

African Agricultural Technology Foundation

Water Efficient Maize for Africa (WEMA)

FREQUENTLY ASKED QUESTIONS Confined Field Trials



What is WEMA?

The Water Efficient Maize for Africa (WEMA) project is a public-private partnership that was formed to develop drought-tolerant maize for use by smallholder farmers. The project uses both conventional advanced plant breeding and biotechnology in the development of the varieties. The WEMA varieties will be marketed by local seed suppliers royalty-free to smallholder farmers in Sub-Saharan Africa (SSA).

What are confined field trials?

Confined field trials (CFTs) are small-scale field experiments to evaluate the performance of genetically modified (GM) plants. In the case of WEMA, the CFTs are evaluating new drought tolerant varieties of maize. These CFTs are an essential step to test and develop such varieties. The trials are conducted under the terms and conditions set by the various governmental regulatory bodies.

Why are the trials important?/What is the purpose?

The CFTs are done to test new plants under real field conditions and to assess the performance of the transgenic trait in a local environment and in local germplasm. Data from the trials will enable selection of the best lines that perform better under drought stress. This will help in eventual seed production for regulatory approval and for deployment to farmers.

Who is carrying out the confined field trials in the WEMA partner countries?

The CFTs are being conducted by the national agricultural institutes in Kenya, Uganda and South Africa. The institutes are working with the International Maize and Wheat Improvement Center (CIMMYT), and Monsanto who are partners in the WEMA project.

For whom are the trials being conducted?

The objective of the WEMA project is to develop and make drought-tolerant white maize varieties available royalty-free to smallholder farmers in SSA. Through these trials, each country will evaluate drought tolerance in maize suited for the country.

When will the drought-tolerant maize be ready?

This is a five-year project that is developing and field testing drought-tolerant maize varieties for eventual release to smallholder farmers in SSA. The project is developing drought-tolerant maize using conventional advanced breeding and biotechnology. The first conventional hybrids developed through conventional advanced breeding will be available in about five years. Farmers will be able to access maize hybrids developed through biotechnology in about eight years depending on research and development results and regulatory approval.

How were the CFT sites selected?

The CFT sites were chosen because of the dry climates that are ideal for testing WEMA maize varieties under drought conditions. The sites have



well-defined dry periods that allow WEMA scientists to carry out their research.

Why genetically modified maize varieties?

Drought affects farmers in SSA every year and often with devastating effects on their families and food security. The WEMA project is developing maize varieties that aim to yield more grain in the face of moderate drought. Biotechnology is one of many tools being used to develop these higher yielding seeds to benefit farmers. When successful, these varieties could benefit farmers and consumers by contributing to lower production costs, higher yields, and more food grain. Better seeds will also allow seed companies the opportunity to market new varieties and build successful businesses.

What is the gene being used in the drought tolerant maize?

After years of research maize scientists identified a gene that helps plants better cope with drought stress. This

gene was isolated from a common bacterium found in the soil known as *Bacillus subtilis*. The gene helps the plant cope better with stress caused by water shortages allowing the plant to focus on filling the grains.

The cold shock protein *B(CspB)* gene is from a common soil bacterium *Bacillus subtilis* which was initially identified in bacteria under cold stress. Further tests showed that the gene helps plants to cope with the drought stress as well. The beneficial gene was discovered by Monsanto, and in a partnership of private and public players, the company has provided a research license to national institutions in the five African countries – Kenya, Uganda, Tanzania, Mozambique and South Africa - to enable testing of the hybrids that have the gene.

Why not just pursue conventional breeding?

To address a complex problem like drought tolerance it is necessary for a breeder to use as many different strategies as possible. WEMA is combining the recent advances in conventional developments with a transgene to provide additional protection and the opportunity to accelerate yield gains.

Where is GM being used in Africa today?

Other GM maize currently on the market in other countries such as South Africa have better resistance to stem boring insects with a significant reduction in pesticide use. Such varieties include *Bt* maize. Other biotech crops such as insect resistant cotton (*Bt* cotton); insect resistant maize (*Bt* maize) and herbicide tolerant cotton are already helping farmers in other African countries such as South Africa, Egypt and Burkina Faso.

Why is the maize fenced off? /How is confinement achieved?

The CFT is fenced mainly to prevent trespassers and animals from entering the trial site. Successful CFTs are guided by and must strictly adhere to the terms and conditions prescribed in the approval permit for conducting the CFTs. These conditions differ from country to country but aim to prevent: pollen flow to other plants or persistence of the trait in the environment, or consumption by animals or humans. Confinement measures may include limited access to the trial site, isolation from other crops by means of barriers or distances and proper disposal and destruction of test plant material.

What will happen once the experiment is finished?

