



A Fruity Affair - Good and Healthy for Kenyans

In 2011, the fruits sub-sector earned the country a staggering Kshs. 60.6 billion, about 29.6 per cent value of domestic horticulture sector. This, according to Kenya Agricultural Productivity and Agribusiness Project (KAPAP), is only scratching the surface of its potential.

BY SHADRACK KAVILU

Smallholder farmers in the agricultural sector produce more than half of the world's food supply accounting for 90 per cent of Africa's agricultural production. Yet, constraints related to production, quality and markets continue to hamper a sector that employs majority of the population in Africa. Agriculture accounts for about 24 per cent of Kenya's gross domestic product (GDP) with an estimated 75 per cent of the population depending on it directly or indirectly. It's estimated that agricultural sectors contributes 63 per cent of employment in Sub Saharan Africa and as much as 83 per cent in Ethiopia and 81 per cent in Rwanda.

profitable returns on their farm investment due to poor technologies and methods of production and post-harvest handling, limited product value addition and diversification and weak marketing linkages. However, through several projects initiated by the Government of Kenya (GoK), local mango and passion smallholder farmers, have significantly improved their fruit production and quality. One such GoK project is the Kenya Agricultural Productivity and Agribusiness Project (KAPAP), through which the government is up scaling technologies and innovations for sustainable agricultural production and growth of mango and passion fruit smallholder farmers in various parts of the country.

Dr E.C. Ikitoo, the Research Specialist at KAPAP Secretariat in Nairobi, says that KAPAP focuses on the productivity agenda of KAPP, while embracing diversification, value addition and linkage to markets. It also aims at promoting Public-Private-Partnerships (PPPs) in service delivery and agribusiness development. The project's main objective is to increase productivity and household incomes of small holder farmers in its mandate areas. This objective is being achieved through; a) improvement of research and extension systems and their linkages to sector priorities through the implementation of



The horticultural industry in Kenya is dominated by smallholder farmers who constitute 80 per cent of the growers and contribute about 60 per cent to the export market. The export market constitutes about four per cent of the horticultural production. Despite the huge contribution made by the smallholder farmers in Africa towards food security and income generation, the majority of these populations live in rural areas with about 56 per cent of them living below the poverty line.

Over the years, Africa's smallholder farmers have been unable to realize

KAPAP – Supporting Development of Agricultural Technology System

KAPAP is the 2nd Phase of Kenya Agricultural Productivity Programme (KAPP), a 12 years Government of Kenya Sector Project supported by the World Bank through an Adaptable Program Loan (APL). The 1st Phase of the Programme closed on December 31st 2008. The development objective of KAPP is to improve the overall agricultural technology system by supporting agricultural research, extension and farmer empowerment.

Agricultural Sector Development Strategy (ASDS), the National Agricultural Sector Extension Policy (NASEP) and National Agricultural Research System (NARS) Policy; (b) empowerment of farmer organizations and other stakeholders to influence agricultural technology development, delivery and application; (c) development of agribusiness along commodity value chains (VCs) aimed at value addition and marketing and (d) integration and main streaming of environmental, gender and other cross cutting issues (HIV/AIDS, youth, governance) throughout the project and along the commodity VCs.

Support to Agricultural Research System

KAPAP's support to Agricultural Research System (ARS) is being implemented through (i) support to National Agricultural Research System (NARS) and (ii) support to Kenya Agricultural Research Institute (KARI), a central research institution of the NARS.

The main objective of the support to NARS is to revise and operationalize the NARS policy and its implementation framework developed in KAPP Phase I, for better coordination of agricultural research in Kenya. Dr. Ikitoo points out that the Government's effort in initiating the formulation of the NARS policy offers the necessary platform for enhanced coordination, resource sharing and capacity building within the NARS.

In Kenya, agricultural research services are provided by a number of both public and private sector institutions including national public and private research institutions, universities and other tertiary institutions and a few international research organizations. The pluralism in agricultural research institutes offers many advantages. However, this also poses major challenges especially in ensuring



Edwin C. Ikitoo PhD, research specialist KAPAP

effective coordination of research activities in order to avoid duplication of efforts and create synergies where possible. Thus, KAPAP support to the NARS is expected to catalyze the implementation of the NARS policy and development of institutional framework and instruments for its implementation. This effort is expected to create an integrated NARS, which facilitates the development of an innovative, commercially oriented and gender-responsive modern agricultural sector.

Developing Research Agenda

According to Dr Ikitoo, collaborative research projects of KAPAP are administered through the Projects Competitive Grants System (CGS). The CGS has adopted the Agricultural Product Value Chain (APVC) and PPP approaches to research agenda development, project implementation and technology delivery, as propounded in the forthcoming NARS Policy. This approach spurs a cycle of demand-driven and cost effective Integrated Agricultural Research for Development (IAR4D), focusing on national priorities identified through consultative stakeholder forums.

