Southern zone, five CBSD-tolerant varieties have been selected for community multiplication in the Southern Zone - Kigoma Red, Nal 34, Kitumbua, Namikonga, Kalulu. Six villages where previously the varieties were evaluated, and six secondary schools agreed to host the multiplications plots of 0.5 – 1.0 acres. The initial planting material was supplied by the CBSD project from ARI Naliendele. In each village the plot was managed by a farmer groups.

The best way of controlling the disease was to ensure that planting materials are taken from plants that are virus free. This also requires farmer's knowledge on the diseases and attitude against a disease control strategy.

Therefore Naliendele agricultural research institute in collaboration with NRI, UK distributed cassava tolerant planting materials particularly to CBSD to selected villages and secondary schools as the control strategy for the disease.

### Objective

To disseminate cassava planting materials to farmers which are tolerant to Cassava Brown Streak Disease ( CBSD ).

## Materials and Methods

The farmer research groups were formulated to selected villages where previously the varieties were evaluated. That were of Ziwani (Mtwara Rural), Ntiniko (Mtwara Rural ), Madaba ( Tandahimba ), Chisegu ( Masasi ), Mtua (Lindi Rural ), and Tulieni ( Lindi Rural ). Each farmer group prepared 0.5 – 1.0 acre for cassava growing. However, few secondary schools of Nanguruwe (Mtwara Rural), Mahuta (Tandahimba), Mnyambe ( Newla) and Chiungutwa ( Masasi ) selected and requested to prepare plots for cassava planting. Then early November cassava planting materials which are tolerant to Cassava Brown Streak Disease were distributed to respective areas for planting. The varieties distributed were Kigoma red, Namikonga, Kitumbua, NDL 90/034, and Kalulu. Each variety separated from each other and labeled in each farm. On station multiplication was also going on in Naliendele and Nachingwea research stations

## How secondary schools were selected?

Secondary schools were selected from cassava growing areas, mostly day schools where students were closer to their home compounds and farming community in general. The selection of these schools was done in collaboration with the Regional education officer (REO). Before sending cassava planting materials to schools, a training workshop was conducted in July 2003 about CBSD and control strategies. Representatives from all secondary schools participated mostly the headmasters and District education officers. The workshop was meant for sensitization purpose as well as imparting some general knowledge on cassava production with more emphasis on Cassava Brown Streak Disease. After the workshop it was agreed that, the planting materials should be sent for multiplication by November. Then the researchers went for monitoring.

## Results and discussion

Given the effort made to distribute the cassava disease free planting materials to farmers, some of farmers still didn't appreciate the effort made to reduce cassava losses. Among the villages and secondary schools selected to multiply the cassava disease free planting materials, Nanyamba secondary school and Tandahimba secondary school dropped because of their poor performance.

At Tandahimba secondary school (Tandahimba District) the multiplication plot destroyed by grazed animals particularly goats and cattle. Also at Nanyamba secondary school (Tandahimba District) the land was not well prepared hence poor sprouting and growth of the plants.

Mnyambe secondary school is situated at relatively high altitude hence characterized by low temperatures which led to slow cassava growth. It takes two planting seasons for the cassava plant to become vigor. The plot is isolated from any other cassava farm so removed three plants showing symptoms of CMD. Seven plants of NDL 90/034 were observed with symptoms of CBSD, one of which showed clear stem necrosis.

At Mtiniko village the cassava plants was intercropped with up land rice, cowpea and maize in common with local practices. Despite rouging earlier in the season there was a high incidence of CMD in NDL 90/034. The plot was not isolated. To the moment most of the cassava plants has been harvested by the farmer themselves and replanted in the same field under dry season environment.

Mtua: This village was one of the last to receive planting g material and they complained that they receive late when the weather was dry. Most farmers said they now have large stand of these varieties in their other fields, so they are becoming well established in these villages and it may be time to stop supplying these villages with planting material and move on to a new set. Sheria was the dominate variety in this area.

However, the multiplication plots of Mtua village only 25 % of the stand survived severe drought at planting. CBSD was seen on four plants of NDL 90/034.

The plot was well isolated and on virgin land so growth was vigorous. The stand was reduced to about 60% by the effects of drought at planting and subsequent rouging of plants with CMD. CMD was still in evidence on Nal 34 and whitefly counts were high at around 50/plant. The teacher in charge agreed that they would ratoon at the end of the season and expand the site.

