

Donor Country Profile: Japan

W ARDA'S RELATIONSHIP with Japan goes back to the early days in Liberia. Japan has probably been our most loyal and consistent supporter. In this first in a series of reviews of WARDA's relationships with specific donors, we look at a collaboration that extends far beyond mere financial support.

Rice has been the traditional staple food in Japan since time immemorial. West African rice consumption and production have increased sharply over the past 20 years or so, fueled by urban immigration and the preference of urban populations for rice over traditional staples such as sorghum, millet, yam and cassava. So, Japan has a long-standing interest in rice and many years of research and production experience. Japan is also the largest development aid donor in the world, so it is not surprising that WARDA has found support and encouragement from the Japanese Government and research and development organizations in pursuing its goal to improve both the livelihoods of rice farmers and food security in West Africa.

Funding history

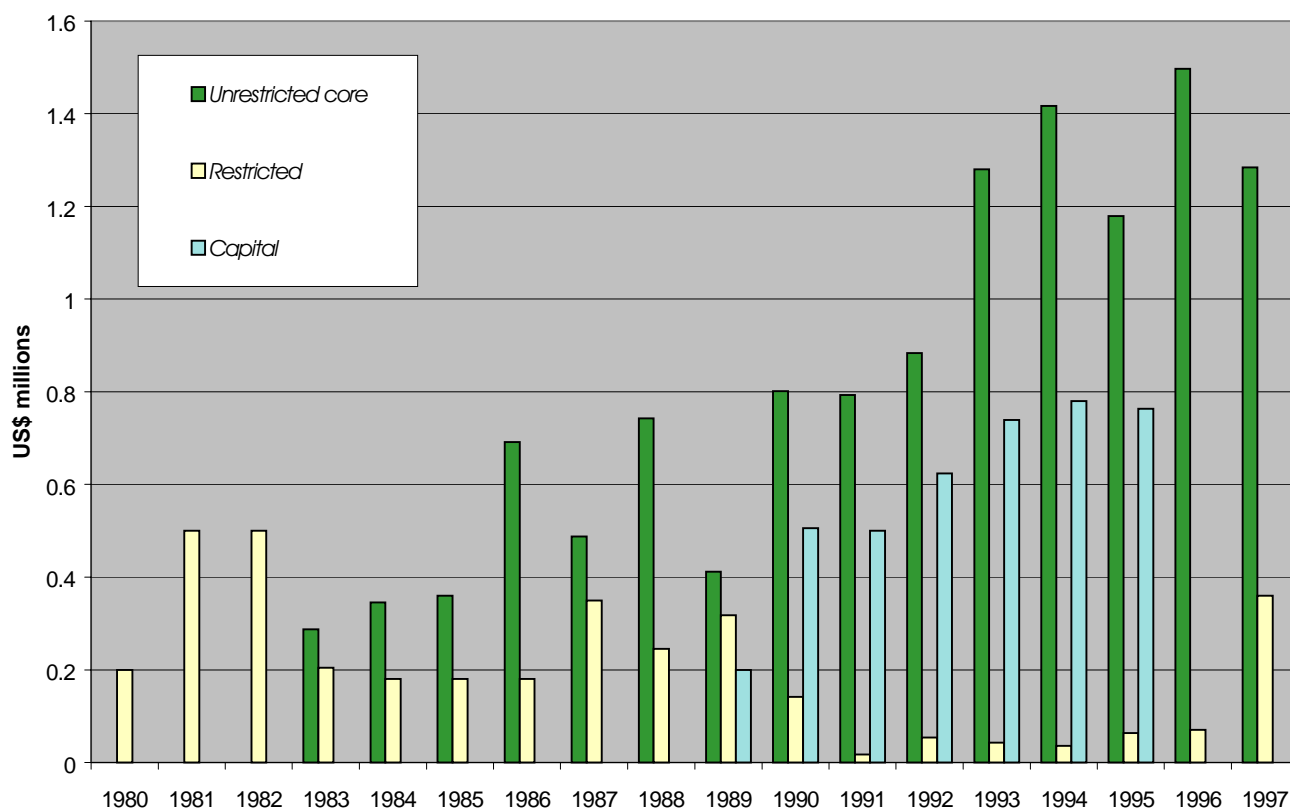
Japan is perhaps the largest long-term donor to WARDA—in 1997, the country provided almost 18% of WARDA's total budget! The breakdown of this funding by unrestricted core, special project and capital is given in Figure 10. Funding per se is channeled through the Ministry of Foreign Affairs (MFA), while experts are provided by the Japan International Cooperation Agency (JICA) and the Japan International Research Center for Agricultural Sciences (JIRCAS).

