Cassava Mosaic Disease Pandemic Mitigation in East Africa

A SYSTEM-WIDE WHITEFLY IPM AFFILIATED PROJECT

Third Quarterly Technical Report

Phase 3

April-June 2001

International Institute of Tropical Agriculture

AUGUST 2001

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I. Executive Summary

Quarterly Report

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Programme title: Emergency Programme to Combat the Cassava Mosaic Disease Pandemic in East Africa
Cooperative Agreement/Grant No: LAG-411-G00-3042-00
Country (ies)/Region(s): UGANDA, KENYA and TANZANIA
Disaster/Hazard: East African CMD Pandemic
Time Covered by This Report: April-June 2001

Activities Summary

A survey in which 142 farmers fields were visited was conducted in Tanzania during this quarter of the project. Of the 11 districts covered in the survey, 4 districts showed high CMD incidence and severity. One of these districts, Geita, was widely affected by a high incidence of severe CMD for the first time. Leaf and whitefly samples were also picked during the survey.

In Uganda, ratooning was done, producing over 600 bags of planting material that was distributed to more than 1,500 beneficiaries in the districts of Rakai and Masaka.

A total of 917 and 691 bags of SS4 and Migyera respectively were cut and distributed to farmers, farmer groups, NGOs and CBOs in Kenya. Additionally, at secondary sites, 21 and 15 ha in Western and Nyanza Provinces respectively were established.

In Tanzania, 24,625 stems of planting material were given to FFS and IPM/N farmer groups. At the Open Quarantine facility, evaluation of the 400 EARRNET derived clones continued during this quarter. Evaluation of tissue culture material continued at the three sites of Gera, Maruku and Bushasha. A nursery was also established using seeds collected from Open Quarantine.

At the Open Quarantine facility in Kenya, 563 clones were planted. 172 clones were planted as base stock material. 14 clones are also under multiplication in order to meet the demand for planting material. 175 clones have been planted in performance evaluation trials and a further 32 in and advanced yield trial in Migori, near to the Tanzania border. Harvesting of evaluation trials at Alupe, Kakamega and Mbita Point was done during this quarter of the project. The o-farm trial at Matungu, Butere-Mumias district was harvested. Farmers participated in the evaluation and selected varieties basing on their own criteria. Clone Unknown 3 was ranked best at two of the sites.

Training organized by the Provincial Crops Officer for extension workers, farmers, CBOs and NGOs was conducted in five districts of Western Province. 435 people were trained. Training in Nyanza province will be done in the next quarter of the project.

A combined team of IITA/NARO and CEDO together with the farmers conducted a final evaluation of the material at the TTCs in Uganda. The material was harvested and farmers evaluated the different clones basing on their own criteria. The sites were replanted and excess material distributed to the farmers. Varieties 92/00057, 92/00067, TME 14 and 95/00087 were most highly ranked by farmers.

An agro-economist from IITA-Benin, Ousmane Coulibaly, visited Uganda and Kenya to initiate impact assessment of the project. A survey protocol has been developed and its implementation has been scheduled for August.

There are also plans to hold steering committee meetings in Kenya and Tanzania and a Stakeholders meeting in Bukoba Tanzania during the next quarter of the project.

II. Programme Overview

A. Goal and Objectives of the Programme

Project Goal: To improve food security and alleviate poverty in the East African region through enhancing the sustainable production of cassava

Project Purpose: To strengthen sustainable production of cassava in areas of Uganda, Kenya and Tanzania most affected by the CMD pandemic through the exchange and development of cassava germplasm and the accelerated multiplication of CMD resistant varieties

Project Objectives:

1. **Monitoring and Diagnostics:** Provide up to date information on the extent of spread of the CMD pandemic and associated viruses and vectors in target areas, and develop forecasts and risk assessments to guide the implementation of control activities
2. **Multiplication:** Accelerate the multiplication of well adapted CMD resistant varieties and facilitate their distribution to farmers impacted by the CMD pandemic
3. **Germplasm diversification and exchange:** Increase the range of cassava materials available to farmers in areas targeted by the Project thereby reducing future risk of production collapse
4. **Training and technology transfer centres:** Provide options for the sustainable development of cassava production in the region through participatory germplasm evaluation and farmer training in pest and disease management and improved processing methods
5. **Project management, monitoring and impact assessment:** Build on links established with a wide range of stakeholders to facilitate effective co-ordination both within target zones and at regional level. Monitor Project impact.

B. Geographic Locations of Major Programme Activities

Country: Uganda

Site/Institution	District	County	Latitude	Longitude	Activity
IITA-ESARC	Mpigi	Kyadondo	0° 31.2' N	32° 32.7' E	Regional co-ordination
CEDO	Rakai	Kyotera			District-based co-ordination
DFI – Rakai	Rakai	Kooki	0° 40.5' S	31° 25.9' E	Multiplication
DFI – Masaka	Masaka	Kalungu	0° 18.3' S	31° 39.6' E	Multiplication/Germplasm
ICR	Rakai	Kakuuto	0° 48.5' S	31° 30.0' E	Germplasm

IITA-ESARC International Institute of Tropical Agriculture – Eastern and Southern Africa Regional Centre
CEDO Community Enterprises Development Organisation
DFI District Farm Institute
ICR International Care and Relief

B. Geographic Locations of Major Programme Activities (cont.)

Country: Kenya

Site/Institution	Province	District	Latitude	Longitude	Activity
KARI-Kakamega	Western	Kakamega	0° 17.0' N	34° 46.1' E	Co-ordination, Multiplication, Germplasm
KARI-Alupe	Western	Teso	0° 29.9' N	34° 7.5' E	Multiplication, Open quarantine, Germplasm
KARI-Kibos	Nyanza	Kisumu	0° 2.4' S	34° 49.0' E	Multiplication
FTC-Bungoma	Western	Bungoma	0° 36.0' N	34° 37.3' E	Multiplication
FTC-Siaya	Nyanza	Siaya	0° 5.0' N	34° 19.0' E	Multiplication
FTC-Busia	Western	Busia	0° 27.5' N	34° 6.9' E	Multiplication
FTC-Bukura	Western	Kakamega	0° 13.4' N	34° 37.3' E	Multiplication

KARI Kenya Agricultural Research Institute
FTC Farmer Training Centre

Country: Tanzania

Site/Institution	Region	District	Latitude	Longitude	Activity
Ukiriguru ARI	Mwanza	Mwanza	2° 43.1' S	33° 1.0' E	Co-ordination, germplasm
Maruku ARI	Kagera	Bukoba	1° 25.0' S	31° 46.8' E	Germplasm, Multiplication, Open Quarantine
Nyakasanga	Mwanza	Mwanza	2° 46.3' S	32° 56.6' E	Germplasm, Rapid multiplication

ARI Agricultural Research Institute

Programme Performance

A. Progress in Attaining Programme Objectives

Objective # 1: Monitoring and Diagnostics

During this quarter of the project, preparations for impact assessment studies were initiated. A specialist from IITA visited some of the project areas and identified a team to be involved in the impact surveys to be conducted in August.

Uganda

- No surveys were done during this quarter of the project.

Kenya

- No surveys were conducted during this quarter of the project.

Tanzania

- A total of 142 farmers' fields in Ukerewe, Bunda, Serengeti, Musoma, Tarime, Bukoba, Muleba, Biharamulo, Geita, Ngara and Kara districts were surveyed during this quarter of the project. CMD incidence and severity were high in Biharamulo, Muleba , Karagwe and Geita districts.
- 117 leaf samples for DNA extraction and 43 whitefly samples were collected during the survey. The DNA will be sent to Namulonge for analysis while the whitefly samples will be sent to University of Arizona for biotype identification.

Whitefly diagnostics

- The analysis of whitefly genotypes was broadened to include material collected from other CMD epidemic affected zones of Africa in western Democratic Republic of Congo and Rwanda. Samples from both of these locations clustered with the previously identified 'non-invader' genotype which appears to be the commonly occurring *B. tabaci* genotype on cassava in Africa. None of the samples from Rwanda or DRC clustered with the 'invader' genotype previously shown to be associated with the CMD pandemic in both Uganda and western Kenya.
- Restriction endonuclease sites were mapped within the genomic Internal Sequence Spacer (ITS) region of 'invader' and 'non-invader' *B. tabaci* populations with the aim of identifying a diagnostic marker.

Indicator: CMD, EACMV-Ug spread maps; > 30 early warning farmers trained, Whitefly biotype map; > 30 impact survey sites Ug, Ke, Tz; radio bulletins, newspaper articles

Current Quarter's Measure: 142 farmers fields surveyed in Tanzania and 117 leaf samples picked for virus diagnoses. 43 whitefly samples also collected for biotype identification

Cumulative Project Measure: > 100 virus samples diagnosed, W. Kenya
Maps developed for CMD pandemic spread, W. Kenya, >100 virus samples diagnosed, Tanzania, >40 whitefly samples analysed to identify biotypes

Objective # 2: Multiplication of CMD resistant varieties

Uganda

- Phase II planted plots were ratooned for the second time and materials were distributed to farmers, individual households and parishes for multiplication. Some of the multipliers sold their material at between 8000-11,500 UGS per bag to the Masaka district administration who bought 494 bags that was given out to 1295 beneficiaries. CEDO's share of the material totalling 173 bags was given to 300 beneficiaries in the counties of Kabula, Kooki, Kakuuto and Kalungu. (See Annex 1)

Kenya

- Planting material was cut from the primary sites at KARI-Alupe, KARI-Kakamega, Kibos, Bukura FTC, Bungoma FTC, Busia FTC and ICIPE. These ministem cuttings totalling 917 and 691 bags of SS4 and Migyera respectively were distributed to farmers, farmer groups, NGOs and CBOs. This material either went into secondary and tertiary sites or into multiplication by NGOs, CBOs and farmer groups. Kakamega, Butere-Mumias, Siaya, Bondo, Bungoma, Mt Elgon, Teso, Vihiga, Busia, Homabay and Suba districts were the beneficiaries of the material.
- Secondary multiplication sites were established in Nyanza (21 ha of SS4 and Migyera) and Western Provinces (15 ha) during this quarter of the project. (See Annex 2)

Tanzania

- During this quarter of the project there was continued maintenance of the multiplication plots at both Maruku and Ukiriguru. IPM/N farmer groups and FFS were given a total of 24,625 cuttings (approximately 2,462 stems)(See Annex 3)

Indicator:	Ke. - 6 million stems; Tz. - 3 million stems; Ug – 2 million stems
Current Quarter's Measure:	Ug. – 112,560 stems; Ke. 36. 2 ha primary site established (21ha Nyanza and 15 ha Western). Tz.- 2,462 stems
Cumulative Project Measure:	Ug. – 248,560 stems; Ke. – 270,000 stems; 40.2 ha primary site established; Tz. – 232,622 stems; 3.4 ha established, 2 sites in Muleba and 1 site in Bukoba

Objective # 3: Germplasm Diversification and Exchange

Uganda

- A combined team of IITA/NARO and CEDO together with the farmers carried out an evaluation of the material at the TTCs. Preharvest and postharvest evaluation was done with the farmers. During postharvest evaluation, farmers looked at yield, maturity period, sweetness and mealyness. The materials were used to plant another site. Varieties 92/0057, 92/0067, TME 14 and 95/00087 were most preferred amongst the farmers. Surplus material was distributed to the farmers for their individual farms. 231 farmers benefited from this material.

