

PROCEEDINGS OF THE KENYA NATIONAL WORKSHOP ON UPGRADING VALUE CHAINS FOR BAMBARA NUT AND AMARANTH



**30 June-2 July, 2014 at Kenyatta University Main Campus,
Nairobi, Kenya**

Editors:

Kiarie Njoroge, Ndungu J., Wasike V., Rudebjer P,
and Hall R.A.

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Organizing Committee

Coordinator: Prof. Kiarie Njoroge (Plant-Breeder/Geneticist/Seed systems, Faculty of Agriculture, University of Nairobi)

Assistant Chief Organizer: Dr Victor Wasike (Principal Research Scientist/Program Officer, Kenya Agricultural Research Institute)

Facilitators: Mr. Per Rudebjer (Head, *a.i.*, Knowledge Management and Capacity Strengthening, Bioversity International) and Dr Richard Hall, (Programme Coordinator, International Foundation for Science)

Chief Rapporteur: Prof. Alex Machocho (Natural Products Chemist, Kenyatta University)

Secretariat: Ms. Pauline M. Ndwiga (Horticulturalist, Kabete Field Station, University of Nairobi)

Enquiries about this Publication can be addressed to:

Prof. George N. Chemining'wa

Faculty of Agriculture,
University of Nairobi)

P. O. Box 29053 00625

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List of Acronyms and Abbreviations

ANAFE:	Africa network for Agriculture, Agroforestry and Natural Resource Education
IFS:	International Foundation for Science
NUS:	Neglected and underutilized species
EU:	European Union
ACPS:	Africa Caribbean and Pacific states
UoN:	University of Nairobi
SMS:	Short message services
KEMRI:	Kenya Medical Research Institute
PRA:	Participatory Rapid Appraisal
MDGs:	Millennium Development Goals
ASDS:	Agricultural Sector Development Strategy 2010– 2020
ITK:	Indigenous technical knowledge
PEC:	Poverty Eradication Commission
NPEP:	National Poverty Eradication Plan
WSSD:	World Summit for Social Development
NGOs:	Non-governmental organizations
CDF:	Constituency Development Fund
ASK:	Agricultural Society of Kenya
KIPPRA:	Kenya Institute for public Policy research and analysis
ASAL:	Arid and semi-arid lands
ICT:	Information and communication technology
BAFAM:	Bondo Amaranth Farmers and Marketing Group
VC:	Value chain

Introduction

Background

There is a considerable emerging interest on how the neglected and underutilized species (NUS) of plants can contribute more to food security, income generation, better nutrition and climate change resilience. Reports on the capacity of NUS and their potential to improve African livelihoods are legion, but there is a need to support the claims with science-based evidence.

Bioversity International, ANAFE, IFS and national partners in Benin, Kenya and Zimbabwe successfully developed the project "Strengthening capacities and informing policies for developing value chains of neglected and underutilized crops in Africa", supported by the EU-ACP Science & Technology programme, with co-funding from the project partners. The project runs from 1st January 2014 to 31st December 2016.

The overall objective of the project is 'Enhanced value chains of neglected and underutilized species (NUS) in Africa contributing to improved food and nutritional security, income of smallholder farmers and entrepreneurs and mitigation of, and adaptation to climatic, agronomic and economic risks.' The project expects to identify, and develop capacity to address, the factors that constrain wider use of NUS and especially Bambara nuts and amaranths (both grain and leafy types). Both Bambara nut and amaranth are recognised as priority crops in Western, Eastern and Southern Africa, among hundreds of traditional NUS crops.

To contribute to this, the project will: 1) Develop national action plans for value chain upgrading of Bambara groundnut and amaranth in Benin, Kenya and Zimbabwe; 2) Prepare strategies and tools for integrating teaching on neglected and underutilized species (NUS) into higher agricultural education in three sub-regions; 3) Enhance capacity to design and conduct inter-disciplinary research projects on NUS value chains and 4) Communicate the results to stakeholders, including policy makers.

The Kenya project component organized a workshop of key stakeholders comprising partners, associated organizations, farmers and experts who met for a national workshop on upgrading the value chains of Bambara nut and amaranth between 30th June and 2nd July, 2014 at the Kenyatta University Conference Centre in Nairobi, Kenya.

The objectives of the two-day workshop were to serve as a national innovation platform aimed at expounding and documenting the value chains of two NUS crops: Bambara groundnuts and amaranth (both grain and leafy types). The purpose was to synthesize the NUS value chains in this country with special emphasis on the two crops. It is expected that, at the end of the workshop, Kenya's stakeholders in these two crops will have been mapped, and the associated value chains and their roles identified. A report on the constraints and opportunities available for Bambara groundnut and amaranth value chains will be documented.

Later, this information will be used to guide writing of a national Action Plan for both Bambara and amaranth value chains. The workshop also served as an important forum to establish a national platform

to deal with the two selected crops, and hopefully develop new networks that can attract funding in this area of NUS that are emerging as vital in addressing the challenges of food and nutritional insecurity and poverty alleviation especially in the face of climate change.

Workshop objectives

Prof. Kiarie Njoroge, Chief Workshop Co-coordinator

The objectives for the workshop were:

- To map Kenya's stakeholders for Bambara and amaranth.
- To analyse their value chains.
- To indentify constraints and opportunities regarding Bambara groundnut and amaranth value chains.
- To guide writing of a National Action Plan for both Bambara and amaranth.
- To establish a national coordination and innovation platform for these two crops.

Project background and neglected and underutilized crops (NUS)

Mr. Per Rudebjer (*Head, a.i., Knowledge Management and Capacity Strengthening, Bioversity International*)

Mr Rudebjer presented experience from an earlier project on neglected and underutilized species, supported by the European Union (EU) and the Africa Caribbean Pacific (ACP) Science and Technology programme and implemented in ten African countries in 2009-2013, and which informed and inspired the design of the current project. National studies on NUS in Benin, Ghana, Kenya, Malawi in combination with sub-regional stakeholder workshops identified priority crops, including Bambara groundnut and amaranth. The project experienced a very high demand for capacity building on NUS research; about 2000 applications were received for 10 courses, in which 220 scientists were trained. The project partners also organized the 3rd International Conference on NUS, held in Ghana in 2013. One finding of the earlier project was that scientists have a tendency to work in isolated segments of the value chain, as opposed to designing their research through a multi-stakeholder analysis of value chain bottlenecks; this reflects weak links between agriculture and food systems.

The rationale for the current project, also supported by the EU-ACP S&T Programme and implemented during 2014-2016, is based on a confirmed high demand for capacity development on NUS and the success of value chain training provided in the previous project. Research can contribute to solving problems related to NUS crops' cultivation, processing or marketing (such as seed availability and quality, variability in growth and time to harvest, laborious post-harvest processing, undeveloped supply chains, lack of standards and a cultural

perception as 'poor man's crops'). The project also recognizes the need to go beyond developing individual capacity: there is a need to link research to markets, inform policies and strengthening higher education on NUS. Given the large number of species, the project is using two model species for learning and sharing of knowledge: Bambara groundnut, widely grown in semi-arid Africa, drought tolerant and with high nutrition value, and amaranth (both the grain and vegetable types), nutritious, rich in vitamins and essential minerals and widely cultivated and consumed in many African countries. Both crops are currently constrained by weak value chains that largely involve local markets. Lessons from these two 'pilot' crops can be applied to many other NUS.

The project has four expected results:

1. National action plans for value chain upgrading of Bambara groundnut and amaranth in Benin, Kenya and Zimbabwe prepared, and best practices and lessons validated with national and regional policy actors.
2. Strategies and tools for integrating NUS into higher agricultural education curricula agreed with universities and technical colleges and shared through African educational networks.
3. Enhanced capacity in three African sub-regions to conceptualize and design interdisciplinary research projects on NUS value chains, and to effectively communicate results to relevant stakeholders.
4. Strategies, tools and methods for strengthening NUS research, education and policy communicated to stakeholders.

At the core of the project is a value chain approach: the value chain is a coordination of all links in the value chain. Value is added at each stage. Crucially, it is a market-led approach, responding to local, national and international consumer demands.

This national workshop on upgrading value chains will build a common understanding of constraints and opportunities for Bambara nut and amaranth value chains in Kenya. Networking and alliances will be built that can jointly address constraints and capture opportunities for upgrading of the value chains. An agreement on some steps needed for improving these value chains will be a key output of this workshop. The identified knowledge gaps and research needs will guide a range of project activities in coming years, such as the research project proposal development training courses.

Official opening address

Opening remarks by dr. George A. Ombakho, Director of Research Management and Development, State Department for Science and Technology, Ministry of Education, Science and Technology, during the official opening of the stakeholders' workshop on upgrading value chains for Bambara nut and amaranth at Kenyatta university conference Centre, 30th June 2014

Stakeholders;

Ladies and Gentlemen;

It gives me great pleasure to be part of this stakeholders' Workshop on "Upgrading Value Chains for Bambara nut and Amaranth" organized by the University of Nairobi in collaboration with other stakeholders. Many cultivated plant species are disappearing as a result of the current high levels of genetic and cultural erosion owing to lack of indigenous knowledge pertaining to the availability, use and various methods of preparation of such plants for use. It is important to note that most of these plant species have a very high potential for food security since they are in most cases drought-tolerant and have value to the users such that if we continue losing these unique and irreplaceable resources, it will be more difficult for us to adapt to climate change and ensure a cheap, healthy and diversified nutrition for all.

Urbanization has further created certain homogeneity of products over time, accompanied by a loss of different culinary traditions and agricultural biodiversity. Dependence on a few crops has negative consequences for ecosystems, food diversity and our health. The food monotony increases the risk of micronutrient deficiency and other nutritional related disorders such as obesity.

Broadening the foundation of food supply is therefore a crucial factor in striving to improve food security and enhance nutrition. Currently we rely on just 15 plant species and eight animal species for more than 90% of all human food. We all appreciate that neglected and underutilized species can play a crucial role in addressing the food and agriculture issues against hunger and poverty and are therefore, a key resource for agriculture and rural development challenges of the future. The resilience attributes give NUS a plus for Africa and specifically Kenya where 84 per cent of the total land mass of the country is in the arid and semi-arid areas where soil fertility and water availability are major problems and remain largely under-exploited. In this regard there is a great need to address the environmental challenges by providing more attention to both sustainable intensification of agricultural production and consumption with special attention to preservation and enhancement of natural resources.