Early days

Japanese support to WARDA began back in 1978, when two rice processing experts were posted to WARDA's station at Fendall in Liberia. These experts were instrumental in establishing WARDA's first Rice Post-Harvest Technology Unit at the Fendall station; however, all this infrastructure was lost with the outbreak of civil war in Liberia and the relocation of WARDA staff to M'bé, Côte d'Ivoire. Encouraged by the success of the earlier venture, Japan continued its support of the postharvest work, and—through the person of its fifth rice processing expert—established a new Grain Quality/Post-Harvest Technology Unit at M'bé. Still today, Japan provides WARDA with its grain quality expert—the sixth such secondeé—who came to Côte d'Ivoire in 1996.

The development of the work and infrastructure for WARDA's Grain Quality Laboratory has been carried out through the Japan International Cooperation Agency (JICA). As a bilateral cooperation agency, JICA's role is to supply experts, infrastructure and operational funds in a holistic approach to development assistance. The JICA package to WARDA also includes support staff and their needs. The early phase of the project focused not only on technical cooperation (the establishment of the facility), but also on training (creating the local expertise). In this way, some 240 national scientists were trained in grain quality/

Figure 10. Japanese funding to WARDA, 1980-1997



postharvest handling techniques between 1980 and 1989, so that they could establish similar facilities in their home countries.

Relocation

With the relocation to Côte d'Ivoire, and especially with the arrival of Hideo Watanabe in 1996, the emphasis of the JICA/WARDA grain quality project shifted toward research. This research has focused on three main areas:

- milling characteristics of rice grain, and selecting grain for high market value
- assessing grain quality of rice, and selecting varieties with good grain quality
- nutrition.

Under the first of these themes, surveys have been conducted on rice markets throughout the region to assess the value of different qualities of rice—for example, how much of a premium does good quality (high proportion of unbroken grain, or known popular variety) rice command on the market over poorer quality (many broken grains, or unpopular variety) rice. Such information provides economic justification for specific recommendations on rice grain handling to improve quality, if the better quality rice is sufficiently more expensive on the market. It may also help millers and wholesalers target rice of differing qualities at markets which will appreciate the differences. It is no good suggesting that a mill improve its handling of rice grain, if its target market sells all qualities of rice at the

same price; conversely, we may recommend that a mill target a different market with its higher quality grain, if that market sells good grain at a premium.

At the same time, the project has conducted surveys of rice grain mills in the region, determining the milling capacity and quality of the various mills, and enabling us to target our marketing information at specific mills that can use it. As a backup to this work, field experiments have been conducted on grain quality maintenance. The final quality of rice grain depends not only on the way it is handled during harvest and processing, but also on certain aspects of the way it is grown. As an example of this, our work in Senegal showed that the timing of the application of nitrogen fertilizer has an effect on the resistance of the harvested grain to breakage: application of nitrogen fertilizer late in the season (10 days before heading) increases yield, milling recovery and grain quality. Grains that are

handled roughly during harvest and postharvest processing are likely to be broken, scratched or otherwise damaged. Such damage affects the cooking quality of the grain, and therefore its price. Thus, we also make recommendations to farmers and millers on appropriate grain handling.

The grain quality of newly developed varieties is assessed on almost 40 characteristics, ranging from physical and biochemical features to cooking qualities, aroma and taste. Work with farmers and consumers alike has shown that the most important qualities that West Africans look for in the rice they eat are texture, aroma and taste, although different groups may have different preferences within these qualities. The grain quality work is done in close collaboration with the rice breeders, and enables quality to be used as a criterion in selecting new varieties.

Japanese scientists posted at WARDA, 1978–1998

Position	Name	Dates
Rice-processing/Grain Quality Experts (JICA)		
	K. Furugori	1978–1980
	T. Akutsu	1978–1980
	M. Kita	1979/80–1981
	H. Miyaishi	1982–1987
	M. Takeda	1888–1993
	H. Watanabe	1996–present
Visiting Scientist (JIRCAS)		
	S. Tobita (Physiologist/Molecular Biologist)	1998–present
Post-Doctoral Fellow (WARDA)		
	K. Futakuchi (Interspecific Hybridization Project)	1997–present

Nutritional value of rice

Nutrition work on rice is built around two basic features of rice itself: first that rice does not have a high protein content, and second that despite this low protein content

Palatability tests are an essential component of grain quality testing



rice does have a useful amino-acid complement. Amino acids are the building blocks of proteins and the relative abundance of each within a grain affects the overall nutritional quality of that grain. Therefore, there is potential for rice to provide valuable dietary components, especially for the rural and urban poor.

The famous WARDA breakthrough with the 'new rice for Africa' sometimes seems too good to be true. In addition to all the other good things offered by the interspecific hybrid progenies, many of them have higher protein contents in their grain than either of their parents. This makes the value of rice in the diets of resource-poor farmers potentially even higher. In 1997, the first 200 interspecific progeny lines were screened for yield and protein content, and by the end of 1998 the best 50 had been selected. In 1999, the best 10 lines will be selected from these, and screening will begin of the next generation of progenies coming out of the breeding program.

