Confronting diseases and pests and making clean planting materials available
Taming the deadly banana
Xanthomonas wilt disease (BXW)
ASARECA has put together a team of scientists drawn from different countries to work with farmers and local leaders to fight BXW. The teams have been promoting agricultural practices and community-based laws to stop the spread of the disease. They have propagated techniques that farmers are already using to quickly revive gardens that were ravaged by the disease. As a result, banana production has recovered from zero production in some parts that were devastated by the disease, to over 80% productivity, leading to food security and improved household income.

Countries involved: Burundi, Rwanda, Uganda, Kenya, DR Congo and Tanzania

Project Leader: Dr. Jerome Kubiriba, National Agricultural Research Laboratories, Uganda

Above: A woman in Bukoba, Tanzania displays bananas destroyed by BXW.

Right: Decapitated banana plants.
Left: A sucker growing after decapitation and (Top left) a scientist explains the technique of macro-propagation. Both techniques are used to control BXW.
Above: A healthy banana bunch realised after implementing decapitation, macro-propagation and other measures.
Access to disease-free, high quality potato seed, by smallholder farmers, is a major constraint to potato production and trade in the region. In response, ASARECA and partners have been promoting innovations such as positive selection for producing quality potato seed to enable potato farmers get higher yields while controlling pests and diseases. In addition, we have been promoting low-cost sweetpotato tissue culture multiplication to get clean planting materials. We have setup tissue culture mother gardens, community-based multiplication and hardening nurseries to serve as demonstration and learning sites in participating countries.

**Countries involved:** Kenya, Burundi, Uganda, D.R.Congo, Ethiopia, Madagascar, Rwanda, Tanzania

**Project Leaders:** Quality potato seed - Mr. Wachira Kaguongo, National Potato council of Kenya; Tissue Culture - Dr. Emmarold Mneney, Mikocheni Agricultural Research Institute, Tanzania

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Farmers supported by ASARECA share experiences from a model potato seed plot. Best practices on this plot have been replicated in individual farms in the project areas.
Quality milk from smallholder farmers

After producing management innovations for Napier smut and stunt diseases such as uprooting diseased plants, application of manure, use of disease-free materials, regulated weeding and cutting periods, ASARECA is promoting access and use of technologies and innovations that enable smallholder dairy farmers in the sub-region to increase milk production by keeping good quality livestock and diversifying livestock feeds. Quality of livestock is improved through provision of artificial insemination services. The feeds being promoted include fodder such as Lablab, Gliricidia, Calliandra and Sesbania as well as homemade feed rations such as nutrient feed blocks, hay and silage.

Countries involved: Tanzania, Rwanda

Project Leader: Prof. Noel Kanuya, Sokoine University of Agriculture, Tanzania
A co-ordinated assault against Striga, the ‘witch’ weed

Striga is a parasitic weed that destroys up to 100% yield of sorghum and other cereals. Sorghum is a staple in the arid areas of the ECA. ASARECA and partners generated a total of 56 lines of Striga resistant sorghum varieties using molecular marker breeding technology. The Agricultural Research Corporation (ARC) of Sudan officially released four of these varieties. Farmers in Sudan are already planting them. Meanwhile, five other countries are now validating these varieties on-farm for release to their farmers.

Countries involved: Eritrea, Kenya, Rwanda, Sudan, Tanzania, Uganda

Project Leader: Dr. Abdalla H. Mohammed, Agricultural Research Corporation, Sudan
Combating epilepsy
Taenia solium, a tapeworm that attacks pigs and people, is a leading cause of adult-onset epilepsy the world over. ASARECA and partners are validating a vaccine to control the worm. We are also validating a pen-size diagnostic kit that easily detects taenia solium in pork. Farmers and meat inspectors can use this kit.

