

Sustainable Livelihoods Through Tuber Crop

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Rural people partake in a number of strategies, including agricultural intensification, migration and livelihood diversification, which enable them to attain a sustainable livelihood. Sustainable Livelihood approaches provide a framework for addressing poverty and vulnerability in both development and humanitarian contexts. They have emerged from the growing realization of the need to put the poor and all aspects of their lives and means of living at the centre of development and humanitarian work, while maintaining the sustainability of natural resources for present and future generations. The rate of social, economic, and technological change in the agriculture sector will gradually transform the setting in which climate change is likely to interact with sensitive features of the food system. The current state of the sector and important trends that would transform it provide a baseline to examine the potential consequences of climate change. Hence there is the need to evaluate the state and trends in root crop production in India.

Current state and trends of root crop production

National and Regional Root and Tuber yield values was assembled and their natural variability was assessed using different computer

software. The current state of the crop within the rural peoples was assessed using a rapid rural appraisal method. A district within the regions identified was selected and using a checklist obtained information pertaining to the state of the crops within their community and their perception of climate change and how vulnerable they are to changes in production levels. For the period 1980 to 2012, root crop production has significantly increased as a result of increase in area under production, improved planting materials and technologies among others. Acreage under production was increasingly higher for cassava production when compared with yam and cocoyam. This makes cassava a major root crop in India. Every household within the identified districts has Yam in the backyard and colocasia field justifying its importance as a food and cash crop and Cassava yields range from 25 – 35 t/ha within the Forest and Transitional zones but improved varieties are capable of giving 30 – 45 t/ha at Kerla and Tamilnadu. The annual domestic rate of consumption is estimated to be 155 kg/capita which are 4 times as great as cereals which range between 4 to 14 kg/capita. Traditionally cassava varieties in Kerla cover a wide range of maturation periods and many are flexible with regard to the length of time. They are left in the ground after maturation without deteriorating

significantly. Therefore different local varieties and so many improved varieties are grown per household within India. Cassava was said to be grown mostly for food and excess for sale. 60% of cassava produced India is for Industrial purpose and 30% for human consumption, 10% for animal feed. Both communities have their main source of income from farming and petty trading which is normally practiced by females. Production and consumption patterns in India tend to fluctuate for the past years with bumper harvest reducing prices as indicated by farmers within the study area. The excess production could be channeled into industrial use as flour for bakery or starch for the plywood, paper and textile industries. Under the Ministry of Food and Agriculture (MOFA), the Food and Agriculture Development Policy has a main goal of creating a sustainable environment for the sector that will ensure food and raw materials security, higher employment and income for farmers, reduce poverty and create wealth and contribute to the GDP through increased foreign exchange earnings and government revenues. Cassava policies that exist to help achieve the goals stated and confirmed by the Ministry of Food and Agriculture's Directorate include the following:

- ❖ Planting material multiplication and distribution to make available to farmers improved planting materials for good crop yields.
- ❖ Training of Agricultural Extension Agents and farmer groups in value addition to the crop. This improves the shelf life of cassava and therefore guarantees a more stable price.
- ❖ Facilitation of loan for farmers from banks.
- ❖ Assistance in the form of loan from Village Infrastructure Project (VIP) to purchase equipments for processing cassava.

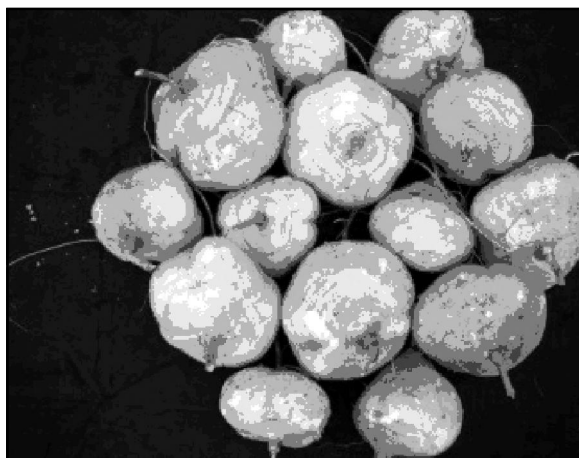


- ❖ Technical assistance from Ministry of Food and Agriculture's Directorate in the form of appropriate technology for high productivity was stressed by farmers.