Cultivation of indigenous vegetables, fruits, and other underutilized crops requires to be promoted as many of these plants have higher levels of resilience to environmental stress.

These underutilized crops can grow and produce adequately under poor soil conditions, for example in drought-prone or saline areas, and often are more resistant or tolerant to insect and disease pests. In many instances, indigenous vegetables can grow in environments unfit for other crops. They are immediate and strong candidates needed to withstand the adverse effects of a changing climate.

The intensive research focuses mainly on conventional crops such as maize and wheat and often discounts many valuable opportunities in underutilized crops hence, the need for increased research on underutilized crops.

While some research on NUS is taking place, the results may not always be reaching smallholder farmers. This lack of appropriate information and awareness creation by experts is also a major drawback in relation to developing NUS in Kenya.

The National policies such as the constitution 2010, Vision 2030 and the Sectoral Medium Term Plans put emphasis on the urgent need to reduce poverty in line with the Millennium Development Goals (MDGs). The government's commitment to the realization of the MDGs and ensure continuation with the Sustainable Development Goals is clearly spelt together with the various achievement strategies.

In these policy documents, agriculture is expected to contribute immensely towards national development and especially the contribution of the smallholder communities with high incidence of poverty, unemployed youth, women, and vulnerable groups that are engaged in different types of agricultural activities in the country. The best example in this regard is the Agricultural Sector Development Strategy 2010– 2020 (ASDS) which seeks to rationalize, streamline and enhance coordination of agricultural research services so that the sector can play its role of delivering the 10 percent annual economic growth envisaged under the economic pillar of Vision 2030. As a result, the stakeholders in the NUS value chains need to take advantage of the existing policies together with the devolution of agriculture to develop NUS at the county/regional levels through county specific appropriate technologies. Such a Forum could explore untapped opportunities that exist in areas such as modern agronomic practices to stabilize yields, improving the quality through bio-fortification to boost micronutrient content and model marketing strategies to renew the relevance of NUS in Kenya's food systems. It is therefore with these concerns in mind that this two-day Stakeholders Workshop which aims to:

- Map the stakeholders involved in Bambara and Amaranth value chains and identifying their roles, and
- Identify challenges and potential opportunities for the exploitation of the two crops to reduce poverty and improve health and nutrition can be appreciated

The two underutilized crop species have not been lost yet, and form the basis of local food systems in different counties. These crops are well adapted to their local agro-ecological conditions and remain important to the livelihoods of the communities that use them.

Different communities have developed crops in harmony with their environments, utilizing their rich natural surroundings. And so food is also part of our culture and identity. We must not lose track of our agricultural and culinary roots, nor the lore and wisdom of our ancestors. On the contrary, we must learn from them, to ensure that our future has even more diversity.

A robust promotion of NUS will require funding to support all activities across the entire value chain, as is said 'from the farm to the table'. In doing this the key role played by women in maintaining crop diversity and indigenous technical knowledge (ITK) related to NUS requires to be acknowledged.

Finally I need to emphasize on the need to work closely with policy makers at national and international level to ensure that pro-NUS policies are included in national and globally important framework such as the Post-2015 Sustainable Development Goals.

I wish to declare the Stakeholders' Workshop on "Upgrading Value Chains for Bambara nut and Amaranth" officially open and wish you all fruitful deliberations.

Underutilized crops in Kenya: a briefing

Perspectives on underutilized crops in Kenya

Dr Lusike Wasilwa (*Asst. Director, Horticulture and Industrial Crops, KARI Headquarters*)

Food security is a global concern with an increasing population. Three hundred million undernourished people live in sub-Saharan Africa. Per capita food consumption (KCAL per capita per day) has been less than 2200 calories, less than the rest of the world. Population dynamics – 62% in urban areas of Kenya by 2030.

Challenges to Food Production

Africa pays >\$12 billion to import 30 million tons of wheat, by 2050-African countries will spend an >\$24 billion for wheat imports or 60 million tons, and Sub-Saharan Africa imports may reach 35 million tons (*Source –CIMMYT, 2012*)

Complex production systems where there are Small-scale/Out-growers, Small to Medium Growers, Large Growers and Contract Farming.

Losses attributed to pest and diseases and effects of climate change. Loss of Pollinator Biodiversity leading in yield losses from poor pollination (*Source – Muo Kasina*). African indigenous vegetables - Flies, stingless bees, honeybees, Halictids, carpenter bees, leafcutter bees - Loss is 25-70% seed yield, lower germination (30%), higher germination 72-76%.

Cucurbits – Honeybees and stingless bees – 100% yield loss. Butternut Squash – 2.5 tons/ha (6 bee visits) to 7.5 tons/ha (unlimited bee visits). Fruit – Honey bees, carpenter bees, hawk moth, stingless bees, bats etc. – 10 to 25% yield loss.

What are underutilized crops? Underutilized, orphaned, emerging, Emerging crops are promising plant species/varieties or cultivars that are either indigenous, wild or domesticated, introductions, or re-introductions that have potential for commercialization at regional or local level for food, fibre, fodder, oil, medicinal, ornamental, aromatic, timber etc. These plants, the potential of which is under-exploited, could contribute to food security, nutrition, health, income generation and environmental services and offer niche market opportunities with value-added potential.

The Cordoba Declaration on Neglected and Underutilized Species (NUS) -2012 raises issues on increasing awareness of NUS strategic roles, conserving genetic and cultural diversity of NUS, promoting NUS in small-scale farming and improving rural livelihoods, developing NUS value chains from production to consumption, changing incorrect perceptions about NUS develop evidence base, enhancing research, developing capacities for promoting NUS, building an inter-sector and inter-disciplinary collaborations for NUS and creating a conducive policy environment for NUS.

Overarching Policies include

- Vision 2030 and ASDS advocate for:
- Transformation of smallholder agriculture from subsistence to an innovative, commercially oriented sector to achieve 10% economic growth

Through:

- Improving market access especially for smallholders
- Value addition to farm produce before reaching local and external markets
- Encourage growth of agri-business to markets
- Increasing agricultural productivity

Research & Emerging Crops

- Kenya Agriculture Research Institute (KARI)
- Academia (institutions of higher learning)
- National Museums of Kenya
- The Kenya Wildlife Service
- Kenya Forestry Research Institute
- Kenya Forest Service
- International Centre for Research in Agroforestry (ICRAF)

Extension and Emerging Crops

- Ministry of Agriculture Livestock and Fisheries – major player
- Extension of these crops is limited
- Inadequate information
- Production and processing packages not verified
- Private organizations and NGOs
- Poor coordination
- Limited technical collaboration
- Low capacity

Processing and Utilization of Emerging Crops

- Processing is limited due to the low level of production
- Inappropriate processing technologies
- Limited product diversity
- Processing mainly by private sector
- Low utilization of raw and semi-processed Products

Markets and marketing of Emerging Crops

- Markets are limited and poorly developed due to low supply of commodities
- No set quality standards
- Plants are collected from wild and sold locally for medicinal, cosmetic and subsistence use
- No organized marketing channels
- Limited market information

Prioritization of Selected Potential APVCs

APVC Priority Setting Process

- Listing of all crops
- Grouping according to agreed categories consultatively with stakeholders
- Random assignment of stakeholders into groups for each category
- Horticulture commodities subjected to agreed criteria and sub-criteria
- Constraint analysis for each priority commodity
- Potential APVCs were selected based on an agreed criteria

Underutilized crops in the national perspective

Promoting Grain Amaranth Growing as a Poverty Alleviation Strategy

Presented By Patrick Macharia –Economist, Poverty Eradication Commission

The Presidency, Ministry of Devolution and Planning Poverty Eradication Commission

Introduction

The Government of Kenya appointed the Poverty Eradication Commission (PEC) in 1999 to spearhead the implementation of the 15-year National Poverty Eradication Plan (NPEP 1999-

2015) and to coordinate all poverty reduction initiatives. This was as a result of the declarations adopted during the World Summit for Social Development held in Copenhagen in 1995. The summit focused on the eradication of income and human poverty.

The Commission's mandates are:

- Advise Government on policies and strategies for poverty eradication in line with the national strategic direction as outlined in Vision 2030.
- Coordinate, harmonize, monitor and oversee poverty eradication programmes by key players through initiation of poverty forums at various administrative levels.
- Coordinate national and international media campaigns, advocacy and publicity to combat poverty.
- Resource mobilization and management of funds for financing direct poverty reduction initiatives and selection of priority geographical and sector targets.
- Conduct research on best local and international practices for poverty eradication, undertake documentation, pilot in sample districts and disseminate results to other stakeholders.
- Document impact of poverty programmes implemented by the Government, NGOs and other stakeholders.

Brief history of grain amaranth

The grain amaranth crop is a non-grass cereal, classified in a very unique food group called "pseudo cereals." It originated from Mexico, and is a member of the *Amaranthus* family. *Amaranthus* and *Celosia* families belong to the Amaranthaceous group of plants, which are made up of 60 species comprising 6,000 varieties, and categorized into four groups namely Grain, Vegetable, Ornamental and Weed.

In Kenya, the traditional amaranth has been used as a vegetable but was regarded as a food for the poor. It is only recently that it has come to be appreciated as a highly nutritious food product. The crop was gazetted in Kenya in Legal Notice No. 281 of 19th July, 1991.

Promotion of a smallholder commercial farming strategy with grain amaranth.

Since its inception, the Commission has initiated a number of strategies towards poverty reduction including addressing infrastructure poverty through devolved funding that gave birth to the now CDF, advocating access to affordable credit by the poor who have no collateral and which saw the birth of the Youth Fund, Women Fund and now the Table Banking Concept under the Uwezo Fund. One of the strategies the Commission is advocating in its search for more appropriate policies and strategies for poverty eradication, is the promotion of smallholder commercial farming to address food insecurity and poverty.

Since 80% of Kenyans living below the poverty line are smallholder (subsistence) farmers, the smallholder commercial farming strategy entails identifying early maturing high value crops with a ready and reliable market which the smallholder farmers can grow individually and sell collectively so as to obtain commercially viable quantities.

The Commission identified vanilla, sunflower, cotton, mango and grain amaranth crops for trialling and piloting the strategy. Vanilla was to be piloted in Malindi and Migori, cotton and mango in Lamu, and grain amaranth in some 33 poverty-stricken districts where traditional crops have failed due to climatic changes. However, due to financial difficulties that PEC has been having, only the grain amaranth crop project took off.