Kenya

- 563 clones, introduced from Serere, Uganda, were planted at the Open Quarantine site in June. Germination was good. 172 clones were planted as base stock material while 14 fast-track clones are also under multiplication at Alupe.
- An advanced yield trial (AYT) with 32 clones was planted at Oyani, Migori district; SS4 and Migyera were used as checks.
- Preliminary (PYT) and advanced yield trials were harvested in April. A further 51 clones were planted in PYT, as well as 124 clones selected from 189. Germination was good.
- August planted AYT of 32 clones each at KARI-Kakamega and Mbita point were harvested.
- 9MAP data were recorded for the clones under on-farm trials in Teso and Ukwala-Siaya districts. CMD infection was recorded on MM96/9362 and MM 96/0183 at both sites. The site in Teso had all but clones MM96/5280, MM 96/7151 and MM 96/1871 infested with green mite. Levels of CMD in fast-track varieties were, however, much lower than those recorded for local variety checks.
- 9 MAP data were also recorded for all the four farms in Oyugis-Rachuonyo, 2 farms in Kuria and 1 farm in Migori district. Samples were taken for cyanide tests.
- Clones at Matungu (Butere-Mumias) were harvested. Farmers participated in the evaluation and used their own criteria to select varieties. The farmers had preference for clones that yielded large tubers, had long stems with small internodes, produced more stems per plant, were disease resistant, non-fibrous and not bitter. The clone Unknown 3 was ranked first in two of the sites.

Tanzania

- Evaluation of 400 clones from EARRNET continued during this quarter of the project.
- Tissue culture material from IITA continues to be evaluated at Gera, Bushasha and Maruku. Some of the clones under evaluation have shown CMD symptoms, but levels of disease are generally low.
- The 10 best clones form Open Quarantine planted for evaluation and multiplication show no symptoms of CMD infection.
- A nursery was established with seeds obtained from Open Quarantine material.

Indicator: Clones introduced: Tz > 100 Vars. evaluated: Tz 8; Ke 8; Ug 6
Vars to multiplication: Ke 4; Tz 4
OQ Tz - 10 clones to fast-track multiplication; 80 clones to prelim. eval.
PQS Ke – Virus indexing established; 10 vars indexed

Current Quarter's Measure: On-going var. evaluation: Tz 10; Ug. 9 varieties harvested. Ke 14 for fast-track multiplication
OQ Tz – 400 clones prelim. Evaluation; Ke: 563 clones, 172 clones for base material, and 175 clones for PYT

Cumulative Project Measure: On-going var. evaluation: Tz > 50; Ug 9; Ke 14
Vars to multiplication: Tz 6; Ug 1; Ke 2
OQ Tz – 480 in prelim. evaluation; Harvest of second set of 1999-planted trial, Ke: 563 clones in OQ, 175 clones for PYT

Objective # 4: Training and Technology Transfer Centres

Uganda

- The farmers and a combined team of IITA/NARO and CEDO staff harvested the 9 varieties under evaluation at the TTCs. Pre and post harvest evaluation was done. Replanting of the sites was done after the evaluation exercise
- Preparations were made to deliver the cassava processing machines to the sites that will host them
- Preparations were also made for training in post harvest processing of cassava tubers and demonstration of the working of the machines

Kenya

- Training was conducted for FEWs, farmers, CBOs, and NGOs in five districts in Western Province. This training organised by the PCO Western and facilitated by researchers and DCOs focussed on preparation of materials for planting, disease identification and control and agronomic practices. A total of 435 people were trained.

Tanzania

- Preparations to receive cassava-processing machines were finalised. Plans were also made for the evaluation of the material at the TTCs. There are also plans to train farmers on post harvest processing of cassava in the next quarter of the project

Indicator: Tech. Trans. Centres: Ug, Ke, Tz: 8 each
Farmers trained: Ug, Ke, Tz: > 160 each
Resistant variety multiplication on-going: TTCs Ug, Ke, Tz

Current Quarter's Measure: Ke: Training conducted for FEWs, farmers, CBOs and NGOs in Western Province, Farmer training: Ke 435; Ug – 4 sites were harvested and replanted.

Cumulative Project Measure: Tech transfer sites: Ug 4; Tz 8; Ke 5
Farmers trained: Ke > 2,000; Extension Workers trained: 19
TTC multiplication: Ug 4 sites; Ke 5 clusters; Tz >50 sites, Ug 4 sites harvested and replanted

Objective # 5: Project Management, Monitoring and Impact Assessment

An impact assessment specialist, Ousmane Coulibaly visited Uganda and proceeded to Kenya to initiate impact assessment of the project. This impact assessment survey has been scheduled for August.
There are also plans for a regional Stakeholders meeting in Bukoba, Tanzania in the next quarter.

Uganda

- There was continued monitoring of project activities by CEDO, the NGO coordinating project activities in the two districts of Rakai and Masaka. CEDO principal management task during the quarter was to distribute stems from established multiplication plots to targeted vulnerable households for which there were more than 300 beneficiaries, and to interact with Masaka District Administration in the sale via project farmer distributors to the District for more widespread distribution.

Kenya

- There are preparations to hold a Steering committee meeting in the next quarter of the project. During the meeting, progress of the project will be discussed and plans made for the next quarters' activities. Provincial Crops Officers continued to supervise the establishment of secondary and tertiary sites. At the tertiary site level, through the District Steering Committees, and increasing number of NGOs and CBOs became active in the cassava programme. It was decided that at tertiary level, farmers or farmer groups should be able to sell a portion of the stems they produced to help sustain the multiplication effort, but involvement of CBOs and Christian groups in the tertiary multiplication is also providing a means of targeting vulnerable groups.

Tanzania

- Links were strengthened between the co-ordinating project partner in Tanzania, LZARDI, and the FAO Farmer Field School programme and the Kagera Agricultural and Environmental Management Project's Integrated Pest Management/Integrated Plant Nutrient Management (IPM/IPN) groups through a second round of distribution of CMD-resistant cassava, cv. TMS 4(2)1425.
- A Steering committee meeting will be in the next quarter of the project. During the meeting, progress of the project will be discussed and plans made for the next quarters' activities.

Indicator:	Regional Stakeholders meeting SC meetings: Ug, Ke, Tz Impact reports: Ug, Ke, Tz
Current Quarter's Measure:	Ug: Monitoring of project activities
Cumulative Project Measure:	Regional Stakeholders meeting - Kampala Stakeholder implementation plans updated New country stakeholders identified: DRC, Rw, Bu Steering Committee meeting - Ke

B. Programme Success Stories

Ensuring food security for households in Uganda

Masaka district administration bought 494 bags of cassava planting material and distributed this to 1295 beneficiaries in the sub counties of Malongo and Bukulula, which had been badly hit by a storm that destroyed most of the food crops. CEDO's share of 173 bags was also distributed to vulnerable households in Kabula, Kooki, Kakuuto and Kalungu Counties.

Because of the increased sale of cassava planting material by multipliers, many farmers in target districts in Uganda have been inspired to adopt cassava as a cash crop.

The successful evaluation and harvest of the materials at the TTCs in Uganda was the highlight of this quarter of the project. The farmers participated with a lot of enthusiasm in this exercise and were able to select varieties of their choice, which met their criteria. Most notably, farmers recognised that the new varieties were far superior to local materials in most cases with respect to their response to pests and diseases and ultimately their yield. This will in the long run boost acceptability of these new varieties because it is they the farmers who have chosen them. Additionally, farmers will have a greater variety of material from which to choose from.

C. Problems in Achieving Programme Activities

A hailstorm severely damaged SS4 at the Bungoma FTC multiplication site in Western Province. As a result of the poor sprouting of the material and resultant poor stand the crop was uprooted. Hailstorm damage was also reported at one on-farm site in Teso district. Insufficient transport hindered monitoring activities in Tanzania. This was further exacerbated by the insecurity prevailing in the area.

ANNEX I

OFDA Project Activities in the districts of Rakai and Masaka
April- June

Rosemary Mayiga

Locations/Contact Persons:

During the quarter under review, the main activity in this programme was ratooning and distribution of SS4 cassava cuttings to the beneficiaries. The plots ratooned were mainly those that were planted during Phase 2 (October 1999). These cassava plots were being ratooned for the second time. The majority of the multipliers have indicated that they are willing to maintain the plots to allow a third ratooning. The locations and contact persons for these plots, therefore, are as indicated in table 1 below:

Table 1: Locations/Contact Persons for SS4 Multiplication Sites.

Sub-County	Village	Contact Person	Hectares
1. Kifamba	Kayege/Mayanja	Dominic Kaganda	1.4
2. Kifamba	Mbiriizi	Mrs. Ddungu	0.6
3. Kasasa	Kimukunda	Mrs. Nabasumba	0.4
4. Kasasa	Kimukunda	Mr. Kayiwa	1.0
5. Kyalulangira	S/County Headquarters	Juliet Naluggo	1.8
6. Byakabanda	Lugongo	Mr. Sabani Sserugo	0.8
7. Kabira	Ndolo	Ms. Nambirinja	0.6
8. Kagamba	Nabutaale	Mr. Ssegona	1.0
9. Kabira	Kibanda	Mr. Joseph Mukasa	0.8
10.Kingo	Kabwami	Mr. Kalule	0.8
11.Bukakata	Bbaale	Mrs. Bwanika	0.4
12.Bukakata	Sunga	Sr. Mary Goretti	0.6
13.Bukakata	Kaziru	Mr. Mutesasira	0.4
14.Mukungwe	Kiggato	Mr. Luswata	0.6
15.Kingo	Kamenyamiggo	DAO Masaka	2.0
16.Mpumudde	Kinoni	Halima Bbaale	1.6
17.Kaliiro	Kaliiro	Byonge Women's Group	0.8
18.Kaliiro	Kaliiro	Mr. Charles Mwesigye	0.4
19.Lwanda	Rakai DFI	DAO Rakai	2.5
20.Kasaali	S/County Headquarters	S/County Chief	0.8
21.Nabigasa	Buziranduulu	Mr. Luyinda	0.8
Total			**20.1**

Cassava Status:

Planted	Ratooned	Height	Status	Hectares
April 1999	Dec. 1999 April 2000 Dec.2000 April–May 2001	4 feet	Healthy	19.4
October1999	Aug.2000 Dec.2000 April-May 2000	4 feet	Healthy	39.0
Sept.2000 (92/00067)	—	5ft. +	Very Healthy	20.2

The cassava stems at these multiplication sites are healthy and show no symptoms of mosaic.

