Proceedings of the 13th ISTRC Symposium, 2007
pp. 682 - 685

Successful restoration of cassava production in Western Kenya

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Abstract. Cassava is an important staple food for consumption and income generation for farming communities in Western Kenya. The region grows and consumes 60% of the national cassava production. Between the years 1994 – 1995 a virulent form of cassava mosaic disease devastated all traditional cassava varieties. Production and productivity of the crop completely declined. Yield loss incurred in 1998 due to CMD was estimated at 15,000 tons valued at US$ 10 million. In response to the magnitude of the problem, Kenya Agricultural Research Institute (KARI) collaborated with International Institute of Tropical Agriculture to mitigate cassava mosaic disease and other important agronomic characteristics. Fifteen desirable clones were bulked for seed through a three-tier multiplication scheme (primary, secondary and tertiary) to ensure equitable, fast and sustainable distribution of healthy planting materials. The clones which are multiplied and distributed were: SS4, Migyera, MM96/5280, MM96/1871, MM96/4466, MH95/0183, MM96/7688, TME – 14, MM96/4884, MM96/3868, MM96/9308, MM96/4684, Unknown 2, MM96/7151, MM96/9362. Over 34 million stems from primary sites have been distributed to farming communities. The coverage under improved cassava is approximately 13,000 ha., which is 38% restoration of the crop. Over 300,000 households are growing improved cassava in Western Kenya. Fresh cassava tubers and processed cassava products are now available on local and urban markets in the region. Hunger, famine and poverty have been addressed by successful restoration of cassava production in Western Kenya.

Introduction

Cassava *(Manihot esculenta* Crantz*)* is a major source of dietary energy for a large population in tropical Africa. It enhances household food security and is a source of income. It provides livelihood to 100 million people globally (Legg, 1999). In Kenya, cassava is grown in Western, Eastern/Central and Coastal regions. The crop provides 9% of the total calories in the diet of Kenyans (Republic of Kenya, 1990). Western region of Kenya grows and consumes 60% of national cassava production. In many districts of Western region of Kenya, cassava is the staple food crop. Cassava is mainly grown in intercrops with beans, maize and bananas.

Cultivation and production of cassava crop in the region is constrained by biotic and abiotic factors. Non use of healthy planting materials, and improved agronomic practices and limited range of improved processing technologies affect production of the crop. The most devastating abiotic factor in the recent years is cassava mosaic disease. In Nyanza, yields declined from 6 - 3 tons of fresh tubers. In Teso district, the area under cassava production reduced to 1000 ha. from 3000 ha. annually (MOA and RD) Annual Report 1997/1998). Yield loss experienced in 1998 due to CMD was estimated at 150,000

tons valued at US$ 10 million.(IITA Annual Report 1998).

Considering the implications of the disease it became extremely necessary to halt spread of the pandemic. Intervention measures that were considered essential to mitigate the scourge were introduction and evaluation of germplasm for resistance to ACMD and other agronomic characteristics. Cassava clones which were desirable, adaptable and acceptable were rapidly multiplied and distributed to the farming communities in Western Kenya (Project Report 2001/2). This paper describes steps which were adopted to restore production of cassava in Western Kenya.

Materials and Methods

The study was implemented by multiple stakeholders. These included KARI, IITA, extension personnel of the Ministry of Agriculture, Non-governmental organizations, Community based organizations, farmer groups, civic leaders and administrators. The approach used was participatory involved a series of targets that are logically circular and potentially recycling of basic activities – diagnosing the problem, identifying solutions, testing and adopting the technology while incorporating farmers' evaluation of the technology. Awareness forums and intervention measures spelt out partner roles. The following activities were carried out:

(a) Monitoring and diagnostic surveys. Surveys were conducted in the Lake basin region to track the progress of the pandemic from 1995-2002.

(b) Germplasm introduction and evaluation. A large number of cassava germplasm were introduced into Kenya. These materials were evaluated for resistance to CMD. Promising materials were advanced through preliminary and advanced yield trials and adaptability trials on-farm in different agro-ecological zones. In addition to diseases and pests these clones were also evaluated for yield potential, cyanogenic and dry matter content.

