

## ICRAF supports Laikipia County Government achieve its vision for a green economy

By Albert Mwangi



ICRAF and the Laikipia County Government team pose for a group photo

Laikipia County in Kenya has a grand vision of transforming its citizens' socioeconomic wellbeing through several empowerment-focused projects. This includes a transformation of the county's landscape with trees, for multiple socio-economic benefits and climate change mitigation and adaptation. ICRAF is providing technical and policy-framing support on this greening project to the Laikipia Governor and fellow policymakers, and both institutions have had several meetings in the recent past.

On 20 January 2016, ICRAF hosted His Excellency Joshua Irungu, the Governor of Laikipia County; Veronica Gakenga, Chief Officer for Education; David King'ori, Director of Environment; Annette Muriuki, Director of Administration and Cabinet Affairs; John Wambugu, Chief of Staff; and Charles Nderitu, Director of Planning.

Tony Simons, the Director General; Jeremias Mowo, the Regional Coordinator for Eastern and Southern Africa; Constance Neely, Senior Advisor, Integration of Research, Practice and Policy; Catherine Watson, Head of Programme Development; Mary Njenga, Post-Doctoral Researcher on Bioenergy; Jonathan Muriuki, Kenya Country Representative; and Catherine Muthuri, Research Scientist, among others, represented ICRAF during the meeting.

In his introductory remarks, Tony Simons noted that ICRAF was delighted to work with Laikipia. He dispelled the notion that ICRAF competes with local organizations and noted that the ICRAF's mandate is to work closely with a range of partners to fulfill its mandate. Dr Simons posed some thought-provoking questions on the County's plans by asking the purpose and commitment of everyone involved.

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## ICRAF supports Laikipia County Government achieve its vision for a green economy. cont.

The Governor shared his experiences from the two conference of the Parties (COP) climate meetings he attended in Peru and Paris, and noted that his focus would be on how to ensure that 25 percent of Laikipia households use renewable energy as a way of mitigating climate change and increase the county's forest cover from six percent (based on data from [Kenya Forest Service](#)) to 10 percent by planting 40 million trees in 48 months.

The consultative meeting discussed sourcing of tree seedlings in the short-term, training locals to start tree nurseries, creating a favourable policy environment to support tree planting and water sources to support the nurseries.

The county is also planning a Governor's Tree Planting Week on 25-29 April 2016 to kick off the tree planting campaign. According to Governor Irungu, he hopes to plant an ambitious 10 million trees in the four days.

ICRAF will provide technical advice on appropriate tree species for various ecological zones and purpose across the county and how to manage tree nurseries and trees. This initiative is part of a wider plan for the county under the Household Economic Empowerment Program (HEEP) that aims to reduce poverty levels currently affecting 47 percent of the county's households who live below the poverty line. HEEP will introduce and support the rearing of indigenous poultry, dairy goats, rabbits and kitchen gardens for organized groups.

The planning for this project began in 29 June 2015 when ICRAF convened a workshop at its Nairobi offices.

The workshop drafted a concept note on city-region food and energy systems in the Kenyan Arid and Semi-Arid Lands (ASALs).

On 2 July 2015, Governor Irungu invited Catherine Muthuri, Miyuki Liyama, Mary Njenga, Constance Neely and Getz-Escudero to a full day discussion on the way forward for enhancing the landscape approach to city-region-food-systems in Laikipia County. On 15 July 2015 the Keekenyokie Slaughterhouse hosted the Governor of Laikipia along with some 30 colleagues from Laikipia County and Mary Njenga for discussions on how to create innovative slaughterhouses similar to Keekenyokie.

Keekenyokie Slaughterhouse is known for its management of slaughterhouse wastes conversion into beneficial products, including soil amendments and biogas generation to support the local community through gas canisters, fertilizer production and support to healthy rangelands. Mary Njenga is working with stakeholders of Keekenyokie Slaughterhouse on production of fuel briquettes from the sludge which is left after extraction of biogas.

