

Scientific Achievements for Agricultural Development in Sub-Saharan Africa¹

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Abstract

Some of the major scientific achievements in Sub-Saharan Africa resulting from CGIAR work have been realized in the areas of biocontrol and the development of improved plant varieties. Of particular note has been the development of the new rices for Africa (NERICAs) through anther culture, the development of quality protein maize (QPM) as well as the effective control of the cassava mealybug. These three achievements were all recognized with the conferment of the World Food Prize to those who developed and promoted the technologies, i.e. in 1995 for cassava, 2000 for maize and 2004 for rice. NERICA was obtained by crossing an Asian rice species (*Oryza sativa*) to an African (*O. glaberrima*) rice species thus combining the high yielding characteristics of the former with the robustness of the latter. The cassava mealybug (*Phenacoccus manihoti*) was controlled using an exotic parasitoid wasp (*Apoanagyrus lopezi*) which saw the numbers of the pest reduced dramatically within a single year at two sites in Nigeria, and wide spread adoption in Malawi over a three-year period. The grain of QPM has nearly twice the essential amino acids, lysine and tryptophan, as normal maize. The QPM is also beneficial to animals where in Kenya alone \$0.3 million savings were realized through the use of QPM in chicken feed. Improved yields stand at 7 t/ha in Ghana, and nowadays QPM is grown in more than 22 developing countries.

Beyond the CGIAR at another international research center, ICIPE, the “push and pull” technology was also developed to control stemborer infestations in maize. The push is from the chemical repellents given off by the Desmodium intercropped with the maize, whereas the pull is from the chemical attractants from the Napier grass that attracts the stemborers to lay their eggs. The Desmodium also puts out root exudates that stimulate the suicidal germination of the *Striga* seeds, resulting in the progressive depletion of the *Striga* seed banks and a 3 –fold increase in maize yields. Nearly 13 000 farmers have adopted push and pull around Lake Victoria with over 25 000 farmers being targeted within the East African region. This technology works well for the control of some livestock pests such as tsetse flies and ticks. Equally effective in the control of *Striga* has been the deployment of Imazapyr (imidazolinone) resistant (IR) maize through a partnership between CIMMYT, the AATF and BASF and local seed companies within Kenya. The maize has a natural mutation that confers resistance to the herbicide imidazolinone. The IR maize yields normally under *Striga* infestation. The herbicide also depletes the *Striga* seed bank in the soil by killing the *Striga* that germinates.

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The lessons learned from the ongoing IAASTD process on agricultural development in SSA have been well documented and are summarized here, briefly. The multi-faceted nature of agriculture is apparent, as it impacts on crops, livestock, agroforestry, aquaculture, health, gender and nutrition. While per capita food availability in the rest of the world has increased significantly over the past 45 years, there has been little change in SSA, infact extreme hunger is on the increase. There is rapid depletion of natural resources with adverse consequences on the rural poor. The limited exploitation of water resources; the land degradation and limited use of chemical fertilizers, are some of the factors limiting agricultural productivity in SSA. While farming systems are highly diversified the over reliance on rainfed agriculture is a threat. Agriculture productivity still operates in a high risk environment and uncertainty, and is exercebate by weak institutions and policies.

To improve agricultural performance requires an improvement in the productivity of the 80% small holder farmers in SSA. The limited genetic potential of indigenous animal breeds, loss of livestock diversity, and weak markets for livestock products, constrains the livestock sector and reduces the resilience of livestock owners in SSA. While the demand for fish products is increasing in SSA and globally, fish production is declining. Agroforestry has the potential to offer wealth-creating opportunities for individual households and communities, and to reduce pressure on natural forests. Agricultural policies in SSA continue to emphasize primary agricultural production to the exclusion of micronutrient rich products, and finally, the ability of SSA to make informed decisions regarding biotechnology research, development, delivery and application is currently insufficient.