

**CASSAVA ON-FARM VOUCHER (OFV) EVALUATION REPORT IN KAGERA
REGION**

(DRAFT)

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1. Introduction

Cassava (*Manihot esculenta Crantz*) is one of the most important crops widely cultivated by farmers in the tropics including Tanzania. Cassava crop has several advantages over other staple foods particularly cereals because it is tolerance to drought, low demands on soil nutrients, low input requirements, flexibility in planting and harvesting, convenient in ground storability and the crop do reduce soil and wind erosion (SARRNET, 1999). In many cassava growing areas, cassava is considered as one of the key staple foods, and both rich and poor households are engaged in marketing activities by selling part of their harvested cassava. Furthermore it is increasingly becoming a cash crop which smallholders sell their cassava to rural and urban consumers (Nweke, 2002).

Of the 35 African countries that grow cassava, Tanzania is the fourth producer of cassava with annual root production estimated at 5.5 million tons of fresh cassava roots from 761,100 hectares (FAO, 2000). The importance of cassava in Tanzania, like in other cassava growing countries, includes ensuring household food security and source of income. In many farming systems, cassava is one of the key staple foods that are increasingly in its contribution to the household regular income to meet farmers' immediate obligations such as paying school fees, day-to-day household expenditures, festivals and funeral ceremonies (Temu and Nyange, 2001; and Mlingi, et al., 2000). In the banana/coffee based farming systems, cassava is one of the crops that its cultivation in the last 20 years has been increasing to cover the food deficit created by decline in banana production (Nkuba et al., 2003).

In Tanzania, cassava production is mainly dominated by small scale farming with an average farm size ranges from 0.5 ha to 2.0ha per household (Manyama et al., 2002; Temu and Nyange, 2001 and Salehe, 2001). This is about one-third of the total household farm size and it accounts 70 percent of the total land under root and tuber crops (Temu and Nyange, 2001).

The yield of cassava in Tanzania is ranging from 1.5 tons obtained in marginal areas with minimal uses of improved technologies to 35 tons per hectare obtained under conducive

climatic conditions and use of improved technologies, with overall average estimated to range between 8 tons per hectare (FAO, 2000) to about 10.5 tons per hectare (Nweke, et al., 1998) compared to average yield of 14 tons per hectare of cassava production in Africa.

1.1 Cassava production in Kagera

Despite that cassava crop is increasingly becoming as an important food and cash crop in the country including Kagera region, its productivity has been declining due to several constraints. The current cassava yield in Kagera region is estimated to range between 3 tons to 10 tons per hectare (Ref).

Table 1. Cassava yield per hectare (t/ha) by district in Kagera region

District	Current yield (t/ha)	Achieveable yield (t/ha)
Bukoba	2-6	30
Muleba	4-10	35
Missenye	4-15	40
Karagwe	2-8	40
Ngara	5-10	35
Biharamulo	6-15	40
Chato	7-20	40

Source:

1.2 Cassava production constraints

Since 1997 cassava pests and diseases have shown to be major constraints of cassava production. This was compounded by low genetic potential of local cassava varieties grown by farmers. Other cassava constraints include unfavourable climatic conditions (prolonged droughts and frequency floods in some areas), low soil fertility and poor agronomic practices.

The reported major diseases and pests are Cassava Mosaic Disease caused principally by the East African Cassava Mosaic Virus (EACMV), Ugandan Variant (UgV) and the African Cassava Mosaic Virus (ACMV), Cassava Brown Streak Disease (CBSD), Cassava Bacterial Blight (CBB), Cassava Green Mite (CGM), Cassava Mealy Bug (CMB) and nematodes (Mkamilo, 2005). The local varieties have shown to be more susceptible to the increasing production constraints leads to low yields and unstable

productions. It is estimated that these constraints can cause a yield loss on local varieties of 50 to 75 percent (Muhanna and Mtunda, 2002).

In 1997, Cassava Mosaic Disease-UgV was noted for the first time in Kagera region. Up to now the disease has spread in all regions of the Lake Zone (Kagera, Mara, Mwanza and Shinyanga) and Western parts of the country (Kigoma region).

1.3. Background and justification

Agricultural research and extension services in collaboration with international and national cassava stakeholders have attempted to mitigate the CMD-UgV effects amongst by introducing, multiplying and disseminating new cassava varieties. Since 1999 several new cassava varieties said to be tolerant to CMD-UgV from outside or within the Great Lakes Region have been introduced into Kagera region. Up to now a number of stakeholders have engaged in the whole process from on-farm testing through multiplication to dissemination of CMD tolerant cassava planting materials. Primary and secondary nurseries for multiplication of cassava varieties shown to be tolerant were established in various places in the region. It was assumed that the CMD tolerant planting materials will spread to surrounding communities. However, the dissemination of these CMD tolerant planting materials has been driven by spread of CMD (UgV). All district authorities make all necessities to get introduced the CMD tolerant planting materials into their districts wherever there is incidence of the CMD-UgV. Usually CMD tolerant materials have been introduced through NGOs or groups of farmers. On the other side, there has been less effort on dissemination of these materials within the communities (i.e., out-scaling) for the real needy farmers or households. Most of farmers surrounding the primary and secondary nurseries are not aware and/or have no access of these CMD tolerant planting materials. This situation has been limiting the spread of CMD tolerant materials to the real targeted households since its spread was only left with the traditional system of spreading seeds or planting materials. Traditional system works only where there is no shortage of planting materials and in absence of insect pests and diseases. Therefore, complementary approach was needed to be put in place that can strengthen the out-scaling of the CMD tolerant planting materials to the targeted households.

On Farm Voucher (OFV) is a demand oriented approach where needy households are issued with vouchers of given value to exchange with farm inputs such as improved crop varieties based on their own choices. OFV approach has been used by CRS to distribute grains seeds to needy households in more than 16 countries all over the world. Since 2006, CRS started to use OFV approach on dissemination of CMD tolerant planting materials in two pilot areas; Busia in Kenya and Kagera in Tanzania. Since the use of OFV in non-grain seeds is very new practice in the selected communities, it required close and effective evaluation of the approach at all stages.

2. Objectives

2.1 General objective

The general objective of the OFV evaluation was to assess the relevance, performance and the impact on the targeted communities. In addition, the assessment investigated and identified problems and constraints of OFV approach.