The farmers claim no marketing policy that guarantees fixed price and ready markets exist. The need for such intervention to reduce poverty levels was stressed.

YAM PRODUCTION IN INDIA

Yam yields range between 4 to 7.5 t/ha and it is confined to the wetter forest zones because of its high moisture requirements for growth. It is produced mainly for cash and food because of the high stable price that exists for the commodity. The annual domestic rate of consumption is estimated to be 56 kg/capita and this has not changed for the last 20 years. Production for the past years have been increasing in acreage but not per unit area. Poor soils, decreasing rain days and total rainfall have been identified as the cause of reduction in cocoyam production. In Ghana, trends in its production and demand for its consumption are similar to yam and cassava production in Ghana (Fig. 3.2). Increasing demand results in increase in production with slight surpluses when compared with cassava. Demand was in short supply in



1995. No policies exist for its production or marketing. Two types of cocoyam, the white and red types were being cultivated in the different area. Planting materials are purchased from other farmers. Corm setts or suckers that sprout after land is cleared for farming are the main source of planting materials used for its establishment. It is normally harvested between 12 to 18 months after field establishment. Prices of produce are more stable and they will normally harvest crop when there are buyers. Cocoyam stores better in the soil and prices are more stable, this makes it a food security crop. Most farmers' crop need for its leaves or roots on subsistence level while a few crop it mainly for cash. It is mainly cropped intercropped with plantains or bananas and sometimes with other food crops such as maize and cassava.

YAM PRODUCTION IN INDIA

Yam yields are relatively high (17 – 35 t/ha) and it is an expensive crop to cultivate, requires soils with high fertility status and a much lesser amount of rainfall. They are therefore being grown mostly in the south and south east zones. Some varieties do well in the Forest ecological zones. Yam is grown in all regions except Upper East and central region. The annual domestic rate of

consumption is estimated to be 42.3 kg/capita. This has also not changed but there has been a steady increase in amount exported. Yam production and consumption or demand trends are similar to other root crops. With the exception of 1985 where demand exceeded production, surpluses increase with increase in demand and production. Although it is an important export crop, yam prices were found to fluctuate with the time of season and the type or variety of preference. Six types of yams – white, water, *Asobayere*, yellow, Chinese and potato yams are grown in the community in addition to other types of food crops produced. Their main food crop is cassava. Yam grown for cash is mostly sole cropped whilst subsistence yam cropping is intercropped.

LINKAGES WITH OTHER SECTORS OF THE ECONOMY

The economy of India has been described as agrarian, employing over 70% of the population and generating about 2/3rds of the export earnings. The government of India also identifies root crops as a possible vehicle for national economic growth and food security. Some state government policy to alleviate rural poverty, improve household food security and the nutritional status of individuals can be achieved by improving the overall food availability and increase income earning opportunities in farming. Root crops also contribute about 40% of the country's Gross Domestic Product. Climate impact is a possibility of reducing food production and therefore making all these policies unrealistic. This section identifies and analyzes linkages that exist with some aspects of the economy and describes adaptation strategies available for mitigation.

WHOLESALE PRICES OF ROOT AND TUBER CROPS

Wholesale prices of root and tuber crops in Ghana were sourced from the Statistical section of the Ministry of Food and Agriculture and documented. The economic production values which is the amount available for consumption was found to be positively correlated with the wholesale prices; giving high positive coefficient values of 0.5 for cassava, 0.75 for cocoyam and 0.90 for yam. Years that had higher production had higher wholesale prices per unit sale. Cassava, yam and cocoyam had increased the wholesale price with time. Yam had the highest unit price, followed by cocoyam and then cassava. Prices for yam are more stable in India than cassava, because of the highly perishable nature of cassava. Processing the root crops would give a higher purchase price for the farmer as suggested by farmers involved in the participatory assessment. Further since most of the increases in production is mostly due to increase in cropped area as against productivity, a climate change would definitely affect yield.

ADAPTATION STRATEGIES

Agriculture production has shown an ability to adapt to changing conditions like natural resource availability, technologies or economies. Most crops may adjust unnoticed especially when climate changes are gradual. Farmers on their own do have options that help them bear and share losses or modifies threats. Appropriate technologies and improved varieties also exist to prevent or help share losses that may occur when climate changes. The PRA conducted during the study identified the following as adaptation options for climate change.

