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RESEARCH ARTICLE

Developing and Promoting Sustainable Postharvest Technologies for India and Africa

By Lisa Kitinoja

Introduction

Field observations over the past 40 years have reported that 40 to 50 per cent of horticultural crops produced in developing countries are lost before they can be consumed, mainly due to high rates of bruising, water loss and decay during postharvest handling (Kitinoja, 2010; Ray and Ravi, 2005). Losses can also show up as decreased nutritional quality or decreased market value. Reducing postharvest losses for fresh produce has been demonstrated to be an important part of sustainable agricultural development efforts to increase food availability (Kader, 2005), but only 5 per cent of funding for horticultural development efforts has assisted postharvest improvements, whereas 95 per cent has assisted efforts to increase production (Kader and Rolle, 2004). Literature reviews indicate that only one in 2000 agricultural development projects during the past 10 years has focused on postharvest horticulture (USAID, World Bank, UNFAO and DEVEX databases), even though an estimated 10-20 per cent of all farmers produce horticultural crops (Weinberger and Lumpkin, 2005; FAOSTAT, 2004). Unpublished evaluation reports on completed projects identified significant failures due to the over-reliance on production oriented activities, the lack of adequate training on postharvest handling practices, and slow or no development of appropriate postharvest infrastructure (see JICA's sponsorship of the Horticulture Crops Development Authority in Kenya; Diversified Agricultural Support Project (DASP) in Uttar Pradesh, India, of the World Bank; USAID projects Agricultural Exports and Rural Incomes, Horticulture (AERI-Hort) in Upper Egypt, Growth-oriented Microenterprise Development (GMED) in Maharashtra, India, and Agribusiness Market and Support Activity (AMARTA) in Indonesia).

In 2009 postharvest specialists initiated a project to document current levels of postharvest losses for small farmers in sub-Saharan Africa and India, then identify and test potential solutions. Project leaders comprised of postharvest specialists from the World Food Logistics Organization (WFLO) and the University of California at Davis (UC Davis) led a large team of collaborating partners based in Africa, India and the United States. The four countries of Benin, Ghana, India and Rwanda were selected based upon the wide variety of climates they had and horticultural crops they grew. Sixteen types of

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Table 1. Crops selected to study postharvest handling and loss

Crop category	Crop or crop type
Subsistence	plantains, bananas
Found in local diets	tomatoes, eggplant, cucurbits, okra, peppers, onions, cabbage
High nutritional value	oranges, indigenous leafy crops
High market value	litchis, pineapples, mangoes
Good potential for drying or added-value processing	tomatoes, cucurbits, peppers, onions, mangoes, bananas, leafy vegetables

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horticultural crops were selected for the study in five categories (Table 1).

Objectives of the study

The study had four objectives. Three objectives identified postharvest losses and ways to reduce that loss. The fourth objective was to feed the results into further work.

1. To systematically assess and characterize the postharvest losses for key horticultural crops in four representative countries at the farm and at wholesale and retail markets
2. To identify and field test postharvest technology options that could solve priority postharvest problems by conducting field trials
3. To identify postharvest technology interventions that would address the identified priority problems which are of appropriate scale, cost-effective and capable of raising income levels by at least 30 per cent
4. To use these results to develop a model dissemination strategy for those postharvest technologies which most likely will promote sustainable agricultural development for smallholder horticultural farmers

Materials and methods

Five workshops on postharvest loss and quality assessment methods were held in Africa and India during 2009 in which 236 people participated. Postharvest scientists from WFLO and UC Davis provided workshops for local partners followed by field visits to practice the use of tools and data collection protocols. Trainers from India participated in Africa-based workshops, and trainers from Africa were instructors in the workshops conducted in India. Local teams were joined by volunteers from the World Vegetable Center and Agricultural Cooperative Development International-Volunteers in Overseas Cooperative Assistance (ACDI/VOCA). Local partners identified the sites to be surveyed, people to be interviewed and observed, and the timeline for data gathering via field visits and laboratory studies.

Data was collected during April through September 2009. WFLO and UC Davis team members briefly participated with local assessment teams at each site, but most of the loss assessment were carried out by in-country project partners at universities and research centres. Participating institutions include Amity University in India; Kwame Nkrumah University of Science and Technology (KNUST), Council for Scientific and Industrial Research (CSIR) and Tamale Polytechnic in Ghana; Institut des Sciences Agronomiques du Rwanda (ISAR) and Kigali Institute of Science and Technology (KIST) in Rwanda; and International Institute of Tropical Agriculture (IITA) in Benin. Assessments were carried out at farms and at wholesale and retail markets. Teams collected 10 random samples for each crop and location combination. Interviews and observations of the commodity systems were done at each site.

