

Annex 10

**RELATING THE IMPACT ON SCALING OUT SWEET POTATO PRODUCTION
UNDER SMALLHOLDER FARMERS IN BEMBEKE AND KANYAMA EPAS**

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ACRONYMS

CIP	INTERNATIONAL POTATO CENTRE
EPA	EXTENSION PLANNING AREA
OFSP	ORANGE FLESH SWEET POTATO

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ABSTRACT

The research study was done in Bembeke and Kanyama EPAs in Dedza District. The objective of the study was to scale out impact of sweet potato production in Dedza District. Results showed that in Bembeke and Kanyama EPAs, 4855 farmers grew OFSP Zondeni variety with support from the International Potato Centre and Concern Universal. 9307 farmers grew other Orange Flesh Sweet Potato (OFSP) like Kajoni and Kamchiputu and 12275 grew other sweet potato varieties. For other OFSP it was own seed. 40 lactating mothers and 36 pregnant women bought vines using vouchers which were going at KM155.00 per 4kilogrammes. A total of KM137562.50 was realized by three farmers who were participating as Decentralized Vine Multipliers from Concern Universal. The vines were grown on 0.5 hectares.

1.1 INTRODUCTION

Sweet potato originated in Central America cultivated way back in 3000BC (O'B rien 1972) It is classified as Ipomea batatas (I), a dicotyledonous plant belonging to the family convulaceae. (Poole 1952). Sweet potato is a warm weather crop and growth is best at temperatures above 24°C. When temperature falls below 10oC, growth is severely retarded. It grows best in sandy warm soils and poorly on clay soils (Watanabe et al 1968).

In Malawi, sweet potato is grown as a food security and cash crop. In Dedza district all the 10 EPAs grow this crop. Orange fleshed varieties are a source of vitamin A. Leaves of sweet potato are used as relish and are also a good source of vitamin A. Current national yields range between 7000-12000 kg per hectare but the potential is 30000 kg per hectare (guide to Agriculture production 2008).

To obtain a plant population of 37000 plants per hectore ridges should be spaced at 75-90cm apart and 30 cm between plants. To harvest the 30000kg potential, planting should be done with the 1st planting rains. The crop can also be planted on residual moisture (Guide to Agriculture Production 2008). Examples of sweet potato varieties are Tainon, Kamchiputu, Lunyangwa, Zondeni, Mugamba, Semusa, Yoyera and Babache(Guide to agriculture production 2008). Because of the Vitamin A, Orange fleshed sweet potatoes are being encouraged in Dedza district by the International Potato centre(CIP) through Concern Universal.

The principles of Orange Fleshed Sweet potato for Decentralized Vine Multiplication (DVM) are as follows

	VINE MULTIPLICATION*	
CLARIFICATION	PRIMARY BENEFICIARIES	SECONDARY BENEFICIARIES AND THOSE PLANTING IN THE FIELD
Planting period	Shortly after the main harvest for storage root production. This could be in the last month	Two months after the primary multiplication. Apparently multipliers will enter the

	of rainy season.	month of dry spell.
Irrigation	Irrigation is needed	Rainfed and Irrigation is needed
Planting method	Rapid multiplication	Adjusted conventional multiplication
Technique of multiplication	Two or three nodes are needed and then plant them in a manageable sized plot i.e.10 x 20m with planting distance of 10 x 20 cm	Vine cuttings of 30cm long are planted in ridges. Planting distance within plants is 30 cm and between ridges 75 or 90, depending on the locality.
Main objective	Producing vine cuttings	Producing vine cuttings as well as storage roots for food security when facing the dry season

*clarification was modified from the report reported by CIP (2011) mainly for this study.