2.2 Specific objectives

The evaluation assessed the performance of OFV by covering the following specific objectives:

1. Determining farmers' perception on the use of vouchers to access CMD tolerant planting materials.
2. Documenting dissemination pathway of CMD tolerant materials through OFV and develop actionable recommendations for future improvement of OFV system
3. Assessing cassava husbandry practiced by farmers for better improvement of cassava productivity
4. Evaluate the performance of the materials exchanged through OFV system

3. Methodology

The OFV evaluation study was conducted in Missenyi, Biharamulo and Chato districts, where OFV approach was implemented by CRS through its C3P, in collaboration with District Government Authorities, Maruku Agricultural Research Institute, and RUDDO (Rulenge Diocese Development Organisation). In Missenye, four villages were selected,

two villages from Biharamulo and one village from Chato (Table). In each village, 20 farmers were randomly selected from list of OFV beneficiary households. In addition, a small checklist was prepared for focused group discussions that involved researchers, extensionists, village leaders, farmers and vendors of CMD tolerant planting.

Table 2. OFV surveyed villages by district

Site No.	District	Ward	Village	Number of farmers	
1.	Missenyi	Kyaka	Mushasha	20	
			Kashaba	20	
			Kyaka	20	
			Byamutemba	20	
2.	Biharamulo	Nsunga	Ntungamo	20	
		Nyarubungo	Buziku	Ihanga	20
			Chato	Bwanga	Nyantimba
Total	3	5	7	140	

3.1 Data collection and data analysis

Data collection was done by using formal structured questionnaire and focused group discussions. Researchers and extension staff involved in cassava activities were consulted during preparation of questionnaire. Amongst of data collected included demographic characteristics of beneficiaries, cassava production, OFV activities, farmers' perception on OFV approach, availability and supply of CMD tolerant materials.

The first round of OFV evaluation study took place during the first two weeks of January 2007. The second round of evaluation was scheduled to take place between 6 to 12 months after crop planted, depends on crop cycle. The evaluation team was comprised of two researchers and 4 enumerators per site. Researchers led the discussions on general farmers' perceptions on OFV approach while enumerators conducted the household interviews under supervision of researchers.

Data from the household questionnaire was analysed by using SPSS by presenting simple descriptive statistics such as frequencies, percentages and means of variables. Qualitative information collected during focused group discussions was handled by employing different PRA techniques and tools.

3.2 Selection of enumerators

The selection of enumerators was determined based on the geographical location of the OFV households and ability to perform the task of conducting household interview using formal structured questionnaire. Enumerators were trained on field survey techniques and the significance of each survey question. In general, the target respondents were household heads or beneficiaries. However, in their absence, the most senior household member available or the household member responsible for the farm was interviewed. After first day of interview, all filled questionnaires were reviewed or crosschecked by the researchers for accuracy and completeness, and discussed with the enumerators for improvement. On average each enumerator carried out 3 interviews per day.

4. Results and discussion

4.1 Characteristics of OFV beneficiaries

Amongst of important demographic characteristics of people's livelihood in Kagera Region are sex, age, marital status and education level of household head, and household size. The average age of heads of 140 beneficiary households interviewed was 47 years that was slightly significantly different between districts. Chato had the highest average age (49.0) of household heads while Missenyi had the lowest average age (46.7).

About 18 percent of the households surveyed were female headed households that were significantly different between the districts (Table 3). In Missenyi female headed households was 25 percent that was significantly different with those of Biharamulo 7.5 and Chato 10.0 percent. The reason to this could be attributed by the different ethnic groups. This depicts the prevailing high average age categories of household heads in Kagera Region. Hence age variable did not influence the selection of the OFV beneficiaries. Nevertheless, the sex of beneficiary female members in the OFV households was 23.6 percent. Also, it was highest in Missenyi (33.7 percent) and lowest in Chato (10.0 percent) and Biharamulo (10.0 percent).

Married and widow were marital status variables of household heads which were significantly different between Missenyi and the other two districts (Chato and Biharamulo). Missenyi had the lowest percentage of married household heads and highest percentage of widow household heads compared to other two districts. Probably, this difference could be attributed to ethnic dissimilarity and level of HIV/AIDS and malaria impact.

Table 3. Characteristics of OFV beneficiary Households by district

Criteria	Missenyi		Biharamulo		Chato		All sites	
No. of households interviewed	80		40		20		140	
Age of household head	46.7		47.7		49.0		47.0	
Sex of household head	No.	%	No.	%	No.	%	No.	%
Male	60	75.0	37	92.5	18	90.0	115	82.1
Female	20	25.0	3	7.5	2	10.0	25	17.9
Social status of household head:								
Married	63	78.8	37	92.5	18	90.0	118	84.3
Female defacto	2	2.5	1	2.5	0	0.0	3	2.1
Widow	13	16.2	2	5.0	2	10.0	17	12.1
Single	2	2.5	0	0.0	0	0.0	2	1.4
Sex of beneficiaries:								
Male	53	66.3	36	90.0	18	90.0	107	67.4
Female	27	33.7	4	10.0	2	10.0	33	23.6
Position of beneficiaries in the household:								
Household head	61	75.9	24	60.0	18	90.0	103	73.4
Wife	17	21.5	5	12.5	1	5.0	23	16.5
Son	2	2.5	5	12.5	0	0.0	7	5.0
Daughter	0	0.0	3	7.5	0	0.0	3	2.2
Relative	0	0.0	3	7.5	1	5.0	4	2.9
Education level of household head:								
None	7	8.8	12	30.0	2	10.0	21	15.0
Adult education	10	12.5	2	5.0	0	0.0	12	8.6
Primary	56	70.0	26	65.0	17	85.0	99	70.7
Secondary	7	8.8	0	0.0	1	5.0	8	5.7
Tertiary/colleges	0	0.0	0	0.0	0	0.0	0	0.0

Most of household heads about 70% had attained primary level (seven years in schooling) of education. On average, about 15 percent of household heads had no formal education, 5.7 percent had secondary education and no household head had tertiary

education (collage and university). Biharamulo had the highest percentage of household heads not attained even a single year in school (30%) followed by Chato district (10%) and then Missenyi (8.8%). Similarly, education levels of household head were significantly different between districts which depict the real situation of education status in each district. This implies that there is no strong evidence that education level had influenced the selection of participants of cassava OFV.