A successful CFT can pave the way for commercial release of a GM drought tolerant maize variety. Before this occurs, however, additional food and feed safety tests and evaluations must be completed and the variety must be certified by regulators as ready for sale to the public.

Are GM crops safe to grow and eat?

GM crops have been available to farmers in other parts of the world since the mid-1990's. Today, GM crops are being grown in 25 countries around the world on billions of acres of land including in African countries such as Burkina Faso, Egypt and South Africa. Except for the





introduced genetic material that confers the desired beneficial characteristic, GM crops are identical to their conventional counterparts.

Nevertheless, all GM crops have to undergo safety assessment before they can be grown and used. This is called a biosafety review and is coordinated by country governments. The result is either permission or refusal of permission to use a specific GM crop and the products derived from it. The safety review covers three areas: details on the changes in the GM crop relative to the conventional varieties; an assessment of

the environmental impact of the GM crop in the release environment; and an assessment of the food and feed safety of the GM crop and any products derived from it.

Who will conduct the safety assessment of GM drought tolerant maize?

Typically, the food and feed safety assessments are conducted by scientists affiliated with the Ministry of Health and the Ministry of Agriculture, while the environmental assessment is conducted by scientists affiliated with the Ministry of Environment and/or the Ministry of Agriculture.

Will the drought tolerant maize costs be high?

The seed developed by WEMA will be made available to smallholder farmers by local seed companies at the regular price of maize seed without royalty. For every technology in the market, there is a mark-up price or royalty above what the product would normally cost. The WEMA maize will not have this mark-up. This means that the maize seed will be royalty-free.

Who will own the drought-tolerance maize seed?

Any drought-tolerant maize variety developed through this project will be licensed to the African Agricultural Technology Foundation (AATF), the coordinator of the WEMA project and a non-profit organization. AATF will grant sublicenses to local seed multipliers in order to make the seed available to smallholder African farmers at more or less the regular price of maize seed without royalty.

Can farmers keep their seed?

Farmers can choose to save seed for replanting. However, as with all hybrid maize seed, maize production is heavily reduced with replanting of the harvested grain. It is good practice to plant fresh seeds each year to help ensure consistently good harvests.

Will the GM maize affect other non-GM crops?

The management of pollen flow to ensure production standards in any crop is a general commercial practice. The partners in the WEMA project have more than a decade of global experience in managing this issue, and all research conducted on the drought tolerant trait, as with all new biotech traits, will be done under supervision of the relevant regulatory authorities.

Which other countries grow GM crops?

In Africa, other countries growing GM crops are South Africa, Egypt and Burkina Faso. Worldwide four countries are principal growers of GM crops: the USA with 47.6 million hectares (59% of global total); Argentina (16.2 million hectares, 20%); Canada (5.4 million hectares, 6%); and Brazil (5.0 million hectares, 6%). Other countries growing GM crops are Australia, China, India, Mexico, Paraguay, the Philippines, Romania, Spain, and Uruguay (ISAAA Report on Global Status of Commercialised Biotech/GM crops: 2009).





into another. Such methods are used to create GM plants – which are then used to grow GM crops.

What is the difference between GM and conventional breeding?

GM crops are very similar to conventional crops. They serve the same purpose: to produce superior food, feed and fibre or improved crop management. The difference lies in how breeders obtain the characteristics to achieve this. Conventional or traditional plant breeding uses the random mixing of thousands of genes between two genetically different but related plants in order to get new, desired traits. With genetic modification transfer, breeders choose the specific characteristics they want and add these individually to a crop.

What will the project do to protect the environment?

Environment Impact Assessments will be conducted before planting of the GM maize and after the harvest to assess any effect on the environment.

Will GM maize affect the environment?

GM crops lead to a decrease in pesticide use. Biotech varieties are known to dramatically reduce farmers' reliance on plant protection products while improving soil conservation and protecting the environment. Drought-tolerant GM maize crops will increase the yield stability of maize during moderate drought which in itself may not affect the environment.

Is GM the only way to increase food production?

GM is not the only tool that is used to increase food production. It is one of the many tools that help ensure adequate, safe food for the growing population.

What are GMOs?

Genetically modified organisms (GMOs) can be defined as organisms in which the genetic material (DNA) has been altered. Genetic modification allows selected individual genes to be transferred from one organism

AATF is a not-for-profit Foundation designed to facilitate and promote public/private partnerships for the access and delivery of proprietary agricultural technologies for use by resource-poor smallholder farmers in Sub-Saharan Africa. AATF is a registered charity under the laws of England and Wales and has been given a tax-exempt status in the USA. It is incorporated in Kenya and in the UK and has been granted host country status by the Government of Kenya where it is headquartered.

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