SS4 Cassava Cuttings Distribution

Farmers in Rakai and Masaka Districts took advantage of the abundant rainfall to plant all types of crops. The demand for SS4 cassava cuttings was very high and, therefore, all the mature SS4 cassava plots were ratooned to meet this demand. In Rakai District, the cassava cuttings were distributed to the individual households to ensure food security in the homesteads. In Masaka District, the local authorities opted to distribute at least one (1) bag of SS4 cassava cuttings per parish for multiplication purposes. It is hoped that the individual households will benefit from the parish multiplication sites during the first season of 2002 (Jan. – July 2002).

Whereas CEDO's share of 173 bags of cuttings was distributed free to the beneficiaries in Masaka and Rakai districts, most of the multipliers sold their shares at a price ranging from 8,000/= - 11,500/= per bag. Masaka District Administration was the biggest buyer because it had to come to the aid of its residents in Malongo and Bukulula sub-counties. The residents of these two sub-counties were badly hit by the storm in March 2001 destroying most food crops and many buildings.

Table 2: SS4 Cassava Cuttings Sold by multipliers to Masaka District.

County	Sub-County	Plot Ratooned	No. of bags	Taken to	No. of Beneficiaries
Kabula	Mpumudde	Byonge Women's Group	65	Malongo Sub-County	98
Kabula	Kaliiro	Mwesigye Charles	18	Malongo Sub-County	22
Kooki	Byakabanda	Sserugo	13	Bukulula Sub-County	27
Kooki	Kagamba	Sseggona	67	Bukulula Sub-County	119
Kakuuto	Kasasa	Kalungi Women's Group	59	Bukulula Sub-County	89
Kalungu	Bukakata	Mrs. Bwanika	7	Kyamusoke Growers	15
Kooki	Lwanda	Mrs. Kayiira	35	Bukulula Sub-County	195
Kalungu	Kingo	DFI Masaka	130	Kyazanga Sub-County	317
Kalungu	Kingo	DFI Masaka	100	Mukungwe Sub-County	413
Total			**494**		**1295**

Table 3:SS4 Cassava cuttings distribution by CEDO

County	Sub county	Ratooned plot	No. of bags	Beneficiaries
Kabula	Mpumudde	Byonge w/g	43	71
Kabula	Kaliiro	Mwesigye C.	12	25
Kooki	Byakabanda	S.Sserugo	8	11
Kooki	Kagamba	Sseggona	44	53
Kakuuto	Kasasa	Kalungi w/g	39	81
Kalungu	Bukakata	Mrs. Bwanika	4	9
Kooki	Lwanda	Mrs. Kayiira	23	50
Total			**173**	**300**

Technology Transfer Centres (TTCs):

During mid April, IITA/NARO staff, in conjunction with the CEDO agricultural extension staff, carried out the evaluation of the four TTCs. They guided the farmers through the pre-harvest evaluation in which the farmers could identify the positive or negative physical attributes of any of the nine varieties at the TTC. During the post harvest evaluation, the farmers looked out for a number of qualities for each of the varieties, e.g.,

1. Yield - Is the variety high yielding?
   - Are the tubers long, straight, big, etc.?
2. Maturity - does the variety mature in a short period or does it take long?

3. Is it sweet (raw/cooked)?
4. Does it have "threads"?
5. Is the cassava mealy?

Having completed the evaluation, the nine varieties were planted at new sites at each of the TTCs. These TTC replicas were established to make sure/crosscheck that the results obtained from the original TTCs were not affected by any other factors like drought, soils, etc. Varieties 92/00057, 92/00067, TME14 and 95/00087 were considered favourites among the farmers. Some farmers have therefore volunteered to be multipliers of these varieties during season "B" 2001 if the cuttings can be availed to them. After re-establishing the TTCs, the surplus cassava cuttings were distributed among the community for multiplication at their homesteads. Some of the cuttings at Kyazanga and Mpumudde TTCs were, however, left standing. This was because by the time land preparation was complete; the dry spell had started. Some of the cassava that had been planted failed to germinate.

Table 4: TTC Cuttings Beneficiaries.

TTC	Location	Beneficiaries
Mpumudde	Kalyamenvu "A"	5
	Kalyamenvu "B"	22
	Nsiika	14
	Bwiha	9
Kyazanga	Kasambya Co-op	19
	Bahiza	13
	Barigye	12
	Hajji Buulu	15
Kabonera	Mr. Bugembe	13
	Bisanje Parish	11
	Bukoto	26
	Mutayomba	1
Lwanda	Matia Ntale	17
	Namwandu Kafeero	15
	Edward Matovu	24
	Ssempiira Eugine	15
	Total no. of beneficiaries	**231**

Related Issues:

1) CMD incidence in the project area has greatly declined and the beneficiaries have started regarding cassava as an important food security crop.

2) Because some of the multipliers got money out of the sale of cassava cuttings, many farmers have been inspired to adapt cassava as a cash crop since even its consumption and appeal has risen locally.

3) The promise by IITA/NARO to install cassava processing machines at each of the TTCs is a motivating factor which may raise the demand for more planting materials in the area. CEDO is, therefore, proposing to establish a multiplication site for the four selected varieties at a rate of 0.8ha per variety.

4) The PL480 Food Security Programme originally paid the monitoring and supervision costs of the cassava programme. The financing of this programme ended in December 2000.To motivate the CEDO staff to pay due attention to this programme, a consolidated monthly allowance of Shs. 50,000/= has been considered with effect from May 2001.

ANNEX 2

ACCELERATED CASSAVA MULTIPLICATION PROJECT IN WESTERN KENYA

H.M. Obiero

Summary

Activities conducted during April - June 2001 included maintenance of primary and secondary sites, preparing planting materials for gap filling and establishment of secondary multiplication sites in Nyanza and Western provinces. Individual farmers, farmer groups, CBOs and NGOs were also supplied with materials for tertiary multiplication. A total of 1,608 bags were supplied by primary sites to various districts in the region. 21.2 ha have been established under secondary multiplication in Nyanza and 15 ha in Western province in this quarter of the project.

Data on diseases and pests were collected for the on-farm trials in Butere-Mumias, Teso, Siaya, Rachuonyo, Kuria and Migori districts. Harvesting of on-station trials at Alupe, Kakamega and ICIPE Mbita Point was done in May 2001. On-farm trials in Butere-Mumias were harvested. AYT2 with 32 clones was planted at Oyani while PYT1 (51clones) and PYT2 (124 clones) were planted at Alupe. Five hundred and sixty-three clones were introduced into the country and planted under open quarantine at Alupe. Base stock material of 172 clones was planted at Alupe in 2-3 rows. Also, fast-track clones (14) were bulked at Alupe to avail planting materials for future trials.

FEWs, farmers, CBOs and NGOs in five districts in Western province were trained on various aspects of managing the cassava crop.

The project was represented during follow-on field days on biological control of cassava green mite (CGM) using *T. Aripo* in Migori district. The field days were organized by Dr. C. Kariuki of CGM Project, KARI. The Cassava project representative sensitized farmers on cassava rapid multiplication, diseases and their control.

The project also received two sets of cassava processing machines in June 2001.

Introduction

Cassava (*Manihot esculenta*) has until recently been an important food security as well as income-generating crop in the lake basin region. Western Kenya has been recorded to cultivate over 60% of the cassava grown in the country. The crop gives good yields per unit area compared to basic staple cereals even under stress of poor soil fertility and low moisture regime.

However, in 1995 an unusually severe form of African cassava mosaic disease (CMD) entered western Kenya through the Kenya - Uganda border. By 1997, the disease had wiped out all the cassava landraces in the affected area. In some districts such as Busia, Teso, and Siaya farmers had given up growing cassava due to the losses incurred as a result of the disease. CMD has since spread within the entire Lake region and this has been perpetuated by whiteflies (*Bemisia tabaci*), which spread the disease, and also by farmers taking cuttings from one area to another within the region.

The disease has now been identified as far as southern Nyanza, up to the border of Tanzania.

Kenya Agricultural Research Institute technically and collaboratively with East African Root Crops Research Network/International Institute of tropical Agriculture (EARRNET/IITA) embarked on a programme to combat the epidemic. Financial support to combat the epidemic was provided by Gatsby Charitable Foundation-UK, Office of Foreign Disaster Assistance-USAID, and Rockefeller Foundation-USA.

Eight hundred and forty-five cassava clones have been introduced into open quarantine at KARI-Alupe since 1997. In May 2001, 563 more clones were added to the already existing collection. These clones are at various stages of evaluation (i.e. quarantine, PYT, AYT and on-farm).

Two cassava varieties, SS4 and Migyera, have been under multiplication since 1998. A three-tier multiplication system has been adopted (primary, secondary and tertiary).

Fourteen fast-track clones have already been put under on-farm trials in Teso, Butere-Mumias, Siaya, Rachuonyo, Migori and Kuria districts.

Specific Objectives under review

a. Multiplication and maintenance of primary and secondary sites
b. Establishment of new primary and secondary sites
c. Activities undertaken on on-farm trials
d. Activities undertaken on on-station trials.
e. Training of FEWs, NGOs, CBOs and farmers
f. Other activities

DESCRIPTION OF IMPLEMENTED ACTIVITIES

Rapid multiplication of SS4 and Migyera

Various activities undertaken at the primary multiplication sites are highlighted below:

KARI-Alupe

During this period preparation of mini-stem cuttings was carried out and materials were given to individual farmers, farmer groups, CBOs, and NGOs in mostly Busia and Teso districts. Weed control consisted of a combination of manual slashing and use of herbicide. Some fields, which had difficult weeds to control like *Stylosanthes*, were partly hand weeded before spraying with Sencor herbicide.