Tools required for the assessment were provided to the assessment teams in a Postharvest Tool Kit, including a refractometer, Effigi penetrometer, sling psychrometer, digital scale, digital temperature probes, laser-guided infrared temperature sensor, colour charts for key crops to assess maturity, sizing rings, calipers, quality rating scales and colour illustrations for identifying crop defects. Data analyses included descriptive statistics for each crop, correlations and regression analyses for key variables.

Results and discussion

Measurement of postharvest losses and quality parameters at markets and farms coupled with interviews of key players along the value chains revealed a wide range of postharvest handling practices contributing to high levels of physical and quality losses, as well as market value decreases. Postharvest losses were related to one or more of four primary factors essential for maintaining quality and extending shelf life: temperature, poor quality containers, poor field sanitation and time to reach wholesale markets.

Temperature

Temperatures measured during harvest, handling, transport and marketing were much higher than recommended for quality maintenance. For example, pulp temperatures for tomatoes in India were found to be 10.2°C, 15.5°C and 14.1°C higher than recommended when measured at the farm, wholesale market and retail market, respectively. For temperate crops (cabbage, onions, amaranth leaves, litchis), measured pulp temperatures were found to be 25-30°C above the recommended lowest safe handling temperatures of 0-2°C.

Lack of the use of shade contributed to high pulp temperatures and high water losses. Mean weight loss for leafy greens, pineapples and bananas at retail markets in Rwanda were 11.3 per cent, 3.4 per cent and 8.8 per cent, respectively, during a period of 6 hours. High temperatures are known to cause increased rates of respiration, deterioration and water loss in

EDITORIAL

Dear Palawija News Readers,

The year 2011 started with food prices at an all-time high, as measureed by the FAO food price index, a trend that began back in the middle of 2010, spurred by unexpected supply constraints arising from adverse weather conditions, natural disasters, currency volatility and speculative demand for food. Additional disruptive weather conditions including floods, tropical storms, cold spells and droughts continued unabated in 2011, disrupting the livelihoods of millions of people and forcing them into food insecurity and poverty. Population growth also continued unabated with the birth of the 7 billionth child reported in October. A number of global forums held in 2011 called for more concerted action toward achieving the goal of sustainable development, particularly forums leading to Rio +20 that included the Global Green Growth Forum in Copenhagen in October and the Durban Climate Change conference in December. Achieving agricultural sustainability is imperative in the efforts towards sustainable development, as agriculture and the environment are inextricably linked. How best to achieve this is the challenge in front of us. While contributing to Asia-Pacific initiatives that define sustainable agriculture's role in a global compact on sustainable development, we are also working to raise awareness about the steps that each country, and even corporations and individuals, can take to realize the noble objective of ensuring a sustainable future for all. We consider these small steps taken by governments, corporations and individuals are as crucial as government negotiations for a global compact for sustainable development.

In light of these events of the past year, reducing postharvest losses and crop diversification are the two critical issues highlighted in this issue of Palawija News. Lisa Kitinoja in “Developing and promoting sustainable postharvest technologies for India and Africa” demonstrates that the majority of projects implemented in India and Africa still emphasize increasing food production, despite growing awareness that postharvest losses are significant and reducing them could greatly enhance efforts towards sustainable development. The second article, by Monayem Miah, points out that crop diversification along with crop rotation can enhance farmers' incomes and help maintain better soil structure, thus contributing to long-term agricultural sustainability.

Similar stories, efforts and research findings need to be shared widely to encourage more countries to implement programmes that create conditions for sustainable agriculture. We continue to count on your support, feedback and new ideas in 2012 toward this end.

All of us here at CAPSA extend our wishes to all of you for a productive year in 2012!

The Editor

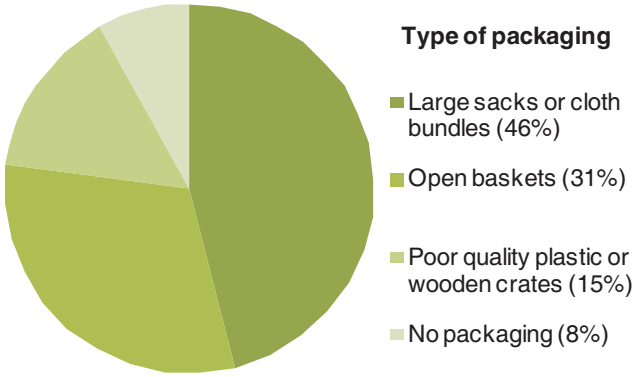
fresh produce, reducing market value and nutritional value.

