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Scientists to breed maize types suitable for areas with poor rains



Dr Stephen Mugo of CIMMYT (right) briefs breeders from National Research Systems and Seghal Foundation who visited Kiboko field station in Kenya during a recent training workshop.

Many areas of Africa frequently experience drought, making farming risky for millions of small-scale farmers who rely on rainfall to grow their crops. Climate change will worsen the effects of drought in many parts of the continent, which has been steadily warming over the past two decades.

The reality of climate change calls for urgent action to prepare communities to cope with persistent drought in the long run. One way to help farmers maintain and increase farm yields is to introduce improved crop varieties that can grow well in conditions of poor rains.

A new public-private partnership being implemented by AATF and partners aims to develop drought-tolerant maize varieties that will produce more reliable harvests for

small-scale farmers. Known as the Water Efficient Maize for Africa (WEMA) project, this partnership brings together leading researchers from national agricultural research institutes in eastern and southern Africa, the International Centre for Maize and Wheat Improvement Centre (CIMMYT) and Monsanto to develop improved drought-tolerant maize for the continent.

The project, launched in 2008, will incorporate the best technology available internationally into high-performing maize varieties that have been adapted to local conditions. Its long-term goal is to make drought-tolerant maize available royalty-free to small-scale farmers in Sub-Saharan Africa. WEMA will combine the benefits of CIMMYT's maize

breeding programme and Monsanto's molecular breeding, genomics and biotechnology platforms with AATF's capacity for project management and deployment to fast-track delivery of drought-tolerant maize to farmers. CIMMYT will provide conventionally bred drought tolerant, high-yielding maize varieties that are adapted to African conditions. The research centre will also bring into the project expertise in breeding and testing for drought tolerance.

Monsanto will donate patented germplasm, advanced breeding tools and expertise as well as drought-tolerance genes developed jointly with the chemical company BASF. The national agricultural research systems, farmers' groups and seed companies taking part in the project will contribute their skills and knowledge in breeding and regulatory issues. These partners will be responsible for governance, testing, germplasm evaluation, seed production and distribution.

WEMA is funded by the Bill & Melinda Gates Foundation and the Howard G. Buffet Foundation. Project activities will initially be carried out in Kenya, Uganda, Tanzania, Mozambique and South Africa. ■

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AATF's portfolio increases to five projects

Since its inception in 2004, the African Agricultural Technology Foundation has been taking part in public-private partnerships that seek to address key problems facing smallholder farmers in Sub-Saharan Africa. The Water Efficient Maize for Africa (WEMA) project (see main story) is one of two new projects that AATF and its partners are implementing. The other new initiative is the Nitrogen Use Efficiency and Salt Tolerance Rice Project, which seeks to develop varieties

that can grow well in saline soils and those low nitrogen levels. Other ongoing projects focus on the control of the destructive weed *Striga* in maize, control of the legume pod borer in cowpeas, and on checking the spread of the banana bacterial wilt disease. All these projects are based on priorities identified by national and regional research and development organisations. ■

For more information visit: www.aatf-africa.org/projects.php

Feature



Benta Siro, a Kenyan farmer, shows maize stunted by *Striga* (witchweed).

Strigaway® maize helping farmers battle stubborn weed

Over the past 20 years, Mrs Benta Siro of Palpal village in the western Kenya district of Siaya has been a troubled woman. Since she got married in 1973, she has struggled to meet the responsibility of feeding her family from her modest farm.

To Benta's family, like many others in western Kenya, food is *ugali*, a meal prepared from maize flour, the country's staple. As a homemaker, Benta, a mother of two, is expected to produce enough maize not only to feed her family, but also to sell and get money for other household needs.

Although the land Benta's husband inherited from his father is fertile, she can hardly harvest enough maize for the family because of *Striga*, commonly known as witchweed, which infests farmlands in the area and can lead to massive crop losses. *Striga* is a virulent

parasitic plant. It attaches itself to germinating maize plants and deprives the crop of nutrients, cutting harvests by up to 80 percent.

"I cannot remember the last time I got even one *gorogoro* (2kg container) from this farm. *Kayongo* (as *Striga* is known in the local Dholuo language) is everywhere in my farm. My maize cannot grow," says Benta.

"This is the most difficult weed to deal with. The more you uproot it the more it appears the next season. It does not matter whether you uproot and leave it on the farm or throw it on the road to be trampled on."



Benta's story echoes across the Lake Victoria basin, where *Striga* affects more than 200,000 hectares of farmland.

About 50 kilometres from Benta's home, at the village of Nyabenge, also in Siaya, Florence Ogutu has given up on growing maize.