Open quarantine
Five hundred and sixty-three clones were planted in open quarantine on 9-10/6/2001. The crop is germinating well.

Base stock
One hundred and seventy-two clones were planted on 21-6-2001 as base stock material. Each clone was planted in 2-3 rows.

Fast-track clones multiplication
Due to the high demand for planting materials of the preferred clones selected from the on-farm trials, the 14 clones were bulked at Alupe on 20/6/2001 on plots of varying sizes ranging from 0.1 - 0.4 ha. Plot sizes were dictated by availability of planting material. The clones were sprouting well at the time of reporting.

KARI-Kakamega

Planting materials were cut and given to individual farmers, farmers' groups CBOs and NGOs throughout the months of April, May and June. SS4, which was established in September 2001 on 0.5 ha, and Migyera were also cut and distributed to farmers. The demand for SS4 was too high to be met. Weeds were controlled in the fields by a combination of both herbicide (Roundup and Sencor) and manual slashing.

Kibos Sugar

All the materials were cut in the month of April and provided to farmers for both tertiary and secondary multiplication. Most of the materials went to the nearby districts. A combination of hand weeding and herbicide was used to control weeds. The Center previously under KARI is now under the management of Kenya Sugar Research Foundation

Bukura FTC

Most of the planting materials were cut and distributed for tertiary and secondary multiplication in Kakamega, Lugari and Butere-Mumias-districts during the period of April-June 2001. Weeding was done manually by slashing followed by a spray of Roundup and Sencor. The crop was top-dressed with CAN to boost growth.

Siaya FTC

All the material from the 2.0 ha plots of Migyera was cut and given to farmers in Siaya and Bondo districts for multiplication. There was heavy infestation of CGM that was confused for CMD on SS4 (1.6 ha). This made the farmers reluctant to take the materials, but this problem reduced considerably when the long rains intensified. Roundup was sprayed on the fields after slashing.

Bungoma FTC

SS4 had poor sprouting, was stunted and severely damaged by a hailstorm after the second season cutting. Generally the stand was poor as a result of poor shallow murram soils. As a result, the crop was uprooted. However, the materials were cut and given to farmers in Bungoma Lugari, and Mt. Elgon districts. Due to the nature of weeds hand weeding was used on the Migyera plot during the quarter.

Busia

During the period Oct-Dec 2000, the FTC provided SS4 planting material to Teso, Vihiga, Siaya and Busia districts. Weeds were controlled by herbicide and hand-weeding.

ICIPE

The main activities at ICIPE's three farms Mbita Point, Amoyo and Nguku were cutting and distribution of cassava mini-stem cuttings to farmers in mostly Suba, and Homa bay districts. All of the SS4 at Mbita was cut and given to farmers through the District Crops Officer, Suba district. Some staff at ICIPE also small quantities of material. Mealybugs that had infested the SS4 field were controlled by spraying with Rogor E insecticide. Pruning of excess branches was done and the ratoon crop was doing well at the time of reporting.

At Nguku farm all the SS4 was also cut and given to farmers in Homa bay district through the District Agricultural Office. The demand for SS4 was unable to be met by the present hectareage. Some of the Migyera at Amoyo farm was cut and given to farmers. More materials available will be cut and be distributed to farmers in the neighbouring districts. Some tubers were harvested and distributed to farmers and to some ICIPE staff to have a taste of SS4. A total of 210 bags of materials were distributed to farmers during this quarter.

Some of the SS4 materials from Nguku farm were used to establish 4.0 ha at Amoyo farm.

Table 1:
Summary of planting materials supplied by primary sites during April-June 2001.

Site	Varieties (mini stem cuttings in large bags)		Total
	SS4	Migyera	
1. KARI-Alupe	12.5	48	60.5
2. KARI-Kakamega	105	462	567
3. Kibos Sugar	268	-	268
4. Busia FTC	164	-	164
5. Siaya FTC	12	55	67
6. Bungoma FTC	32	105	137
7. Bukura FTC	135	-	135
8. ICIPE	188.2	21.4	209.6
TOTAL	**916.7**	**691.4**	**1608.1**

NB
Materials at ICIPE were supplied in Kg but for uniformity in report writing, these were converted into bags estimated at 40kg of cuttings per bag.

Table 2(a):
Summary of secondary multiplication established (April-June 2001) in Nyanza province

Districts	Varieties	Area in ha	Status
1. Nyando	Migyera	2.2	1st weeding done
	SS4	1.8	
2. Kisumu	SS4	3.2	70% germination
3. Suba	SS4	4.0	90% germination
4. Bondo	SS4	4.0	Over 80% germination
5. Homa bay	SS4	2.0	Over 70% germination
6. Migori	Migyera	2.0	
7. Kuria	Migyera	2.0	
Total		**21.2**	

Table 2(b):
Summary of secondary multiplication (April-June) in Western Province

Districts	Variety	Area (ha)	Status
1. Bungoma	SS4	2.8	1st weeding done once
	Migyera	1.2	
2. Kakamega	SS4	2.2	1st weeding done
	Migyera	0.8	1st weeding done
3. Butere-Mumias	SS4	2.0	70% germination, weeded once
4. Mt. Elgon	SS4	3.2	65-80% germination
5. Lugari	Migyera	1.6	1st weeding already done
	SS4	2.4	
Total hectareage		**16.2**	

ON-STATION TRIALS

KARI-Oyani

AYT2 with 32 clones was planted on 11/4/2001 at Oyani sub-centre of KARI-Kisii in Migori district. Two clones Migyera and SS4 were used as checks. There was a dry spell shortly after planting lowering the germination to about 40% in some plots. The trial has however been hand-weeded twice.

KARI-Alupe

The main activities in this quarter included preparation of mini-stem cuttings, harvesting, planting and weeding trials. Harvesting of PYT and AYT planted in 2000 was done between 22-24 of April 2001. Two middle rows were harvested as net plots in both trials.

PYT1

Fifty-one clones were planted on 30/4/2001 on plots of 4 rows, each 10-m long. Pre- emergence herbicide (Sencor) was sprayed after planting. Two weedings have already been done.

PYT2

One hundred and twenty-four clones selected from 189 were planted on 1-5-2001 on plots of 3 rows, each 4m long. The trial had over 80% germination. Sencor (a pre-emergence herbicide) was sprayed after planting. It has been hand weeded twice.

KARI-Kakamega

AYT2 of thirty-two clones planted in August 2000 was harvested on 25th May 2001. Only two middle rows each 10 m long were harvested.

ICIPE -Mbita Point

Thirty-two clones (AYT2) that were planted in 2000 were harvested on 26 - 27 May 2001. Two middle rows 10 m long were harvested.

ON-FARM TRIALS

Teso (Amukura division)

Nine months after planting data on diseases and pests were taken on 29/5/2001 by Researchers and Extension personnel. One plant per plot was found with CMD symptoms on clones MM96/9362 and MH95/0183. All the clones have been attacked by CGM except MM96/5280, MM96/7151 and MM96/1871. There was hailstorm damage on the second farm and later the clones were attacked by cassava anthracnose.

Ukwala-Siaya district

Nine months after planting data were recorded on 16/5/2001. Clones MM96/9362 and MH95/0183 had few CMD infected plants. Three of the farms were weedy.

Matungu (Butere-Mumias district)

The third data collection was taken on 4/5/2001. There was severe hailstorm damage at Geoffrey Makau's farm. Samples for cyanide testing were taken on 7/6/2001 from all the four farms. Harvesting of the clones was done between 26 - 27/6/2001. Farmers evaluated the materials as follows:

(a) Farmer one (Cluis Watako Lutta)
Four plants of MM96/9362, one plant each of MM96/1871 and MH95/0183 were infected with CMD. Mild CGM symptoms were observed on all the clones except MM96/5280 that recorded fewer plants with CGM. MM96/4466 gave the highest yields of 18.3 t/ha followed by MM96/5280 with yield of 10.8 t/ha. 68 men and women farmers participated in the evaluation of the clones. The farmers selected the clones in order of preference as follows: MM96/4466, MM96/9362 and MH95/0183.

(b) Farmer two (Geoffrey Makau Mulama)
Clone 55329 had 8 plants with CMD while Migyera and MM96/1871 had 2 plants each infected. The local variety (CK2) had 47 plants infected. Mild infestation of CGM was observed on MM96/7151, 55329, and MM96/7688. Unknown 3 gave the highest yield of 11.1 t/ha followed by MM96/7688 with 9.8 t/ha. This trial was repeatedly hit by hailstorms and this must have had an effect on yield. Seventy-five farmers were involved in evaluation. They chose the clones in the following order; Unknown 3, 55329, and SS4.

(c) Farmer three (Gabriel Oduori)
Unknown 3 and MM96/4884 both had 3 plants each infected with CMD. CGM with severity level of 2-3 was observed on all the clones. TME-14 had 9.1 t/ha, Unknown 3 yielded 8.8 t/ha and SS4 yielded 8.7 t/ha. The 64 farmers involved in the evaluation selected MM96/1871, MM 96/3868 and Unknown 3 in order of preference.

(d) Farmer four (Ochola)
Two clones CK2 and 55329 had 29 and 2 plants respectively infected with CMD. Anthracnose was wide spread on the plots as a result of hailstorm damage. MM96/3868 had a yield of 32.9 t/ha while MM96/5280 and Unknown 3 had 25.8 and 25.6 t/ha respectively. Seventy-three men and women farmers participated in the evaluation and preferred Unknown 3, 55329 and SS4 in that order.

Across the four farms, the farmers had some common criteria for choosing the clones. They particularly had preference for those clones with many and large tubers, longer stems but with short inter nodes for provision of more planting materials, more stems per plant, disease resistance, non fibrous tubers and the non bitter but not sugary types.

Oyugis - Rachuonyo district

Nine months after planting data were recorded on 12/4/2001 on all the four farms.

(a) Farmer 1 (Florence Lusi Walo)
Three plants of clone MM96/9308, two of TME-14 and one plant of MM96/4884 had CMD symptoms. All the clones were however attacked by CGM. Severe attack of CBB was observed on Migyera, MM96/5280, TME-14 and SS4 as a result of hailstorm damage. Samples for cyanide tests were taken on 11/6/2001.

(b) Farmer 2 - Nyala women's group (Tobias Omenda)
MH95/0183, MM96/9362 and a local variety (Ongielo) had 6, 4 and 96 plants infested with CMD respectively.

