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Africa-wide Rice Agronomy Task Force

Africa Rice Center (AfricaRice) – Annual Report 2012

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About Africa Rice Center (AfricaRice)

AfricaRice is one of the 15 international agricultural research Centers that are members of the CGIAR Consortium. It is also an intergovernmental association of African member countries.

The Center was created in 1971 by 11 African countries. Today its membership comprises 24 countries, covering West, Central, East and North African regions, namely Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Côte d'Ivoire, Democratic Republic of Congo, Egypt, Gabon, The Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Madagascar, Mali, Mauritania, Niger, Nigeria, Republic of Congo, Senegal, Sierra Leone, Togo and Uganda.

AfricaRice is implementing its Strategic Plan through the CGIAR Research Program on Rice, known as the Global Rice Science Partnership (GRiSP), the Rice Task Force mechanism and a network of Rice Sector Development Hubs that are being set up across Africa to concentrate R&D efforts and connect partners along the rice value chain.

AfricaRice temporary headquarters is located in Cotonou, Benin. It has outreach stations in Côte d'Ivoire, Nigeria, Senegal and Tanzania. Research staff are also based in Liberia and Sierra Leone.

For more information visit: www.AfricaRice.org

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Africa Rice Center
Centre du riz pour l'Afrique

AfricaRice

Message from the Board Chair and the Director General

Although 2012 saw political turmoil, economic downturn and transitions in many parts of the world, as well as legislative and presidential elections in most of the Association's member countries, for AfricaRice it was overall a very positive year, with many solid achievements.

Rice is high on the political agenda of most member countries. There is strong commitment from governments to support rice production. Indeed, several countries have set ambitious goals to become self-sufficient in a very short time frame (within 2–4 years). At the same time, the private sector is increasingly interested in investing in rice.

According to the Food and Agriculture Organization of the United Nations (FAO), paddy production in 2012 in Africa is estimated to have increased by 4% compared to 2011, reaching the level of 26.4 million tonnes (17.4 Mt, milled equivalent), spearheaded by large gains in Egypt, Guinea, Mali, Senegal and Sierra Leone, followed by Burkina Faso, Côte d'Ivoire, The Gambia, Ghana, Guinea-Bissau, Liberia and Mauritania.

At AfricaRice, 2012 was truly a year dedicated to research for development as we launched the Rice Sector Development Hub network — an innovative approach to achieve development impacts at scale.

The Hub approach is an important component of our new research-for-development strategy for 2011–2020 'Boosting Africa's Rice Sector', which is being implemented mainly under the umbrella of the Global Rice Science Partnership (GRiSP). Hubs are locations strategically identified by national partners to boost Africa's rice productivity. Rice sector development hubs are located in different rice-growing environments and markets, which have the potential to produce high-quality rice and rice products for national and regional markets. Researchers and advisory services from AfricaRice and partner organizations help to evaluate technological and institutional innovations that could be used in these locations, along with local knowledge with thousands of actors in rice value chains.

By the end of the year, our national partners had identified 56 hub locations in 26 countries.

The Africa-wide Rice Task Force mechanism is another important element of our strategy, with activities in 26 countries. In 2012, all the Task Forces made significant progress, but the Rice Agronomy Task Force in particular came into the limelight as it carried out important surveys in the rice sector development hubs in 15 countries to identify yield-limiting and yield-reducing factors in farmers' fields. It is therefore appropriate that we highlight the task force's work in our first feature article (p. 4).

Several types of mechanical weeders were tested with farmers in Tanzania and Benin. A Madagascar-type rotary weeder worked best on heavy clay soils. Local blacksmiths were trained in the fabrication of three rotary weeders in Tanzania. Some more details are provided in our second feature (p. 11).

During the year we provided targeted support and interventions for rice-sector development in Liberia, Mali, Nigeria and Sierra Leone — at these countries' request.

We also enhanced our activities in Central Africa, in line with the resolutions of the 28th Session of the Council of Ministers, held in September 2011. The AfricaRice National Experts Committee (NEC) endorsed this action at its meeting in June 2012.

We made special efforts to revive our capacity-building efforts through the development of a new training strategy, new curricula and courses, and the production of learning materials. A brand-new regional training center is under construction in Saint-Louis, Senegal, close to our experimental facilities in Ndiaye, to respond to the need to conduct practical and long-duration (2–4 weeks) training courses on rice production, processing and marketing that target especially unemployed youth and women, in addition

to researchers, extension agents, seed producers and other rice value-chain actors.

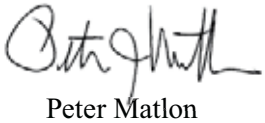
The year saw the forging of new strategic partnerships, steady growth in funding with the launch of several large donor-supported projects, sustained policy and advocacy efforts, visits by several important personalities, our presence in high-level meetings, and wide recognition through prestigious international and national awards.

The CGIAR Consortium Board Chair, Dr Carlos Pérez del Castillo and CEO, Dr Frank Rijsberman visited AfricaRice in Benin on 17–18 July, interacting with management and staff and representatives of national partners, a women seed producers' association and farmers' organizations. We presented some of the Center's main achievements over the last 5 years, the partnerships and the mechanisms we use to implement our 2011–2020 Strategic Plan (approved last year by our Council of Ministers in The Gambia, in particular leveraging global rice knowledge through GRiSP), the newly established Africa-wide Rice Task Forces and the network of rice sector development hubs.

The delegation appreciated the emphasis AfricaRice places on partnerships to achieve research outcomes and impact across the rice value chain. They also visited the Minister of Agriculture of the Republic of Benin, thanking the Government of Benin for their support in enabling the CGIAR Consortium to obtain the status of international organization.

On a more somber note, 2012 was also the year when we lost our dear colleagues Dr Youssouf Dembélé in Cotonou and Mrs Oyin Oladimeji (a winner of the Dr Robert Carsky Award) in Ibadan. Our thoughts are with their families.

Papa A Seck



Peter Matlon

Chair of the Board of Trustees, Dr Peter Matlon (left), with Director General, Dr Papa Abdoulaye Seck.

Africa-wide Rice Agronomy Task Force

It is as if African rice agronomists had just been waiting for the "go" — the launch of the Rice Agronomy Task Force in November 2011 led to a cascade of activity in 15 countries throughout the continent in 2012/13.

The five Africa-wide Rice Task Forces are a major component of the rice research-for-development strategy for the continent elaborated by AfricaRice in 2011. The Africa-wide Rice Agronomy Task Force pools the resources of rice agronomists across the continent, with overall coordination provided by AfricaRice. The overarching aim of the Task Force is to improve rice production and productivity through the introduction, testing and dissemination of baskets of 'good agronomic practices' (GAP baskets).

Of all the Rice Task Forces, the Agronomy Task Force is arguably the most closely linked with the rice sector development hubs.

"Through this task force mechanism, we will test innovations and monitor adoption in the rice sector development hubs that are located in broad geographical areas in many countries," explains AfricaRice agronomist Kazuki Saito.

At the second annual meeting of the Africa-wide Rice Agronomy Task Force in February 2013, it was decided that task force activities would expand to 20 countries for 2013/14 (*see* Fig. 1).

Groundwork: Listen to farmers' voices and observe farmers' fields

"The first research task," explains Saito, "is to conduct diagnostic and yield-gap surveys in each hub. A diagnostic survey involves interviews with individual farmers or other actors such as input suppliers and extension workers, and group discussion

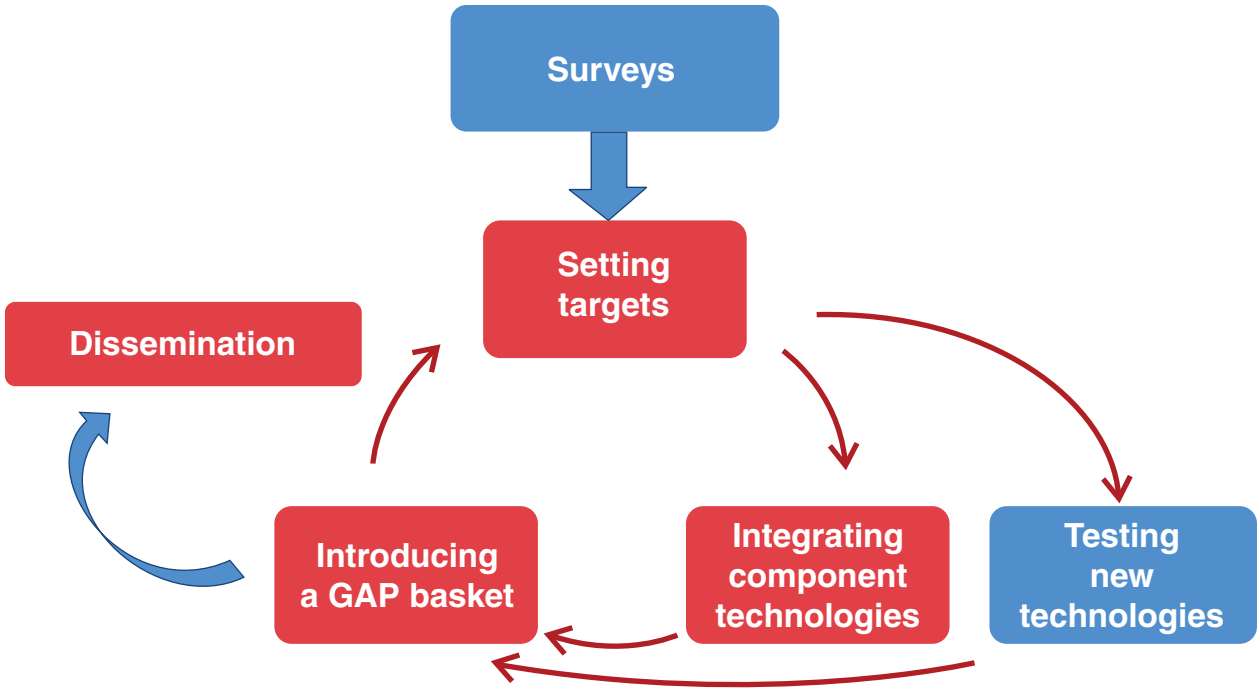


Figure 1. Framework of the Africa-wide Rice Agronomy Task Force

to understand farmers' current practices, knowledge, and the challenges and constraints they face. A yield-gap survey involves interviewing farmers, a series of field observations from sowing to harvesting, soil and plant sampling, and yield measurements.

These two surveys enable us to determine the gaps between on-farm yields obtained by farmers and potential yields, which can be determined by crop simulation models, and their causes." Causes of yield gaps in farmers' fields vary among rice production systems and agro-ecological zones. But, typical causes include sub-optimal crop management, yield-limiting (e.g. poor soils) and yield-reducing (e.g. pests) factors, socioeconomic constraints (e.g. finance, labor shortage), and institutional/political arrangements (e.g. land availability, rice and fertilizer prices).

By March 2013, yield-gap surveys had been conducted in 23 hubs across 15 countries, involving more than 800 farmers, while diagnostic surveys had been conducted in 22 hubs in 15 countries, involving more than 1000 farmers, processors, extension agents and other key actors with knowledge and experience in local rice production. Smart-phones and computer tablets are used to enter data and allow for immediate analysis and interpretation by AfricaRice and national partners.

"The results from the surveys enable AfricaRice and its national partners to identify the opportunities available to introduce technologies to close the yield gaps," says Saito. Although data from the surveys had not yet been fully analyzed, three challenges across major rice-growing environments were frequently reported by national partners during the meeting in February 2013 — weed infestation, lack of availability of purified seeds of new, improved varieties, and lack of mechanization. Other challenges identified were: sub-optimal crop and nutrient management, including timing of interventions in irrigated systems; sub-optimal land preparation and water management in rainfed lowlands; and drought and soil problems in uplands.

Proper data analysis is essential for identifying the challenges. A training workshop will be held in April 2013 to familiarize participants from 15 countries with methods of data analysis, and a workshop on yield-gap survey analysis is planned for the end of 2013.

Apart from the surveys, multi-stakeholder platform (MSP) will be another entry point for identifying technologies suitable for local conditions.

Introducing GAP baskets to farmers

The second aspect of the Agronomy Task Force's research activities in the hubs is the introduction and adaptation of suitable innovations through participatory learning and action-research (PLAR). At the second annual meeting, national partners identified three or four promising component technologies as an initial GAP basket, based on the preliminary results from surveys and available technologies in each country. The component technologies selected by the national partners varied among hubs and rice-growing environments, but mainly included land-preparation options (bunding, puddling and leveling), crop establishment, variety choice, weed management and nutrient management. The GAP baskets will be introduced to farmers, who are randomly selected in randomly selected villages in the hubs. This design is based on so-called 'randomized control trials'.

"An important aspect of working in the hubs is that we can monitor the adoption behavior of the farmers who take part in PLAR activities, and the spillover effects to their neighbors," says Saito. Once GAPs with higher potential adoption rate are identified, these will be disseminated through training and various media tools in collaboration with other partners, although such dissemination is not part of the work of the Agronomy Task Force. If the GAP introduction fails, GAPs will be modified and adjusted to local conditions, and new versions of GAPs will be introduced. In other words, there is an effective feedback system to ensure that GAP baskets evolve over time in each hub.

Use of tablet computer in the field

New technologies

Testing and validating new technologies before introduction is another activity of the Agronomy Task Force. So far, the task force has identified several technologies for testing across the network of hubs: decision-support systems for crop management practices including nutrient management, mechanical weeders, and improved land preparation practices involving bunding, leveling and facilitating drainage.

Decision-support systems for rice are not new in Africa. In the 1990s and early 2000s, AfricaRice developed the RIDEV and FERRIZ tools for Sahelian irrigated rice systems, which give advice to farmers on 'date-and-rate' agronomy such as optimum sowing windows and timing and amount of fertilizer application. Recent rapid evolution of information and communications technology (ICT) has provided the means to make decision-support tools available at the farm level. "The NutrientManager provides cost-effective and balanced fertilizer recommendations for achieving a target rice yield," explains AfricaRice senior agronomist Kabirou N'Diaye. Initially developed by the International Rice Research Institute, it

has been adapted for and tested in Senegal and Nigeria. Small-scale evaluation of the NutrientManager in the Senegal River valley resulted in a 30% increase in yield (from an average of 6.1 tonnes per hectare under farmers' practice to an average of 8.2 t/ha with the NutrientManager). In the task force, nutrient-omission trials are being conducted in farmers' fields in 23 hubs in 15 countries. Currently, AfricaRice is developing comprehensive crop management decision-support systems, through combining updated results from crop simulation models and a framework on nutrient management. The systems will also include an option to maximize yield with a given budget through choice of inputs such as fertilizer.

Although the sawah system, involving bunding, leveling and drainage infrastructure to improve water management (*see* 'Working with farmers to improve water control in inland valleys', p. 14) are included in GAP baskets in some of hubs for testing this year, some countries plan to learn from the other countries' experience in this area.

Several mechanical weeders have been tested and adapted by AfricaRice and national partners over the

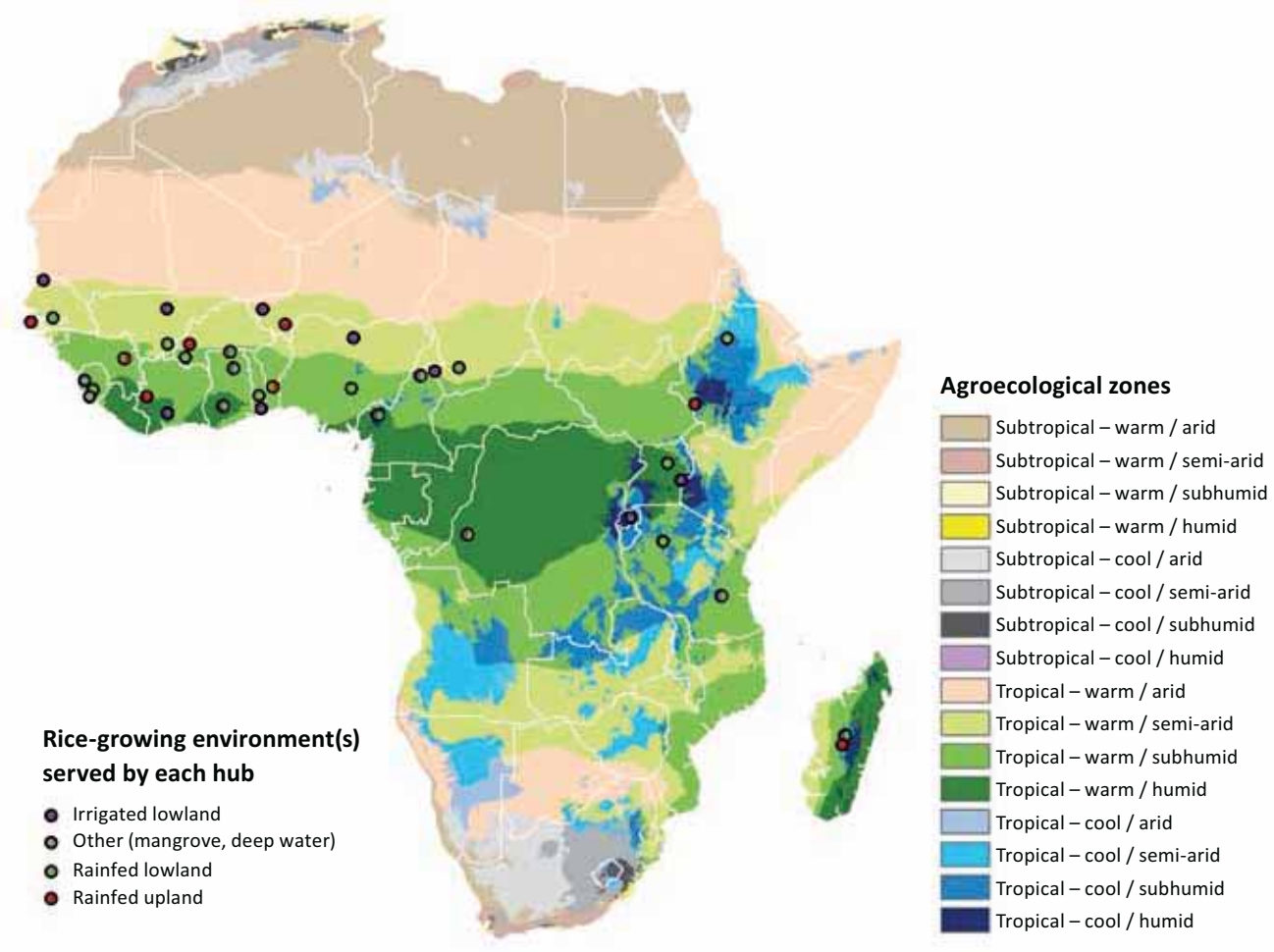


Figure 2. Location of Agronomy Task Force sites

past few years. Tests of mechanical weeders against hand-weeding showed the mechanical weeders to be a promising option. "There seems to be a marked preference for mechanical weeders and farmers are looking for simple and light tools at cheap price," explains Saito, "which reduce the labor input for weeding considerably over the usual hand-weeding." There are various types of mechanical weeders, which are adapted to different water regimes and soil conditions. They will be introduced to the hubs to identify the most suitable one in each case. The mechanical weeders are the subject of the second feature in this annual report (*see* 'Weeding out the weeders: Options for mechanized weed control', p. 11). Effective weeding using mechanical weeders requires uniform crop establishment: simple line- or grid-makers are available, and can be used to set row and plant spacing by farmers to improve crop establishment.

Capacity-building

"Another key aspect of the task force's work is rebuilding and strengthening agronomy capacity across the continent," says N'Diaye. "The AfricaRice Training Center has recently been completed near Saint-Louis, Senegal, where we will train farmers and others in integrated rice management and other aspects of rice research and cultivation." The new training facility comprises a 100-seat conference room, two 25-seat classrooms, a 52-room dormitory, laboratories for biotechnology, grain quality and soils, and a 10 ha research farm. "Researchers, extensionists and leading farmers will be able to spend a whole season based at the Center, gaining hands-on experience of everything from land preparation to postharvest aspects of rice management," says N'Diaye. In particular, 2013 will see the first batch of trainers of farmers attending the integrated rice management course at the Center.

Meanwhile, funding for postgraduate training in rice-related topics will enable PhD students to be identified and begin their research, and Masters students to be supervised by AfricaRice and national rice researchers.

Next steps

"The Agronomy Task Force is still in its infancy," says N'Diaye. "Although we have achieved much in the first 15 months, many more activities will come 'online' in 2013."

In addition to various 'about to be implemented' activities already mentioned, 2013 will see Burkina Faso, Chad, the Democratic Republic of Congo, Guinea and Rwanda join the Task Force and commence their farmer surveys.

"It is great to see how this Agronomy Task Force has raced ahead," says Marco Wopereis, deputy director general at AfricaRice, "and how we work with farmers towards improved crop management based on agro-ecological principles, local innovations and good technology. It is one crucial first step towards ecological intensification of rice-based systems in Africa."

AfricaRice and the 'System of Rice Intensification'

The 'System of Rice Intensification' (SRI) created controversy within rice research communities in the late 1990s and early 2000s when it was first promoted, mainly due to the unrealistically high yield claims (up to 20 tonnes per hectare). Moreover, SRI — which was 'discovered' by the French Jesuit Father Henri de Laulanié in Madagascar — is very different from what is generally considered 'normal' practice based on recommendations derived from decades of scientific research. SRI in its original form is composed of a set of component technologies:

- The use of very young (12- to 15-day old) rice seedlings, planted singly in straight rows at wide spacing (25 × 25 or 30 × 30 cm) — compared with older seedlings (21 days old) planted 2–3 together at 20 × 20 cm in conventional recommended practice
- Incorporation of large quantities of organic matter, preferably compost, for soil fertility management — in conventional rice farming recommendations consist of the use of inorganic fertilizers
- Fields are subjected to alternate wetting and drying — the field should be flooded at the time cracks start to appear in the soil — compared with permanently flooded fields under conventional recommended practice

SRI is being promoted in at least 15 African countries and another 33 worldwide. Meanwhile, the yield claims of the proponents have been deemed "excessive", "unconfirmed" or "based on measurement errors" by 'traditional' rice researchers. It has also surprised rice researchers that SRI is promoted as a complete and fixed package rather than a flexible and locally adaptable set of recommendations. In fact, the SRI debate has been fierce and highly polarized — it seems that every rice researcher was either pro- or anti-SRI, with no middle ground!

To test the merits of SRI and whether farmers could benefit from its components, AfricaRice supervised work by Timothy Krupnik, then a PhD student at the University of California at Santa Cruz. Specifically, the research team compared SRI with recommended best management practices in the Senegal River valley, and tested the component technologies of SRI in an

Experimental plots on the AfricaRice farm in Ndiaye (Senegal River delta)

Former PhD student Timothy Krupnik with Senegalese field workers setting up one of the on-station SRI trials in Fanaye (Senegal River middle valley)

experiential learning and innovation experiment with farmers.

The key findings and conclusions from this work were that:

- SRI can produce yields as high as (but not higher than) conventional recommended practices
- SRI can help reduce water use without negatively affecting yield
- SRI should not be promoted as a fixed package, but rather be adapted to local conditions or, better still, its components should be considered part of the GAP basket of options in integrated rice management — as daily practitioners, farmers are intuitively able to improve their systems through exposure to new practices and experimentation.

"Arguably the most useful components of SRI are those that reduce the water requirement of the crop," explains AfricaRice agronomist Jonne Rodenburg, who supervised Krupnik's work. "This is important because locally water is becoming more scarce, while fuel for irrigation pumps is becoming more expensive." For example, irrigation fees now comprise 20–44% of farmers' total production costs in the Senegal River valley.