Improved Farming technologies or practices

These are normally referred to as on farm adaptation options and they include planting more

than varieties with different maturity periods and /or introducing drought resistant varieties in farm fields. Farmers in the study area already crop different varieties of a commodity to ensure food maturation (food security) even in the event of an unpredicted harsh weather. Integrated nutrient management under the various crops which is not being practiced could be introduced. Under this different soil amendments in the form of organic or inorganic or including leguminous crop in the cropping system could be applied to the degraded soils. This would increase the nitrogen to take full advantage of the CO₂ effects, while some may protect the soil structure and therefore increase soil moisture availability. Afforestation / reforestation which involve the planting of trees within the degraded forest lands will be encouraged. Farmers perceived this to be the cause of the irregular rains and the degraded soils. Some communities are already pursuing this option while others think it is not their responsibility. This point raises the issue of extensive education on tree planting. Alternate cropping could be encouraged. This practice allows farmers to change cropping systems. For instance farmers in the *Akumadan* areas of Ashanti Region who use to grow cocoyam now grow vegetables which are short duration crops and cereals like maize. Members of *Boekrom* (Western Region) also grow more of cassava than cocoyam and yam because of lack of good soils. To achieve the above mentioned strategies the following researchable topics need to be studied;

- ❖ Drought tolerant and early maturing root crops need to be identified and made available to farmers.
- ❖ Tree planting as part of the root crops production systems – yam and cocoyam need to be introduced.

- ❖ Identification of fast growing trees that cope with root crops production.

The vulnerable groups most likely to benefit from this adaptation strategies are the farmers and rural folks, fisher folks, women and the urban poor in a decreasing order of severity. For farmers and rural folks, the adoption of these technologies will increase productivity / production should there be a change in climate. This will make them secure and guarantee income for them. The fisher folks are mainly subsistence in their activities and therefore depend on root crops as their main staple food. Being assured of food at a constant price is making them food secure. Women are important actors in root crops production. Their involvement in the implementation of this option is critical and an improvement in production will definitely give them a plus. They act as middlemen in the marketing of the commodities and are mostly responsible for the cultivation of cocoyam. Since they provide food for the household a reduction in the availability of root crops which is a staple in almost all diet will be disastrous. For the urban poor, since they are migrants from the rural communities, a stable production system would prevent their migration and encourage them to crop the land. Key persons that can promote or undermine these adaptation strategies are researchers, extension agents, non-governmental agencies and community members.

Post harvest technologies

This adaptation option provides insurance against local supply changes through storage which tends to store the crop for a longer period and also guarantees a good price for the commodity. This option requires the identification of processing techniques that will preserve root

crops and provide an alternate use of the crop. Some processing techniques already exist, the need to source for them and adapt to our conditions is very important. Training on these post harvest technologies and the establishment of cottage industries for processing root crops can not be overemphasized. To achieve the above mentioned strategies the following researchable topics need to be studied;

The main actors to support this option are the researchers and extension agents who will identify, modify and disseminate the technologies. The Government and NGO (Non Governmental Organizations) that provide support for training and logistics. The community members' preparedness to accept technology will support the implementation of this option. Non availability of logistics to fund the study and support training and dissemination would undermine the project. Vulnerable groups are likely to benefit from this option are as follows;

Farmers and rural folks - The adoption of these technologies will create the market condition for an increase in productivity / production should the change in climate bring about a glut. This will also guarantee income and make them feel secured should there be a shortage.

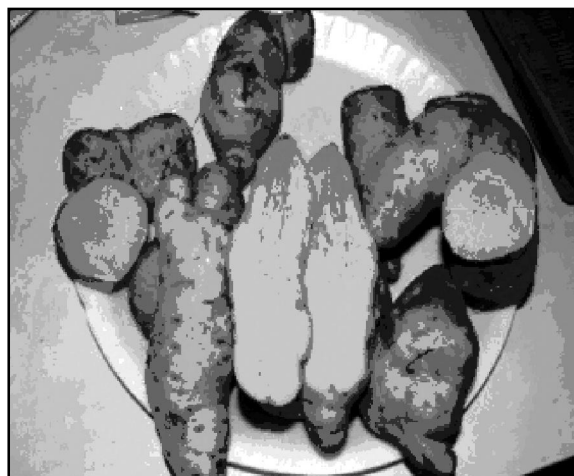
Women - Women are important actors in root crops production and processing. Their involvement in the implementation of this option is critical and an improvement in processing and production will definitely give the project the support it needs.