Poor quality containers
The packages used for handling fresh produce in sub-Saharan Africa and India were found to be too large, too rough, and too flimsy to provide protection for fresh produce during handling and transport. During handling and transport (Figure 1) only 15 per cent of the crops sampled were packed in wooden or plastic crates, which provided protection from crushing during stacking. Even some of the most delicate, highly perishable crops were packed in sacks (leafy greens in Rwanda, okra in India), and many of the moderately perishable crops were packed in very large sacks (eggplant in India, pepper in Ghana and Benin, pineapple in Rwanda).

Poor field sanitation
Pre-sorting losses on the farm due to decay and pest damage in the field were high for okra in India (18.5%), tomatoes in Ghana (12.9%) and for leafy greens (17.3%) and tomatoes (23%) in Benin. Even though the most obviously decayed or infested units had been sorted out and discarded, 47 per cent of the sampled bunches of leafy greens showed decay symptoms in Benin.

Damage and decay during marketing
The time required for produce to reach retail markets varied widely and physical damage

Figure 1. Vegetable packaging in Sub-Saharan Africa and India



during transport and marketing was very high. Visual symptoms of losses and quality problems included wilting for leafy greens, softening in tomatoes and fruit crops, and bruising for many crops. Physical damage was extremely high for the most delicate crops: 34.3 per cent of leafy greens in Benin were damaged at the farm, 86.4 per cent, at wholesale market and 73.8 per cent, at retail markets. Cabbage in Ghana which is handled in large sacks, had damage levels of 54 per cent at farm, 32 per cent at wholesale market and 45 per cent at retail market. Bananas in Rwanda are transported without any kind of package and saw 22 per cent damage at retail markets.

Table 2. Postharvest technology topics and related options for study

Technologies	Field study options
Improved containers	plastic crates, liners, smaller packages
Improved field packing methods	Sorting and grading, gentle handling, trimming, wrapping
Providing shade	cloth covers, plastic net shelters, umbrellas
Insect control/pest management for fresh produce	hot water treatment
Insect control/packaging upgrades for processed products	sealed plastic for dried products, small scale CO_2 applications
Low cost cooling/evaporative forced air cooling	not tested
Low cost cooling/hydro-cooling	use of water from deep wells
Low energy cool storage practices	various sizes of the original evaporative zero energy cool chamber[a], clay refrigerator, ventilated storage structures for onions.
Small-scale cool transport	insulated boxes
Cool and Ship portable forced air cooler	not tested
Small-scale cold room equipped with CoolBot	Tested in India (potatoes) and Ghana (onions)
Methods to slow fruit ripening	ethylene scrubbers, 1–MCP treatments[b]
Methods to speed fruit ripening	use of ethylene (as Ethrel or Ethephon)
Solar drying	improved direct solar drying, indirect solar drying methods
Solar cookers for food processing	not tested
"Combined methods" as advocated by FAO for processing	bottling and canning fruit juices and tomato products
Sanitation procedures	hand washing, chlorinated wash water
Curing root and tuber crops	field curing methods (natural air) versus heated air
Alternative cooling technologies	Peltier refrigerator, desk study ongoing at UC Davis

[a] As documented in Roy and Khurdiya, 1981; Pal and Roy, 1988; Roy and Pal, 1991.

[b] Desk and lab studies are still underway at UC Davis. No sources for 1-MCP were identified in Africa, although studies have been recently conducted in India (Singh and Pal, 2008).

Conducting field trials

Based upon findings on the causes of postharvest losses and quality problems, 32 potential postharvest technical solutions were identified and 19 individual options were investigated further in field trials. Since findings during the postharvest assessments pointed to poor temperature management and poor quality packaging as the main causes of loss and reduced quality, the focus during the field trials was on simple technologies that could reduce temperatures, improve the quality of packages, add value or extend shelf life. Postharvest specialists from the USA and India visited Africa during the study to provide guidance on setting up field trials and collecting results and cost-benefit data (Table 2).

Preliminary results of selected field trials

Not every option could be tested due to time and funding constraints, but the final project report provides details on 19 field trials conducted during the study (Kitinoja, 2010; Kitinoja *et al.* in press). Cost-benefit analyses were conducted on improved handling, packing, storage and processing practices for specific crops. In 81 per cent (17) of these analyses, the postharvest technologies were determined to be cost effective and of appropriate scale for successful adoption and management by small-scale horticultural producers and marketers in Africa and South Asia. Use of these technologies are expected to boost incomes by 30 per cent; assuming a baseline income of US$ 600 per year, and additional profits are projected to be more than US$ 200 per year.

