IITA
Research to Nourish Africa

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Japan and IITA: Partnership to improve livelihoods and incomes in Africa

Japan is among the donors supporting efforts to improve agricultural research in Africa. Using scientific innovations, Japan has over the years joined forces with the International Institute of Tropical Agriculture (IITA) towards improving agricultural productivity, boosting farmers' incomes, and ultimately improving livelihoods.

These efforts are rewarding farmers especially in sub-Saharan Africa, where food accessibility, quality, and affordability have become a major concern. For IITA, funds from Japan are contributing in taking research to new frontiers. For instance, new technologies and varieties are being developed for traditional crops such as cowpea and yam.

Japan's contribution to agricultural research and development is not only limited to funds but also includes personnel. Several Japanese researchers working for IITA have made remarkable breakthroughs in research and development that are benefiting Africa. The collaboration with IITA has been a win-win situation, with a spin-off effect on the larger community. The exchange of students between Japanese institutions and IITA has continued to build capacities on both sides. Consequently, IITA has become the first port of call for several Japanese scientists with interest in agricultural research and development in the continent.

The relationship between IITA and Japan is a thing of pride to both sides. Japanese Ambassadors to Nigeria and Burkina Faso commend this relationship, noting that years of collaboration have brought benefits to Africa.

Breakthrough in propagating yam

One area of success in the partnership between Japan and IITA is in the area of yam research. Indigenous to Africa, yam is part of the culture in several countries on the continent. The tuber crop, however, faces many production constraints including poor funding for research, pests and diseases, and high cost of production. Traditionally, yam is propagated through seed yam. The cost of seed yam alone accounts for about 60 percent of the total production cost. This high cost makes research on yam very expensive. In 2009, a Japanese researcher working for IITA, Dr Hidehiko Kikuno made a breakthrough by propagating yam through vine cuttings. Today, researchers can easily multiply yam seeds using this technology for their research. Besides, the multiplication of yams using the vines offers clean yam seeds that are healthy for research.

Support to IITA-Abuja station

IITA has a research station in Abuja—Nigeria's capital city. The research station backstops research activities in the Guinea Savannah. Under the Grant for Grassroots Project, Japan provided facilities such as a cassava processing center and a screen house. The cassava processing center is now a center for training of thousands of farmers within the Abuja environs. The station also provides capacity building for students in that region.

New frontiers

Building on the successes earlier recorded, JIRCAS, together with several Japanese research institutions, initiated a collaborative research project called "Evaluation and Utilization of Diverse Genetic Materials in Tropical Field Crops (EDITS)." The project aims to efficiently evaluate and utilize the genetic resources of West African traditional crops for effective breeding. The project, which began in 2011, focuses on yam and cowpea—both African traditional crops—and is being implemented in collaboration with IITA. EDITS-Yam is designed to strengthen genotyping by using molecular tools and phenotyping protocols to facilitate genetic improvement of yam. On the other hand, EDITS-cowpea is designed to identify breeding targets, efficient evaluation techniques and genetic materials for value addition of cowpea grain. The outputs from these collaborative efforts are expected to contribute to IITA's breeding programs.

JIRCAS is playing a key role by linking the Japanese scientific capacities to African communities, with IITA being the entry point for many overseas research institutions wanting to work on certain constraints in Africa. The knowledge and techniques gained from these collaborative research would boost the development of improved yam and cowpea varieties that can help promote rural livelihood improvement.

Dr Muranaka and Dr Kano from JIRCAS express appreciation to farmers in Nigeria.

Success story: Release of cowpea varieties in Burkina

Early this year, Burkina Faso released two improved cowpea varieties to help advance better nutrition for women and children, and boost the incomes of farmers.

The two varieties, IT99K-573-2-1 and IT98K-205-8, were developed by IITA with funds from the Japanese Ministry of Agriculture, Forestry and Fisheries (MAFF). Local farmers and researchers selected the varieties from a basket of options after a two-year trial.

The varieties being selected are early maturing and high yielding and are also resistant to *Striga*—a parasitic weed that limits the yield of cowpea. They also mature in about 60 days compared with local varieties that mature in about 80-90 days.

Farmers love the varieties for their yield, color, and cooking qualities and have given the varieties the following local names: *Yiis yande* for IT99K-573-2-1, meaning a crop that helps farmers to escape from shame arising from hunger; and *Niizwe* for IT98K-205-8, meaning a crop that has brought an end to hunger.