2.0 LITERATURE REVIEW

Most sweet potato cultivars are rich in carotene. The cultivars with yellow or orange flesh contain a much higher amount of carotene than those with white flesh. The carotenes present in Orange flesh sweet Potato (OFSP) is B-carotene. Carotene is Vitamin A which is responsible for the development of babies before they are born. Other functions of carotene are providing good growth of children, strong bones and teeth healthy blood vessels. Sweet potatoes are also a good source of ascorbic acid. This is Vitamin C a water soluble vitamin which has to be taken in daily. It prevents scurvy, hemorrhage on the skin and strong bones and teeth. (World Book encyclopedia 1982 volume 20 page 334)

Some of the compositions in sweet potato are starch 8-29%, Protein 2.4-6% mineral matter like potassium, phosphorus, calcium, chloride and sodium 1.38%.

The vitamins that are present are carotene 12%, thiamine 0.1, riboflavin 0.06%, nicotinic acid 0.9%, ascorbic acid 29-40% (I.C Onwueme page 189)

It is for this reason that smallholder farmers, specifically where Concern Universal is working, are being encouraged to grow orange flesh sweet potato (OFSP) like Zondeni. The advantage of Zondeni variety over other varieties like Semusa is that, the orange colour is deeper. The deeper the orange colour the more vitamins it has. (Putri 2010). The international potato centre, an NGO which is coordinated by Dr. Putri here in Malawi, is working with farmers in Dedza to promote (OFSP) through partnership with Concern Universal (CIP, 2010)

There are two project areas where concern universal is work and these are Bembeke and Kanyama EPAs. In November 2009, individual farmers and some groups were identified to do Decentralized Vine Multiplication of Zondeni variety. After identification, some members of staff from the ministry of agriculture and Concern Universal were trained on sweet potato vine multiplication (CIP, 2010). A total of 3 individuals and 2 irrigation groups were identified in Bembeke EPA while Kanyama EPA had 3 irrigation groups and 3 individuals (Chizimba L 2010). There after concern universal bought sweet potato vines (Zondeni) at Bvumbwe research station in Thyolo and at Chiwamba EPA in Lilongwe district. The vines

were issued to the identified individual farmers and irrigation groups, otherwise known as Primary beneficiaries, for Decentralized vine multiplication (CIP, 2011).

Six to eight weeks after planting the vines were ready for sales to other farmers otherwise known as secondary beneficiaries. The primary beneficiaries were asked to sell to the secondary beneficiaries using vouchers. There was a criterion put in place for those who could buy using vouchers. The first one was those farmers who wished to buy should be within the project area where Concern Universal is working. The second one was that those buying the vines from secondary beneficiaries should be lactating mothers and pregnant women (CIP, 2010). The determination of value of voucher system was on the following factors (i) the costs of multiplication of OFSP (ii) living costs of the multiplier (iii) the price of sweet potato vines on the free market and (iv) The price given by the government. The price of voucher currently given was slightly above the government's price and also covered the production and living costs (CIP, 2010 and 2011). This research is therefore aimed at knowing the number of primary and secondary beneficiaries that bought the vines and established sweet potato nurseries of Zondeni variety by the end of 2010 season either using vouchers or conventional prices.

3.0 JUSTIFICATION

Farmers have been growing sweet potato for years but they were not aware that some sweet potato varieties especially those rich in vitamin A have essential components like starch and proteins, vitamins and minerals that can boost immunity in their bodies resulting in disease prevention and good health (I.C. Onwueme 1982). Also there has been a problem from farmers (primary beneficiaries) on how best to document the voucher system (personal communication with Abidin in Jan 2011)

The research is aimed at finding number of primary and secondary beneficiaries growing Zondeni variety and other farmers who grow sweet potato varieties having same characteristics as Zondeni.

The characteristics of Zondeni variety samples will be shown to farmers for easy comparison with the varieties they grow during focus group discussions and personal interviews.

4.0 STUDY OBJECTIVES

4.1 OBJECTIVES

To relate the scaling out against the production levels of sweet potato in Dedza District

4.2 SPECIFIC OBJECTIVES

1. To evaluate Primary and secondary OFSP beneficiaries
2. To evaluate farmers growing other varieties with same characteristics as Zondeni
3. To analyze perception of lactating mothers and pregnant women about OFSP
4. To analyze the income of farmers who sold the vines and tubers

5.0 HYPOTHESIS

1. Scaling out could have an impact in the increase in production of sweet potato
2. Orange flesh sweet potato was grown by few farmers in Dedza

6.0 METHODOLOGY

6.1 AREA OF STUDY

The research was conducted in Bembeke and Kanyama EPAs, because Kanyama EPA was a project area for Concern Universal where as Bembeke EPA used to be the project area for concern universal

Members of staff in the two EPAs were trained on vine multiplication.