4.2 Household assets

Household assets considered during the selection of OFV beneficiaries were type of main houses, hand hoes, radio, bicycles, ox-ploughs, TV, motorbike and cars. A house type is one of the criteria used in household classification for well-being or resource-endowment. Therefore, indirectly, house type can determine the decisions made by a particular household for an economic activity. During the household interview, main houses of the households were classified into threefold; temporary, semi-permanent and permanent. The household type showed significantly different between the three districts. From the results in Table 4 most of beneficiary households in Biharamulo and Chato districts inhabit temporary houses which are 62% and 80% respectively. This implies more poor-resource households were picked in the OFV of CMD tolerant planting materials than the rich-resource households.

Table 4: Household assets owned by beneficiary households

Assets owned	Missenyi		Biharamulo		Chato		All sites	
	No.	%	No.	%	No.	%	No.	%
Main house type								
Temporary	27	33.8	25	62.5	16	80.0	68	48.6
Semi-permanent	36	45.0	13	32.5	3	15.0	52	37.1
Permanent	17	21.3	2	5.0	1	5.0	20	14.3
Radio	56	70.0	27	67.5	14	70	97	69.3
TV	3	3.8	0	-	0	-	3	2.1
Bicycles	55	68.8	34	85.0	16	80.0	105	75.0
Hand hoes	77	96.3	36	90	19	95.0	132	94.3
Ox-ploughs	0	-	5	12.5	4	20.0	9	6.4
Motorbike	0	-	0	-	0	-	0	-
Tractor/car/lorry	0	-	0	-	0	-	0	-

Important household assets/equipments in the study area were radio, bicycles and hand hoes. Farming tool used by most of OFV beneficiaries is hand hoe (about 94%), except few farmers in Biharamulo and Chato district who own Ox-ploughs. Likewise, the distribution of ownership of the household assets among the OFV beneficiaries indicated that both rich-resource and poor-resource households were selected. This provide additional evidence that cassava crop is important for both poor and rich households.

4.3 Livestock

Keeping of livestock is one of important livelihood activities carried out by farmers in Kagera region. Livestock play important role in nutrients recycling among the three land use types (Kibanja, Kikamba and Rweya) found in the banana/coffee farming system (Bosch, et al., 1996). Livestock are mainly kept for farmyard manure to apply on homestead plots, obtaining some cash out of milk and animal sales, and source of protein for home consumption (Rugambwa, et al., 1997). Major livestock types kept by farmers in the project area are cattle, goats, sheep, pigs, chicken and ducks. Chicken were kept by highest number of households (67.1 percent), followed by goats (65.0 percent), cattle (23.6 percent) and ducks (17.1 percent). Percentages of goats' and chicken keepers were significantly different between the districts (Table 5). There is no indication that ownership of the livestock influenced the selection of OFV beneficiaries.

Average livestock herd/flock sizes per household in the study area were generally small (Table 5) and have been increasing although at a very slow pace (Omolo, et al., 1999). Average numbers of livestock kept per household were significantly different between districts. For all livestock types kept except pigs, Biharamulo had the highest average number of livestock kept per household. Missenyi had the highest average number of pigs kept per household. This reflects the number of livestock available in the respective district and it implies that households having large and small herds of cattle have equal chances to be participating in the OFV.

Table 5. Types of livestock owned by OFV beneficiaries by district

Assets owned	Missenyi		Biharamulo		Chato		All sites	
	N/A	%	N/A	%	N/A	%	N/A	%
Cattle								
Households with	19	23.8	9	22.5	5	25.0	33	23.6
Average cattle	3.1		18.1		5.6		7.6	
Goats								
Households with	44	55.0	33	82.5	14	70.0	91	65.0
Average goats	2.9		7.2		3.8		4.6	
Sheep								
Households with	2	2.5	5	12.5	2	10.0	9	6.4
Average sheep	2.0		5.2		1.5		3.7	
Pigs								
Households with	11	13.8	2	5.0	0	0.0	13	9.3
Average pigs	23		4.0		-		2.5	
Chicken								
Households with	46	57.5	35	87.5	13	65.0	94	67.1
Average chicken	4.2		7.8		5.5		5.7	
Ducks								
Households with	14	17.5	6	15.0	4	20.0	24	17.1
Average ducks\$	3.4		4.2		8.5		4.5	

4.4. Land access and ownership

Land is one of the most important resources on rural farming households for their livelihood activities since its ownership describes owners' security and to some extent wealth. The type of ownership and size to greater extent predict type of crops to grow and intensity of intercropping. Table 6 shows farm size owned by OFV beneficiaries, size of land rented or hired out.

Of all households surveyed, 15 percent of the sample households owned not more than 2 acres (Table 6). Households owned at least more than 5 acres were 70 percent which was the mode class of all household surveyed. This indicates that cassava crop is cultivated by all farmers regardless of their farm size per household. Both farmers with small and large farms joined the OFV system.

Land renting was also practiced by farmers in the study area. About 35 farmers out of 140 farmers surveyed rented a piece of land from their fellow farmers. Majority of them (68.5 percent) rented a land piece of not more than 2 acres. Perception of majority of

farmers was that there was no land shortage for planting cassava crop since cassava can perform well even in fields where banana crop not performing well.

Table 6. Farm size categories of OFV beneficiaries by district

Assets owned	Missenyi		Biharamulo		Chato		All sites	
	No.	%	No.	%	No.	%	No.	%
Farm size owned:								
Less than 1 acre	1	1.3	1	2.5	0	0.0	2	1.4
1 – 2 acres	14	17.5	5	12.5	0	0.0	19	13.6
2.1 – 5 acres	40	50.0	13	32.5	3	15.0	56	40.0
Over 5 acres	25	31.3	21	52.5	17	85.0	63	45.0
Household rented land	18	22.5	14	35.0	3	15.0	35	25.0
Land size rented:								
Number of farmers rented	18	100	14	100	3	100	35	100
Less than 1 acre	4	22.2	1	7.1	1	33.3	6	17.1
1 to 2 acres	8	44.4	8	57.1	2	66.7	18	51.4
2 to 5 acres	3	16.7	5	35.7	0	0.0	8	22.9
Over 5 acres	3	16.7	0	0.0	0	0.0	3	8.6
Size of rented land	2.3	-	2.3	-	1.7	-	2.2	-
Household rented out land	23	29.9	3	7.7	7	35.0	33	24.3

4.5 Crops grown by farmers

During the interview more than 23 crops were recorded being cultivated by farmers (Table 7). Average number of crops per household in the study area was 6.3 with a range of 3 to 13 crops per household. This situation offers good crop diversity for better livelihoods of farmers and reflects the potentiality of agricultural production. However, the important crops that were cultivated by at least 10 percent of the households surveyed were maize, beans, cassava, sweet potatoes, bananas, coffee, sorghum, yams/cocoyam and rice. Majority of the OFV beneficiaries were cassava growers in the previous years. Table 7 indicates that cassava is among the top three widely grown by farmers after maize and beans. This implies that when local cassava varieties are not performing well there will be high demand of CMD tolerant varieties and the cassava farming community will be in famine.