Burkina Faso's Research, Science & Innovation Minister, Gnissa Isaïe Konaté, who is also a researcher, said that the physical qualities of the varieties such as color and bigger size were appealing and would make farmers more competitive in the region. "Also, these varieties will help farmers to adapt better with climate change," he added.

With protein content of about 20 percent, these varieties provide a good option to tackle malnutrition in local communities.

Looking ahead

In spite of the milestones recorded so far, there is still a need to upscale and to amplify the benefits of IITA and Japan collaboration. This will require more or additional and financial resources. In the words of the Japanese Ambassador to Burkina Faso, His Excellency Tsutomu Sugiura, "This is the kind of project that should be supported to continue. I hope it will not stop at this stage."

Japanese scientists in IITA: Satoru Muranaka (JIRCAS), Haruki Ishikawa (IITA), Yukiko Kashihara (IITA), and Ryo Matsumoto (TUA)

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Workshop on IITA-Japan Collaboration on R4D for Africa held in JIRCAS, Tsukuba

A one-day workshop on the IITA-Japan Collaboration on Research for Development for Africa: Current Perspectives and Beyond was held 14 February at the JIRCAS International Conference Room, Tsukuba, Japan.

The workshop consisted of presentations on various areas of research, capacity building, and development assistance. More than 50 participants attended the meeting, including scientists from IITA (7), INERA (1), national institutes including JIRCAS, Japanese universities, graduate and post graduate (MSc and PhD) students, staff of NGOs, and officers from various Ministries.

The IITA contingent was led by DG Nteranya Sanginga, who presented a keynote talk on "Refreshed Strategy and Perspective: IITA's Research for Sustainable Development in sub-Saharan Africa." IITA scientists included Drs Antonio Lopez-Montes, Michael Abberton, Ranjana Bhattacharjee, Ousmane Boukar, Tahirou Abdoulaye, and Haruki Ishikawa. Visiting scientist Satoru Muranaka and Postdoctoral Fellow Ryo Matsumoto were also in attendance.

The workshop emphasized yam and cowpea, and reported on ongoing joint activities of JIRCAS, MAFF (as special project form), and TUA with IITA on these two crops.

Also discussed were prospective joint activities with IITA including "how to link Japanese scientific capacities to African agriculture issues, "roles of JIRCAS and IITA," and "how to transfer technologies to the development sector."

The Japan International Cooperation Agency (JICA) was invited from the development sector. Dr Shuichi Asanuma, a former IITA scientist, who is working with ICCAE (International Cooperation Center for Agricultural Education) of Nagoya University, and JISNAS (Japan Intellectual Support Network in Agricultural Sciences) represented capacity building in agricultural science.

JIRCAS invited IITA and other Japanese scientists for a 1-day meeting.

Dr Iwanaga, JIRCAS.

Dr Sanginga, IITA

Some comments

...The level of interaction between Japanese science capacities and IITA has declined for multiple reasons, including lower funding level due to the financial situation, security issues in Africa...

IITA has two major thrusts. One is commodity based research for regional crops. Another is on ecosystem research. IITA has the challenge to show its impact in these areas.

It would be good to look at the importance of market-oriented research focusing on value addition, postharvest technologies, and so on—for which Japan has a comparative advantage. These are good areas where we can strengthen our collaboration.

It is very clear that IITA- JIRCAS or Africa-Japan have a lot of opportunities to work together in many areas beyond rice. It will be a good opportunity to move one step further to enhance collaboration.... - *Dr M. Iwanaga, President, JIRCAS, Japan*

The workshop discussed a lot of impact-oriented research activities with various research programs.

- Dr O. Koyama, JIRCAS

It was useful to understand the research and achievements of the AVEC-BF project funded by MAFF.

The cowpea project showed enormous successes through various activities and by working closely with farmers. Congratulations on the success of the project. - *Dr Y. Hosen, Officer, Ministry of Agriculture, Forestry and Fisheries, Japan*

Cowpea development seems to be moving successfully with various achievements and through cooperation.

Yam is still on its way. Through the discussion, we got many ideas that we could explore, including medicinal uses or starch. - *Dr N. Sanginga, IITA*

Science has no boundaries: IITA and Japanese scientists come together in a workshop to discuss ongoing and future collaboration.

Appropriate **V**ariety of **E**arly-maturing **C**owpea for **B**urkina **F**aso (AVEC-BF)

The AVEC-BF project was designed to establish village-based dissemination system of improved cowpea varieties. The project is funded by the Ministry of Agriculture, Forestry and Fisheries (MAFF) of Japan.