Countries involved: Kenya, Tanzania, Uganda, Rwanda, Burundi and D.R. Congo

Project Leaders: Vaccine, Dr. Brian Babigumira, National Animal Genetic Resources Centre, Uganda; Diagnostic Kit, Dr. Helena Ngowi, Sokoine University of Agriculture, Tanzania

Pigs like this will be saved from Taenia solium once the pen-size diagnostic kit is approved for use by the farmers.
Climate change adaptation
Drought resistance in indigenous maize

Drought is a key factor leading to maize crop yield losses and thus persistent food shortage in the ECA, where maize is a major staple food. ASARECA mobilised a team of young scientists to develop maize that could withstand drought. This team made tremendous breakthroughs by inserting drought tolerant genes into indigenous maize varieties. The varieties are ready to move from the laboratory to confined field trials in Kenya, Tanzania, Sudan and Ethiopia.

Countries involved: Ethiopia, Kenya, Tanzania, Uganda and Sudan

Project Leader: Dr. Steven Rono, Kenyatta University, Kenya

Above: Genetically modified maize seeds harvested from the screen house at Kenyatta University, Nairobi, Kenya. These seeds are now being bulked for confined field trials. Top left: One of the researchers extracts immature embryos from local varieties at the beginning of the research.
Investing in climate smart water management and forecasting

Water availability is a major constraint in improving agricultural productivity in the ECA sub-region. This is mainly compounded by the reliance on rain-fed agriculture by a majority of farmers. With increasing uncertainty and risks associated with seasonal variability, ASARECA has effectively promoted water productivity enhancement innovations and downscaled forecasting in eight sites in the sub-region. Through downscaled forecasting, efficient water use innovations and provision of quality planting materials, maize yield in drier parts of Kenya and Ethiopia has increased from 0.5 tons/ha to 3.2 ton/ha and thus getting about 1,600 households out of the food insecurity bracket. Similarly, through improved adoption of water productivity innovations and market linkages, off-season onion growing is becoming a major source of income for small-scale farmers in Madagascar.

Countries involved: Kenya, Ethiopia, Eritrea, Sudan, South Sudan, Rwanda, Madagascar

Project Leader: Mr. Kwena Kizito, Kenya Agricultural Research Institute.
A farmer practices Zero grazing using feed combinations recommended to him by ASARECA partner scientists in ECA.
Healthy livestock in drought conditions
A previous ASARECA project identified strategies that pastoralists could use to cope with drought and minimize livestock loss. These included diversifying cattle species, use of traditional drought indicators, diversifying income, supplementary feed and feed conservation. ASARECA and partners are now promoting these innovations among pastoralists in three countries.

Countries involved: Kenya, Tanzania, Uganda and Ethiopia

Project Leader: Dr. Elizabeth Muthiani, Kenya Agricultural Research Institute

Right: This couple in Mwanza, Tanzania practice zero-grazing using stocked feed combinations for all season feeding.
Conserving agro-biodiversity

ASARECA and partners are conserving species and genetic resources of all sorts of crops, plants, trees, grasses and seeds to ensure they are available for posterity. The conserved species and resources are important for future research and development of new varieties. ASARECA has built capacity in the region to rehabilitate and refurbish facilities, and stock the national gene-banks. ASARECA is also promoting the sharing of genetic resources across member countries.

Countries involved: 10 ASARECA Countries

Project Leader: Dr. Abebe Demissie, ASARECA, Uganda
Nutrition and income
Promoting Snap beans for household consumption and for income

Snap bean, also known as ‘French bean’ or ‘green bean’, is a crop that smallholder farmers grow to increase their income. However, existing snap varieties are susceptible to diseases such as rust, angular leaf spot and anthracnose. Farmers rely on expensive pesticides to control these diseases. Their produce is often rejected because it fails to meet the acceptable pesticide residue levels in the export markets.

In a previous ASARECA project, scientists developed high yielding snap bean varieties that are resistant to the multiple diseases and adapted to local conditions. The varieties were released in 2012 after validation for performance in three countries.