(c) Multiplication. The project ensured that farmers in the region obtained sufficient healthy planting materials of improved, high yielding varieties which were also resistant to cassava mosaic disease (CMD). A three-tier multiplication system was adopted. This included bulking the materials at primary sites on institutional farms, then at secondary sites organized and managed by district steering committees and tertiary sites which were organized and managed by NGOs and CBOs in the region. Individual farmers were also involved in multiplication at tertiary level. The system aimed at decentralising the seed delivery system to ensure that all farmer groups got seed.

(d) Trainings. Technical information on cassava production was disseminated through awareness creation sessions, trainings, demonstrations, field days, workshops and stakeholder meetings.

(e) Monitoring and evaluation. Various fora were put in place to ensure broad participation for efficient and effective implementation of the project. This included establishment of regional steering committees, National steering committee and district steering committees. The committees ensured that work-plans were followed.

Results and Discussions

Monitoring and Diagnostic Surveys. Diagnostic surveys revealed that CMD disease was spreading from Uganda into Kenya at a rate of 40 km per year (Gibson *et al.*, 1996). The disease now covers the whole region up to the boarder of Kenya and Tanzania. The approach adopted was to introduce improved varieties in areas where the disease had already devastated the crop and in areas threatened by the disease. Infection rates on cassava in Busia, Teso, Bungoma and Siaya were between 75% and

Table 1: Summary of diagnostic survey of CMD status (years 2001 and 2002).

Year	Province	Cutting infection incidence	Whitefly infection incidence	Total	Severity[1]
2001	Western	55.1%	2.1%	57.2%	3.1
	Nyanza	41.6%	1.3%	48.9%	2.7
	Mean	48.4%	4.7%	53.1%	2.9
2002	Western	4.5%	3.8%	49%	2.8
	Nyanza	51.4%	3.0%	54.4%	2.7
	Mean	48.3%	3.4%	51.7%	2.75

100%. Spread was largely by cuttings though large swarms of whiteflies were evident. Disease severity was almost maximum in most areas. The infection rate in Butere, Mumias, Kakamega and Vihiga during the same period of was between 65% and 70%. Further to the south in Kisumu and Nyando districts infection ranged between 30% and 50%.

Data from the most recent surveys (year 2001 and 2002) revealed that CMD disease pressure has declined. Total infection was compared to low in Western province than Southern Nyanza (Table 1).

Germplasm and exchange and evaluation. Since 1997 a total of 1408 cassava germplasm have been introduced into Kenya. In 1998, two clones, SS4 and Migyera were released for multiplication and distribution to the farming communities. In the year 2001, thirteen more clones were released for multiplication and distribution. The clones were; MM96/5280, MM96/1871, MM96/4466, MH95/0183, MM96/7688, TME-14, MM96/9362, MM96/7151, MM96/4884, MM96/3868, MM96/9308, MM96/4684 and unknown 2. All these are resistant to cassava mosaic disease (CMD), over 20 tons/ha under farmers management. They are also early maturing (taking between 12-14 months) and are preferred for cooking, culinary purposes and flour milling.

3. Rapid multiplication and distribution. Multiplication of selected materials was conducted. Currently the area under improved cassava clones is 13,000 ha. which is 38% restoration of cassava in Western Kenya. Over 300,000 households grow these improved cassava varieties.

4. Capacity building. Over 3,000 farmers and agricultural workers have been trained in all aspects of cassava production and control measures of CMD, rapid multiplication of CMD free planting materials, processing and utilization. The efforts were aimed at making cassava production sustainable in the region.

Summary

Monitoring and diagnostic surveys, germplasm introduction, three tier multiplication and distribution arrangements and capacity building of the agricultural workers have proved to be a successful technology transfer method against the CMD pandemic in Western Kenya. It has enabled rapid multiplication and distribution of large quantities of improved CMD resistant varieties to many farmers in a relatively short period. Cassava growing has been restored in Western Kenya.

Acknowledgments

I wish to thank GCF, OFDA and Rockefeller Foundation for financial support. Sincere thanks to IITA/EARRNET for technical support.

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