(c) Farmer 3 (Isaac Odhiambo)
Only the local variety (Duruma) had 63 plants infected with CMD. CGM was recorded on MM96/5280/, SS4, MM96/4684, and Migyera though with moderate severity.

(d) Farmer 4 (Sikri School for the Deaf and Blind)
Nine month after planting data on diseases and pests were recorded on 12 th April 2001. Clone MM96/4052 had two plants infested with CMD; unknown 2 had two while the local clone (Serere) had 16 CMD infected plants. Samples for cyanide test were taken on 11/6/2001.

Kuria

Kehancha
Nine months after planting disease data were recorded on 8/5/2001. Two of the plots had had hailstorm damage and were slowly recovering. CMD was observed on SS4, MM96/9362 and MH95/0183. Mohere Mogibai's farm was weedy, with many other local clones that failed to germinate having been replaced with local varieties.

Subakuria
Nine month after planting data was collected on 10/5/2001. CMD was observed on MMH95/0183 and MM96/93652 on 1 and 2 plants respectively but with mild severity. CGM was however, widespread on all but the local, TME-14 and MM96/5280. Paul Mabere's farm was very weedy and this may ultimately affect the tuber yield.

Muhuru bay (Migori district)
Nine months after planting data on diseases and pests was recorded on 9/5/2001. CGM with moderate severity ranging from level 2-4 was observed on all the clones.

TRAINING

FEWs, farmers, CBOs and NGOs in 5 districts of Butere-Mumias, Busia, Teso, Bungoma and Mt. Elgon in Western Province were trained during this quarter of the project. The training was organized by the PCO Western and facilitated by Researchers and DCOs. The training covered preparation of cassava planting material, disease identification and control and other agronomic practices. It was a one-day training for each site. Before the training took place, the PCO went round all the districts on supervision and selection of appropriate training venues. Training in Nyanza is scheduled for July. Below is a summary of the training conducted in Western Province:

Table 3: Summary of place and number of farmers, FEWs and other Stakeholders who were trained in Western Province.

District	Site	Farmers		FEWs	Total number trained	NGOs/CBOs represented
		Males	Females			
1. Butere-	a) Matungu	23	4	4	31	-
Mumias	b) Khwisero	56	34	6	96	-
2. Busia	a) Nambale	34	56	3	93	3
	b) Funyula	13	3	2	18	1
3. Teso	a) Chakol	25	14	3	42	-
	b) Amagoro	36	9	2	47	4
4. Bungoma	a) Nalondo	12	3	-	15	-
	b) Bumula	26	4	1	31	-
5. Mt. Elgon	Cheptais	38	20	4	62	2
Total		**263**	**127**	**25**	**435**	

EQUIPMENT

The project received two sets of cassava processing machines (four motorized chippers and four presses)

OTHERS

Three field days were conducted from 20th to 22nd of June 2001 in Migori district by Dr. Kariuki of cassava green mite project as a follow up on the training carried out earlier on biological control of CGM using T. Aripo (*Typhlodromulus*

Aripo). The participants included farmers, CBOs, Extension Officers and other stakeholders. The cassava project was represented and the participants were sensitized by the project representative on cassava diseases and rapid multiplication.

ANNEX 3

CMD PANDEMIC MITIGATION IN TANZANIA APRIL - JUNE 2001

Jeremiah Sato and Innocent Ndyetabura

Multiplication and Distribution of Resistant Varieties

In the period between April to June 2001, the plots of multiplication were maintained at both Ukiriguru and Maruku. Some cuttings from Maruku plots were distributed to IPM/N groups and FFS. The number of cuttings and areas where the material were sent in Bukoba are as indicated below:

Location	Number of cuttings	Varieties
Mizani	6,000 500	TMS 4 (2) 1425 SS4
Byamtemba	2,605	TMS 4 (2) 1425
Kanyigo	7,500 1,000	TMS 4 (2) 1425 SS4
Rubale	1,220	TMS 4 (2) 1425
Maruku	3,800	TMS 4 (2) 1425
Kemondo	2,000	TMS 4 (2) 1425

All the planted sites have established well. There is a need to visit the sites but transport constraints have hindered this exercise. All multiplication plots established in Kagera need to be assessed but transport still poses a problem.

Germplasm Diversification

Open quarantine materials

A total of 400 clones from EARRNET Uganda were planted and assessed under the Open Quarantine site at Maruku. A total of 259 plants from different clones expressing CMD symptoms were uprooted in the OQ. A total number of 102 clones showed no symptoms of CMD. The number of plants rogued per clone ranged from 1 to 5.

Evaluation of IITA tissue culture material.

Tissue culture materials from Nyakasanga (Ukiriguru) are being evaluated at 3 sites in Kagera (Bushasha, Gera and Maruku). A list of these 38 clones is shown below:

I 92/0600	I 93/005	I 91/00416	TME 13
TME1	I 93/0614 (3x)	I 93/0571 (3x)	I 93/0127
I 93/0639 (3x)	I 93/0026	I 92/0042	91B/00462
TME 6	I 93/0584 (3x)	I 93/0569 (3x)	I 93/0053
I 93/0161	I 92/0053	I 93/0658 (4x)	I30572

I 93/0170	I 93/0571(3x)	I 92/0429	I 92/0401
I 92/0455	I 92/0019	I 92/0342	I 93/0560
I 92/0509	TME 12	I 92/0019	TME 4
I 92/097.			

At Maruku (low disease pressure), Gera (moderate disease pressure) and Bushasha (high disease pressure), seven, eight and 19 clones respectively showed CMD symptoms. In future the evaluation should be done at the front of the CMD pandemic.

Evaluation /Multiplication of EARRNET clones

All 10 best clones from OQ, which were planted for both evaluation and multiplication, were observed to be clean and free of CMD infection.
In another batch of 80 clones, a total of 12 clones had CMD symptoms and the disease severity ranged between 2 and 3.

Maintenance of ratoon crop and multiplication plots

All multiplication plots at both Ukiriguru and Maruku continue to be maintained. All plants with CMD infection were rogued.

Establishment of nursery from seeds collected from open quarantine

Plants established from seed collected from OQ were evaluated. Some seedlings (5 plants) were uprooted due to the presence of CMD symptoms

Monitoring and Diagnostics

A survey was conducted in 11 districts of the Lake Zone. A total of 142 farmers' fields were surveyed for CMD. 13 fields in Ukerewe, 11 in Bunda, 7 in Serengeti, 13 in Musoma, 24 in Tarime, 13 in Bukoba, 10 in Muleba, 17 in Biharamulo, 8 in Geita, 12 in Ngara and 14 in Karagwe districts were covered during the survey.
Generally, CMD incidence and severity in the visited areas seems to be higher in some areas of Biharamulo, Muleba , Karagwe and Geita (the pandemic affected areas). However, in Bunda and Ukerewe the situation is exacerbated by the practice of using infected planting materials and the presence of cassava green mite during the prolonged drought. During the survey a total of 117 leaf samples and 43 whitefly samples were collected. The DNA samples will be sent to Namulonge for analysis and whitefly samples sent to University Arizona for biotype identification. The report on the status of CMD in the zone will be presented in the next quarter.

Future plans
There are plans to visit all TTCs in both Kagera and Mara for data collection and evaluation of the test clones in August 2001

Training of trainers and farmers on CMD mitigation, multiplication and post harvest processing has been scheduled for August 2001.

Table 1.Tissue-culture materials evaluated at Maruku site in Bukoba District

Clone	Maximum CMD severity score
I 92/0342	2
I 93/0560	2
I 91/00416	2
I 93/057(3X)	5
I 30572	3
I 93/0739(3X)	3
TMS 4(2)1425	2

Table 2. Tissue culture materials evaluated at Gera Site in Bukoba District

Clone	Maximum CMD severity score
I 92/0325	3
TME 7	2
I 92/0401	2
I 92/0455	3
I 93/0464 (3X)	3
I 92/0402	2
I 93/0161	2
I 93/0170	4
I 92/0325	3
TME 7	2
I 92/0401	2
I 92/0455	3
I 93/0464 (3X)	3
I 92/0402	2
I 93/0161	2
I 93/0170	4

Table 3. Tissue culture material evaluated at Bushasha Site, Bukoba District

Clone	Maximum CMD severity Score
I 92/0600	4
I 93/005	2
I 91/00416	3
TME 13	2

Table 3. Tissue culture material evaluated at Bushasha Site, Bukoba District (cont.)

Clone	Maximum CMD severity Score
TME 1	3
I 93/0571 (X)	4
I 93/0127	3
I 93/ 0639 (3X)	2
I 93/0026	2
I 92/0325	3
TME 7	3
I 92/0402	2
I 93/0229	3
I 93/0057	3
TMS 4(2)1425	4
I 93/0161	2
I 92/0053	3
I 93/0658 (4X)	4
I 92/0342	2

ANNEX 4

IDENTITY AND DISTRIBUTION OF WHITEFLY VECTOR VARIANTS ASSOCIATED WITH BEGOMOVIRUS INFECTIONS OF CASSAVA IN EASTERN AFRICAN COUNTRIES

April-June 1, 2001

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Project Goal and Approach.

The goal of this study is to apply a PCR based-methodology to determine the identity and map the distribution of whitefly vector biotypes associated with cassava-infecting begomoviruses in Eastern Africa. The purpose is to better understand the identity, dynamics, relationships, and specific circumstances surrounding whitefly vector populations in cassava, in relation to the new begomovirus epidemic and ACMV/EACMV/UGV.

Objectives and Progress To Date:

Objective 1.
To continue to use a strategy recently developed in the Arizona laboratory by which *B. tabaci* variants/biotypes/topotypes can be identified or differentiated using PCR amplification of the mt cytochrome oxidase I gene fragment. This sequence has been found to be highly useful for discriminating between *B. tabaci* variants by comparative analysis with reference sequences in the mt COI database developed in the Arizona laboratory.