Table 7. Types of crops grown by farmers

Types of crops grown	Missenyi		Biharamulo		Chato		All sites	
	No.	%	No.	%	No.	%	No.	%
Banana	76	95.0	12	30.0	1	5.0	89	63.6
Beans	80	100.0	37	92.5	19	95.0	136	97.1
Coffee	69	86.3	1	2.5	2	10.0	72	51.4
Maize	79	98.8	38	95.0	20	100.0	139	99.3
Cassava	72	90.0	37	92.5	20	100.0	129	92.1
Sweet potatoes	67	83.8	38	95.0	9	45.0	114	81.4
Sorghum	7	8.8	16	40.0	8	40.0	31	22.1
Yams	12	15.0	7	17.5	1	5.0	20	14.3
Tobacco	2	2.5	-	-	2	10.0	4	2.9
Rice	-	-	12	30.0	8	40.0	20	14.3
Cotton	-	-	4	10.0	1	5.0	5	3.6
Number of crops per household:								
Average	6.3	-	6.3	-	6.0	-	6.3	-
Minimum	1	-	3	-	4	-	1	-
Maximum	13	-	10	-	8	-	13	-

4.6 Cassava varieties grown

In the OFV study areas, planting of cassava is done in both long (March – May) and short (September-December) rains seasons depend on the onset and distribution of the rains in a particular season. However, the most preferred proper cassava planting season is during the short rains than in long rains, particularly after farmers learnt the distribution of rains. The common cropping practices of cassava cultivation are cassava planted either on flat lands or ridges of 60 to 90 cm wide. In some land use types, cassava planted on flat lands is more laborious to harvest than those cassava planted on ridges, particularly at period of dry spell.

There are mainly two types of cassava cultivated by farmers; bitter and sweet varieties and their proportions vary from one community to another. For example, Missenyi has higher proportion of sweet varieties than bitter while in Biharamulo and Chato it is a reverse. Most of cassava varieties cultivated by farmers are local varieties with low genetic yield potential without much evidence for resistance to pests and diseases. The names of varieties are in local names and a single variety could have different names in different locations (Appendix 1). Therefore, there is a need of updating the classification of all cassava varieties grown in the zone and the entire country.

Due to increasing pressure of CMD (UgV) a number of local varieties were reported by farmers being dropped and new varieties with preferred attributes are being introduced into the communities. The preferred variety attributes considered by farmers are: good in-ground storability, high root yield, weed suppression, early maturity, low cyanogens, tolerance to pests and diseases, good processing qualities, desirable branching habit, good cooking qualities and good planting material yield. Sweet varieties are more preferred by market oriented farmers due to early maturity and fast turn over.

Majority of farmers have more than one cassava plot which allows for farmers to cultivate more than one cassava variety (Table 8). Usually, in many occasion, farmers grow a mixture of more than one variety in a single plot.

Table 8. Cassava growers, acreage and number of plants per household in 2004 and 2005

Criteria	2004 (local varieties)			2005 (local varieties)		
	No. of plots	No. of plants	Area	No. of plots	No. of plants	Area
Missenyi						
Average	1.5	563.3	0.60	1.3	481.3	0.64
Minimum	1	30	0.05	1	20	0.01
Maximum	5	3000	3.00	4	4000	8.00
No of farmers	54	45	47	63	53	55
Biharamulo						
Average	1.6	8703.6	2.30	1.3	7382.2	1.68
Minimum	1	600	0.15	1	1000	0.28
Maximum	4	28000	7.00	4	24000	6.00
No of farmers	28	28		32	32	32
Chato						
Average	2.8	13206.4	2.80	2.3	20415.9	2.47
Minimum	1	2170	0.50	1	4083	1.00
Maximum	10	41733	10.00	6	200070	5.00
No of farmers	18	18	18	17	17	17
All Districts						
Average	1.8	5568.8	1.50	1.4	5968.7	1.26
Minimum	1	30	0.05	1	20	0.01
Maximum	10	41733	10.00	6	200070	8.00
No of farmers	100	91	93	112	102	104

The size of cassava fields ranged from 0.01 to 10 acres with an average of 1.5 acres and 1.26 acres in 2004 and 2005 respectively (Table 9). Average number of local cassava plants cultivated per household was 5569 plants in 2004, 5969 in 2005 and 4969 in 2006 ; Chato having the highest record in each year probably because it has less affected by CMD (UgV) compared to other two districts. In 2006, both cassava acreage and number of plants planted per household showed slightly decline probably due to increasing pressure of CMD (UgV) and lack of CMD tolerant planting materials in the respective communities (Table 9).

Table 9. Households planted local and new cassava varieties in 2006

Criteria	2006 (local varieties)			2006 (new varieties)		
	No. of plots	No. of plants	Area	No. of plots	No. of plants	Area
Missenyi						
Average	1.3	421.9	0.48	1.2	255.0	0.32
Minimum	1	20	0.10	1	40	0.01
Maximum	3	2500	2.00	2	630	0.50
No of farmers	47	38	41	5	5	5
Biharamulo:						
Average	1.2	6077.9	1.38	1.5	203.5	0.1
Minimum	1	300	0.08	1	7	0.1
Maximum	3	28000	6.00	2	400	0.1
No of farmers	35	35	35	2	2	2
Chato						
Average	2.5	11669.1	2.88	-	-	-
Minimum	1	4063	1.00	-	-	-
Maximum	10	41003	10.00	-	-	-
No of farmers	20	20	20	-	-	-
All Districts						
Average	1.5	4969.3	1.31	1.3	237.8	0.27
Minimum	1	20	0.08	1	7	0.01
Maximum	10	41003	10.0	2	630	0.50
No of farmers	102	93	96	7	7	7

The clear trend indicates that there is increasing creating awareness and access of the new varieties being introduced by breeders. During the household interview of the OFV beneficiaries, 7 farmers (5 from Missenyi and 2 from Biharamulo) were recorded to have planted the new CMD tolerant varieties in 2006 with an average of 238 plants per household (Table 9). Also, about 27.7 percent of the total 18 varieties recorded being

cultivated by farmers in the Lake Zone was improved (new) varieties (Manyama, et al., 2002).