6.2 DATA ANALYSIS

Descriptive statistics was used and it included graphs, mode and mean.

6.3 SAMPLING OR VARIABLE

Systematic sampling method was used because agriculture staffs in the EPAs were conversant with the method.

A sample size of 30 farmers was used in each EPA and sample forms designed like (closed and open questionnaire) were printed for the smooth running of the work. Random numbers and sampling of the farmers in the selected blocks was done by the AEDCs who sampled 30 farmers. The sampled farmers were given back to two AEDOs in each EPA for the work to start.

Four AEDOs were involved in interviewing 60 farmers so that the work did not look laborious as they were already used to the sample size of 15 farmers during agriculture estimates. A proportional probability sample was used to find number of sweet potato growers in the two EPAs.

Secondary data was provided by the two AEDCs from agriculture and Field Facilitators from Concern Universal.

6.4 DATA COLLECTION

The following methods were used

1. Focus group discussion using check list for the groups that received vines
2. Questionnaires were used during personal interviews for the sampled farmers to come up with number of farmers that grow OFSP other than Zondeni
3. Secondary data was collected to come up with number of farmers who received zondeni in the irrigation sites and in the field

6.5 RESULTS AND DISCUSSIONS (BEMBEKE AND KANYAMA EPAs)

6.5.1 DISCUSSIONS

Bembeke EPA had a total of 64 blocks with a total of 9074 male Headed Households and 10209 Female headed Households making a grand total of 19283 Farm Families

The name of the sampled block was Kamgultse 11 of Kapenuka section where there were 90 Households from which 30 Households were sampled for the exercise.

In the block, it was found out that 2 males and 3 females grew zondeni, 1 male and 7 females grew other Orange Flesh Sweet potato like Kamchiputu and Kajoni. 10 farmers grew other sweet potato varieties that were not orange flesh sweet potato. 7 farmers did not grow sweet potato but grew other crops like soya beans and phaseolus beans (See Table 2). Using the Proportional Probability Sample a total of 3145 house holds grew Zondeni, 5032 households grew other OFSP like Kajoni and Kamchiputu, 6290 grew other sweet potato varieties and 4403 households did not grow sweet potato. They did not grow because vines were not available to them (Ngwemba B. J et al May 2011 Bembeke Extension Planning Area)(See Table 2)The highest number of farmers were those who grew other sweet potato varieties.

Kanyama EPA which has 25661 Households with gender segregated as 17963 men and 7698 women vine uptake by sex was as indicated in Table 3 of this report. The sample block was Magunditsa in Livizi section where total farmer s in the block were 103men and 30 women. Number of farmers who benefited zondeni was 1 male and 1 female. 4 males and 1 female grew other orange flesh Sweet potato varieties like Kamchiputu. 5 males and 2 women grew other sweet potato varieties like Kenya and semusa which were issued by Catholic Relief Development Commission (CADECOM). 12 males and 4 women did not grow sweet potato. See table 3.Using Proportional Probability sample in Kanyama EPA, 1710 farmers grew zondeni variety, 4275 farmers grew other OFSP, while 5985 grew other sweet potato varieties. 13691 did not grow any sweet potato(See table 4) In the two EPAs there were 40 lactating mothers and 36 pregnant women, 420 men and 400 women who bought zondeni vines from primary beneficiaries.122 households were given free vines by their relatives who happened to be primary beneficiaries. Ngwemba B.J et al , May 2011