"However, the same SRI component that reduces the water use — alternate wetting and drying — also favors weed growth. Moreover, the wider plant spacing and younger and fewer seedlings at transplanting hamper the crop's competitiveness against weeds. So, special attention to weed control would be required in such systems," says Rodenburg. This makes the system more labor intensive.

In the experiential learning and innovation experiment, farmers took what they considered to be the best components from both SRI and the conventional recommended practice to create what was termed 'farmer adapted practice'. This new practice — or rather, set of practices — resulted in rice yields that were better than those achieved under SRI and recommended practice. Moreover, it reduced labor inputs compared to SRI and herbicide application rates compared with conventional practice.

However, in one of their research articles, Krupnik and the team conclude: "broader promotion of farmer adapted practice as a non-flexible technological package is not appropriate, nor was it a goal of this study. While the components practices used in farmer adapted practice are likely to be of broader value, farmers' circumstances will vary across the Senegal River valley, and within the greater Sahel or sub-Saharan Africa."

"Of course, AfricaRice is no stranger to the heterogeneity of African rice-farming systems," says deputy director general Marco Wopereis. "It is, after all, the basis of so much participatory work that we have conducted over the past 15 years — from participatory varietal selection (PVS) to participatory learning and action-research (PLAR). Indeed, the latter has been adopted as the *modus operandi* for work in the new rice sector development hubs." (See main story.)

Weeding out the weeders: Options for mechanized weed control

In Africa, weeds are the biggest drain on farm resources and the greatest constraint on yields. Smallholders cannot afford herbicides and few have access to mechanical weeders, which leaves them with one option: laborious manual weeding. About a third of all the labor invested in a smallholder's rice crop goes to weeding.

Every rice farmer in Africa recognizes that weeds are a problem. They compete with the crop for nutrients, water and sunlight, and controlling them by hand is extremely time-consuming. Left uncontrolled, it is estimated that weeds would reduce rice yields by up to 90%. Yet even when weeding is done in irrigated and rainfed lowland fields — laboriously by hand — scientists estimate weeds still deprive farmers of between 16 and 23% of their crop.

In an experiment to determine whether mechanical weeders could reduce the weed-control burden for rice smallholders, AfricaRice tested the efficacy of two rotary weeders — the straight- and twisted-spike floating weeders — against herbicide application and hand-weeding in Bagamoyo, Tanzania. The tests were conducted in irrigated lowlands with full water control.

AfricaRice agronomist Jonne Rodenburg takes up the story: "As expected, herbicide application was the most time-saving option, reducing weeding time by an average of 92% compared to hand-weeding. However, the two rotary weeders also saved valuable time — 43% and 39% for twisted-spike and straight-spike versions, respectively.

"With no significant difference in rice yield between the four weed-control methods, the mechanical weeders demonstrated their value in freeing up farmers' time."

To use a mechanical weeder, a field has to be level and the rice planted in rows slightly wider than the weeder. Even so, each mechanical weeding needs to be followed by hand-weeding between plants within rows. When plants are transplanted in a grid formation, weeders can be passed both ways — especially if many weeds survive the first pass; if not, what's left can be removed manually.

One option is to perform successive weeding operations perpendicular to each other, which would leave many fewer weeds to be hand-weeded. Typically, a lowland rice field in sub-Saharan Africa will require two or three weedings before the rice canopy closes and new weeds are shaded out.

"When using the rotary weeder, instead of removing the weeds [as in hand-weeding], they are cut down and buried, and add nutrients to the soil," says rice farmer Nasibu Katoto, a keen adopter of the rotary weeder in Tanzania. "That's what the rotary teeth do."

In addition to the labor-saving experiments, three types of weeders — the two aforementioned ones and a cono-weeder — were presented at a workshop organized by AfricaRice and Intermech Engineering in Morogoro, Tanzania.

Twenty-four blacksmiths and engineers from various companies and locations in Tanzania built these rotary weeders, based on existing prototypes but modified for ease of manufacture and use. These machines performed well in field-testing and the blacksmiths were confident they could promote them to local people. Engineering drawings of the three prototype weeders were produced by Godfrey Mwinama, an engineer with the Centre for Agricultural Mechanization and Rural Technology in Arusha, Tanzania, and are now freely available.

In Benin, another AfricaRice team tested six mechanical weeders — the twisted-spike floating weeder and five others — with 157 farmers in 14 villages throughout the country. These farmers' rice fields covered a range of hydrological conditions, including irrigated lowlands and rainfed lowlands. Farmers ranked the weeders against their own methods. Overall, they preferred the ring-hoe weeder, followed

Local fabrication and maintenance are considered key in mechanizing Africa's rice sector

by the straight-spike weeder which was developed for upland conditions in Japan.

Where soils are ponded and soft, farmers tended to prefer the curved-spike floating weeder over the ring-hoe. Farmers' rankings of the weeders were independent of their gender, size of field, or years of experience in rice farming. All but two farmers preferred the ring-hoe to hand-weeding or traditional hoes. Conversely, while only a few farmers used herbicide, 17 of the 22 who did preferred it to weeders. These farmers felt that herbicide application was easier than using any of the mechanical weeders (it is indeed quicker). Though the sample of herbicide-using farmers was small, it does suggest that uptake of mechanical weeders is likely to be more successful in areas where most farmers currently weed by hand.

"Water and soil conditions at the testing time are likely to be related to preference rather than socioeconomic information, including gender," says AfricaRice agronomist Kazuki Saito, who supervised the work in Benin. "The ring-hoe weeder is better where fields are not flooded and soils are relatively hard. But in inland-valley conditions, water and soil conditions vary over short distances."

The conclusions from the Benin work were that the mechanical weeders present a viable alternative for reducing the labor required for weeding, and that a range of types is required to suit farmers' preferences and the diversity of soil and water conditions.

Weeding a muddy paddy even with a mechanical weeder may not be as easy as it sounds …

... but skill in mechanical weeder use quickly improves with practice

To assist in the dissemination of rotary weeders among farmers, the team in Tanzania has produced a peer-to-peer video of the kind that has already proved invaluable in extending technologies beyond research at the village level. This video suggests farmers should combine weed-control methods and recommends suitable preparation of land (leveling and flooding).

The advice to farmers is to:

- Choose the right weeder for the type of soil (clay, for example, will quickly clog up a weeder that has a lot of teeth)
- Test and adjust the weeder before use
- Flood the rice field to about 5 cm before weeding so that the soil is soft and will easily rinse off the weeder's teeth, helping it to pass smoothly between rows
- Work when the weeds are small, with just two or three leaves.

All the mechanical weeders tested in Tanzania and Benin, along with line- and grid-markers, have been catalogued (including technical information) on a knowledge-management web portal being provided for the rice sector development hubs by AfricaRice and national teams.

Research in brief

Working with farmers to improve water control in inland valleys

AfricaRice has adopted a simple and participatory approach called 'sawah system development' (SSD) to develop inland-valley lowlands for rice. SSD has been used experimentally in Togo with support from various donors since 2004. Under the auspices of the Japan-funded project 'Sawah, Market Access and Rice Technologies for Inland Valleys' (SMART-IV), in 2009 AfricaRice expanded the work to Benin. There have been promising results in both countries.

'Sawah' is a Malayo-Indonesian word for a leveled and bunded rice field that has a water inlet and a water outlet. Because level and bunded fields are easier to work, farmers are able to:

- Improve land preparation and transplanting
- Reduce water run-off and loss of fertilizer
- Maintain a water layer in the field to help control weeds.

Water control is vitally important for raising lowland rice yields

Sawah systems are well known in Asia, where they produce higher yields than lowland rice fields with less water control.

AfricaRice land-development specialist Worou Soklou uses SSD to develop an inland-valley lowland in just 2–3 months. Sawah is not necessarily about building irrigation infrastructure, rather it is about improving water control in a rainfed environment.

"The important players in SSD are the farmers," explains Worou. "We tell them about the approach and how it might improve their rice production and consequently their livelihoods. If they don't 'buy into' it and take ownership of the whole developmental process, we can't continue!"

"Before we get to the field, we have to be sure to select suitable inland valleys that have appropriate hydrology and land-quality characteristics, for guaranteed ongoing supply of water and good soil fertility," explains AfricaRice remote-sensing and geographic information systems (GIS) specialist Sander Zwart.

Firstly, inland valleys are mapped at national scales. This is done using Digital Elevation Models derived from satellite remote sensing. Then spatial analysis is performed on maps of soils, climate and socio-economic parameters (such as accessibility, population density and distance to markets) to assess the potential for inland-valley development. The new map resulting from this process depicts the areas that provide the basic conditions for successful development.

Two critical elements in the process are farmer organization and land tenure aspects. Based on previous experiences, AfricaRice advocates an organization where farmers develop and expand a site as a group, but thereafter cultivate their own rice fields within the system. In each site AfricaRice tries to negotiate long-term tenure agreements with the land owners to provide a sustainable environment for investments. Once an inland valley is identified as suitable for sawah development, the farmers who work there are brought together and told about SSD. It is made clear

that, if they take it on, they will do most of the work. If they want to go ahead with SSD, they are organized and trained accordingly. First, they take on the role of surveyors, simply because they know their lands better than anyone else.

The farmers provide the researchers with information on the inland valley's soil, the behavior of crops in the field, and — most importantly — information that enables the researcher to determine the drainage axis of the inland valley and site the main canals and bunds appropriately according to the topology. Then the area is cleared of trees, shrubs and grass, although cash-crop trees, such as coconut palms, may be left in place.

The locations of the various elements, including drainage axes, bunds and irrigation canals, are marked with colored posts (or pegs) to guide producers in their construction. Once the posts are in place and the meaning of the colors explained to the farmers, the farmers develop the site with a minimum of supervision from technicians.

One project site in Benin, Zoungo in the commune of Ouinhi, was confirmed as meeting the SSD selection criteria in May 2012. Fieldwork began in June 2012. The rice crop was established in July–August using variety NERICA-L 20 (developed by AfricaRice), and rice was harvested in November–December.

"The project in Zoungo started with about 15 producers on less than 3 hectares, but aroused a lot of interest, soon growing to 62 farmers — in all, 12 hectares were developed in less than 3 months," says Worou. SSD at Zoungo, with minimal fertilizer, yielded 4–5 tonnes of rice per hectare in a rainfed system where average yields traditionally fluctuate between 800 and 900 kg/ha and rarely reach 2 t/ha without development. Worou thinks that yields of 6 t/ha, and even more, could have been achieved if producers had used the recommended doses of fertilizers.

Come harvest day, all the producers were very happy. Aboko Daniel, a rice farmer and president of the rice farmers' association of Zoungo, said, "with support from AfricaRice, we are highly motivated. We have had technicians supervise us in the development work. We have used only our hoes and machetes. Since we have been cultivating rice, we have never harvested such a vast quantity."

Fadonougbo Dominique, another rice producer, is equally satisfied: "I am very pleased with this technology because we did not know before how to construct bunds to retain water in the plots and drain it when it is in excess, or how to properly apply inputs in the plots. We have learned all these things this year. And this was very good. I gained 400,000 CFA [francs] last year [2011]. With what we have achieved with the project, I will gain at least a million CFA. I am very happy."

Comlan Célestin Danvi, director of the Rural Engineering division of the Ministry of Agriculture, the national coordinating institute of the project in Benin, says, "SSD is a technique that allows small producers to alleviate hunger, and ward off food insecurity. Yields are very attractive. This cheap approach gives yields close to those achieved in systems with full water control, which cost several million CFA per hectare."

According to Worou, the lesson to be learned from this approach is that, with very limited means, it is possible to bring lot of change in rural areas of Benin and Togo.

The results achieved were not obtained without difficulty, however. Judicaël Babadoudou, in charge of development activities in the commune of Ouinhi, said that a lot of patience and perseverance was needed to convince producers about the approach because producers have their own technique for producing rice. The project's national coordinator for Benin, Felix Gbaguidi, indicated that he also had to encourage producers to join the initiative because they were used to ready-made or 'turnkey' projects from the various partners intervening in rural areas.

In 2012, a total of 30.7 ha was developed across 12 sites in the two countries, involving 269 farmers (of

which 92 were women). Average yields at these newly developed sites ranged between 2 and 5 t/ha (*see* Table 1 for details).

"This year [2013], in the site of Zoungo, the farmers are expanding their site impressively — without any outside support!" enthuses Zwart. "We suspect adoption rate will be high, because the methodology is low-cost and easy to learn. In all 2012 sites in Benin, except one, the farmers have decided to continue and to expand their rice cultivation area."

"AfricaRice has selected SSD as one of the key technologies that will be scaled out in the rice sector development hubs that focus on lowland rice," says AfricaRice director of research for development Marco Wopereis. "I am glad to see that the work we started with Worou in 2004 in Togo is beginning to show real impact. We are preparing an instruction video and manual that will be distributed among the members of the Agronomy Task Force. Furthermore we are continuing to train NGOs, extension services and leading farmers in the use of this technology. In the second phase of the SMART-IV project we will expand to Sierra Leone and Liberia, two countries with a high potential for development of rice-based systems in inland valleys."

Judging by appearances

Rice is severely constrained by various abiotic and biotic factors. In West Africa, drought is one of the most important abiotic stresses. Research has demonstrated the severe impact of dry periods on the yield of rice genotypes — especially when it occurs during the reproductive phase of the crop. In plant breeding, laboratory, pot and field screening are used to identify drought-tolerance traits that can be incorporated into high-yielding genotypes using conventional and biotechnological tools.

During the 1980s and 1990s, much of AfricaRice's drought-tolerance breeding focused on determining

Table 1. Sawah system development in 2012 in Benin and Togo

Site	Area (ha)	Average yield (t/ha)	No. farmers involved		
			Male	Female	Total
Zoungo	11.6	4	46	15	61
Agosou	5.7	5	16	8	24
Kpakapza	1.8	3	9	7	16
Todjotin	1.4	2	9	7	16
Korobororou	0.7	—	30	0	30
Total Benin	**21.2**		**110**	**37**	**147**
Tutu	2.0	3	11	6	17
Sodo	2.0	3.5	8	7	15
Bémé2	1.7	2.5	12	10	22
Tchanganidè	0.9	5	7	8	15
Kawa	0.8	5	14	8	22
Gnatre	0.8	5	13	3	16
Atchangbadè	1.3	4	9	6	15
Total Togo	**9.5**		**74**	**48**	**122**

the genetic basis of physiological traits associated with drought tolerance, such as ability to extend roots into deeper soil layers under drought conditions. The assumptions were that these traits would be under simpler genetic control than drought tolerance itself and therefore easier to track through the breeding generations, and that the individual traits would be easier to evaluate than yield under drought conditions. Unfortunately, research results have not confirmed these assumptions and breeding for yield under drought remains the most effective approach, provided that drought stress is applied uniformly.

Many 'forward marker-assisted breeding' schemes have been developed in which quantitative trait loci (QTLs) — areas of the genome associated with target traits — are detected within the segregating progeny of elite lines crossed for their complementary characteristics, in this case yield and drought tolerance. Together with information on phenotype, the markers (the QTLs) can then be used to guide the breeding process. One of these schemes is marker-assisted recurrent selection (MARS) — a breeding approach where useful QTL alleles are repeatedly accumulated through successive intercrossing and selections are made using only genotype (marker) data (i.e. no growing out in the field to phenotype). MARS has been used successfully for drought-tolerance breeding in crops such as maize and beans. However, this is the first attempt for rice.

Phenotyping

'Phenotype' is the appearance of the plant as grown (compared to 'genotype', which is the genetic makeup of the plant); the phenotype is influenced by the genotype and the environment in which the plant is grown.

In a modern biotech-dominated plant breeding program, 'phenotyping' is growing a plant of known genotype in the environment for which it has been bred to confirm its performance, in this case primarily its yield and drought tolerance.

The AfricaRice MARS project has introduced national breeding programs to the systematic use of molecular tools in breeding for quantitative traits. The 4-year project aims to prove the concept that MARS can contribute to increased yield — with a focus on drought tolerance as the target trait — and to change the approach of the breeders accordingly.

The project focuses on rice for the rainfed lowland ecosystems in Burkina Faso, Mali and Nigeria. Within 4 years the scientists expect to establish drought profiles of environments in inland-valley lowlands; develop and phenotype MARS populations and promising lines for yield potential and drought tolerance in various environments; and develop better-adapted germplasm for each major target environment in the three countries.

AfricaRice now has a wide range of field and controlled-environment facilities for phenotyping plants resistant or tolerant to most of the major biotic and abiotic stresses that affect rice in Africa (Table 2).

"Through phenotyping we can broadly identify potentially useful lines and eventually identify the most promising ones," says AfricaRice ecophysiologist Koichi Futakuchi. "And also for conventional breeding, phenotyping is crucial for identifying useful genes and QTLs … Phenotyping appears everywhere in our work, and it's very important."

"We've developed facilities — 'rainout shelters' — to phenotype tolerance to lowland drought conditions," says Futakuchi. AfricaRice spent the first year of the program constructing the rainout shelters at its experimental farm in Cotonou, while field-based phenotyping continued with partners in the three project countries.

"There's always some 'noise' when you're trying to identify QTLs," Futakuchi adds, "but if the phenotyping is not accurate, it can make breeding very difficult. But compared to phenotyping under field conditions, the rainout shelters mean we can identify QTLs more accurately."

Table 2. AfricaRice and national partners' phenotyping facilities

Trait	Controlled facilities	Field phenotyping (hot spots)
Drought tolerance (lowland)	Rainout shelters, Cotonou, Benin	Ibadan, Nigeria (from 2014 M'bé, near Bouaké, Côte d'Ivoire will be added)
Drought tolerance (upland)	Rainout shelter, Ikenne, Nigeria	Ikenne (from 2014 M'bé will be added)
Submergence tolerance	Plot with full water depth control up to 1 m deep, Ibadan	Need to be identified (Boundiali, Côte d'Ivoire is a good candidate)
Salt/salinity tolerance	Ndiaye, Senegal	Ndiaye & Ndiol, Senegal; Niono, Mali
Cold tolerance (Sahel)	Cold tank, Ndiaye	Ndiaye & Fanaye, Senegal; Kogoni, Mali
Cold tolerance (highland)	Screen houses, Sokoine Agricultural University, Morogoro, Tanzania	Igurusi & Uyole, Tanzania
Phosphorus deficiency	Under development	Need to be identified (Man, Côte d'Ivoire is a good candidate)
Iron-toxicity tolerance	Pots, Cotonou	Burkina Faso, Ghana, Guinea, Nigeria
Rice yellow mottle virus resistance	Screen house, Ibadan (insect vectors) Screen houses, Cotonou (manual inoculation)	To be decided (at least 8 hot spots in 3 countries available)
Blast resistance	Greenhouse, Cotonou (under renovation)	Farakoba, Burkina Faso; Sikassso, Mali; Foulaya, Guinea
Bacterial leaf blight resistance	Screen house, Cotonou	Parakou, Benin
Stem borer resistance	Greenhouse, Ibadan	Ikenne
African rice gall midge resistance	Screen houses, Ibadan	Gadza & Ogidiga, Nigeria
Termite resistance	Not available	Ibadan
Weed competitiveness	Experimental irrigated field (using crops as artificial weeds)	None used routinely
Parasitic-weed resistance	Containers, Dar es Salaam, Tanzania	Need to be identified in East and Southern Africa

The controlled lowland-drought facility at AfricaRice headquarters in Cotonou consists of four rainout shelters, each 5 m × 68 m. The traits being measured include visual scores, phenology, yield, yield components, leaf water potential, stomatal conductance (porometer), chlorophyll content and leaf photosynthesis

Building rural enterprises in Central Africa through the development of co-sharing mechanisms

The 4-year Common Fund for Commodities (CFC) project on 'Improving the Competitiveness of Rice in Central Africa', implemented in Cameroon, Central African Republic (CAR) and Chad, ended recently having achieved what may have been its most ambitious goal: setting up rural enterprises to develop market opportunities by bringing farmers, processors and traders together to make a profit and share dividends.

Launched in 2008 and reaching nearly 180,000 farmers, the project was intended to enhance food security and rural incomes while reducing dependency on imports, through interventions that promote production and marketing of quality rice and rice-based products.

The focus was on strengthening the capacity of all actors in the rice value chain (e.g. farmers, processors, input dealers) and establishing business-oriented processing centers in rural areas. The project was the first of its kind in the Communauté Économique et Monétaire de l'Afrique Centrale (CEMAC) zone — Cameroon, CAR, Chad, the Republic of Congo, Equatorial Guinea and Gabon — since the 2008 global food crisis.

Capacity-building

The project began with participatory varietal selection (PVS) trials in which 432 farmers looked at 100 varieties with biophysical characteristics most appropriate for them, and were also introduced to 'best-bet' upland and lowland varieties and paddy production techniques (Table 3). This was followed by organoleptic tests that led them to choose: NERICA 3, NERICA 8, NERICA-L 36, NERICA-L 42,

Table 3. Number of farmers trained through the CFC project

Country	No. farmer-trainers trained in the PVS approach	No. trainers trained in seed-production techniques	No. trainers trained in confectionery processing
Cameroon	25 in north (19 women)	25 in north (19 women)	30 (26 women)
	50 in Tonga (35 women)	50 in Tonga (35women)	
	75 in Ndop (55 women)	75 in Ndop (55 women)	
CAR	50 in Bambari (24 women)	30 in Bambari (24 women)	27 (23 women)
	50 in Sakaï (25 women)	50 in Sakaï (25 women)	
	50 in Bozoum (15 women)	25 in Bozoum (15 women)	
Chad	57 in Kolobo (24 women)	47 farmers in Kolobo (24 women)	124 (99 women)
	50 in Mala (25 women)	50 farmers in Mala (25 women)	
	25 in Mara (6 women)	23 technicians on CBSS and 6 leading seed producers (6 women)	

CBSS, community-based seed systems.

NERICA-L 56 and NERICA-L 60 in Cameroon; NERICA 7, NERICA-L 23, NERICA-L 37 and NERICA-L 60 in CAR; and NERICA 6, NERICA 11, NERICA-L 28, NERICA-L 33, NERICA-L 50 and NERICA-L 55 in Chad.

With respect to postharvest technologies, 181 processors (80% of them women) were trained in the manufacture and sale of rice-based products, while 30 youths were trained in the operation and maintenance of milling machines.

The work progressed through the establishment of a 'rapid-impact' seed program, postharvest technologies, off-season vegetable cultivation, enterprises for primary and secondary processing activities, commercialization, and linkages with input dealers and microfinance institutions.

Thanks to the equipment they acquired, farmers (enterprise members) were able to obtain loans for inputs (quality seed and fertilizers) and to buy shares worth a total of US$ 35,000 per enterprise in Cameroon from the microfinance institution CCA (Credit Communautaire d'Afrique) and $30,000 per enterprise from the Banque Arabe Soudano-Tchadienne in Chad.

The introduction and use of improved varieties (NERICA) and improved crop management, including the use of mineral fertilizer, by enterprise members boosted productivity from less than 0.8 tonne per hectare to 2 t/ha for upland rice, and from less than 2 t/ha to more than 6 t/ha for lowland varieties.

In quantitative terms, the project targeted some 30,000 smallholders per country and exceeded this target in 2012 in each of the three countries. Figures for 2012 collected from extension agencies and NGOs give the number of farmers (to the nearest thousand) with access to the newly introduced rice varieties as 70,000 for Cameroon, 36,000 for CAR and 72,000 for Chad.

It was the bringing together of rice-sector actors (farmers, traders, scientists, policy-makers, financial institutions, private companies and NGOs) through an operational stakeholder platform that contributed to realizing the project's aims.

Processing centers

To ensure competitiveness, the capacity of seed and paddy producers was boosted by six 'one-stop shop' quality-processing centers, which reinforce trust among farmers, processors and traders. These centers opened up new opportunities for private initiatives in rural areas by investing $420,000 ($70,000 per center).