Implementing simple postharvest technologies such as those identified and field tested in this study can help small-scale farmers successfully protect produce during handling, store produce for a short time or process perishable crops to more stable foods. Use of appropriately scaled postharvest technologies can provide farmers with options to immediate sale, and can reduce fruit and vegetable losses while enhancing agricultural sustainability by reducing demands on natural resources used to grow horticultural crops.

Follow-on activities in extension and service delivery

As a follow-up to the planning study, WFLO, UC Davis and the University of Georgia are piloting a model postharvest training and services centre (PTSC) in Rwanda with KIST (under the USAID-funded HORT CRSP), based upon these field trials. In addition, The Postharvest Education Foundation (www.postharvest.org) and Amity University in India are developing a similar PTSC in Noida,

Uttar Pradesh, during 2011-2013. Uttar Pradesh is one of the most impoverished states of India, where a large population of smallholder farmers have typically lacked access to education and markets. Several private companies in Sri Lanka and India have recently expressed interest in funding set-up costs for similar postharvest centres as part of their corporate social responsibility strategies.

Both model centres include components aimed at reducing postharvest losses and improving earnings for smallholder horticultural farmers: capacity building through training of local trainers; demonstrations; a shop selling packages, liners, postharvest tools and other goods; fee-based services for packing, cooling and short-term storage; training on improved postharvest handling and processing (via links with extension services); and advice on marketing options, transport services, microcredit and other support services along the value chain as needed.

The Postharvest Education Foundation, in partnership with Amity University and Tamale PolyTechnic, is also launching two concurrent postharvest e-learning programmes, one for South Asians, the other open to a global audience. Applications to the global programme have been coming in from many countries, including Cambodia, Indonesia, the Philippines and Thailand. Assignments include assessing postharvest loss and quality for horticultural crops, conducting field trials and cost-benefit analyses of small-scale postharvest technologies, designing postharvest demonstrations and training programmes for local farmers, traders and marketers on best practices. E-learners who successfully complete the programme receive a Postharvest Tool Kit and a trip to the model PTSC in India for hands-on experience in providing practical postharvest training programmes for smallholder farmers. Participants will also receive long-term mentoring. A highlight of the e-learning programmes is a planned meeting of diverse participants from many countries at our postharvest training site in India, where we expect young professionals to network and improve their extension education skills by interacting with one another in solving practical postharvest problems.

Conclusions

Historically, production agriculture has received the vast majority of attention in development efforts. Increasing yields, planting improved seed and growing new crops are all important, but these improvements will be inefficient whenever food losses remain high during postharvest handling. High levels of postharvest losses represent an enormous waste not only of food, but also of the land, water, fertilizers and human labour that went into producing the food. Documenting the high levels of losses in the four target countries for small farmers during 2009-2010 was a key step toward designing appropriate future loss prevention efforts. A major benefit of the work was to improve the expertise and increase awareness of the causes and extent of postharvest losses among the many young scientists and extension workers from India and Africa who participated in workshops and in data collection and analyses. Many of the postharvest technologies tested were found by local participants to be equally applicable and cost effective in Africa and South Asia.

PolyNet shading is used for a field trial in India

By working with farmers and handlers in the postharvest sector and investing in simple, low cost improvements such as gentle handling, protective packages, shade and cooling, cool storage and processing, we all can help farmers and marketers to reduce physical losses, maintain food quality and market value for a longer period of time. By developing and promoting postharvest training and services centres in India, Africa and other countries in the Asia Pacific region that will serve to protect the food supply and extend the marketing period in cost effective ways, we can help farmers boost their confidence and take responsibility for crop value at further stages along the postharvest chain, and to use these technologies both to better access their local and regional markets and to gain more profit from their agricultural efforts.

(References available upon request)

SHORT ARTICLE

Crop Diversification in Bangladesh: Past Initiatives and Future Research and Policy Needs

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Agricultural diversification is the change in enterprise choices and input use decisions based on market forces and profit maximization principles (Pingali and Rosegrant, 1995). This diversification implies a shift of resources from primary staple crop, namely rice, to other cereal crops, from cereals to non-cereal crops, and from crops to non-crop (livestock, fisheries and forestry) agriculture.