4.7 Accessing CMD tolerant varieties

Many farmers who planted improved cassava cuttings obtained and/or accessed it from their neighbours and their own farms. Traditionally, source of planting materials for majority of farmers is from their fellow farmers and from their own farms (Table 10). Only few farmers obtained their planting materials by purchasing. However, as the shortage of CMD-UgV resistant planting materials increases, the proportion of farmers obtained their cassava planting materials is expected to increase.

Table 10. Source of cassava planting materials (local) in 2005 and 2006

Sources of planting materials	Missenyi		Biharamulo		Chato		All Districts	
	No.	%	No.	%	No.	%	No.	%
2005 Year								
Seed sellers	4	5.5	1	2.5	0	0.0	5	3.7
Neighbours	35	47.9	15	37.5	10	45.5	60	44.4
Extension staff	2	2.7	2	5.0	0	0.0	4	3.0
Relatives	9	12.3	4	10.0	1	4.5	14	10.3
From own farm	23	31.5	18	45.0	11	50.0	52	38.5
2006 Year								
Seed sellers	4	6.5	0	0.0	0	0.0	4	3.4
Neighbour	25	40.3	8	20.0	6	24.0	39	33.3
Extension staff	1	1.6	1	2.5	2	8.0	4	3.4
Relatives	7	11.3	5	12.5	1	4.0	13	11.1
From own farm	25	40.3	26	65.0	16	64.0	57	48.7

4.8 Identification of cassava pests and diseases

The most prevailing cassava pests and diseases in the study area are Cassava Mosaic Disease (CMD), Cassava Brown Streak Disease (CBSD) and Cassava Bacterial Blight Disease (CBBB). About 69 percent of farmers were able to identify pests/diseases of cassava and 64.3 percent can identify CMD-UgV (Table 11). Identification of other cassava pests and diseases was very low to farmers.

Table 11. Identification of cassava pests and diseases by farmers

Cassava pests and diseases	Missenyi		Biharamulo		Chato		All sites	
	No.	%	No.	%	No.	%	No.	%

Able to identify pests/diseases	49	61.3	33	82.5	15	75.0	97	69.3
Cassava Mosaic	46	57.5	29	72.5	15	75.0	90	64.3
Cassava Brown Streak	1	1.3	2	5.0	0	0.0	3	2.1
Cassava Bacterial Blight	1	1.3	2	5.0	0	0.0	3	2.1
CMD identification:								
Positive identification	42	52.5	31	77.5	12	60.0	85	60.7
Not aware	12	15.0	6	15.0	3	15.0	21	15.0
Can not describe	26	32.5	3	7.5	5	25.0	34	24.3
Means of controlling CMD								
Rouge diseased plants	52	65.0	26	65.0	11	55.0	89	63.6
Use clean planting materials	12	15.0	5	12.5	8	40.0	25	17.9
Others	16	20.0	9	22.5	1	5.0	26	18.6

Reasons given by farmers for not accessing CMD-UgV resistant planting materials included not been aware as to where to get the planting materials, the materials been too expensive and unavailability of planting materials (Table 12). About 46.4 percent of OFV beneficiaries did not know where to get the CMD-UgV tolerant planting materials. Therefore, extra effort is needed in creating awareness, on the new cassava varieties.

Table 12. Reasons for not access CMD tolerant planting materials

Criteria	Missenyi		Biharamulo		Chato		All sites	
	No.	%	No.	%	No.	%	No.	%
Access to new cassava varieties	5	6.3	2	5.0	0	0.0	7	5.0
Reasons for not accessing new cassava varieties:								
Don't know where to get them	37	46.3	9	22.5	19	95.0	65	46.4
Too expensive	20	25.0	18	45.0	0	0.0	38	27.1
Not available	18	22.5	10	25.0	0	0.0	28	20.0
Others	1	1.3	2	5.0	1	5.0	4	2.9

4.8 Source of information on farm voucher (OFV)

Farmers obtained the information about on-farm system during November – December period mainly through village-open meeting and neighbor farmers. It can be anticipated that their understanding about the OFV depends much on effectiveness of the village meetings. Extension staff was not the source of OFV information to farmers because most villages had no Village Agricultural Extension Officer (VAEO).

Table 13. Source of OFV information to farmers

Criteria	Missenyi		Biharamulo		Chato		All sites	
	No.	%	No.	%	No.	%	No.	%
First learnt about OFV								
October 2006	2	2.5	0	0.0	0	0.0	2	1.4
November 2006	29	36.3	14	35.0	0	0.0	43	30.7
December 2006	48	60.0	26	65.0	20	100.0	94	67.1
January 2007	1	1.3	0	0.0	0	0.0	1	0.7
Source of OFV information:								
Village-open meeting	42	52.5	20	51.3	12	60.0	74	53.2
Extension staff	1	1.3	0	0.0	0	0.0	1	0.7
Village leaders	10	12.5	4	10.3	1	5.0	15	10.8
Neighbours	18	22.5	13	33.3	4	20.0	35	25.2
Relatives/friends	8	10.0	1	2.6	2	10.0	11	7.9
Beneficiaries attended OFV village meeting prior to receiving vouchers	41	52.6	25	62.5	11	55.0	77	55.8
Who selected OFV beneficiary								
Village meeting	50	64.1	32	80.0	20	100.0	102	73.9
Chairperson/VEO	4	5.1	6	15.0	0	0.0	10	7.2
Sub-village leader	21	26.9	2	5.0	0	0.0	23	16.7
Others	3	3.8	0	0.0	0	0.0	3	2.2
Reasons for being selected:								
Lack of cash to buy cuttings	11	13.8	4	10.0	9	45.0	24	17.1
Food insecurity	6	7.5	4	10.0	0	0.0	10	7.1
Hard worker/successful farmer	49	61.3	21	52.5	8	40.0	78	55.7
Good cooperative with other villagers	9	11.3	3	7.5	3	15.0	15	10.7
Sick	1	1.3	2	5.0	0	0.0	3	2.1
Widow/widower	3	3.8	2	5.0	0	0.0	5	3.6
Don't know	1	1.3	4	10.0	0	0.0	5	3.6

Majority of OFV beneficiaries were selected during the village meeting in their presence or absence. Those who were absent were informed by their respective Sub-village Chairpersons or their neighbours.