Results
Results of the mt COI analysis of samples from Rwanda and Congo (along with some redos) (Table 1) are shown in Figure 1 (not included). Indigenous *B. tabaci* from Uganda (AH = ahead of the front) form a tight cluster (bottom of tree) with Congo 1 and 2 collections (CG1, CG2), part of the collections from Kenya, all collections from Rwanda and Tanzania, and a single sample each from cassava in Malawi and Mozambique (included to test relationships with other sub-Saharan populations outside the present survey zone (courtesy, Prof C. Rey, Wits, South Africa and JK Brown, UA). We interpret this 'non-invasive' genotype to constitute a common *B. tabaci* genotype associated with cassava (and sometimes other non-cassava hosts, though it is possible they originated in cassava despite their collection from pepper and cabbage, for example) in these locations in Africa. A second large cluster (top of the tree) contains apparent 'invader' *B. tabaci* (FR = front; BH = behind the front) associated previously with the new

epidemic in cassava in Uganda, together with some of the Kenyan samples. Outgroups from Benin, Cameroon, Uganda sweet potato are clearly clustered with others from sub-Saharan Africa (Ug 3-2 Bukoba was redone, showing its old position (out of place?) and a new sequence (*redo*) which is of improved quality (Ug 3-2 I zone), the latter being consistent with its placement with other Ugandan 'non-invader' genotypes, as expected. No samples were identified as being genotypes that did not cluster with other African exemplars. No samples were identified as the polyphagous, invasive, B biotype now found throughout the world. No 'invasive' genotype samples were identified in Rwanda or in Congo (though n = 2 for the latter).

Several samples from Rwanda grouped with the reference sequence for *Bemisia afer*, indicating these whiteflies are probably *B. afer*, a *Bemisia* species that colonizes a range of host species, including cassava, in Africa and Mediterranean region, but is not a begomovirus vector.

Other *B. tabaci* clusters are as seen in previous analyses, and comprise a New World group, a second that contains *B. tabaci* from N Africa + the Mediterranean region, a third containing the Indian subcontinent + India/Southeast Asia/Australia.

Table 1. Whitefly samples subjected to mt COI analysis during this quarter.
Rwanda
James Legg (revd 8/11/00, ziplock -20°C d/s)

RW1	Rwanda, *B. tabaci*,	Cassava 7/19/00 J. Legg
RW2	Rwanda, *B. tabaci*	Cassava, 7/19/00 JB Muhinyuza
RW3	Rwanda,. *B. tabaci*	Cassava, 7/19/00 JB Muhinyuza.
RW4	Rwanda, *B. tabaci*	Cassava, 7/20/00
RW5	Rwanda, *B. tabaci*	Cassava, 7/20/00
RW6	Rwanda, *B. tabaci*	Cassava, 7/20/00.
RW7	Rwanda, *B. tabaci*	Cassava, 7/20/00
RW8	Rwanda, *B. tabaci*	Cassava, 7/20/00
RW9	Rwanda, *B. tabaci*	Cassava, 7/21/00
RW10	Rwanda, *B. tabaci*	Cassava, 7/20/00
RW11	Rwanda, *B. tabaci*	
RW12	Rwanda, *B. tabaci*	Cassava, 7/21/00
RW13	Rwanda, *B. tabaci*	Cassava, 7/21/00

Rwanda (Awaiting additional information)
James Legg (6/01, ziplock -20°C d/s)

RW14	Rwanda, 2,	6/5/01
RW15	Rwanda, 10,	6/5/01
RW16	Rwanda, 13,	6/5/01
RW17	Rwanda, 17,	6/5/01
RW18	Rwanda, 25,	6/5/01
RW19	Rwanda, 28,	6/5/01
RW20	Rwanda, 31,	6/5/01
RW21	Rwanda, 36,	6/5/01
RW22	Rwanda, 51,	6/5/01
RW23	Rwanda, 57,	6/5/01
RW24	Rwanda, 61,	6/5/01
RW25	Rwanda, 66,	6/5/01
RW26	Rwanda, 71,	6/5/01
RW27	Rwanda, 76,	6/5/01
RW28	Rwanda, 81,	6/5/01
RW29	Rwanda, 86,	6/5/01
RW 30	Rwanda, 93,	6/5/01
RW31	Rwanda, 96,	6/5/01
RW32	Rwanda, 103,	6/5/01
RW33	Rwanda, 103,	6/5/01
RW34	Rwanda, 108,	6/5/01
RW35	Rwanda, 116,	6/5/01

Congo:	**D.R. Congo, rcvd 8/11/00 James Legg**
CG1	Matungu, Cassava, 7/22/00, James Legg.(EtOH)
CG2	Matungu, Cassava, 7/22/00, James Legg.(EtOH)

Objective 2

To develop a PCR based, or combined PCR-restriction enzyme approach for identifying the common genotypes of *B. tabaci* in cassava, and thereby, permit on-site monitoring of whitefly vector activity. This will involve development of a diagnostic assay for each commonly occurring *B. tabaci* genotype found thus far in cassava in Kenya, Tanzania, and Uganda. The objective requires identification of unique restriction enzyme sites and/or design of genotype-specific primers within the mt COI or other whitefly genes that prove useful for identifying and tracking unique genotypes.

Results

The mt COI gene, KDR gene, and internal transcribed spacer (ITS) sequence of the ribosomal transcription unit were explored as possible targets around which to devise a diagnostic that could be adapted and established at IITA to monitor *B. tabaci* genotypes associated with the virus epidemic. Candidate *B. tabaci* populations included in this objective were: AZA (New World, polyphagous, AZB (Old World, polyphagous, nearly ubiquitous), Jatropha (New World, monophagous), UG 14 and UG 16 (Uganda, BH, cassava), UG 31 (Uganda, FR,

cassava), and UG35 (Uganda, AH, cassava). Primer design, PCR, DNA sequencing of cloned amplicons and analysis of the three target sequences revealed that none were compatable with the criteria needed in the absence of DNA sequencing capabilities. For example the mt COI sequence is too A-T rich to design sequence specific primers that do not cross-anneal, the KDR gene was difficult to amplify consistently even though several primer pairs were designed and used to amplify the gene, and the ITS, although sufficiently polymorph for phylogenetic analysis, unique sequences with flanking conserved regions did not lend themselves to the design of primers that could be used at sufficiently high annealing temperatures to avoid annealing to the ITS for heterologous test populations from Uganda. Thus, we are currently exploring the possibility for amplification of the ITS sequence followed by digestion with key endonucleases (restriction enzymes) (Figure 2; Table 2)

Table 2. Prospective, strategic restriction enzymes under consideration for generating diagnostic patterns following digestion of whitefly ITS amplicons (work underway).

Restriction Enzymes for ITS-Uganda

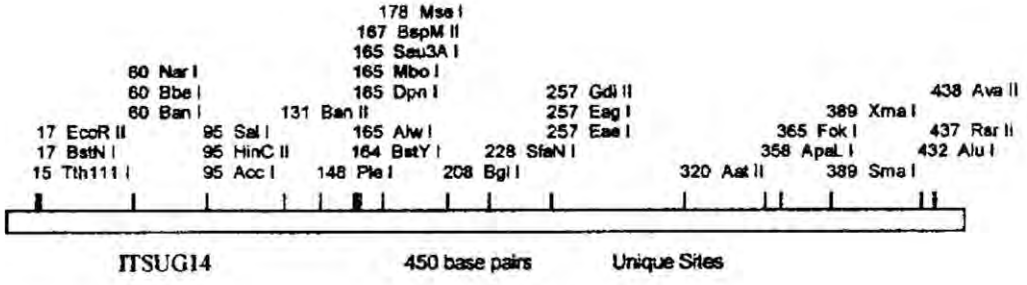
		UG14	UG16	UG31	UG35
Enzymes	**Sequence**				
AlwI	ggatc	164,286	161,334	158,333,7	169,334,12
Sty I	C/cwwgg	No site	No site	No site	20,495
Hpa I	Gtt/aac	No site	No site	169,329	No site
SmaI	Ccc/ggg	388,62	No site	381,117	393,122

Publications resulting from work:

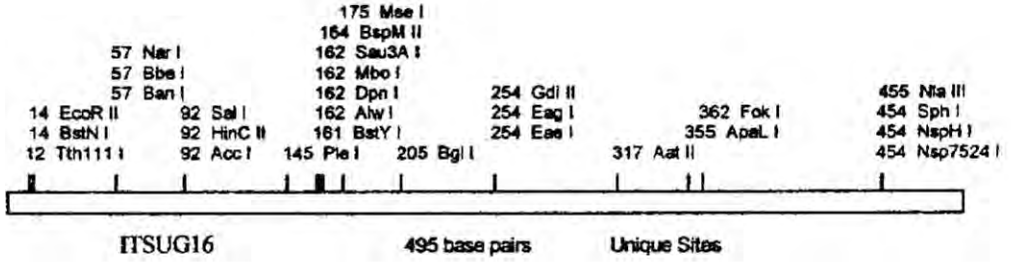
Legg, J.P., D. Rogan, R. French, G. Okao-Okuja, and J.K. Brown. A distinct biotype of *Bemisia tabaci* (Gennadius) (Homoptera: Aleyrodidae) is associated with the epidemic of unusually severe cassava mosaic virus disease in Uganda (in preparation).

Figure 2. All possible restriction enzymes identified for ITS- Uganda sequences.

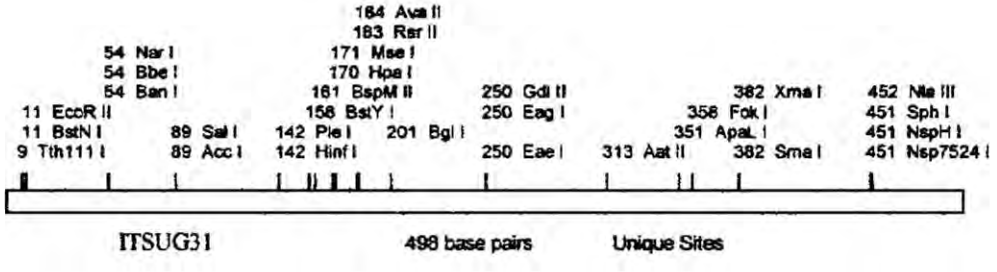
UG 14



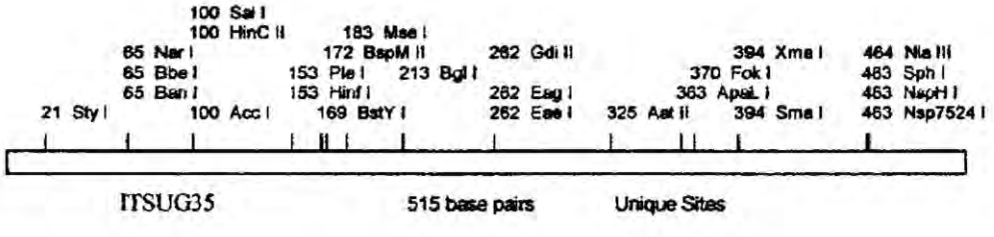
UG16



UG31



UG35



ANNEX 5

REPORT ON REGIONAL PLANT QUARANTINE DEVELOPMENT FOR CASSAVA IN EAST AFRICA PLANT QUARANTINE STATION, MUGUGA, KENYA (JAN-JUNE, 2001)

Inventory of Cassava Germplasm at PQS

Site/Activity	Number of Clones	Remarks
Field	15	Water shortage
Glasshouse	29	Repair of glass house
Acclimatized	8	Poor performance
Short term storage	8	Good condition
Total	**60**	

In the previous quarter (Jan-March), the above clones were maintained and handled as explained above. In addition, we received chemicals and supplies form KARI Katumani. Open tender procedure for the construction of the laboratory is awaiting clearance from the proposed meeting between KEPHIS and CSC representatives (Dr. Whyte).

