SUB-THEME 1: AGRICULTURE AND FOOD SECURITY

What type of investment, research and education systems are required and practical to achieve the targeted increase in agricultural output of 10% over the next 20 years?

Chairman: Martin Schneider

Rapporteurs: Alice Nderitu and Maina Mwangi

The session Chairman opened by informing the participants of some facts on challenges facing mankind. He noted that 10% of all grain (about 220 million tons) is lost due to poor handling and storage methods and that in 2008, 48 million tons of rice was lost due to poor handling. Between US$ 14 – 30 billion is required to address these and other related challenges.

Other gaps identified during discussion include:

(i) Underfunding in agriculture education and research.

(ii) Dependence on government as sole or main source of funding untenable due to:
- Competition from other more critical issues, e.g., contagious diseases (avian flu, swine flu, HIV/AIDS).
- Dwindling sources of government revenue, e.g., impacts of recent global economic downturn.

(ii) Policies imposed on governments in the last 10 – 20 years by World Bank/IMF have had far-reaching adverse impacts on capacity of institutions to carry out training and research in agriculture. Critical gaps are identified in human capacity and infrastructure.
- Without investments in higher education it is difficult to produce manpower to generate the required technologies to drive increased agricultural productivity.
- Weak institutions may have difficulties attracting and constructing effective partnerships.
- Poor infrastructure compromises the quality of training provided.

Noted:

(i) A critical mass of well trained people is necessary who can use knowledge appropriately.

(ii) Investments are needed at different training levels, not just tertiary.

(iii) In Europe, 70 % of university funds are obtained externally through individual effort of professors. This can happen in Africa.

(iv) Quality of training should be given to agriculture students.

(v) The level of preparedness of graduates to meet the needs/ demands of the job market is uncertain.

(vi) It may be detrimental for graduates to be too specialised in specific themes.

(vii) Multidisciplinary is necessary:
- Provides graduate with better capacity to fit in job market.
- Makes agriculture more interesting and attractive to students.

Important:

(i) To what extent should training be oriented towards formal employment sectors?

(ii) Can trained youth apply the knowledge to venture into agribusiness within rural areas?

(iii) How can graduates in agriculture be facilitated with resources, e.g. microfinance arrangements, to venture into self employment?

(iv) Observed that all necessary knowledge cannot be obtained at once or in one place. Thus innovative strategies needed, e.g.:
- Continuing education opportunities for agriculture graduates.
- Deliberately sequenced training, e.g., BSc first then MSc to follow after timed exposure of graduate to work environment.

(iii) Availability and applicability of relevant agricultural information/knowledge.
- After training many scientists are likely to engage in 'office' or non-field activities, thus the knowledge they hold may not readily flow to end-users.
- Often the information may not be well packaged for ready utilisation by farmers.
- Capacity of scientists to package information for use by farmers needs strengthening.
- Significant disparity between available extension agents and the population of farmers.

(iv) Agriculture not attractive to students:
- Employment opportunities not readily available in public service.
- Working locations are mostly in rural areas where life may be harsh and not all amenities are available as in urban areas or in universities. This reverse experience (from institutions with superior facilities to areas with only basic amenities) may contribute to negative perception.
- Agriculture seen simply as production of crops and livestock.
- Noted that Agriculture as an option subject has been dropped from the Kenyan high school curriculum.
- Noted there is need to integrate agriculture into other subjects taught in high school, e.g. biology, geography.

Observed:

(i) Agriculture should not be confined to only the production of food.

(ii) Need to detach agriculture from subsistence level farming.

(iii) Rather agriculture should be presented to students as a much more interesting and dynamic science that entails more including non-food application of agricultural products, e.g., industrial processes.

(iv) This approach has led to increased enrolments in agriculture in some universities in Europe.

(v) This should be adopted as a good model by African Universities.

(v) Relevance of curriculum for job markets and inclusion of emerging issues, e.g.,
- Climate change, phytosanitary issues and trade, energy farming (biofuels), etc.
- Need for stakeholders to contribute to curriculum review exercises.
- Basis for revising/reviewing curriculum need careful thought to ensure focus/goals are achieved. Should not be done for the sake of it but should orient to meeting needs of the workplace.

Suggested Solutions

(i) Enhance and improve partnerships:
- These to encompass diverse public-private and private-private partnerships.
- Access to advanced equipment and other infrastructure can be improved through partnerships, e.g. modern genomics capacity at Biosciences east and Central Africa Hub located in Nairobi Kenya. Using these will improve quality of training.
- Private sector can create partnerships with universities to support generation, evaluation and validation of technologies that contribute to their profit.
- Through attachments/visits, private and public sector institutions can provide a window for students to appreciate opportunities available for graduates in agriculture.
- Partnerships that enable universities to influence teaching of agriculture at high school level.
- Seek/create opportunities for marketing agriculture to students at high school level, e.g. through high school heads association.

