Interview with Stephen Mugo, IRMA's project coordinator in Kenya

"The project design has proven solid"

Dr. Mugo, what was the most important result of your work as coordinator for the IRMA project in 2001?

Dr. Mugo: The most important thing in the biotechnology field was the identification of the Bt proteins, the so-called Cry Genes, which are effective against the stem borers found in Kenya.

Is the same true from the perspective of the plant breeder?

Mugo: To me as a maize breeder, it's important that, from among the thousands of conventionally bred varieties of maize we are now able to identify several that can provide us with the genetic material needed for insect resistance.

How many types did you investigate for resistance?

Mugo: Among several thousands, we selected some 500 different types, originating from Kenya, Zimbabwe, and Mexico. We are now narrowing these to a few to use as sources of resistance to stem borers.

How many scientists and other experts are participating in the IRMA project to date?

Mugo: On the KARI and CIMMYT side there were about 30 researchers involved from all over Kenya - plant breeders, agronomists, entomologists, economists and other scientists. Also joining the project are professors and students at the University of Nairobi.

As well as other specialists and technical staff?

Mugo: Yes, if we count everyone who was involved, it's around 60 people. And we shouldn't forget that the socio-economic group is working very closely with providers of agricultural inputs and our customers, the small subsistence farmers. They have talked with more than 900 farmers and their families during the last two years ensuring that our work takes into account the real needs of the rural population.

You mean the farmers are just as important for you as collaborators as the scientists and technicians are?

Mugo: Absolutely. The contributions they make are extremely valuable for us. They share with us the problems they are having with the stem borer and other pests, they tell us about their ways of fighting drought and low soil fertility, and they report on their traditional methods of cultivation. The farmers are very interested in our work, and some of them even regularly take part in our conferences and stakeholders meetings.

Most farmers usually use seed from their harvest from the most attractive plants. What did you learn about this selection process??

Mugo: Yes, the farmers are indeed breeders as well. The many local varieties of maize are the result of this process. However, we should not forget that improvements in the seed can only be achieved very slowly using this method.

Why?

Mugo: In the first place, it's to do with the selection method. Most of the farmers just look for the largest cobs - without taking account of the fact that the size of the cob may not be due to superior genes, but may just be the result of the plant's location.

On a fertilized piece of land, for example?

Mugo: Yes. In addition, the starting-point that the individual farmers have is often too narrow to capture the wide number of genes needed to develop a genetically stable plants population. After dry periods, which in many places can last for a very long time, precious seed can be consumed or lost through drying of crops during vegetative stage and farmers may have to obtain new seeds.

Still, in the IRMA project you are not depending on genetic improvements alone?

Mugo: No, we're moving on several tracks. As I mentioned, we're currently involved in testing traditionally bred varieties - both hybrids and open-pollinating varieties - for their insect resistance, so that we can cross particularly suitable genetic material from CIMMYT stocks with local varieties.

When will the conventionally produced seed be available?

Mugo: We haven't fully completed testing using artificial stem borer attacks yet. As soon as this has been done, we will enter the most suitable varieties for testing in the maize National Variety Performance Trials that are conducted by the appropriate authorities. This is the first step in the release procedure.

Has your research approach proved itself so far?

Mugo: Yes, the project design has proven solid. There were a few delays because we weren't clear enough to begin with about how much time would be required to establish needed laws and regulations . But that was just part of our learning process.

What would you do differently now, based on your experience?

Mugo: We would give more attention to making the results of our work visible to the farmers more quickly.

How?

Mugo: By placing more emphasis on identifying insect-resistant genetic material in conventionally bred varieties. If we had done more work in this direction during the first year, the farmers would now be able to use the improved seed.

Did the information you gathered from the farmers also make a contribution to new discoveries?

Mugo: Yes. It was thanks to these surveys that we learned to include storage pests such as the weevil *Sitophilus zeamais* as well.

How much damage do these insects cause?

Mugo: The average national maize loss to weevils is about 15%, but we know that in several areas, 80% of stocks are damaged.

What can you do to stop it?

Mugo: Although we've got the option of the Bt protein with the stem borers, we want to approach the

weevil as conservatively as possible, by looking for suitable genetic material from conventional breeding.

The year 2002 is obviously going to be full of hard work for you.

Mugo: Very labor-intensive, yes. In the field of developing transgenic plants, we will be reaching the second generation, which can already do without markers, and we will be importing it into Kenya. The greenhouse needed for this is to be built very early in 2002, so that we can start on the experiments quickly.

Is this the continuation of the feeding experiments with leaves from the laboratory?

Mugo: In order to identify proteins that are effective against the highly resistant *Busseola fusca* we have to continue these experiments. In addition to the greenhouse experiments, we will conduct field tests to verify the laboratory and greenhouse results.

Does this mean you will be testing transgenic maize plants outdoors in Kenya as early as this year?

Mugo: We hope so. But with one decisive qualification - we will be detasseling the plants before they set pollen. So there will be no pollen escape and of course no transgenic fruit.

You've already mentioned your continuing work on insect-resistant conventionally bred varieties. How is the socio-economic research going?

Mugo: The survey of the farmers is continuing. Above all we want to find out where in their fields they harvest the seed for the following season - in the middle of the field or on the edges.

Why do you need that kind of information?

Mugo: It is an important aspect for determining the gap needed around fields with Bt maize in the future. The entomologists on the scientific team are starting investigations on the interaction between beneficial insects and pests in maize plants. The main aim is to ensure that defense measures against stem borers do not cause any damage to beneficial insects.

So the long list of projects and studies is by no means finished?

Mugo: Not by a long way. For example, we also want to continue the experiments with plants that attract or repel insects - both beneficial ones and pests. And we'll make continuing efforts in the information exchange and training for extension workers giving them more details about our project and about agricultural biotechnology as a whole.