Mahuta sec. School was well isolated site and therefore worth rouging out the six or so plants seen with CMD. The teacher in charge agreed to ratoon and expand the plot next year. At

Chiungutwa sec. School cassava intercropped with groundnuts. The stand was poor due to drought at planting and subsequent rouging of CMD- infected plants.

There were two plots at Madaba village, one cultivated by the chairman himself and a group plot managed by nine group members. The chairman's plot intercropped with bambara and the crop was well maintained and vigorous. The group plot had more gaps due to dry conditions following planting. CMD incidence was low in both plots.

While in Chisegu village the group contained thirteen members with a common plot. Each member also took cuttings for their own plots. Although the plot was not well isolated there was no evidence of CMD or CBSD. The chairman agreed that the plot would be ratooned at the end of the season for further multiplication.

*Tulieni Village:*
In this village, CBSD-susceptible varieties such as Supa and Sheria dominate so there was a great need for CBSD-tolerant planting material. Early planted plots have been well established. In response to the questionnaires, Nal 34 again was popular with the contact farmers but also Kigoma Red and Ktumbua, although there was CMB damage in the latter two cvs. As at tulieni each farmer seems to have given cuttings to about 3 villagers.

Ziwani village only two plants of NDL 90/034 with CMD. The group were willing to ratoon next season. This season, five CBSD-tolerant varieties are being evaluated on-farm Cv. Kalulu has been added to Nal 34, Kitumbua, Kigoma Red and Namikonga. Most of the trials were well established and it was clear that contract farmers had grown the new varieties in their own fields. Each farmer was asked to complete a questionnaire to determine his evaluation of the varieties harvested last year. Naliendedle 34 was consistently popular and considered to be high yielding, early maturing with good cooking and taste qualities. Kigoma Red and Kitumbua were popular but suffered from mealy bug attack (CMB). Namikonga was less popular but may not have been fairly assessed as it reaches maturity in the second year after planting. Most farmer had given cutting of the new varieties to at least

three friends and relatives. The local variety 'Saranga' was mentioned as a popular variety but it is bitter and late maturing. Other popular varieties mentioned by farmers were Kuliachi – said to be bitter, high yielding but suffers from root necrosis. Chindu Moto said to be sweet, high yielding and early maturing but is prone to CMD. Tulieni village had four members, each with their own plots. The plots were not isolated and both kigoma red and NDL 90/034 showed symptoms of CBSD

**Nachingwea sub-station:**

This site has been chosen for multiplication of virus-free planting material of local varieties selected by the project as tolerant oCBSD. The site is suitable for this as there are large plots separated by cashew trees, so that 'clean' material can be grown in isolation from virus-contaminated material. Breeding trials should not be planted close to the multiplication plot as the breeding material is full of CBSD and if spread will taking place there will be a risk that the multiplication plot will become infected with CBSD.

Liwale

Following drought and food shortage in 2001, the DALDO from Liwale requested cassava planting material from Naliendele. Project staff planted small plots in 6 villages with the CBSD-tolerant varieties at the beginning of 2001/02. Of the 4 sites we were able to reach, all the plants had been destroyed by wild pigs at three of the sites, but there was a reasonable stand remaining at the fourth site and the farmer said he had given cuttings to 6 other families this year.

Ruangwa District:

This district was not included originally in the project area but two villages have been given planting material of the CBSD-tolerant cvs this season following a request from the District Extension Officer. Cuttings were brought from Naliendele by Dr.Mponda. Mwakajira village-Nachinyaya (672 cuttings), Kigoma Red (672 cuttings), Kibaha (158 cuttings) and Kitumbua (378 cuttings) are being managed by a group led by the village chairman. The plot was well established on newly cleared land and should give good planting material at the end of the year for distribution to selected villagers. Narung'ombe village – have received the same 4 varieties (approx 200 cuttings of each) which were also well established in ¾ has maintained by a group of 12 villagers. The plot was close to a main road and used as a demonstration lot by the extension office. District Extension Office-DEO, Mr. Namkaa says that control of CBSD was included in his farmer training programme and that it would be very helpful to have some training leaflets on CBSD and its control. The main local varieties currently grown in this area are the sweet cvs Sheria and Nanjenjeha, both being CBSD-susceptible and the bitter cv. Yuda

ARI–Naliendele

Despite very dry weather conditions this season, all on-station trials were planted. Yield and disease assessment trials planted in December were well established. Plants should be marked with paint when CBSD symptoms appear so that they can be identified later in the season when foliar symptoms are less clearly expressed.

