

Research Application Summary

Postharvest training in Kenya: Universities' role to address the knowledge and skills gap in postharvest management

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Abstract

Over the years, agricultural training and research in Universities and research organizations has focused on increasing crop production. This has been achieved over the years through breeding high yielding varieties; development of good agronomic packages; and pest/disease management solutions among other production-side interventions. In line with the focus on increased production, curricula and facilities in many agricultural training institutions have been developed to enhance the skills-set on the production side of the food supply chain. There has been little focus or emphasis on the postharvest side of the supply chain. As a result most of the actors and practitioners in agricultural value chains (including farmers, traders, transporters and extension agents) are poorly equipped to deal with challenges in postharvest management. In this paper, the need to strengthen postharvest training to equip practitioners in agricultural value chains with the requisite knowledge and skills in postharvest management is discussed. The postharvest training gaps in the relevant agricultural curricula from selected public universities in Kenya is highlighted. The paper makes recommendations on how Universities can address the skills gap through review of existing curricula, development of new programs and tailor-made short courses in postharvest management. In addition the paper highlights the need for universities to strengthen their research capacity and industry linkages to provide solutions in postharvest management. Universities and specifically Faculties of Agriculture are challenged to reposition and realign themselves to play their critical and strategic role of producing the skilled labor force which is required to address challenges in the Agriculture sector such as high postharvest losses in food supply chains.

Key words: Capacity building, curriculum, extension, Kenya, postharvest, training

Résumé

Depuis des décennies, la formation et la recherche agricoles dans les universités et les organismes de recherche ont été axées sur l'augmentation de la production végétale. Cela a été réalisé au fil des années par la sélection de variétés à haut rendement, le développement de paquets de bonnes pratiques agronomiques et des solutions de gestion des nuisibles et des maladies, entre autres interventions au niveau de la production. Conformément à l'accent mis sur l'augmentation de la production, les programmes et les installations de nombreux établissements de formation agricole ont été développés afin d'améliorer les compétences pour l'aspect production de la chaîne d'approvisionnement

alimentaire. L'aspect post-récolte de la chaîne d'approvisionnement n'a pas fait l'objet d'une attention particulière. En conséquence, la plupart des acteurs et des praticiens des chaînes de valeur agricoles (y compris les agriculteurs, les commerçants, les transporteurs et les agents de vulgarisation) sont mal équipés pour faire face aux défis de la gestion post-récolte. Dans ce document, la nécessité de renforcer la formation post-récolte pour doter les praticiens des chaînes de valeur agricoles des connaissances et des compétences requises en matière de gestion post-récolte est examinée. Les défis de la formation post-récolte dans les programmes agricoles de certaines universités publiques du Kenya sont mises en évidence. Le document fait des recommandations sur la manière dont les universités peuvent répondre au problème de manque de compétences par une révision des programmes existants, le développement de nouveaux programmes et des cours de courte durée en gestion post-récolte. En outre, le document souligne la nécessité pour les universités de renforcer leurs capacités de recherche et leurs liens avec l'industrie afin de fournir des solutions en matière de gestion post-récolte. Les universités et plus particulièrement les facultés d'agriculture doivent se repositionner et faire un recadrage pour jouer leur rôle critique et stratégique de production de la main-d'œuvre qualifiée nécessaire pour relever les défis du secteur agricole, tels que les pertes élevées après récolte dans les chaînes d'approvisionnement alimentaire.

Mots clés : Renforcement des capacités, programme d'études, vulgarisation, Kenya, post-récolte, formation

Introduction

Increasing agricultural production has been the key strategy adopted by many African governments in their bid to address food insecurity. As a result budgetary allocation to the Agricultural sector has been expended mainly to address challenges on the production side of the supply chain. Similarly agricultural training, research, outreach initiatives in most countries have laid more emphasis on increasing production. With 30% (equivalent to 1.3 billion tons) of the food produced for human consumption being lost or wasted in the supply chain, there is now an urgent need to rethink the strategy towards attaining food security in a sustainable manner (FAO, 2014). Out of the total funding allocated to agricultural research and extension over the past 20 years, less than 5% goes to postharvest management (Lisa et al., 2011; Wilson, 2017). Similarly agricultural training curricula in Universities is heavily skewed towards production-related disciplines including agronomy, breeding, soils sciences and pest management (Ambuko, 2016). As a result, there is an acute deficiency of adequate knowledge and skills in postharvest management in the various sectors of Agriculture.