About 60% of the money came from processor-traders and 40% from farmers. The initiative has been greatly appreciated by communities and national authorities, especially in the employment of young people and women — 110 jobs have been created, directly or indirectly, and quality rice and rice-based products have been generated.

The 'Centre qualité de riz de Sakaï' and the 'Pendere Lossotikodro', with 50 farmers each, were established in CAR; 'Daynand Tena' and 'Ndaling Pen', also with 50 farmers each, in Chad; and the 'Ndop rice value-chain' (NRIVAC) and the 'Coopérative de la Benoue pour la chaîne de valeur du riz' (COBECVAR), with 30 farmers each, in Cameroon.

The centers have been equipped with pre-cleaners, combination hulling-and-polishing machines, graders, parboilers, and spare parts. Secondary processing equipment (basins, sieves, tarpaulin, ovens, mixers, scales, molds and sealing machines) enables broken grains to be turned into marketable flour and semolina. Additional tools include moisture gauges and generators. Flour is processed into cakes, cookies, bread, pasta and drinks.

The centers are expected to drive up quality along the whole value chain from seed, through milling, grading/sorting, storage, branding and packaging, to marketing. They supply quality rice, rice bran and by-products to both wholesalers and retailers.

Since rice flour (which is gluten-free) can be used in place of wheat, the centers will likely facilitate import substitution and reinforce local livelihoods. The production and marketing of rice flour opens up opportunities for women farmers who can process and sell rice-based products appropriate for those sensitive to gluten, as well as snacks for workers and children.

Having installed the equipment, the priority was to establish a management team to ensure continuity, so processors and traders agreed to run the center together through 'co-sharing'. The management team at Ndop in Cameroon, for example, is made up of five members (two farmers, one processor and two traders): the president of the management committee is a trader; there are two women and three men. Table 4 shows total capital (fixed and running) of a center.

By the end of 2012, just three months after its launch, NRIVAC had made a net profit of just under 4.6 million FCFA, which was shared among partners as shown in Table 5. Each farmer received nearly 53,000 FCFA, of which half was used for debt servicing.

Centers need threshers, storage facilities, drying units and processing equipment like improved parboiling units, beyond the single locally made example provided. Good management on the part of the committee, sales and cost control, and maintenance are also vital. These are important challenges. The centers will be followed and supported for another 3 years by the national agricultural research systems.

Table 4. Capital costs of a center

Item	FCFA (millions)	US$ (thousands)
Cost of equipment	25.3	50.6
Co-shares (Running costs)		
Private	20	40
Farmers	15	30
Total	**35**	**70**
Grand total	**60.3**	**120.6**

Table 5. NRIVAC profit distribution (on 31 December 2012)

Item	FCFA (millions)
Depreciation (10% of gross profit)	0.46
Processors / traders (57% of net profit)	2.09
Farmers (43% of net profit)	1.58
Backstopping – IRAD and Stakeholders platform (10% of gross profit)	0.46
Total	4.59

IRAD, Institute of Agricultural Research for Development (Cameroon).

Net profit = Total (gross) profit minus depreciation and cost of backstopping, i.e. 80% of gross profit.

An old (inefficient) winnowing machine, Cameroon. The CFC project has tried to introduce new small-scale machines through the enterprises to help the smallholder farmers and other private partners (processors and traders) become more efficient

Bringing research facilities in Côte d'Ivoire back online

At the end of 2004, AfricaRice had to relocate its headquarters after the resumption of hostilities in Côte d'Ivoire. For the second time in 3 years, AfricaRice was forced out of its headquarters by civil strife. The M'bé headquarters (a 20 minute drive north of the city of Bouaké) had been established on the site of the Center's upland rice research station in 1988 after negotiations with the Ivorian government (AfricaRice was originally headquartered in Liberia).

This major relocation of headquarters and research staff could have spelled the end for the M'bé research station, but for the dedication of a handful of diligent staff who kept on working right through both crises, aided by some of those living in the surrounding villages who helped preserve the infrastructures. With stability returning to Côte d'Ivoire, the M'bé station is again set to play a major role in the research and development activities of AfricaRice.

"The M'bé site is extremely valuable to us," explains deputy director general Marco Wopereis. "Of all the sites the Center has used over its 42-year history, M'bé is the only one where we have access to the three major environments used for growing rice in Africa —upland, rainfed lowland and irrigated."

"For the past few years, we have been using fields at M'bé for foundation seed production in response to demands from several AfricaRice member countries," explains Amadou Moustapha Bèye, geneticist and AfricaRice regional representative for Côte d'Ivoire.

In a typical 'formal' seed system, national programs produce foundation seed. Foundation seed is the second step in seed production: breeder seed (G0), foundation seed (G1, G2, G3), registered seed (G4), and commercial or certified seed (R1, R2 and sometimes R3). However, many national programs in Africa are simply unable to produce foundation seed of improved varieties, especially those that are rebuilding their public-sector institutions after conflict or other crises.

The recent experimental work in this area that Bèye supervised, across just two cropping seasons, was so successful that some people initially doubted the results. But he emphasizes: "We did everything on time [and] according to established technical practices."

Now he believes that the technicians at M'bé have proved, beyond reasonable doubt, that foundation seed can be produced far more economically than previously thought — in fact, the team has produced the seed at about a third of AfricaRice's 'normal' cost. Thus, AfricaRice has clearly demonstrated the affordability of foundation seed production using techniques that national programs can replicate with the objective of providing regular supplies of foundation seed at affordable prices.

By maximizing the efficiency of foundation seed production and monitoring everything through an 'operating account', AfricaRice produced spectacular yields of upland variety WAB 56-50 (6 t/ha) and lowland variety WITA 9 (8 t/ha). This is unusual in seed production because of the rigorous roguing (removal) of off-types.

"Subsequent analysis showed that the 'operating account' is a good way of controlling forecast production costs," Bèye says, "and increasing both the productivity and competitiveness of the seed value chain." It all depends on what Bèye accepts must be a 'disciplined' and cost-conscious approach to seed production — albeit one that has been realistically modeled at M'bé.

"This vindication of the 'operating account' tool is an important step," he says, "in fact, it was a pivotal moment in our analytical work on the value chain. It moves us nearer to, on one hand, good economic and financial outcomes for seed producers and, on the other, the successful reduction of risk."

Cheaper foundation seed supplied to seed producers should in turn result in cheaper certified seed for the farmers, and a greater chance of them using quality seed rather than grain saved from the previous season's

harvest. For farmers in rainfed areas, this is important as they usually don't make a big distinction between paddy and commercial seed.

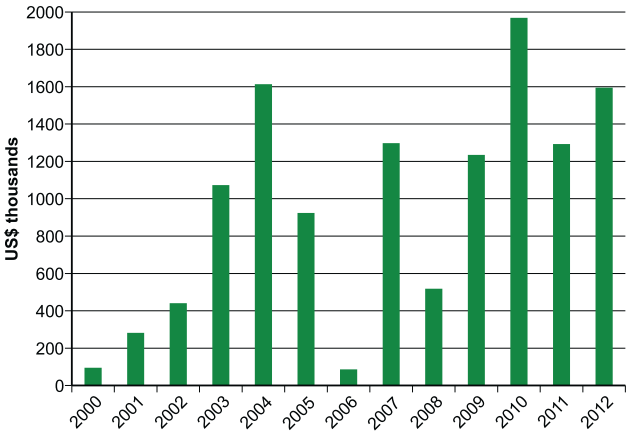
"Another major thrust of AfricaRice work is training. With facilities in place at M'bé, we should soon start offering seed-production courses at the station for national partners," says Bèye. In addition, the amount of land available at the station makes it an ideal place for emergency seed production for countries and regions coming out of crisis or seed-crop failure. Because of its large seed collection, AfricaRice has a history of being able to repatriate rice varieties to countries emerging from protracted crises, such as Liberia, Sierra Leone and the Democratic Republic of Congo.

"In 2013 and 2014, the M'bé station will start to regain some of its research functions," says Wopereis. "We hope that we can really use the facility more and more in the future. It is ideally suited for testing of breeding lines across all three main growing environments: rainfed upland, rainfed lowland and irrigated systems. We will put in place a whole new top-notch drought screening facility in both the upland and lowland environment. By 2014 we will start a few key experiments — that may well turn into long-term experiments — working on rice-based cropping systems 'for the future', consuming less water, relying less on external inputs and that are highly mechanized across the three main rice-growing environments. More standard 'rate × date trials' to develop crop management recommendations for the new varieties coming out of the Africa-wide Rice Breeding Task Force will also be part of the work that we will do at M'bé."

Deputy director general Marco Wopereis and regional representative Amadou Bèye with staff members exploring the M'bé research farm

Donor profile – European Union

For more than two decades, the European Union (EU) and AfricaRice have enjoyed a rewarding partnership to help improve food security, reduce poverty and protect the environment in Africa. A few examples of EU-funded programs and projects are highlighted in this profile.



EU funding to AfricaRice 2000–2012

ROCARIZ, 2001–2005

The Rice Research and Development Network for West and Central Africa (ROCARIZ) was created in 1999 through the merger of the Rice Network of the West and Central African Council for Research and Development (CORAF/WECARD) and the AfricaRice–NARS Task Forces. The EU provided funding for ROCARIZ operations and activities from 2001 to 2005.

ROCARIZ brought together international and national rice researchers and development agents in a number of task forces, overseen by a network coordinator, a steering committee and a CORAF-style stakeholders' consultation group. ROCARIZ also introduced the biennial Regional Rice Research Review (4Rs), which took place in 2000, 2002 and 2004. The partnership, support and synergy created within the task forces was popular among the national scientists.

In December 2008, CGIAR awarded ROCARIZ its Outstanding Partnership Award at its annual general meeting in Maputo, Mozambique. CGIAR singled out ROCARIZ for "its decentralized, issue-driven task force approach" that had enabled it to successfully foster a high level of national involvement in collaborative research to improve rice productivity in both rainfed and irrigated systems in West and Central Africa. By that time, ROCARIZ involved more than 150 national scientists from 21 West and Central African countries and international scientists from AfricaRice. Despite its success and popularity, overall funding for ROCARIZ dried up and the network ceased to function.

Today, however, the task forces are back! The new Africa-wide Rice Task Forces were launched in 2010.

Impact of rice policy and technology on food security and poverty reduction in sub-Saharan Africa

The project 'Rice policy and technology impact on food security and poverty reduction in sub-Saharan Africa' has been operating since 2003 with a single break in EU funding in 2011. Projects have a finite lifespan, which is usually short (normally about 3 years). However, good projects not only attract funding for new phases, but also adapt to changing conditions. The Rice Policy and Technology Impact project is one such success story. The current incarnation of the project, which started in 2010, builds on the work of its predecessors, and receives technical support from the International Fund for Agricultural Development (IFAD). The project retains its long-term goal of generating knowledge that supports the development of demand-driven rice technologies, policies and institutions to improve livelihoods, nutrition and economic development.

Earlier phases of the project were instrumental in laying the groundwork for the overall upgrading of the

Center's policy and impact-assessment work, which were to prove so vital in the rice crisis of 2007–2008 (*see below*).

The specific objectives of the current phase are to:

- promote the harmonization of rice policy at a regional level through the establishment of consultative frameworks and the development of regional rice development strategies;
- create and disseminate knowledge and decision-support tools for smallholder rice farmers and stakeholders;
- analyze the profitability and options for crop diversification in rice-based systems;
- provide information and analyses for setting rice research priorities and investing in the rice sector;
- provide timely and reliable geo-referenced information and knowledge on all aspects of the rice value chains through the establishment of a Rice Information Gateway for Africa (RIGA);
- develop national and regional pools of policy analysts and impact-assessment experts through capacity-building.

Advocacy for appropriate rice policy and policy-related research

The arrival of Papa Abdoulaye Seck as AfricaRice director general in 2006 brought a new sense of urgency to the Center's policy work.

Already concerned about the state of Africa's rice sector, Seck immediately launched a review of AfricaRice policy research, and then aided the distillation and packaging of key policy messages that member states needed to hear. These messages were relayed through personal visits to member states, a 2-day workshop of the Africa Policy Research and Advocacy Group (APRAG), culminating, in September 2007, in an address entitled 'Rice crisis in Africa: Myth or reality?' to the Center's Council of Ministers meeting in Abuja, Nigeria. This and subsequent policy advocacy have not simply stated the problems, but suggested solutions to 'turn crisis into opportunity'.

In collaboration with the Economic Community of West African States (ECOWAS) and the Network of Farmers' and Agricultural Producers' Organizations of West Africa (ROPPA), AfricaRice developed a framework for a regional rice development strategy. During 2012, AfricaRice and partners took two approaches to bring harmonization of regional rice policies.

The first was a strategy for reducing rice imports. ROPPA, regional economic communities and other regional organizations attended a rice policy research and advocacy stakeholders conference, which recommended that ECOWAS increase the common external tariff (CET) of rice from 10% to 35% to help protect the local production system (*see* 'Domesticating West Africa's rice market', *GRiSP in Motion: Annual Report 2012*, pp. 14–15). ECOWAS showed reluctance to upgrade the rice CET, so terms of reference were subsequently drawn up for conducting an *ex-ante* impact assessment of the likely impact of such a tariff change.

The second approach to harmonizing regional rice policies was to look into the feasibility of a regional rice storage system. To this end, AfricaRice and the University of Arkansas (USA) are preparing a background paper and proposal to analyze the likely impact of such a storage system on rice price variability and food security.

Recognizing that most West African countries now have national rice development strategies, but that these do not sufficiently address regional aspects, a number of regional organizations have been pushing for a harmonized regional rice strategy.

In 2012, ECOWAS took the lead in developing a 'Regional Rice Offensive in West Africa', in collaboration with the West African Economic and Monetary

Union (WAEMU), the African Union, Hub Rural, ROPPA, the Permanent Interstate Committee for Drought Control in the Sahel (CILSS), the national programs and AfricaRice. By the end of the year, a concept note for the Offensive had been prepared and approved by ECOWAS, AfricaRice and ROPPA, and subsequently presented to the ministers of agriculture of ECOWAS member states, and a framework developed for a technical and financial feasibility study.

The objectives of the Offensive are to: sustainably increase rice production; promote the regional rice value chain; and improve the institutional environment so that it supports the development of the regional rice sector. The goal is to reach regional self-sufficiency in rice in 2018. The Offensive will aim to achieve its objectives and goal by: modernizing rice production systems; reducing import dependency; and facilitating regional trade.

Development of tools for impact assessment and policy analysis

Funding for agricultural research and development is strongly influenced by the expected outcomes of implementing the project in question. Donors want to know that their money is going to make real inroads into the issues of hunger and poverty. Consequently, the ability to assess the impact of research and development is vital.

AfricaRice has long been assessing the impact of its own and its partners' work. Since determining the impact of research and development is by no means straightforward, AfricaRice has been drawn into the business of designing new tools for the job.

For example, it was under the Rice Policy and Technology Impact project that the new methodology for estimating potential and actual adoption using the 'average treatment effect' (ATE) framework was developed and published. Other tools developed by AfricaRice under this project included a new methodology for measuring and monitoring *in-situ* crop biodiversity; a database for rice research management; and a novel methodology for *ex-ante* impact assessment for research priority-setting when there is imperfect information.

"An important part of the work carried by the Policy, Innovation Systems and Impact Assessment Program involves the development of software tools to automate the processing of survey data collected by the NARS and the analysis of the data," says program leader Aliou Diagne. The development of these tools is a critical part of the technical support that AfricaRice provides to the NARS scientists involved in various joint projects.

A lot of impact assessment and policy analysis involves long and tedious processing and statistical analysis of data. This can be complicated and requires specific knowledge of statistical computer programs. The tools developed by AfricaRice enable NARS scientists to process and analyze their data quickly using up-to-date analysis tools and methods.

The use of a standard set of tools by the NARS also facilitates cross-country comparison of results.

Conducting rigorous impact and adoption studies normally requires a certain amount of sophisticated programming in general purpose statistical software like Stata. AfricaRice developed two software tools in the form of Stata modules (or Stata add-on commands). The first module, 'Adoption', enables easy estimation of ATE-based adoption models. The second module, 'Impact', uses the latest models and methods to automate the estimation of the impact of any change (including adoption of a technology) on any behavioral or welfare outcome including noneconomic ones (e.g. yield, production, income, consumption, schooling indicators).

Since 2006, these two Stata-based tools have been used by NARS collaborating with AfricaRice in their adoption and impact studies, some of which have led to peer-reviewed publications in international journals.

2

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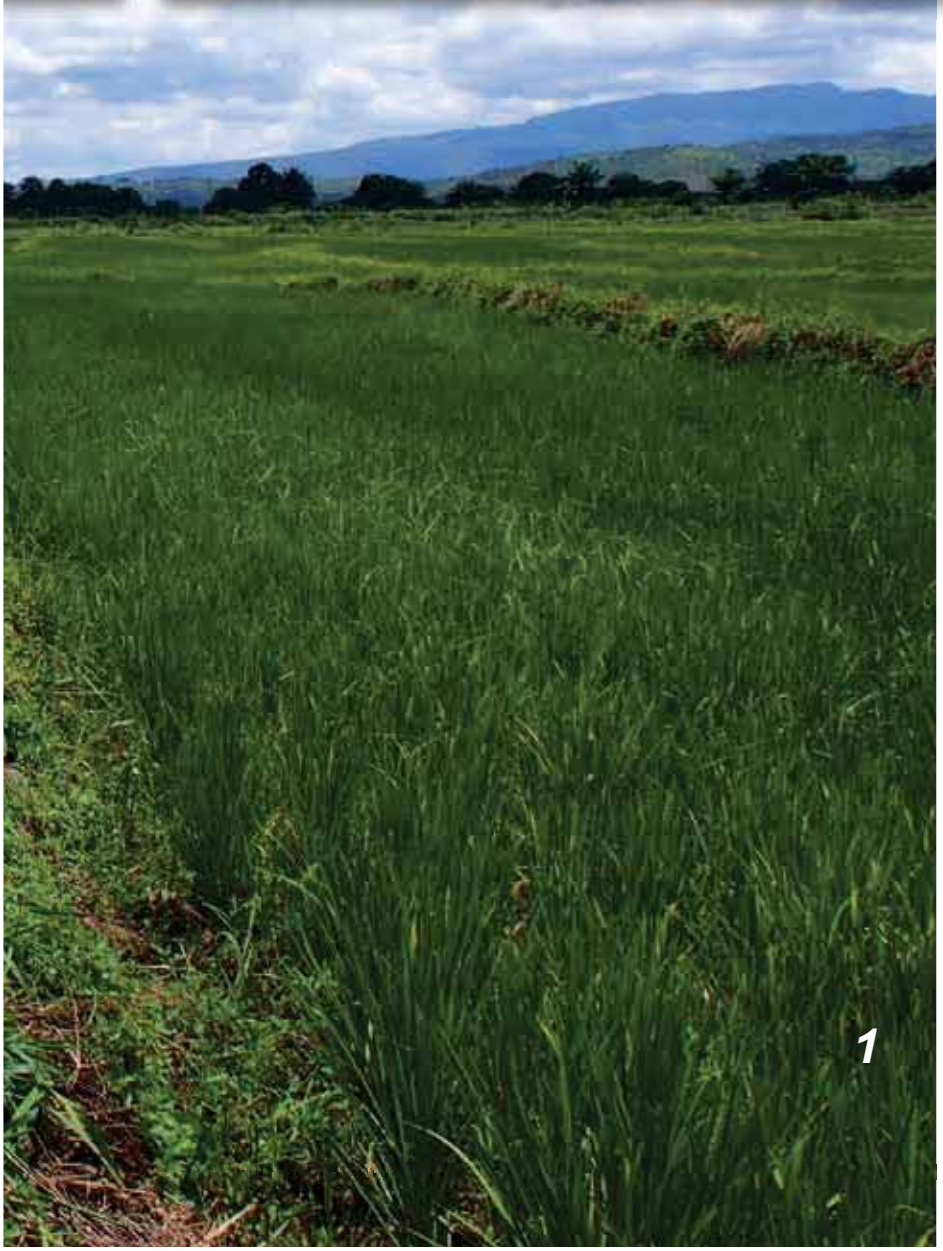

Upgrading a value chain for import substitution (the goal of most national rice development strategies in Africa):

1. Quality seed multiplication (Upper Nun Valley Development Authority, UNVDA, Ngoketunjia, Ndop, Cameroon);

2. Medium-scale processing (Upland Rice Millers Ltd, Jinja, Uganda);

3. Branding and packaging of quality local rice to meet consumers' preferences (UNVDA, Cameroon);

4. Targeting consumers through supermarkets (Nakumatt Supermarket, Kampala, Uganda);

5. Rice-based food products (cookies, Institute of Agricultural Research for Development, Nkolbisson, Yaoundé, Cameroon).

In particular, they have been the primary tools used in the NERICA adoption and impact studies, which have been completed in 10 countries. NARS are also using the tools in studies not related to rice and beyond their collaboration with AfricaRice. Students in African and a few European universities that collaborate with AfricaRice and researchers involved in the 'proof of concept' of integrated agricultural research for development (IAR4D) implemented by the Sub-Saharan Africa Challenge Programme (SSA CP) led by the Forum for Agricultural Research for Africa (FARA) are also using the tools.

In collaboration with the University of Gaston Berger in Senegal, AfricaRice has also developed tools to automate surveys and monitoring and evaluation (M&E). 'Mlax' has been developed to automate data collection using tablets or smartphones and as a web-based application to send data collected to a central database managed by AfricaRice with online access for the NARS partners. In total, 395 people (20% of them women) from 17 countries were trained and are using this application.

An M&E system has been designed as an off-line web-based application and will be used to collect project information. Data collected will be sent automatically into the 'cloud' by the web-based application, which will also generate updated information on project indicators, target outputs and outcomes.

Broadening the focus to the whole rice value chain

It was perhaps in the context of the EU project that AfricaRice began to look seriously beyond production to the wider value chain. Rice concerns millions of people who are not rice farmers: from input and machinery producers and manufacturers and those who trade in them on the pre-production side, through processors and traders on the post-production side, to consumers.

AfricaRice's value-chain work began in the Sahel, first looking at the reasons behind the Senegalese preference for imported rice (which has everything to do with quality and lack of knowledge of local alternatives), and then at improving the competitiveness of *quality* local rice through marketing and branding (*see* 'A rice by any other name', *GRiSP in Motion: Annual Report 2012*, pp. 16–17).

This in turn led to AfricaRice's proposal for policy sequencing to tailor local rice to consumer demand, increase production, scale up processing and distribution, branding and advertising, and quality control and generic advertising (*see* 'Upgrading rice value chains: The role of policy sequencing', *AfricaRice Annual Report 2011*, pp. 16–18).

AfricaRice developed and tested tools and methods for experimental rice value-chain research in Africa that measure consumers' valuation and willingness-to-pay for new products or quality attributes, and developed 'new' marketing strategies (standards, certification, labeling, branding and generic promotion).

Former AfricaRice agricultural economist Matty Demont headed the team that did this work, which won the Theodore W Schultz Prize for Best Contributed Paper at the 28th International Conference of Agricultural Economists (ICAE) held in Foz do Iguaçu, Brazil, August 2012. He also won the 2012 Louis Malassis Young Promising Scientist Prize (awarded by Agropolis Fondation, Montpellier, France) for this work.