In its efforts to attain self-sufficiency in food production to feed a growing population since 1972, the government of Bangladesh has promoted cereal crop production with the introduction of high yielding varieties (HYV) of rice and wheat and by launching Green Revolution and Grow More Food programmes. As a result of these initiatives, cereal crop production has increased tremendously, but land allocation and yields for minor crops, such as pulses, oilseeds, vegetables, fruits and spices, has decreased. Despite the policy emphasis on cereals, demand for minor crops increase and the government expended valuable foreign exchange to import them. To ensure the success of the diversified cereals policy, large quantities of fertilizers were imported to improve the nutrient status of soil.

Table 1. Land type by altitude and associated cropping patterns

Land type	Cropping pattern
High	Boro, Aman, fallow
	potato, Boro, Aman
	pulses , jute , fallow
	wheat, Kaon, Aman
	tomato, Aus, vegetables
Medium	potato, Boro, Aman
	wheat, Aman, pulses
	oilseed, Boro, Aman
	Boro, Aman, mustard
	tomato, Aus, vegetables
Low	potato, Boro, broadcast Aman
	Boro, Aman, fallow
	kaon, Aman, fallow
	wheat, Boro, Aman
	jute, Aman, fallow

In 1989, realizing the importance of growing minor crops, the government launched the Crop Diversification Programme, which was undertaken jointly by the government of Bangladesh, the government of Netherlands and Canada's International Development Agency. Crops included in the programme were tubers (potato, sweet potato, aroid), oilseeds (rapeseed, mustard, groundnut, sesame, sunflower, soybean) and pulses (lentil, black gram, mungbean, chickpea, field pea, cowpea, and pigeonpea).

Crop diversification patterns

Different crop diversification patterns were recommended and practiced throughout the country. The major cropping patterns based on land types are listed in Table 1. Boro, Aus and Aman are all transplanted rice varieties.

Five of these cropping patterns were reported to be highly adopted across the country (Table 2).

Table 2. Highly adopted cropping patterns and reasons for higher adoption

Cropping patterns	Reasons
potato, Boro, Aman	Irrigation facility
	Maximum return
	Land suitability
wheat, Kaon, Aman	Irrigation facility
	Credit facility
pulses, Aus, vegetables	Improving soil fertility
	Balanced diet
	Maximum profit
wheat, Aus, Aman	Irrigation facilities
	Credit facility
	Land suitability
Boro, Aman, fallow	Land suitability
	Demand for cereal foods
	Improving soil fertility

Public policies and strategies for crop diversification

The government of Bangladesh emphasized agricultural diversification in various policy

documents. The Ministry of Agriculture stated that the crop production system dominated by rice was neither scientific nor acceptable from an economic point of view. The ministry emphasized the need to increase the area and production of other minor crops such as potato, sweet potato, pulses, maize and millets in the Fifth Five-Year Plan (1997-2002) (FFYP, 1998). The plan intended to promote crop rotation of shallow-rooted crops with deep-rooted ones and legumes followed by non-legumes to enhance farmers' incomes and to help maintain better soil structure for long-term sustainability. The specific objectives of the plan were as follows:

- To sustainably increase productivity and real income of farming families in rural areas through sustainable intensification of rice production and locally appropriate crop diversification.
- To attain self-sufficiency in food-grain production along with increased production of other nutritional crops.
- To encourage export of agricultural commodities, particularly vegetables and fruits.
- To promote adoption of modern agricultural practices in dry land, wetland and coastal areas.
- To ensure sustained agricultural growth through more efficient and balanced use of land, water and other resources.
- To encourage comparatively large farms to graduate into commercial farming.

Despite policy support and constant encouragement from the government for crop diversification, measurements against the Simpson Index indicate that diversification remained low over the years. Lack of technological advancement was considered to be the main constraint.

Impact of agricultural diversification programmes

Although diversification remained low, some studies show positive impacts of the Crop Diversification Programme on production of minor crops (Alam, 2005; Rahman, 2008). Rahman (2008) reported that production of potato, oilseeds, pulses, fruits and vegetables increased in those areas under the programmes as compared to the non-CDP areas. He also showed that the level of crop diversity actually increased by 4.5 per cent over the 36-year period from 1960 to 1996, when the two agricultural censuses were conducted. Alam (2005) reported that there was a modest increase in potato production, which was attributed to growth in acreage and yield. He found that yields of pulses and oilseeds increased due to the adoption of improved production practices.

Constraints to the promotion of CDP crops

Each CDP crop experienced a different set of problems. However, the Ministry of Agriculture (2000) identified some common constraints for promoting crop diversification:

Lack of suitable land: Most farmers used their suitable land to cultivate high yield varieties of Boro rice and the potential for expanding area under CDP crops was limited.

