

Partnership for Water Use Efficiency in Maize: An Imperative for Africa

Mpoko Bokanga

The quasi-totality (95%) of African cropland does not have access to irrigation schemes. Therefore, delays in the startup of the rain season or a dry spell of two weeks or more at critical periods of plant growth can lead to great reduction in yields at harvest time. When farmers fear that the rain will be inadequate, they are less likely to invest in essential crop production technologies such as good quality seeds or fertilizers. As a result of this risk aversion, crop yields remain low even during years of sufficient rainfall. Without higher yields and yield stability in the face of diminishing water availability, Africa's farmers will continue to cultivate every acre of land in a futile struggle to keep up with increasing food demand, driven by expanding populations, higher incomes and new developments such as the use of crops to produce biofuels.

In the absence of opportunities for large scale irrigation, African farmers practice a range of water conservation measures, including cultivation of faster maturing crops, reducing water runoff, water harvesting and surface mulching to reduce the loss of soil water to the atmosphere.

The agricultural research community has responded by developing and promoting farming technologies that reduce the consequences of drought, including low tillage or no-till systems that better capture and store water, and by breeding crops that produce yields over a shorter cropping interval. All these techniques, however, do not reduce the impact of water stress, especially is water shortage occurs at critical stages of plant growth. Although plant breeders have always been searching for traits that would reduce the impact of water stress, the potential for achieving greater drought tolerance through conventional crop breeding has remained rather limited because severe moisture deficit greatly affects plant metabolic functions and coping mechanisms are very complex and are regulated by many genes.

In the face of increasingly erratic rainfall patterns due to climate change and having to respond to greater demand for crop production as a result of population growth and new crop uses such as biofuels, the development of drought tolerant crops has emerged as an imperative for African agriculture.

The African Agricultural Technology Foundation (AATF), an institution devoted to facilitating access to proprietary agricultural technologies that can solve farming constraints of smallholder African farmers, is coordinating a project to harness the potential of molecular marker-assisted breeding and genetic engineering to develop maize varieties with increased resistance to water stress. Funded by the Bill and Melinda Gates Foundation and the Howard G. Buffett Foundation, the project intends to develop drought tolerant maize varieties that will be given to local seed multipliers for wide access by smallholder farmers. It is expected that drought tolerant maize varieties obtained in this project will, under moderate drought conditions, produce at least 20 percent more than current farmers' varieties.