The key to successful village multiplication is to ensure that the primary plot is well chosen:

- The planting material should be given initially to a farmer or small group that are trusted by the villagers to grow the crop well.
- The site should be chosen that is fertile and not prone to drought.
- The site should be prepared for planting before the cuttings are delivered.
- The group should agree to supply planting material to at least 10 other farmers next season.
- Roguing is not worthwhile in plots close to virus-infected cassava.

**Issues arising from observations at village multiplication sites**

Farmers hosting multiplication plots were asked to rogue out any plants showing symptoms of CBSD or CMD. However, removal of infected plants is worthwhile only if multiplication plots are physically isolated from any other cassava plants. In most cases the plots were located close to cassava infected with CBSD and CMD such that new infections arise due to vector transmission, as plants presently showing symptoms are removed.

Two types of on-farm multiplication have to be recognised – research or extension-supervised plots and farmer-owned plots. This is an important distinction because in some cases the farmer may need to harvest the roots and will be reluctant to remove plants. In this case the obligation lies with the organisation providing the initial planting material to ensure as far as possible that it is virus-free on delivery. From the time it is received by the farmer, it becomes his property [or the property of the village] and subsequent multiplication is their responsibility. To make the best of the initial planting material it may be better to obtain agreement from the participating farmer[s] that the organisation supplying the cuttings will supervise site selection and inspection of the crop, including removal of any plants that sprout with symptoms of CBSD or CMD. In this case the site should be separated from other cassava by 200 metres. With the farmers' agreement the first year root crop should be foregone so that the plants can be ratooned and the multiplication site expanded. From the time the crop is ready to harvest in the second season, ownership reverts to the villagers who then become responsible for distribution of the cuttings and any subsequent multiplication. Both types of on-farm multiplication can be used provided it is clear which approach is being used and that rouging is not justified in plots that are not isolated from other virus-infected cassava.

**Issues arising from School multiplication sites**

Four of the schools have planted well isolated and well managed multiplication plots. All plants with virus symptoms should be removed from these plots and after rationing at the end of this year, the expanded plots will provide a good supply of CBSD-tolerant planting material for the community.

The involvement of the schools in the project was agreed after consultation with the relevant District Education Officers. This has had the added benefit that representatives from each of the schools has visited Naliendele for training in disease recognition, and will also participate in more extensive training in May on all aspects of cassava growing and processing.

**Issues arising from primary multiplication plots at Naliendele and Nachingwea**

The starting point for multiplication schemes run by research should be a stock of virus-free plants. From then on virus can be excluded from the multiplication by

maintaining the isolation distance of 200m. Several seasons of low whitefly populations in the past have contributed to complacency in implementing proper isolation for multiplication blocks.

**Conclusion**

Multiplication plots then have to be inspected right from early sprouting stage and any plants showing virus symptoms should be removed. This exercise needs to be repeated as frequently as possible during the first two months after sprouting, but at least once per week.

Records of whitefly numbers should be kept each season as a way of assessing virus 'inoculum potential'. Weekly counts are required as populations can change greatly over a period of one month.

CBSD-tolerant varieties such as Kiroba will spread fast once they become established in villages affected by CBSD, due to its [Kiroba] short season and good processing qualities. The problem lies in the early stages of multiplication, when planting material can be lost due to poor rainfall or poor management.

If we are to have any hope of using the multiplication plots at Naliendele and Nachingwea this year, all plants showing virus symptoms should be removed now and again at harvest. At Nachingwea this will mean doing the same in the breeding plots or they will continue to be a source of infection.

At the same time we should embark again on a cleaning-up process to regain a virus-free stock, by planting a small block [in isolation] of each of the CBSD-tolerant varieties and imposing a strict rouging regime. This exercise has to be repeated over two or more seasons until none of the plants sprout with virus symptoms. This stock can then form the basis of new virus-free multiplication.

During the three seasons that the project conducted on-farm evaluation of the CBSD-tolerant varieties, whitefly populations remained low and none of the varieties in any of the 50 or so plots became infected. During the two most recent seasons when whitefly population has been high, it became apparent that Nal 34 is rather susceptible to CMD. It also developed leaf symptoms of CBSD. This had been observed earlier by the breeders, and are doing much effort to breed for resistant varieties to both CBSD and CMD.

The CBSD-tolerant variety Nachinyaya has spread quite widely in Mtwara. It should now be dropped from the Naliendele programme, due to its high level of susceptibility to CBSD foliar symptoms.