Lack of water and technologies: Most of the CDP crops, except pulses, require irrigation during the dry season, but subsistence farmers could hardly afford to irrigate crops other than rice.

Low adoption rate of new varieties: Although a good number of improved varieties for different CDP crops and maize were available, diffusion of these varieties was still limited.

Imports discourage diversification: A large quantity of pulses, oilseeds and edible oils are imported every year. Imports bring down the local price for pulses exposing local producers to competition against world market prices.

Existing marketing system discourages diversification: Prices on most CDP crops generally drop to their lowest levels during the local harvest period. Farmers are compelled to sell at least 40-50 per cent of their output at any price prevailing at harvest to meet their cash needs.

Future policy needs

The government of Bangladesh is still emphasizing agricultural diversification throughout the country, which calls for rigorous policy analysis and in-depth review of past government initiatives toward CDP. It also calls for thorough evaluation of the changing situation for the country's agricultural production, consumption and export–import balance at the macro level. Future policy frameworks need to take into account what we know so far.

- Agriculture is still the single most important sector of the Bangladesh economy. Although the overall rate of increase for the agricultural

share of the GDP has declined over the years, specific increased rates have occurred in specific agricultural subsectors. The annual growth rate of the crop subsector decreased from 6.2 per cent in 2000/01 to 4.2 per cent in 2009/10. On the other side, the growth rates for livestock, fisheries and forestry subsectors increased from 2.8, –4.5 and 4.9 per cent in 2000/01 to 4.0, 4.5 and 5.9 per cent respectively in 2009/10 (Ministry of Finance, 2010). Non-crop agricultural production has exhibited a relatively high rate of growth in recent years.

- Agricultural diversification toward products with higher added value contributes to more rapid agricultural income growth and employment by stimulating small-scale farmers' participation in the market.
- Diversified production is also likely to lead to diversification in consumption, which is required for healthier and more balanced diets.
- Non-cereal crops like pulses and oilseeds are more profitable than modern rice and wheat cultivation due to lower input use, lower production cost, and suitability of producing these crops under non-irrigated or semi-irrigated condition. On the other side, the cultivation of high yield varieties of cereal crops involves high risk and incompatibility with existing irrigation system.
- Poverty and malnutrition are crucial problems in Bangladesh. The incidence of poverty and malnutrition is greatest in rural areas and is typically severe among small and marginal farmers. Agricultural diversification will be the best strategy to achieve the millennium goal of halving the number of people in severe poverty by 2015.
- The rapid growth in domestic demand for fruits, vegetables, dairy products, fats and oils is also creating new opportunities for diversification of agricultural production beyond cereals. Diversified agriculture could also be promoted through encouraging further diversity in food consumption. The share of rice and wheat in the total food basket has declined both in rural and urban areas, while the share of potato and pulses has increased.

Much emphasis was given in the Fifth Five-Year Plan (1998) to three objectives: attain self-sufficiency in food grain production; increase production of other nutritional crops; and increase exports of vegetables and fruits keeping in view domestic production and need. Such an emphasis at the policy level enhanced agricultural diversification in Bangladesh. Current national policy documents, including the NAP (2010) and NFPPA (2008), also recognize the need for diversifying agricultural production.

Policy guidelines should be developed for policy planners and practitioners in a formal and structured manner by pooling lessons learned from past initiatives. Five key research questions for future study are recommended:

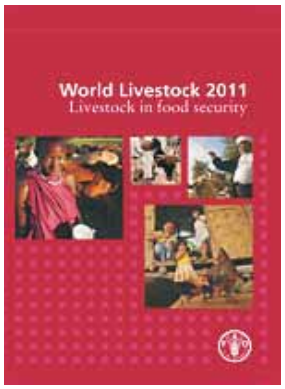
1. What changes have occurred in land use patterns due to implementation of past agricultural diversification programmes?
2. Are the diets of rural households with diversified agricultural production richer in micronutrients than rural households not practicing diversified production?
3. What can we learn about practical applications from past successes and failures?
4. What are the key constraints in implementing an agricultural diversification programme?
5. Do we need a set of strategies to implement agricultural diversification programmes based on products and regions?

(References available upon request)

BOOK REVIEW

World Livestock 2011: Livestock in Food Security

McLeod, A. (ed.), Food and Agriculture Organization of the United Nations, Rome, 2011. 128 pp. ISBN 978 9 25107 013 0.