The project was designed in 2005 and launched the same year in Bondo district. The project has proved successful and has been replicated in more than 30 more districts (i.e. Kisumu West, Murang'a, Kirinyaga, Thika, Maragua, Lamu, Siaya, Taita Taveta, Butere/Mumias, Kajiado, Bungoma, Koibatek, Migori, Nyeri, Isiolo, Kiambu, Teso, Meru, Rachuonyo, West Pokot, Machakos, Kitui, Kibwezi, Mbooni, Kangundo, Uasin Gishu, Nzoia, Nyando and Gem districts). However, more farmers, especially in semi-arid and arid districts, should be assisted to engage in the enterprise. The following special attributes of the grain amaranth justifies the need for the promotion of the crop:

Grain amaranth as food

Grain amaranth has potential for food security and for alleviating poverty. It has the highest nutritional value among cereals. It is therefore a multi-purpose crop combining good nutrition, medicinal properties and, through its commercial potential, could alleviate poverty.

Grain amaranth as source of income

As a result of the early maturity of the grain (75 days), it can be planted several times a year compared to other crops like maize or beans which take a minimum of three months. It is a rapid source of income to farmers.

Other attributes of the grain amaranth

Grain amaranth can tolerate a wide range of soil conditions. The crop can grow on very acidic soils as well as soils with high aluminium; furthermore, it tolerates salinity, and textured and even fine soils. Grain amaranth grows at sea level up to 3200m. The crop uses just 2/3 of the water required by maize or sorghum. It can grow under light rainfall conditions in which other plants will wither.

Furthermore, grain amaranth can tolerate temperatures varying between 16 to 33°C. Grain amaranth can produce an average of 1000 kilograms or even more per acre depending on the area and soil fertility. Grain amaranth has the ability to 'pop' just like maize popcorn. It has a lot of water and oil, and when heated, the water is liberated in vapour form, thus forcing the seed open.

Grain amaranth has the ability to mill just like any other cereal. Amaranth seed is about 74% starch, which is equivalent to that of wheat grain, and comprises 26% content of germ and bran. Amaranth seed contains 8-17% of edible oil - useful for both domestic cooking and

industrial purposes. This oil contains a special component known as squalene. Otherwise, this component is only found in dogfish liver, whale fish liver oil and shark liver oil.

It is said that lysine in grain amaranth is a herbal cure for herpes (a common and painful skin disease in HIV/AIDS victims). Additionally, it is said that several more diseases are prevented, managed or healed by this grain. These diseases include heart diseases, tuberculosis, liver and kidney metabolism, gout, menstrual disorders and child malnutrition diseases such as marasmus and kwashiorkor.

Market

The principle commercial buyers at present are: Amaranth Grain Limited, Super Grain Limited, Incas Amaranth Limited, Kirinyaga Millers, Nubian Food Industries, Anglican Diocese of Mt. Kenya Murang'a, Promote Amaranth Services, Ann Muthoni and Jacob Alemu.

Impacts of the amaranth project

- a) Income-poverty: The commercial farming project aims to create income for farmers through selling their produce. It will therefore create income at community level.
- b) Employment: The members are involved in the day-to-day running of the project. They undertake planting, weeding, hilling, thinning and harvesting, thus creating employment.
- c) Food-poverty: Amaranth leaves are used as vegetables while grains/seeds are milled into flour and used alone or blended with other flours to prepare various dishes. Grain amaranth can also be 'popped'.

Challenges of the amaranth project

Despite the early maturing period and quick returns, few farmers have started growing the crop. Various reasons include lack of information on proper management of the crop, lack of market, and exploitation by middlemen and processors.

In order to address poverty and the above concerns, the Poverty Eradication Commission has made arrangements to enhance the promotion of farming of amaranth as a Rapid Result Initiative. The activities undertaken are on the farm with ASK demonstrations, media publicity and indentifying marketing linkages for buying and selling.

Recommendations and the way forward

Advocacy and publicity - It has been observed that many poor people are not aware of the existence of amaranth and its products and it is recommended that there should be strong advocacy and publicity of the cereal and its products using public *barazas*, through government media and posters and other stakeholders to create more awareness.

Marketing of the crops - It has been observed that some farmers are not able to sell their crops mainly due to lack of local organized marketing systems and so it is recommended that farmers be assisted to form local marketing organizations to buy crops from farmers and then sell directly to the millers.

Value addition - Promotion of local consumption at farm level by promoting cottage industries.

Pricing structure - Some farmers are reluctant to sell their produce at what they consider to be low prices. Therefore, it is recommended that local market groups carry out studies to determine suitable price levels.

Capacity building of farmers - It is recommended that existing and potential amaranth farmers should be trained in modern farming practices to enable them to acquire the requisite farming skills.

Extension services - It is recommended that the farmers be visited regularly by government extension officers as a follow up of their training, or for supervision and advice.

Provision of loans - It has been noted that one of the factors limiting the growing of amaranth is lack of funds especially for smallholder farmers. It is therefore recommended they be provided with small loans to enable them to purchase basic farming inputs.

Kenya's agricultural sector and its challenges

Kenya's agriculture is considered as one of the economic components of Vision 2030 that is expected to mitigate the challenges of feeding a growing population, to create wealth, to reduce poverty and to mitigate the degradation of natural resources. These challenges can be met only if concerted efforts are made to address the country's vulnerability to climate change and other external shocks, as well as policy and institutional reforms.

Specific areas that must be addressed are those related to:

- The low per-capita income growth – real per-capita income grew by 7.8 per cent in the last 5 years;
- High levels of unemployment which is estimated at 8.6 per cent, having improved from 12.7 per cent in the 2005/6 statistics reports. However Some non-bureau sources put the youth unemployment rate at 25 per cent which suggests almost doubling of the unemployment over the last 8 years
- High levels of poverty: according to the Kenya Economic Report by KIPPRA 2013 – the overall poverty levels increased from 48.8 per cent in 2007 to 50.8 per cent in 2008 before declining marginally to 49.8 per cent in 2012.
- A rapid population growth rate which currently stands at 2.44% with the majority of the population (55.1%) being between the ages of 15-64
- High dependence of the country on rain-fed agriculture and, low unsustainable agricultural productivity.

Neglected crops/ underutilized crops/ traditional high value crops and poverty reduction in general

Neglected and underutilized species (NUS) get very little attention if any from research, economic activities and general policy support. The species are generally associated with traditions and culture and some of them suffer genetic erosion in equal proportions to cultural extinction in the societies where they exist. The need to diversify agriculture to make it more productive is now more urgent than before and all the various options including the role NUS can play in advancing agricultural development beyond the Green Revolution model of improving and raising the yields of staple crops must be explored.

The current realization that neglected crops present tremendous opportunities for fighting poverty, hunger and malnutrition and that they can help make agricultural production systems more resilient to climate change as well as empower indigenous communities, particularly women and reaffirm their identity, is welcomed. This project on Bambara groundnut and amaranth, coordinated by Biodiversity International and the International Foundation for Science among other development partners should therefore be explored to its conclusion through strong collaboration and linkages among stakeholders.

Bambara groundnut cultivation in Kenya

Bambara groundnut is cultivated in almost all countries south of the Sahara in Africa with most of the cultivation being found in Western Africa. In Kenya, the crop is chiefly grown in the western parts of the country, especially in the western province, a large part of Nyanza Kenya, and to a limited extent, in the coastal provinces.

Research shows that in Kenya the modern agricultural trends encourage mono-cropping or maize intercropped with beans in most smallholder farms. However, maize yields are generally poor (less than 1 t/ha) and farm sizes are decreasing as the population increases. These modern agricultural approaches, which discourage farmers from growing their indigenous crops and cultivars, tend to increase food insecurity.

Bambara groundnut, like other NUS crops, is planted on very small land areas of about 0.21 ha on average and in most cases as a minor activity. This is because the crop has no attached serious commercial value in most areas where it is grown and so is instead used as a subsistence crop.

This situation is worsened by the increasing pressure on both wild habitats and agricultural land, due to demographic and socioeconomic changes that is causing the ecological niches of many indigenous crops to disappear through rapid genetic erosion.

There is a need to understand that the crop has a very high potential for food security since it is drought-tolerant, has a high nutritional value (seeds of the nut contain on average 63% carbohydrate, 19% and 6.5% oil and the gross energy value being greater than that of other common pulses, such as cowpea, lentil and pigeon pea) and also does well in low soil fertility conditions. Research has also shown that the crop has weed-suppressing characteristics especially against striga which is very common in western Kenya.

These attributes give the crop an advantage in Africa and specifically Kenya where 84 per cent of the total land mass of the country is arid or semi-arid and where soil fertility and water availability are major problems. Yet, Bambara remains largely under exploited.

The National Gene Bank of Kenya (GBK), established in 1988 by the Kenyan Government as the national institution for coordination and implementation of all activities concerned with crop plant and forage genetic resources, is currently concentrating on vegetable crops/species widely distributed in Kenya and has not yet considered Bambara nut as important (amaranth has been so considered).

In view of the above, an urgent need to safeguard the genetic basis of Bambara nut should be recognized in Kenya. A proposed programme for mapping, collecting, characterization and conservation of Bambara nut is therefore highly relevant and implementation needs to be fast tracked by relevant stakeholders as soon as possible.

Market potential - the success stories

Reports from Ghana indicate that the success of value added products of Bambara and amaranth, such as high quality flour, seem to have been inconclusive and not to have resulted in new value chains due to the high cost of products compared to competing ones derived from e.g., cowpea and beans.

A market survey by a European Union project identified insufficient demand in the formal market for Bambara groundnut to justify further expensive development research. However, the conclusions drawn by the only two researchers that have considered the marketing issue,

In Kenya, the nut has been introduced systematically in Mukuruweni District to replace coffee. The success of the Mukuruweni farmers has now attracted new scientific attention to the nut.

The old variety, which the farmers cultivate, yields in the region of 500 kg/ha, but scientists are now developing new varieties, which they say under research conditions yield as much as 4000 kg/ha. The Mukuruweni farmers now are celebrating their commercial success with the nut, but only embraced the crop after everything else failed to make good use of the land.

Initially, a lot went to waste with the market for the commodity still in its infancy but now value has been added through canning and grinding into flour which the farmers package and sell to local hospitals, which value its superior nutritional content compared with conventional flour.

The question of market value of Bambara groundnut in Kenya needs to be examined in more detail to identify the underlying perceived failure factors before any wide-ranging conclusions and recommendations can be made for the crop.