In preparation for the implementation of the landscape approach to city-region-food-systems in Laikipia County, the County Government convened a meeting attended by six ICRAF scientists and over 60 participants from the executive arm of government on 13 January 2016.

The team also agreed to boost awareness and increase advocacy on the importance of having a strong tree planting culture for the county residents. It also aims at developing a county model for transforming landscapes with trees that could be replicated in other counties and regions.



Tony Simons gives a short presentation on ICRAF mandate



Hon Joshua Irungu, the Governor of Laikipia County, speaks of the collaboration between Laikipia County Government and ICRAF

## CGIAR Centers and Programs take major step towards improved collaboration and integration in Malawi

Blog content credit: CIP

A two day [national consultative workshop for Malawi](#) held at Crossroads Hotel in Malawi's capital Lilongwe from 18th-19th February 2016 has marked a key step in the engagement process of the [third Global Conference on Agricultural Research Development \(GCARD3\)](#) which aims to provide a variety of opportunities for interaction with diverse groups of stakeholders to positively influence the direction and activities of international research for development over the next ten years.

GCARD3 involves consultations online as well as [National, Regional](#) and [Global](#) levels which help to refine agricultural research priorities, as identified by different stakeholder groups and representatives in an inclusive way.

This meeting also marks the first steps towards the [site integration](#) of institutions and programs of CGIAR working in the Southern African country.



## CGIAR Centers and Programs take major step towards improved collaboration and integration in Malawi. cont.

Drawing participation from each of the eight CGIAR Centers in Malawi, as well as government agencies, NGOs, the academia, the donor community and the private sector, the workshop aimed to introduce the concept of GCARD3 and site integration with the key aim to explore opportunities for partnership, alignment and collaboration among the Centers and their partners in line with collectively identified development priorities.

In Malawi, the idea of site integration received the backing of Ministry of Agriculture, Irrigation and Water Development with its principal secretary signing the invitation letters to invitees.

Opening the workshop, Chief Director, Mr. Bright B. Kumwenbe for Ministry of Agriculture, Irrigation and Water Development hailed CGIAR for the idea, saying it would help reduce duplication of efforts and wastage of resources particularly where several organisations were conducting similar activities in isolation.

He expressed optimism that participants would come up with concrete interventions which the CGIAR Centers, government, NGOs and the private sector should focus on to contribute to national priorities.

To foster deeper understanding of the country's nine key priorities among participants, the Ministry of Economic Planning and Development outlined the Malawi Growth and Development Strategy (MGDSII), which has agriculture and food security as the top priority.

The plan was then narrowed down to agricultural policies and priorities before delving into the agriculture research strategy for Malawi.

More often left out of discussions that have a bearing on their lives, farmers were also importantly represented. Outlining their expectations, the Farmers Union of Malawi looked forward to strengthened collaboration with CGIAR Centers and their stakeholders for the benefit of farmers.

Each of the eight CGIAR Centers namely CIAT, ICRAF, CIMMYT, CIP, ICRISAT, IITA, World Fish Centre and IFPPRI took turns to expound on their activities in Malawi. From the presentations a picture of some overlaps, need for greater collaboration and alignment emerged.

The workshop was also tasked with spelling out problems affecting the achievement of the Malawi's eight agriculture priorities. Among the challenges highlighted were:

- climate change
- limited availability of improved seed
- limited land holdings
- lack of appropriate technologies to achieve sustainable agricultural production and productivity
- over-reliance on rain-fed agriculture
- low adoption of sustainable irrigation practises, and
- low levels of agriculture mechanisation.

With the challenges and possible interventions outlined, it was time to map the way forward.

The workshop noted that although there are a few examples where CGIAR Centers work together, collaboration among them is very low, partly because of the different timelines of projects and narrow interests or targets of the donors.

Some of the recommendations included the need for greater synergy and complementarity in research work, harmonisation of project timelines, and regular meetings to ensure farmers get timely outcomes of research work.