Further, the approach enhances efficiency and reduces costs by eliminating duplication of research efforts, creating synergies and improving accountability through high quality governance and professional delivery of services. The process adopted by KAPAP CGS, leads to strong up-take and up-scaling of technologies because of the strong links between research,

extension, users/user organizations and investors. It is expected that in the long run, this approach will induce improvement of capacity and institutional quality in the NARS, thereby yielding positive benefits accruing from improved coordination, collaboration and deliberate entrenchment of environmental, social and gender perspectives in the research agenda.



Setting up of validation plots

Fruits VC Collaborative Research Project

The Fruits VC Research Project is one of the seven KAPAP CGS research projects developed by KAPAP and funded in 2011. The other six projects are in cereals (sorghum), vegetables (indigenous leafy vegetables, mushroom and French bean) meats (beef and indigenous chicken), dairy (cow, goat and camel milk), aquaculture (fish) and Natural Resource Management (NRM). Each project involves several institutions among them national research institutions, universities, government ministries, agricultural processor industries, farmer organizations and individuals.

The main challenge to mango and passion fruit production in Kenya today is inadequate technology to manage major pests and diseases for economical fruit production and attainment of required international standards for diverse utility markets of the fruit products. The KAPAP collaborative research on mango and passion fruit focuses on generating suitable technologies for enhancing productivity, post-harvest handling, value addition and marketing of mango and passion fruit; and promoting their use for improved incomes of smallholder farmers and other VC actors. This will be achieved through (a) improving disease and pest management; in particular, mango fruit fly and weevil and passion fruit - fusarium wilt, die back, woodiness and brown spot problems, (b) improving post-harvest handling by testing and validating suitable technologies and (c) enhancing fruits market linkages and value addition to fruit products through processing.

Technologies generated through KAPAP Collaborative Research Project, are set to change the mango and passion fruit farming situation. By enhancing small holder farmers' incomes from mango and passion production through increased production, Agro-processing and access to markets; hence, improvement of the entire value chain, Kenya's agricultural potential is unlocked. It is imperative to note that the fruit sub-sector is important for nutrition and food security, foreign exchange earning and employment creation in the country. Data from the Horticulture Crop



Dr. Joseph K. Njuguna, Fruit expert KARI

Development Authority (HCDA), shows total area under fruits cultivation in 2011 was 177,715 hectares producing 2.8 million tons of fruit, which generated Kshs. 60.6 billion. This is about 29.6 per cent value of domestic horticultural production. Up to 80 per cent of total fruit production is by small holder farmers. Thus, improvement in the fruits sub-sector production has significant influence on the distribution of wealth in the country.

Profits from Mango and Passion



Mango and passion fruit are key sources of nutrition and income for small holder farmers in Kenya. However, in the recent past development of mango and passion fruits industries has been threatened by various constraints that have curtailed value chain activities. Mango can be processed into juice, chutney, pickles, jam/jelly, fresh fruit, canned fruit and dried fruit while passion fruit can be processed into juice and wine. Production techniques of such products exist but their application by entrepreneurs is low. Despite the high potential on agro-processing, high post-harvest losses as a result of poor harvesting methods, pests and diseases management has greatly hindered mango and passion smallholder farmers from accessing markets. In mango production the key problems are the mango fruit fly and weevil infestation while in passion fruit, die back, brown spot, fusarium wilt and woodiness virus are the main diseases affecting production.

According to Dr. Joseph Njuguna, a fruit expert at KARI, the project which is funded by KAPAP to the tune of Ksh. 24 million will enhance production of mangos and passion to enable farmers penetrate the export market. The project would optimize mango and passion production and value addition for food security and climate change mitigation in the country. By enhancing food security through improved production and quality of mangos

and passion, farmers will be able to get improved incomes thus maximizing on their profits. The mango and passion component of the project would look at production and other value chain actors such as post harvest technologies, value addition and marketing. “We have incorporated collaborators from different disciplines and backgrounds; in particular the industry, to work with us in the Project. The collaborators complement one another and support our research effort by carrying out research along the entire fruit value chain. This enables us come up with well researched and balanced information and analysis,” says Dr. Njuguna. The partners include Kenyatta University, Kamurugu Agricultural Development Initiative, Kenya Forestry Research Institute (KEFRI), Kamumo Products, Jomo Kenyatta University of Agriculture and Technology (JKUAT), University of Nairobi and Kenya National Federation of Agricultural Producers (KENFAP). KARI is focusing on the production component of the value chain, which involves looking at issues that affect production of mangos and passion mainly pests and diseases. Its disease and pest management focuses on conservation/ protection of the environment through use of Integrated Soil Fertility Management (ISFM) and Integrated Pest and Nutrient Management (IPNM) approaches. Validation trials indicate that use of Pheromone traps could be successful method for the control of the fruit fly in mango. The Project also focus on enhancing the capacity of small scale processors especially women to meet the required hygiene standard and market requirements.