There are concerted efforts to address high postharvest losses in the food supply chain. At the global level, the United Nations Sustainable Development Goals, in SDG 12.3 a target of halving postharvest losses by the year 2030 has been set. At the regional level, under the Malabo Declaration of 2014, Africa's Heads of State have committed to halve postharvest losses by the year 2025. Realization of these targets will require appropriate knowledge and skills (capacity development) in postharvest management, among other interventions. Training and research institutions have a pivotal role to play in equipping the stakeholders and actors in the food supply chain with the requisite skills and knowledge. There is therefore need for a paradigm shift not only in training and research but also resource allocation to address the problem of high postharvest losses in the food supply chain. Lack of knowledge and inadequate skills in postharvest management has been identified as one of the major drivers of postharvest loss in developing countries (Kitinoja, 2010).

As African countries aspire to attain food security, focus must shift from simply increasing production of food that is eventually lost or wasted along the supply chain. Better and proper utilization of the food produced using scarce production resources (land, water and energy) is critical to ensure sustainability of food systems. The term 'Postharvication' has been coined to refer to the improvement of postharvest handling and agro processing which must be mainstreamed in the agricultural transformation and industrialization agendas (Opara, 2017). Postharvication advocates for greater investments in education, research and application of innovative technologies and policies to improve the efficiency of food supply chains by reducing losses and waste, developing diverse and value-added nutritious and safe food and other agro-based products, and facilitating trade and exchange through better quality control and assurance (Opara, 2017). To realize the goals of postharvication, practitioners in the food supply chain right from production to retail and consumption stage must be equipped with the requisite knowledge and skills to address the factors that contribute to high postharvest losses.

There have been some initiatives to address the skills gap in postharvest management. A good example of these initiatives is one spearheaded by the Postharvest Education Foundation (PEF). The PEF has been training young professionals including those from Universities and research organizations since 2012. To date the under PEF program, 100 trainees in 18 African countries have received a year of intensive e-learning based training. They were equipped with practical tools and training aids, and receive on-going mentoring and technical support (Cathy and Lisa, 2017). Those trained in postharvest loss assessment, improved small-scale technologies and extension methods have developed postharvest outreach programs that reach approximately 30,000 smallholder clientele per year. Graduates are expected to work as postharvest researchers, professors, subject matter specialists, extension workers, NGO training staff, and/or in private sector as independent postharvest consultants. The PEF initiative is laudable and has had a significant impact on building a pool of postharvest experts. However this number is insufficient to address the postharvest management skills and knowledge gap in Africa. There is need for homegrown initiatives in Africa to shore up the numbers and build a critical mass of postharvest experts at all levels. Additionally, postharvest training and outreach must be strengthened and institutionalized to ensure sustainability and continuity. This was one of the key recommendations of the 1st All Africa Postharvest Congress and Exhibition, under the thematic area on capacity development (Ambuko, 2017).

Approach

Curricula of three flagship degree programs under the Faculties of Agriculture which are considered key in training agriculture sector experts were reviewed. The three main curricula included BSc Agriculture, BSc Horticulture and BSc Food Science and Technology. The three curricula were sampled from four leading public universities which have a Faculty of Agriculture. The curricula were reviewed to establish the extent of training in postharvest management. This was based on the number of courses in the curriculum at the different levels (year one to year four) that are directly related to or impart the students with relevant knowledge in postharvest management. The three degree programs contribute significantly to the workforce in the agricultural sector. The graduates of these programs are frontline actors/practitioners in the agricultural sector including agricultural production, extension and research. Other degree programs that contribute to the Agricultural sector workforce such as BSc Agricultural Education and Extension; BSc Agribusiness Management; BSc Agricultural Resource Management have no courses in postharvest management and therefore were not reviewed.