Capacity-development

The EU support has enabled ongoing development of institutional and human capacity in impact assessment in the NARS, local universities and African research organizations (e.g. SSA CP led by FARA):

The impact assessment unit has been conducting annual one-week intensive impact-assessment methodology training courses since 2001, reaching a total of 254 NARS economists, university professors, post-doctoral fellows and students in 13 such courses since 2001. The participants came from Benin, Burkina

Faso, Cameroon, Côte d'Ivoire, the Democratic Republic of Congo, Gabon, The Gambia, Ghana, Guinea, Mali, Mauritania, Niger, Nigeria, Senegal, Tanzania, Togo, Uganda and the International Institute of Tropical Agriculture (IITA).

With the EU support, the policy program provided on-the-job training for more than a hundred NARS and FARA post-docs who came to AfricaRice as visiting scientists for short stays (2 weeks to up to 3 months) between 2005 and 2013. During their stay in Cotonou, these visiting scientists were able to acquire advanced skills in impact-assessment methodology, data management and statistical analysis using Stata while working on their country technical reports or journal articles.

The EU funding made possible an internship program, launched in 2005, in which AfricaRice scientists co-supervised 79 student theses — 16 PhD (11 completed, 5 ongoing); 44 MSc/DEA (41 completed, 3 ongoing), 15 engineers (all completed) and 5 BSc (all completed). Many of these students have published papers based on their theses in referred journals, with some winning prizes including one for 'the most promising young scientist' from the prestigious African Academy of Sciences.

AfricaRice organized a 3-day training-of-trainers workshop on improved rice parboiling techniques in Saint-Louis, Senegal in August 2011. The 31 participants (15 women, 16 men) were mainly postharvest specialists and rice parboiling practitioners from Benin, Burkina Faso, Mali, Niger and Senegal.

As a result of the training, microfinance organization Fédération des groupements et associations des femmes productrices de la région de Saint-Louis (FEPRODES) initiated its own training program for women parboilers to promote rice parboiling in Senegal.

Some of FEPRODES' 350 members received training in gender-mainstreaming in 2012, which they are passing on to others using a value-chain approach.

Other policy research and external review of the AfricaRice policy program

Much more went on under the auspices of the project, including economic research into the profitability of rice and maize; the wide-ranging NERICA adoption and impact study; video production on postharvest practices; *ex-post* assessment of the impact of the ASI thresher–cleaner; and numerous training opportunities for national-partner scientists and students.

In 2009, the whole of AfricaRice's Policy and Impact Assessment Program (of which the EU project formed a major part) was subjected to external review (funded by the European Commission). The reviewers reported that "the spectacular rise in importance of rice as a major food staple in sub-Saharan Africa, and the impact of increasing rice prices on the urban and rural poor, have led most rice-producing countries in the region to develop options for self-sufficiency. This has vastly increased expectations and demand from these countries for technical support and backstopping from AfricaRice." The main recommendation of the review was: "Future support highly recommended — through the development of a new proposal that builds on the outcomes of the current EC-supported project." The review exercise also drew the following conclusions:

- *The project has the highest degree of relevance, given the recent African food crisis*
- *Given the demonstrated ability and capacity of AfricaRice to harvest synergies from collaboration with numerous and diverse stakeholders, the project has produced a significant number of quality outputs — yielding significant returns from moderate investment*
- *The project has been extremely effective in terms of producing anticipated outputs and disseminating these to African policy-makers*
- *The project impact in terms of informing policy-makers has been assessed as highly satisfactory. The sustainability of the project is satisfactory and its visibility is assessed as high.*

With the success of the latest phase of the project and the concrete results expected in the near future, the EU granted a 'no-cost' extension to the project to August 2013. This meant that AfricaRice and partners could continue to use the funds already allocated for the period to the end of 2012 for work conducted in the first half of 2013.

Rice research network in East and Central Africa

The Eastern and Central Africa Rice Research Network (ECARRN) of the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) was re-activated in December 2004, with AfricaRice hosting and providing technical back-stopping through a scientist who ran the Coordination Office in Dar es Salaam, Tanzania. The EU provided funding to ECARRN from 2005 to 2007.

Linkages and exchange visits with ROCARIZ helped to move rice research and development forward in East and Central Africa.

Good things for inland valleys

'Realizing the agricultural potential of inland valley lowlands in sub-Saharan Africa while maintaining their environmental services' (RAP) is another longer-term EU–AfricaRice project, which started in 2009 and is currently in its second phase (which runs to 2014).

Inland valleys seem always to have been a bit of an enigma. The focus of the AfricaRice-hosted Inland Valley Consortium (IVC, launched in 1993; now the Inland Valley Community of Practice), inland-valley lowlands have been claimed to be the potential basis for turning Africa into a powerhouse of rice production.

While population pressure on the 'fragile' uplands has shortened fallows and exacerbated weed problems, there are millions of hectares of inland-valley lowlands whose potential has barely been scratched by farmers.

A major concern about the development of inland valleys is that they are an integral part of larger watersheds, and watersheds are known to provide wide-scale environmental services beyond agriculture. For example, typical watersheds provide water-storage and purification services and their hydrology may influence local weather patterns.

The main focus of the RAP project is therefore to develop inland-valley lowlands for sustainable rice-based agricultural systems without damaging their ability to provide important environmental services. RAP does this by using a multi-stakeholder platform (MSP) process to help identify, organize and empower value-chain actors to improve communication and decision-making around collective resource management in the inland valley, which leads to value-chain improvement and entrepreneurship.

MSPs are facilitated not by researchers or research organizations, but by key rice value-chain actors such as representatives of farmers' organizations, processors or local administrators — recognizing the importance of all those who have a vested interest in the success of inland-valley agriculture.

It is all too easy to forget that AfricaRice is a research-*for*-development organization rather than a research-*and*-development organization. We have come to expect big impact on farmers' and others' livelihoods as a primary *output* of AfricaRice research. However, impacts on poverty and livelihoods should come as a result of the developmental use of AfricaRice's research outputs, not as primary outputs in their own right. For those of us who have come to expect 'impact' at the grassroots level, the RAP project brings us back to AfricaRice's *modus operandi* — research for development following a participatory learning for innovation approach.

In its first phase (2009–2011), RAP worked in four inland valleys — two in southwest Benin and two in southeast Mali. These sites provided working case studies for future expansion.

"Large inland valleys provide agricultural and environmental services for a wide range of their inhabitants and other stakeholders, often from a number of communities and villages," explains AfricaRice sociologist and RAP project coordinator Cara Raboanarielina. "So much so that it is not uncommon for conflicts to arise between different land-users."

In order to address this and prevent any one group from dominating the inland valley as it is developed for rice-based agriculture, RAP brought 'everyone' together to create an MSP in each inland valley.

"At first, conflict was rife as the groups met," says Raboanarielina, "but everyone eventually got the idea that collaboration and compromise were the orders of the day, so that they could work toward benefits for all." The process of meeting and negotiation is documented for Bamadougou inland valley in Mali in a 52-minute film *Sinima Sinima: MSPs in action*, developed by MOOV-ON Productions.[1] "The MSP theory and practice is arguably the most important outcome of RAP," says Raboanarielina.

In addition to developing a methodology for MSP establishment and functioning, the RAP project also adapted survey tools to identify capacity and knowledge gaps among stakeholders, stakeholder interaction, and the environmental services provided by the inland valley.

In 2012, the European Commission and IFAD (the intermediary in the funding channel) commissioned a thorough review of RAP. The review team deemed the project "highly relevant" because of the prevalence and potential of inland-valley lowlands in the region, its strong focus on (especially women) smallholders, and the demand-led participatory approach it uses. Moreover, the quantity, quality and timeliness of project outputs (including the MSPs) are considered "good value for money". The review goes on to say: "Multi-stakeholder platforms and approaches

1. *See* trailer at http://www.dailymotion.com/video/xpkqkt_sinima-sinima-msps-in-action-trailer_shortfilms#.UcA21uuxMZR

RAP project site, Likossa, Benin (inset: rice grain spread out to dry on an improved platform)

should be used to set and implement (action-) research agendas of disciplinary groups and teams beyond the immediate RAP project."

"It is a little-known fact that the RAP project was the birthplace of the MSPs that are being established at a much larger scale to support the rice sector development hubs," says Raboanarielina. This is evidence that AfricaRice takes project-review feedback seriously.

With a little help from the 2012 review (submitted in January 2013), RAP has been granted a 'no-cost' or 'cost-neutral' extension to the end of 2014. In other words, the project will not cost the EU any more than originally promised, but activities will extend through 2014.

Phase II of the project envisages expansion into six additional countries. Work is already underway to establish MSPs for selected inland valleys in Liberia and Sierra Leone and to conduct the baseline surveys in those inland valleys that will provide 'fuel' for MSP discussions on inland-valley development. Modeling and analysis of the likely impact of agricultural intensification on water resources is ongoing in Benin and Mali, with possible extension to Liberia and Sierra Leone before the end of Phase II.

"In addition to the film *Sinima Sinima*, the project has also produced training manuals and other publications that can be used independently of the project by anyone else who wants to set up an MSP for inland-valley development," says Raboanarielina.

"We are greatly encouraged by the ongoing support provided by the EU," says director of research for development Marco Wopereis. "We are particularly happy that they were keen to support the long-term RAP project, when so many donors still prefer to work on 3-year time horizons. We look forward to continuing our positive and beneficial relationship with the EU and seeing it produce even better things for rice farmers and rice consumers in the years to come."

Major events

January

AfricaRice participates in 'Africa RISING' program

The Africa Research in Sustainable Intensification for the Next Generation (Africa RISING) program comprises three research-for-development projects supported by the United States Agency for International Development (USAID) as part of the US government's Feed the Future initiative. The overall aim is to transform agricultural systems through sustainable intensification.

AfricaRice is a partner in two of these projects, both of which are led by the International Institute of Tropical Agriculture (IITA): (1) Sustainable intensification of cereal-based farming systems in the guinea-savannah zone of West Africa; and (2) Sustainable intensification of maize–legume–livestock integrated farming systems in Eastern and Southern Africa.

The West Africa project component of the Africa RISING program is being implemented in northern Ghana and southern Mali. AfricaRice was assigned to take the lead for rice-based systems and IITA for maize-based systems in Ghana. Africa RISING-Ghana is hosted by the Savanna Agricultural Research Institute (SARI). A workshop on Project Design and Planning was organized, 9–12 January, in Tamale, Ghana, in which AfricaRice participated.

February

AfricaRice new strategy unveiled

A product-oriented strategic plan presenting a clear vision of success to help Africa achieve almost 90% self-sufficiency in rice by 2020 — with at least 10 countries projected to reach over 100% self-sufficiency — was unveiled by AfricaRice on 1 February. The plan was endorsed by the Center's Board of Trustees and approved by its Council of Ministers in September 2011.

The strategy articulates seven research-for-development (R4D) priority areas, identified through a systematic process involving extensive consultations with stakeholders and based on the results of household surveys and national statistics in sub-Saharan Africa:

- Conserving rice genetic resources and providing smallholder farmers with climate-resilient rice varieties that are better adapted to production environments and consumer preferences
- Improving rural livelihoods by closing yield gaps and through sustainable intensification and diversification of rice-based systems
- Achieving socially acceptable expansion of rice-producing areas, while addressing environmental concerns
- Creating market opportunities for smallholder farmers and processors by improving the quality and the competitiveness of locally produced rice and rice products
- Facilitating the development of the rice value chain through improved technology targeting and evidence-based policy-making
- Mobilizing co-investments and linking with development partners and the private sector to stimulate uptake of rice knowledge and technologies
- Strengthening the capacities of national rice research and extension agents and rice value-chain actors.

The R4D strategy will be implemented mainly under the umbrella of the Global Rice Science Partnership (GRiSP), a CGIAR Research Program, in close collaboration with a broad range of partners, notably the national programs in Africa through the Africa-wide Rice Task Forces.

Inception workshop of the Africa RISING program in East and Southern Africa

The East and Southern Africa component of the Africa RISING program — Sustainable intensification of

Intensification requires a movement away from backbreaking land preparation by hand (Tanzania)

cereal-based farming systems in Eastern and Southern Africa — was launched, 6–9 February, in Dar es Salaam, Tanzania.

The project inception workshop provided an opportunity for a broad range of stakeholders from various organizations to learn about the project plans and exchange views on opportunities for synergies within the project, as well as for greater alignment with the development community.

Two draft concept notes were presented: one by IITA on maize-based systems, including legumes and livestock; and one by AfricaRice on rice-based systems, including vegetables. Participants explored ways to operationalize a 'systems' approach and how to integrate different technical components, and identified potential 'jumpstarts' or 'quick wins' that would build on existing initiatives and lay the groundwork for future research.

Benin–AfricaRice Day

A meeting to discuss all joint R&D activities between the national agricultural program of Benin (INRAB) and AfricaRice was organized in Cotonou, Benin, 9–10 February.

The participants included government authorities led by the Director of the Cabinet of the Ministry of Agriculture, the directors general and research staff of INRAB and AfricaRice, representatives of the University of Abomey-Calavi and members of the national seed system.

The following recommendations were made:

- Establish a platform for stakeholders in the rice sector
- Establish rice sector development hubs which take into account the major rice ecosystems in Benin
- Continue efforts to develop rice varieties adapted to different stresses and ecosystems
- Involve all stakeholders in the development of future projects through INRAB.

Training course on yield gap and diagnostic surveys

A training course on Yield Gap and Diagnostic Surveys was conducted in Cotonou, from 13 to 17 February for participants from seven Anglophone countries (Ethiopia, The Gambia, Ghana, Nigeria, Sierra Leone, Tanzania and Uganda) and from 20 to 24 February for participants from seven Francophone countries (Benin, Cameroon, Côte d'Ivoire, Madagascar, Mali, Senegal and Togo).

The first 3 days of each training program were devoted to training on collection and analysis of qualitative field data under the Agronomy Task Force. The subsequent 2 days were used for the discussion and harmonization of various questionnaires to determine ongoing postharvest practices and the points at which interventions could be introduced for improvement.

March

Developing training curriculum on rice seed production

Over the years, AfricaRice has developed several courses on rice seed production. AfricaRice intends to continue organizing such courses in the context of its new R4D strategy, more specifically for the rice sector development hubs, albeit using more of a 'training-of-trainers' approach, as this will allow the Center to focus increasingly on more 'upstream' research learning events.

As part of this course, a workshop on 'Curriculum Framework Development' was held in Cotonou, 12–15 March, to plan, organize and implement a 'Rice Seed Production' training course.

The main objectives of these workshops were to help scientists to:

1. Develop a typology of the proposed learners and suggest ways to identify and assess their learning needs
2. Set the overall aims and objectives of the learning activity
3. Propose and structure learning content (modules, lessons, learning activities), methods and resources
4. Develop a process for producing learning materials
5. Suggest approaches, tools and methods for assessing and evaluating teaching and learning
6. Compile a list of logistical considerations in support of the learning activity.

Operationalizing the Memorandum of Understanding (MoU) with the African Union

Following the signing of the MoU with the African Union (AU) in 2011, representative of the AU and AfricaRice, along with other strategic partners, met in Addis Adaba and Cotonou to elaborate concrete activities in line with the MoU, in order to promote the rice sector on the continent through research, development, supportive policies and capacity-building.

To operationalize the MoU, the AU Commission sent a delegation along with representatives from the United Nations Economic Commission for Africa, the Food and Agriculture Organization of the United Nations, IFDC, Union economique et monétaire ouest africaine and the Forum for Agricultural Research in Africa to AfricaRice, Cotonou, 15–16 March, for in-depth discussions.

Joint rice germplasm collection mission in East Africa

Rice genebank experts from AfricaRice and IRRI met with representatives from Kenya, Tanzania and Uganda in a workshop in Nairobi, 15–16 March, to plan rice germplasm collection in the three countries. The workshop was held at the headquarters of the Kenya Plant Health Inspectorate Services and was the first of several activities under a project funded by the Gatsby Foundation to collect landraces and wild species of rice.

The 2-day workshop involved presentations and discussions on the importance of rice in each of the three countries, the International Treaty on Plant Genetic Resources for Food and Agriculture, gathering traditional knowledge, and planning collection missions.

Following the workshop, IRRI and AfricaRice scientists visited each of the project countries to gain an understanding of local issues regarding germplasm collection and to help the national programs complete their collection.

AFROweeds project workshop

AfricaRice organized an AFROweeds project workshop on 20 March in Antsirabe, Madagascar to present an overview of the project and the project website, demonstrate the use of the tools developed by the project (particularly the weed identification tool), and register new members for the AFROweeds collaborative network called 'Weedsbook'.

The workshop was attended by 31 participants from the national research centers, extension services and Athénée Saint Joseph Antsirabe (ASJA) University. According to Jonne Rodenburg, AfricaRice coordinator of the AFROweeds project, an important target group for the tools, databases and publications offered by the AFROweeds platform is students and lecturers of universities and agronomy schools.

AfricaRice Board: "Rice research in Africa provides a strong case for investment"

At its 32nd meeting, held in Cotonou, 26–30 March, the Board commended the Center's work on the development of new stress-tolerant and climate-resilient technologies for major rice production systems in Africa. "We believe that rice research in Africa provides a strong case for investment," the Board stated.

The work includes marker-assisted selection for tolerance to important yield-limiting and yield-reducing stresses, such as salinity, drought, cold, iron toxicity, *Rice yellow mottle virus* and rice blast, as well as component technologies to increase labor, nutrient and water productivities to close yield gaps and reduce risks in farmers' fields. Several of these technological options are already being tested in participation with farmers.

The Board described AfricaRice's new product-oriented 10-year strategic plan, which presents a clear vision of success to help Africa achieve almost 90% self-sufficiency in rice by 2020, as "a compelling and convincing agenda for realizing Africa's tremendous rice potential."

The current thrusts of AfricaRice were recognized by the Board as signs of a new vitality and resurgence of rice research in Africa. These include: (1) evidence-based policy advocacy; (2) the establishment of rice sector development hubs to conduct proof-of-concept work with public- and private-sector partners to develop competitive, equitable and sustainable rice value chains tailored to market demand; (3) focused research-product development to enable sustainable intensification and diversification of rice-based systems (varieties, agronomic options, mechanization); and (4) strengthening of the capacities of national rice research and extension communities and rice value-chain actors.

In particular, AfricaRice's strategic vision and leadership, diversified partnership and sound financial

management were highlighted by the Board, based on the following indicators:

- Significant increase in average annual contribution of member countries to AfricaRice;
- Increase in reserve funds that contribute to financial stability and efficient management of risks;
- Increase in the volume of joint projects with national partners;
- Increase in the number of PhD students (43 in 2011 compared with 9 in 2006) and MSc/DEA students (51 in 2011 compared with 5 in 2006);
- Increase in the number of workshops and training programs to build Africa's research and development capacity relating to rice;
- Launch of the CGIAR Global Rice Science Partnership (GRiSP) activities in Africa under the leadership of AfricaRice;
- Launch of the Africa-wide Rice Task Forces;
- Strategic alliance forged with the African Union;
- Winning of several international and regional awards, including the Japan International Award for Young Researchers.

2012 Carsky Award

At the Board Meeting, the 2012 Dr Robert Carsky Award for the most outstanding Internationally Recruited Staff (IRS) was presented on 30 March to Marie-Noëlle Ndjiondjop, AfricaRice molecular

Board members touring the facilities during their meeting in March 2012

Marie-Noëlle Ndjiondjop (right) and Klana Dagnogo (left) receive their awards from Dr Rebecca Khelseau-Carsky, wife of the late Robert Carsky

biologist, for important contributions to rice science, particularly her work on gene discovery.

The 2012 Carsky Award for the most outstanding General Support Staff (GSS) was conferred on Klana Dagnogo for his tremendous support to the development and maintenance of facilities, experimental farms and equipment.

This annual award, which was instituted by AfricaRice in honor of the late Dr Robert Carsky, is conferred on the most outstanding IRS and GSS, who have demonstrated high standards of excellence and made exceptional contributions to rice research, training and research support.

April

Working environment safety management workshop

As part of AfricaRice's efforts on risk management, two safety-management experts from Centre de coopération internationale en recherche agronomique pour le développement (CIRAD) were hired as consultants to provide orientation to AfricaRice staff on safety issues, especially in laboratories but also in the working environment in general. The main objectives were to:

- Verify compliance with basic rules and make recommendations for technical and organizational improvements
- Provide advice to establish or improve the system of safety management
- Assess training needs based on AfricaRice's objectives.

The consultants visited the Cotonou campus in April and inspected the laboratories and other facilities. As part of this visit, a workshop on 'Working Environment Safety Management' was held, 22–28 April. At the end of their visit, the consultants submitted a report with specific recommendations on the prevention of professional hazards on the campus. The Center is implementing the recommendations.

AfricaRice molecular biologist Marie-Noëlle Ndjiondjop (right) discusses laboratory safety issues with safety-management experts from CIRAD

Ambassador of France in Benin visits AfricaRice

The Ambassador of France in Benin, M. Jean-Paul Monchau, paid a visit to the Center on 25 April and met with the Director General. He was taken on a tour of the Center and interacted with scientists, particularly CIRAD scientists working in collaboration with AfricaRice.

At the end of his visit he thanked the Director General and staff for their warm reception, and said, "AfricaRice is a beautiful institution and an honor for Africa. It is building the future of the continent for food security."

It was a wet day in Cotonou when the French ambassador visited the AfricaRice station...

Africa-wide Rice Breeding Task Force meeting

Forty participants, including 22 breeders, from several African countries attended the second annual Africa-wide Rice Breeding Task Force meeting, in Cotonou, 24–27 April. The main objectives of the meeting were to present and review progress made in 2011, emphasizing promising breeding lines identified through trials, and to develop a clear work plan for 2012.

The program included a mid-term review of the Africa-related component of the project Stress-tolerant Rice for Africa and South Asia (STRASA) and a presentation on achievements of the Green Super Rice (GSR) project.

One of the main thrusts of this Task Force is to accelerate the development and release of new rice varieties through multi-environment and multi-year trials of many promising breeding lines developed by various national and international institutes.

"The progress of this Task Force is being watched with great expectations by donors and our R&D partners, who are looking forward to seeing new varieties selected through the Task Force and released in target countries," said Takeshi Kumashiro, AfricaRice program leader for Genetic Diversity and Improvement.

...but the next day the sun shone for the field visit of the Africa-wide Rice Breeding Task Force

Training workshop on rice breeding

Following the second annual meeting of the Africa-wide Rice Breeding Task Force, a training workshop on rice breeding was organized in Cotonou, from 30 April to 4 May for the Francophone national partners attending the meeting.

The Breeding Task Force is actively engaged in capacity-development programs on breeding, experimental design, and germplasm-database management for national researchers.

A similar training course was organized in June 2012 for the Anglophone national partners involved in the Task Force.

May

Africa-wide Rice Policy Task Force training program

As part of the annual Rice Policy Task Force meeting, a training session was organized mainly for agro-economists involved in the implementation of collaborative activities. The session for Francophone national (NARS) partners, held from 3 to 9 May 2012 in Cotonou, was attended by 15 participants from 13 countries (Benin, Burkina Faso, Cameroon, Central African Republic, Côte d'Ivoire, Democratic Republic of Congo, Guinea, Madagascar, Mali, Niger, Rwanda, Senegal and Togo).

The session for Anglophone NARS partners, held from 29 May to 2 June, in Saint-Louis, Senegal was attended by 11 participants from seven countries (Egypt, Ethiopia, The Gambia, Ghana, Nigeria, Sierra Leone and Tanzania).

The program covered various methodologies, including protocols for participatory varietal selection (PVS), which was organized in collaboration with the Africa-wide Rice Breeding Task Force. This training session provided to the NARS agro-economists the necessary skills to efficiently undertake the activities planned within the rice sector development hubs.

