



ARC-Grain Crops Institute

The Agricultural Research Council (ARC) conducts fundamental and applied research with partners to generate new knowledge, develop human capital and foster innovation in agriculture, through technology development and dissemination, and competitive commercialisation of research results.

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African Agricultural Technology Foundation

AATF is a not-for-profit organisation that facilitates and promotes public/private partnerships for the access and delivery of appropriate proprietary agricultural technologies for use by resource-poor smallholder farmers in Sub-Saharan Africa.

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Water Efficient Maize for Africa Project: Socio-economic considerations

The sustainability of WEMA GM maize for use by smallholder farmers will be ensured by providing the technology royalty-free, using locally adapted maize varieties, providing agronomic support services and enabling farmers to generate an income through the selling of any surplus maize harvested.

Socio-economic considerations for WEMA drought-tolerant GM maize varieties for smallholder farmers

Background

The Water Efficient Maize for Africa (WEMA) project is a public-private partnership, coordinated by the African Agricultural Technology Foundation (AATF), to address the devastating effects of drought on smallholder maize farmers. The goal of the WEMA project is to develop and deploy royalty-free, drought-tolerant maize varieties to smallholder farmers in sub-Saharan Africa. AATF is working with the national agricultural research systems in Kenya, Mozambique, South Africa, Tanzania and Uganda; the International Maize and Wheat Improvement Centre (CIMMYT), an internationally funded, non-profit, scientific research, training, and development organisation; and Monsanto, a private agricultural company. In South Africa the project is coordinated by the Agricultural Research Council (ARC).

Maize is one of the most important grain crops in sub-Saharan Africa, where it is a staple food for more than 300 million people and a major feed grain. The WEMA project will in particular benefit smallholder farmers and their associated rural communities as small-scale farming in this region, which is frequently affected by droughts, is done almost exclusively under rainfed conditions. WEMA maize varieties are being developed to stabilise yields under moderate drought conditions, allowing smallholder farmers not only to secure harvests which would satisfy their own household requirements, but also to produce surplus maize which can be sold to generate income.

WEMA GM varieties

The WEMA project aims to introduce the drought-tolerant genetic characteristics into locally adapted maize varieties using both conventional breeding and genetic modification (GM) technologies. GM crops are more strictly regulated than conventional crops. In addition to the conventional agronomical evaluations GM varieties also have to pass: (i) a food and feed safety assessment, (ii) an environmental risk assessment and (iii) a socio-economic sustainability assessment as dictated by the individual national regulatory frameworks for genetically modified organisms (GMOs).

In South Africa the WEMA GM varieties will be required to comply with the regulations of the GMO Act (Act 15 of 1997), which was specifically promulgated to provide measures to promote the responsible development and use of GMOs. Food and feed safety assessments and environmental risk assessments for WEMA's GM varieties will be similar to those done for insect resistant and herbicide tolerant maize varieties which have been commercially available since the mid-1990s.

However, the WEMA project's GM drought-tolerant maize varieties will be the first to be specifically developed for use by smallholder farmers, which warrants a discussion of the possible unique socio-economic aspects associated with this project and its resulting product.

Socio-economic considerations for WEMA's drought-tolerant maize varieties

Locally preferred varieties: Traditionally, smallholder farmers save and share their best seeds, which over time can result in the establishment of land races, i.e. open pollinated varieties with specific agronomic and food quality traits to which local consumers have grown accustomed. Although a single drought-tolerant GM maize variety will be submitted for regulatory approval, the approved drought-

tolerant GM trait will be bred into a number of locally preferred varieties. This will help ensure farmers have access to modern high-yielding, drought-tolerant maize genetic material in varieties with locally preferred agronomical and food characteristics.

Deployment and accessibility: Already established, local seed distribution networks will be used to distribute the new drought-tolerant varieties. The Department of Agriculture, Forestry and Fisheries (DAFF) and the ARC will also be responsible for agronomic support services to smallholder farmers with respect to the efficient and effective use of the WEMA maize varieties.

Technology cost: The WEMA project will allow smallholder farmers to get access to modern, high-yielding conventionally bred WEMA and/or GM drought-tolerant maize varieties without royalty fees. That means smallholder farmers will not have to pay any additional fees or enter into a technology-use agreement with the technology developer. This is expected to have a significant positive impact on the food security, financial security and livelihoods of smallholder farmers and their families.

Seed saving and sharing: Farmers will always have the option of using the seed

they prefer; whether this is saved seed or open pollinated or hybrid seed available from their preferred seed supplier. Both the conventionally bred and GM drought-tolerant varieties developed by WEMA will be available as hybrids only. Farmers will be free to save and re-use WEMA seeds, but as with any hybrid variety, the performance and the overall benefit will be compromised.

Income generation: Improved yields from drought-tolerant varieties grown under moderate drought conditions will not only enable smallholder farmers to harvest enough maize to feed their families, but will also provide them with an opportunity to generate an income by selling any surplus maize.

Choice: The decision on whether to use or not to use the WEMA GM and/or non-GM maize varieties will always be that of the individual farmer. The WEMA project will also not impact on the routine development and deployment of other maize varieties or the other services delivered by the ARC and DAFF.