According to Dr Paul Demo of CIP, the recommendations will inform the second phase of CGIAR Research Programs (CRPs) for which full proposals are currently being developed as well as the site integration plan that will be developed for Malawi. He noted that twenty countries were identified, including Malawi, as a starting point for the site integration initiative which has a key objective for CGIAR to make significant impact.



Group work



Group photo of participants in the Malawi National Consultative Workshop

# Enhancing Leadership in Flood Based Farming Systems in Africa and Asia

By Elsabijn Koelman

ICRAF, in partnership with MetaMeta and the International Water Management Institute, convened a two-week leadership course under the *Africa to Asia: Testing Adaptation of Flood-Based Farming Systems (FBFS)* Programme. The goal is to provide a platform for exchanging new and innovative ideas, experiences and knowledge among young professionals on water management. Twenty-one participants took part in the leadership course from 29 February to 11 March 2016 in Nairobi, Kenya and Moshi, Tanzania. The participants were drawn from Afghanistan, Ethiopia, Malawi, Myanmar, Pakistan, Kenya, Somalia, the Netherlands, Sudan, Tanzania and Yemen. They comprised researchers, engineers, lecturers, communication professionals, agronomists, as well as farmers.

The main objective of the leadership course was to train development leaders on the participatory approach to watershed management and climate change and variability. The other objective was to develop practical know-how and specific skills for sustainable development and management of FBFS and Water Harvesting Systems.

The Leadership Course comprised two key components. During the first week in Nairobi, expert facilitators trained the participants on the practical know-how and specific skills of FBFS. Topics such as 'Flood Water Governance and On-Farm Management' were discussed as well as 'Water Harvesting-Practices and Recent Innovations'. There were several interactive sessions including group work, presentations and video presentations during the first five days.

The second week of the course was held in Moshi, Tanzania. Participants visited two field sites, including the upper and lower catchment of the Pangani Basin near Moshi. They interacted with farmers and viewed some of the structures such as the Ndiva

Reservoirs. From the Bangalala and Makanya community, they learnt how farmers use flood water to irrigate their land and how it is managed and distributed amongst the upstream and downstream communities. The final session of the training focused on setting up the *Kilimanjaro Declaration*, which was to guide the way forward in promoting FBFS in the 10 participating countries.

One of the participants, Mr. Maurice Opondo who works for the Ministry of Water and Irrigation in Kenya, noted that the training was an eye opener on FBFS. Amongst the participants of the leadership course there was consensus that in any intervention something should be left behind for the farmers, such as strengthened capacity or supported champion farmers. This point was further stressed by Prof. Henry Mahoo from Sokoine University of Agriculture in Tanzania, who was concerned about the sustainability of FBFS interventions. Moreover, the young leaders agreed that in order to continue strengthening links with farmers and to build their capacity, it is vital to involve the government, private sector, existing farmers associations and other relevant stakeholders.

The FBFS Leadership Course is an annual event of the FBFS programme and will be hosted by one of the member countries. "As a young professional, it was encouraging to share experiences and stories with participants from different countries. I learned a lot and it gave me even more motivation to take the lead in working together on rain water harvesting," Luwike Bosma an expert from MetaMeta shared.

One of the aspects of the FBFS programme is mentorship, where each young leader will have an experienced mentor from their field to help strengthen their capacity on FBFS.



Participants from over 10 different countries meet during the first week of the FBFS course in Nairobi



## Enhancing Leadership in Flood Based Farming Systems in Africa and Asia. cont.

With such continued mentorship, the young leaders who participated in the course are encouraged to make a difference in their respective countries by promoting FBFS and building the capacity of local partners as well as promoting the benefits and technologies of FBFS.

The *Africa to Asia: Testing Adaptation Of Flood-Based Farming Systems (FBFS) Programme* uses FBFS to alleviate poverty and develop inclusive growth in water-stressed regions of Africa and Asia through relatively short flood periods. The project is aimed at eight intervention countries: Kenya, Ethiopia, Malawi, Sudan, Myanmar, Pakistan, Yemen and Afghanistan. It is looking to expand into Somalia and Tanzania where FBFS is a suitable option. The project targeting 24 million FBFS users in the eight participating countries. The overall goal of the project is to support the flood-based farming system, to contribute to food and nutrition security and build the resilience of local communities. The initiative aims to achieve this goal by strengthening knowledge networks and local institutions via research, capacity building and through investment in programs and policies.