Fourth TICAD ministerial follow-up meeting

The Director General represented the CGIAR Centers along with CGIAR Consortium Board Member Mohamed Ait-Kadi (who represented the Consortium) at the fourth Tokyo International Conference on African Development (TICAD), a high-level meeting held 5–6 May in Marrakesh, Morocco. The Director General's advocacy for strong support to international agricultural research was included in the official communiqué of the meeting.

Workshop on building local and regional capacities in weed science

A workshop on Building Local and Regional Capacities in Weed Science was jointly organized by AfricaRice and the Sokoine University of Agriculture (SUA) on 10 May in Morogoro, Tanzania.

The objectives of the workshop were to present the collaborative network Weedsbook and the AFRO-weeds identification tool and database to potential users in Tanzania, and to demonstrate how to make a herbarium and field pictures of weeds, provide guidelines for identifying weed species, and registering new members to Weedsbook.

The overall aim was to build local capacity in weed identification and management in Tanzania and to connect Tanzanian weed scientists and students to their peers in the wider region. In total 37 participants, including 15 students, attended.

SMART-IV project mid-term workshop

As part of the 5-year Japan-funded project on 'Sawah, Market Access, and Rice Technologies for Inland Valleys' (SMART-IV), a mid-term workshop was held on 21–23 May, with the following goals:

1. To perform a mid-term review of the project activities
2. To discuss, plan and coordinate activities for the remaining half of the project.

The workshop was attended by the project partners from Togo, Benin and Ghana — Institut Togolais

de Recherche Agronomique (ITRA), Cellule bas-fonds (CBF), and International Water Management Institute (IWMI), respectively — project scientists and students from AfricaRice, Dr Buri from Soil Research Institute in Ghana and two officials from the Ministry of Agriculture, Forestry and Fisheries of Japan. The workshop included a field visit to the research site in Bamé and to the development site of Kaffa-Ouinhi.

June

STRASA review and planning workshop for Africa

The Review and Planning Workshop for the African component of the STRASA Phase II was held at AfricaRice Sahel Regional Station in Saint-Louis, from 4 to 6 June. The meeting was attended by 44 participants comprising AfricaRice, IRRI and NARS scientists, seed producers and NGOs from 19 African countries. The meeting reviewed the 2011 project activities and developed workplans for 2012 activities. The major highlights of 2011 included:

- Identification of 21 promising breeding lines of rice tolerant to drought, salinity, cold and iron toxicity
- Release of 18 rice varieties in Burundi, Mali, Mozambique and Sierra Leone partly STRASA funded
- Production and distribution of 26 tonnes of seed of stress-tolerant rice varieties
- Training of 373 African scientists and technicians in different aspects of rice research and development.

In 2012, the research activities focused on validation trials for promising stress-tolerant lines selected in 2011 and during STRASA Phase I, with the objective of proposing lines for varietal release in 2013. Concurrently, new breeding lines will continue to be developed and evaluated at the AfricaRice regional stations and NARS centers. NARS project partners were advised to form and strengthen linkages with development partners to allow for large-scale demonstrations and rapid diffusion of STRASA varieties.

July

Mapping rice in Africa using remote sensing

A consultation meeting on 'Mapping rice in Africa' was held, 2–6 July, in Cotonou. The overall goal of the meeting was to develop a cost-effective strategy to map rice areas of different ecosystems (irrigated and rainfed lowlands and upland), across Africa using remote sensing, geographic information systems (GIS) and secondary data.

The specific objectives were to:

- Assess methodologies for rice mapping developed for irrigated conditions in Europe and Asia;
- Evaluate/investigate rice environments in various agro-ecological zones during a field visit in Benin;
- Investigate the use of radar and satellite images for mapping rice;
- Assess verification, calibration and validation data sets for rice mapping;
- Establish new partnerships among AfricaRice, IRRI and other institutes;
- Develop an outline research proposal for rice mapping in Africa.

Meetings of CIDA Steering and Technical Committees

The annual meeting of the Steering Committee of the project 'Enhancing food security in Africa through the improvement of rice post-harvest handling, marketing and the development of new rice-based products' funded by Canadian International Development Agency (CIDA) was held on 3–6 July in Cotonou.

The project is introducing improved harvest and post-harvest rice processing practices and technologies to upgrade the quality and marketability of locally produced rice in order to meet urban consumers' preferences.

The project is also promoting the development and adoption of new rice-based products, and providing technical advisory and policy guidance support to the regional economic communities in sub-Saharan Africa. The ultimate goal of the project is to increase food security and sustainable livelihoods among rice value-chain actors in Africa.

CGIAR Consortium Board Chair and CEO

The CGIAR Consortium Board Chair Frank Rijsberman and Chief Executive Officer (CEO) Carlos Pérez del Castillo visited AfricaRice, Cotonou, 17–18 July. After interacting with AfricaRice management and staff as well as with representatives of national partners, women seed producers' association (through FEPRODES) and farmers' organizations (through the Network of Farmers' and Agricultural Producers' Organizations of West Africa, ROPPA), they appreciated the vision and the exceptional strengths of the AfricaRice system, particularly in terms of real

The 'big guns' always ask difficult questions: Biotech Unit research assistant Kolade Olufisayo responding to a question from CGIAR Consortium CEO Frank Rijsberman, while founder-president of FEPRODES Peinda Cissé (center left), CGIAR Consortium board chair Carlos Pérez del Castillo (back right), lecturer and vice dean of the Faculty of Science of Dassa, Benin Gustave Djedation (far right) and AfricaRice research operations coordinator Olupomi Ajayi listen in

partnership on the ground which can contribute to strengthening the new CGIAR.

The Director General presented some of the main achievements of the Center over the last 5 years focusing on the uniqueness of AfricaRice. The partnerships and mechanisms used by AfricaRice to conduct quality science for impact were highlighted by the Deputy Director General, who focused on the Center's 2011–2020 Strategic Plan, the GRiSP research program, the newly established Africa-wide Rice Task Forces and the network of rice sector development hubs. The delegation appreciated the emphasis AfricaRice places on partnerships to achieve research outcomes and impact across the rice value chain.

They made a tour of the AfricaRice facilities in Cotonou, including the biotechnology, plant-pathology and grain-quality laboratories, and the genetic resources unit. Their program also included discussions with Bioversity International and IITA staff and a visit to AfricaRice on-station field trials and demonstrations.

They paid a courtesy visit to the Minister of Agriculture of the Republic of Benin. The minister stressed the important role AfricaRice is playing and will continue to play in the development of the rice sector in the country. The Board Chair thanked the Government of Benin for their support in enabling the CGIAR Consortium to obtain the status of international organization. He extended an invitation to the President of Benin to give opening remarks at the Second Global Conference on Agricultural Research for Development (GCARD2) in Uruguay, in his capacity as president of the African Union and 'agriculture champion' of the New Partnership for Africa's Development (NEPAD).

Experts committee meeting

The 8th Biennial Meeting of the National Experts Committee (NEC) was held in Grand Bassam, Côte d'Ivoire, 30–31 July, under the chairmanship of Ibet Uthman, director general of Institut Tchadien de Recherche Agronomique pour le Développement, Chad.

The Meeting was attended by heads of NARS of 21 member countries. The executive secretary of the West and Central African Council for Agricultural Research and Development (CORAF/WECARD), the president of Women Rice Farmers of Africa, representative of ROPPA and a rice breeder from Chad participated as observers in addition to selected AfricaRice staff members.

The Director of Cabinet of the Minister of Higher Education and Scientific Research inaugurated the meeting on behalf of the Minister, conveying the government's strong commitment to support AfricaRice's return to the country.

The Director General presented an update on AfricaRice, highlighting concrete achievements and emphasizing the need for capacity development of actors in the rice value chain, the nurturing of young talent, the production of appropriate technologies, and the dialogue with policy-makers.

A presentation on the implementation of the 2011–2020 Strategic Plan, with particular focus on the concept of rice sector development hubs was made by the deputy director general. Other presentations included a report on the Africa-wide Rice Breeding Task Force, on the Saint-Louis Regional Training Center and the feasibility of AfricaRice's return to Côte d'Ivoire.

The second day of the NEC meeting was devoted to a visit to the national program, CNRA headquarters near Abidjan, where the NEC delegation was given a warm reception. A presentation by CNRA on the manifold activities and achievements and its close collaboration with AfricaRice revealed the strong points of CNRA and its unique funding mechanism through partnership with the private sector.

At the end of the NEC meeting, the national experts commended the Director General and the staff for the

remarkable progress made in several areas to support the NARS of the member countries.

Twelve recommendations were made relating to capacity-building, the Sahel Training Center, the Global Rice Science Scholarships, the rice hub and task force mechanisms, the support to West Africa Agricultural Productivity Program in specific countries, the AU partnership, the Nigeria Rice Transformation Agenda (RTA) initiative, the new focus on Central Africa, and the return to Côte d'Ivoire.

August

AfricaRice and its Belgian partners win T W Schultz Prize

An international research team led by Matty Demont, AfricaRice value-chain economist, received the prestigious T W Schultz Prize for Best Contributed Paper at the 28th International Conference of Agricultural Economists (ICAE) held 18–24 August 2012, in Foz do Iguaçu, Brazil.

This flagship event is organized once every 3 years by the International Association of Agricultural Economists (IAAE), which has a worldwide membership of agricultural economists and others concerned with agricultural economic problems. IAAE's primary aim is to foster the application of agricultural economics to improve rural economic and social conditions.

The Schultz Prize is named after the Nobel Laureate in Economic Sciences Dr Theodore W Schultz, who was an outstanding contributor to IAAE and the agricultural economics profession. It is presented to the best contributed paper at the ICAE.

The other members of the winning team comprise Maïmouna Ndour and Papa Seck from AfricaRice, Pieter Rutsaert and Wim Verbeke from Ghent University, and Eric Tollens from the University of Leuven, Belgium.

They received the prize for their paper on 'Experimental auctions, collective induction and choice shift: willingness-to-pay for rice quality in Senegal', which will be published in the *European Review of Agricultural Economics* in 2013.

The paper presents the novel method developed by AfricaRice for conducting experimental auctions in the African context. An experimental auction creates a market in a 'laboratory' setting, which allows researchers to determine whether consumer behavior can be altered under certain conditions. This provides more and different information than can be obtained through classical surveys.

September

Reflection–consultation workshop on reclassification of the rice CET in ECOWAS countries

ECOWAS has recommended a Common External Tariff (CET) of only 10% for rice since 2006. From 3 to 6 September, ROPPA and AfricaRice organized a reflection and consultation workshop on the reclassification of the rice CET in ECOWAS countries. Participants agreed that an increase in the CET of rice to 35% was appropriate to control imports and support the development of the rice sector.

As a follow up to the workshop recommendation, the terms of reference for a study to evaluate the likely impact of an increase in the CET of rice in the ECOWAS region were developed. The objective of this study will be to conduct an *ex-ante* impact assessment of the implementation of changing the ECOWAS CET on the rice sector in seven countries (Benin, Côte d'Ivoire, Ghana, Guinea, Nigeria, Senegal and Togo).

Meeting on the validation of the regional rice development strategies for West Africa

AfricaRice has worked in close collaboration with ECOWAS and ROPPA to develop the framework

for the regional rice development strategies. The main approach used to reach this output comprised: (i) bringing stakeholders together for constructive dialogues on the regional rice sector development strategy for the West Africa region; (ii) elaboration of consultative frameworks for rice policy dialogues and rice sector development strategy in West Africa; and (iii) organization of a workshop to validate the draft outline for the regional rice development strategy.

The validation workshop was held on 5 September in Cotonou. Overall, this approach strengthened collaboration between AfricaRice and the regional economic communities such as ECOWAS and WAEMU (West Africa Economic and Monetary Union) and with the rice farmers' association ROPPA.

Within the framework of the regional policy dialogue, stakeholders agreed on the deployment of a region-wide 'rice offensive' to be led by ECOWAS; consequently a strategic orientation framework was elaborated. The terms of reference of the feasibility study of the Regional Rice Offensive in West Africa were also defined.

Realizing the agricultural potential of inland valley lowlands in sub-Saharan Africa while maintaining their environmental services (RAP)

The second phase of the RAP project was launched, 19–21 September. Research and development partners from the four project countries attended (*see* 'Donor profile: European Union — Good things for inland valleys', p. 32).

The major objective of the program is to contribute to increase the output and productivity of rice-based systems through intensification and diversification of inland-valley ecosystems while minimizing potential negative effects on environmental services.

The project uses an innovation systems approach to research, making a paradigm shift away from a principally technological package approach to a truly integrated agricultural research approach, ensuring that researchers (national and international) work together with smallholders, pastoralists, extension agencies, the private sector and NGOs to have impact on the ground.

Partner consultation around the concept of rice sector development hubs

Rice sector development hubs are geographic locations strategically identified by national partners to boost Africa's rice productivity. Researchers and advisory services from AfricaRice and partner organizations will help evaluate technological and institutional innovations that could be used in these locations, along with local knowledge with thousands of actors in rice value chains.

A workshop on 'Partner consultation around the concept of rice sector development hubs' was held, 24–25 September, in Cotonou to discuss and build a strategic partnership for effective collaboration for regional rice-sector development in Africa.

The specific objectives were:

- To present AfriceRice's Strategic Plan and approach to rice-sector development through the hubs;
- For partner institutions to understand each other's vision and role in the rice sector;
- To create synergies among key research and development partners to promote regional rice-sector research for development;
- To develop a strategic approach to partnerships needed to support rice-sector development.

Participating institutions and strategic partners represented at the workshop included Catholic Relief Services (CRS) from Burkina Faso, Africa Harvest from Kenya, the Network of Farmers' and Agricultural Producers' Organizations of West Africa (ROPPA) from Mali, Sasakawa Global 2000 from Mali and the Songhai Center from Benin.

Experts launch tool for identifying major rice weeds of Africa

An interactive tool for identifying nearly 200 different weed species that infest lowland rice in East and West Africa was unveiled at AfricaRice during the closing workshop of the project on African Weeds of Rice (AFROweeds), in Cotonou, 24–26 September. The tool can be accessed both online and offline on laptops and CD-ROMs or as an app on smartphones and tablet computers.

Workshop participants presented and discussed the achievements and products of the 3-year AFROweeds project, which was coordinated by CIRAD and AfricaRice with support from the EU–ACP Science and Technology Programme. The project was carried out in close partnership with national agricultural research and extension systems in sub-Saharan Africa.

The goals of the project were to establish a viable African–European weed science network, consolidate existing knowledge on weed management by building a user-friendly web-based platform on weeds of West and East African lowland rice-cropping systems, and disseminate good weed management practices for lowland rice-cropping systems.

Getting to grips with the AFROweeds Identikit

In addition to the identification tool, the AFROweeds project has generated other important products:

- A collaborative platform — called Weedsbook — for sharing information on applied botany, weed science and weed management in rice in Africa; currently, the Weedsbook network has about 125 members from 20 countries;
- An online database of selected weed species, including images, articles, reports and recommendations on management.

About 30 participants attended the workshop, including 17 partners from 12 African countries.

October

GRiSP-Africa on the right path

The 2012 AfricaRice Science Week and GRiSP-Africa Science Forum was held in Cotonou, 1–5 October.

The event drew more than 160 participants — including research staff from all of AfricaRice's regional stations and representatives of regional and national partner organizations, IRRI, the Institut de recherche pour le développement (IRD), CIRAD, Japan International Research Center for Agricultural Sciences (JIRCAS), the Institute of Development Studies (IDS), seed producers' associations, local agricultural machinery manufacturing units and the media.

GRiSP seeks to be a single coordinated blueprint for global rice research that allows researchers to address global rice challenges and to be more effective and efficient in achieving impact. It is led globally by IRRI and in Africa by AfricaRice.

In addition to focusing on GRiSP performance monitoring in 2012 and planning for 2013, the program included discussions on: (i) creating a community of

practice of user-feedback, involving IDS; (ii) the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS); (iii) epidemiology, with IRD; (iv) single-nucleotide polymorphism (SNP) application in breeding, with IRRI; (v) AfricaRice–JIRCAS workshop on agronomy and breeding; (vi) breeding — sterility and salt tolerance, with IRD; and (vii) methodologies and new resources for genotyping and phenotyping of African rice species and their pathogens for developing strategic disease-resistance breeding programs (MENERGEP) project meeting with CIRAD, IRD and JIRCAS.

"The Science Week provided a good overview of how GRiSP fits into the national, regional and international rice research and development agendas," said AfricaRice deputy director general Marco Wopereis.

Expressing satisfaction over the quality of presentations and reports relating to GRiSP-Africa activities, GRiSP director Bas Bouman remarked that the structure of themes and products under GRiSP was working well across the three continents, Africa, Asia and Latin America.

The following recommendations were made:

- AfricaRice's activities on the development and dissemination of rice production and processing equipment should be accelerated;
- AfricaRice should find affordable solutions to the problems of weeds and bird damage in rice;
- AfricaRice's vision should extend beyond 2020 to 2050;
- More emphasis is needed on gender issues in rice production;
- AfricaRice's support was solicited for the implementation of the World Bank West Africa Agricultural Productivity Program (WAAPP) in Côte d'Ivoire;
- The Africa, Asia and Latin America GRiSP teams should jointly learn about value chains (connecting actors, value addition, etc.) and impact pathways analysis, monitoring and measurement of impact;
- AfricaRice's research agenda still places more emphasis on production issues — there is a need to focus more on other issues, such as grain quality.

The invited participants appreciated the high-quality research being carried out by AfricaRice and its partners, the concept of clear impact pathways from gene discovery to the market through partnerships, and the reporting structure using milestones to mark achievements.

"GRiSP is on the right path," said AfricaRice director general Papa Abdoulaye Seck in his concluding statement. "We invite our partners to go forward courageously to do what is necessary to make Africa self-sufficient in rice production."

AfricaRice economist wins Louis Malassis International Scientific Prize

The 2012 Louis Malassis Young Promising Scientist Prize was presented to Matty Demont, AfricaRice agricultural economist on 29 October for his groundbreaking research in the field of rice value-chain development in Africa. The award ceremony was held during the 2nd Global Conference on Agricultural Research for Development (GCARD2) in Punta del Este, Uruguay.

Named after Louis Malassis, a renowned French agronomist and agricultural economist who was an ardent supporter of farmers, the prize recognizes exemplary and promising contributions of scientists in the field of agriculture and food.

Through pioneering research — conducted in close association with public- and private-sector partners — and by building much needed capacity in value-chain research, Demont has made important contribution to the development of Africa's rice sector.

"Dr Demont is a worthy recipient of this highly prestigious prize and we are immensely proud of him,"

said AfricaRice director general Papa Abdoulaye Seck, himself a specialist in agricultural policy analysis and strategy.

Some of Demont's research was featured in last year's report (*see* 'Upgrading rice value chains: The role of policy sequencing', *AfricaRice Annual Report 2011*, pp. 16–19).

Accepting the Louis Malassis Prize from Henri Carsalade, chair of the governing board of Agropolis Fondation, and from Guido Gryseels, Chair of the Jury, Demont said, "This Prize is extremely important to me and I am deeply honored. It marks a milestone in my research career and I am grateful to AfricaRice to have given me a great opportunity to do this work over the last few years with many of our partners across the African continent."

November

BADEA and AfricaRice join hands to build rice R&D capacity in sub-Saharan Africa

More than 40 participants from 19 African countries benefited from a specially designed hands-on training course on best-bet integrated rice management (IRM) practices that are crucial for bridging yield gaps in farmers' fields.

The course was organized by AfricaRice at its Regional Center in Saint-Louis, 5–23 November for French-speaking and 12–30 November for English-speaking participants, with support from the Arab Bank for Economic Development in Africa (BADEA), which has been sponsoring the IRM training program since 2009.

Matty Demont (far right) receiving the 2012 Louis Malassis Young Promising Scientist Prize at GCARD2 from (left to right) Guido Gryseels, Prize Jury Chair, Anne-Lucie Wack, Agropolis Fondation Director, and Henri Carsalade, Agropolis Fondation Governing Board Chair

"There is a desperate lack of trained capacity in rice R&D in sub-Saharan Africa," said Papa Abdoulaye Seck, AfricaRice director general. "We are grateful to BADEA for supporting our capacity-building efforts to help create a new generation of rice research and extension professionals in the continent through quality and gender-balanced training."

The 2012 IRM training course was for rice researchers and extensionists, especially those linked to the activities of the Africa-wide rice task forces and rice sector development hubs.

Combining practical experience with theoretical knowledge, the course comprised training modules on specific areas of IRM, including:

- Techniques for improving and increasing rice production through IRM;
- Field preparation techniques;
- Seed production, storage and distribution techniques;
- Technology-transfer and innovation techniques, and participatory approaches.

The course was mainly based on Participatory Learning and Action-Research for Integrated Rice Management (PLAR-IRM). It included a series of learning videos developed by the Center.

"Our goal is to empower our trainees to play an active role in developing environmentally sustainable rice production systems in their countries," said Kabirou N'Diaye, AfricaRice agronomist, who coordinated the 2012 IRM training program.

The participants reported that in addition to improving their knowledge and competence, which will help them to better target and serve the needs of their countries, the course also helped them to link with other colleagues.

Head of the BADEA Technical Assistance Division Mohamed El Aichouni and AfricaRice regional representative in Senegal Vincent Bado participated in the official ceremony to award certificates to the participants.

"As part of its mandate to strengthen the African–Arab cooperation and linkages, BADEA is pleased to support AfricaRice's efforts to enhance national R&D systems in sub-Saharan Africa and ultimately improve the quality of life," remarked El Aichouni.

December

Technical meeting of mechanization experts

With support from GRiSP, rice scientists and mechanization experts met in Saint-Louis, 19–20 December to: identify technologies that are appropriate for local production and dissemination in the rice sector development hubs; develop workplans and budgets for each country for the introduction and testing of these technologies; and determine a survey method to ascertain the capacity of private and governmental equipment manufacturers in Africa.

The 47 workshop participants included representatives from national agricultural research and extension systems, local manufacturing and distribution units of nine countries (Burkina Faso, Ghana, Mali, Nigeria, Senegal, Sierra Leone, Tanzania, Togo and Uganda), farmer organizations, rural credit bodies, international research and development organizations (AfricaRice, IRRI, JICA and CIRAD), international agricultural machinery manufacturers (Briggs & Stratton) and the Coalition for African Rice Development (CARD).

The meeting made recommendations for the various key players: governments; international manufacturers; local manufacturers; national research and extension systems; AfricaRice, IRRI and CIRAD; and CARD.

An Africa-wide Task Force on Rice Mechanization is expected to be launched early in 2013 with support from the European Union.

Profiles of selected PhD candidates

Joseph Kwesi Gayin

Joseph Kwesi Gayin, a scientist with the Food Research Institute (FRI) of Ghana's Council for Scientific and Industrial Research, is studying for his PhD at the Department of Food Science of the University of Guelph in Ontario, Canada. With a first degree in biochemistry and a master's in food science and technology, he worked at FRI on cereal processing, preservation and utilization, particularly rice.

His PhD thesis, 'Structure and functional properties of starches from indigenous African rice varieties (*Oryza glaberrima*)', is based on the hypothesis that the thermal properties, *in-vitro* digestibility and expected glycemic index (eGI) of *O. glaberrima* are not different from those of *O. sativa*.

Another hypothesis is that the organization of glucan chains (polysaccharide of D-glucose monomers, linked by glycosidic bonds) in the starch of *O. glaberrima* varieties is not related to their *in-vitro* starch digestibility and thermal properties.

Gayin will characterize the thermal properties, cooking quality and *in-vitro* digestibility (for human health) of some selected *O. glaberrima* and *O. sativa* varieties. He will investigate the molecular structure of starches from these rice varieties, and relate the thermal attributes and eGI to their internal structure.