This thematic report expands on the 2009 State of Food and Agriculture (SOFA) section which explored the multiple roles played by livestock in achieving food security for the poor, further advocating support for smallholders.

New Agriculturist (http://www.new-ag.info/en/book/review.php?a=2342) gives this review.

Livestock play a critical role in achieving food security, by providing nutritious food to consumers and income to producers. But to sustainably feed a growing population, the resources used to rear livestock – including water, fossil fuel and grain – must be used efficiently. In addition to outlining the general role livestock play in human nutrition, the supply of food, and access to food, World Livestock 2011 examines specifically the ways in which livestock contribute to the food security of pastoralists, small-scale mixed farmers and urban dwellers in Mongolia, Nepal and China.

Communities dependent on livestock, people who practice mixed farming on a small scale, and consumers in cities each have specific demands on farm animals and their products and distinct food security concerns. "The global land area available for grazing is close to its biological limit for production under the prevailing climatic and soil fertility conditions, putting pastoralist systems under pressure," the authors state. But due to the importance of pastoralist production, they call for investment to secure access to markets, enabling livestock owners to gain greater value from their produce. Issues of disease risk, environmental pollution and animal welfare in intensive livestock units that supply urban areas are also outlined.

The book ends by discussing the expected future demand for livestock products and ways this demand can be met with increasingly limited resources. Water shortages, the spread or emergence of disease and market volatility are also assessed. "The pressures on natural resources may force the price of livestock source foods to rise, making them less accessible to the poor, but improving efficiency and reducing waste in livestock production will make important contributions to ensuring the supply and accessibility of livestock source food," the authors write.
"Today's livestock sector must be prepared to respond with a shift in focus and investment towards building greater resilience into food systems, meaning an increased ability to deal with change and recover from shocks," the authors conclude. "All share a need for food systems to be sustainable and resilient. Each region and type of community will have an influence in shaping livestock's contribution to the food security of the future."

(Available for download at http://www.fao.org/docrep/014/i2373e/i2373e00.htm)

NEWS AND ACTIVITIES

CAPSA Hosts a Delegation from the Federal Republic of Germany

A delegation from the foreign ministry of Germany, led by H.E. Ambassador Dr. Norbert Baas, visited CAPSA the afternoon of Monday, 10 October 2011. The purpose of the visit was to learn more about our outreach and capacity building activities for sustainable agriculture, and how these efforts may link with Germany's aims for achieving global food security goals.

The German Ministry of Development Cooperation presented its new strategy for enhancing development cooperation efforts, called "Minds for Change – Enhancing Opportunities", in August 2011. Strengthening multilateral organizations by combining bilateral and multilateral cooperation efforts is an important component of the strategy.

UN4U Event in Bogor Recognizes the Need for Sustainable Agriculture for Poverty Reduction and Food Security

CAPSA, along with the World Food Programme, took part in an event that formed part of UN4U Campaign 2011 organized by the United Nations Information Centre in Indonesia. The event took place at Bogor Agricultural University (IPB) on 20 October 2011. More than 200 students and lecturers from IPB and other universities in and around Bogor attended the event.

Initiated by the current UN Secretary-General Ban Ki-Moon in 2008, the UN4U campaign aims at raising awareness of the work of the United Nations and its various organizations among young people through lectures, presentations and discussions.

In his lecture on the theme "Agricultural sustainability for poverty reduction", Dr. Upali Wickramasinghe, Regional Adviser on Poverty Reduction and Food Security, highlighted the need to think about ways and means of feeding an ever-increasing human population, expected to reach 9 billion by 2050, without undermining the regenerative capacity of agricultural resources, namely soil, water and biodiversity, so as to benefit future generations. Participating students raised engaging questions, including: Are genetically modified foods desirable? Is it possible to extend the land area dedicated to agriculture? How can we reduce food waste and excessive consumption by some groups? Can we determine our capacity for feeding a growing population through sustainable agriculture?

NEWS AND ACTIVITIES

CAPSA Launches Policy Research Workshop on *Sustainable Agriculture for Poverty Reduction and Food Security*

CAPSA launched its research workshop series on "Sustainable agriculture for poverty reduction and food security" by organizing a 5-day capacity building workshop on sustainable agriculture in collaboration with Sri Lanka's Ministry of Agriculture in Kandy, Sri Lanka on 14-18 November 2011. Twenty-seven researchers and government representatives from Sri Lanka and Bangladesh attended the workshop, representing the Ministry of Agriculture and research institutes in Sri Lanka and the Bangladesh Agricultural Research Council. Mr. K.E. Karunatilake, Secretary of the Ministry of Agriculture was the guest of honour at the inaugural session and Dr. Nimal Sandaratne delivered the keynote address.

