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Research Application Summary

Contribution of Masinde Muliro University of Science and Technology to capacity building of agricultural researchers

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Abstract

The role played by smallholder farmers in Africa cannot be overemphasized. Smallholder agricultural production systems contribute significantly to the economic development as well as livelihoods in sub-Saharan Africa. The small scale production systems are characterized by a high level of diversity, low technology and vulnerability to adverse effects of climate change. As a result agricultural recommendations can neither be extensively borrowed from other systems nor applied over a wide area. Meeting the research needs of such systems requires highly knowledgeable and experienced agricultural researchers, who are scarce in Africa. Masinde Muliro University of Science and Technology (MMUST) has been implementing the On-the-Job Capacity (OJCB) programme for agricultural researchers in developing countries funded by the United Nations University Institute for Advanced Studies of Sustainability (UNU-IAS) since 2012. The objective of the programme was to build the capacity of young agricultural researchers in their early research careers by involving them in research projects supervised by senior scientists. So far, MMUST has trained seven researchers and implemented four research projects. In addition to building the capacity of agricultural researchers, the programme also served to solve farmers problems and generate knowledge for agricultural development. This paper highlights the experiences of this programme at MMUST and the results of the research projects in which the trainees were involved.

Key words: Agricultural researchers, climate change, Kenya, Masinde Muliro

Résumé

Le rôle joué par les petits agriculteurs en Afrique ne peut être sous-estimée. En Afrique sub-saharienne, les petits systèmes de production agricole contribuent de manière significative au développement économique et aux moyens de subsistance. Les systèmes de production à petite échelle sont caractérisés par un niveau élevé de diversité, de faible technologie et la vulnérabilité aux effets néfastes des changements climatiques. En conséquence des recommandations agricoles ne peuvent ni être largement empruntées à d'autres systèmes, ni appliquées sur une large zone. Répondre aux besoins de la recherche sur ces systèmes

exige des chercheurs agricoles hautement qualifiés et expérimentés, qui sont rares en Afrique. L'Université des sciences et de la technologie de Masinde Muliro (MMUST) a mis en œuvre le programme On-the-Job Capacity (OJCB) pour les chercheurs agricoles des pays en développement, financé par l'Institut Universitaire des Nations Unies pour les études avancées de développement durable (UNU-IAS) depuis 2012. L'objectif du programme était de renforcer les capacités des jeunes chercheurs agricoles dans leur jeune carrière de recherche en les impliquant dans des projets de recherche supervisés par des scientifiques chevronnés. Jusqu'à présent, MMUST a formé sept chercheurs et mis en œuvre quatre projets de recherche. En plus de renforcer la capacité des chercheurs agricoles, le programme a également permis de résoudre les problèmes des agriculteurs et générer des connaissances pour le développement agricole. Ce document met en lumière les expériences de ce programme à MMUST et les résultats des projets de recherche dans lesquels les étudiants ont été impliqués.

Mots clés: Chercheurs agricoles, changements climatiques, Kenya, Masinde Muliro

Background

Agriculture plays a very important role in managing the three major challenges facing the world today, namely provision of food to the world population, alleviation of poverty and climate change. With the world population ever on the increase, more food needs to be produced every day in order to satisfy the demand. FAO estimates that the world will need to produce 70 percent more food for an additional 2.3 billion people by 2050 while combating poverty and hunger, using scarce natural resources more efficiently and adapting to climate change (FAO, 2011). More food needs to be produced from more or less the same amount of land whose productivity is declining due to land degradation and continuous use. To achieve this, more innovative approaches and technologies need to be developed by researchers to meet the changing production requirements and circumstances. Agricultural researchers play a leading role in development of such innovations. In Africa, the number and capacity of agricultural researchers is generally low and needs to be enhanced. Masinde Muliro University of Science and Technology (MMUST)has implemented a programme referred to as "On-the-Job Research Capacity Building (OJCB) for Agriculture in Developing Countries" funded by Japan's Ministry of Agriculture , Forestry and Fisheries (MAFF) and coordinated by United Nations University Institute for the Advanced Study of Sustainability (UNU-IAS) from 2012 to 2016. The objective of the programme is to train young and upcoming researchers by working with a senior scientist on a research project. MMUST has undertaken four research projects and trained seven researchers in the programme. This paper highlights the contributions of MMUST to capacity building in agriculture using an example operations and achievements of the OJCB programme as well as the findings of the research projects in which the trainees were involved.

Literature summary

On the Job Capacity Building (OJCB) research projects at MMUST were designed in response to the research priorities advanced by United Nations University, the programme

coordinating institution. These were to disseminate new agricultural technologies that are adaptable by local farmers and to local conditions for the 2012 call, climate change adaptation and mitigation for the 2013 call and food security and environmental conservation for the 2014 and 2015 calls.