Fisher folks - Root crops in its fresh and processed state are their main staple food. Being assured of food is making them food secure.

Urban poor - This will preserve excess root crops for lean periods or eventualities; resulting in food security and stable price for the urban poor who feed on root crops. This will further prevent out migration which is a major cause for increase in urban poor population. Job created for the rural poor in their environs prevents out migration.

Alternate livelihood

Alternate livelihood development especially those that give fast income was identified as a household or village adaptation option. Communities will be trained on occupations other than root crop production; these are bee keeping, poultry production, piggery, snail rearing, mushroom cultivation etc. This will involve the provision of startup capitals or some sort of loans for project establishment and training in the prescribed trade. A detailed household studies to identify an alternate livelihood which is more feasible and acceptable by the populace will support the option. Farmers and rural folks will have an added income for their household if climate change reduce or destroys farm produce. But for the fisher folk, since root crops are their staple food an alternate crop or livelihood which will prevent the production of root crops will render them food insecure. Prices may also go up and in effect reduce their purchasing power. Women will gain extra income for their household budget. And since the urban poor are persons who migrate from the rural areas because of lack of jobs the presence of jobs will reduce their population in the urban areas. Alternate jobs will be created in the villages for them. These programmes are ongoing in certain localities and should therefore be given full support by the government.



Marketing policies

Marketing channels exist for the sale of most root crops. These are normally through middlemen or women who price the commodity anyhow resulting in unstable low prices within the harvest season especially with cassava. Policies to address such issues and create market avenues for these root crops are necessary. Identification and implementation of policies that address marketing issues in relation to root crop production need to be done. The following persons are involved in the implementation of this strategic project; Policy makers, Researchers, Processors and Community members. Women and the urban poor are vulnerable groups fully integrated in marketing root crops a stable price as a result of the marketing policies will mean a stable income as against a fluctuating root crop pricing. Farmers, fisher folks and rural folks are another group who will be affected by this adaptation option. This option will ensure a ready market for possible increases in root crop yield and guarantees a stable market price and income for them.

Irrigation under root crops production

Small scale irrigation schemes as supplementary water source for crop growth would be established in farm fields. The need to identify and design the appropriate irrigation system for root crop production is crucial. Funds for its establishment will require the presence of policies that allow the acquisition of such implements at affordable price. Actors that can support or undermine the proposed adaptation activity are the Policy makers, Researchers and Community members. The provision of irrigation as supplementary water for root crop production will increase soil moisture and finally yield. Prices will be stable as a result of increased productivity for the fisher folk, urban poor and women who are part of root crops production and its utilization.

CONCLUSION

Agricultural production and marketing policies have been found to affect food availability and food security. There is a widespread tendency for us to cry for policies that effectively subsidize agricultural production or policies that tax or discourage agricultural production in certain areas, or pursue policies that promotes food self-sufficiency. Although all of these policies tend to reduce the efficiency of agricultural resource utilization in low- and high-income countries, they have not changed trends in food supply and demand. Relatively few studies have attempted to predict likely paths for food demand and supply beyond 2020. There are reasons for optimism that growth in food supply is likely to continue apace with demand beyond 2020. For example, population growth rates are projected to decline into the 21st century and multiple lines of evidence suggest that agricultural productivity potential is likely to continue to increase. However, scientists

projected that current and future expected yields will remain below theoretical maximums for the foreseeable future, implying opportunities for productivity growth increases in food demand are mostly due to increase in population and supplies are due to increase in acreage under production and not productivity. These concerns about future productivity growth, if correct, mean that simple extrapolation of yield for impact assessment may be overoptimistic. The implication is that confidence in predictions of food demand and supply balance and price trends beyond the early part of the 21st century will be low. Climatic conditions often interact with socio-economic conditions to undermine food security. Climate variability tends to have the greatest impact on people who are landless, poor, or isolated. Changes in socio-economic conditions can lead to dramatic changes in food security. Disadvantageous terms of trade, poor infrastructure, and armed conflict also make it more difficult for people to cope with the effects of climatic extremes. Therefore these factors cause deforestation in the case of either yam production which requires new forest land.

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