The *O. glaberrima* varieties were selected from a collection of 1020 accessions from AfricaRice's Genetic Resources Unit, based on existing data (pasting properties and apparent amylose) supplied by AfricaRice's grain quality laboratory. They will be compared with two *O. sativa* varieties (Koshihikari and WITA 4) and NERICA 4.

Starch is the major constituent of rice and the structure of the starch influences the cooking, eating and quality of the rice, and that of rice-based products. Gayin's work is in line with 'priority area 4' of the 2011–2020 R&D strategy of AfricaRice that seeks to "create market opportunities for smallholder farmers and processors by improving the quality and competitiveness of locally produced rice and rice products."

Stella Kabiri

PhD candidate Stella Kabiri, a member of the 'Crop Systems Analysis Group' at Wageningen University in the Netherlands, is looking at how host–parasite interactions of parasitic weeds and rainfed rice are affected by environmental conditions.

Her PhD study is intended to "unravel the ecology and biology" of *Rhamphicarpa fistulosa* — a less well-known facultative parasitic weed that is "growing in importance," she says, and establish any similarities with the obligate parasitic *Striga* species.

The study is examining the environmental requirements for the establishment of facultative and obligate parasitic weeds in rice, how they thrive in rice production systems, and what the consequences are for yields. Some initial results from fieldwork in Tanzania show that both *Striga asiatica* and *Rhamphicarpa fistulosa* have markedly different habitat characteristics and soil moisture could be an important driver.

Greenhouse experiments at Wageningen showed that once a host–parasite relationship is established, the host's physiology is severely affected, its growth

Stella Kabiri taking chlorophyll measurements on Rhamphicarpa fistulosa*-infested rice plants in a greenhouse at Wageningen University and Research Center, Netherlands*

stunted and its 'plant architecture' altered — sometimes leading to complete crop failure.

"Population pressure is driving rice farming into the marginal uplands and inland valleys — the preferred habitats of parasitic weeds," says Kabiri. The weeds parasitize on rice roots, withdrawing nutrients and water while exerting pathological effects that can result in total crop failure.

"If we are to find out whether the problems with parasitic weeds in rice cultivation in the coming decades are likely to expand," according to Kabiri, "we need to ascertain the factors that cause these weeds to thrive."

Kabiri took her first degree in agriculture at Makerere University of Kampala in 2004; for her master's she majored in natural-resources management and food security at the University of Twente in the Netherlands in 2009.

Samuel Tetteh Partey

Samuel Tetteh Partey, from Ghana, is doing his PhD research in the UK at the University of Manchester's Sustainable Consumption Institute. His work centers on the impact on rice harvests in Benin of 'legume green-manuring' — the cultivation of a crop that is later worked into the soil as fertilizer — and the use of biochar (charcoal) to improve fertility.

A large proportion of the rural population in sub-Saharan Africa depends on subsistence agriculture, yet the region remains food insure. Maintaining an adequate supply of nutrients on farm land is vital for preserving a sustainable supply of food for people on smallholdings.

At AfricaRice, Partey helped conduct on-station trials with upland rice fields to determine the efficacy of green-manuring with cowpea (*Vigna unguiculata*) and mucuna (*Mucuna pruriens*), and using biochar amendments for improving the fertility of the soil. Data were collected on the biological nitrogen fixation (BNF) and nutrient supply from legumes, the physico-chemical properties of soil, and the agronomic characteristics of rice. There were clear indications that biochar improves nodulation and the BNF of legumes, particularly cowpea.

The residue chemistries of legumes planted on biochar and control fields did not differ significantly. But the study revealed large positive synergistic effects of the legume green manure, as well as the application of 5 tonnes of biochar per hectare on cation exchange capacity and nitrogen availability in soil.

Regardless of biochar application, however, the study recorded comparable grain yields in fields that received sole inorganic fertilizer and sole green-manure inputs — suggesting green manure is an effective alternative to nitrogen-based fertilizer.

Espérance Zossou

Beninese Espérance Zossou is finalizing her PhD studies through the Université de Liège, Gembloux, Belgium. The title of her thesis is: 'The role of communication tools (video and rural radio) in local rice processing and impact on rural livelihoods and markets'.

Espérance Zossou working with a group of rice processors, Garou Village, northern Benin

"The study deals with the impact of processors watching videos of improved postharvest practices — improved rice parboiling and quality rice — in terms of rice processors' practices, rice physical and cooking characteristics, consumers' valuation of local rice and rice processors' social, financial and human capitals," explains Zossou.

In northern and central Benin, consumers prefer parboiled rice to white rice; however, traditional parboiling practices in these areas produce a low-quality product.

Consequently, small-scale processors have low livelihood status, as well as low human and social capitals. ('Human capital' covers knowledge, health, skill, happiness, responsibility and quality rice, while 'social capital' includes group cohesion, information exchange, institutional linkage and support, commitment and solidarity.) These processors have almost no access to formal training and receive little advice on best practices for their work.

After viewing the video about improved parboiling, processors developed their own parboiling technologies as a response to not having access to the specific parboilers featured in the video.

Experimental auctions conducted with consumers revealed the potential value of improving rice processing and postharvest handling in general: consumers were willing to pay premiums of 9–27% for rice parboiled using practices developed through innovation after screening of the video, and 25–34% for rice parboiled with the video-featured improved parboiler.

"By adopting the 'new' practices or developing their own solutions to the problem of poor-quality parboiled rice, processors increased their incomes, along with their social and human capitals," concludes Zossou.

Financial statements

Statement of financial position

As at 31 December 2012

ASSETS

	2012 (US$)	2011 (US$)
Current assets		
Cash and cash equivalent	8,038,183	12,155,406
Accounts receivable:		
Donors	10,307,822	5,841,551
Employees (net of allowances)	431,054	409,127
Others (net of allowances)	432,257	273,324
Inventories	299,701	325,468
Prepaid expenses	338,890	447,405
Total current assets	**19,847,907**	**19,452,281**
Property and equipment		
Property and equipment	14,149,832	12,544,953
Less: Accumulated depreciation	–13,661,526	–12,009,318
Total property and equipment – Net	**488,306**	**535,635**
TOTAL ASSETS	**20,336,213**	**19,987,916**

LIABILITIES AND NET ASSETS

	2012 (US$)	2011 (US$)
Current liabilities		
Bank balances (overdraft)	39,574	
Accounts payable:		
Donors	2,573,211	2,771,273
Employees	562,259	424,756
Others	705,857	692,880
Employees investment account	214,365	214,136
Provisions and accruals	3,702,580	3,895,815
Total current liabilities	**7,797,846**	**7,998,860**
TOTAL LIABILITIES	**7,797,846**	**7,998,860**
Net assets		
Unrestricted net assets:		
Undesignated	12,050,061	11,453,421
Designated	488,306	535,635
TOTAL NET ASSETS	**12,538,367**	**11,989,056**
TOTAL LIABILITIES & NET ASSETS	**20,336,213**	**19,987,916**

Statement of activities

For the year ended 31 December 2012

(Expressed in US$)

	Unrestricted	Restricted – CRPs				Restricted – Other		Total	
		CGIAR Fund Windows 1 & 2	CGIAR Fund Window 3	Bilateral	Total	Bilateral	Total	2012	2011
REVENUE AND GAINS									
Grant revenue	371,778	9,805,025	1,645,120	9,208,327	20,658,472	257,510	257,510	21,287,760	21,738,874
Member states operating income	1,142,107							1,142,107	492,964
Other revenue and gains	241,094							241,094	149,315
Total revenue and gains	**1,754,978**	**9,805,025**	**1,645,120**	**9,208,327**	**20,658,472**	**257,510**	**257,510**	**22,670,960**	**22,381,153**
EXPENSES AND LOSSES									
Research expenses	5,988	9,805,025	1,645,120	9,208,327	20,658,472	257,510	257,510	20,921,969	20,457,985
General and administration expenses	3,213,102							3,213,102	2,898,843
Other losses									
Sub-total	**3,219,090**	**9,805,025**	**1,645,120**	**9,208,327**	**20,658,472**	**257,510**	**257,510**	**24,135,071**	**23,356,828**
Indirect cost recovery	(2,013,423)							(2,013,423)	(2,166,407)
Total expenses and losses	**1,205,667**	**9,805,025**	**1,645,120**	**9,208,327**	**20,658,472**	**257,510**	**257,510**	**22,121,649**	**21,190,421**
Surplus (Deficit)	**549,311**							**549,311**	**1,190,732**

EXPENSES BY NATURAL CLASSIFICATION

	Unrestricted	Restricted – CRPs				Restricted – Other		Total	
		CGIAR Fund Windows 1 & 2	CGIAR Fund Window 3	Bilateral	Total	Bilateral	Total	2012	2011
Personnel	1,577,299	3,856,932	579,993	2,450,015	6,886,941	26,368	26,368	8,490,608	7,690,790
Supplies and services	1,290,901	3,124,454	702,238	3,577,049	7,403,741	132,028	132,028	8,826,670	8,196,215
Collaborators – CGIAR Centers									
Collaborators – Partners		922,893	170,996	2,011,084	3,104,973			3,104,973	3,652,468
Travel	190,138	614,950	172,503	991,557	1,779,011	29,415	29,415	1,998,564	1,452,354
Depreciation	160,751	1,285,796	19,389	140,939	1,446,124	69,699	69,699	1,676,574	2,344,614
System cost (CSP)				37,681	37,681			37,681	20,387
Sub-total	**3,219,090**	**9,805,025**	**1,645,120**	**9,208,327**	**20,658,472**	**257,510**	**257,510**	**24,135,071**	**23,356,828**
Indirect cost recovery	(2,013,423)							(2,013,423)	(2,166,407)
Total expenses and losses	**1,205,667**	**9,805,025**	**1,645,120**	**9,208,327**	**20,658,472**	**257,510**	**257,510**	**22,121,649**	**21,190,421**

Schedule of grant revenues

For the year ended 31 December 2012

(Expressed in US$)

Donor	Grant period	For the year ended 31 December 2012				Grant 2011
		Grant pledges available	Accounts receivable	Accounts payable	Grant 2012	
UNRESTRICTED						
Australia	Jan '12–Dec '12					520,065
Belgium	Jan '12–Dec '12					760,824
Japan	Jan '12–Dec '12	371,778			371,778	
Total unrestricted grants		**371,778**			**371,778**	**1,280,889**
TEMPORARILY RESTRICTED BILATERAL GRANTS						
AfDB (NERICA Dissemination Project)	Jan '04–Dec '11	1,230,000		13,427	2,000	200,833
Contracted Services to CARD Secretariat	Oct '09–Jul '10	24,415			6,978	114
ANRP ESCAPE			1,807		51,269	9,803
ACP – AfroWEEDS Project	Oct '09–Oct '12	408,453	2,812		76,387	102,895
BADEA – 2010 IRM training	Jul '10–Dec '11	330,000		0	5,453	25,431
BADEA – Training	Nov '12–Dec '12	310,000	20,286		262,786	
Consultancy services (Kabirou)			20		2,054	4,691
Diffusion of Improved Crop Varieties in Africa (DIVA)	Nov '09–Dec '12	168,300	0		29,789	24,537
BIOV2 New DIIVA Obj.					147,752	102,248
Chinese Academy of Agricultural Sciences (CAAS)	Nov '08–Oct '11	3,449,862	0		(340)	650,663
Green Super Rice Phase II	Oct '12–Oct '15	1,300,000		435,333	134,567	
Canada Linkage Fund – McGill University	Apr '08–Mar '11	209,711				50,601
CIDA Support to Rice Research in Africa	Apr '11–Mar '16	7,136,573		72,970	1,077,344	1,270,871
CFC–FAO – NERICA Dissemination in Central Africa project	Jan '08–Dec '12	2,500,961	348,943		547,223	836,355
Vegetable Value Chain in Rice-based Crop	Apr '12–Dec '12	15,000	1,500		15,000	
DFID16 – *Striga* Project – University of Sheffield	May '08–Dec '12	76,313	0		5,845	16,282
Esso Rice Development in Chad	Jan '10–Dec '11	214,242				63,905
EU – Rice Policy & Technology Impact on Food Security	Jan '07–Dec '10	1,203,184		0		
EU – RAP project	Jan '09–Dec '13	4,614,514	1,173,788		694,352	479,436

Donor	Grant period	For the year ended 31 December 2012				Grant 2011
		Grant pledges available	Accounts receivable	Accounts payable	Grant 2012	
Rice policy (Incremental Fund)	Jun '10–Dec '13	2,000,000	800,241		901,051	813,519
FAO – Liberia seed production project	Aug '08–Jun '09	168,475				2,188
Seed policy workshop	Jan '11–Jun '11	50,000				50,000
APO training	May '11–Jun '12	4,200			4,200	
GIZ–RISOCAS–University of Hohenheim project	Mar '08–Feb '11	236,553		0		(12,872)
GTZP8 – GIZ MICCORDEA	Jan '10–Dec '13	1,608,000	138,140		437,855	595,033
GIZ – Attributed grant	Jan '12–Dec '12	196,072	100,686		196,072	219,924
IBRD–CGIAR Collaboration Fund project	Jan '11–open	414,492		14,492	58,289	160,240
AIDP Liberia	Oct '12–Jul '14	854,232		22,454	142,927	
CCAFS Research Theme #5 project	Dec '10–May '11	15,000				15,000
IFAD – NERICA Seeds Access – West and Central Africa project	Dec '07–Dec '12	1,500,000		2,497	49,146	219,950
IFAR–CGIAR fellowship programs	Jan '09–Dec '12	55,000			8,609	8,067
FTF – Ghana	Feb '12–Dec '12	299,822		3,011	296,811	
Africa RISING	Apr '12–Dec '12	170,000	2,465		172,465	
AfDB – SARD-SC	May '12–Nov '16	15,500,500		750,683	35,289	
IRRI–AfricaRice abiotic stress project, phase 2	Mar '11–Feb '14	4,800,000	358,835		1,792,161	1,446,674
Japan–UNDP-TCDC – Interspecific hybridization project	Jan '00–Mar '13	324,000	330,152		402,792	257,548
Japan – Increasing quality & competitiveness of local rice project	Jan '03–Mar '13	86,000	75,479		60,849	99,326
Japan – Development of interspecific *Oryza glaberrima* & *O. sativa* progenies project	Jan '03–Mar '13	86,000	80,366		51,724	58,889
Japan – High yield varieties – humid zones project	Dec '05–Mar '13	86,000	88,433		102,127	151,143
Japan – Physiological & genetic investigation – NERICA project	Jan '07–Mar '13	86,000	81,883		104,617	62,562
Japan – Development of sustainable rice farming systems project	Jan '08–Mar '13	53,000	58,132		133,812	50,324
Japan – Breeding project	Jan '10–Dec '14	6,000,000	1,775,959		1,538,675	1,686,384
Japan – SMART-IV	Oct '09–Sep '14	3,000,000		420,371	599,526	731,471
Japan – Capacity building – Sokei	Oct '09–Feb '11	48,349	0			(1,472)
Japan – Capacity building – Abe	Sep '10–Feb '11	11,500		0	602	1,986
Japan–CG Fellowship program – Abe	Nov '10–Feb '11	12,700		5,807	745	3,539
Japan–CG Fellowship program – Saito	Nov '10–Mar '11	7,000		5,106		8,152
CGIAR Fellowship – Dr Michi	Jan '12–Dec '12	7,192		5,736	4,212	2,980

Donor	Grant period	For the year ended 31 December 2012				Grant 2011
		Grant pledges available	Accounts receivable	Accounts payable	Grant 2012	
Japan – Statistics project	Apr'12–Mar'13	310,995	51,560		51,560	
JIRCAS Fellowship	Nov'12–Dec'12	9,310		536	8,774	
Japan – RYMV project	Jan'00–Mar'13	86,000	78,193		94,847	70,946
JICA–AfricaRice collaboration project	Apr'04–open	164,035		17		67,772
JIRCAS – Collaboration project – Benin	Jun'10–open	4,000		91	3,852	1,249
MISU1 – Competitiveness study	Oct'10–Aug'11	49,335			(121)	49,456
LABOSEM	Jan'12–Dec'12	95,448	19,677		54,240	
GYGA	Feb'12–Oct'13	102,350	10,656		10,656	
PADER project	Feb'11–open	54,820	11,459		66,279	
Syngenta proposal development	Jan'10–Dec'10	193,530	0			(1,640)
Value chains	Apr'11–Jul12	416,456	0		29,816	547,654
UEMO1 – UEMOA–PACER project	Aug'12–Aug'14	301,205		165,663		
UNDP – Liberia seed production project	Apr'09–Apr'11	296,604	0		(82)	93,100
UNDP – KMV project – Liberia	Oct'08–Jun'11	230,000				(44,982)
NOW-WOTRO – Parasite project	Apr'11–Mar'15	139,923		8,606	52,646	25,672
Sub-total restricted bilateral grants		**63,325,626**	**5,611,469**	**1,926,800**	**10,525,481**	**11,278,445**

Donor	Grant period	For the year ended 31 December 2012				Grant 2011
		Grant pledges available	Accounts receivable	Accounts payable	Grant 2012	
CHALLENGE PROGRAMS						
Generation Challenge Program						
CIMMYT-GCP-Project SP1-G4008-05	Jan '08–Dec '10	19,200			(1,320)	
CIMMYT-GCP-Project SP3-G4007-08	Aug '07–Jul '09	304,440				
GCP-I-Bridges-WARDA/IRD	Aug '07–Dec '09	80,000	9,000			
GCP-NAM population-WARDA/ CIAT	Aug '08–Jun '13	138,950	7,324			29,442
GCP Rice Challenge Initiative	Jun '09–Mar '14	2,717,754	65,309		583,472	569,206
GCP Drought Avoidance Root	Nov '08–Sep '11	100,800			3,324	4,237
Sub-total Challenge Program grants		**3,361,144**	**81,634**		**585,476**	**602,885**
CGIAR Research Program (CRP) grants						
CCAFS CRP Total	Jan '11–Dec '15	787,980	203,012		740,674	47,318
GRiSP CRP Total	Jan '11–Dec '15	15,613,048	3,531,713		7,790,001	8,186,337
GRiSP – IRRI Bilateral Projects	Jan '11–Dec '15		502,116	38,318	896,471	
Sub-total CRP grants		**16,401,028**	**4,236,841**	**38,318**	**9,427,147**	**8,233,655**
CGIAR Genebank Stability Grants						
Fund Council Genebank	Jan '11–Dec '16	2,311,385	377,878		377,878	343,000
Sub-total CGIAR Genebank Stability Fund Grants		**2,311,385**	**377,878**		**377,878**	**343,000**
Total restricted grants		**85,399,183**	**10,307,822**	**1,965,118**	**20,915,982**	**20,457,985**
Total grants		**85,770,961**	**10,307,822**	**1,965,118**	**21,287,760**	**21,738,874**

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(As on 31 December 2012)

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AfricaRice Board of Trustees in 2012, together with a few senior staff

Senior staff and Associates

(As on 31 December 2012)

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Aguibou Dahirou Tall ‡	Director of Administration and Finance
George Maina	Head of Finance
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Amadou M. Bèye	Regional Representative, Côte d'Ivoire

Paul Kiepe	Regional Representative, Tanzania
Francis Nwilene	Regional Representative, Nigeria
Maïmouna Diatta	French Editor/Translator
Emmanuel Onasanya	Desktop Publishing Assistant
Fassouma Sanogo	Translator

Genetic Diversity and Improvement Program

Takashi Kumashiro	Program Leader
Ibnou Dieng	Biometrician
Khady Nani Dramé	Molecular Biologist (Tanzania)
Raafat El-Namaky	Hybrid Rice Breeder (Senegal)
John Manful	Grain Quality Specialist
Baboucarr Manneh	Irrigated Rice Breeder (Senegal)
Marie-Noëlle Ndjiondjop	Molecular Biologist
Francis Nwilene	Entomologist (Nigeria)
Kayodé Sanni	Head of Genetic Resources Unit, INGER-Africa Coordinator
Saber El-Sayed Sedeek	Upland Rice Breeder (Tanzania)
Mandè Semon	Upland Rice Breeder (Nigeria)
Yacouba Séré	Plant Pathologist (Tanzania)
Moussa Sié	Senior Rice Breeder
Drissa Silué	Plant Pathologist
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Negussie Shoatec Zenna	High-altitude Rice Breeder (Tanzania)
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Mamadou Fofana	PDF Molecular Genetics – Drought (Nigeria)
Yonnelle Moukoumbi	PDF Yield Potential (Senegal)
Akolly Raissa ‡	Program Administrative Assistant (Senegal)
Seth Graham Acquaah	Research Assistant
Gbenga Akinwale	Research Assistant (Nigeria)
Fatimata Bachabi	Research Assistant
Saidu Bah	Research Assistant
Daniel Tia Dro	Research Assistant

Kolade Fisayo	Research Assistant
Judith Hubert	Research Assistant (Tanzania)
Ghislain Kanfany	Research Assistant (Senegal)
Seleman R. Kaoneka ‡	Research Assistant (Tanzania)
Martin E. Ndomondo	Research Assistant (Tanzania)
Ayoni Ogunbayo	Research Assistant
Oyin Oladimeji	Research Assistant (Nigeria)
Bosede Popoola	Research Assistant (Nigeria)
Felix Waweru *	Research Assistant (Tanzania)

Sustainable Productivity Enhancement Program

Koichi Futakuchi	Program Leader * and Crop Ecophysiologist
Paul Kiepe	Program Leader (Tanzania) ‡
Susumu Abe	Soil Scientist
Senthilkumar Kalimuthu *	Cropping Systems Agronomist (Tanzania)
Mutsa Masiyandima *	Water Management Specialist
Frank Mussgnug ‡	Cropping Systems Agronomist
Jonne Rodenburg	Weed Scientist (Tanzania)
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Pepijn van Oort *	Crop Modeler
Sander Zwart	Remote Sensing/Water Management Specialist
Alpha Bocar Balde	PDF Climate Risk Assessment (Senegal)
Côme Agossa Linsoussi *	PDF Remote Sensing and GIS
Amos Onasanya	PDF Plant Pathology (Nigeria)
Suchit Shrestha	PDF Agronomy/Physiology
Cyrille Adda	Research Assistant
Confidence Duku ‡	Research Assistant
Derek Makokha *	Research Assistant (Tanzania)
Abibou Niang	Research Assistant
Enos Onyuka *	Research Assistant (Tanzania)
Abdoulaye Sow	Research Assistant (Senegal)
Abou Togola	Research Assistant
Amadou Touré	Research Assistant
Mel Valere	Research Assistant (Senegal)

Policy, Impact Assessment and Innovation Systems Program

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Rita Afiavi Agboh-Noameshie	Gender Specialist
Jeanne Y. Coulibaly *	Policy Economist
Matty Demont	Agricultural Economist (Senegal)
Godswill Makombe ‡	Agricultural Economist (Tanzania)
Cara M. Raboanarielina	Social Scientist
Aminou Arouna *	PDF Agricultural Economist
Edwige Fiamohe	PDF Agricultural Economist
Ali A. Touré	PDF Policy Economist
Esther Leah Achandi	Research Assistant (Tanzania)
Didier Alia	Research Assistant
Mandiaye Diagne	Research Assistant (Senegal)
Theophile Eyram	Research Assistant
Abdoulaye Kaboré	Research Assistant
Tebila Nakelse	Research Assistant
Maimouna Ndour	Research Assistant (Senegal)

Rice Sector Development Program

Inoussa Akintayo	Program Leader
Amadou M. Bèye	Seed Systems Specialist (Côte d'Ivoire)
Youssouf Dembélé †	Water Management Specialist
Sarah Michelle Fernandes ‡	Information and Knowledge Management Officer
Mamadou Kabirou N'Diaye	Senior Rice Agronomist and Coordinator, Rice Training Center (Senegal)
Boubakary Cissé	Program Assistant
Mansour Diop	Research Assistant (Senegal)
N'kou Mobio Modeste Romaric	Research Assistant (Côte d'Ivoire)