Farmers believe that some of the households are poor due to their negligence of not working hard. Such households are clearly known by the communities. Therefore, during selection exercise of OFV beneficiaries those lazy households were not considered to avoid wastage of planting materials. The major criterion emphasized by villagers was the attitude of the household head on hard working or successful farmer followed by lack of cash to buy cuttings and good cooperation with other farmers (Table 13). Sickness and

widow/widower both ranked low because it depends on the household endowments owned.

Table 14. Distributors of the cassava OFV vouchers

Criteria	Missenyi		Biharamulo		Chato		All sites	
	No.	%	No.	%	No.	%	No.	%
Who provided beneficiary cassava voucher:								
Focal CRS/Extension staff	2	2.5	14	35.9	18	90.0	34	24.5
Village chairperson/VEO	8	10.0	23	59.0	2	10.0	33	23.7
Sub-village chairperson	62	77.5	2	5.1	0	0.0	64	46.0
Fellow farmer	5	6.3	0	0.0	0	0.0	5	3.6
Others	3	3.8	0	0.0	0	0.0	3	2.2
Obtained training on cassava production before receiving OFV	26	33.3	0	0.0	1	5.0	27	19.7
Number of new cassava varieties bought:								
One	28	37.8	16	41.0	10	50.0	54	40.6
Two	24	32.4	9	23.1	9	45.0	42	31.6
Three	22	29.7	14	35.9	1	5.0	37	27.8

OFV beneficiaries obtained their cassava vouchers through various people that vary by district. In Missenyi, Sub-village Chairperson played big role in distributing the materials while in Biharamulo it was Village Chairperson/Village Executive Officers and in Chato was VAEO. Each OFV beneficiaries received one to three new cassava varieties.

4. 9 CMD-UgV resistant varieties bought

The types of CMD tolerant varieties bought through OFV approach include SS4, TMS (Nigeria), MM series and I series (Table 15). On overall MM series were bought by highest number of farmers (76 farmers), SS4 (73 farmers) and TMS (64 farmers). However, on average SS4 had the highest number of cuttings per household bought under OFV approach.

Table 15. Types of new cassava varieties and number of cuttings bought under OFV

Cassava variety	Missenyi		Biharamulo		Chato		All sites	
	No.	Av	No.	Av.	No.	Av.	No.	Av
SS4	67	223.9	6	135.0	-	-	73	216.6
TMS	33	136.4	28	169.6	3	183.3	64	153.1
MM – Series	38	114.5	20	152.5	18	225.0	76	150.7
I – Series	4	100.0	5	180.0	-	-	9	144.4
Other varieties	2	200.0	17	123.0	10	140.0	29	134.5
Farmers who spent all OFVs	78	97.5	36	90.0	20	100.0	134	95.7
Satisfied with quality of cuttings	64	80.0	28	70.0	16	80.0	108	77.1
Unavailability of preferred varieties	30	37.5	7	17.5	17	85.0	54	38.6

About 95.7 of all OFV beneficiaries spent their vouchers provided to buy CMD-UgV resistant cassava cuttings. All beneficiaries in Chato spent their vouchers to buy CMD-UgV resistant cassava cuttings probably due to the fact that distribution of vouchers was done by extension officers. In the other village distribution was done by village government leadership. On quality of cuttings bought, 77.1 percent of beneficiaries were satisfied with the quality of the cuttings.

4.10 Important cassava attributes and transport means used in buying cuttings

The most important cassava attributes considered by farmers (by merit) were high yielding, taste, disease tolerant, early maturity and ground storage (Table 16). The results indicate great variation on attributes farmers consider by district. In Missenyi farmers consider more on taste, in Biharamulo farmers consider more on high yielding while in Chato consider on disease tolerant. Majority of farmers travelled more than 5 km to buy CMD-UgV resistant cuttings and that was considered by 75 percent as to be far distance (Table 17). This implies that with good mobilization and facilitation farmers are willing to travel such distance to get the planting materials. Means of transport used by farmers to get their CMD-UgV resistant planting materials was bicycle (63.5 percent).

Table 17. Ranking of important cassava attributes and means of transport to buy cuttings

Criteria	Missenyi		Biharamulo		Chato		All sites	
	No.	%	No.	%	No.	%	No.	%
Ranking of cassava attributes								
Early maturity	10	14.5	10	26.3	4	20.0	24	18.9
High yielding	17	24.6	16	42.1	1	5.0	34	26.8
Taste	23	33.3	9	23.7	0	-	32	25.2
Disease tolerant	13	18.8	3	7.9	15	75.0	31	24.4
Ground storage	6	8.7	0	-	0	-	6	4.7
Distance traveled to get planting materials (km)								
< 1	3	3.8	0	-	0	-	3	2.2
1.1 – 2.0	4	5.1	6	15.8	0	-	10	7.3
2.1 – 3.0	4	5.1	4	10.5	0	-	8	5.8
3.1 – 4.0	6	7.6	6	15.8	0	-	12	8.8
4.1 – 5.0	9	11.4	0	-	0	-	9	6.6
> 5.0	53	67.1	22	57.9	20	100.0	95	69.3
Means of traveling to get planting materials:								
On foot	9	11.5	4	10.3	5	25.0	18	13.1
By own bicycle	43	55.1	31	79.5	13	65.0	87	63.5
By hired bicycle	13	16.7	4	10.3	2	10.0	19	13.9
Motorcycle/lorry/bus	13	16.7	0	-	0	-	13	9.5
Distance traveled								
Too far	59	74.7	25	64.1	19	95.0	103	74.6
Not a problem	20	25.3	14	35.9	1	5.0	35	25.4

4.11 Factors considered in choosing cassava vendors to buy cuttings

In situation of good availability of planting materials, most farmers will prefer to buy cassava varieties of their own choice i.e., preferred. Therefore, where farmers obtained their cuttings was determined by availability of cuttings. At the time of receiving vouchers, only 53.6 percent of beneficiaries had already prepared their OFV plots, 22.1 percent partly prepared and 22.1 not started (Table 18). This was contrary to what was taught during sensitisation meetings. Probably it could have contributed to delay in purchasing planting materials. After received the vouchers, 38.6 percent bought the cuttings within a week, 50.7 percent after 1 to 3 weeks. This implies that this is the critical stage to be closely monitored by District council C3P focal staff in collaboration with village leadership. Farmers in Missenyi showed to delay more to buy the cuttings compared to farmers in the other two districts due to sub-village leaders taking responsibility of buying cuttings on behalf of the farmers from the vendor. This was contrary to what was agreed during OFV sensitization meeting.