"One would have been forgiven for thinking that *Kayongo* was my main crop and maize the weed. About five weeks after planting, my farm would turn purple with *Kayongo* plants, which would be so healthy that some would be taller than the maize. I could not stand the stunted maize any more. If I had market for the weed, I would have continued cultivating. I had to quit growing maize and sorghum," says Florence, a mother of two.

Florence is lucky she had the option of quitting. She and her husband, Alex Magaga, have alternative sources of income. They operate a cereals and farm inputs shop at Ndori shopping centre, not far from their home. They are also officials of Hagonglo, a community based organisation that helps local families improve their livelihoods.

A majority of families are not as lucky as Florence and have to continue planting maize year after year, hoping to somehow defeat the weed and get a good harvest.

Says Isaiah Omondi, 65, of Butula in Busia district: "We used to uproot *Striga* and throw it on the road. But it did not disappear. Instead an even healthier generation of weeds would grow in the farms the following season."

Uprooting *Striga* can help control the weed but it is often done at the wrong time. Most farmers do not understand the life cycle of the weed and uproot the plants after they have flowered and produced seeds, creating a veritable seed bank in the soil. A single plant can produce more than 50,000 seeds.

news

"The seeds remain dormant in the soil for up to 20 years and are hence difficult to eliminate. Handweeding and routine field sanitation procedures, even when combined with improved soil fertility management, appear insufficient to eradicate the weed once it is established in a farmer's field," says Dr Paul Woome, head of the Forum for Organic Resource Management (FORMAT), a non-governmental organization that has been working with AATF to combat *Striga* in Kenya.

So far, one of the most promising solutions against *Striga* is Imazapyr-resistant (IR) or Strigaway® maize that AATF and partners are deploying among smallholders in eastern Africa.

This technology is based on inherited resistance in maize to a systemic herbicide, Imazapyr. When IR maize seed is coated with the herbicide, *Striga* weeds attempting to attach themselves to the germinating maize plants absorb the chemical and are destroyed. Thus, *Striga* seed banks in soil can be reduced by protecting maize with a "chemical barrier" to *Striga* infection.

Affordable and easy to use

Developed about 10 years ago jointly by the International Maize and Wheat Improvement Centre (CIMMYT), the German chemical company BASF and Israel's Weizmann Institute of Science, IR technology is suitable for small-scale farmers, especially because it is affordable and easy to use.

Demonstrations by AATF and partners on smallholder farms in western Kenya showed IR maize to be highly effective and surveys show that farmers appreciate it. Well applied, the technology was found to increase yields up to four-fold and virtually clear farms of *Striga*.

Furthermore, the herbicide is released close to the protected maize seed. Therefore, unlike spraying, it leaves the soil safe for other crops, including the nitrogen-fixing legumes such as beans and cowpea, which are often intercropped with the maize.

After successful pilot deployment in western Kenya, AATF and its partners have expanded their network of collaborators and spread the technology to Uganda, Tanzania and Malawi. ■

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Insect-resistant cowpea field trials underway

The first confined field trials for genetically modified cowpea resistant to the legume pod borer, *Maruca vitrata*, were conducted in central-west Puerto Rico, USA, in late 2008.

The trials were designed to test the efficacy of a *Bt* gene, *cry1Ab*, that scientists in Australia have found to be effective against the insect pest in laboratory conditions.

Puerto Rico was chosen for the trials partly because *Maruca* is a pest in the area year-round, feeding on white beans commonly grown by smallholder farmers in the region.

The trials were conducted with strict adherence to all the rules and regulations of United States Department of Agriculture's Animal and Plant Health Inspection Service Biotechnology Regulatory Service (USDA-APHIS BRS), the Puerto Rico Department of Agriculture and the Institutional Biosafety Committee of the University of Puerto Rico, Mayaguez.

USDA-APHIS BRS approved the research following an application by the project partners to import 15 transgenic cowpea lines containing the *cry1Ab* gene, which confers *Maruca*-resistance to cowpea.

One or two of the lines will be selected for breeding.

Maruca-resistant cowpea varieties are expected to be released to farmers by 2015 after field tests in Nigeria, Ghana and Burkina Faso.



Dr T.J. Higgins and Dr Mohammad Ishiyaku discuss the confined field trials in Puerto Rico.

Partners in the project — which is funded by the United States Agency for International Development (USAID) — include the National Agricultural Research Systems of Nigeria (IAR), Ghana (CSIR-SARI) and Burkina Faso (INERA), the Network for the Genetic Improvement of Cowpea for Africa (NGICA), Commonwealth Scientific and Industrial Research Organization (CSIRO) in Australia, Program for Biosafety Systems (PBS), Monsanto and AATF.