Group discussions with the farmers of the Upper Makanya catchment in Tanzania about the Ndiva water structure. Photo © Elsabijn Koelman

## Funding and partnership opportunities for ICRAF in Tanzania

By Albert Mwangi

Between 7-15 February, Dr Jeremias Mowo, Eastern and Southern Africa Regional Coordinator visited several project sites in Mbeya in the Southern Highlands of Tanzania. The purpose of these visits was to monitor the progress of projects and explore funding opportunities and collaboration in the country.

On 7-9 February 2016 Dr Mowo visited the East Africa Dairy Development (EADD) country office based in Mbeya to discuss project implementation with the manager. He later visited an EADD project hub and a farmers' field site which showcases the latest developments in improved dairy cattle and fodder species.

On 10-15 February 2016, the ESAf Coordinator met with ICRAF Tanzania staff to discuss the Centre's activities in the country. He later held meetings with groups from the GIZ-Kilimo Trust, IFAD and the Competitive Africa Rice Initiative (CARI).

The team from GIZ-Kilimo Trust, expressed interest in developing a business case for agroforestry value chain with emphasis on fertilizer trees, fruit trees, nuts and medicinal trees that can be grown with cash crops. They were particularly interested in having *Moringa* and *Allanblackia* as complementary crops. The Tanzanian team was tasked with developing the proposal.

Dr Mowo met with Ms Mwatima Juma, the Senior Country Program Officer and Ms Rachele Arcese, the Program Officer during his visit to the IFAD-Tanzania offices. The team shared information on three proposals: sugarcane plantation in Bagamoyo, dairy project in the highlands of Tanzania and decentralized packaging of food products. IFAD-Tanzania is in the design phase of a dairy farming project that will focus on high milk producing regions like Iringa, Mbeya, Tanga and Arusha. IFAD proposed that ICRAF drafts and submits a concept note highlighting its potential contribution to the project with emphasize on feeds and fodder.

Dr. Mowo also met with Ueli Mauderli, Head of the Rural Development Sector and Ms. Clara Melchior the Program Officer, Employment and Income from the Swiss Agency for Development and Cooperation (SDC). The agency expressed interest in working with ICRAF to develop a business case for fertilizer trees intercropped with maize or sunflower. The country team is developing a Concept Note on this.

During the final leg of the visit, Dr. Mowo paid a courtesy call to the Ministry of Agriculture, Livestock and Fisheries, Tanzania where he met Dr Geophrey Kajiru, the Acting Director of Research and Development. Dr Mowo followed up on the renewal of ICRAF-Tanzania's memorandum of understanding with the Government of Tanzania which Dr Kajiru indicated was at 'an encouraging stage'.

## Concern Universal Representative Tours Forestry Project in Dedza, Malawi

By Godfrey Chisusu and Aston Mulwafu

On 22 December 2015, ICRAF Malawi hosted Esther Mweso, the Concern Universal (CU) Programme Manager as she participated in the *Empowering Forest Dependent Communities through Commercialization of Small-scale Forestry (EFDCCSF)* project field tour.

The project is an initiative mainly funded by the EU mission in Malawi. The UK's Department for International Development (DfID) though CU financed some activities of the initiative for six months from October 2015 to March 2016.

The aim of the field visit was to monitor progress in the project implementation sites. The team visited places in Traditional Authority Kamangagwaza in Dedza District where farmers have established individual and communal timber plantations.

In this area, the project anticipates to grow 12,000 (≈11 hectares) pine and blue gum trees for 20 individual farmers and 1,500 (≈1.4 hectares) pine and blue gum trees for the communal forest.

