

## A revised research agenda unfolds

The WARDA strategic goal remains the same – to significantly increase the quality, usefulness and availability of knowledge and technology within the rice sector to support the poor in Africa – but the inherent complex target problems are being re-addressed directly and vigorously.

While concentrating its research efforts on the three major rice production systems – upland, lowland and irrigated – WARDA is maximizing the partnership model established with its traditional West African NARES partners and seeking to transfer this model to its other new engagements in sub-Saharan Africa. At the same time, reorganization of the Research Division in the second half of 2004 into just two programs with eight main projects provides fresh focus for a reinvigorated team of scientists.

The main research challenges were first outlined in the 2003–2012 Strategic Plan and are now being tackled through an unfolding new research agenda. For biophysical research, the production-system-based approach specifically aims at stabilization of the fragile natural-resource base of rainfed upland systems; intensification and diversification of rainfed lowlands, improved water control, use of external inputs, and integration of vegetables especially in peri-urban environments; and improvement of resource use efficiency in irrigated systems through ICM and NRM techniques. In all systems, multiple-stress-resistant NERICAs and elite *sativas* play a key role, while the *O. glaberrima* gene pool continues to be exploited for new sources of resistance to biophysical constraints and for development of novel plant types.



*Preventing damage by African rice gall midge remains a WARDA research priority.*

The USAID-WARP marker-assisted selection project to produce varieties with resistance to RYMV was initiated (page 15), and a rice-vegetables systems research project in collaboration with AVRDC was also implemented. A new project on NERICA dissemination was initiated in Central Africa, using support from IFAD for NERICA trials and PVS in the Democratic Republic of Congo (page 19).

Dr Ousmane Youm was appointed Assistant Director of Research (ADR) to head the Integrated Production Systems Program with its four new projects, one of which is specifically designed to find improved drought-tolerant varieties to dovetail with integrated management options for mitigating drought. A search was initiated for a suitable candidate for the corresponding ADR post for the Policy and Development



*Continual evaluation seeks new and improved rice varieties.*

Program. The late Dr Bob Carsky filled this post on a temporary basis until his untimely death, and subsequently Dr Paul Kiepe acted as interim program leader.

WARDA relocated to its headquarters near Bouaké, Côte d'Ivoire in September 2004. However, the resumption of the Ivorian crisis in November 2004 forced WARDA to relocate to Cotonou. This movement caused only slight disruption to Research and Development activities. The scientists evacuated from Bouaké could not be readily accommodated in Bamako for November and December but a core team, including those still based in Bamako, continued ongoing activities, while those that had left Côte d'Ivoire continued activities in other countries with the support of national partners. As a result of the sudden move from Côte d'Ivoire some trials planted at M'bé could not be harvested. The WARDA policy of dispersing trials in several countries in partnership with NARS proved a worthwhile safeguard.

Despite the ongoing difficulties, among the achieved highlights within the *Integrated Rice Production Systems* (Program 1) were:

- Development of habitat management strategy to control the African rice gall midge (AfRGM) in Nigeria by using plants of *Paspalum scrobiculatum* around rice fields as a reservoir of AfRGM parasitoids.
- Identification of a new gall midge species from a new wild grass host in Nigeria.
- Regeneration of about 3,000 rice germplasm accessions at IITA-Ibadan.
- Production of 400 *glaberrima* accessions at M'bé (Côte d'Ivoire).
- Nutrient deficiency (N, P and K) confirmed in upland and lowland ecologies.
- Research findings showed that NERICAs gave highest yield in the upper part (plateau) rather than on the lowest point (the hydromorphic zone) due to excess water.
- Development of a seed system designed to enhance the delivery of promising NERICA lines to many countries in West and Central Africa.
- Successful use of molecular markers in genotyping a segregating backcross population ( $BC_2F_1$  single plant) and in phenotyping of the  $BC_2F_2$  families.
- Development of near-isogenic lines (NILs) using NERICAs as donor of the character. At the end of the process, the NILs will be distributed to collaborators to evaluate in different environments.
- Development of a database and guide for the WARDA Farm Management Household Survey (FMHS) completed in October 2004.