The challenges associated with utilization of Bambara ground nuts

According to research reports, the crop is not widely utilized owing to the following challenges:

1. Agronomy: Bambara is a short-duration crop that grows very close to the ground with the pods underground making it difficult to harvest mechanically compromising the ease of large-scale production.
2. It takes a long time to cook and contains anti-nutritional factors such as tannins and trypsin inhibitors.
3. It has poor milling characteristics because of the hard pod and a seed coat that does not de-hull easily.
4. The long cooking time consumes more fuel and water than might be required for cowpea or *Phaseolus* bean: boiling of fresh beans may take 45-60 minutes, while dried beans may take as much as 3-4 hours.
5. The crop is associated with women: research done in Western Kenya districts of Busia, Mumias and Butere indicated that the crop is grown mainly by women in very small portions of land (about 0.21 ha) owned by their husbands or other male relatives.
6. Low average yields with a mean yield of 63.42 kg/ha: this can be attributed to the low levels of inputs, particularly of pesticides which according to research reports are hardly used at all. Fertilizer is used sparingly and only applied by a few farmers.
7. Lack of appropriate information and awareness creation by experts on agronomic practices, value chains and marketing as well as difficulty of access by farmers to existing information.
8. Unavailability and high cost of planting materials.

9. Low interest by the research system and official policies that give priority to crops that suit (uninformed) urban tastes, or that offer a potential for export.
10. The crop is not even listed as one of the high value traditional crops in operation manuals and other agricultural policy documents.

There has been a high level of genetic as well as cultural erosion owing to its unavailability and a lack of indigenous knowledge pertaining to its use and various methods of preparation. This cultural erosion has increased the genetic erosion of the crop, as it promotes non-usage of the crop by different communities, which cause production to decrease.

The policy interventions

It is important to note that the fight against poverty is a top priority on Kenya's development policy agenda. The government's commitment to the realization of Millennium Development Goals and ensure continuation with the Sustainable Development Goals is clearly spelt out in the policy documents.

Strategies for ensuring the elimination of hunger and poverty, and achievement of inclusive and equitable growth is contained in various policy documents such as the Constitution 2010, Vision 2030 and the Medium-Term Plans for different sectors of the economy.

For example: the Constitution 2010 (Chapter 4: Article 42 -43) spells out the right to health, to be free from hunger and the right to a clean environment to be protected for future generations while The Kenya Vision 2030 has the objective of achieving 'A Globally Competitive and Prosperous Kenya by the year 2030' and agriculture is one of the components of the economic pillar of the Vision to establish enhanced equity and wealth creation opportunities for the poor.

The Sectoral Medium-Term plans such as the Agricultural Sector Development Strategy 2010–2020 (ASDS) the Strategy for Revitalizing Agriculture, the ST&I Sector plan among others all realize the need to:

- End extreme poverty and hunger
- Achieve development and prosperity for all without ruining the environment through human-induced climate change
- Develop value chains
- Develop human resource capacities
- Achieve gender equality and reduce inequalities
- Achieve health and wellbeing at all ages
- Increase agricultural production in an environmentally sustainable manner to achieve food security and rural prosperity.

In these policy scenarios, agriculture is expected to contribute immensely towards national development and especially the contribution of the smallholder communities with high incidence of poverty, unemployed youth, women, and vulnerable groups engaged in different types of agricultural activities in the country.

It is also important to realize that although the policies do not mention anything on NUS directly, it is still necessary to include them as strategies and activities that we can use to achieve the policy statements.

Conclusion

Bambara groundnut is a promising commodity especially for the ASAL areas and needs more publicity, both as a crop and as a food mainly because it is a low-cost and dependable crop that grows in harsh environments where many other crops fail. Its high nutritive value especially to the rural poor is also a very important factor.

Stakeholders need to take advantage of the existing policies especially the devolution as specified in Constitution 2010, Vision 2030, the Medium-Term Plans and other existing agricultural policies to develop the crop's productivity, value addition and value chains at the county/regional levels through county-specific technologies.

Research can be used extensively to resolve most of the challenges listed above. I am challenging the research system to widen the adoption of Bambara groundnut, by improving quality, modern agronomic practices to stabilize yields, modern processing, marketing and the general mode of consumption of the crop through a more proactive research approach.

For example, research can specifically take advantage of biotechnology in order to develop new genotypes that perform well in contrasting soils and atmospheric environments as well as to identify the physiological attributes associated with the ability to produce yields under semi-arid conditions.

The cultural erosion and marketing issues mentioned regarding the challenges above also need to be addressed through training and capacity building which should be made as simple as possible.

Some of the capacity building approaches that can be employed include:

- Development and production of publicity materials to create awareness and mobilize beneficiaries;

- Development of training manuals and standard operating procedures;
- Organizing and conducting participatory workshops and seminars for various stakeholders to equip and refine knowledge and skills;
- Organizing and conducting field demonstrations to impart knowledge and provide experiential learning;
- Imparting knowledge to change attitudes and behaviour on socio-cultural, gender and environmental issues;
- Organize for support on bulk value addition and marketing of the products through farmer groups;
- Train the women who are involved in the crop production value chain to develop skills in production and encourage them to set up value chains. This will increase production and profitability simultaneously by minimizing the number of times the product changes hands before arriving at the consumer's table;
- Establish the health and nutrition interfaces of the crop;
- Involve the agro-based private sector comprising both profit-driven and not-for-profit (civil society) as the non-state actors.

The agriculture stakeholders should take advantage of the devolved system under the Constitution of Kenya 2010 to develop agriculture at the county level. County governments can leverage public-private partnerships (PPPs) to enhance agricultural production and productivity. Potential areas for application of PPPs include cold-chain infrastructure; use of ICT in collecting, processing and disseminating information; development of cottage industries; and skills development. Development of inter-county markets also offers opportunities for increasing access to markets.

Perspectives from the local level

Contribution of grain amaranth to poverty reduction in Siaya County

Introduction

According to 2004 Government statistics, 80% of those living below the poverty line (less than one dollar a day) were smallholder farmers. The Poverty Eradication Commission (PEC) therefore decided that targeting them with specific poverty reduction initiatives would have a huge impact on the war against poverty since smallholder farmers form a high proportion of the poor. Accordingly, PEC crafted an initiative which would involve identifying early maturing crops with ready and reliable markets for these smallholder farmers through growing individually but selling together so as to obtain commercially viable quantities and through increased negotiating power, better prices. These crops include grain amaranth.

But the PEC was not allocated any development grant in the 2005/2006 financial year which could enable it to pilot the initiative. However it was able to team up with an informal group in Bondo Sub County comprising 38 farmers led by Patrick Otieno Odera and Rev. Washington Omondi Genga, The District Agricultural office led by Jacob Mugambi and SAGA, a micro-finance non-governmental organization led by Lucy Ngoe.

These farmers were trained by a team led by Dr. Davidson Mwangi, a pioneer amaranth researcher and promoter. The team also included Beatrice Muraguri and Cyrus Wang'ombe. Dr. Mwangi supplied the farmers with seed which he had produced. The training was conducted on-farm and as field days. The pilot had two main aims: introduction of grain amaranth farming in Bondo and provision of market outlets for the crop.

Introducing the crop

Introducing grain amaranth farming in Bondo was a success. The 38 farmers each planted three quarters of an acre on average (totaling 27 ½ acres). Despite extreme drought in the area that year (2005), the yield per acre was 422 kg, giving a total of about 12 tons. In the following planting period in 2006, the number of farmers increased to 525, planting an average of 1 acre each, which yielded about 220 tons.

The project had a positive impact on poverty alleviation in the district. For example 38 farmers earned Ksh. 360,000 in total (Ksh. 30 per kg thus each farmer increasing his/her income by about Ksh. 9,000 from the 45-75 day planting period). These farmers also employed paid labourers who also increase their income. Their number was 144, each earning Ksh. 70 per day for 12 days, totaling Ksh. 95,760 for all the workers. It can be seen therefore that grain amaranth farming can contribute potentially very positively in the war against poverty at present there are caveats (see next paragraph)..

Unfortunately, PEC did not adequately consider marketing in its planning of the pilot. They ignored emphasis on marketing both in policy and budgetary provision. Perhaps they thought that private stakeholders would undertake the necessary promotion of the grain. Consequently, the 220 tones from the 525 farmers cited above took one year and a half to be cleared, as the then market was too small to clear them sooner. This problem impacted negatively on the farmers; ending up in lowering of morale and drastic reduction in their number to less than 100, and producing only 20 tonnes annually.

To address the challenge, the remaining farmers formed a self-help group known as **Bondo Amaranth Farmers and Marketing Group (BAFAM)** in 2010 to put in place strategies for increasing local consumption and hence local market for the grain. It was envisaged that the local market would form up to 95% of the total grain amaranth market in the area.

The main strategy devised by BAFAM involved demonstrating new recipes which incorporated grain amaranth to enhance nutritional value and taste of traditional dishes. It conducted demonstration in various forums including market places and farmer's field days. The number of farmers began to rise again, and by 2012 the membership had risen to 47 and managing to produce 14.1 tons that year, part of which they consumed locally and the rest they sold in bulk to traders in Nairobi.

As the membership and activities of BAFAM grew, it became necessary to convert it into a co-operative society covering the whole of Siaya County (**Bafam Amaranth Farmers Co-operative Society Ltd**). The society wishes to continue with and expand the demonstration strategy and is actively looking for the necessary financial support, especially from governmental and other public institutions. A private enterprise might not consider it a profitable business to financially support such a promotional drive because of the likelihood of being undercut by competitors who will not have incurred the heavy cost of supporting the promotion.

However, the private sector has undertaken significant marketing and, standing out in this regard was **ICAS**. The only concern was that the private sector mainly dealt with established supermarkets and similar outlets which were largely frequented only by more affluent people who could afford to pay Ksh. 200 per kg of grain amaranth unga. This excluded the middle- and low-income groups which constitute about 90% of the potential market (kadogo economy).

The way forward

- a) It is important for us to move away from uncertified seed. The universities and other research institutions should undertake seed breeding, with Bafam handling seed bulking. This would ensure a constant and timely supply of KEPHIS certified grain amaranth seed.
- b) The universities and the other research institutions should also conduct soil analysis, to help ensure that only appropriate fertilizers are used
- c) Support is needed for Bafam to carry out intensive and extensive promotion of grain amaranth. The pilot stage would require Ksh. 17.1 million

Conclusion

It has been shown that adoption of grain amaranth as a smallholder crop, if given adequate attention, has a potentially huge impact on the war against poverty, not only in Siaya but in Kenya as a whole.