Table 18. Cassava vendors, field preparation and time of purchasing after voucher issued

Criteria	Missenyi		Biharamulo		Chato		All sites	
	No.	%	No.	%	No.	%	No.	%
From whom a farmer bought cassava cuttings:								
Seller within village	5	6.3	15	37.5	0	-	20	14.3
Seller with variety preferred	37	46.8	6	15.0	16	80.0	59	42.1
Seller who is farmer's relative	3	3.8	0	-	0	-	3	2.1
Seller I know very well	13	16.5	0	-	0	-	13	9.3
Seller with better price	1	1.3	0	-	4	20.0	5	3.6
From any nearby vendor(s)	7	8.9	18	45.0	0	-	25	17.9
Others	13	16.5	0	-	0	-	13	9.3
Cassava field preparation status at time of receiving OFV:								
Ready	55	68.8	11	27.5	9	45.0	75	53.6
Partly ready	11	13.8	13	32.5	7	35.0	31	22.1
Not started	12	15.0	15	37.5	4	20.0	31	22.1
Fields already planted	2	2.5	0	-	0	-	2	1.4
Time spent to purchase cuttings from time a farmer received voucher:								
Less a week	16	20.0	20	50.0	18	90.0	54	38.6
1 to 2 weeks	21	26.3	18	45.0	1	5.0	40	28.6
2 to 3 weeks	30	37.5	1	2.5	0	-	31	22.1
More than 3 weeks	8	10.0	0	-	1	5.0	9	6.4
Not purchased at all	5	1.3	1	2.5	0	-	6	4.3

4.12 Farmers' understanding on cassava vouchers

In general farmers' understanding on the OFV was low as shown on Table 19. It was only the value of each voucher that was clear to farmers and the rest power of the voucher was not visualised by the majority of farmers. However, majority of farmers rated the OFV trade satisfied to very satisfied. This could be attributed to the fact that they got new cassava varieties that was not expected to have them in the near future days.

Despite that farmers were taught about recommended planting spacing for cassava, only 48.3 percent of all beneficiaries followed the recommended plant spacing. The rest of farmers planted their OFV cuttings under close or wide spacing. This implies that more training on cassava crop husbandry is required in future.

Table 19. Farmers' understanding and rating of OFV

Criteria	Missenyi		Biharamulo		Chato		All sites	
	No.	%	No.	%	No.	%	No.	%
Farmer's understanding on OFV:								
Value of each voucher	56	70.0	27	67.5	16	80.0	108	77.1
Vouchers could be used for more than one cassava variety	23	28.8	22	55.0	10	50.0	55	39.3
Voucher could be used with more than one vendor	10	12.5	17	42.5	7	35.0	34	24.3
You could bargain with the vendors on prices of cuttings	21	26.3	15	37.5	8	40.0	44	31.4
Rating of on-farm voucher trade								
Very satisfied	51	65.4	7	20.0	13	65.0	71	53.4
Satisfied	24	30.8	28	80.0	7	35	59	44.4
Unsatisfied	3	3.8	0	-	0	-	3	2.3
Planted cuttings bought by voucher	75	93.8	39	97.5	20	100.0	134	95.7
Plant spacing used								
As recommended	46	63.0	14	35.9	5	25.0	65	48.3
Close spacing	21	28.8	20	51.3	14	70.0	55	40.7
Wide spacing	9	12.3	5	12.8	1	5.0	15	11.1

4.13 Focused group discussions

Perceptions of extension staff and farmers were collected through Focused Group Discussions (FGDs). The discussion sessions covered supply of CMD tolerant planting materials, implementation of OFV, its advantages and deficiencies of this approach.

4.13.1 Suppliers of CMD tolerant planting materials

The on-farm trials conducted provided the promising varieties for further multiplication. Individual or groups of farmers and institutions who were willing to participate in multiplication of CMD tolerant planting materials were selected. The multiplication was done under supervision and facilitation by researchers, district agricultural extension officers or NGOs. The major aim was to expose the planting materials to farmers both within and outside multiplication communities.

The increasing demand of CMD resistant planting materials due to increasing areas affected by CMD in the country, the large share of multiplied materials were sold more outside the multiplication communities. Factors contributed to this situation were:

- Farmers in communities surrounding multiplication sites were not prepared to buy the planting materials. Less mobilisation efforts were put in place to make farmers be aware on the availability of CMD tolerant materials. Up to the time of OFV evaluation study all farmers visited said there were no extension materials about the new cassava varieties that were distributed to farmers.
- Lake Zone Agricultural Research and Development Institutes (LZARDIs) (Maruku and Ukiriguru), District councils and NGOs flowing to the CMD-UgV multipliers to buy the materials each season and leaving cassava farming communities in the multiplication sites with no materials to even buy. Also, some multipliers having contract with LZARDIs and some NGOs to supply a certain amounts.
- Suppliers of planting materials realised earlier, on value of planting materials than the targeted farmers because they were receiving regularly and proper information from researchers or NGO staff on demand of CMD tolerant materials. By knowing the value of the CMD-UgV resistant materials they were selfish to give their neighbours as they fear the market will be flooded and loose market although majority of them got the materials free from been involved in research on-farm trials
- Majority of rural farming households are poor with no ability to buy improved seeds if there is no external support or facilitation.
- Tendency of farmers to wait until they see the performance of new varieties from their fellow farmers
- Some local varieties have different responses to CMD being some have higher tolerance than others. In some areas the disease pressure is low for example in higher altitudes the pressure of the disease is low compared to low altitude therefore in this situation farmers become reluctant to seek the new varieties as still they are enjoying their local varieties. These situations make not all farmers seek the new varieties at the same time.