As specified in the 2005–2007 MTP – and within the framework of the Strategic Plan – the Center was also actively involved in promoting the development of complementary technologies to enhance sustainable production in rice-based farming systems throughout West and Central Africa. To this effect:

- Improved integrated crop management technologies developed to enhance input use efficiency, productivity and profitability of Sahelian irrigated rice systems were evaluated and adapted to farmers' production environments.
- Post-harvest technologies that improve grain quality and address the drudgery of labor were adapted and tested with a wide range of stakeholders in the rice sector.
- Improved inter- and intraspecific varieties, developed for irrigated rice systems, tested and adapted to a wide range of irrigated rice environments within the context of ICM.

- Emphasis was given to the development of weed-competitive cultivars for direct seeded systems.
- In the Savanna and humid forest ecologies, ICM options developed for the Sahel were adapted and evaluated with farmers' participation at key sites.

The *Rice Policy and Development Program* initiated a major study in Burkina Faso, Mali, Niger, Nigeria and Senegal on Policy Effects on Institutions and Structural Arrangements for Rice Production and Marketing in West Africa. This study focuses on irrigated rice schemes, while the second part will focus on lowland and upland rice production systems. Through a rapid appraisal approach, background information was collected for each country. In addition, key informants in the rice production to market chain were interviewed.

Major highlights from the program were:

#### *Rice policy and technology impact*

- Timely responses made to several information and data requests from national programs and governments on rice production and trade statistics.
- Various statistical indexes, graphs and tables were generated as supporting materials for presentations and technical documents.
- Further improvements to the West Africa Rice Statistics database through information updates and start up of the development of an Access version of the database to allow easy data manipulation and to quickly respond to information and data requests.
- Developed a network of policy researchers in West Africa.
- Development of a database archiving system that will be based on an activity programmed in 2005.

### ***Updates on the New Rice for Africa (NERICA)***

**Upland rice varieties:** Upland NERICAs are planted on more than 100,000 ha across Africa, including about 60,000 ha in Guinea and more than 10,000 ha in Uganda. Dr Monty Jones, a former WARDA researcher was selected as a co-recipient of the **2004 World Food Prize** for developing the NERICA varieties by successfully crossing African with Asian rice species to produce drought- and pest-resistant, high yielding NERICA rice varieties, a feat which had not been achieved before in the history of rice breeding.

In 2004, NERICA increased in number from the seven known varieties to 18. WARDA's Variety Nomination Committee named 11 new NERICA varieties (NERICA8 – NERICA18) that have been developed by our breeders in partnership with the national programs for the upland ecology of SSA. Some of these varieties are already beginning to be released in West African countries.

*This lady farmer explains her favorite rice choice from the range of potential varieties supplied by WARDA to Congo DRC.*



**Lowland NERICA varieties:** Another scientific breakthrough was achieved with the development and release of lowland NERICAs. These new varieties have yield potential of 6–7 t per ha and have good resistance to major lowland stresses. The lowland NERICA varieties (see p5) have been developed for the African lowlands, one of the most complex rice ecologies in the world. Given the high potential of the lowlands in Africa, the new rice varieties, which have already received a stamp of approval from farmers, are expected to make an even bigger impact than the upland NERICA varieties. Four lowland NERICA varieties were released in Burkina Faso and two in Mali in early 2005.

About 60 of the new varieties for the lowlands have already been grown and evaluated by farmers in several African countries through the participatory varietal selection (PVS) process – an approach that was used successfully in accelerating the dissemination of the upland NERICAs.

#### **Impact assessment**

- An update of the results of NERICA diffusion and adoption in Côte d’Ivoire show a high (80%) long-run potential adoption rate.
- A clear impact of NERICA adoption on farmer income in Côte d’Ivoire is not yet established. Conflicting results of NERICA impact on income were observed across the adopting population.
- In Guinea, the preliminary results from the first phase of the study show that NERICA varieties are known by 27% of sample farmers.
- ASI thresher/cleaner manufacture and use continues to spread in Senegal, Mali, Mauritania, Burkina Faso and Côte d’Ivoire. Nearly 500 machines were operating by harvest 2005.

Following the completion of phase I of the project ‘Participatory Adaptation and Diffusion of Technologies for Rice-Based Systems (PADS) in West Africa’, a Phase II proposal has been approved and will be implemented using the Participatory Learning and Action Research (PLAR) methodology developed by WARDA.

On capacity building, several training activities involving farmers, students and other organizations were undertaken (See Annexes). A marker-assisted selection system was set up at the University of Mali, Bamako.