**2.6 TASTE TESTING**

Farmers in the project areas have tested and evaluated these varieties. The taste teasting of the varieties showed that Naliendele, Kigoma red and Kitumbua (Table 9) were most liked by farmers. These varieties were considered as good because, according to farmers, they possessed some good characteristics as follows:

- High yielding

- Good and fast cookability
- Sweet all the time
- Good sprouting ability (85% - 100%)
- Resistant or tolerant to drought, pests and diseases
- Early maturing (6 – 9 months)
- Suitable leaves for relish
- Strong plant vigour with wide branching pattern
- Big roots and not fibrous

Namikonga was disliked by farmers. For example in Mtua village, only 20% of respondents were growing Namikonga. The reasons for disliking this variety were as follows:

- It has low yield
- Poor cookability
- Bitter during dry period and sweet during rainy season
- Difficult to sprout when planted, e.g. if 20 cuttings are planted, you may end up having only 8 cassava cuttings which have sprouted
- Highly affected by ants
- Its leaves are not attractive for relish (not soft)
- Not tolerant to drought
- Late maturing – up to 18 months
- When harvested in the same planted season (9 months), it has low yield because it hasn't attained its full maturity.

All in all Namikonga gives higher yields when kept for more than a season. As a general view, it was noted that storage of processed sweet cassava was difficult because it was highly affected by storage pests compared to bitter varieties. Also sweet cassava varieties are prone to theft. These could be some of the reasons as to why farmers used to choose bitter varieties in most cases than sweet varieties.

Table 7: Taste testing for cassava varieties

| Village | Naliendele 90/034 | Kigoma red | Namikonga | Kitumbua | Kalulu |
|---|---|---|---|---|---|
| Mtiniko | 4 | 3 | 2 | 5 | 3 |
| Madaba | 3 | 4 | 1 | 5 | 2 |
| Chisegu | 4 | 5 | 2 | 3 | |
| Mtua | 5 | 3 | 2 | 4 | |
| Tulieni | 4 | 5 | 3 | 4 | |
| Ziwani | 5 | 4 | 3 | 4 | 2 |
| Total | 25 | 24 | 13 | 25 | 7 |
| Mean | 4.2 | 4.0 | 2.2 | 4.2 | 2.3 |
| Rank order | 1 | 2 | 4 | 1 | 3 |

Source: Halima Kwikwega, 2004. Cassava variety preference report.

The criteria for selection during this practice were; sweetness, cookebility and fibre content. The same varieties were also ranked based on their yield, maturity, drought resistance, plant vigour and tolerance to pests and diseases(CBSD and cassava mosaic). Results also showed that, Naliendele 90/034 was the first followed by Kitumbua and Kigoma red. Kalulu was the least liked in the list (Table 10).

Table 8: Assessment based on yield, maturity, drought resistance, plant vigor and tolerance to pests and diseases

| Village | Naliendele 90/034 | Kigoma red | Namikonga | Kitumbua | Kalulu |
|---|---|---|---|---|---|
| Mtiniko | 5 | 3 | 2 | 4 | 3 |
| Madaba | 5 | 4 | 2 | 4 | 3 |
| Chisegu | 5 | 3 | 3 | 4 | |
| Mtua | 5 | 3 | 2 | 4 | |
| Tulieni | 5 | 4 | 2 | 3 | |
| Ziwani | 5 | 4 | 3 | 4 | 2 |
| Total | 30 | 21 | 14 | 23 | 8 |
| Mean | 5.0 | 3.5 | 2.3 | 3.8 | 2.6 |
| Rank order | 1 | 3 | 5 | 2 | 4 |

Source: Halima Kwikwega, 2004. Cassava variety preference report.

**Yield:**
Results from this study also showed that, there was a difference in cassava yield to farmers who were using improved varieties and those who were not using local types. The mean yield of cassava to farmers who used tolerant varieties was 781kg per household while those who were not using tolerant varieties was 665kg.

### 2.6.1 Selection criteria

Each farmer has his /her own criteria for choosing the varieties which are grown in his/her household. Some of those criteria are shown in table 11.