(ii) Regular review of curriculum to ensure relevance to needs of employers and also to strengthen ability of graduates for self employment:
- This can only be effectively accomplished when the fate of past graduates is known. Where do they end up? Tracer studies should be conducted before curriculum review.
- Other stakeholders need to be involved in curriculum review, especially those affected by such reviews.

(iii) To promote a positive perception of agriculture:
- Universities should develop strategy to get involved in training of agriculture teachers in high schools.
- Lobbying to retain agriculture in high school curriculum;
- Curriculum needs to be structured in a way that ensures coverage of the entire value chain, from basic production to consumer point. Agriculture should not be seen only as being about crop production.
- Institutions can set aside some resources to be used for positive publicity (marketing) to promote agriculture courses.

(iv) Universities need to diversify income sources, e.g.
- Produce and market produce, e.g., unique products that universities have good capacities in;
- Levy to be instituted on those who use trained manpower or other inputs generated/produced through participation of universities (e.g. in Kenya this could be part of the levy on exported horticultural produce collected by HCDA/ KEPHIS).

(v) Improved methods of disseminating information to farmers:
- Regional centers for synthesising and packaging information that is locally relevant (possibly into languages easily understood locally).
- Use opportunities availed by current technologies, e.g., ICT.
- Establishing effective feedback loops. Obtaining information from farmers makes them partners in innovation.

(vi) To improve quality of training:

- It is necessary to improve mentoring and acquisition of teaching skills (pedagogy)
- Invest in good infrastructure or enhance partnerships to access the necessary infrastructure.
- Involve stakeholders in developing curriculum.

How prepared to respond to new demands or emerging challenges in agriculture and economies are agricultural universities and research institutions?

Chairman: Elenimo B. Khonga

Rapporteurs: Mary Abukutsa, Alexander Kahi and Ngugi Kahiu

Emerging Challenges/New demands:

(i) Need for sustainable energy. There are moves to use agricultural products to produce energy. There is the need to find a balance between agriculture for energy and for food security
(ii) Climate change.
(iii) Degradation and management of resources.
(iv) Market linkage.
(v) New kind of farmers. Famers are literate and clearly demarcated and there is need to be ahead of farmers. We should note that we are dealing with different customers who are well informed.
(vi) Food safety especially with regard to GMOs.
(vii) HIV and AIDS problems.
(viii) Land fragmentation.
(ix) Reduced enrolment into agricultural courses
(x) Gender issues.
(xi) Globalisation and internationalisation of agriculture.
(xii) Human resources development
(xiii) Policy framework.
(xiv) New tools, e.g., ICT.
(xv) New gap – between farmers and emerging supermarkets (high standard demanded).
(xvi) Increasing population.

How prepared are we?

Our level of preparedness is not optimal. However, there is the need to change our approach to development of curriculum by

(i) Involve stakeholders/public and private sector – to address the needs of the practitioners.
(ii) Regular review of curriculum.

Problems

(i) Most university lecturers and students are not hands-on. This is opposed to the situation in medicine where most lecturers are also involved in the treatment of patients.
(ii) Past negative experiences.
(iii) Other changes needed – in promotion criteria, teaching methods
(iv) Pedagogy important – lecturers need to be prepared for their duties.
(v) Measure of success? – Is it certificates, student numbers, impact on society and economic development, or ability to solve problems?
(vi) Attitude towards agriculture. Admission is based on grades and not really the attitude. Need for strategies on how to make agriculture attractive to the younger generation.

Research Institutions

How best to improve research institution to meet emerging demands:

(i) Retooling of researchers?
(ii) Researcher specialisation versus. Interdisciplinarity. Researchers should be encouraged to adopt interdisciplinary approach.
(iii) Research agenda priorities (even for universities) especially where there are no research councils like in some developing countries
(iv) Linking research with extension – e.g. farmer field school/farmers' day (open day) – important source of researchable topics
(v) Regular research review at different levels with involvement of stakeholders

Way Forward

(i) Involve stakeholders to answer their needs.
(ii) Need for coordination/collaborations for benefit of farmers.

Change necessary in response to challenges. Collaboration between Universities and research institutions also important to avoid duplication.

What is the potential of agriculture in meeting the MDGs and how can this be exploited?

Chairman: Marten Soerensen
Rapporteurs: Gatahi Mwago and Raphael Wahome

Millenium Development Goals (MDG's)

(i) The millennium goals required investment of USD 403 billion.
(ii) Agricultural research and infrastructure was targeted to cost USD 109 billion or a quarter of the total estimate, but few countries have increased their national budget for agriculture to comply with this target.
(iii) Although agriculture can contribute to all the eight goals that were set, it is directly concerned with goals number one and seven. These goals desire to:
(iv) Eradicate extreme poverty and hunger. Reduce by half the proportion of people living in absolute poverty (poverty measured by inability to earn more than one US$

per day).

(v) Ensure environmental sustainability

The role of Agriculture in the SSA

(i) A large proportion (47%) of SSA's people lives under the poverty line of one USD per day.