Key findings and discussion points

The desk review revealed that agricultural curricula from the leading public Universities in Kenya sampled have a glaring gap in postharvest training. Degree programs and course content therein have inadequate contact hours to impart sufficient knowledge in postharvest management including the science and technologies. In the BSc Agriculture program which is offered in most of the agricultural faculties in Kenya, postharvest-related courses (postharvest science/physiology/biology, postharvest technology and their variants) take an average of 68 contact hours out of the total 2,600 - 2,800 contact hours allocated to the full degree program. This is a meagre 3% of all the contact hours (Table 1). Similarly, the BSc Horticulture program which should train a competent workforce for the highly specialized Horticulture sector has an average of 68 contact hours out of the total 2,700 – 2,900 contact hours, averaging 2%. The BSc Food Science and Technology curriculum, which includes Nutrition in some of the universities has more contact hours allocated to postharvest related courses ranging from 28 – 42% with an average of 38% of total contact hours (Table 1).

Most of the extension service providers (graduates) employed by the government (County or national) or private sector organizations are drawn from the faculties of agriculture. It is therefore critical that the graduates are well equipped and grounded in theory and practice of postharvest management. It is noteworthy that in Kenya (and possibly most African countries), the extension workforce is composed of old graduates of the postharvest management-deficient degree programs. This scenario of an ageing extension workforce has been occasioned by the general freeze on employment of extension officers. Therefore even though universities might be churning out better equipped graduates, the new graduates often opt for careers outside the agriculture sector, which are regarded as more lucrative and prestigious than agricultural extension. Therefore the existing extension workforce might require retooling in postharvest management through tailor-made short courses.

The deficiency in contact hours to impart theoretic knowledge is further aggravated by lack of adequate facilities for practical (hands on) training in postharvest science/technology. Most institutions lack the requisite facilities including well-equipped postharvest laboratories where the students can be exposed to the practical application of the knowledge imparted in the theory. Postharvest management (including science and technology) is an applied science that requires practical training to complement the theory. In the absence of the practical component, even with the best curriculum, the resultant graduates will still be poorly equipped to address industry or agriculture sector challenges in postharvest management.

Recommendations

Universities must urgently review the existing curricula to include more contact hours in the relevant postharvest-related courses. There is need to include more content on postharvest management in the existing degree programs. This could be achieved by revising specific course units to include topics on various aspects of postharvest management in line with the course and degree program. In most of the flagship BSc Agriculture curricula that were reviewed, postharvest science/biology/physiology and postharvest technology are offered as one course unit of 45 hours, split between the theory (30 hours) and practical (15 hours). Given the breadth of postharvest science, 30 hours is insufficient to ensure that the students are well grounded with adequate theoretic knowledge in postharvest science. At the very least, postharvest science/biology/ physiology should be separated from postharvest technology as standalone course units of 45 hours each. Ideally there should be at least three course

Table 1. A summary of contact hours allocated to postharvest management degree programs offered in leading public Universities in Kenya

Year of study	Year 1		Year 2		Year 3		Year 4		Grand total	PH total	% PH
Degree Program	ALL	PH	ALL	PH	ALL	PH	ALL	PH			
Agriculture	698	0	698	0	653	23	675	45	2678	68	68
Horticulture	653	0	698	0	720	23	630	45	2745	68	2
Food Science and Technology	765	0	698	225	698	428	675	428	2835	1080	38

units assigned to postharvest management including; Postharvest science/ biology/physiology of perishables; postharvest science/ biology/physiology of non-perishables and Postharvest Technology. This will raise the direct contact hours from the current average of 68 to 135 hours (5% of the total contact hours). Although 5% is still low considering the importance of postharvest management, it is an improvement from the current scenario. The 5% can be complemented with increased content on postharvest management in other course units.

At the post graduate level, full-fledged degree (MSc and PhD) and diploma programs in Postharvest management are recommended. In the case of MSc programs, the graduate students can specialize in various sector-oriented disciplines (livestock, food and crops) during their thesis research projects. This will contribute towards creating a critical mass of postharvest experts with specialization for the different sectors of agriculture.

Postharvest management involves various practitioners along the food supply chain including farmers/producers, transporters, aggregators, traders, exporters, processors and among others. To build capacity of these practitioners, universities are encouraged to develop short tailor-made practical courses for the various groups in the supply chains. To address the skill and knowledge gaps among the extension service providers, the universities are encouraged to develop training of trainer (ToT) courses/programs. Such programs, if well executed have a great multiplier effect and have potential to have great impact because the extension agents or service providers interact more closely and regularly with the practitioners including farmers.