4.13.2 District extension staff, NGOs and farmers' perceptions on OFV impacts on livelihood of the people

In general extensionists, NGOs, farmers and suppliers had the feeling that the OFV approach was good in dissemination of the CMD tolerant planting materials. They said that dissemination of planting materials within and the surrounding communities where multiplication of CMD tolerant planting materials is taking place has been dominant since 2001. Before the OFV implemented, CMD tolerant planting materials have been moving to far distant places more than within the surrounding communities where multiplication sites are based. The following were mentioned to be the advantages and immediate impacts of the OFV seed system:

1. The introduction of OFV enhanced the willingness of needy farmers to buy the planting materials because traditionally, farmers are not used to buy cassava planting materials. It increased the understanding of farmers that cassava planting materials are valuable commodities and can be sold
2. Increased awareness of farmers and local leaders on availability of CMD tolerant planting materials in the communities
3. Farmers realised that importance of cassava plant are not only its tubers and leaves but also the stem “planting materials”
4. OFV stimulated the production of planting materials by smallholder farmers
5. OFV enhanced effective dissemination of appropriate technologies of cassava production (agronomic practices) and the use of improved varieties for more yield and hence more income
6. Cassava vendors had the opportunities of increased their household income and other assets from sales of cuttings. One farmer in Messenyi sold cuttings of value of TSh 1.9 million who decided to buy motorbike as remembrance of the OFV system. Other cassava vendors managed to send their children to private schools because of cassava sales both planting materials and roots.

4.13.3 Lessons learnt on OFV implementation in Tanzania:

1. Only few selected Agricultural extension staff got training on OFV seed system approach at the beginning of C3P under CMD Training of Trainers (ToT) course. Hence not all Village Agricultural Extension Officers (VAEO) had clear information about OFV. They were not aware of their participation roles and

responsibilities on OFV at district, ward and village levels. Since it was less participatory, the OFV was less incorporated into the District Agricultural plans. Therefore need for more trainings in the OFV approach to be adopted by many actors (NGOs, District councils, Government Organizations etc)

2. Time of implementation: Time of issuing vouchers for buying CMD tolerant materials was right but farmers were not prepared in advance to prepare their cassava plots. In future the whole exercise of OFV should start early as possible by doing the village sensitization and selection of voucher holder in order to give the voucher holders enough time to prepare their fields. In addition, farmers were not clear with the attributes of new cassava varieties versus their local varieties and therefore the need for research to release/recommend varieties with their accompanying packages.
3. In one OFV pilot site CMD-UgV planting materials suppliers/vendors were not involved in the village sensitization meetings as they were from next villages from the selected OFV villages. This brought about some of the voucher holder been limited in selecting their preferred CMD resistant varieties as the vendors did not allow them to go to the field. Since vendors were not given training they influenced some voucher holders to buy CMD resistant varieties even if he/she has only one variety. There were allegations of some selected voucher holders selling their vouchers to other farmers.
4. Shortage of CMD planting materials: the shortage of planting materials in some places forced some farmers to accept even planting materials of low quality. In future there is a need to intensify the multiplication process by making sure the multipliers have most of the best recommended CMD resistant varieties in order vouchers holders to have wider choice of types of CMD varieties to plant.
5. There was no follow up made on confirming whether the planted materials are the ones bought from the supplier(s).
6. Limited on-going agricultural extension activities in the OFV villages. Some of the selected OFV villages had no VAEO for example and very limited on-going agricultural activities that reduces the attainment of effective monitoring and evaluation of this approach. In future it will be wise to select villages with an

- agricultural extension worker for day to day follow-up and cassava being an important crop in the village.
7. Lack of effective village government leadership in some villages reduced the good implementation of the OFV seed system. In future for a start and for better achievements on OFV approach in disseminating CMD-UgV resistant materials it will be better to start with villages with strong leadership and then later followed with weak leadership villages as they may copy from the active leadership villages.

5. Conclusion and recommendations

1. The OFV approach in Tanzania was conducted in three pilot areas in Kagera region and in each pilot site there were some variations in the implementation of the approach as compared with other pilot sites. In this case it is recommended to hold a workshop which will discuss and standardize the OFV approach for different situations encountered on the implemented grounds as they differ from one site to another. The workshop/seminar to involve other donors/ districts that the project is intending to conduct OFV in future and if possible to include all districts served by C3P.
2. The use of OFV stimulate the demand side and is a more sustainable way of disseminating CMD resistant varieties and market friendly response in helping farmers to access CMD resistant materials. There is a need to sensitize other donors to be involved in the same activity to use this approach as the best means of disseminating CMD resistant varieties.
3. In establishing OFV sites the recommended steps to be followed with slight modifications (See recommendation no 1 above) whenever applicable:
 - a. To conduct meeting with the District authorities to explain the OFV procedures and to get their support
 - b. To conduct leaders sensitization meetings (Division, ward, Village executive offices and their chairperson and sub-village leaders)
 - c. To conduct villagers and their leader sensitization meeting
 - d. To conduct voucher holders selection meeting and select the vouchers holders by using wealth ranging tool in order to select the needy group (the resource poor farmers)
 - e. To conduct verification of CMD resistant materials availability, purity and amount that will be available in vendors (people who have the materials). Make enough copies and avail them to voucher holders at least 1-2 weeks before exchange of vouchers with cuttings

- f. To conduct selected voucher holders meeting and issuing vouchers
 - g. To conduct vendors meeting to explain all the needed procedures for them to serve the voucher holders
 - h. To exchange vouchers and cuttings
 - i. To take records of how much each vendor to be paid
 - j. To pay the vendors
 - k. To conduct evaluation at 2-3 weeks after issuing vouchers to get farmers perceptions on the whole system of OFV
 - l. To conducting evaluation again at 6-12 weeks after issuing vouchers
4. The OFV approach works well in villages where CMD resistant materials are already introduced and the distance between the voucher holder and the vendor is short (not more than 8Km). In this case it is recommended to start introducing the CMD resistant materials in the intended OFV villages by establishing primary, secondary sites or having multiplications under contract farmers. This will bring the CMD resistant planting materials closer to the needy communities then you can establish OFV system.
 5. Record keeping mechanism of planting materials being multiplied and dissemination should be established at all levels been regional, district and village for any different project intervention
 6. Further efforts of sensitisation of farmers on use of OFV should be preceded effective mobilisation and creating awareness on the availability of new varieties to the communities.
 7. Selecting of OFV beneficiaries should be left to the community/village to decide by focusing to the resource poor farmers by using wealth ranking tool but looking also, to others factors as well like if the targeted person will deliver what is expected.
 8. In future more sensitization campaign on voucher holders on price bargaining and obtaining 2-3 CMD resistant varieties from the vendors should be emphasized.
 9. The number of CMD resistant cuttings provided for such poor farmers was enough for him to carry long distances and for his initial land preparation and later to multiply and obtain more materials to expand his field.

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