(ii) However, 85% of the poor depend entirely on agriculture. The people are further encumbered with traditions or culture that minimises choice of permitted food.

(iii) For example, cactus is a major vegetable grown in Mexico for food. It also grows widely in SSA, but people are generally not familiar with its potential as a vegetable food.

(iv) Contribution of agriculture to MDG depends on overcoming national constraints, prejudices and exploiting the opportunities presented by a largely untapped resource of agro-biodiversity

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(vii) This is true for many exotic foods, but even previously well-known (orphaned) and ecologically highly specialised traditional crops are currently disappearing in spite of their remarkable potential.

(viii) The contribution of agriculture to MDG depends on overcoming national constraints, prejudices and exploiting the opportunities presented by a largely untapped resource of agro-biodiversity

The Options Available To Agriculture in Development

(i) The opportunity lies either in raising productivity per unit of land or alternatively/additionally utilise the land areas defined as marginal or even arid by (re) introduction of agro-biodiversity capable of producing under such conditions. The two complimentary strategies should be to both intensify agricultural production as well as increasing the land area by novel or reintroduced crops and practices. From among the options available the following render themselves to actions with potential for success.

(ii) Improved Water management through:

- Rainwater harvesting during the rains to mitigate dry seasons and droughts. Examples include use of dams or water pans protected from evaporative water loss
- Access to irrigation using appropriate technologies within reach of small holders is needed. Examples are drip irrigation and tread pumps with sprinklers. Small scale water and soil management improvement may reduce drought effects by more than 50%.
- Increase production by the use of water efficient crops / drought tolerant crops,

and this may be accomplished by utilising a range of traditional crops locally selected for their adaptability to marginal and/or arid lands or novel introductions of agro-biodiversity from regions with limited water availability.

Soil Management Practices

(i) Use of conservation agriculture.
(ii) Organic production practices
(iii) Intercropping.
(iv) Use of high value crops, where possible.
(v) Use of varieties tolerant or resistant to pests and diseases.
(vi) Use of transgenic crops.

Efficient Water Management

(i) Water harvesting during the rains to mitigate dry seasons and droughts. Examples include use of dams or water pans protected from evaporative water loss
(ii) Large irrigation schemes for smallholder systems may not work. Irrigation using appropriate technologies within reach of small holders are needed. Examples are drip irrigation and tread pumps with sprinklers. Small scale water and soil management improvement may reduce drought effects by more than 50%.
(iii) Use of water efficient crops might work, but they require more land space.

Crop and Livestock Diversification

(i) There is need to identify the major issues constraining crop production and determine which to address first. However green revolution emphasised increase in yield through increased water and fertilizer use. This could be tried all over again but is it sustainable?
(ii) Drought tolerant crops adoption or breeding. To address food security and poverty, focus should be on staple crops. These normally form 65% of smallholder value added crops and employment. People's preference for introduced crops that were accepted as staples may need to be changed. But difficulties are foreseen because of attitudes and practices that have been built over time. Opportunity to change over exists through starting in the marginal areas
(iii) Intercropping may reduce reliance on a few crops and increase resilience.
(iv) Use of new high value crops, where possible.
(v) Use of varieties tolerant or resistant to pests and diseases.
(vi) Intensive raising of high yielding breeds.
(vii) Judicious use of transgenesis. For example, use of transgenic crops may have possibilities of contaminating the pre-existing wild type genomes. In addition, there non-scientific objections to their use making them not immediately useful. They may have a positive role in reducing use of chemical fertilizers; but will consumers be convinced about their quality. There is also a danger that domination of seed production by some nations or companies may limit their usefulness
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Post Harvesting Handling and Processing

(i) Avoiding harvesting, handling and storage loss:
- Encouraging post harvesting value addition
- Market development to encourage market oriented production.

New Options

(i) New agro-ecological approaches such as Combination of trees and grazing allows use of animals normally stressed by heat.
(ii) Bio-fuel crop production that give the farmer some income for poverty reduction but may also reduce food production

Unlocking Potential

(i) The potential lies in directing research towards development of appropriate technologies, more vigorously disseminating those already developed and most specifically encouraging market development and value addition. Simple solutions that multiply yields may lead to over-exploitation of the production resources making the increase unsustainable.
(ii) Nevertheless, new agro-ecological approaches such as combination of trees and pasture to minimise heat stress on animals, may allow use of more efficient breeds while bio-fuel crop production could give the farmer some extra income for poverty reduction but may also reduce food production

Resolutions / Recommendation

(i) In summary agriculture based on plant derived staples representing a wide range of crops will ensure the essential demand for food security, sustainability, nutritionally attractive diets and improved livelihood.
(ii) Using agriculture as the basis for economic growth in the agriculture-based countries requires a productivity revolution in smallholder farming.
(iii) The role of agricultural university education is to train and focus students to develop, extend and implement the relevant technologies needed for the smallholder based production revolution.