CASE STUDY 1: Makonnen Farm Ltd. Selling Hybrid Maize in Ethiopia

Maize grows in a field near the village of Maderia, in Gemechis, a woreda (district) of Oromia Region. Credit, UNICEF Ethiopia

Alemayehu Makonnen is a local seed entrepreneur in the Southern Nations, Nationalities, and Peoples' Region (SNNPR) in southwest Ethiopia who specialises in producing hybrid seeds with support from the Alliance for a Green Revolution in Africa (AGRA) Programme for African Seed Systems (PASS).[1] Compared to other countries where AGRA operates, uptake of hybrid maize has been slow in Ethiopia, with fewer than 10% of farmers adopting the technology. This low level of adoption is likely due to the lack of availability of the seed through established seed systems.[2]

Makonnen cites the major reason why people do not use quality seeds and input as a lack of access. In 2011, he was able to expand his production of hybrid seed with the support of a US$200,000 grant from AGRA. He also started working with a Zimbabwean maize breeding company – Seed Co. Ltd. – to acquire the supply of the parent material for hybrid seed production.[3]

Following the expansion of Makonnen Farm Ltd., he was able to sell seed to 1,000 farmers. When other farmers saw the success of their crop, they became interested in buying the seed, resulting in sales to 6,000 farmers in 2012. By 2013, Makonnen was selling seed to 16,000 farmers and cultivating 100ha of land for the production of hybrid maize seed. He expects 20,000 customers in 2015, showing that adoption is growing. Makonnen reports that 80% of smallholders who buy his seed and use reasonably good management practices realise an average of 4t/ha, whilst some farmers have reached up to 6t/ha. This is in comparison to the national average of 2t/ha.[4]

CASE STUDY 2: Hybrid sorghum builds resistance to Striga in the Sudan

Sorghum is one of the most important crops in Africa, but it faces challenges from drought and the devastating parasite *Striga* or witchweed. *Striga* affects an estimated 40% of arable savannah land and the livelihoods of more than 100 million people in Africa.[5]

One of the first commercially released hybrid sorghum varieties, *Hageen Durra 1,* was developed and tested in Sudan by the International Crops Research Institute for the SemiArid Tropics (ICRISAT) in the early 1980's. *Hageen Durra 1* was both drought tolerant and high yielding producing 50%–100% higher yields than traditional varieties. Drought tolerant hybrid varieties were later developed in Niger that produced yields 4–5 times the national average. Some of the most significant advances were made in the 1990's with the development of *Striga* tolerant hybrid sorghum varieties.

Sorghum breeder Gabisa Ejeta and team used several breeding approaches to identify genes for *Striga* resistance then used these in crosses with locally adapted and modern sorghum varieties.[6] The new *Striga* tolerant sorghum varieties were widely adapted to different African environments and are now grown from Sudan to Zimbabwe. Sorghum productivity was also enhanced through the introduction of an integrated *Striga* management system that included weed resistance, soil fertility improvement and water conservation.[7] In 2009, Gabisa Ejeta was awarded the World Food Prize for his seminal achievements in improving the livelihood opportunities of African sorghum growers.[8]

A Sudanese farmer (right) shows Dr Kiambi the devastation caused by Striga.
Credit, ICRISAT,C.Masiga

CASE STUDY 3: Hybrid Cassava and Cassava Mosaic Disease in Uganda

Cassava Mosaic Disease (CMD) resistant variety in cassava field.
Credit, IITA

Cassava is grown in more than 40 countries in sub-Saharan Africa and Nigeria is now the largest producer of cassava in the world. Cassava production in Africa, however, is severely threatened by cassava mosaic disease (CMD). In the 1970's the International Institute of Tropical Agriculture (IITA) developed high yielding mosaic disease resistant cassava varieties by a process known as 'Tropical Manjioc Selection' (TMS) that draws on earlier approaches crossing the disease resistant Ceara rubber x cassava hybrid with high-yielding West African selections.[9] These TMS varieties increased cassava yields by 40% without the use of fertiliser.[10]

In the mid-1990's CMD appeared in a new, more virulent form in Uganda known as East African cassava mosaic virus. The epidemic spread south along a broad "front" at a rate of approximately 20 km per year subsequently reaching neighbouring countries and beyond. CMD is not only highly contagious, but the symptoms are severe. Infected crops in Uganda suffered a 55%-87% yield loss and in just 6 years, 80% of Uganda's cassava crop was destroyed. Cassava was all-but abandoned in Uganda, contributing to food insecurity in the late 1990s.[11]

The International Institute for Tropical Agriculture (IITA), the National Root Crops Research Institute and the Root and Tuber Expansion Program have undertaken a project to conduct both demonstrations and on-farm trials in Uganda and Nigeria. From more than 2,500 trials, 12 disease resistant TMS varieties have been released. These have multiple resistance and tolerance to CMD along with other yield-damaging pests such as bacterial blight disease, anthracnose disease, green mite and mealybug. They are high-yielding and suitable for the food industry and livestock feed. Yields of these TMS hybrids range from 20 tonnes to 50 tonnes per hectare or 40% to 100% higher than local varieties.[12]

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