Using the sample total number of growers growing zondeni in the two EPAs was 4855 (Mthepheya Enock et al May 2011)number of beneficiaries from secondary data was 4733 (Abidin Putri et al 2011) There is a difference of 122 growers which has come about because some primary beneficiaries were giving their relatives free vines. In other words the difference of 122 beneficiaries did not buy vines using vouchers but received for free from relatives (Mthepheya Enock et al). The 4733 farmers were primary and secondary beneficiaries (Abidin Putri Sweet potato Progress report 2011 page 5) and table 5 of this report. On income, three farmers namely Mr. Chimpikizo got the highest income (KM40455.00 per 0.1ha) followed by Mrs. Chiyenda (KM59287.50 per 0.2ha) and the least was Mr. Chintali (Km37820.00 per 0.2ha). The difference in income was a result of managerial aspect including time of planting and weeding.(Mthepheya Enock et al 2011) (See table 6). In Table 9 and graph 5 there has been an increase in area, yield and production in the past four years because Non Governmental Organizations have been pumping in inputs like sweet potato vines.(Agriculture Estimates 2010-2011 season). Even though 2011 season experienced dry spells in the district, there was still an increase in yield and production because sweet potatoes are drought tolerant.

At harvest a palatability test and Field observations, according to the expected results in the proposal, on the performance of sweet potato plants were done in Bembeke EPA. Before palatability test field observation was first done (See Table 7). People who were invited were divided into two groups namely A and B. (Abidin et al 2011). Each group went around the field discussed and judged the performance of the 15 sweet potato varieties above ground. The International Potato Centre staff recorded the comments. The same varieties were used in palatability test. The varieties were

six breeder lines namely LU06/0432,BV07/016, LU06/0258, LU06/0299, LU06/0196 and LU06/0137 with white flesh colour, four promising OFSP lines LU06/0146,LU06/0527,,LU06/0252 and LU06/0428, two white local varieties namely Semusa and Kamchiputu, one yellow local variety known as Kenya; Zondeni OFSP and one orange flesh local known by Kolodina (table 7). TABLE 8 Palatability done in Kamgultse Village initiated by a number of beneficiaries that received the subsidized vouchers in the rainy season.

6.5.2 RESULTS

In Bembeke and Kanyama EPAs a total of 4855 farmers grew zondeni OFSP variety (See Table 5). 40 lactating months and 36 pregnant women bought vines using vouchers which were at KM155.00 per 4kilogrammes. It was also an indication that women like OFSP varieties so much. Besides these women, 820 farmers bought vines from the primary beneficiaries using vouchers. 9307 farmers grew other Orange flesh sweet potato varieties like Kajoni and Kamchiputu while 12275 farmers grew other sweet potato varieties like Kenya, Semusa and Yoyera.18094farmers did not grow any sweet potato in the two EPAs. In terms of income, three farmers namely Mr. Chimpikizo, Mrs. Chiyenda and Mr. Chimtali got (KM40455.00 per 0.1ha), (KM59287.50 per 0.2ha)and (Km37820.00 per 0.2ha) respectively. The difference in income was a result of managerial aspect including time of planting and weeding.

Name of Farmer	Value(MK)
Mirrium Chiyenda	59287.5
Maximiano Chimpikizo	40455.00
Bernado Chimtali	37820.00
TOTAL	137562.5

Results on palatability taste showed that white flesh colour and taste ranged from 40%-92% i.e. from less taste to most taste or sweetest. Yellow varieties like Kenya was 63% tasty while Orange flesh Sweet Potato ranged from 40% - 70% tasty. Although Orange Flesh Sweet Potato varieties had that average taste they were liked by many farmers due to their nutritive, less sugar when consumed, good ground cover and less disease and pest incidence in the field. (See Table 7 &8)

6.5.3 RECOMMENDATIONS

Utilization of fresh tubers and processing for human consumption should continue to be done in the district. 4855 farmers should be taken up as zondeni growers in both Kanyama and Bembeke EPAs. This includes the 122 farmers that grew zondeni using free vines given by their relatives. The 9307 farmers should be taken aboard as orange flesh sweet potato growers. Trainings or demonstrations on utilization and processing should include farmers growing Orange Flesh Sweet potato like Kajoni, Kamchiputu and Zondeni. Growth rate of babies consuming Orange Flesh Sweet potato should be compared with babies that do not consume OFSP. Other variables to consider are frequency of illness but other extraneous variables under control.