## Concern Universal Representative Tours Forestry Project in Dedza, Malawi. cont.

The project is also encouraging farmers to expand their plantations by planting blue gum trees which is early maturing for short-term benefits, when compared to pine. They later visited a small-scale timber plantation (1ha) and an orchard comprising 100 (≈0.4ha) fruit trees established by Mngonioonda Primary School.

Farmers will now sell their logs to a nearby sawmill or may opt to produce the timber themselves before selling. Fruit orchards will provide food and income from fruit sales. Diversifying into small-scale timber plantations and fruit production has helped the farmers to generate more income and improving their livelihoods.

During the interaction with the communities in the area of Group Village Headman Nadzikhale, Esther praised Mr. Raizio Gilifesi the Nadzikhale Village Head for providing land and portraying good leadership in implementing the project. She stressed the need for communities to take ownership of the project. "Managing the community nurseries is commendable as it proves that the people have bought into the project. This will go a long way in ensuring that the project is a success," she said.

"So far so good. I was worried that with the delayed project funding, implementation might not start on schedule. These communities

are showing genuine interest and willingness in participating in the project activities," Esther opined. The initiative is meant to help 260 communities who live around national forest reserves in six districts in Malawi. These communities will be empowered to engage in activities that will generate alternative sources of income with the aim of reducing pressure on forests. The key activities include, small-scale timber out-grower schemes, establishment of fruit orchards, beekeeping, farmer-managed natural regeneration (FMNR), use of fuel-efficient stoves and production of briquettes. In Dedza, the project is currently at the tree planting stage for both out-grower and fruit orchards. The fruit orchards will also act as mother blocks for propagation of improved fruit varieties.

The project is funded by the European Union. Concern Universal with support from DfID provided supplementary funding to the tune of £350,000 through Developing Innovative Solutions with Communities to Overcome Vulnerability through Enhanced Resilience (DISCOVER) a project managed by CU. ICRAF and World Vision Malawi are implementing this project in six districts of Karonga, Mzimba, Dedza, Machinga, Ntchisi and Chikwawa.

## Voluntary certification aims to improve tree-planting investments in Malawi

By Godfrey Chisusu and Bruce Sosola

In Malawi, there is an old adage from the Chewa community, which states '*fodya n'kunazale*' meaning '*good tobacco begins from a good nursery*'. This is no different when it comes to fruit and agroforestry trees. A good nursery stock is the beginning of a productive fruit orchard, agroforest or woodlot.

Currently there are no laws governing the supply of quality tree planting material. To address the issue of poor quality seedlings, the World Agroforestry Centre, in partnership with various organizations, developed a voluntary nursery certification scheme.

On 10 December 2015, ICRAF convened a half-day dissemination workshop at the Golden Peacock Hotel in Lilongwe, Malawi with these organizations to discuss the possibility of institutionalizing minimum standards for tree planting material in the country. Malawi will only make progress in afforestation, reforestation and agroforestry efforts if the quality of planting material is improved.

During the official opening, Mrs. Erica Maganga, the Principal Secretary for Agriculture, Irrigation and Water Development, noted that it was important to ensure that tree-planting efforts are not wasted due to poor quality planting material. She stressed the importance of being pragmatic when addressing the issue of quality tree planting materials.

Dr. Isaac Nyoka, ICRAF's Nodal Representative for Southern Africa pointed out that without a framework to regulate tree-planting material, farmers' efforts would go to waste. According to Dr. Nyoka, even with the absence of a legal framework, other options are available that could be used to address the issue of quality tree planting materials and voluntary certification is one such option.

ICRAF has been testing a voluntary tree nursery certification for nursery operators to meet set minimum standards for over three years. The Centre has trained government officers as nursery inspectors and nursery operators on the standards, and set up a Voluntary Inspection Board that will oversee the certification process. Although the scheme is voluntary, the government has

agreed to have its officers handle the inspection. Certification is open to all willing nursery operators.

Currently, 43 tree nursery operators across the country are participating in the scheme: northern region has 14 nurseries, central region has 15 and the southern region has 14 nurseries under this initiative. The good news is that more nursery operators seem to be willing to participate in the voluntary certification scheme. The nursery operators already have two functional associations, namely the Indigenous Tree Seedling Producers Association (ITSPA) and the National Fruit Tree Nursery Operators (NFTNO).

