



ISSN 1607 - 9345



*Linking Agricultural Universities with Civil Society, the Private Sector, Governments
and other Stakeholders in support of Agricultural Development in Africa
Partnerships to unlock the Potential of Agricultural Development in Africa*

RUFORUM Working Document Series No. 14 (3)

Fifth RUFORUM Biennial Conference: Book of Abstracts

Editors

A. Egeru, S. Mensah, M. Osiru, M.P. Nampala, S. Uwituze and E. Adipala

17 - 21 October, 2016, Cape Town, South Africa

Foreword

Global dynamics indicate that the world is at a position of immense opportunities primarily driven by the surge in innovation from all parts of the world and not merely limited to the high-technology sectors (Crunchbase, 2016). Population is expanding and so are markets and product value chains; in all innovation is playing a critical role. The 2030 Agenda for sustainable development recognises that significant progress has been made in meeting many development challenges, with millions of people moving out of poverty, access to education increased, and global interconnectedness strengthened through digital commons (UN, 2017). Yet, a lot more progress is still required in order to respond to pressing development needs. For example, in the next three decades, a rising global demand is projected that will put pressure on the agriculture and food sector, increased competition for limited natural resources, and the effects of climate change will continue to pile pressure on the food system. Innovation remains critical to sustaining the productivity growth required to meet the rising demand, enhance the networks that integrate sustainable food production, processing, distribution, consumption, and waste management thereby expand the opportunities and resources available on a global scale (Dutta *et al.*, 2017).

Research is at the centre of facilitating advances in innovation through knowledge translation. Studies have shown that knowledge translation resulting into innovation often arises from a series of continuous efforts often responding to discrete events, history-specific problems and new technological opportunities. Innovation space is widespread from every person's daily life experiences, observations, and communities to industry; for industry it has been observed that patterns of response often are industry specific and are associated with the radicalness and complexity of the innovation processes (Taalbi, 2017). Universities have a critical role as innovation centres through research processes and research products that emerge out of their undertakings (Power and Malmberg, 2008). Universities have equally recognised the fundamental role that innovation plays in creating a competitive advantage. As such, partnerships and innovations to strengthen higher education have become critical facets sought by universities globally, Africa inclusive. To this end, building regional innovation infrastructure and learning through networking have been proven to be key to achieving successful approaches in a dynamically aligning societies (Cooke, 1996). This has allowed universities and businesses to maximize the full range of regional innovation assets at their disposal. In this RUFORUM Working Document Series Volume 14 (3), perspectives into partnerships and innovations to strengthen higher education in Africa as well as strengthening information and communication technology and knowledge management in agriculture are presented.

As earlier pointed out, the world will have to respond appropriately to meet increased demand for food requirements by the accelerating population as well as the changing consumption patterns and evolving food systems. To this end, sustainable agricultural intensification has been fronted as an innovative paradigm and approach to increasing production with efficient use of inputs on a long-term basis, whilst reducing environmental damage and building resilience, natural capital and the flow of environmental services (Seed, 2013). In this Volume 14 (3), an expose of sustainable crop and livestock production within smallholder value

chains is provided. In addition, innovations for reducing post-harvest losses within the smallholder value chains are addressed. Post-harvest losses are a recognised challenge within the African agricultural food systems accounting for at least 30% of the food waste in general but with as much as 50%-60% of the cereal grains susceptible to loss due to technical inefficiency of storage facilities (Kumar and Kalita, 2017; Sheahan and Barrett, 2017). This Volume 14 (3) also discusses the reality of addressing risks associated with climate variability and change in agricultural systems. Climate variability and change impacts are widely discussed and how they will impact on African farmers (Muller *et al.*, 2011); providing opportunity to profile what innovations and perspectives are available in the scientific community to appropriately respond is imperative. Finally, this Volume 14 (3) also tackles an issue that has had a limited consideration yet very critical for sustainability and availability of healthy protein diets; Marine science and blue economy-fisheries and aquaculture. Sustainable fisheries and aquaculture are particularly critical to securing food and nutrition security among the world's poorest regions such as in West Africa, Asian coastal regions and many island states whose proportion of dietary protein intake is in the region of 60% and beyond (EU, 2015).

