

Technology to improve crop varieties

By Prossy Nandudu

Ugandan crop scientists have been called upon to adopt modern technologies to speed up the release of improved crop varieties.

The call was made by international crop researchers who met in Uganda recently. One of the technologies the researchers recommended is molecular breeding. This is the process of identifying and transferring a desired trait from one crop to another where it is absent.

According to Rajeev Varshney, the Global Research Programme director, at the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), the improved variety attains traits like resistance to drought, as well as pests and diseases, among others.

Varshney made the remarks during a five-day meeting that brought together crop scientists to review progress in research on tropical legumes and cereals to improve their productivity to better livelihoods of smallholder farmers growing the crops, especially, in drought-prone areas.

The research is on going under the Tropical Legumes II (TLII) and HOPEII projects, supported by the Bill and Melinda Gates Foundation in nine countries in Sub-Saharan Africa and South Asia.

Through the projects, some countries are developing improved planting materials for four key legumes which are beans, cowpeas, groundnuts and chickpea in Burkina Faso, Ghana, Mali, Nigeria, Ethiopia, Tanzania and Uganda and India.

Molecular breeding

This is a process that involves selecting desired traits from one plant and add them to the DNA of another plant.

The desired traits are selected using tools called molecular markers. The available molecular tools are for crops such as barley, beans, cassava, chickpeas, cowpeas, beans, groundnuts, maize, potatoes, rice, sorghum and wheat.

Other methods of breeding including conventional breeding, which is identifying and selecting desirable traits in plants and combining these into one individual plant.



Dr Ambrose Aqona with Rajeev from ICRISAT during the tropical legumes conference at Speke Resort Munyonyo Photo by Prossy Nandudu

Through molecular breeding, farmers can access quality seed in five years as opposed to waiting for the current 15 years



Molecular breeding will help increase food production

During this process, many plants are planted, then and physically selected and tested one by one. They are then planted again until a researcher finds the trait he or she is looking for. This process usually takes 10-15 years.

The third process is genetic engineering, which involves the transfer of genes with better traits from one plant to another to make it more productive. However, none of the crop varieties that have been improved through genetic engineering have been released to farmers owing to the absence of a law that regulates the technology.

Why molecular breeding

Varshney, explained that through molecular breeding, farmers can access quality seed in five years as opposed to waiting for the current 15 years.

The improved seeds yield highly and withstand resist various challenges associated with climate change hence improving production which

Experts' Views

Dr Godfrey Asea, the director of the National Crop Resources Research Institute (NaCRRRI)

Molecular breeding takes a shorter time because there is an expanded method of getting enough information from which selection of better traits for plants is done easily. The cost of the seed produced through molecular breeding, will not attract any additional cost because it's just been bred faster, but remains the same seed that meets particular traits.

Dr Kalule Okello, a breeder of groundnuts at NaSARRI

Molecular breeding is the way to go, however, this may not be easily achieved in Uganda for a number of reasons. There is need for better laboratories that will keep the DNA or desired trait for some time after it has been removed from a crop to be inserted in another.

This means we must have DNA analysis laboratories, human resources, training of scientists to understand the new breeding methods, so once this is in place, it will make our work easier and much faster.

If research is prioritised and specialised laboratories are set up in Uganda, then more scientists will be trained in this breeding method.

Dr Ambrose Aqona, the Director General of the National Agriculture Research Organisation (NARO)

NARO is committed to developing improved crop varieties to respond to the growing population that is in need of food, but the current budget cannot allow the body to conduct this task effectively. The Government needs to allocate at least 1% of the total national budget to research for work and adoption of new technologies including breeding methods, which are vital in the release of improved varieties on time but also prevent movement of researchers away from Uganda in search of greener pastures.

promotes food security.

"If we are going to feed nine billion people in the world, we need to produce more food. This cannot be achieved using the current varieties, thus the need to use modern technology like molecular breeding," he said.

According to Varshney, molecular breeding will help researchers come up with new varieties of leguminous crops, like beans, cowpeas, chickpeas, groundnuts and millet, among others.

In Uganda, crops in the project are groundnuts, beans, sorghum and millet.

This is being carried out through the National Crop Research Resources Institute (NaCRRRI) and the National Semi Arid Resources Research Institute (NaSARRI) under the National Agriculture Research Organisation (NARO).

Why the selected crops

Varshney explained that in developing countries many households earn their livelihood from agriculture.

Most of the crops they depend on include legume: such as beans, cereals like 1 millet, sorghum and maize, which can be grown with minimal requirements.

However, farmers are fail to increase the productivity quantities of these crops d various reasons.

Research findings indica that poor access to improv seed, effects of climate ch-lack of markets is falling production of more legu and cereals among small farmers. Other reasons it lack of high yielding and improved varieties.

Farmers are still grow seed varieties that are 2 years old, which are no only poor yielding, but easily attacked by pests diseases, added Varshr