Collaborating Scientists

Bertrand Muller	Agro-climatologist (CIRAD, Senegal)
Joël Huat	Vegetable Agronomist (CIRAD)
Philippe Menozzi	Entomologist (CIRAD)
Seiji Yanagihara	Rice Breeder (JIRCAS)

* Joined or changed job title in 2012

‡ Left or changed job title in 2012

† Youssouf Dembélé passed away in 2012

AfricaRice team members and partners

Postgraduate trainees

Name and thesis topic	Institution / University	Country of origin	Gender	Sponsor	Degree
Adepoju, Abidemi A. Evaluation of *Oryza*-SNP panel for drought tolerant traits in field condition	University of Ibadan, Ibadan, Nigeria	Nigeria	M	Self	MSc
Adesina, Adejumoke Genebank data management	National Centre for Genetic Resource & Biotechnology	Nigeria	F	Programme d'Appui au Développement Rural (PADER), Benin	MSc
Adjibogoun, O. Rodrigue Effects of late nitrogen application and harvesting dates on grain quality of African rice (*Oryza glaberrima* Steud.)	Université d'Abomey-Calavi, Benin	Benin	M	Japan	MSc
Aguidissous, Elvis Leonard *Amélioration de la politique achat dans une organisation à but non lucratif : cas de AfricaRice*	Université d'Abomey-Calavi, Benin	Benin	M	AfricaRice	MSc
Akinwale, Moses Gbenga Application of marker-assisted backcrossing approach for developing submergence tolerant rice varieties in Nigeria	The Federal University of Technology, Akure, Nigeria	Nigeria	M	Stress Tolerant Rice for Poor Farmers in Africa and South Asia (STRASA), Bill and Melinda Gates Foundation (BMGF)	PhD
Alberizzi, Micol Andrea Gender related issues: if and how sex of the household head promotes or inhibits the adoption of new varieties of rice	School of Oriental and African Studies, University of London (SOAS)	Italy	M	European Union (EU)	MSc
Atikatou, Mama Biotechnology	Faculté des sciences de l'Université Moulay Ismail, Morocco	Benin	F	Generation Challenge Program (GCP)	MSc
Awotide, Bola Amoke Assessing the impact of improved rice technology on income distribution and poverty among rice farmers in Nigeria	University of Ibadan, Ibadan, Nigeria	Nigeria	F	EU	PhD
Ayemere, Ehijie Evaluation of yield characteristics of interspecific backcross progenies between *O. sativa* L. and *O. barthii* Chev.	University of Ibadan, Ibadan, Nigeria	Nigeria	M	Self	MSc

Name and thesis topic	Institution / University	Country of origin	Gender	Sponsor	Degree
Ba, Aby Der *Changement climatique et stratégie d'adaptation : contribution à la recherché de variétés de riz tolérantes au froid et mise à jour des calendriers culturaux dans la vallée du fleuve Sénégal*	Université Gaston Berger, Saint-Louis, Senegal	Senegal	M	Self (ISRA)	PhD
Bama, Aissata Delphine *Impact des régimes hydriques sur la salinisation et la productivité de la riziculture dans les bas-fonds du Sine Saloum au Sénégal*	Université Cheikh Anta Diop, Senegal	Burkina Faso	F	African Union	PhD
Basse Blaise Waly *Évaluation de l'impact des variétés*	Université Gaston Berger, Saint-Louis, Senegal	Senegal	M	EU	PhD
Batureine, Jasper Mwesigwa Characterization of pathogen–host–environment relationships for *Magnaporthe grisea* in Uganda	University of Makerere, Kampala, Uganda	Uganda	M	Global Rice Science Scholarship (GRiSS)	PhD
Bemerew, Mohamed Genetic diversity analysis and impact of climate change on bacterial blight of rice caused by *Xanthomonas oryzae* pv. *oryzae* in East Africa	Georg August University, Gottingen, Germany	Ethiopia	M	Federal Ministry for Economic Cooperation and Development (BMZ)/Deutsche Gesellschaft für Internazionale Zusammenarbeit (GIZ)	PhD
Bizimana, Jean-Pierre Comparison of blast population structure in three blast disease hotspots in Rwanda	Makerere University, Kampala, Uganda	Rwanda	M	GIZ/BMZ	MSc
Branly, Effa Effa Introgression of cold tolerance QTLs/genes into popular African rice varieties	Université Cheikh Anta Diop, Dakar, Senegal	Gabon	M	STRASA, BMGF	PhD
Choudhury, Khalida Akhtar Research on new varieties of rice, sorghum and pearl millet: effects of adoption of these crops on average incomes of individuals, the distribution of income and the rate of poverty	SOAS	UK	M	EU	MSc

Name and thesis topic	Institution / University	Country of origin	Gender	Sponsor	Degree
Cissoko, Mamadou The molecular genetic basis of resistance in rice to the parasitic weed *Striga*	University of Sheffield, UK	Côte d'Ivoire	M	Department for International Development (DFID), UK	PhD
Codjo, Ogoudele Simon *Étude de la compétitivité de la filière du riz au Bénin*	Université d'Abomey-Calavi, Benin	Benin	M	EU	MSc
Dago, Faustin Effect of fertilizers on RYMV epidemic	University of Abidjan, Cocody, Côte d'Ivoire	Côte d'Ivoire	M	Japan	PhD
Deh, Deloris Cynthia *Effet des plantes parasites sur la qualité des graines de riz*	Université d'Abomey-Calavi, Benin	Benin	F	Japan	MSc
Diarra, Aboubacar *Introgression gène* RYMV-1 *des lignées élites par sélection assistée par marqueur*	Université d'Abomey-Calavi, Benin	Mali	M	Rice Challenge Initiative (GCP)	MSc
Dibba, Lamin Assessing the impact of improved rice technology on household food security in The Gambia	University of Hohenheim, Stuttgart, Germany	The Gambia	M	GRiSS	PhD
Diop, Soudou Marker-assisted introgression of blast resistance into African mega-varieties of rice	Université Cheikh Anta Diop, Dakar, Senegal	Senegal	M	STRASA, BMGF	MSc
Diouf, Daba Ndour *Tolérance du riz au froid*	Université Cheikh Anta Diop, Senegal	Senegal	F	STRASA, BMGF	PhD
Diouf, Ndeye Seynabou The impact of NERICA varieties on food security — role of gender in development strategies of rice	Université Gaston Berger, Saint-Louis, Senegal	Senegal	F	GRiSS	PhD
Djedatin, Gustave Identification and mapping of resistance genes to bacterial leaf blight in rice	University of Abomey-Calavi, Benin	Benin	M	USAID	PhD
Djibril, Aboubakar Souna *Etude comparative de deux dispositifs du système de lâcher de* I. eldanae *parasitoïde de* Corcyra cephalonica	Université d'Abomey-Calavi, Benin	Benin	M	McKnight through IITA	MSc

Name and thesis topic	Institution / University	Country of origin	Gender	Sponsor	Degree
Dossa, Sylvester Comparison of *Xanthomonas oryzae* pv. *oryzae* strains according to two rice ecozones in Tanzania	Georg August University, Gottingen, Germany	Benin	M	BMZ/GIZ	MSc
Dossou, W. Alphonse *Isolement de* Xanthomonas oryzae *pv.* oryzae *responsable du flétrissement bactérien des feuilles (BB)*	Université d'Abomey-Calavi, Benin	Benin	M	STRASA, BMGF	MSc
Fontes, Francisco Pereira Evaluation of new agricultural technologies in Tanzania	SOAS	UK	M	EU	MSc
Gayin, K. Joseph How differences in rice starch properties affect functional and nutritional properties of indigenous and improved varieties	Guelph University, Canada	Ghana	M	GRiSS	PhD
Houessou, A. Valentin *Savoirs paysans dans la gestion des mauvaises herbes dan les systèmes à base de riz*	Université d'Abomey-Calavi, Benin	Benin	M	Netherlands Organization for Scientific Research – Research for Global Development (NWO-WOTRO)	MSc
Houndedji, Dewanou Cosme Relationship between the distribution of a single grain moisture content and grain breakage: a comparison between *Oryza glaberrima* and *O. sativa*	Université d'Abomey-Calavi, Benin	Benin	M	Japan	MSc
Jasper, Paul Estimating determinants of adoption intensity and productivity impact of improved rice varieties in Tanzania and Togo	SOAS	Germany	M	EU	MSc
John, Constantine Effects of *Striga asiatica* and *Rhamphicarpa fistulosa* densities on yielding ability of rice	Sokoine University of Agriculture, Tanzania	Tanzania	M	Climate Change, Agriculture and Food Security (CCAFS) (CRP7)	MSc
Jomanga, Kennedy Elisha Effect of *Rice yellow mottle virus* on performance of different rice genotypes	Sokoine University of Agriculture, Tanzania	Tanzania	M	Self	MSc

Name and thesis topic	Institution / University	Country of origin	Gender	Sponsor	Degree
Kabiri, Stella Understanding how host–parasite interactions for economically important parasitic weed species in rainfed rice are differentially affected by present and expected future environmental conditions	Wageningen University, Netherlands	Uganda	F	NWO-WOTRO	PhD
Kaboyo, Solomon Barungi Distribution and population structure of *M. grisea* in Uganda	Makerere University, Kampala, Uganda	Uganda	M	BMZ/GIZ	MSc
Kalisa, Alain Distribution and population structure of *M. grisea* in Rwanda	Makerere University, Kampala, Uganda	Rwanda	M	GIZ/BMZ	MSc
Kam, Honoré Marker-assisted selection for improvement of rice varieties resistant to RYMV for West Africa	University of KwaZulu-Natal, South Africa	Burkina Faso	M	USAID	PhD
Kilese, John Characterization of rice germplasm for cold tolerance through field evaluation and participatory selection in the southern highlands of Tanzania	Sokoine University of Agriculture, Tanzania	Tanzania	M	STRASA, BMGF (research only)	MSc
Kindjinou, T. André *Cartographie des bas-fonds et intensification des cultures en utilisant les données de télédétection et les données secondaires dans le Bénin*	Université d'Abomey-Calavi, Benin	Benin	M	Japan	MSc
Konaté, Abdourasmane Marker-assisted selection for improvement of rice varieties resistant to RYMV for West Africa	University of KwaZulu-Natal, South Africa	Burkina Faso	M	Rice Challenge Initiative (GCP)	PhD
Koné, Bréma Moussa *Analyse de la politique budgétaire comme facteur contribuant à l'émergence de l'agriculture en tant que moteur de la croissance économique au Mali : cas du riz à l'office du Niger*	Institut Supérieur de Formation et de Recherche Appliquée, Mali	Mali	M	EU	PhD

Name and thesis topic	Institution / University	Country of origin	Gender	Sponsor	Degree
Koudamiloro, Augustin *Caractérisation et étude biomoléculaire des insectes vecteurs de la panachure jaune du riz (*RYMV*) au Bénin : perspective de contrôle avec l'huile de neem*	Université d'Abomey-Calavi, Benin	Benin	M	Self	PhD
Langeloo, Djoeke Research on *Ramphicarpa*	Wageningen University and Research Centre, Netherlands	Netherlands	F	NWO-WOTRO	MSc
Maganga, Reinfrid Martin Analysis of population structure of *M. grisea* and cultivar resistance in three major rice growing regions of Tanzania	Sokoine University of Agriculture, Tanzania	Tanzania	M	BMZ/GIZ	MSc
Magosongo, Hashim Morphological and molecular characterization of wild rice in Tanzania	Unversity of Dar es Salaam, Tanzania	Tanzania	M	Self	PhD
Medhin, Alem Reda Gebre Productivity, and farmers perception of organic and conventional upland rice production in Tselemt Woreda, NW Tigray	Mekele University, Ethiopia	Ethiopia	M	STRASA, BMGF	MSc
Menza, Mwalimu Developing and disseminating locally adaptable and socially and economically acceptable strategies for prevention and damage control of parasitic weeds in rainfed systems in SSA	Wageningen University, Netherlands	Kenya	M	NWO-WOTRO	PhD
Mersha, Tilahun Tadesse Developing agronomic packages for newly released cold tolerant rice germplasms, with emphasis on mitigation of terminal moisture stress in rainfed lowland rice production system of Fogera Plain, northwestern Ethiopia	Haramaya University, Ethiopia	Ethiopia	M	STRASA, BMGF (research only)	PhD

Name and thesis topic	Institution / University	Country of origin	Gender	Sponsor	Degree
Middleton, Francis Stephen Analyze the impact of adoption of NERICAs on marketed surplus and production using an endogenous selected model controlling for determinants of adoption	SOAS	Portugal	M	EU	MSc
Mkanthama, Joseph A farmer participatory evaluation of good agricultural practices (GAP) in rice production in Tanzania	Jomo Kenyatta University of Agriculture and Technology, Kenya	Malawi	M	EU	MSc
Moges, Tekalegn Gebere Michael Evaluation of cold tolerant genotypes for their yield and yield attributes in N. Tigray Tahtay Koraro woreda [district]	Mekele University, Ethiopia	Ethiopia	M	STRASA, BMGF (research only)	MSc
Montcho, David *Diversité et bases génétiques des traits lies à la vigueur végétative et à l'adaptation du riz africain aux différentes conditions hydrauliques*	Université d'Abomey-Calavi, Benin	Benin	M	BMGF	PhD
Moukoumbi, Yonnelle *Diversité génétique et valorisation NERICA bas-fond*	Université d'Abomey Calavi, Benin	Gabon	F	UNESCO/Self	PhD
Msangi, Saidi Hamadi Effects of *Striga asiatica* and *Rhamphicarpa fistulosa* densities on yielding ability of rice	Sokoine University of Agriculture, Tanzania	Tanzania	M	CCAFS (CRP7)	MSc
Mwenda, Mesharck Analysis of population structure of bacterial leaf blight and cultivar resistance in three major rice growing regions of Tanzania	Sokoine University of Agriculture, Tanzania	Tanzania	M	BMZ/GIZ	MSc
N'cho, Simon Assessing current and future economic, social and environmental impacts of parasitic weeds in rice in SSA	University of Wageningen, Netherlands	Côte d'Ivoire	M	NWO-WOTRO	PhD
N'tcha, N'po Audit	None	Benin	M	AfricaRice	Maitrise

Name and thesis topic	Institution / University	Country of origin	Gender	Sponsor	Degree
Ndaw, Omar Faye Study the salt tolerance using SSH-microarrays and genetic transmission of this character in rice	Université Cheikh Anta Diop, Senegal	Senegal	M	GRiSS	PhD
Ndoye, Cheikh Tidiane *Projet de développement d'application mobile pour la collecte et la gestion automatisées de données d'enquêtes géo-référencées*	Université Gaston Berger, Saint-Louis, Senegal	Senegal	M	EU	MSc
Niang, Abibou Modeling the effect of nutrient management on rice yield in rainfed upland environment in Africa	University of Bonn, Germany	Senegal	M	GRiSS	PhD
Nkima, Germain Analysis of *Xanthomonas oryzae* pv. *oryzae* population structure and cultivar resistance in Rwanda	Sokoine University of Agriculture, Morogoro, Tanzania	Rwanda	M	BMZ/GIZ	PhD
Odesola, Kafilat Abiodun Molecular profiling of an interspecific backcross population between *Oryza sativa* Linn. and *Oryza barthii* Chev.	University of Ibadan, Nigeria	Nigeria	M	Self	MSc
Ogonnaya, Ukoha Grace Weed competitiveness of interspecific (*O. sativa* × *O. glaberrima*) genotypes in Ultisol	University of Ibadan, Nigeria	Nigeria	F	Japan	MSc
Ogwuike, Philomena Chima Impact of NERICA adoption on labour productivity in Nigeria	University of Agriculture Abeokuta, Ogun State, Nigeria	Nigeria	F	EU	MSc
Okpara, Chioma Ulumma Evaluation of interspecific rice (*O. sativa* × *O. barthii*) for drought tolerance	University of Ibadan, Nigeria	Nigeria	M	Self	MSc
Olajire, Eunice Olabisi Genebank data management	National Centre for Genetic Resource & Biotechnology	Nigeria	F	PADER, Benin	On-the-job
Olubiyi, Mayowa Raphael Screening of *Oryza glaberrima* accessions for tolerance to anaerobic germination	University of Agriculture Abeokuta, Ogun State, Nigeria	Nigeria	M	STRASA, BMGF	MSc

Name and thesis topic	Institution / University	Country of origin	Gender	Sponsor	Degree
Onaga, Geoffrey Impact of climate change on pathogen diversity, and rice gene expression in response to *Magnaporthe oryzae*	Georg August University, Gottingen, Germany	Uganda	M	BMZ/GIZ	PhD
Ongom, Joel Pathogenic diversity of *Xanthomonas oryzae* pv. *oryzae* in Uganda and reaction of rice germplasm to the pathogen	Makerere University, Kampala, Uganda	Uganda	M	GIZ/BMZ	MSc
Oumarou, Souleymane Breeding rice (*Oryza sativa* L.) for salt tolerance in Niger	University of Legon, Accra, Ghana	Niger	M	West Africa Center for Crop Improvement	PhD
Palanga, Koffi Identification of restorer lines in African germplasm using SSRs	Université Cheikh Anta Diop, Dakar, Senegal	Togo	M	STRASA, BMGF	MSc
Partey, Samuel Tetteh Effects of legume green manuring and biochar amendments on maintenance on green water and soil fertility indicators on rice cropping fields in Ghana	Manchester University, UK	Ghana	M	GRiSS	PhD
Rahman, Abdel Mohamed Identification of salinity tolerance QTLs in traditional African rice germplasm	Katerlsheikh University, Egypt	Egypt	M	BMGF via IRRI	PhD
Rosendaal, Susanna Bernandina Matthia Impact of the adoption of new varieties	SOAS	Netherlands	F	EU	MSc
Sall, Amadou Tidiane QTL analysis for cold tolerance using populations derived from crosses between NERICA-L-19 × Plovdiv22 and NERICA-L-19 × Diamante	Université Cheikh Anta Diop, Dakar, Senegal	Senegal	M	STRASA, BMGF	MSc
Sangaré, Jean Rodrigue *NERICA et le séquençage des allèles d'*O. glaberrima *révélés par marqueurs microsatellites*	University of Abomey-Calavi, Benin	Mali	M	GCP	PhD
Santos, Carline Christelle *Analyse de l'influence des conditions agro écologiques de cultures sur la résistance du riz aux insectes de stock au Bénin et possibilité d'amélioration de la qualité par étuvage*	University of Abomey-Calavi, Benin	Benin	F	GRiSS	PhD

Name and thesis topic	Institution / University	Country of origin	Gender	Sponsor	Degree
Sarr, Dior Index insurance for avian risk in the Senegal River valley	Université Gaston Berger, Saint-Louis, Senegal	Senegal	F	Changement Environnementaux et Socio en Afrique : Passe, Présent et Future (ESCAPE)	MSc
Shaibu, Abraham Assessment of the utility of *Oryza glaberrima* in drought tolerance breeding in lowland ecosystem for yield potential	University of Nigeria, Nsukka, Nigeria	Nigeria	M	Rice Challenge Initiative (GCP)	PhD
Shittu, Ganiyu A. Screening of rice varieties for drought tolerance	University of Ibadan, Ibadan, Nigeria	Nigeria	M	Self	PhD
Sikirou, Mouritala Genetic analysis of iron toxicity tolerance in rice	University of Abomey-Calavi, Benin	Benin	M	University of Abomey-Calavi	PhD
Sock, Mamadou Genetic fingerprinting and grain quality determination of AfricaRice irrigated lowland rice using molecular markers	Université Cheikh Anta Diop, Dakar, Senegal	Senegal	M	STRASA, BMGF	MSc
Souley, Issaka *La panachure jaune du riz en Afrique : épidémiologie et diversité du* RYMV *au Niger*	Obafemi Awolowo University, Ile-Ife, Nigeria	Niger	M	Japan	PhD
Sow, El Hassimi Mounirou *Criblage d'une collection du riz su Niger pour la résistance au virus de la panachure jaune (*RYMV*) et étude de la diversité génétique*	University of KwaZulu-Natal, South Africa	Niger	M	USAID	PhD
Taiwo, Stephen Sustainable weed control and productivity improvement in improved inland valleys in south-eastern Nigeria	Michael Okpara University of Agriculture – Umudike, Umuahia, Nigeria	Nigeria	M	Self	PhD
Thiam, Maimouna Identification of novel salt tolerance QTLs in populations derived from NERICA-L-19 × IR4630-22-2 and NERICA-L-19 × Hasawi	Université Cheikh Anta Diop, Dakar, Senegal	Senegal	F	STRASA, BMGF	MSc

Name and thesis topic	Institution / University	Country of origin	Gender	Sponsor	Degree
Tognite, Fifame Gertrude Soil fertility under sawah system development in inland valleys in Benin	Agrocampus Ouest, Centre de Rennes, France	Benin	F	Japan	MSc
Togola, Abou *Bio-écologie de* Sitotroga cerealella *et* Sitophilus oryzae. *Perte quantitative et qualitative et impact économique des technologies de lutte au Bénin et dans des pays du projet CIDA*	Université de Lomé, Togo	Mali	M	AfricaRice	PhD
Toz, Allodehou Amos *Évaluation* ex ante *de la stratégie nationale de développement de la riziculture au Bénin*	Université d'Abomey-Calavi, Benin	Benin	M	EU	MSc
Tusekelege, Hezron Kumbala M. Improvement of selected rice variety in Tanzania for bacterial leaf blight resistance using marker-assisted selection	Sokoine University of Agriculture, Morogoro, Tanzania	Tanzania	M	GIZ/BMZ	PhD
Wiredu, Alexander Nimo Impact of fertilizer subsidy program on farm level productivity and food security: a case study of rice producers in northern Ghana	University of Hohenheim, Germany	Ghana	M	GRiSS	PhD
Yamazaki, Yuri Exploring nutrient management options to combat biotic and abiotic stresses in wetland rice cultivation	Kinkin University, School of Agriculture, Japan	Japan	F	Japan	MSc
Yao, Nasser Genetic basis and mapping of the resistance gene to African rice gall midge	University of KwaZulu-Natal, South Africa	Côte d'Ivoire	M	USAID	PhD
Yelome, Octaviano Igor *Résistance induite chez le riz contre la pyriculariose du riz causée par* Magnaporthe oryzae	Université d'Abomey-Calavi, Benin	Benin	M	STRASA, BMGF	MSc
Zossou, Espérance *Soutenir la poste-récolte et le marché du riz local en Afrique de l'Ouest*	Université de Liège, Gembloux, Belgium	Benin	F	Japan	PhD

AfricaRice training programs

Training activities and workshops conducted by AfricaRice in 2012

Theme	Workshop/ Training	Countries represented and number of participants	Place and date	Total number of participants
Training course on field phenotyping of rice for drought resistance	Training	Burkina Faso 4 Mali 3 Nigeria 3 PhD Student 1	Sikasso, Mali 30 Jan to 3 Feb	11
Training for Agronomy & Processing and Value Addition Task Forces (Anglophone countries)	Training	The Gambia 2 Ghana 3 Ethiopia 2 Nigeria 2 Sierra Leone 2 Tanzania 2 Uganda 2	Cotonou, Benin 13–17 Feb	15
Training for Agronomy & Processing and Value Addition Task Forces (Francophone countries)	Training	Benin 2 Cameroon 2 Côte d'Ivoire 2 Madagascar 2 Mali 2 Niger 1 Senegal 2 Togo 2	Cotonou, Benin 20–24 Feb	15
Workshop to develop a training curriculum and course content for seed training	Workshop	Benin 2 Nigeria 1 Senegal 1	Cotonou, Benin 12–15 March	4
AFROweeds workshop	Workshop	Madagascar 31	Antsirabe, Madagascar 20 March	31
Training on varietal selection and rice improvement	Training	Benin 1 Burkina Faso 1 Burundi 1 Cameroon 1 Congo 1 Côte d'Ivoire 1 Guinea 1 Guinea-Bissau 1 Madagascar 1 Mali 1 Niger 1 Senegal 1 Togo 1	Cotonou, Benin 30 Apr to 4 May	13