Table 9: Planting material selection criteria used by farmers. N = 80

| Criteria | Frequency | Percentage |
|---|---|---|
| CBSD free | 53 | 66 |
| Mealy bug free | 49 | 61 |
| Thick stem | 42 | 53 |
| CMD free | 32 | 40 |
| Mature and fresh | 30 | 38 |
| Performance | 27 | 34 |
| Bitter/sweet | 4 | 5 |
| Readily available | 1 | 1 |

The most important criteria mentioned by 66% of respondents was CBSD free this was followed by mealy bug free, thick stem and CMD free (Table 11). Pest or disease free planting materials and thick stem appeared to be a leading criteria. Therefore, even those who did not mention that they used tolerant varieties in practice they do because they normally choose healthier plants which means they choose what has tolerated the most adverse conditions which are biotic (e.g. pests and diseases ) and abiotic factors e.g drought and Floods. Material selection is normally done at harvest. The responsibility for selection of planting materials was reported to be the men's activity.

*3.0 CONCLUDING REMARKS*

- Information is power. Research findings need to be disseminated using different types of methods to make sure that, a wide range of communities are getting the messages. Training being one of the methods, plays a very big role in message of trainers whereby training and trainers have been made as well as farmer training for different small groups was also made.

- The trained trainers are expected to disseminate CBSD and control strategies to many others through the use of institutes and farmer groups e.g M.A.T.I is a place where training of extension officer is made.

- Apart from this, farmer training and other retraining courses are being made. Extension officers are even the most important link between farmers and researchers, and they are even more closer to farmers than researchers.

- Researchers themselves, by using small amount of resources allocated to them may not reach a wide range of farmers. Therefore, this needs a strong linkage between farmer – Extension – Research.

- Participants need more and more trainings of this sort not only for cassava to be Conducted every now and then or whenever there are new findings from research the flow of information should be from Research - training - Extension - farmers.
- Every Tanzanian citizen, should know about cassava production and their uses or its utilization.

- The district councils have to be strict on taking actions of the decisions which have already been agreed upon for more success, hence economic development.
- Need for improve internal and external market for cassava products.
- Extension officers should extend trainings to farmers on how to identify the symptoms of CBSD and their control strategies.
- To increase the distribution of leaflets and posters describing cassava pests and diseases and their control measures.

## TASTE TESTING

Description
1 = Bad
2 = Moderate
3 = Good
4 = Very good

| | | CHISEGU VILLAGE | | MASASI DISTRICT | |
|---|---|---|---|---|---|
| | **Farmer** | NDL/034 | k\red | N/konga | Kitumbua |
| 1 | FATUMA MOHAMEDI | 4 | 2 | 2 | 3 |
| 2 | LUIZA MUSSA | 4 | 1 | 2 | 3 |
| 3 | BETRICE SALIMU | 4 | 1 | 2 | 3 |
| 4 | JOMIMA NGONYAGA | 4 | 2 | 1 | 3 |
| 5 | UGESTA ISAYA | 4 | 1 | 2 | 3 |
| 6 | PATRICK NDEKETU | 4 | 4 | 3 | 4 |
| 7 | ABASSY ALLY | 4 | 4 | 3 | 4 |
| 8 | HASSANI SABIHI | 4 | 4 | 3 | 4 |
| 9 | SALUMU SELEMANI | 4 | 4 | 3 | 4 |
| 10 | PHILIPO ANDREW | 4 | 4 | 3 | 4 |
| | **TOTAL** | 40 | 27 | 24 | 35 |
| | **MEAN** | 4 | 2.7 | 2.4 | 3.5 |
| | **RANK** | 1 | 3 | 4 | 2 |

| | | TULIENI VILLAGE ( LINDI RURAL DISTRICT ) | | | |
|---|---|---|---|---|---|
| | | NDL/034 | k\red | N/konga | Kitumbua |
| 1 | Mwajuma Mohamedi | 4 | 2 | 3 | 3 |
| 2 | Msafiri Maulidi | 4 | 2 | 1 | 3 |
| 3 | Mary Nipepe | 4 | 3 | 2 | 3 |
| 4 | Somoe Ally | 4 | 3 | 1 | 2 |
| 5 | Sharifa Mkusa | 4 | 3 | 1 | 2 |
| 6 | Hadija Mwamba | 3 | 4 | 2 | 4 |
| 7 | Mohamedi Mkwefi | 3 | 4 | 2 | 4 |
| 8 | Sofia Nguku | 3 | 2 | 2 | 2 |
| 9 | Rashidi Salum | 3 | 2 | 2 | 4 |
| 10 | Amiri Mapua | 4 | 3 | 4 | 2 |
| | **TOTAL** | 36 | 28 | 20 | 29 |
| | **MEAN** | 3.6 | 2.8 | 2 | 2.9 |
| | **RANK** | 1 | 3 | 4 | 2 |