Universities must also embrace and strengthen experiential and problem-based learning to enhance the graduates' practical skills in postharvest management. This will require strong partnerships between universities and the food industry actors including the farmers. Student attachment and internship programs should be strengthened and reinforced such that industry challenges which are identified by the students during attachment/internship can inform the research agenda at the University. In this case, the universities can foster a win-win symbiotic relationship with the industry with the latter providing the much-needed resources to fund research at the university. Universities must make a deliberate effort to reach out to the industry and private sector actors with value propositions that will attract funding from them. These recommendations as summarized in Figure 1.

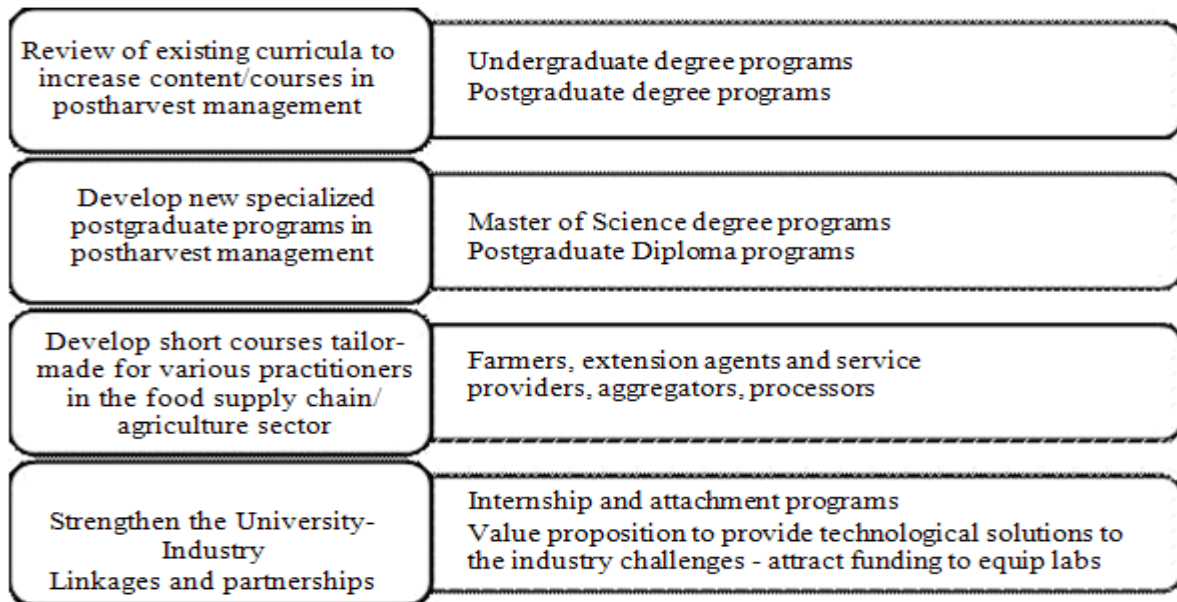


Figure 1. Recommendations for curricula development/review and industry engagement to address knowledge and skills gap in postharvest management

Overall, Universities are in an advantaged position as respected knowledge institutions and should play a more critical role in driving the agenda of capacity development to address the knowledge and skills gap in postharvest management. On their part, the government must allocate substantive funds to universities so that they are not dependent on donor funds to drive the research, training and outreach activities. Sustained investment in quality education is a necessary condition to develop the much needed human capital to drive agricultural sector growth and transformation.

Conclusion

The need for urgent action in Agricultural faculties in Kenya's Universities to address the knowledge and skills gap in postharvest management cannot be overemphasized. The process of curriculum development and review is long and requires resources to ensure an inclusive process that adequately engages relevant stakeholders. The universities will require innovative and strategic engagement with relevant partners and government in order address these challenges. Ultimately the Universities must rise to the occasion and live up to the public expectation of providing a well-trained and skilled work force to address the agriculture/ food industry challenges such as postharvest management.

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