**Countries involved:** Uganda, Kenya, Rwanda

**Project Leader:** Prof. P.M. Kimani, University of Nairobi, Kenya
Expanding production of African indigenous vegetables

There is huge demand for African indigenous vegetables due to their nutritional benefits and potential source of income. ASARECA is supporting farmer-led enterprises to produce quality seed and vegetables through good agronomic practices, processing, value addition and marketing.

**Countries involved:** Kenya, Uganda, Rwanda and Burundi.

**Project Leader:** Ms. Evelyn Nasambu Okoko, Kenya Agricultural Research Institute

*Multiplying amaranthus seeds in Dodoma, Tanzania.*

*Farmers processing African night shade seeds in western Kenya.*
Scaling up Quality Protein Maize

Scaling up Quality Protein Maize (QPM) varieties contain protein value which is 90% that of milk. Because of this advantage, QPM can be consumed without supplementing with other protein sources such as meat, or beans. It has potential to generate income for poor households. ASARECA and partners are scaling out uptake of QPM among small scale farmers. They are also promoting value added QPM products such as cakes, cookies, biscuits, ‘mandazi’, porridge, juice and animal and poultry feeds. A cook book with recipes for QPM has been published in English. It will soon be available in French.

Countries involved: DR Congo, Tanzania, Kenya, and Uganda

Project Leader: Dr. Godfrey Asea, NARO Uganda
Orange Fleshed Sweet Potato (OFSP), a healthier choice

ASARECA and partners are promoting the uptake of OFSP in Eastern and Central Africa. In addition, a wide range of value added OFSP products such as mandazi, cakes, cookies, biscuits, quality porridge; juice, animal and poultry feeds are being promoted in the region. OFSP varieties are adequate and cheaper sources of vitamin A for children and breast-feeding mothers. Vitamin A prevents blindness, measles and pneumonia among children. For adults, it gives healthy skin, improves immunity and resistance to chronic diseases and prevents premature ageing.

Countries involved: Tanzania, Kenya and Uganda

Project Leader: Dr. Everina Lukonge, Lake Zone Agricultural Research Institute, Tanzania
Having developed six value added products; mango juice, passion juice, mango and passion blend juice, amaranth soup formulation, solar dried mango slices and mango bars, ASARECA and partners are now validating and scaling out the products for commercialization. We continue to train farmers on various methods of conserving fruits like passion fruits, pineapples and mangoes to ensure year-round availability.

**Countries involved:** Rwanda, Tanzania

**Project Leader:** Prof. Bendantunguka Tiisekwa, Sokoine University of Agriculture, Tanzania
Intensifying small holder agriculture
ASARECA and partners are promoting the use of integrated crop-livestock innovations to boost the production of both crops and livestock, especially for smallholder farmers. These innovations integrate land and water management technologies and practices to improve food security and incomes. Some of the innovations include rainwater harvesting, improved forage chopper, drip irrigation innovations and the application of animal manure to facilitate year-round vegetable production. In addition, to enable the farmers to diversify livestock feeds, we are promoting fodder such as Lablab, Gliricidia, Calliandra and Sesbania. Also included are home-made feed rations such as nutrient feed blocks, hay and silage.

**Countries involved:** Kenya, Tanzania, Uganda and Burundi

**Project Leader:** Dr. Jolly Kabirizi, National Livestock Resources Research Institute, Uganda.
ASARECA in pictures

Tending to a kitchen garden of onions and cabbages in Masaka, Uganda.
Sorghum and legumes
Besides breakthroughs in efforts to generate Striga resistant varieties, ASARECA and partners are seeking to increase profits for sorghum farmers by promoting intercropping sorghum with cowpeas, ground-nuts and green gram. They are also uplifting the profile of sorghum by creating an attractive range of products to suit modern tastes and different market needs. Some of the products include cakes, mandazi, bread, cookies, popcorns and samosas. We are also promoting the formulation of chicken feeds from sorghum.