6.5.4 CONCLUSION

The past four years has seen sweet potato vine uptake and production on the increase with area by 4%, yield by 7% and production by 11% (See Table 9 & Graph 5). This clearly shows that farmers have an interest in the enterprise which can assist them nutritionally and economically

Table 1(VINE UPTAKE ACCORDING TO SAMPLE IN BEMBEKE EPA

	Zondeni	Other OFSP	Other SP	Didn't grow
Male	2	1	2	1
Female	3	7	8	6

Graph 1

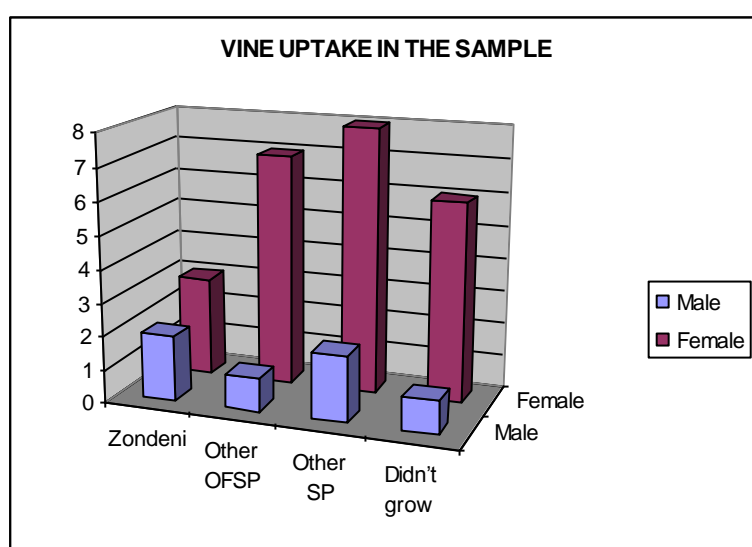


Table 2 SWEET POTATO GROWERS IN BEMBEKE EPA

	Zondeni	Other OFSP	Other SP	Didn't grow
Male	1258	629	1258	629
Female	1887	4403	5032	3774
	Zondeni	Other OFSP	Other SP	Didn't grow
Households	3145	5032	6290	4403