Bambara nut, Kakamega County

Bertha Wachuye- CDA Kakamega County

Situation

Area under crop – 3ha

Sub counties with the crop – Kakamega South, North, Lewinal, Mumias, Navakholo but suitable to all

- Mainly a second season crop
- Grown on very small uneconomic plots
- Not a major food item in the farmers meals
- Considered poor – crop only for occasions
- High market prices compared to other crops e.g. 2kg tin 300-800 while beans 50 – 200 and maize 50 – 100
- Poor production i.e. yields
- High pest and disease incidences lowering yields

Way forward

- Intensive research – planting materials, pests & disease
- Intensive extension – promotion of production, awareness, sensitization
- More demonstration on utilization of the crop

Brief report on amaranth and Bambara nuts - in Kilifi County

(By Ngugi Ticha & Margaret Jefwa)

Amaranthus (Amaranthus SPP)

Introduction

Amaranthus is also known as African spinach. *Amaranthus* is grown for the domestic market. The major counties in the coastal region producing *Amaranthus* are Kilifi and Mombasa. The major constraint to increased production of *Amaranthus* is the unavailability of quality seeds. However, the crop has potential for increased production due to low cost of inputs and it is well adapted to a wide range of agro-ecological zones.

Production in Kilifi County in 2013 was 1395.6 tonnes from 176 ha

Gross Margins for *Amaranthus* Leaves

i. Grown Under Basin Irrigation

Assumptions:

- Area cultivated is 1 acre
- Irrigation water is pumped from a bore-hole

- Harvesting is done almost all year round
- Harvesting is done four times monthly yielding 600 bunches per harvest
- A bunch of vegetables weighs approximately 1 kg

Item	Unit	Unit cost (Ksh.)	Quantity	Total cost (Ksh.)
Yields (Revenue)	kg	15	24,000	360,000
Variable costs				
Seed	kg	900	1	900
Bush clearing	Man-day	1,500	1	1,500
Ploughing	Man-day	2,250	1	2,250
Harrowing	Man-day	2,250	1	2,250
Manure	Lorry(7 tons)	3,300	2	6,600
Planting	Man-day	2,000	1	2,000
Fertilizer	70 kg bag	4,000	1	4,000
Water	month	3,000	10	30,000
Weeding	Man-day	1,500	10	15,000
Pesticides	Package	10,800	1	10,800
Labour for spraying	Man-day	250	20	5,000
Harvesting	Man-day	250	80	20,000
Total Variable Cost				100,300
Average Cost per Kg				4
Profit per kg of Amaranthus	Kshs.			11
Gross profit				259,700

ii. Grown Under Drip Irrigation System

Assumptions:

- Area cultivated is 1 acre
- Irrigation water is pumped from a borehole
- Harvesting is done 10 months in a year
- Harvesting is done 4 times monthly getting 600 bunches per harvest
- A bunch of vegetables weighs approx 1 kg

Item	Unit	Unit cost (Kshs.)	Qty	Total cost (Kshs.)
Yields (Revenue)	kg	15	64,000	960,000
Variable costs				0
Seed	kg	900	1	900

Bush clearing	Man-day	1500	1	1,500
Ploughing	Man-day	2250	1	2,250
Harrowing	Man-day	2250	1	2,250
Manure	7 ton lorry	3300	2	6,600
Planting	Man-day	2000	1	2,000
Fertilizer	70 kg bag	4000	1	4,000
Water	month	1650	10	16,500
Weeding	Man-day	1300	10	13,000
Pesticides	Package	8500	1	8,500
Labour for spraying	Man-day	250	20	5,000
Harvesting	Man-day	250	80	20,000
Total Variable Cost				82,500
Average Cost per Kg				1
Profit per kg of Amaranthus	Kshs.			14
Gross Profit				877,500

NB:

A higher profit margin when using Drip System can be attributed to:

- Reduced Irrigation Water and hence Water Bill
- Uniform Water application leading to high yields (leaves)
- Pests/Diseases control and hence lower Pesticides Bill

Advantages of drip system over other application methods

- More uniform and higher crop yields
- More efficient use of available water
- Reduced labour costs
- Low energy requirements
- Reduced salinity hazards

Amaranthus Value Chain analysis was presented

Bambara Nuts Production

These nuts are grown on a very small scale in Kilifi and Malindi sub counties. Very little effort has been made to promote the crop.

The major challenge is obtaining certified seeds

Production in Kilifi County in 2013 was 3.3 tons with an area of 4.8 ha under Bambara.

Opportunities available in Kilifi and Malindi:

- Farmers are organized
- Contract farming though attempts to introduce it in Malindi did not work
- Use of ICT e.g. passion fruits marketing is done by phone using SMS

- Providing nutritional Bambara supplements to children in schools

Question: Why do the aged refuse to release land to the younger generation?

Answer: Younger people dispose of land quickly.

Additional comments on the issue included: The aged farmers to release the management and not the title to the younger generation. Making farming more interesting e.g. introduction of small and exciting, machineries. Introduce agriculture to schools.

Question: Gross margin for amaranth production was very high in Kilifi and very low in western provinces? Why?

Answer: Many reasons e.g. in western the crop was intercropped, in Kilifi it was pure stand, in Kilifi it was under irrigation, in western it was rainfed.

Question: How can we facilitate innovation along the Value Chains?

Answer: Improving flavour, shape, colour
Increased market segments
Involve the consumers

Question: Ticha asked on how to fill in the template???

Answer: Use the guideline and templates given but adjust where necessary

Question: Where should adaptive research and research and development be in the Value Chain?

Answer: It is a cross-cutting issue

Value chain analysis of Africa Leafy Vegetables in Kenya: A case of Busia County

Ndungu J¹, Wasike V², Kirigua V², and Tumwet T³

¹ Kenya Agricultural research Institute Thika

² Kenya Agricultural research Institute Headquarters

³ Ministry of Agriculture Nairobi

Introduction

Indigenous leafy vegetables (ALVs) are an integral part of the agricultural system in Africa. Unfortunately, most African countries' governments have not accorded priority to them. About

200 indigenous plant species are used as leafy vegetables in Kenya. Only a few have been fully domesticated, more are semi-domesticated while the majority is wild. The species used and the wealth of indigenous knowledge vary with the culture, economic pursuits, and species availability. Leafy and fruit vegetables form a significant part of the traditional diets of agricultural communities. Their consumption is, however, generally less significant among many communities. In western Kenya, especially Busia county, ALVs offer a significant opportunity for poor people to earn a living because it little capital investment is needed. This can also help to provide employment opportunities for those outside the formal sector.

In addition to serving as food, some ALVs are sources of traditional medicine. They are also adapted to many tropical conditions, pests and diseases. Therefore they can be a source of genes for genetic improvement of cultivated species especially in the area of pest and disease resistance. Despite this, ALVS are being neglected by researchers and the policy makers.

Objectives

- Assess and identify the value chain of the African leafy vegetables in Busia County Kenya.
- To identify actors in the ALVs value chain.
- To share information with stakeholders.

Area of study

The research was carried out in three locations in Busia County - Mundika, Township and Bukalama. It borders Kakamega County to the east, Bungoma County to the north, Lake Victoria and Siaya County to the south and Busia District, Uganda to the west. The county has a total population of 743,946 (2009 census).

Steps in value chain analysis

1. Specify the final product and end market(s).
2. Establish the stages of the chain (specifying the functions performed).
3. Establish the main sequence of operators (micro).
4. Differentiate the chain into channels if appropriate.
5. Map support service providers (meso level).
6. Map value chain enablers (macro level).
7. Prepare thematic detail maps if required.

This research was conducted with the help of a questionnaire. The farmers were gathered in one place in each location where they were divided into three groups. The farmers were then asked to respond to a set of questions and the results were compared.

It can be seen from the results that suga, saka, dodo, kunde, mrenda, mito, nderema and malenge are the most grown ALVs in Busia county. Suga, saka and dodo are the most important in terms of market value, competitive potential, nutritive value and income generation. Busia County depends on ALVs for food, income and even medicine.

Spider plant (*Cleome gynandra*) was the most profitable in Mundika followed by nightshade (*Solanum nigrum*). Amaranth was less profitable. Thirty per cent of the farmers in Mundika sell their vegetables directly from the farm, 25% take them to Mundika market and the remaining 25% take their vegetables to Busia, Korinda, Bumula and Matayos market. Their main mode of transport is motorbike and bicycle.

ALVs are very important in Busia County as it is the backbone of the county. All three locations consider spider plant, night shade and amaranth to be the most important ALVs. ALVs need to be prioritized in the county so as to increase farmers' income thus improving their lifestyle and reducing poverty.

Recommendation

The government and the Ministry of Agriculture should encourage home and village level conservation through establishment and maintenance of 'home' gene banks and retention of traditional practices that encourage genetic diversity by:

- Promoting the utilization and conservation of vegetables through educational programmes for schools and communities.
- increase the ALVs' potential through breeding/selection.
- Increase appreciation through nutritional and agronomic research.

Research priorities in amaranth in Kenya

Presented by: Agnes M. Ndegwa Vegetable Programme Coordinator- KARI-Thika

Indigenous leafy vegetables (ALVs) have been integrated in local communities' culture as food over a long timespan. *Amaranthus* spp is among the most important ALV prioritized by stakeholders during a recent priority setting forum in KARI (2010). Nutritionally superior to exotic vegetables like cabbage and containing higher levels of carotene, vitamin C, protein, iron, calcium, magnesium, fibre and antioxidants, ALVs are a vital component of rural diets - over 40% of all vegetables consumed are ALVs. ALVs are an increasingly attractive food group for upper income groups in the region and gaining importance in urban and peri-urban markets in Kenya. Research interest in ALVs, particularly amaranth, has increased mainly because of their

high nutritional content and potential to meet special nutritional needs of vulnerable groups, including those infected with HIV-AIDS.

Production statistics (Leafy Amaranth): Area: 1,679 ha, Volume: 17,445 MT, Value: KES 524 million (source: HCDA validated data report-2012). Grown in almost all counties in Kenya – Leading producers: Kilifi, Kisii, Murang’a, Lamu.