Collaboration with Japanese agricultural research

The Japan International Research Center for Agricultural Sciences (JIRCAS) is a Japanese national research center, which also cooperates with international organizations like CGIAR Centers. In 1998, WARDA and JIRCAS established a five-year collaborative program. JIRCAS provides the research scientist to

A recent JIRCAS short-term mission to WARDA, seen here visiting on-farm trials at Man (Côte d'Ivoire)



WARDA, while WARDA provides office, laboratory and field space, as well as administrative support. JIRCAS will also fund research assistants and technicians, and provides a certain amount of essential equipment, either direct from Japan or by funding for local purchase. The first JIRCAS scientist joined WARDA in January 1998. Satoshi Tobita is working with the Interspecific Hybridization Project on genetic and physiological characterization of *Oryza glaberrima* and interspecific progenies (*O. glaberrima* × *O. sativa*), focusing on drought resistance and tolerance to soil acidity. The aim is to develop a method for rapid assessment of whether newly bred rice lines have these desired traits, through a system known as 'marker-assisted selection'—a 'marker' gene (or group of

genes) which indicates the presence of the gene for the trait, and which can be easily detected in any of the plant's cells. In this case, the markers will be genes known as quantitative trait loci (QTLs).

The JIRCAS/WARDA program also includes short-term assignments for JIRCAS staff to visit WARDA, and for WARDA staff to visit JIRCAS and other research institutions in Japan.

Focus on the 'new rice for Africa'

In October 1998, Japan organized the Second Tokyo International Conference on African Development (TICAD II), at which it reconfirmed its commitment to the goal of "reducing poverty and integrating Africa with the global economy through accelerated economic growth and sustainable development." The development action agenda states "Improving production and competitiveness of agricultural ... industries is necessary because [it has] the potential to create jobs and products for export." The meeting emphasized the importance of developing rice farming in Africa, including specific mention of WARDA's Interspecific Hybridization Project and Asian-type irrigated rice farming—both of which are to be targeted for development and extension.

In recent years, the MFA has become the major donor to the Interspecific Hybridization Project, through the United Nations Development Programme's Technical Cooperation among Developing Countries (UNDP/TCDC). This support complements the roles of JICA and JIRCAS.

In addition, the MFA funds a postdoctoral fellow working with the Interspecific Hybridization Project, Koichi Futakuchi, who is assessing the value of the 'new rice for Africa' in lowland cropping (the plants were originally bred for upland cropping). The traditional African rice (*O. glaberrima*) occurs not only in the uplands, but also in the lowlands, so it is possible to use lowland *glaberrimas* in the interspecific crosses, with the aim of developing new rice plant types for these systems. Some *glaberrimas* also have the advantage



The 'new rice for Africa' is given a high profile by Japanese donors and collaborators alike

of being adapted to flood conditions, not to mention their resistance to drought and weeds, which were target traits for the original upland work. Dr Futakuchi started work in May 1997 and, so far, has screened 200 progenies for yield and weed competitiveness in rainfed lowland and hydromorphic environments, and 300 progenies in irrigated lowland environments. Several progenies combined vigorous growth (see *Allies in the War on Weeds* in this report) with good height (tall plants)—both essential adaptations to lowland cropping. A further 10 progenies gave high yields (more than 6 tonnes per hectare) in rainfed lowland cropping with a moderate level of fertilizer. The chlorophyll content of the leaves seems to be a good indicator for final grain yield. Chlorophyll is the chemical which captures energy from sunlight to enable plants to manufacture sugars, and therefore feed themselves. Screening numbers of progeny on this trait is likely to identify lines with greater yield potential than the varieties currently grown by lowland farmers. Specific yield trials are underway for 50 lines selected in the lowland screening. Work also started in 1998 on the performance of some 30 lines under deep-water conditions.

Additional research under the Interspecific Hybridization Project is being conducted in collaboration with Tokyo University, to assess adaptations of *O. glaberrima* to submergence (flood conditions).

New avenues

The Japanese Ministry of Agriculture, Forestry and Fisheries recently started a project in Côte d'Ivoire, on Community Based Participatory Swamp Reclamation, under the umbrella of the World Food Programme and the Ivorian Government. The training and applied research components of this project involve WARDA. The main areas of WARDA's contribution will be participatory diagnosis, water and nutrient management systems, participatory varietal selection, community-

based seed production, technology testing and transfer, health (nutrition and diseases) and socioeconomics (land tenure, market access and credit).

A successful partnership

Japan and WARDA have been working together for 21 years. It is a partnership that has grown and benefitted not only the partners themselves, but also the rice farmers of West Africa. In recent years, the collaboration has expanded to involve more Japanese institutions and fields of research. In 1999, the second JIRCAS scientist—Takeshi Sakurai, an economist—will move to WARDA. We at WARDA have enjoyed the collaboration to date, and are looking forward to our continued work with Japan well into the next millennium.