Theme	Workshop/ Training	Countries represented and number of participants	Place and date	Total number of participants
Training on rice policy	Training	Benin 1 Burkina Faso 1 Cameroon 1 Central African Republic 1 Côte d'Ivoire 1 DRC 1 Gabon 1 Guinea 1 Madagascar 1 Mali 2 Niger 2 Rwanda 1 Senegal 1 Togo 1	Cotonou, Benin 3–9 May	15
AFROweeds: Weeds of rice	Workshop	Tanzania 37	Morogoro, Tanzania 10 May	37
Training course on fluorometry and infra-red thermography	Training	Burkina Faso 1 AfricaRice (Biotech Unit) 6	Cotonou, Benin 7–11 May	7
Mid-term review SMART-IV project	Workshop	Benin 4 Ghana 1 Germany 1 Japan 4 Netherlands 1 Togo 4 Uganda 1	Cotonou, Benin 21–23 May	16
Training curriculum development workshop	Workshop	Burkina Faso 1 Mali 4 Senegal 9	Saint-Louis, Senegal 21–25 May	14
Rice Breeding Task Force training	Training	Egypt 1 Ethiopia 1 The Gambia 1 Ghana 1 Liberia 1 Mauritania 1 Nigeria 1 Rwanda 1 Senegal 1 Sierra Leone 1 Uganda 1	Saint-Louis, Senegal 29 May to 2 June	13

Theme	Workshop/ Training	Countries represented and number of participants	Place and date	Total number of participants
Policy Task Force training	Training	Egypt 1 Ethiopia 1 The Gambia 2 Ghana 2 Nigeria 3 Sierra Leone 1 Tanzania 2	Saint-Louis, Senegal 29 May to 2 June	11
Expert consultation meeting on rice mapping in Africa using remote-sensing	Workshop	Benin 1 France 1 Italy 1 Republic of Korea 1 Netherlands 2 Philippines 1 Switzerland 1 UK 1	Cotonou, Benin 2–6 June	9
Training on diagnosing *Xanthomonas oryzae* pathovars	Training	AfricaRice (Pathology Unit) 15 Benin 2	Cotonou, Benin 4–8 June	17
Training on yield gap survey and weather station establishment	Training	AfricaRice (Benin) 10 AfricaRice (Senegal) 1 AfricaRice (Tanzania) 1	Cotonou, Benin 11–13 June	12
Workshop on results-based management of CIDA project	Workshop	Benin 1 Canada 1 AfricaRice (Program 3) 10	Cotonou, Benin 18–21 June	12
Training on the building/assembling of mini-combine harvester	Training	Cameroon 1 The Gambia 1 Ghana 1 Mali 1 Nigeria 1 Senegal 1 Sierra Leone 1 Uganda 1	Saint-Louis, Senegal 25 June to 14 July	8

Theme	Workshop/ Training	Countries represented and number of participants	Place and date	Total number of participants
Workshop on CIDA project reporting	Workshop	Cameroon 1 The Gambia 1 Ghana 1 Mali 1 Nigeria 1 Sierra Leone 1 Senegal 1 Uganda 1	Cotonou, Benin 9–11 July	8
Blacksmith workshop program: Manufacturing locally adapted rotary weeders for lowland rice	Training	Tanzania 32	Morogoro, Tanzania 10–12 July	32
Training course on rice production	Training	Benin 1 The Gambia 1 Ghana 1 Guinea 1 Madagascar 1 Mali 1 Nigeria 1 Rwanda 1 Senegal 1	Saint-Louis Senegal 13–24 Aug	9
Training on experimental design, data management and analysis for plant breeding	Training	Benin 1 Burkina Faso 1 Burundi 1 Côte d'Ivoire 1 Ethiopia 1 The Gambia 1 Ghana 1 Guinea 1 Madagascar 1 Mali 1 Mozambique 1 Niger 1 Nigeria 1 Senegal 1 Sierra Leone 1 Tanzania 1 Togo 1	Saint-Louis, Senegal 27–31 Aug	17

Theme	Workshop/ Training	Countries represented and number of participants	Place and date	Total number of participants
Workshop on rice common external tariff (CET) in ECOWAS countries	Workshop	Benin 9 Burkina Faso 6 Côte d'Ivoire 3 The Gambia 2 Ghana 2 Guinea 2 Liberia 2 Mali 3 Niger 5 Nigeria 3 Sierra Leone 2 Senegal 7 Togo 3	Cotonou, Benin 3–4 Sep	49
Validation of the outline for the Regional Rice Development Strategy	Workshop	Benin 2 Burkina Faso 1 Côte d'Ivoire 1 Nigeria 1 Senegal 1	Cotonou, Benin 5 Sep	6
The development and promotion of regional strategic food and food agricultural commodities value chains	Workshop	Benin 7 Côte d'Ivoire 1 Ethiopia 7 Mali 2 Nigeria 1 Senegal 1 USA 2	Cotonou, Benin 13–14 Sep	21
RAP 2 project launching workshop	Workshop	Benin 11 France 2 Liberia 4 Mali 10 Netherlands 1 Sierra Leone 4	Cotonou, Benin 19–21 Sep	32
Partner consultation around the concept of rice sector development hubs	Workshop	Burkina Faso 1 Kenya 1 Mali 2 Nigeria 1	Cotonou, Benin 24–25 Sep	5

Theme	Workshop/ Training	Countries represented and number of participants	Place and date	Total number of participants
AFROweeds: End of project workshop	Workshop	Benin 3 Burkina Faso 1 Côte d'Ivoire 2 France 3 Ghana 1 India 1 Kenya 1 Madagascar 1 Mali 2 Mozambique 1 Nigeria 1 Senegal 1 Uganda 1	Cotonou, Benin 24–26 Sep	19
Gender, leadership and promotion of female entrepreneurship at the community level	Workshop	Benin 1 Burkina Faso 1 Côte d'Ivoire 1 The Gambia 1 Guinea 2 Madagascar 1 Mali 1 Rwanda 1 Senegal 4	Saint-Louis Senegal 15–18 Oct	13
BADEA training (Francophone countries)	Training	Benin 1 Burkina Faso 1 Burundi 2 Cameroon 2 Gabon 1 Guinea 1 Mali 4 Niger 4 Senegal 3 Togo 2	Saint-Louis, Senegal 5–23 Nov	21
BADEA training (Anglophone countries)	Training	Eritrea 1 Ethiopia 2 The Gambia 4 Ghana 1 Namibia 3 Nigeria 1 Senegal 1 Uganda 5 Zimbabwe 5	Saint-Louis, Senegal 12–30 Nov	23

Theme	Workshop/ Training	Countries represented and number of participants	Place and date	Total number of participants
Agricultural mechanization experts' workshop	Workshop	Benin 1 Burkina Faso 1 Chad 1 Côte d'Ivoire 1 Ghana 1 Mauritania 1 Nigeria 2 Senegal 1 Uganda 1	Cotonou, Benin 19–21 Dec	10

Publications

Papers published in peer-reviewed journals

Abe S. 2012. Advances in soil science in sub-Saharan Africa. Why is suiden crucial for Africa? An introductory review of the research on soil fertility management in African rice farming systems. *Japanese Journal of Soil Science and Plant Nutrition* 83(2): 183–196.

Adesanwo OO, Adetunji MT and **Diatta S**. 2012. Effect of legume incorporation on solubization of Ogun phosphate rock on slightly acidic soils in SW Nigeria. *Journal of Plant Nutrition and Soil Science* 175(3): 377–384.

Adigbo SO, Olojede MO, Harris PJC and **Ajayi O**. 2012. Ratooned lowland NERICA rice varieties as an option for triple cropping in inland valleys of derived savannah in Nigeria. *Experimental Agriculture* 48(4): 551–562.

Adigbo SO, Vaughan IO, Odedina JN, Adigbo VB, **Ajayi O** and **Nwilene FE**. 2012. Evaluation of sowing methods of upland and ratooned rice planted in-between lowland rice–fluted pumpkin sequence in derived savannah. *Journal of Agricultural Science* 4(11): 226–234.

Agnoun Y, Ahounou E, **Sié M**, Ogunbayo SA, Toulou B, **Futakuchi K** and Ahanchédé A. 2012. Variation and phenotypic evaluation of intraspecific *Oryza glaberrima* lines resulting from crossings between Tog5681, Tog5672 and Tog7291. *Journal of Plant Studies* 1(2): 129–139.

Agnoun Y, Biaou SSH, **Sié M**, Vodouhè RS and Ahanchédé A. 2012. The Africa rice *Oryza glaberrima* Steud: knowledge distribution and prospects. *International Journal of Biology* 4(3): 158–180.

Agnoun Y, **Sié M**, **Djedatin G**, **Dramé KN**, **Toulou B**, **Ogunbayo SA**, **Sanni KA**, **Tia D**, Ahanchédé A, Vodouhè RS and **Ndjiondjop M-N**. 2012. Molecular profiling of interspecific lowland rice progenies resulting from crosses between TOG5681 and TOG5674 (*Oryza glaberrima*) and IR64 (*Oryza sativa*). *International Journal of Biology* 4(3): 19–28.

Arouna A and Dabbert S. 2012. Estimating rural households' willingness to pay for water supply improvement: a Benin case study using a semi-nonparametric bivariate probit approach. *Water International* 37(3): 293–304.

Assigbe P, **Koné B**, Bognonpke JP, **Touré A**, **Huat J** and Yao-Kouame A. 2012. Bush fallow and cowpea crop use as precedent and organic sources of nutrients for rice cultivation on acidic Plinthosol of central Benin in West Africa. *Journal of Agricultural Science and Technology B* 4(8): 320–324.

Awotide B. 2012. Poverty and income inequality among fish farming households in Oyo State, Nigeria. *Agricultural Journal* 7(2): 111–121.

Awotide BA, Awoyemi TT and **Diagne A**. 2012. Access to certified improved rice seed and farmers income in Nigeria. *Journal of Crop Improvement* 26(4): 558–579.

Awotide BA, Awoyemi TT, **Diagne A**, **Kinkingnihoun FM** and Ojehomon V. 2012. Effect of income diversification on poverty reduction and income inequality in rural Nigeria: evidence from rice farming households. *OIDA International Journal of Sustainable Development* 05: 10.

*The names of Africa Rice Center (AfricaRice) authors are shown in bold

Awotide BA, Awoyemi TT, Okoruwa VO and Omonona BT. 2012. Impact of seed quality improvement on rice productivity: evidence from rural Nigeria. *New York Science Journal* 5(12): 14.

Awotide BA, Awoyemi TT and Oluwatayo IB. 2012. Gender analysis of income inequality and poverty among rural households in Nigeria: evidence from Akinyele Local Government Area, Oyo State. *New York Science Journal* 5(10): 13–19.

Awotide BA, **Diagne A**, Awoyemi TT and Ojehomon VET. 2012. Poverty and its determinants among rice farming households in Nigeria. *The International Journal of Environmental, Cultural, Economic and Social Sustainability* 7(6): 105–126.

Awotide BA, **Diagne A**, **Wiredu AN** and Ojehomon VE. 2012. Wealth status and agricultural technology adoption among smallholder rice farmers in Nigeria. *OIDA International Journal of Sustainable Development* 5(2): 97–108.

Bado BV, Lompo F, Bationo A, Segda Z, Sedogo MP, Cescas MP and Mel VC. 2012. Nitrogen recoveries and yields improvement in cowpea sorghum and fallow sorghum rotations in West Africa savannah. *Journal of Agricultural Science and Technology* 2(7B): 758–767.

Banito A, Kadai EA and **Sere Y**. 2012. Pathogenic diversity of *Xanthomonas oryzae* pv. *oryzae* isolates in Togo. *Trends in Applied Sciences Research* 7(9): 768–776.

Banito A, Kadai EA and **Séré Y**. 2012. Screening of rice varieties for resistance to bacterial leaf blight. *Journal of Applied Biosciences* 53: 3742–3748.

Bocco R, Lorieux M, **Seck PA**, **Futakuchi K**, **Manneh B**, Baimey H and **Ndjiondjop M-N**. 2012. Agro-morphological characterization of a population of introgression lines derived from crosses between IR 64 (*Oryza sativa indica*) and TOG 5681 (*Oryza glaberrima*) for drought tolerance. *Plant Science* 183: 65–76.

Chagné D, **Krieger C**, Rassam M, Sullivan M, Fraser J, André C, Pindo M, Troggio M, Gardiner SE, Henry RA, Allan AC, McGhie TK and Laing WA. 2012. QTL and candidate gene mapping for polyphenolic composition in apple fruit. *BMC Plant Biology* 12: 12–28.

Dandedjirohoun L, **Diagne A**, Biaou G, **N'cho S** and Midingoyi S-K. 2012. Determinants of diffusion and adoption of improved technology for rice parboiling in Benin. *Review of Agricultural and Environmental Studies* 93(2): 171–191.

de Mey Y, **Demont M** and **Diagne M**. 2012. Estimating bird damage to rice in Africa: evidence from the Senegal River valley. *Journal of Agricultural Economics* 63(1): 175–200.

De Steur H, Gellynck X, Feng S, **Rutsaert P** and Verbeke W. 2012. Determinants of willingness-to-pay for GM rice with health benefits in a high-risk region: evidence from experimental auctions for folate biofortified rice in China. *Food Quality and Preference* 25(2): 87–94.

Dembele Y, Yacouba H, Keita A and Sally H. 2012. Assessment of irrigation system performance in south-western Burkina-Faso. *Irrigation and Drainage* 61: 306–315.

Demont M and Rizzotto AC. 2012. Policy sequencing and the development of rice value chains in Senegal. *Development Policy Review* 30(4): 451–472.

Demont M, **Zossou E**, **Rutsaert P**, **Ndour M**, Mele PV and Verbeke W. 2012. Consumer valuation of improved rice parboiling technologies in Benin. *Food Quality and Preference* 23: 63–70.

Dibba L, **Diagne A**, Fialor SC and Nimoh F. 2012. Diffusion and adoption of new rice varieties for Africa (NERICA) in The Gambia. *African Crop Science Journal* 20(1): 141–153.

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Abbreviations

4Rs	Regional Rice Research Review
ACP	African, Caribbean and Pacific group of states
ADRAO	Association pour le développement de la riziculture en Afrique de l'Ouest (former French name of AfricaRice)
AfDB	African Development Bank
AfricaRice	Africa Rice Center
AIDP	Agriculture and Infrastructure Development Project
ANRP	Agence National de la Recherche project
APO	Assistant Professional Officer
APRAG	Africa Policy Research and Advocacy Group
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa
ASI	ADRAO–SAED–ISRA thresher–cleaner
ASJA	Athénée Saint Joseph Antsirabe (university)
ATE	average treatment effect
AU	African Union
BADEA	Arab Bank for Economic Development in Africa
BMGF	Bill and Melinda Gates Foundation
BMZ	Federal Ministry for Economic Cooperation and Development (Germany)
BNF	biological nitrogen fixation
BSc	Bachelor of Science (degree)
CAAS	Chinese Academy of Agricultural Sciences
CAR	Central African Republic
CARD	Coalition for African Rice Development
CBF	Cellule bas-fonds (Benin)
CBSS	community-based seed systems
CCA	Credit Communautaire d'Afrique
CCAFS	Climate Change, Agriculture and Food Security (CRP)
CEMAC	Commission de la communauté économique et monétaire de l'Afrique central
CEO	chief executive officer
CET	common external tariff
CFA	local currency of countries in CEMAC and UEMOA
CFC	Common Fund for Commodities
CG	CGIAR
CIDA	Canadian International Development Agency
CILSS	Permanent Interstate Committee for Drought Control in the Sahel (Comité permanent Inter-État pour la Lutte contre la Sécheresse dans le Sahel)
CIRAD	Centre de coopération internationale en recherche agronomique pour le développement (France)
CNRA	Centre national de recherche agronomique (Côte d'Ivoire)
COBECVAR	Coopérative de la Benoue pour la chaîne de valeur du riz
CORAF/WECARD	West and Central African Council for Research and Development
CRP	CGIAR Research Program

CRS	Catholic Relief Services
CSP	Cost Sharing Percentage
DEA	Diplôme d'études approfondies (postgraduate degree)
DFID	Department for International Development (UK)
DIIVA	Diffusion and Impact of Improved Crop Varieties in Africa
DIVA	Diffusion of Improved Crop Varieties in Africa
e.g.	for example
ECARRN	East and Central Africa Rice Research Network
ECOWAS	Economic Community of West African States
eds	editors
eGI	expected glycemic index
ESCAPE	Changement Environnementaux et Socio en Afrique : Passe, Présent et Future
EU	European Union
F	female
FAO	Food and Agriculture Organization of the United Nations
FARA	Forum for Agricultural Research in Africa
FCFA	CFA franc
FEPRODES	Fédération des groupements et associations des femmes productrices de la région Saint-Louis (Senegal)
FERRIZ	Fertilisation du riz irrigué, operational framework for soil-fertility management
Fig.	Figure
FRI	Food Research Institute (Ghana)
FTF	Feed the Future
GAP	good agricultural practices
GCARD	Global Conference on Agricultural Research for Development
GCP	Generation Challenge Program (CGIAR)
GIS	geographic information systems
GIZ	Deutsche Gesellschaft für Internazionale Zusammenarbeit
GRiSP	Global Rice Science Partnership
GRiSS	Global Rice Science Scholarship
GSS	general support staff
GYGA	Global Yield Gap Atlas
IAAE	International Association of Agricultural Economists
IAR4D	integrated agricultural research for development
IBRD	International Bank for Reconstruction and Development (World Bank)
ICAE	International Conference of Agricultural Economists
ICT	information and communications technology
IDS	Institute of Development Studies (UK)
IFAD	International Fund for Agricultural Development
IFAR	International Fund for Agricultural Research
IFDC	International Fertilizer Development Center
IITA	International Institute of Tropical Agriculture

INRAB	Institut national de recherches agricoles du Bénin
IRAD	Institute of Agricultural Research for Development (Cameroon)
IRD	Institut de recherche pour le développement (France)
IRM	integrated rice management
IRRI	International Rice Research Institute
IRS	internationally recruited staff
ISRA	Institut sénégalais de recherches agricoles (Senegal)
ITRA	Institut Togolaise de Recherche Agronomique (Togo)
IVC	Inland Valley Community of Practice (formerly Inland Valley Consortium)
IWMI	International Water Management Institute
JICA	Japan International Cooperation Agency
JIRCAS	Japan International Research Center for Agricultural Sciences
KMV	Kokoya Millennium Village (Liberia)
LABOSEM	Laboratoires de semences
M	male
M&E	monitoring and evaluation
MARS	marker-assisted recurrent selection
MAS	marker-assisted selection
MENERGEP	methodologies and new resources for genotyping and phenotyping of African rice species and their pathogens for developing strategic disease resistance breeding programs (project)
MICCORDEA	Mitigating the Impact of Climate Change on Rice Disease Resistance in East Africa
MISU	Michigan State University
MoU	Memorandum of Understanding
MSc	Master of Science (postgraduate degree)
MSP	multi-stakeholder platform
Mt	million tonnes
NARS	national agricultural research system(s)
NEC	National Experts Committee (AfricaRice)
NEPAD	New Partnership for Africa's Development
NERICA	New Rice for Africa (family of interspecific rice varieties for uplands)
NERICA-L	New Rice for Africa (family of interspecific rice varieties for lowlands)
NGO	non-governmental organization
No.	number (of)
NRIVAC	Ndop rice value-chain
NWO-WOTRO	Netherlands Organisation for Scientific Research – Research for Global Development
p.	page
PADER	Programme d'Appui au Développement Rural
PhD	Doctor of Philosophy (doctoral degree)
PLAR	participatory learning and action-research
pp.	pages
pv.	pathovar

PVS	participatory varietal selection
QTL	quantitative trait locus
R&D	research and development
R4D	research for development
RAP	Realizing the agricultural potential inland valley lowlands in sub-Saharan Africa while maintaining their environmental services
RIDEV	Rice Development (computer model)
RIGA	Rice Information Gateway for Africa
RISING	Research in Sustainable Intensification for the Next Generation
RISOCAS	Developing rice and sorghum crop adaptation strategies for climate change in vulnerable environments in Africa
ROCARIZ	West and Central Africa Rice Research and Development Network
ROPPA	Network of Farmers' and Agricultural Producers' Organizations of West Africa
RTA	Rice Transformation Agenda
RYMV	*Rice yellow mottle virus*
SAED	Société d'Aménagement et d'Exploitation des terres du Delta et des vallées du fleuve Sénégal et de la Faléme (Senegal)
SARD-SC	Multinational CGIAR Support to Agricultural Research for Development on Strategic Commodities in Africa (project)
SARI	Savanna Agricultural Research Institute (Ghana)
SMART-IV	Sawah, Market Access and Rice Technologies for Inland Valleys
SNP	single-nucleotide polymorphism
SOAS	School of Oriental and African Studies, University of London
SRI	System of Rice Intensification
SSA	sub-Saharan Africa
SSA CP	Sub-Saharan Africa Challenge Programme
SSD	sawah system development
STRASA	Stress Tolerant Rice for Poor Farmers in Africa and South Asia
SUA	Sokoine University of Agriculture
TCDC	Technical Cooperation among Developing Countries (UNDP)
TICAD	Tokyo International Conference on African Development
UEMOA	West African Economic and Monetary Union (Union Économique et Monétaire Ouest Africaine)
UK	United Kingdom (of Great Britain and Northern Ireland)
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
US	United States
USA	United States of America
USAID	US Agency for International Development
WAAPP	West Africa Agricultural Productivity Program (World Bank)
WAEMU	West African Economic and Monetary Union
WECARD	West and Central African Council for Research and Development

About CGIAR

CGIAR is a global partnership that unites organizations engaged in research for a food secure future. CGIAR research is dedicated to reducing rural poverty, increasing food security, improving human health and nutrition, and ensuring more sustainable management of natural resources. It is carried out by the 15 centers who are members of the CGIAR Consortium in close collaboration with hundreds of partner organizations, including national and regional research institutes, civil society organizations, academia, and the private sector.

For more information, visit: www.cgiar.org

The Centers

AfricaRice	Africa Rice Center (Cotonou, Benin)
Bioversity	Bioversity International (Rome, Italy)
CIAT	International Center for Tropical Agriculture (Cali, Colombia)
CIFOR	Center for International Forestry Research (Bogor, Indonesia)
CIMMYT	International Maize and Wheat Improvement Center (Mexico, DF, Mexico)
CIP	International Potato Center (Lima, Peru)
ICARDA	International Center for Agricultural Research in the Dry Areas (Beirut, Lebanon)
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics (Patancheru, India)
IFPRI	International Food Policy Research Institute (Washington, DC, USA)
IITA	International Institute of Tropical Agriculture (Ibadan, Nigeria)
ILRI	International Livestock Research Institute (Nairobi, Kenya)
IRRI	International Rice Research Institute (Los Baños, Philippines)
IWMI	International Water Management Institute (Colombo, Sri Lanka)
World Agroforestry	World Agroforestry Centre (Nairobi, Kenya)
WorldFish	WorldFish Center (Penang, Malaysia)

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