Countries involved: Sudan, Tanzania, Uganda

Project Leader: Dr. Dafalla Ahmed Dawoud, Agricultural Research Corporation, Sudan

Bread, popcorn, cakes, samosas and Mandazis made from sorghum in Tanzania and Sudan.
Promoting regional trade
Commercializing cassava and potato

Market opportunities for farmers in Uganda, Kenya, Tanzania, Uganda, Burundi and Rwanda are set to expand following the approval of 11 rationalized and harmonized standards for cassava and sweet potato by the East African Community. ASARECA and partners are raising awareness on the requirements of harmonized standards for cassava and potato to promote cross border trade in the root crops. This is part of the efforts to increase the value of cassava and potato, by expanding their uses.

Countries involved: Rwanda, Tanzania, Kenya, Uganda

Project Leader: Ms. Stella Apolot, Uganda National Bureau of Standards
Farmers of sweetpotato and cassava in East Africa are due to earn better income as implementation of the approved cassava and potato standards gets underway.
Harmonised seed policies bear fruit

ASARECA has worked closely with the governments in Kenya, Tanzania, Uganda, Burundi, DR Congo, Eritrea, Ethiopia, Rwanda, Madagascar and Sudan to rationalize and harmonize regulatory and legal frameworks for the seed industry in the region. The efforts are already bearing fruit. Local seed production in Uganda, Kenya and Tanzania has tripled from 43,000 to about 122,000 tonnes between 2002 and 2008. In Uganda, exports from Kenya increased from less than 1,000 to more than 3,000 tonnes in the same period. Private sector involvement in variety breeding and release has increased the number of high performing seed varieties on the market.

Countries involved: Burundi, Tanzania, Kenya, Uganda, South Sudan

Project Leader: Mr. Wachira Kaguongo, National Potato council of Kenya
Influencing national policy making processes
Containing food prices

ASARECA and partners are making concerted efforts to keep the issue of food prices, markets and barriers to commodity trade high on the policy agenda of the governments in the region to mitigate the adverse effects of the high food prices. This comes after world food prices reached historic high levels in 2011, hence aggravating food security. Part of the advocacy to curb food prices has been to keep policy makers well informed of the food trends and their implications, so that they do not make ad-hoc policy actions, which could worsen the situation. ASARECA has generated data on food trends, analysed it and made it available to guide policy makers to make evidence-based decisions. Besides, we are developing and validating frameworks for forecasting future price changes.

Countries involved: Rwanda, Tanzania, Kenya, Uganda

Project Leader: Dr. Francis Aron Mwajande, Economic and Social Research Foundation, Tanzania

Commodities in a shop in Kampala, Uganda. ASARECA contributes to the stability of food prices by providing policy guidance to governments.
Capacity for agricultural research, development, extension, education and training
Training scientists to face modern research challenges

A total of 34 young scientists from the national agricultural research institutes of Burundi, Rwanda and Sudan whom ASARECA sponsored to undertake Masters degrees in universities in East Africa completed their studies in Plant Breeding, Soil Science, Agricultural Information and Communication Management, Research Methods, Range Management, Agricultural Extension, and Breeding. The young scientists have been well received in their countries. In Rwanda and Burundi for example, the scientists have been deployed in strategic positions to help realise the food security visions of the two countries. Initial assessments indicate that they are doing a good job.

Countries involved: Sudan, Rwanda, Burundi, Uganda, Kenya

Project Leader: Dr. Wellington Ekaya, Regional Universities Forum, Uganda

These scientists who were trained through the Strengthening Capacity for Agricultural Research and Development (SCARDA) programme returned to Rwanda and Burundi and are already making positive contributions to agricultural research and development.

Cyamweshi Rasangama (centre bending) from Rwanda Agricultural Board teaches farmers to prepare kitchen gardens for domestic vegetable production.
Above: Gafishi Kanyamasoro from Rwanda Agricultural Board is developing inbred maize lines for high altitude areas.

Right: Mathilde Uwizerwa is conducting research and extension work in soy bean production in Rwanda.

Maximilan Manzi monitors and coordinates all livestock research and development activities in Rwanda.

Wilson Dufitumukiza (Left) is actively involved in tea research in Rwanda.