MTINIKO VILLAGE MTWARA RURAL DISTRICT

| | Farmer | NDL/034 | k\red | N/konga | Kitumbua | Kalulu |
|---|---|---|---|---|---|---|
| 1 | Somoe Abdala | 4 | 4 | 1 | 3 | 2 |
| 2 | A.H Likukulu | 4 | 4 | 2 | 3 | 1 |
| 3 | Mshamu Omari | 4 | 4 | 3 | 3 | 2 |
| 4 | A.H Liveve | 3 | 2 | 2 | 3 | 2 |
| 5 | M. Naweka | 3 | 2 | 3 | 3 | 2 |
| 6 | M.A Limbende | 3 | 3 | 4 | 3 | 1 |
| 7 | Salum M. Salum | 4 | 3 | 3 | 4 | 1 |
| 8 | Hawa Jafu | 4 | 3 | 4 | 4 | 3 |
| 9 | Sophia Machupa | 4 | 4 | 3 | 4 | 3 |
| 10 | Rashidi Mohamedi | 4 | 4 | 3 | 4 | 1 |
| | **TOTAL** | 37 | 33 | 28 | 34 | 18 |
| | **MEAN** | 3.7 | 3.3 | 2.8 | 3.4 | 1.8 |
| | **RANK** | 1 | 3 | 4 | 2 | 5 |

MTUA VILLAGE ( LINDI RURAL DISTRICT)

| | | NDL/034 | k\red | N/konga | Kitumbua |
|---|---|---|---|---|---|
| 1 | Raphael Namate | 4 | 2 | 1 | 3 |
| 2 | Abdala Chiwangu | 4 | 2 | 1 | 3 |
| 3 | Sefu Mandeu | 3 | 3 | 2 | 3 |
| 4 | Mussa A. Chihiko | 4 | 3 | 3 | 2 |
| 5 | Hadija Njaka | 4 | 3 | 1 | 2 |
| 6 | Abdala Masudi | 3 | 4 | 3 | 4 |
| 7 | Salum Ngaholo | 4 | 4 | 2 | 4 |
| 8 | Joseph Ngitu | 4 | 2 | 4 | 2 |
| 9 | Hamisi Makwinda | 3 | 4 | 2 | 4 |
| 10 | Mohamedi Mbonde | 4 | 3 | 4 | 2 |
| | **TOTAL** | 37 | 30 | 23 | 29 |
| | **MEAN** | 3.7 | 3 | 2.3 | 2.9 |
| | **RANK** | 1 | 2 | 4 | 3 |

SUMMARIZED CASSAVA VARIETY PREFERENCE RESULTS

| | NDL/034 | k\red | N/konga | Kitumbua | Kalulu |
|---|---|---|---|---|---|
| ZIWANI | 4 | 3 | 2 | 3 | 2 |
| MADABA | 4 | 3 | 3 | 4 | 3 |
| CHISEGU | 4 | 3 | 2 | 3 | NP |
| TULIENI | 4 | 3 | 2 | 3 | NP |
| MTINIKO | 4 | 3 | 3 | 3 | 2 |
| MTUA | 4 | 3 | 2 | 3 | NP |
| **TOTAL** | 24 | 18 | 14 | 19 | 7 |
| **MEAN** | 4 | 3 | 2.333333 | 3.166667 | 2.333333 |
| **RANK** | 1 | 3 | 4 | 2 | 4 |

**Note on adoption of CBSD control measures:**

In year 2001, a socio- economic study was conducted in selected villages of Lindi and Mtwara regions of Tanzania to assess CBSD management strategies among farmers. Results showed that, introduction of disease management strategies have reduced disease pressure. However, the adoption rate was somehow slow as only 58% were practicing one or more strategies leaving up to 42% were still not doing anything to control CBSD. Farmers perception towards cassava (crop for poor or crop only for bad years) and inadequate post- harvest technologies (processing) at farm level which could prolong cassava life shelf (prolonged storability) are factors acting as a disincentive for wider adoption of disease control strategies. It was

generally viewed by farmers that, any increase in production due to management practices would get lost during storage due to storage pests and rodents (Halima & Katanila 2001, Discussion between Lindi and Mtwara district authorities and researchers of NARI, 2003). This seems to be an argument in favour of village processing facilities for the preparation of cassava flour which is more easily stored and can be sold for cash.