We plan to index the germplasm at PQS and any other introduced cassava materials for viruses in the next quarter of the project.

We need to strengthen collaboration with researchers and international scientists to be able to identify clones and index for viruses those clones to be multiplied.

Constraints

1. There was a breakdown in communication, especially telephone lines and E-mail, which are vital in facilitating collaborative efforts among stakeholders
2. Chemicals for the laboratory, IgG rabbit polyclonal antibody, monoclonal antibodies 23 and 33, EDTA and p-nitrophenylphospahte were out of stock and were not supplied thereby delaying preparations to run ELISA.

ANNEX 6

Minutes for The Third Steering Committee Meeting
6th -- 7th February 2001
Lake Zone, Tanzania

Introductory note

The third national steering committee meeting was held at ELCT Kashura in Bukoba town in February. Mr. Mukandala chaired the meeting because the chairperson was unable to attend the meeting due to other commitments. The aim of this meeting was to evaluate the progress for the period between October 2000 and January 2001.

Welcome address by the Officer in charge

The officer in charge of Maruku research station welcomed all members to the steering committee meeting He explained that this was the third time the meeting was being held in Bukoba. He welcomed all members who were attending this kind of meeting for the first time.

The officer in charge appreciated the efforts made so far by the project. He noted that one of the big successes of these meetings was the availability of resistant materials from Uganda in the country, as well as the raised awareness of the farmers about CMD. He also highlighted on the research activities, which have been conducted in the Zone. The officer in charge appreciated the efforts made by IITA-ESARC in Kampala in attendance of the meetings, and the big pushes given to the project. He also mentionec that the CMD Project has set a good example for other projects to follow. He appreciated the efforts and commitment of the Ministry of Agriculture towards mitigation of CMD in the Lake Zone. The meeting was officially declared opened.

Adoption of Agenda:

The members adopted the following agenda after reviewing them:
(a) Progress reports for the past few months.
(b) Planning for the remaining months
(c) Future plan
(d) AOB

Progress report for the past few months

After the steering committee of September 2000, some activities were planned, and the implementation started just after the meeting. The activities accomplished so far are elaborated below:

Multiplication and Distribution of Resistant Varieties

In November 2000, plots of multiplication were ratooned at both Ukiriguru and Maruku. The cuttings were distributed to contract farmers/FRGs/IPM/N groups and FFS. The number of cuttings and districts where the material were sent are as indicated in Table 1

Table 1: Number of cutting and varieties supplied to different districts for multiplication

Location	No. of cuttings supplied	Varieties
Muleba	31,200	cuttings of SS4
Bukoba	23,500	SS4
Karagwe	31,400	SS4
IPM/N and TTCS	9,072	SS4
Musoma	17,464	Different varieties
Tarime	15,460	Different varieties
Biharamulo	80,744	Different varieties
Ngara	15,000	Different varieties
FAO-FFS (Kagera)	5,000	TMS 30572
Rubya	1,000	TMS 30572
World Vision- Misenye	3,000	TMS 30572, and 30337
Kiilima	625	TMS 42029
Butundwe	3,250	TMS 4(2) 1425
Ukiriguru	12,700	TMS 4(2) 1425
Total	**249,415**	

Table 1b: The old fields at Ukiriguru and Maruku had the following number of cuttings

Site	Variety	No. Of Stems	No. Of cuttings
Maruku	TMS 4(2) 1425	53,202	266,010
	SS4	35,844	179,220
	TMS 30337	2,020	10,100
	TMS 60142	180	900
	Migyera	330	1,650
	IITA tissue culture	269	1,345
	MM 96/8450	58	290
	MM 96/4448	180	900
	MM 96/3075B	164	820
	MM 96/4619	65	325
	MM 96/8100	43	215
	MM 96/0876	18	90
	MM 96/4684	36	180
	MM 96/5373	41	205
	MM 96/5723	44	220
	MM 96/8233	38	190
	TMS 30572	2,560	12,800
Ukiriguru	TMS 81983	1,868	9,340
	TMS 4(2) 1425	6,256+10,697	84,765
	TMS 60142	765+3,042	19,035
	TMS 30562(6)	783	3,915
	TMS 30337	320+156	2,380
	TMS 30001	716	3,580
	Lwakitangaza	3,294	16,470
	TMS 83/01762(5)	450+1,224	8,370
Buhemba	TMS 4(2) 1425	9,250	46,250
	TMS 83/017662(5)	2,225	11,125
Tarime	TMS 4(2) 1425	9,250	46,250
	TMS 83/01762(5)	2,225	11,125

Germplasm Diversification

Open quarantine materials:

The clones that were planted at the Open Quarantine were harvested and evaluated for their yield potential, pest and disease reactions and availability of planting materials. The ten best clones were selected for multiplication. The list of selected clones is as indicated in Table 2.

Table 2: Ten best clones selected from EARRNET clones

S/N	Clone/variety	No. of plants harvested	No. of roots/plant	Yield/kg/plant	Taste (raw)	Colour	Pulp
1	MM 96/3075B	12	10.0	4.8	S	W	Hard
2	MM 96/4446	3	10.7	4.3	B	Y	Intermediate
3	MM 96/4619	11	7.5	4.0	B	W	Hard
4	MM 96/8100	11	10.4	3.7	B	W	Hard
5	MM 96/0876	9	6.8	5.7	S	W	Watery
6	MM 96/4684	9	6.4	3.5	B	W	Int
7	MM 96/0876	9	8.8	3.4	B	W	Hard
8	MM 96/2725	12	10.8	3.3	B	W	Watery
9	MM 96/3462	11	101	3.3	I	W	Watery
10	MM 96/8233	20	8.8	3.2	I	W	Hard

Another set of 80 clones were selected and planted for further evaluation as listed in Table 3. The remaining clones' (420) were planted in the Germplasm for breeding purposes in future.

Table 3:Eighty best clones from open quarantine

S/N.	Clone/variety	No. of harvested plants	No. of roots	Wt of roots /plant	Taste (raw)	Color	Pulp
1	MM 96/1776	14	10.4	4.1	I	W	
2	I 60142	8	5.5	1.9	S	W	Watery
3	Ug X1		5.2	1.1	B	W	Hard
4	MM 96/3900	10	11.3	3.1	B	W	Hard
5	MM 96/2640	12	10.8	3.0	B	W	Watery
6	Ug X2	11	4.9	2.4	I	W	Hard
7	Ug X3	9	9.9	3.1	B	W	Hard
8	MM 96/5870	12	7.9	2.2	B	W	Watery
9	MM 96/4689	8	1.0		I	W	Inter.
10	MH 95/0349	4	4.0	4.0	S	W	Watery
11	TME 6	6	5.8	1.2	S	W	Hard
12	MH 95/0332	8	5.7	2.6	B	W	Hard
13	ABBEY-IFE	13	5.5	2.5	B	W	Watery
14	MM 96/3382	10	6.4	3.6	S	W	Hard
15	MM 96/8450	9	5.8	2.6	B	W	Watery
16	MM 96/8640	12	6.3	1.7	B	W	Hard
17	MM 96/0115A	14	5.4	1.8	I	W	Hard
18	MM 96/0929A	12	6.5	2.9	I	W	Inter.
19	I.91/0326	12	7.1	1.3	I	W	Watery
20	TME/13	9	3.5	2.9	S	W	Hard

S/N.	Clone/variety	No. of harvested plants	No. of roots	Wt of roots /plant	Taste (raw)	Color	Pulp
21	Alice Local	15	7.8	1.4	S	W	Inter.
22	MH 95/0100	12	2	2.8	S	W	
23	MM 96/2055	15	5.1	0.7	I	W	Hard
24	MM 96/3155	11	3.7	1.8	B	W	Watery
25	MM 96/7487	22	14.5	1.4	B	W	Hard
26	MM 96/7469	11	3	2.7	S	W	Hard
27	MM 96/3121	9	3	0.9	B	W	Hard
28	MM 96/4570	10	3.6	1.0	S	W	Hard
29	MM 96/2603	10	4.9	1.1	B	W	Hard
30	I 91/0316	11	2.5	0.7	I	W	Hard
31	Ug X3	8	5.3	1.0	B	W	Watery
32	Ug X4	15	3.2	1.1	B	W	Watery
33	MM 96/2759	6	7.7	2.9	B	W	Watery
34	MM 96/2004	8	3.5	1.8	S	W	Inter.
35	TME-12	13	4.8	0.8	I	W	Hard
36	MM 96/4593	12	5.1	2.0	B	W	Watery
37	MM 96/2096	12	6.3	1.6	I	W	Inter.
38	MM 96/5919	16	3.4	0.8	B	W	Watery
39	MM 96/1823	10	4.4	1.7	S	W	Watery
40	MM 96/8974	10	9.8	1.5	B	W	Hard
41	MM 96/0259	12	5.3	1.5	B	Y	Watery
42	MM 96/4466	6	4.7	0.7	B	W	Watery
43	MM 96/4593	9	5.4	1.0	B	W	Watery
44	MM 96/4899	2	5.0	2.5	B	W	Hard
45	MM 96/9304	3	7.7	1.0	B	W	Hard
46	MM 96/1874	8	3.9	0.7	I	W	Watery
47	MM 96/0217	13	4.5	1.0	B	W	Hard
48	Ug X5	12	5.3	2.1	I	W	Hard
49	I 92/0342	12	3.8	0.6	S	W	Watery
50	Ug X6	10	2.4	0.5	B	W	Watery
51	MM 96/5548	8	2.2	0.5	I	W	Watery
52	MM 96/6816	2	2.3	0.3	S	W	Hard
53	Ug X 7	11	4.7	0.5	S	W	Watery
54	MM 96/1700	6	5.2	1.5	B	W	Watery
55	Ug X 8	12	3.1	0.7	I	W	Hard
56	MM 96/5929	16	5.5	1.9	S	Y	Watery
57	MM 96/0788	8	3.3	1.3	S	W	Watery
58	MM 96/1179	14	3.6	0.9	B	Y	Watery
59	MM 96/4494	11	3.2	1.0	B	W	Watery
60	MM 96/6997	11	4.4	1.1	B	W	Watery
61	Ug X 9	16	6.8	1.8	B	W	Hard
62	Ug X 10	9	7.0	1.9	B	W	Watery
63	MM 96/7688	10	4.5	1.1	B	W	Hard
64	MM 96/7688	11	6.6	2.5	S	W	Inter.