References

- Cooke, P. 1996. The new wave of regional innovation networks: analysis, characteristics and strategy. *Small Business Economics* 8 (2): 159-171.
- Crunchbase. 2016. Global innovation investment report: 2016 year in review. Available from: https://static.crunchbase.com/reports/annual_2016.../crunchbase_annual_2016.pdf Accessed on 19th January, 2018.
- Dutta, S., Lanvin, B. and Wunsch-Vincent, S. 2017. The global innovation index 2017: Innovation feeding the world. Geneva, Switzerland, by the World Intellectual Property Organization (WIPO), and in New Delhi, India, by the Confederation of Indian Industry (CII). 463pp.
- European Union Commission. 2015. Making a difference: How fisheries contribute to sustainable development around the globe. Maritime Affairs and Fisheries. Available from: https://ec.europa.eu/dgs/maritimeaffairs_fisheries/magazine/en/places/making-difference-how-fisheries-contribute-sustainable-development-around-globe Accessed on 19th January, 2018.
- Kumar, D. and Kalita, P. 2017. Reducing postharvest losses during storage of grain crops to strengthen food security in developing countries. *Foods* 6 (1): 8.
- Muller, C., Cramer, W., Hare, W. L. and Lotze-Campen, H. 2011. Climate change risks for African agriculture. *Proceedings of the National Academy of Sciences* 108 (11): 4313-4315.
- Power, D. and Malmberg, A. 2008. The contribution of universities to innovation and economic development: In what sense a regional problem?. *Cambridge Journal of Regions, Economy and Society* 1 (2): 233-245.
- Seed, J. 2013. Sustainable Intensification: A New Paradigm for African Agriculture. CTA. Available from: http://www3.imperial.ac.uk/newsandeventspggrp/imperialcollege/centres/africanagriculturaldevelopment/newssummary/news_26-3-2013-13-48-16 Accessed on 19th January, 2018.

- Sheahan, M. and Barrett, C.B. 2017. Food loss and waste in Sub-Saharan Africa: A critical review. *Food Policy* 70: 1-12.
- United Nations. 2017. Transforming our World: The 2030 Agenda for Sustainable Development A/RES/70/1. 41pp.

Table of contents

Foreword	i
Sub-theme 1: <i>Partnerships and innovations to strengthen higher education in Africa</i>	
Strengthening African University leadership and management capacity for economic transformation in Africa: My leadership and management experience in the University (1976-to date) Lwakabamba, S.	1
Strategy for alignment to the LMD system in selected francophone universities of Africa Majaliwa, J.G.M., Sebuliba, E., Kizza, C.L., King Freedom, Walangululu, M., Rasoarahona, J., D’Haese, L., Pillot, D., Ratsirason, J., Uwituze, S. and Adipala, E.	5
Challenges and opportunities for regional capacity building for sustainable natural resource management and agricultural productivity under changing climate: A case of South Sudan Kyamanywa, S., Bamutaze, Y., Ram, B. and Moilinga, P.	13
Nurturing Agri-Entrepreneurial skills through students’ attachments to agribusiness firms in northern Uganda: A case of the MSc. Agri-Enterprises Development Program of Gulu University Akidi, I.L. and Mugonola, B.	23
Sub-theme 2: <i>Strengthening ICT and knowledge management in agriculture</i>	
Coping with hardship in the Gezira Scheme, Sudan: Farmer’s strategy of developing a system of knowledge management Musa, N.S.A., Birungi Kyazze, F., Sseguya, H. and Kampen, J.K.	29
Innovation Platforms as accelerators to agricultural technology adoption in Ghana Adu-Appiah, A., Nsiah Frimpong, B., Obeng-Antwi, K., Osei-Adu, J., Agyeman, K., Darkey, S.K. and Tengan, L.M.	35
Understanding customer value as a driver for customer loyalty: The case of Airtel - Uganda Delyon, J.	43
Managing cellular network signaling traffic using helper nodes Oteyo, I.N. and Bainomugisha, E.	51
Student and e–assessment authentication in distance learning Mugambi, K.D., Sansa-Otim, J. and Bulega, T.	65