Adoption of agricultural technologies is directly related to the farmers' ability to implement the technologies being promoted. Indigenous knowledge is very important in the development of local solutions to farmers' problems that can be applied under the farmers' conditions. Indigenous knowledge has been widely used by farmers in the management of crop pest in east Africa (Stoll, 1986; Mugisha, 2008) including the use of plant products in the management of pests of stored produce (Ogendo *et al*., 2004). Postharvest losses (PHL) associated with storage pest have been reported to be high in Africa (Boxall, 2001), reaching as high as 100% for the case of the larger grain borer (LGB). The profile of PHL reduction has once more been raised in light of the understanding that it complements efforts to enhance food security through improved farm-level productivity and more so in an environmentally sustainable manner (FAO, 2011; World Bank, 2011). Most of the indigenous knowledge and farmers technologies used by small scale farmers have neither been documented nor validated. They are however promoted on the strength of being environmentally safe and accessible to farmers. There are continued efforts to search for technologies that are more effective but environmentally friendly and safe to the users, hence the development of hermetic bags technology. This is a relatively new technology that reached some African countries after the year 2000 and hence its effectiveness and preference by farmers needs to be determined. Climate change is another serious challenge to agricultural production and food security. The problem is serious for smallholder farmers and pastoralists in developing countries who are already coping with a degraded natural resource base, lack of knowledge about the potential options available for adapting their production systems and have limited assets and capacity to access and use technologies and financial services. Smallholder farmers are disproportionately vulnerable to the impacts of climate change as a result of poverty, marginalization and reliance on natural resources (Frank and Buckley, 2012). There is need for smallholder food systems to become more efficient and resilient, more efficient in resource use and more resilient to changes and shocks (FAO, 2013). To achieve these changes, farmers are required to have sufficient knowledge of all the options available to them for their use in building resilient systems.

Research approach

The OJCB research programme is implemented for a period of nine months each year. The applicant for the grant should be a senior researcher who serves as a host scientist and who may engage an assistant trainer where necessary. The host scientist has to be an employee of a research institution which serves as the host institution. The host institution identifies the trainees and makes an application to UNU. The proposed trainees should be employees of a public institution and in the early stages of their research career. Once the application is successful, the trainees are invited to come and undertake the training for a specified period of time, five to six months in the case of MMUST. The host scientist conducts research on the topic submitted to UNU during the application process together with the trainees. On

completion of the training the trainees draw a plan of action for implementing what they have learned back at their work stations with the guidance of the host scientist. The trainees return home to implement their action plan and a follow up visit is make by the host scientist to support and advise the trainees.

Results of OJCB trainings at MMUST

Since 2012, four trainings have been undertaken at MMUST with seven participants trained under the following projects.

1. Testing farmers on-farm pest management strategies for sustainable small scale crop production in Western Kenya

This study was intended to establish the technologies being used by small scale farmers to manage pests of stored produce and provide a scientific recommendation for improvement. The study established that:

(a) Three plants utilized most by farmets were *Tithonia diversifolia, Tagetes minuta* and *Tephrosia vogelii.*

(b) The plant products were more effective when used as plant extracts or essential oils instead of whole powder

(c) mixing of the plant products adversely affected their performance and should be avoided where possible.

2. Prioritizing adaptation options to Climate change for farmers in Kakamega County, Kenya

This study's objective was to establish the best options that farmers in the localized area had to adapt to climate change. It followed a four-step methodology for prioritizing adaptation options for farmers used in Latin America as published by the World Bank (2009). .The farmers prioritized the options available to them as follows.

(a) Diversification of livelihood resources

(b) Improvement of water availability and conservation through water harvesting and agroforestry

(c) Introduction of well adapted crops and livestock with improved farming practices

(d) Enhance availability, dissemination and use of weather information

3. Management of post-harvest losses for food security and environmental conservation (1)

This study examined the status of postharvest losses and the existing postharvest innovation systems in Busia and Bungoma Counties, Kenya. It was established from the study that the most recent and innovative grain protection system is the use of hermetic storage for preservation of grains by the small scale farmers. Though not widespread then, this method was preferred by the farmers because

(a) It offered 100% full proof protection against storage pests experienced by farmers in the region.

(b) It was free from hazardous chemicals and convenient to use. The major limitations to the use of this method were low levels of awareness and the cost as well as availability of the hermetic bags.

(c) It lowered the cost of production for individual farmers in the long run. While recognizing that the cost of the bags was high, the farmers were generally in favour of the hermetic bags with the hope that the cost of the bags would finally come down.

Another hermetic storage method observed in the field was the metallic silos, although their use was limited mainly because of high costs. A summary of the observations gathered in the studies is presented in Figures 1 and 2.