Production statistics (Grain Amaranth): Area: 682 ha, Volume: 3,068, Value: KES 202 million, (source: HCDA validated data report-2012). Production rising due to promotion, Leading producers: Nyamira, Migori, Busia, Nandi.

Prioritized indigenous vegetables (2010) in order of ranking were amaranth (*Amaranthus* spp.), African nightshade (*Solanum nigrum* complex), stinging nettle (*Urtica massaica*), pumpkin (*Cucurbita pepo*; *C. maxima*), Nderema (*Basella alba*), spider plant (*Cleome gynandra*), Malaba gourd (*Cucumis ficifolius*), Mtsunga (*Launae acornuta*), jute mallow (*Corchorus* spp.) and slender leaf (*Crotalaria* spp.)

On-going research activities

1. Amaranth multiplication at KARI-Kiboko- (KARI Katumani activity)
2. Evaluation of elite lines of vegetable amaranth at KARI- Kiboko
3. Grain amaranth germplasm evaluation at Katumani
4. Farmer’s grain amaranth field in Mbuvo, Makueni County
5. Amaranth women’s farmer group meeting with researchers
6. Greenhouse solar drier donated by USAID to Utithini women’s group
7. Training on value addition
8. Drying of vegetables by Uthitini women’s group in Mwala

Opportunities for research on neglected and underutilized species

R. A. Hall *The International Foundation for Science*

Basic Principles of formulating a good scientific research proposal

- Why do research on NUS?
- IFS receives a number of applications which justify their proposal thus: “*Because it is an under-utilised crop*”. This is not a reason in itself to do such research.

Project justification/problem statement

- Is there a problem?
- Is there a need?
- Is there an opportunity?

- Questions which can be answered through research

Why do research on NUS?

- Is there a problem or need?
 - Nutritional?
 - Climate-related?
 - Processing problem?
 - Post-harvest problem?

Project justification/problem statement

- Must include specifics: Facts, figures, statistics, references
- If we have identified an opportunity or need which can be satisfied by NUS, then there may be many researchable questions

When conceptualising research on NUS....

- Must ascertain what farmers are prepared, processors to do, what consumers want etc.....
- Therefore stakeholder consultation is essential during research project conceptualisation

Developing Research Proposals

- Read the Guidelines!!!
- It is a technique - like riding a bike.
- And the most important thing is..... Get the reader on your side.
 - Writing a good proposal is not just a scientific exercise, it is a psychological exercise also
 - Proposal evaluators are, like scientists everywhere, extremely busy people
 - They are human and despite their best endeavours may, knowingly or otherwise let subjectivity creep in....

Bambara groundnut research: current status and into the future

Patrick O'Reilly

Crops for the Future – Malaysia: world's first research centre dedicated to underutilized crops:

- Food, feed, health, nutrition, energy, biomaterials
- Product marketing opportunities
- Capacity-building

Bambara Groundnut – Exemplar Crop

- Most recent of a series of research programmes on the Bambara ground nut – Project builds on 30 years of research
- An important legume in parts of sub-Saharan Africa
- A number of attributes associated with the crop make it a good candidate for development

Breeding Programme

- Currently multiplying 400-500 pure lines
- Partners in six centres to screen within local agro-ecological zones
- The outcome will be a core set of between 30-40 lines
- Main targeted traits for breeding are photoperiod insensitivity for pod-set and pod-filling, cooking characteristics, nutritional content and traits related to new food product
- Breeding a MAGIC population (which maximises genetic variation) will begin in July 2014; n>1000 lines.
- Aim is to select from within this population for lines adapted to different environments.

Experiences with medicinal plants from underutilized crops

Dr. Jennifer Orwa (*Kenya Medical Research Institute, KEMRI*)

Medicinal value of Bambara nuts not availed since the research is not yet published but the following was noted:

KEMRI conducted a PRA with healers in western where it was reported that Bambara nuts have medicinal value

- Treatment of cancer in Kenya by traditional healers
- Addition of sexual vigour in men as it increases prostrate fluids secretion

KEMRI currently validating these claims by importing cancer cells of different types and doing lab tests.

Results not yet published

Integration of underutilized crops into tertiary education curricula: the case for ANAFE

Prof. James B. Kung'u (PhD) Dean, School of Environmental Studies, Kenyatta University and Chair, ANAFE-ECARAFT

Agriculture is the most important sector for poverty reduction and economy growth

African Network for Agriculture, Agro forestry & Natural Resource Education (ANAFE) was launched in 1993.

In 2003, ANAFE's Mandate was expanded to encompass reforming education and training programmes in Agriculture, including forestry, agroforestry, and natural resources to make it more responsive to development needs.

Registered as an international Network 2007.

Membership

Created in 1993 by 29 TAE institutions with the assistance of the World Agroforestry Centre (ICRAF)

Currently in 2013, the network is made up of 136 Agricultural Colleges and Universities in 35 African countries

ANAFE Aims to:

1. Strengthen the content and delivery of tertiary education in Agroforestry, Agriculture and Natural Resource Sciences
2. Establish and nurture linkages among education, research and extension institutions to maintain the relevance of education programmes
3. Build a culture of sharing information and expertise among educational and training institutions in Africa and promote links with global partners.

Situation analysis of value chains of Bambara groundnut and amaranth in Kenya

Overview of value chain upgrading strategies and introduction to group work

Per Rudebjer, Bioversity International

One expected result of the 3-year EU-ACP project that financed this stakeholder workshop is to develop National action plans for value chain upgrading of Bambara nut and amaranth. These National Action Plans are being developed in the three project countries: Benin, Kenya and Zimbabwe.

The approach for value chain upgrading builds on experience from Bioversity International's work on a range of neglected and underutilized species in Africa, Asia and Latin America (Figure 1).

As an introduction to the group work, Mr Rudebjer gave a short presentation that covered: what a value chain is; why we would want to upgrade it; what do we need to do in order to upgrade it and; what the characteristics of a successful upgrading strategy are.

What is a Value Chain? It is a full range of activities required to bring farmed produce through to consumers, such as physical transformation and inputs of producer services. It also involves credit, seed, feed, production, processing, storage, marketing, distribution, consumption. A value chain comprises several nodes. At each node a product is exchanged or transformed and value added: Inputs and services; Production; Transport and processing; Marketing, and; Consumption.

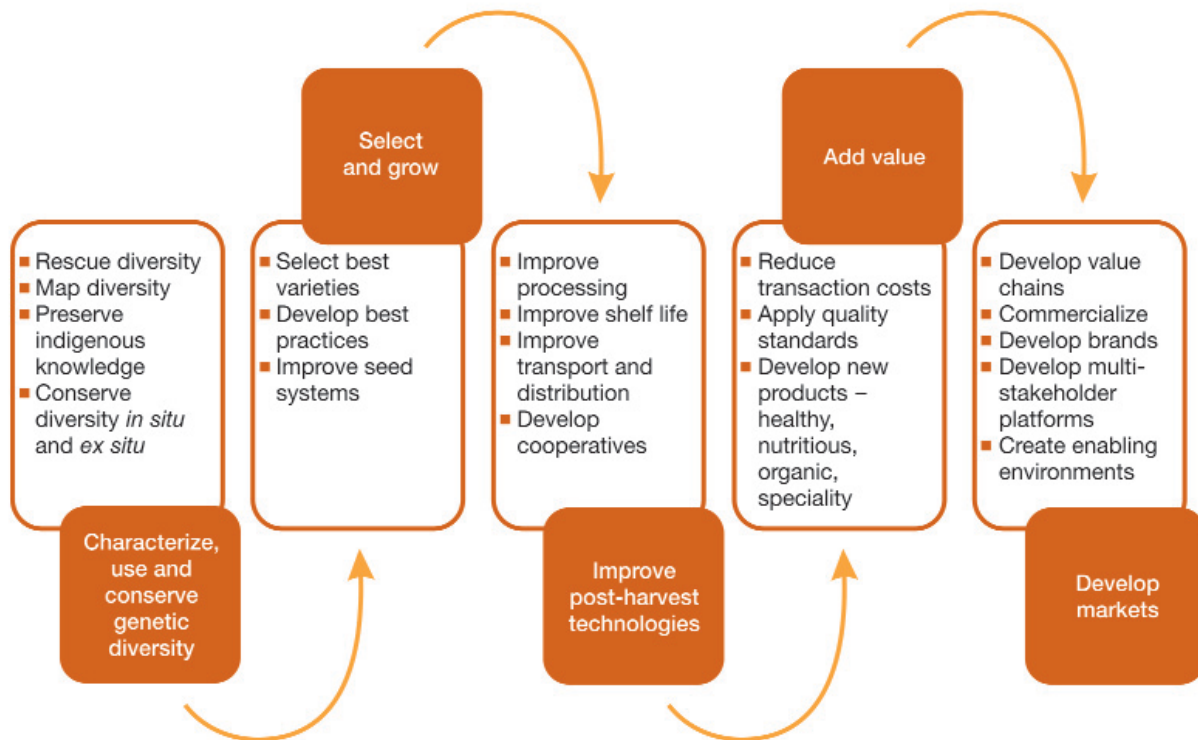


Figure 1. Value chain upgrading, adapted from Padulosi et al., 2013

A value chain approach has three main features:

- Coordination of all links in the value chain
- Added value at each stage
- A market-led approach, responding to local, national and international consumer demands

Coordination and stakeholder interaction is also a key feature. Different value chain actors and service providers have to meet in 'Innovation platforms', with the aim that the chain as a whole is upgraded, for all actors to benefit. This in turn would increase the competitiveness of a value chain by moving it in a new direction, for example towards new markets, finding a new segment in existing markets, or increasing the efficiency in the value chain.

For NUS crops, there is also an ambition to increase the participation of the rural poor in the value chain. It is important to point out that a value chain is not a charity, but a competitive environment. However, government can enhance opportunities for rural poor to participate by improving services and infrastructure, education, providing better organization (e.g. contract farming).

What does it take to develop a successful upgrading strategy for the target crops of this project, Bambara groundnut and amaranth? A strategy should be:

- Based on a sound analysis of the existing value chain
- Pragmatic
- Affordable
- Attainable
- Measurable

In order to move towards a national strategy for Bambara nut and amaranth value chains in Kenya, we decided to work in two groups, one for each crop. The session was then organized as follows:

1. Analysis of constraints and solutions (group work)
2. Identification of opportunities and actions needed (group work)
3. Plenary discussion: conclusions and recommendations
4. Discussion on how to continue working together

To structure the analysis, the groups assessed six dimensions of the value chain:

1. Market access/Consumer demand
2. Input supply: seeds, fertilizers, pesticides, etc
3. Agronomy/Technological/Product development
4. Organisation and management
5. Regulatory (policy)
6. Finance

The following section presents the results of the two groups' work.