AgriMatch: A dynamic Ontology Matching System Ochieng, P. and Kyanda, S.	71
Sub-theme 3: <i>Sustainable intensification within smallholder crop value chains</i>	
Soil and water conservation practices and soil erosion intensity in the Lake Kivu Basin, Democratic Republic of Congo Addja, M.W., Majaliwa, M.J.G., Tenywa, M.M. and Somora, M.P.	77
Characterization and evaluation of rice genotypes under rainfed ecosystems in Malawi and Mozambique Abade, H., Abdala, J.A., Bokosi, J.M., Mwangwela, A.M. and Mzengeza, T.R.	87
Effects of tillage practices and cropping systems on maize grain yield in Gurue, Mozambique Chichongue, O.J., Van Tol, J.J., Ceronio, G.M. and du Preez, C.C.	95
Morphological and genetic diversity among blackberry accessions in Kenya Ochieng' J.A.	99
Screening of selected cassava genotypes for resistance to Cassava Brown Streak Disease by mechanical grafting in Southern Mozambique Oyesigye, E., Anabela, Z., Mondjana, A. and Magaia, H.	107
Competitiveness of selected pasture plant species with parthenium weed Mehdi, I., Lisanetwork Nigatu and Alemayehu Mengistu	113
Post flowering drought tolerance in cowpea genotypes in Uganda Mwale, S.E., Ochwo-Ssemakula, M., Sadik, K., Rubaihayo, P., Gibson, P. and Edema, R.	123
Farmers' own evaluation criteria in the continued use of adopted improved maize seed varieties Nchembi, N.S., Chonde, C., Mambo, I.M.C., Edriss, A.K. and Mvena, Z.S.K.	129
The effects of plant density on growth and yield of groundnuts Mkandawire, L.M., Mhango, W., Saka, V.W., Kabambe, V.H. and Goodman, J.	135
Farmer preference for improved seed potato varieties in Malawi: Case study of Ntcheu and Dedza districts Tione, G.	141

Environmental and social impacts of <i>Pteridium aquilinum</i> (L.) Kuhn (Bracken Fern) invasive species growing in Nyungwe Forest, Rwanda Senyanzobe, J.M.V., Mulei, J.M. and E. Bizuru, E.	147
Genetic sources of bruchid resistance in soybean: A review Ulemu, M.M., Kyamanywa, S. and Tukamuhabwa, P.	151
The role of drought stress on aflatoxin contamination in groundnuts and <i>Aspergillus flavus</i> population in the soil during field production Sibakwe, C., Donga, T., Njoroge, S. and Msuku, W.A.B.	161
Effects of harvesting date on aflatoxin contamination in groundnuts in northern Mozambique Zuza, E.J., Mondjana, A.M., Muitia, A. and Amane, M.	167
Effect of crop rotation on aflatoxin contamination in groundnuts Abraham, A., Saka, V., Mhango, W., Njoroge, S.M.C. and Brandenburg, R.	173
Molecular analysis of over-expression of NPR1 gene in putative transgenics of <i>Brassica juncea</i> plants Hailay, M., Anita, G. and Bhat, S.R.	179
Changes in respiration pathways during hydrogen cyanamide-induced terminal budbreak of Cripps' Pink Inamahoro, M., Steyn, W., Schmeisser, M., Jacobs, G. and Louw, E.	185
Temporal development of sorghum anthracnose in Uganda Akwero, A., Edema, R. and Okori, P.	197
Response of sorghum genotypes to anthracnose and <i>Turcicum</i> leaf blight Mayada, M.B., Okori, P., Rubaihayo, P., Nafisa, E.A. and Abdelbagi, M.A.	205
Genetic variation in durum wheat in N-use efficiency and heritability of trait at different N fertilizer application levels Miesho Belay, Tadesse Dessalegn and Wondimu Bayu	213
Effect of application of aquaculture effluent on nutrient uptake and grain yield of the common bean Alupo, N., Majaliwa, J.G.M., Nakileza, B., Kizza, C.L., Bugenyi, F., Iwadra, M., Akol, P. and Majugu, S.	221
Sub-theme 4: Sustainable intensification within smallholder livestock value chains	
Ex-ante benefit-cost analysis of an animal production and forage centre for a smallholder dairy value chain in Zimbabwe Chamboko, T., Mwakiwa, E. and Mugabe, P.	229

