

[Kakenhi Essay]

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JSPS Grants-in-Aid: A Crucial Source for Continuing
My *Suiden* Sawah Research in Africa over 28 Years



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From 1986 to 1989, I was dispatched to International Institute of Tropical Agriculture (IITA) in Nigeria, as an expert from the Japan International Cooperation Agency (JICA). During that period, I studied African systems of rice farming and conducted water and soil surveys in major rice-growing areas of 15 countries stretching across central and western Africa from the Sahel zone to the mangrove forests along the coast of the Gulf of Guinea. The distances I traveled in 4WD vehicles would more than encircle the globe. In small inland valleys of the Niger river lowlands near the city of Bida in central Nigeria, I was involved in an on-farm pilot project including the development of irrigated sawah systems and sawah-based rice farming that local farmers would be able to develop and manage by their self-support efforts. I was convinced that sawah-based farming would realize Africa's rice potential and that the promotion of sawah-based paddy production would enable the continent to achieve its own Green Revolution.

However, my perspectives failed to gain acceptance among researchers in the West and in African countries that had no historical roots in sawah-based rice farming culture. Even in Japan, sawah-based rice farming has been criticized as a form of agricultural imperialism or as little more than an exercise in agricultural development and not a subject of serious research. Strategies for the promotion of rice agriculture in Africa have drifted without clear direction and been influenced by a variety of common misconceptions including those that emphasize upland rice production on the mistaken assumption that it is analogous to dry-land rice cultivation, confuse irrigated farming without sawah with irrigated sawah farming, confuse paddy and Sawah farming due to a lack of terminology for sawah concepts in the French and English languages, or overvalue and implement too early the popular biotechnology-based results of NERICA, a new upland rice variety for Africa .

The fundamental “technology” underpinning Asia’s Green Revolution was Norin 10, a semi-dwarf wheat variety developed in 1935 by Dr. Gonjiro Inazuka. Having obtained seed samples of Norin 10 from the US occupied forces in Japan, the American agricultural scientist Dr. Norman Borlaug facilitated its development as a high-yielding variety (HYV) and an “innovation” of the Green Revolution and CGIAR, a consultative group for international agricultural research. Borlaug later received the Nobel Peace Prize in 1970. Developed by the International Rice Research Institute (IRRI), IR8 was a “miracle rice” variety that successfully applied the same concepts of Norin 10 wheat breeding to rice. Seventy years later, in 2003, Nagoya University Professor Makoto Matsuoka identified the semi-dwarf gene *sd1*, thus establishing a “scientific basis” for HYV. This is especially interesting in terms of understanding the correlations between “innovation,” “scientific research,” and the “development of technology” in the agricultural field.

As noted above, I was convinced 28 years ago that, even more than crop-breeding by bio-technology, the core technology driving Africa’s Green Revolution would be eco-technology, or ecological engineering, to develop improved rice growing ecosystems, including sawah infrastructure (the sawah hypothesis). This is a science that studies past experience and knowledge to develop new ideas and innovations. To verify that premise, in 1989 I applied for a position as a researcher with the Africa Rice Center (AfricaRice, based in Côte d'Ivoire, one of the CGIAR centers). My final interview examination was held in New Delhi in June 1990. During the interviews with Director General, E. Terry and Deputy DG, P. Matlon, discussion focused on the subjects of upland rice breeding strategies and lowland sawah-based rice farming strategies. However, as a CGIAR institution that had already decided to pursue upland rice research as one of its main strategies for the ensuing decade, AfricaRice did not accept any of my proposals. Among its accomplishments, in 1994 AfricaRice succeeded in developing the NERICA, an interspecific hybridization progeny through the interbreeding of selected Asian and African rice varieties. Following the Third Tokyo International Conference on African Development in 2003, the Japanese government intensified its efforts to support the spread of NERICA rice. However, the strategy for upland NERICA rice dissemination is now at a standstill.