Constraints in value chains and possible solutions

Amaranth: constraints and solutions

List of the Amaranth Group Members

- Alex Machocho
- Beatrice Muraguri
- Agnes M Ndegwa
- Patrick Macharia
- Joseph M. Ndambuki
- Cyrus Wangombe
- Joseph Asaua
- Ann Muli
- Patrick Odera
- Margaret Jefwa

Amaranth: constraints and solutions

Topic	Value chain constraint	Solutions
1. Market access/consumer demand	<ul style="list-style-type: none"> • Nutritional and medicinal value not widely known • Low volumes • Sporadic productions • High cost of final product • Consumer preference for the leaves • Grain of low quality • Exploitation by middle men • Transport 	<ul style="list-style-type: none"> • Research & dissemination • Training on agronomic practices • Production subsidy • Market-driven varieties • Provide quality seeds • Form marketing groups • Construction of better infrastructure
2. Input supply: seeds, fertilizers, pesticides, etc	<ul style="list-style-type: none"> • Lack of certified seeds (uncontrolled recycling) • Lack of awareness on usage of fertilizers /pesticides (amount, timing, supplies)/ no wide spectrum • High cost of inputs • Lack of awareness of status soil fertility 	<ul style="list-style-type: none"> • Breeding and bulking of better varieties • Training on usage of inputs/use of IPM • Procurement as a group • Soil analysis
3. Agronomy/technology/ product development	<ul style="list-style-type: none"> • Poor agronomic practices • Lack of accurate information by the extension providers • Over dependence on rain-fed agriculture • Lack of labour 	<ul style="list-style-type: none"> • Training • Retooling of EW • Irrigation • Mechanization • Training

	<ul style="list-style-type: none"> • Post-harvest handling /losses • Crude threshing methods • Lack of handling equipment/materials • Lack of capacity in product development and analysis • Not a priority crop in research • No product for low-end segment 	<ul style="list-style-type: none"> • Mechanization • Driers • Training /support • More focus in research & disseminating findings • Reduce overheads
4. Organization/management	<ul style="list-style-type: none"> • Lack of/poor coordination among groups • Lack of collection centres • Lack of management skills • Some farmers are over ambitious • Expectation to sell at high prices • Agribusiness skills lacking 	<ul style="list-style-type: none"> • Capacity building • Form groups • Training /capacity building • Awareness on reality • Training on agribusiness skills
5. Regulatory/policy	<ul style="list-style-type: none"> • Lack of adequate policies • Lack of implementation of policies • INADEQUATE funding in agricultural sector 	<ul style="list-style-type: none"> • Develop and implement policies • Alternative source of funding
6. Finance	<ul style="list-style-type: none"> • Lack of funding for • Research and • Dissemination of findings • Poor access to loans by small scale farmers • POOR access for loans to processors due to lack of collateral • High interest rates on loans • Lack of gender inclusiveness in decision making 	<ul style="list-style-type: none"> • Sponsorship • Dissemination of findings • Form groups to access loans • Both genders to be included in training

Bambara Groundnut: constraints and solutions

List of the Bambara groundnut group members:

- Joyce Ondicho
- Jennifer Orwa
- Rose Nyanga
- Isack Misiko
- Bertha Wachiye
- Damaris Mwangi
- Ndungu John
- Victor Wasike
- Kiarie Njoroge
- A. Shikuku
- Ngugi Ticha

Bambara groundnut: constraints and solutions

Topic	Value chain constraint	Solutions
1. Market access/consumer demand	<ul style="list-style-type: none"> • Insufficient & non consistent supply 	<ul style="list-style-type: none"> • Enhance production & productivity (HYV, increase acreage etc) • Intensify/innovative extension
	<ul style="list-style-type: none"> • Limited knowledge on the product & on its utilization 	<ul style="list-style-type: none"> • Enhance Capacity building of the value chain actors
	<ul style="list-style-type: none"> • Product available only in selected rural market centres 	<ul style="list-style-type: none"> • Streamline marketing channels • Enhance market information systems
	<ul style="list-style-type: none"> • Quality standards not in place 	<ul style="list-style-type: none"> • Develop standards
2. Input supply: seeds, fertilizers, pesticides, etc	<ul style="list-style-type: none"> • Limited information on landraces available • Low quality and quantity of planting material/seed 	<ul style="list-style-type: none"> • Characterization of available landraces • Develop certified seed • Seed bulking with selected, trained growers
	<ul style="list-style-type: none"> • Limited access to agro-inputs 	<ul style="list-style-type: none"> • Introduce subsidy programmes, improve infrastructures etc.

3. Agronomy/technology/ product development	<ul style="list-style-type: none"> No agronomic package available: fertilizer regime, planting calendar, seed rate, crop protection, post harvest handling, etc 	<ul style="list-style-type: none"> Develop suitable agronomic package (ITK considered) Capacity building & awareness creation
	<ul style="list-style-type: none"> Rudimentary Processing technologies 	<ul style="list-style-type: none"> Product development Enhance cottage industries
3. Agronomy/technology/ product development	<ul style="list-style-type: none"> Limited end products 	<ul style="list-style-type: none"> Research on product development for product diversification Dissemination on product diversification
	<ul style="list-style-type: none"> Lack of/ poor packaging technologies 	<ul style="list-style-type: none"> Develop/design packages for different markets
4. Organization/ management	<ul style="list-style-type: none"> Farmers not organized in formal/commercial groups Disjointed/uncoordinated VC actors 	<ul style="list-style-type: none"> Adopt commercial village model/innovation platforms Form/strengthen farmer groups into commercial entities Enhance public-private partnerships
5. Regulatory/policy	<ul style="list-style-type: none"> Low emphasis on Bambara in the nuts policy 	<ul style="list-style-type: none"> Awareness creation Sensitize & seek collaborative activities with county governments on NUS Advocacy for greater emphasis of Bambara in the policy
5. Regulatory/policy	<ul style="list-style-type: none"> No standards for Bambara products 	<ul style="list-style-type: none"> Create awareness among the chain actors & engage regulators e.g KeBS
	<ul style="list-style-type: none"> Seed- No regulation in place 	<ul style="list-style-type: none"> Advocacy on Bambara
6. Finance	<ul style="list-style-type: none"> Lack of friendly credit package for Bambara farmers 	<ul style="list-style-type: none"> Partner with selected credit institutions & develop a credit package for Bambara production

Opportunities for upgrading, and suggested actions

Amaranth: opportunities and actions

Topic	Value chain constraint	Solutions	Opportunities	Action
1. Market access/ consumer demand	<ul style="list-style-type: none"> Nutritional and medicinal value not well known Low volumes Sporadic productions High cost of final product Consumer preference for the leaves Grain of low quality Exploitation by middle men Transport 	<ul style="list-style-type: none"> Research & dissemination Training on agronomic practices Production subsidy Market driven varieties Provide quality seeds Form marketing groups Construction of better infrastructure 	<ul style="list-style-type: none"> Untapped market Income generation Creation of employment Food and nutritional security 	<ul style="list-style-type: none"> Marketing /promotions/ exhibitions Increased output Develop cottage industries Improved storage Create awareness on the nutritional values and utilization
2. Input supply: seeds, fertilizers, pesticides, etc	<ul style="list-style-type: none"> Lack of certified seeds (uncontrolled recycling) Lack of awareness on usage of fertilizers /pesticides (amount, timing, supplies)/ no wide spectrum High cost of inputs Lack of awareness of status soil fertility 	<ul style="list-style-type: none"> Breeding and bulking of Better varieties Training on usage of inputs Procurement as a group Soil analysis 	<ul style="list-style-type: none"> Production of organic fertilizer/ pesticides Seed breeding and bulking 	<ul style="list-style-type: none"> Farmers trained to produce organic fertilizer /pesticides using locally available materials Research institutions to undertake breeding Farmers and seed companies

<p>3. Agronomy/technology/product development</p>	<ul style="list-style-type: none"> • Poor agronomic practices • Lack of accurate information by the extension providers • Over dependence on rain-fed agriculture • Lack of labour • Post-harvest handling /losses • Crude threshing methods • Lack of handling equipments/materials • Lack of capacity in product development and analysis • Not a priority crop in research • No product for low-end segment 	<ul style="list-style-type: none"> • Training • Retooling of EW • Irrigation • Mechanization • Training • Mechanization • Driers • Training /support • More focus in research & disseminating findings • Reduce overheads 	<ul style="list-style-type: none"> • Research in agronomy and IPM • Mechanized farming • New products development 	<ul style="list-style-type: none"> • Research institutions to develop better practices • Develop tool for planting, harvesting , threshing, cleaning and drying • Developing animal feeds and recipes
<p>4. Organization/management</p>	<ul style="list-style-type: none"> • Lack of/poor coordination among groups • Lack of collection centres • Lack of management skills • Some farmers are over ambitious • Expectation to sell at high prices • Agribusiness skills lacking 	<ul style="list-style-type: none"> • Capacity building • Form groups • Training /capacity building • Awareness on reality • Training on agribusiness skills 	<ul style="list-style-type: none"> • Better group organization/management 	<ul style="list-style-type: none"> • Training of groups/ cooperatives

5. Regulatory/ policy	<ul style="list-style-type: none"> • Lack of adequate policies • Lack of implementation of policies • Inadequate funding in agricultural sector 	<ul style="list-style-type: none"> • Develop and implement policies • Alternative source of funding 	<ul style="list-style-type: none"> • Development of better policies • Implementation of policies 	<ul style="list-style-type: none"> • Policy formulation and briefs • Source funds through public-private partnerships
6. Finance	<ul style="list-style-type: none"> • Lack of funding for research and dissemination of findings • Poor access to loans by small scale farmers • Poor access to loans by processors due to lack of safe collateral • High interest rates on loans • Lack of gender inclusiveness in decision making 	<ul style="list-style-type: none"> • Sponsorship • Dissemination of findings • Form groups to access loans • Both gender to be included in training 	<ul style="list-style-type: none"> • Banking services and availability of pro-poor funds/grants 	<ul style="list-style-type: none"> • Sourcing of affordable credit/grants providers