Graph 2

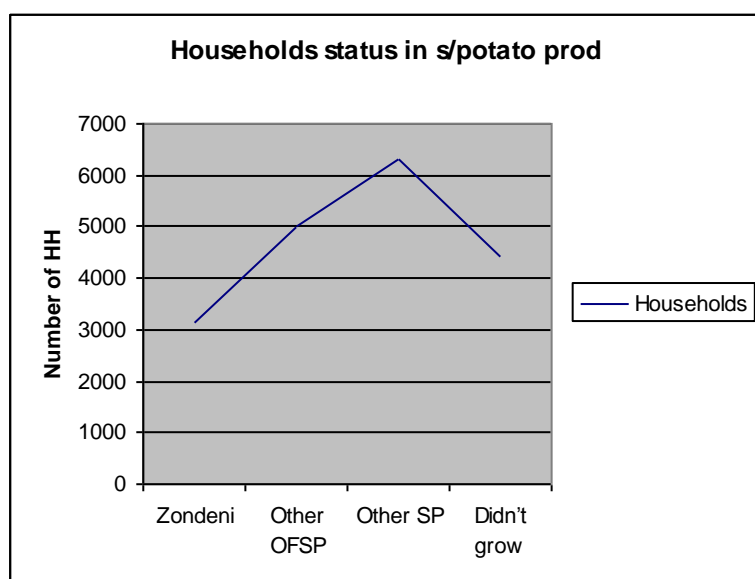


Table 3 VINE UPTAKE ACCORDING TO SAMPLED FARMERS IN KANYAMA EPA

	Zondeni	Other OFSP	Other SP	Didn't grow
Male	1	4	5	12
Female	1	1	2	4

Graph 3

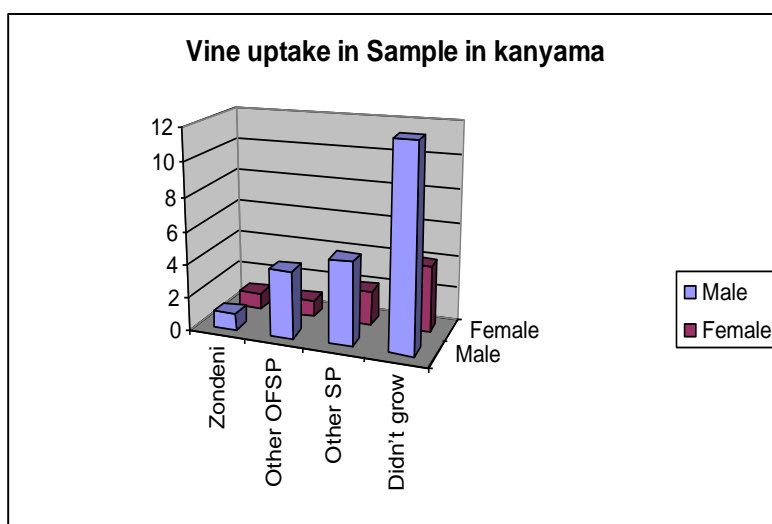


Table 4 SWEET POTATO GROWERS IN KANYAMA EPA

	Zondeni	Other OFSP	Other SP	Didn't grow
Male	855	3420	4275	10260
Female	855	855	1710	3431
	Zondeni	Other OFSP	Other SP	Didn't grow
Households	1710	4275	5985	13691

6.6 SUMMARY OF SWEET POTATO GROWERS IN THE TWO EPAs

Table 5

Zondeni		Other OFSP	Other SP	Didn't grow
From Sample	Secondary Data(CIP)			
4855	4733	9307	12275	18094

6.7 INCOME OF PRIMARY BENEFICIARIES

Table 6

Name of Farmer	Area planted	Quantity produced(kgs)	Quantity sold(Kgs)	Quantity kept(kgs)	Value(MK)
Mirrium Chiyenda	0.2	1631	1530	101	59287.5
Maximiano Chimpikizo	0.1	1144	1044	100	40455.00
Bernado Chintali	0.2	1076	976	100	37820.00
TOTAL	0.5	3851	3550	301	137562.5

7.0**7.1 PALATABILITY TEST (OBSERVATIONS)****TABLE 7**

VARIETY	FLESH COLOR	RANKING	REASONS
GROUP A (n = 19: 9 males and 10 females)			
Zondeni	OFSP	1	Very healthy appearance with no pests and diseases, good ground cover
LU0/0252	OFSP	2	Good appearance less pests and diseases and attractive
Kenya	Yellow	3	Good crop appearance with less pests and disease attack.
GROUP B (n = 51: 19 males and 32 females)			
LU06/0428	OFSP	1	Very healthy appearance(No

			pests and diseases, attractive appearance and good ground cover
Zondeni	OFSP	2	Good crop appearance(less disease and pest attack, attractive
Kenya	Yellow	3	Good crop appearance with less damage by pests and diseases, attractive

TABLE 8 Palatability done in Kamgultse Village initiated by a number of beneficiaries that received the subsidized vouchers in the rainy season.