The workshop covered five key themes:

- the global state of food insecurity and poverty and their measurements;
- methods and approaches to agricultural policy analysis;
- sustainability and its measurements;
- analysing policy through the lens of farming systems; and
- agricultural statistics.

A team of professionals drawn from the United Nations system, national and international research institutes and universities facilitated the discussions. The workshop concluded with a roundtable discussion about areas where further research could inform a sustainable agricultural strategy in Sri Lanka. Dr. Nimal Dissanayake, Director of the Rice Research and Development Institute in Sri Lanka chaired the roundtable.

CAPSA is planning to organize similar training workshops in the Asia-Pacific region with the objective of bringing together a core group of researchers to debate ideas on sustainable agriculture, poverty reduction and food security and to identify techniques and methodologies for analysing agricultural policy.

Participants of the workshop

Strengthening CAPSA's Data Repositories

As you have read in our previous updates, CAPSA's shifted its mandate in 2011 from secondary crops production to addressing systemic issues in sustainable agriculture. From December 2011 until February 2012, the Statistics Division of the United Nations' Economic and Social Commission for Asia and the Pacific (ESCAP) will provide us with support and technical advice to ensure that our database applications fully reflect the new mandate, offer benefits to ESCAP member states and meet the highest standards. The support will cover an assessment and reprofiling of the databases.

Renewing the CAPSA Library

With the shift in CAPSA's mandate, the library is refocusing its resources to address the current needs of the Centre and its stakeholders. In September 2011, we initiated a weeding programme to remove obsolete, damaged or rarely used books from our holdings. Since the library's print collection is limited by the space available, and the collection will be changing to reflect new strategic directions, weeding will ensure that our materials will be more useful and relevant. The work is expected to finish in 2011 and the library will once again be open to the public in the beginning of 2012.

SUCCESS STORY

Multiple-Use Water Schemes

Most farming households in the northeastern hilly regions of India and Nepal grow rice, millet, corn and a few other crops using a traditional agriculture practice called *jhum*, also known as slash and burn. Most people immediately think of the negative environmental impacts of slash and burn agriculture, but one of its main drawbacks is the very low yields it returns.

Slash and burn agriculture is also a poverty trap. Farmers would like to change their farming practices to grow more vegetables and fruit trees to increase income, but this would require reliable supplies of water. Several farm-level water management innovations and indigenous practices have been tried in the past. What smallholder farmers need is a water supply system that provides water for both domestic needs and high-value agricultural production, including livestock. Such a system needs to be flexible so that householders can switch from domestic to productive use to match seasonal demands. It has got to be simple with no maintenance costs, and it must ensure equitable access. Such systems are called multiple-use water schemes (MUS).

The basic designs for MUS are based on:

- Groundwater and lake water lifting and distribution;
- rainwater collection and distribution;
- spring water distributed by mechanical systems using gravity;
- and stream and river water supply after treatment.

Most of these schemes are designed to supply10 to 40 households, assuming 45 litres per person per day for domestic use, and 400-600 litres per household for productive use. In some cases up to 80 households have been provided water services through MUS. Design of such multiple-use systems accords first priority to drinking water and domestic use. This is in line with government policies on water resources development. The final design is determined by technicians in consultation with community users and based on their local knowledge and stated needs.

Working with local authorities, researchers from the International Water Management Institute (IWMI) and International Development Enterprises (IDE) installed MUS in the hilly regions of Nepal and organized cross-learning programmes between the Indian and Nepalese researchers, policymakers and farmers. A water-poverty mapping technique helped identify the best areas to target in the study villages, which are located in Nagaland and Sikkim states of India.

An evaluation of the schemes installed showed that they more than met the key indicators for success, with the added benefit of low initial investment costs (approximately USD 200 per household) and short cost-recovery periods. With MUS, households can earn an additional annual income of about USD 190 through the sale of surplus produce, which means that the initial set up of the system has a payback period of only one year.

MUS also has a great many non-monetary benefits, especially for women. Women are the prime target audience for all the project activities from design through development to use. When villages adopt MUS, women generally take up key positions in MUS user committees, empowering them to lead and link with other agencies. The additional income they earn from the sale of vegetables and other produce provides financial independence and enhances financial decision making. MUS also reduce women's workload by decreasing the time needed to collect water. More domestic vegetable consumption also provides better nutrition for women and children, which translates into savings on medical care.

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For more information, see www.iwmi.org.

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