Having been turned down by AfricaRice, I decided to pursue the verification of my sawah hypothesis at Shimane University. At that point, I needed to obtain a JSPS assisted Grant-in-Aid for overseas scientific research (Kakenhi), a source of funding

that endorses research based on individual free ideas. Although applications I submitted for that purpose over a three-year span (from 1989 to 1991) were not accepted, applications I submitted for a two-year plan in 1992-1993 were approved for the first time. My failure to win acceptance of any of my applications over the first three years gave me an impression that JSPS grants are not easy to obtain and taught me the importance of how application documents are prepared. To improve the odds that at least one of my applications would be accepted, each year I upgraded my research prospectuses for three or four projects. Additionally, to ensure that they would end up in the hands of a suitable referee, I continued to submit applications for project funding in a diversity of relevant fields. Thanks to the lessons of my earlier application failures, from 1992 to the present (2013), I have been able to pursue funded research on a sustained basis. My research is in a field that cannot be fully handled by Japanese scholars alone. For that reason, to date I have utilized the resources of JSPS grant funding, Kakenhi, and foreign exchange programs of both MEXT and JICA to train over 20 African researchers at the doctoral level. Although I initially focused on training Japanese researchers, from 2002 onward Ghanaian and Nigerian researchers have formed my core teams for research on sawah-based rice farming in Africa.

In addition to my own specializations in soil science and plant nutrition of agricultural chemistry, sawah-based rice farming also involves the fields of agronomy, forestry, agricultural engineering, and agricultural economics. For that reason, I decided to apply for JSPS's project funding, Kakenhi, in a broad range of designated areas, including environmental science (a discipline of environmental technology and materials), area studies, and interdisciplinary agriculture. The approval of a project for Grants-in-Aid for Basic Scientific Research (S) in FY2003 came after two previous rejections. In 2005, I began applying for Grants-in-Aid for Specially Promoted Research. In the first year of that effort, I submitted an application for the science and engineering category because it was on a theme closely related to the field of ecological engineering. However, that application was rejected on the grounds that agriculture is a field in the biological sciences category. In FY2006, I submitted an application for project funding in the biological sciences but this, too, was rejected on the grounds that African development had to do with the humanities and social sciences category. In FY2007, I applied again—this time for project funding with a focus in the humanities and social sciences—and finally won approval. During my application interview on that occasion, I was asked why I had applied for project funding in the humanities and social sciences. I replied that I had merely applied successively for funding in all of the three categories

covered by JSPS Kakenhi and had finally arrived at the humanities and social sciences category. Upon hearing my explanation, all of the application referees burst out laughing. That said, I am very grateful for the broad perspectives that application referees in the humanities and social sciences share.

This project in Specially Promoted Research led to the development of sawah eco-technology. This technology is a kind of On-Ko-Chi-Shin, a Chinese idiom, which means to develop new ideas and innovative technologies based on the study of past experience and knowledge. One feature of this technology is that it facilitates in low cost site specific irrigated sawah development and sawah based rice farming by local African farmers' self-support efforts in diverse lowland ecosystems in Africa. Furthermore, through this approach, irrigated sawah development is (should be) possible on an accelerated basis because the on-the-job training is conducted in parallel with funds that amount to only 5-10 percent of the scale of funding typically associated with conventional ODA-based approaches. Asian countries established their own foundations for sawah-based rice culture over a historical period extending back a 1,000 years. Although that also became a foundation or platform for applications of agricultural science and technology, the widespread societal acceptance and implementation of sawah technology can be expected to lead to innovations that result in the development of sub-Saharan-wide irrigated sawah infrastructure on a scale approaching some 20 million hectares within the next few decades.

I have spent 28 years engaged in the development of sawah technology, which is also a strategic tool aimed at confirming my sawah hypothesis. The true test will demand that sawah technology be implemented on a society-wide scale throughout the sub-Saharan region. JSPS grants-in-aid, Kakenhi, and efforts to foster wider societal acceptance will prove crucial in that undertaking. It is conjectured that the history of the slave trade and colonial rules of the West extending back some 500 years might be major factors that explain why Africa is the only continent that has lagged in the formation of sawah-like farm infrastructure and accordingly in its development of national land infrastructure and the adoption of scientific technologies of Green Revolution. At any rate, albeit a half-century behind tropical Asia, Africa has at last begun to make rapid progress from the budding stages of its own Green Revolution.