Effect of supplementing steers with graded levels of concentrate on rumen environment and degradation kinetics of <i>Chloris gayana</i> hay Semwogerere, F., Kigozi, A. and Kabi, F.	237
The use of mobile phone in camel marketing: The case of Babelle district of Fafan zone, Somali region, Ethiopia Ifrah Tofik	247
Raw cattle milk quality from smallholder dairy farms with respect to <i>E. coli</i> and Salmonella quality indicators Murongo, M.F. and Nassuuna-Musoke, M.	253
Sub- theme 5: <i>Marine science and blue economy - fisheries and aquaculture</i>	
Effect of dietary spirulina supplements on growth, haematological factors and survival of <i>Oreochromis shiranus</i> challenged with <i>Aeromonas hydrophila</i> Siringi, J.O., Kang'ombe, J., Jere, W. and Mtethiwa, A.H.	261
Comparative analysis of wood utilization and acceptability of fish from the smoking and frying technologies in Malawi Makawa, Z., Kaunda, E., Kapute, F., Valeta, J. and Maguza, F.	269
Effects of feeding frequency and feeding rate on growth performance, feed utilization and body composition of <i>Oreochromis shiranus</i> juvenile (Trewavas 1983) reared in laboratory condition Gwaza, T., Kaunda, E., German, C., Kang'ombe, J., Jun, Q. and Zongli, Z.	275
The effect of formulated and supplementary feeds on water quality parameters in concrete ponds stocked with fresh water fish Moges, T., Sikawa, D., Kaunda, E., Mtethiwa, A., Kang'ombe, J. and Macuiane, M.	281
Sub- theme 6: <i>Reducing postharvest losses</i>	
The potential of commercial preservation of tomatoes using a mixed-mode solar drying technology in rural Botswana Ebangu, O.B., Dintwa, E. and Motsamai, O.	287
Management of chlorine decay and formation of disinfectant by-products in drinking water: A case of Gaborone City, Botswana Nono, D., Odirile, P.T. and Parida, B.P.	295

Sub-theme 7: *Agricultural marketing pathways, product uptake, trade and policy*

Economic efficiency of rice production in smallholder irrigation schemes in Southern Malawi 305
Magreta, R., Edriss, A.K., Mapemba, L. and Zingore, S.

Potential role of traditional African foods in food security, nutrition and health 311
Muyonga, J.H., Nansereko, S., Ilona Steenkamp, Marena Manley and Okoth, J.

Sub-theme 8: *Addressing risk associated with climate change variability in agricultural systems*

Unpacking the nexus between climate change and cereal production: Implications for food security in the East African region 319
Olila, D.O. and Wasonga, V.O.

Aridity changes and its association with drought severity in Botswana 325
Byakatonda, J., Parida, B.P. and Kenabatho, P.K.

Socio-economic factors affecting adoption of climate smart agriculture technologies in Malawi 335
Nyengere, J.K., Mwase, W., Njoloma, J. and Nyoka, B.I.

Intensification of pastures in the tropics should consider Enteric Methane emission to the environment to save the climate: An *in vitro* CH₄ analysis from common intensified range pastures in Kenya 341
Koeh, O., Mooby, J. and Leemans, D.

Factors explaining producer perception towards weather index micro-insurance: Evidence from Kenya 345
Isaboke, H.N., Zhang Qiao, Nyarindo, W.N. and Wang Ke