When quality tree seedlings are available, all tree planting programs (afforestation, reforestation, agro-forestation, enrichment plantings) benefit. The efforts of institutions that promote planting of trees for improving nutrition, tree cover, firewood or other chores would likely bear fruit.

Bruce Sosola, the Agroforestry Food Security Program (AFSP) Manager invited the donor community, government and others NGOs to support this initiative. He also contemplated on the possibility of integrating the supply of high quality tree planting materials with other donor-supported development programs. He opined that it was possible for the voluntary certification scheme to be self-sustaining. For example, the Inspection Board could collect a minimal fee from the nurseries they inspect. This income would help in meeting some operational costs of the project. At present, AFSP II funds the certification.

"There will be need for the voluntary certification board to rigorously market the initiative for it to be self-sufficient," Sosola concluded.

Mr. Nikolas Bosscher, the Chairperson of the Donor Committee on Agriculture and Food Security (DCAFS) who is also the General Representative for Development Cooperation of the Government of Flanders in Malawi advised the forum to draft a communiqué on the donor community's role in promoting the use of quality 'certified' tree planting material in Malawi.



## Voluntary certification aims to improve tree-planting investments in Malawi cont.

With funding from the Irish Aid and Flanders, the workshop convened government officials, NGOs, CGIAR Centres, tree nursery operators, the private sector and media. The tree nursery voluntary certification initiative is a joint effort by ICRAF and the Government of

Malawi through the Department of Crop Development, Department of Agricultural Research Services and Forestry Research Institute of Malawi (FRIM).

## Sap-flow training projected to boosting tree and crop yields in Uganda

By Clement Okia and Joel Buyinza

ICRAF Uganda in collaboration with the National Forestry Resources Research Institute (NaFORRI) held a Sap Flow Training and Installation workshop in Uganda in November 2015. This initiative falls under the Trees for Food Security project funded by the Australian Centre for International Agricultural Research (ACIAR). The training was in fulfilment of one of the project objectives on generalizing predictions of impacts of trees species and management at field, farm and landscape levels.

Julius Njoroge, a research assistant from ICRAF Nairobi delivered the five-day training to nine staff members from NaFORRI and ICRAF Uganda. The participants were introduced to the theoretical background of sap flow with a focus on tree water use monitoring in the field. Water is a key factor in tree growth and it is important to conduct tree water use studies. Generating knowledge on water use for different tree species can be used to inform policy on irrigation requirements and tree species ranges.

The training also included practical sessions. Suitable sites were selected from a range of farm options on the farmers' fields at project sites in Manafwa District, eastern Uganda. The sap flow gauges were installed on three *Albizia coriaria* and three *Cordia africana* trees, in two different farms.

Other field sessions included installation of solar panels, testing of the sap flow gauges to ensure they were charging, downloading data, analysis and interpretation of the outputs.

The downloaded data was analyzed for sap velocity, sap flow rate and sap volume. The graphs generated were interpreted and the trainees were able to visualize a few selected scenarios. With the six sap flow gauges fully installed and operational, data will be downloaded at least once a month. Some of the trees will later be subjected to treatments such as pruning.

From the subsequent data analysis outputs, the trainees will be able to monitor tree-water use in the field, and make recommendations to farmers on best management regimes for different tree-crop combinations on farm. The participants are expected to apply the acquired knowledge to conduct other eco-physiological studies that could improve the existing body of knowledge for monitoring tree-water use. Such studies will improve the adaptive capacity of agroforestry systems and subsequently, ensure food security in Uganda.



