



Training Africa's national partners in rice biotechnology

Giving an EDGE to young African researchers

by Savitri Mohapatra

It was a proud moment for three PhD students from West Africa participating in the graduation ceremony at the University of KwaZulu-Natal, Pietermaritzburg, South Africa. They had just taken a decisive step forward in fulfilling their dream of becoming biotechnology specialists.

Mounirou El-Hassimi Sow of Niger, Honoré Kam of Burkina Faso, and Kouadio Nasser Yao of Côte d'Ivoire all had worked in the biotechnology laboratory of the Africa Rice Center (AfricaRice) in Cotonou, Benin, under the supervision of Marie-Noelle Ndjiondjop. Their sense of pride was shared by Gustave Djedatin from Benin, who successfully defended his PhD thesis in front of an international panel of scientists at the University of Abomey-Calavi in Benin.

"These students have each made major contributions to global

knowledge of rice in Africa," declared Prof. Mark Laing, director, African Centre for Crop Improvement at the University of KwaZulu-Natal. "They are also keen to apply their newly acquired skills in their respective countries."

Their doctoral research was supported through a USAID-funded AfricaRice project on the application of marker-assisted selection (MAS). This aims to find solutions to rice yellow mottle virus (RYMV) infection (see the news report on page 8) and two other devastating rice biotic stresses, African rice gall midge (AfRGM) and bacterial leaf blight (BLB).

As part of their studies, the students traveled thousands of kilometers by motorcycle and boat to interview rice farmers and collect their local varieties. Mounirou, for instance, collected about 270 local rice varieties, many of which face

DR. NDJIONDJOP of AfricaRice, second from left, is helping national partners to use molecular breeding techniques to speed up the process of developing disease- and pest-resistant rice varieties.

extinction. These varieties were then characterized through field trials and DNA profiles for use as parental material in breeding for RYMV resistance.

The making of a work force

In rice breeding, the efficiency of MAS to transfer major rice genes is now widely recognized as it offers rice breeders a better opportunity to develop varieties that are resistant to diseases and pests and tolerant of abiotic stresses.

However, many African countries lack adequate local research capacity in this area. In response to a strong demand from its member countries, AfricaRice is progressively helping develop a work force of national

researchers trained to apply molecular biology techniques critical to solving agricultural problems.

For Dr. Ndjiondjop, the overall strategy is to advance Africa toward the concept of “modern breeders” to efficiently exploit this potential for food security in Africa.

“The USAID-sponsored PhD training was the starting point of this strategy, which has contributed to the strengthening of the capacity of the national agricultural research and extension systems (NARES) and has a significant impact on agricultural research in West Africa,” said Dr. Ndjiondjop. “For instance, Kam Honoré now leads the molecular laboratory established in his home country.”

Dr. Ndjiondjop is the driving force behind molecular biology research at AfricaRice relating resistance to a number of biotic constraints. She and her team have trained more than 60 NARES researchers, including PhD and MSc students from Africa, in molecular breeding.

AfricaRice is actively helping the NARES acquire the necessary skills and equipment to facilitate breeding involving MAS. Its modern biotechnology facility in Cotonou, Benin, is used for rice breeding and enables national partners and students to learn on the job or gain hands-on experience.

“At AfricaRice, I have not only been trained in molecular breeding and statistical analysis of research data but I was also exposed to the techniques of managing germplasm and field research experiments,” said Mounirou Sow. Thanks to this thorough background, he has been selected for the multiyear training program of CGIAR’s Generation Challenge Programme (GCP). He is now involved in sharing his knowledge and skills with his colleagues from various countries.

“The hands-on experience gained by the students through their involvement in collaborative research,



YOUNG AFRICANS, such as Mounirou Sow from Niger, who have been trained in the AfricaRice biotechnology laboratory are dedicated to applying molecular breeding and transferring the technology to other staff members in their respective countries (above). AfricaRice’s biotechnology facility in Cotonou, Benin, enables national partners and students to learn on the job or gain hands-on experience in marker-assisted breeding.

training programs, and technology transfer projects is very valuable,” explained Dr. Ndjiondjop.

The trainees also benefit greatly from the partnerships that AfricaRice has developed with advanced research institutions, particularly in France (Institut de recherche pour le développement and Centre de coopération internationale en recherche agronomique pour le développement) and the United States (Cornell University), and through the GCP, CGIAR sister centers—the International Center for Tropical Agriculture and the International Rice Research Institute—as well as with national programs and universities in Africa.

Adequate infrastructure

Realizing the importance of adequate research infrastructure in

national laboratories to ensure that scientists can apply their newly acquired skills when they return to their countries, Dr. Ndjiondjop and her team have helped purchase equipment and established the first national molecular biology laboratories in four West African countries (Burkina Faso, The Gambia, Guinea, and Mali).

“Trained national staff members need to have these facilities to introduce MAS into their breeding programs and to transfer resistance genes into elite varieties,” said Dr. Ndjiondjop. Moreover, national scientists can use these facilities to apply molecular techniques and MAS in many different crops, not just rice.

AfricaRice is now helping the national programs to run their molecular laboratories, through molecular breeding projects being implemented in Burkina Faso, Mali, and Nigeria, funded by the GCP.

It is also helping its partners to establish new molecular biology laboratories or upgrade the capacity of existing ones in several West

African countries involved in USAID-West and Central African Council for Agricultural Research and Development (CORAF/WECARD) projects.

“We will continue training our national partners in molecular techniques and MAS through a genetic and genomic platform focusing on low-cost, high-throughput genotyping based at AfricaRice,” said Dr. Ndjiondjop.

The platform will facilitate the expansion of molecular research activities throughout sub-Saharan Africa for rapid development of new varieties. It will also help update the knowledge of conventional breeders in molecular breeding and help them understand the tools, statistical software, and experimental designs required for effective use of molecular markers. 🍌