TABLE 8

Variety	Flesh color	Participants 28 males and 42 females	Tasty(%)	Not tasty(%)
LU06/0432	White	70	92	8
BV07/016	White	70	89	11
LU06/0258	White	70	86	14
LU06/0146	Orange	70	73	27
LU06/0527	Orange	70	68	32
Kenya	Yellow	70	63	37
LU06/0299	White	70	50	50
Semusa	White	70	50	50
LU06/0252	Orange	70	42	58
Zondeni	Orange	70	40	60
LU06/0196	White	70	40	60
Kamchiputu	Orange	70	27	73
LU06/0428	Orange	70	25	75
Kolodina	Orange	70	25	75
LU06/0137	White	70	4	96

GRAPH 4

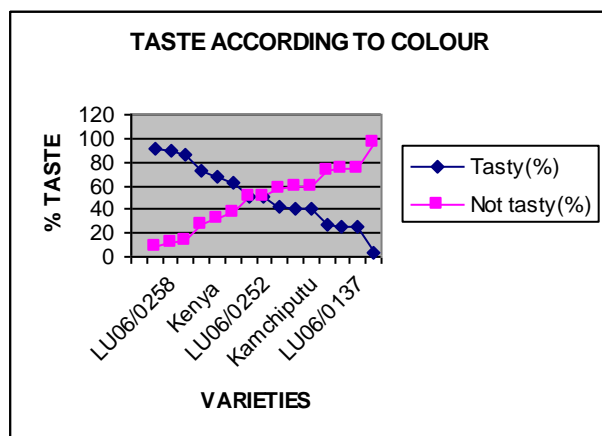


TABLE 9 SWEETPOTATO PRODUCTION FOR THE PAST 4 YEARS

	2007/08	2008/09	2009/10	2010/11	% Increase
Area	6722	7101	7202	7467	4
Yield	16289	16717	16978	18188	7
Production	109492	118709	122277	135806	11

GRAPH 5

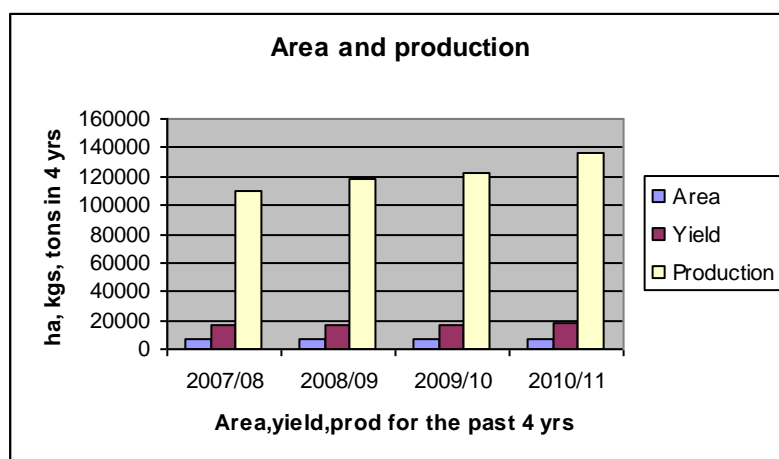
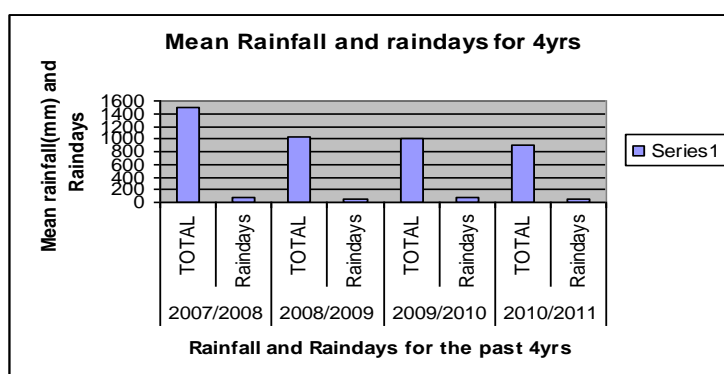


TABLE 10 RAINFALL DISTRIBUTIONS FOR PAST 4 YEARS

The decrease in rainfall for the past 4 years did not affect production because sweet potato is drought tolerant. There has also been increased use of improved varieties (Agriculture Estimates Third Round 2011)

2007/2008		2008/2009		2009/2010		2010/2011	
TOTAL	Raindays	TOTAL	Raindays	TOTAL	Raindays	TOTAL	Raindays
1506	69	1045	59	1004	65	903	56

GRAPH 6



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