Drilling the *Albizia coriaria* tree for installation of sap flow gauge in a farmer's field in Manafwa district, Uganda



Training on how to download data from the installed sap flow gauge



Installation of a sap flow gauge on *Cordia africana* tree

# Rose's smart tips for climate change

Source: [CTA](#)

Rose Kamanga grew up on a farm with her parents, and she now farms a 10-hectare plot in Dika Mhlanga village, northern Malawi. In response to difficulties caused by drought, erratic rainfall and warmer temperatures, she has embarked on a programme to introduce climate-smart practices to her farm, acting on advice from a government agricultural extension worker. In an interview, this mother of two children explains that the results have been well worth the extra effort to her family.



Rose Kamanga

## Can you describe your farm and what crops and livestock you have?

My farm size is 10 hectares and I grow maize, beans, soya beans, peas, potatoes, cassava, vegetables and fruits. I also rear animals, such as cattle, pigs, turkeys, chickens and pigeons.

## What are the climate-change difficulties you have to deal with on your farm?

One of the main problems is shortage of rain. But we also have to deal with poor soil fertility, floods and very hot conditions, which severely restrict the growth of forage for our animals.

## Have you noticed a difference in climate over the years that you have been farming?

I have been farming for many years, but in the past four years I have noticed that the climate conditions have changed quite dramatically.

## What steps have you taken to deal with these changes? What climate-smart practices have you introduced?

I have started using a whole range of climate-smart practices, which are having a good effect. I have constructed marker ridges on my land, which guide planting and help to make the best use of the small quantities of rain we receive. I have also planted vetiver grass to reduce runoff and erosion. Other climate-smart practices I've introduced include having a woodlot on my farm, pasture conservation and making silage. For my crop cultivation, I now ensure minimum soil disturbance by using planting pits and reduced tillage and maximise soil cover by using maize stalks or cover crops such as cowpeas. I have also planted fodder trees and am rotating and interplanting maize with 'fertiliser trees' and maize with *Tephrosia*, which is a nitrogen-fixing legume. These new farming technologies have enabled me to achieve stable maize yields in spite of the challenges of climate change, such as drought.

## I understand you have introduced fodder banks. Please explain how they work

Fodder banks are beneficial to me and my family. These are plantings of high-quality fodder species. I use them to feed my livestock when forage is scarce, especially in dry seasons. They are cut and fed fresh or dried and mixed with maize bran, salt and calcium. They are a good source of protein for livestock and enable fast growth and increased milk yields, especially in cows.

## What results have you had with fertiliser trees, and which species do you use?

Fertiliser trees are very effective in improving soil fertility. I plant them in the same field with my food crops – species such as *Tephrosia* and *Gliricidia sepium*, *Faidherbia albida* and pigeon peas. For *Tephrosia* and pigeon peas, I plant them each season, and during that season we remove the leaves three times and bury them in planting pits while still green. For *Gliricidia*, I trim the tree at a height of 30 cm three times each season and bury the leaves in planting basins or pits. By so doing, the leaves release fixed nitrogen in the soil. In the case of *Faidherbia albida*, the leaves drop naturally onto the ground during the rainy season, thereby decomposing and releasing nitrogen in the soil. I also grow trees like *Acacia polyacantha* and *Acacia galpinii*, which have the same beneficial effect.

## What about your fruit orchard – what problems have you faced and how have you solved them?

In my orchard, I grow oranges, tangerines, lemons, mangoes, guavas, apples, peaches, avocado, pineapples and bananas. To solve problems of pests and diseases, I apply pounded *Tephrosia*, which is an effective biological control for fruits. Another challenge we face here is the presence of termites, which damage the fruit trees, so I have got round that by planting onion or marigold in the orchard. There is also the problem of human theft, so I now keep dogs to guard the orchard.

## I understand you have a biogas plant. How does it work and how does it help?

I obtained the technology to build a biogas plant from Mzuzu University. It works, but there are a few problems which are the result of some faults during construction. But even though it has these problems, it is useful to our farm and family as it has reduced the cost of firewood.

## Do you think more farmers could adopt practices such as yours and offset climate change?

Yes, the practices that I use could definitely help other farmers. They are effective and not difficult to introduce. I am lucky enough to have a hard working and supportive husband, and in our family we always share our day-to-day undertakings equally. Gender equality is important to both of us.

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