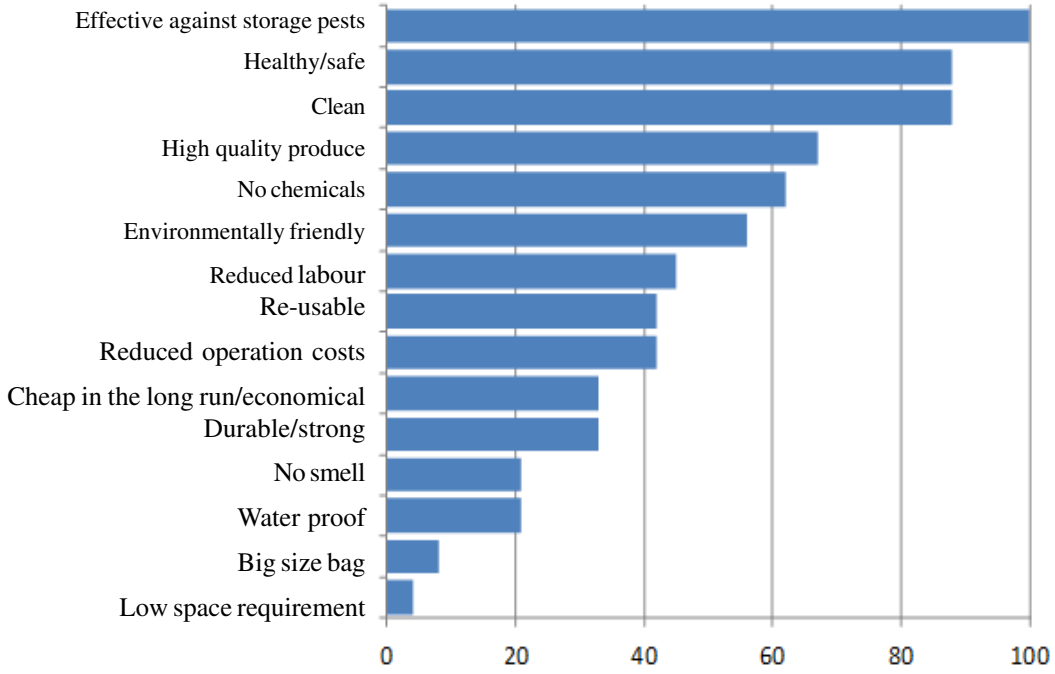

Figure 1. Benefits of hermetic bags as perceived by small scale farmers in Western Kenya

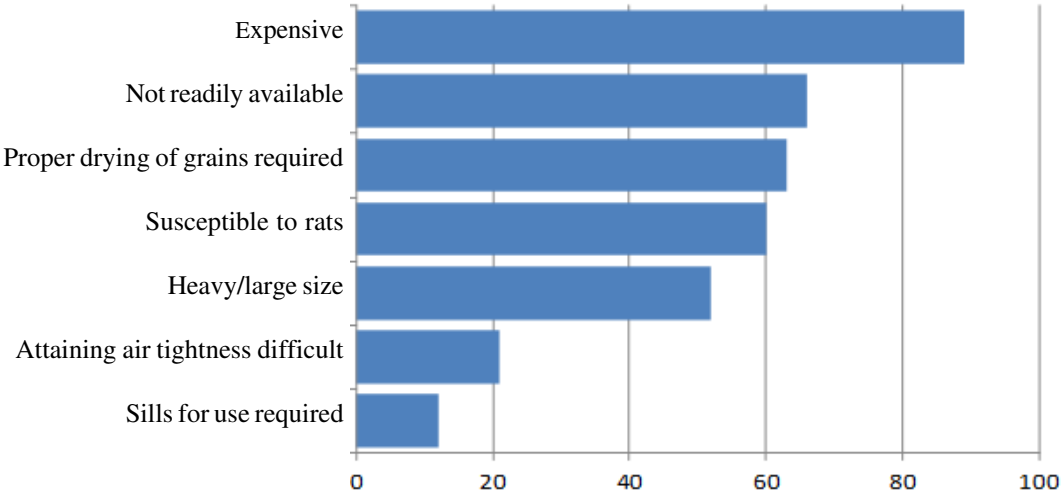

Figure 2. Limitations to the use of hermetic bags as perceived by small scale farmers in western Kenya

Conclusion

Capacity building for agricultural research in Africa is essential for agricultural development. Despite the efforts being made by many programmes to build the capacity of agricultural researchers in Africa, the numbers and capacity are still low hence the need for more interventions. More capacity development will results in more knowledge creation and better application of research knowledge to improve the livelihoods of small scale farmers in Africa. It is recommended that capacity building incorporates collaboration and networking initiatives for better sharing of knowledge created.

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