S/N.	Clone/variety	No. of harvested plants	No. of roots	Wt of roots /plant	Taste (raw)	Color	Pulp
65	MM 96/4660	5	6.4	2.0	B	Y	Watery
66	MM 96/8408	12	3.6	1.0	B	W	Watery
67	MM 96/9540	4	7.0	2.3	S	W	Hard
68	Ug X 11	11	4.5	1.3	S	W	Watery
69	Ug X 12	12	3.8	0.6	S	W	Watery
70	Ug X 13	5	3.6	1.6	B	W	Hard
71	MM 96/1874	4	1.5	0.7	S	Y	Watery
72	MM 96/52/85	20	4.0	0.6	B	W	Hard
73	Ug X 14	266	6.2	2.0	B	W	Watery
74	MM 96/7718	6	4.8	2.0	B	W	Hard
75	MM 96/4883	9	6.3	2.0	B	W	Hard
76	MM 96/7842	14	6.6	2.5	B	W	Hard
77	MM 96/7618	13	7.8	2.2	B	W	Watery
78	MM 96/3474	9	8.9	2.7	I	W	Hard
79	MM 96/3583	10	5.8	2.0	B	W	Hard
80	MH 95/0067	7	8.1	2.3	B	W	Hard
81	MM 96/7174A	6	2.7	0.8	B	W	Watery
82	MM 96/7842	14	4	16	I	W	Hard

I= Intermediate; B= Bitter; S= Sweet; W= White; Y= Yellow; Wt = Weight in Kg

Maintenance of Open Quarantine.

The 510 clones under Open Quarantine were harvested in early October 2000. SS4 was ratooned for distribution to farmers and re-evaluation at different locations with different CMD inoculum pressure. Weeding was done once. CAN fertilizer was applied on the SS4 plot to reduce the problem of Nitrogen deficiency. 288 plants with CMD infection were rogued.

The plot where the EARRNET clones were harvested was sprayed with round up to kill the couch grass in preparation for planting the 100 clones from Uganda in March/2001. The live fence was planted to strengthen the fence around the open quarantine.

Establishment of TTCs/FRGs

Eight farmer groups were established in Kagera, Mara and Mwanza. Two TTCs in Bukoba, two in Muleba, two in Tarime and one each in Mwanza and Musoma were established.
The IPM/N groups were given varieties for multiplication and some for evaluation. The varieties for evaluation in Kagera were brought from Ukiriguru and these included:
Lwakitangaza, TMS 42029, TMS 30337, TMS 81983, TMS 83/01762(6), TMS 30572 and SS4 from the Open Quarantine. One local variety selected by farmers themselves was planted for comparison.

- 4 farmers were selected among IPM/N members assuming that all IPM/N members will participate in evaluation of approved varieties for multiplication.

For Mara region, the same procedure used in Kagera was applied. Four farmers from each FRG were selected for variety evaluation. The varieties under evaluation were TMS 81983, TMS 30337, TMS 42029, Lwakitangaza and Karingisi (Local)

Status of farmers' participatory evaluation of CMD tolerant varieties trials in Muleba and Bukoba districts, three months after planting.

Site	Variety	No. Planted	No. Sprouted	No infected with CMD
Kangaza - Muleba	TMS 330337	80	45	1
	TMS 42029	80	57	0
	TMS 83/01762	80	63	2
	TMS 81983	80	72	0
	SS4	80	30	0
	Kajaga (Local)	80	61	33
Ngenge - Muleba	TMS 330337	80	74	3
	TMS 42029	80	76	19
	TMS 83/01762	80	73	4
	TMS 81983	80	76	4
	SS4	80	43	0
	Kaitampunu (Local)	80	54	8
Mashule – Bukoba	TMS 330337	80	56	0
	TMS 42029	80	65	5
	TMS 83/01762	80	61	1
	TMS 81983	80	61	0
	SS4	80	43	0
	Bukarasa (Local)	80	60	4
Nyabihanga - Bukoba	TMS 330337	80	58	0
	TMS 42029	80	68	1
	TMS 83/01762	80	65	0
	TMS 81983	80	60	0
	SS4	80	43	0
	Manigabalimi (Local)	80	23	23

Remarks:

In the trial, variety Lwakitangaza was included but it didn't sprout at all sites because it had been stored for too long prior to planting. SS4 also sprouted poorly. The evaluation in Mara region will be assessed this month and compared with Kagera sites. Also comments from farmers will be recorded from the beginning.

Evaluation of tissue Culture materials

The tissue culture materials from Ukiriguru were planted at Maruku, Gera and Bushasha for evaluation. A total of 40 clones were planted at Bushasha and Gera and 50 clones at Maruku. These clones were:

I 92/0600	I 93/005	I 91/00416	TME 13
TME1	I 93/0614 (3x)	I 93/0571 (3x)	I 93/0127
I 93/0639 (3x)	I 93/0026	I 92/0042	91B/00462
TME 6	I 93/0584 (3x)	I 93/0569 (3x)	I 93/0053
I 93/0161	I 92/0053	I 93/0658 (4x)	I 30572
I 93/0170	I 93/0571 (3x)	I 92/0429	I 92/0401
I 92/0455	I 92/0019	I 92/0342	I 93/0560
I 92/0509	TME 12	I 92/0019	TME 4
I 92/097.			

The plots have sprouted well and have already been weeded. Parameters to be considered during evaluations are CGM, CMD and CBB incidences and severity.

Report from KAEMP:

KAEMP distributed planting materials through contract farmers. The distribution of the materials was as indicated below:

District	total number of cuttings	No. of farmers
Biharamulo	67,031	36
Ngara	13,681	12
Bukoba	23,450	14
Karagwe	31,300	28
Muleba	24,000	32
Total	**159,462**	**122**

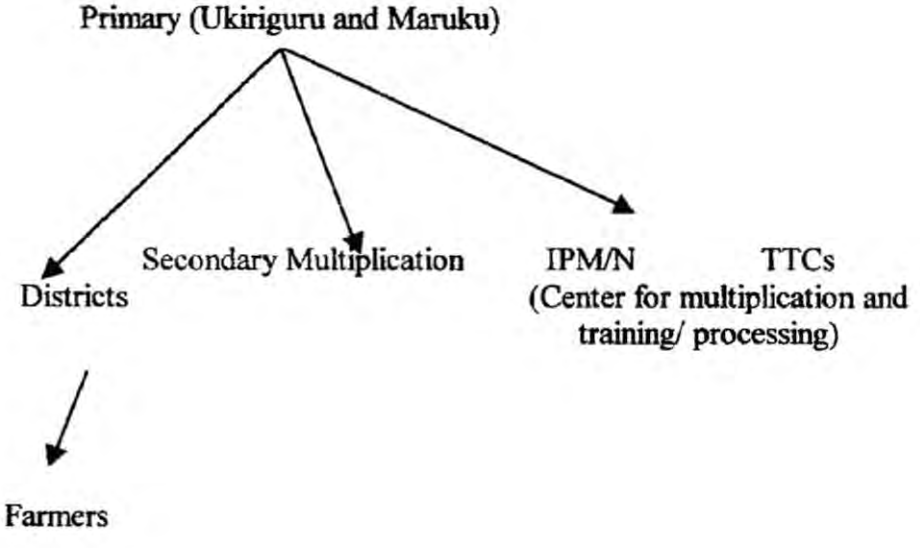
- The sprouting was estimated to be 60%

Report for MARAFIP

There was no report from MARAFIP because the representatives from this organization were not present. However it was explained that in Tarime and Musoma materials were planted, at 3 locations. The only problem encountered was the ratooning of the last year's batch. Farmers in Tarime wanted to be paid 67,000 TSH before the materials were ratooned. This was a MARAFIP contract that didn't materialize and therefore caused some difficulties. The secretary was assigned the task of following up with MARAFIP in order to rescue the planting materials and also to discuss the fate of the materials.

If MARAFIP is not willing to pay for the contract, then other options should be considered which includes paying the farmers and negotiating with MARAFIP about the second ratooning.

The Multiplication system will follow the following channels.



On the multiplication issue, a decision was made to discuss with Geita Authority the possibility of someone multiplying for the district, either NGOs or the District council. The secretary was also assigned the task of reporting to the members the outcome of this.

Review of Activities

The planned activities were reviewed and schedules made for their implementation as indicated below.

1. Monitoring and diagnostics- July 1st 2001
2. Germplasm Development

- Importation of 100 clones from Uganda –March, 2001

3. Training- Muleba, Biharamulo TTCS – End of March, 2001
   Geita- End of March, 2001
   Mara- End of March, 2001
   Early warning- End of April , 2001

Membership

It was explained that NGOs that are actively involved in the CMD control process should be involved in the steering committees. There is also a need to create interest/awareness among other NGOs so that they can be involved in the multiplication process.

AOB

- Members thanked the project for their efforts to create a new commercial crop, cassava. The collaborative work done by the country and IITA to recover cassava in the affected areas of the Lake Zone was also appreciated.
- CARE-Magu requested for training on CMD in their target area.
- Later the Chairman thanked all members for their participation in the meeting and their valuable contribution towards the betterment of the project.

Closing remarks – ZDRD representative:

The ZDRD representative on behalf of the ZDRD thanked all members for their active participation and consolidative ideas on this valuable project. He pointed out that the Zonal Director was keenly following the CMD problem in the zone and he is aware of what this project has done so far. The representative promised to brief the ZDRD on the resolution of the Steering committee meeting. He then thanked all members who attended the meeting. The next meeting was scheduled for 6th September 2001 in Bukoba.

- The next meeting will be followed by the Regional Stakeholders meeting in Kagera (ELCT HALL from 8th –10th September 2001.

S.C. Jeremiah — Secretary

L. Mkandallah — Ag. Chairperson