Bambara groundnut: opportunities and interventions

Topic	Value chain constraint	Opportunity	Solutions	Action
1. Market access/consumer demand	<ul style="list-style-type: none"> Insufficient & inconsistent supply 	<ul style="list-style-type: none"> Demand for Bambara Products exist 	<ul style="list-style-type: none"> Enhance production & productivity (HYV, increase acreage etc) Intensify/innovative extension 	<ul style="list-style-type: none"> Sensitize farmers on BB growing(2) Link farmers to market(3) Market survey(dd & ss, prices, seasons, sources, outlets etc) (1)
	<ul style="list-style-type: none"> Limited knowledge on the product & on its utilization 	<ul style="list-style-type: none"> Willingness of Technology uptake high ICT available 	<ul style="list-style-type: none"> Enhance Capacity building of the VC actors 	<ul style="list-style-type: none"> Develop curriculum for various VC actors (2) Awareness creation (1) Trainings (3) Develop ICT platforms(4)
	<ul style="list-style-type: none"> Product available only in selected rural market centres 	<ul style="list-style-type: none"> Existence of other rural/urban markets & mkt segments/channels 	<ul style="list-style-type: none"> Streamline marketing channels Enhance market information systems 	<ul style="list-style-type: none"> Market survey to assess size, type & location (mapping) (1) Awareness creation on nutritional/health benefits(2)
	<ul style="list-style-type: none"> Quality standards not in place 	<ul style="list-style-type: none"> Institutional capacity exist (e.g KeBs, Kephis,PPB) 	<ul style="list-style-type: none"> Develop standards 	<ul style="list-style-type: none"> Convene value chain forums (1) Create linkages & networks(2)
2. Input supply: seeds, fertilizers, pesticides, etc	<ul style="list-style-type: none"> Limited information on landraces available. Low quality/qty planting material/seed 	<ul style="list-style-type: none"> dd for quality seeds exist Stockist networks exist Strong seed supply systems exist Research capacity exist 	<ul style="list-style-type: none"> Characterization of available landraces Develop certified seed Seed bulking with selected, trained growers 	<ul style="list-style-type: none"> Develop improved varieties for diff AEZs (2) Seed bulking with growers (3) entice seed companies (4) develop competitive research protocols (1)

	<ul style="list-style-type: none"> Limited access to agro-inputs 	<ul style="list-style-type: none"> Devolved government structures 	<ul style="list-style-type: none"> Introduce subsidy programmes, improve infrastructure etc 	<ul style="list-style-type: none"> Sensitize county government on Bambara (1)
Agronomy/ technology/ product development	<ul style="list-style-type: none"> No agronomic package available fertilizer regime, planting calendar, seed rate, crop protection, post harvest handling, etc 	<ul style="list-style-type: none"> Robust research and extension systems in place & well distributed 	<ul style="list-style-type: none"> Develop suitable agronomic package (ITK considered) Capacity building & awareness creation 	<ul style="list-style-type: none"> Conduct adaptive research & recommend (1) Develop training & extn manuals (3) Review & include NUS in school curriculum (4) Package & disseminate technologies (2)
	<ul style="list-style-type: none"> Rudimentary Processing technologies 	<ul style="list-style-type: none"> Appropriate processing technologies exist 	<ul style="list-style-type: none"> Product development Enhance cottage industries 	<ul style="list-style-type: none"> Validate the processing technologies (1) Fabricate processing equipment (2)
	<ul style="list-style-type: none"> Limited end products 	<ul style="list-style-type: none"> Diversity of Bambara products exists 	<ul style="list-style-type: none"> Research on product development for product diversification Dissemination on product diversification 	<ul style="list-style-type: none"> Test & validate diversified products for taste & consumer preference (1) Diversify culinary options (2)
	<ul style="list-style-type: none"> Lack of/ poor packaging technologies 	<ul style="list-style-type: none"> Packaging institutions exist & personnel 	<ul style="list-style-type: none"> Develop/design packages for different markets 	<ul style="list-style-type: none"> Carry market need assessment (1) Feasibility study (2)

<p>4. Organization/management</p>	<ul style="list-style-type: none"> • Farmers not organized in formal/commercial groups • Disjointed/uncoordinated VC actors 	<ul style="list-style-type: none"> • Existence of farmer groups, merry-go-round, CBOs, FBOs • VC/ Stakeholder forum exists 	<ul style="list-style-type: none"> • Adopt commercial village model/innovation platforms • Form/strengthen farmer groups into commercial entities • Enhance private-public partnerships 	<ul style="list-style-type: none"> • Capacity needs assessment (1) • Capacity building gaps (2) • Develop upgrading strategy (3) • Upgrade/strengthen the VC (4)
<p>5. Regulatory/policy</p>	<ul style="list-style-type: none"> • Low emphasis on Bambara in the nuts policy 	<ul style="list-style-type: none"> • Draft oil & nut policy & other relevant policies in place 	<ul style="list-style-type: none"> • Awareness creation • Sensitize & seek collaborative activities with county governments on NUS • Advocacy for greater emphasis of Bambara in the policy 	<ul style="list-style-type: none"> • Capacity building (3) • Sensitization (1) • Lobbying & advocacy for Bambara inclusion (2)
	<ul style="list-style-type: none"> • No standards for Bambara products 	<ul style="list-style-type: none"> • Institutions exist 	<ul style="list-style-type: none"> • Create awareness among the chain actors & engage regulators e.g KeBS 	<ul style="list-style-type: none"> • capacity building (3) • Sensitization (1) • Lobbying & advocacy for Bambara inclusion (2)
	<ul style="list-style-type: none"> • Seeds: no regulation in place 	<ul style="list-style-type: none"> • Stakeholders & institutions exist • political will exist 	<ul style="list-style-type: none"> • Advocacy on Bambara 	<ul style="list-style-type: none"> • Capacity building (3) • Sensitization (1) • Lobbying & advocacy for Bambara inclusion (2)
<p>6. Finance</p>	<ul style="list-style-type: none"> • Lack of credit - friendly package for 	<ul style="list-style-type: none"> • Credit institutions exist • Funds & 	<ul style="list-style-type: none"> • Partner with selected credit institutions & develop a credit 	<ul style="list-style-type: none"> • Lobby for Bambara friendly terms (2) • Develop competitive grant protocols (1)

	Bambara farmers	funding agencies exist	package for Bambara production	
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All the topics exhaustively covered by both groups. Amaranth group captured issues at both grain and leaf products.

Bambara group comments:

Commercialization possible as the nuts are already being imported from Uganda, grown in Kakamega and in Mukurweini.

Several hotels selling it as food in Nairobi: the names of the hotels are not yet disclosed by the sellers, indicating that it may be making good profits and so they want to keep the markets to themselves.

Amaranth group comments

Value for amaranth not well known. Need to be established through different methods.

After each group presented, conclusions, ranking of topics and mechanism for actions were made by the whole team.

Conclusions

Amaranth

- Market was ranked as No.1 constraint since it is the driver of the VC

Actions- Ranked from 1 (high) to 4 (low)

- Marketing /promotions/ exhibitions (1)
- Increased output (2)
- Develop cottage industries (3)
- Improved storage (4)
- Create awareness on the nutritional values and utilization1

Bambara

- Market was ranked as No.1 constraint since it is the driver of the VC

Actions- Ranked from 1 (high) to 4 (low)

- market survey (demand & supply, prices, seasons, sources, outlets etc) (1)
- Sensitize farmers on Bambara growing (2)
- Link farmers to market (3)

Mechanisms for pushing the action plan forward

- Science based e.g. Universities
 - Involvement of students
 - Compiling of information from different media

- Leverage on the existing initiatives e.g.
 - In the recent past, FAO submitted a proposal to EU on VC
 - If proposal is successful, it opens wider opportunity for this kind of a project
- Farmers level
 - Creating links and markets at the local level

Official closing remarks: By Prof J. Orwa of KEMRI

Vote of thanks by G.P. Olouch a farmer from Siaya/Bondo

Ending prayers by Bertha Wachiye

Appendixes

Conclusions from the Zimbabwe Innovation Platform Workshop

Per Rudebjer, Head, Knowledge Management & Capacity Strengthening Bioversity International

Prior to the Kenyan workshop, a parallel innovation platform workshop was held at Africa University in Zimbabwe on 23-24 June, 2014. These are conclusions reached by participants in that workshop:

- The development of NUS value chains in Zimbabwe offers a variety of potential economic, social and environmental benefits.
- This is becoming recognized at the highest levels of government, but this has yet to filter down to other levels e.g. agricultural extension-workers.
- Zimbabwe has underutilized research capacity which can be brought to bear in terms of developing NUS value chains.
- The primary constraint in terms of developing these value chains is the relative lack of market interest.
- Grain amaranth and Bambara nut both represent pro-poor value chains with significant opportunities for upgrading in Zimbabwe.
- Past efforts on these species have been fragmented and sporadic.
- Most of the research on Bambara nut has been on propagation. However, we still have only two commercially marketed seed varieties.
- Research on grain amaranth has included propagation and market development. However, still at a very early stage.
- Application of marketing principles is deficient in agricultural training and practice in Zimbabwe.
- NUS represents fertile ground for new research in Zimbabwe.
- Our current education system for agriculturalists does not sufficiently promote innovation and innovative thinking.
- Lack of involvement of practitioners in the training/education system.

Recommendations on developing capacity around NUS in Zimbabwe

1. Policy level – needs to make explicit reference to NUS and take explicit steps to support NUS.
2. Link between health, NUS and “climate-smart” agriculture is a strong potential marketing area.

3. NUS value chains should be viewed especially in terms of their pro-poor benefits and their suitability for dryland areas.
4. Opportunity for integration of NUS (inc. marketing) into higher education curriculum with support of ANAFE.
5. Need to link with NUS researchers and support organizations outside Zimbabwe (e.g. CFFRC, Bioversity etc).
6. IFS support to Zimbabwean researchers on preparation of research proposals.
7. Need to learn from other countries with explicit NUS policies and market experiences – perhaps through exchange visits.
8. Need to create a culture of more genuinely participatory and collaborative research and extension around NUS.
9. Promote innovation amongst farmers and expand profile of NUS through linkages to existing awards etc.
10. NUS roll-out needs to be driven by market interests, but sometimes markets need to be developed from scratch.
11. Scientists working on NUS need to learn how to popularize, disseminate and lobby with their scientific findings.
12. Need to develop innovative seed funding mechanisms to support early stage NUS businesses.
13. Need to explore EU novel foods approval for Bambara nut.