#### *WAIVIS (West African Inland Valley Information System)*

Land use information stored in WAIVIS is now being used across institutions and is leading to identification of new research areas. Apart from scientists in national programs, staff members of international organizations like IWMI and FAO are using WAIVIS. This has led to joint project proposal developments.

A second outcome is the development of national databases in Benin, Togo and Guinea. National scientists were trained by WARDA GIS staff in the structure and creation of their own national databases based on the same format as WAIVIS. The national program of Nigeria is discussing a similar proposal, while NARI in The Gambia has already adopted the WAIVIS format for storage of its data for characterization of the country’s inland valleys.

#### **Internal and external reviews**

As part of the Board of Trustees’ oversight for programs, and in anticipation of the Fifth External Program and Management Review of WARDA, the Research Division set in motion two CCERs in 2004. These were on

IVC and on Partnership, both approved by the Board. In 2005, further CCERs, one on rainfed rice and natural resources management and another on the socio-economic impact of rice, are being prepared. It should be possible to conduct one or two other CCERs in 2006. In 2004, two donor-supported projects were evaluated. These included project 1.4, entitled creating low management plant types for resource-poor farmers in rainfed ecosystems, supported by the EU. The other one was the review of Networks, including ROCARIZ, carried out by USAID WARP. WARDA prepared comments on the two review reports and has interacted with the individual donors on the future of each of the projects. Recommendations from all the review reports and lessons learnt are useful in streamlining the management of research projects and the review system in the CGIAR.

### ***Seed dissemination***

The year 2004 brought an increase in request for seed compared with 2003, with 3,170 seed samples being supplied to countries in West Africa and 14,850 to East, Central and Southern Africa (ECSA). Despite the relocation of WARDA to Cotonou in January 2005, INGER-Africa was able to restart delivery of seed samples to its partners in West Africa and ECSA. By mid-2005, 17 sub-Saharan countries had received seed samples, including Benin, Sierra Leone, Niger, Nigeria, Mali, Ghana, Guinea and Guinea-Bissau in West Africa, and Central African Republic, Democratic Republic of the Congo, Congo-Brazzaville, Malawi, Ethiopia, Kenya, Tanzania, Uganda and Sudan in ECSA.

### ***Establishment of ECARRN***

With support from the Canada Fund for Africa and from the European Union, the East and central Africa Rice Research Network (ECARRN) was established in Dar es Salaam, Tanzania. A Coordinator was appointed in January 2004 and the steering committee inaugurated. A high level meeting to boost rice production in East Africa was organized and hosted by ECARRN.

### ***Conference and Workshop participation***

Cotonou has become a convenient venue for several meetings and workshops organized by WARDA. ROCARIZ, ARI and IVC all held steering committee meetings in Cotonou, and a major policy study

*Traditional crossing for varietal improvement may follow initial assessment in the biotechnology lab to determine which parental lines hold genes conferring desirable traits of quality or resistance.*



methodology and planning workshop brought in NARES economists from throughout West Africa. Four countries are participating in the USAID-funded project on marker-assisted selection that got underway with a workshop in Bamako, Mali attended by all the participating scientists, farmer and donor representatives. The steering committees of ARI, ROCARIZ and IVC met in 2004 or in early 2005.

Scientists from WARDA attended more than 40 workshops, conferences, regional and international meetings, including key events such as the 4th International Crop Science Conference in Brisbane, Australia, the World Rice Research Conference 2004 at Tokyo and Tsukuba, Japan, the launch of the implementation of the Comprehensive African Agriculture Development Program (CAADP) hosted by COMESA-ASARECA in Dar es Salaam, Tanzania, and the later G8/NEPAD Summit in Accra on the CAADP implementation. ROCARIZ organized the Third Biennial Regional Rice Research Review (4Rs 2004) in Accra, Ghana, attended by more than 70 NARS and WARDA scientists, NGOs and donor representatives. WARDA helped organize the Pan-African Celebration of the International Year of Rice in Côte d’Ivoire and Ghana and participated in IYR-related events in Guinea, Nigeria and Mali.

**Staff Publications**

During the period under review, program staff prepared and submitted or published several papers in peer-reviewed journals, conference proceedings/book chapters and poster presentations at regional or international fora. Compared to 2003-2004, the overall publication record of WARDA staff showed some improvement, exceeding the CGIAR average of 2.5 papers per scientist. WARDA is one of eight Centers above the average.

*New drought-resistant lines with high-yield potential are under development in Cotonou, Benin.*