Dr Njuguna explains the institution is working with farmers in Embu, Makeni, Kilifi and Mbeere where it promotes uptake of appropriate production, pests and disease control packages, post-harvest practices and agro-processing technologies for the mango fruit and passion to enhance small scale farmer’s income. “We train farmers on pests and diseases identification, post harvest handling and document standard maturity index for each mango variety in these districts. Farmers need training to enhance their knowledge in processing and promote agro-processing to reduce post harvest losses and increase income from value added products,” he says.

The project is also training farmers on how to meet international food safety standards



for the export market. “We train farmers on how to meet the global food safety standards by not exceeding the maximum pesticide residual levels,” notes Dr. Samuel Muriuki, an Entomologist at KARI Thika. He adds there is need to train farmers on how to apply pesticides in order for them to meet the requirements of the export market. Mango as an export crop earns the country a lot of foreign exchange and acts as a source of household income for resource poor farmers. KARI has for the last 20 years introduced commercial mango varieties which are high yielding. These varieties which include Tommy Atkins, Kensington, Van dyke, Haden and apple have been widely adopted by farmers and this has led to increase in production levels especially in Eastern, Coast and central Provinces.

Post-harvest challenges

At the marketing front, the mango and passion fruit potential has not been fully exploited due to weak marketing structure and glut during peak season. Mango processing in Kenya has not expanded and

only a negligible share of total production is currently processed. There are very few firms that process local juice products. Other local firms making juice and jam from mango, import their raw products in the form of concentrates mainly from Mauritius, Egypt and South Africa. Thus, there is potential for increasing the scope of local mango processing into products of high value and increased shelf life. This is one way of mitigating against losses due to gluts in production and at the same time, diversifying utilization and markets.

According to Dr Muriuki, farmers lack ways of ensuring year-round income. For instance, minimizing post harvest losses by employing appropriate up-to-date preservation and processing technologies, could ensure sustained income for farmers. Majority of farmers loose fruit products quality because of applying the wrong post-harvest methods such as shaking the tree and harvesting at the wrong time of the day. “We are working through this Project to document standard maturity indices for commercial mango varieties grown in different regions of the country, to avoid post-harvest losses,” he explains, adding that there is high level of post-harvest wastage of mango fruit due to surplus in the market during peak harvesting period.

Generally, mango supply peaks between October and February and during that time the market is flooded with the fruits forcing farmers to compromise their prices. To alter the normal harvesting cycle of mango fruits, the Project has imported a flower inducing product that acts as growth regulator from Australia. The product will alter the normal flowering season to ensure farmers have different plants flowering earlier than the normal cycle.



Dr. S.J.N. Muriuki, Entomologist KARI



Passion fruit infected with Anthracnose

Dr Muriuki says the project trains farmers on agro-processing of mangoes into high value and long-shelf products. This is

also a way of mitigating against losses and diversifying utilization and markets. However, challenges in processing the mango which include lack of equipments, inadequate agro processing knowledge, seasonal variations and lack of proper packaging materials need to be addressed in order to increase productivity. During post-harvest handling, at least 40-45 per cent of fruit is lost due to mechanical damage, pests and diseases, excess fruits in the market and immature harvesting. To help farmers improve on storage facilities, the Project is providing farmers with driers for mango preservation. “We’re providing the farmers with driers which can be used to preserve mangos for up to a year. This ensures consumers of availability of mangos throughout the year as well as help farmers stabilize the prices,” states Dr. Njuguna.

Apart from providing the farmers with driers, they are being linked to local markets by providing young people with cooled boxes and trolleys to help them sell mango juice. This concept is quite similar with that of sausages and ice creams; where, sellers can move the trolley from one place to another depending on the demand of the products.



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Efforts to overcome teething problems of Passion fruit diseases

The passion fruit component of the project is being carried out by Kenyatta University, which is doing studies to develop effective passion fruit disease control measures. Dr. Maina Mwangi, a crop pathologist, who is leading the research, says they are currently focusing on dieback epidemiology; woodiness virus and fusarium wilt management as well as development of effective integrated pest and nutrient management for the diseases. Extensive researches on some of these diseases have significantly helped farmers manage pests. “We have contained diseases such as fusarium by



grafting yellow and purple passion plants which produce a plant resistance to these diseases,” he explains.

Though the grafting method has proved effective in containing some of these diseases, a lot of training on grafting need to be done especially at the nursery level to educate the farmers on the best practice of grafting. “The biggest challenge has been that of nursery farmers they don’t know how to graft correctly. The grafting joint don’t heal properly thus expose the plant to pests and diseases,” notes the Crop Pathologist. However, under the project, they’re training farmers on how to detect diseases in the nursery level by introducing indicator plants which are very sensitive to some of these diseases. “The tobacco plant is very sensitive to these diseases and we are educating farmers on how to use it to detect diseases in their nurseries,” he explains. Due to the KAPAP collaboration, many farmers are now leading a more decent life’ adds Dr Maina.