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AATF gets grant to tap into China agritech

The Rockefeller Foundation has given the AATF a grant of close to 400,000 US dollars for a six-month project to identify Chinese agricultural technologies that can help address constraints facing smallholder farmers in Africa.

The grant will enable AATF undertake collaborative exploratory research in preparation for the Forum for China-Africa Collaboration (FOCAC) scheduled to take place at the end of 2009. The findings of the survey will be disseminated to influential policy makers to inform their deliberations at the meeting.

AATF Interim Executive Director Prof Jennifer Thomson signed

the grant agreement with the Rockefeller Foundation.

China is a fast-growing force in agricultural technologies and could provide valuable products to boost small-scale farming in Africa. New applications in China have increased rapidly and will pass Japan, the current leader in new patents, by 2012, according to a recent report by Thomson Scientific agency.

The Rockefeller Foundation was one of the founding investors in AATF and has contributed immensely to making the organization what it is today.

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Dr Daniel Fungai Mataruka

Daniel Mataruka appointed Executive Director

Dr Daniel Fungai Mataruka, a private sector strategist, has been appointed the Executive Director of the African Agricultural Technology Foundation (AATF).

Dr Mataruka will take up the position on 1 March 2009, succeeding **Prof Jennifer Thomson**, who has been the Interim Executive Director since September

2008.

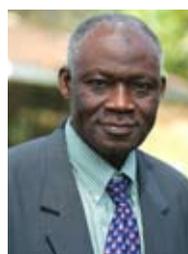
A national of Zimbabwe, Dr Mataruka obtained his doctorate in agronomy from Cornell University, United States of America, and a Masters degree in tropical and sub-tropical crops from the University of Southampton, United Kingdom. ■



Prof Jennifer Thomson

AATF is uniquely positioned to help solve problems of African agriculture

Prof Walter S. Alhassan (right) was in November 2008 elected the new Chair of the AATF Board of Trustees. Following are excerpts from an interview with Prof Alhassan, a founder member of the AATF, on the organisation's past, present and future.



It is now five years since AATF was created. How far has the organization come?

We have come a long way. It seems not so long ago that we started playing and toying with the concept of AATF and the role it could play in support of the resourcepoor farmer. We considered various possibilities in terms of technologies that would be of interest to the private sector and to small-scale farmers.

First of all we consulted the sub-regional research organizations, which work closely with the national research systems of eastern Africa, West Africa, central Africa and southern Africa. We then came up with priority research projects that could best suit the regions. We also consulted the national research systems directly and obtained relevant information on problems of interest to smallholder farmers. We now have five projects going and there are several others at various stages of development.

Where does genetic modification fit in AATF's approach?

Our focus is on those proprietary technologies that can benefit resource-poor, smallholder farmers in Africa. Conventional breeding technologies alone cannot solve all the production problems these farmers face. The introduction of GM technology is usually not the first line of action. Where conventional breeding alone cannot solve a problem, then we look at other options, including genetic modification.

We are also looking at tissue culture. Another option we are considering is mechanisation.

In what direction do you see AATF's project portfolio growing?

As we identify new problems, as new challenges emerge there will be new projects to address these. We are keeping touch with national agricultural research systems. Where we think that AATF can help, we will do so and work with them to find, access, and adapt technologies that can help solve the problems.

What are the key challenges you see ahead for AATF and its partners?

The biggest challenge I foresee is funding. Currently, our annual budget is about 17 million US dollars. Most of this money is from donors, but we are not seeing much contribution from our very own African governments. So the challenge is how to achieve sustainable funding to complement what the donor community can contribute. With the support from donors, we are developing products that will, in turn, help us convince our partners, the African governments and regional organizations, that there is need to invest in what AATF is doing. ■

Full interview online: <http://www.aatf-africa.org/newsdetail.php?newsid=123>

Staff appointments

Six new staff members joined AATF in the second half of 2008. **George Marechera** was appointed to the position of Agri-business Specialist to strengthen linkages with the private sector. A Zimbabwean national with wide ranging experience in the corporate as well as in government and donor agencies, George will coordinate business initiatives involving AATF and various stakeholders.

Dr Nompumelelo H Obokoh, a South African Plant Molecular Biologist, joined AATF as Project Manager for the *Maruca*-Resistant Cowpea Project. She will be responsible for the coordination, implementation and monitoring of all the project's activities to ensure the successful development and deployment of regulated *Maruca*-resistant cowpea. The other new members of staff are:

- **George Obanyi**
Communications Officer
- **Grace Wachoro**
Project Communications Officer
- **Jacquine Kinyua**
Administrative Officer
- **Maurice Ojow**
Accounts Assistant