This project also aims at the rapid dissemination of suitable cowpea in the target region via capturing requirements of farmers using farmer participatory selection scheme and introducing improved management practices packaged with improved varieties. The project also supports IITA's cowpea breeding program that aims to develop new and appropriate lines for various African countries. Early maturing cowpea lines developed by IITA can mature within 60-70 days and escape serious drought stress at late growing season.

Dr Haruki Ishikawa explains the characteristics of new cowpea varieties to farmers.

The introduction of appropriate early maturing varieties will provide farmers with new ways of tackling these difficult situations during the lean periods, stabilize cowpea production, and provide cash income for farmers.

The farmer participatory varietal selection (FPVS) activities were conducted in 2012 with 910 participants in target villages of Burkina Faso. From the FPVS, 3-4 major varieties, such as KVx442-3-25, KVx775-33-2, IT99K-573-2-1 and IT98K-205-8, were selected for release. In 2013, these genotypes were formally released as varieties by the Burkina Faso government. In addition, 17 seed producer groups were trained on improved cowpea production under the project, and 28 tons of certified seeds were produced. At the same time, the supply of seed by community seed producers and the improvement of farmers' knowledge were enhanced through farmer field school. These activities, along with the FPVS, enabled a total of 2,949 farmers to test the recommended variety.

These activities have generated important findings and insights that will contribute to future food security in Burkina Faso and other African countries.

Collaborating on improving yam productivity

IITA and Tokyo University of Agriculture (TUA) have been collaborating on research to improve yam productivity since 2006; the MOU ended in 2011. To conduct joint research, six MSc students (2006-2011) and one postdoctoral fellow (April 2011 to March 2013) were sent to IITA from TUA.

Postdoctoral fellow Ryo Matsumoto (in blue shirt) with IITA staff, Ibadan.

Yam is propagated vegetatively in West Africa using small whole tubers or pieces (>200 g) cut from a large tuber. The sett multiplication ratio for yam is low compared to other root and tuber crops and the cost of planting materials is over 33% of the total outlay for yam production. The breeding process of yam is also very long, taking about 8 to 10 years, because of the very low multiplication rate of propagates and the existence of a juvenile phase during the seminal generation. For these reasons, there is a need to improve the multiplication of yams.

One of the purposes of this collaborative research is to establish the vine cutting technique for mass propagation for seed tuber or foundation seed for yam farmers and researchers. Vine cuttings can be used to produce mini tubers that could be used in germplasm exchange and for production of seed tubers. Previous collaboration studies have shown the appropriate collecting time and vine region. Moreover, a clean seed tuber production system combined with vine cuttings and tissue culture technique has been established and proposed as a result of this collaboration. A project titled "Comparative assessment of seed yam production techniques" that

Vine cuttings and mini-tubers.

evaluates the productivity and growth efficiency of cutting propagation is ongoing and is supported by the Japan Society for the Promotion of Science (JSPS). Dissemination of the vine cutting propagation technique through workshops and training programs for farmers and national research institutes is being planned.

EDITS projects: Collaborative Research Towards Improvement of Traditional Food Crops in West

The importance of traditional food crops was emphasized by the recent recognition that agricultural diversification and innovation should be defined and suited for each location to increase productivity and profitability, achieve sustainable food security, and overcome poverty and malnutrition. However, these traditional crops are often under-researched despite their potential to alleviate widespread poverty and hunger.

Although yam is widely cultivated throughout the humid and subhumid tropics in Africa, Caribbean, and the South Pacific Islands, 93% of the global production is estimated to be produced in West Africa. Yam plays important roles in regional food security and income generation as a traditional staple crop. Meanwhile, cowpea plays an important role as a cash crop for small-scale farmers in the drier regions of West Africa, who have limited options for income generation. It also serves as a readily available and cheap protein source for the poor.

Cowpea trader inspecting his product.

JIRCAS, together with several Japanese research institutions, has initiated a collaborative research project in 2011 with IITA called Evaluation and Utilization of Diverse Genetic Materials in Tropical Field Crops (EDITS). The project aims at efficient evaluation and utilization of the genetic resources of West African traditional crops for effective breeding. EDITS-Yam is designed to strengthen genotyping by using molecular tools and phenotyping protocols to facilitate genetic improvement of yam. EDITS-cowpea is designed to identify breeding targets, efficient evaluation techniques, and genetic materials for value addition of cowpea grain. The outputs of these collaborative efforts are expected to contribute to enhancing IITA's breeding programs.

JIRCAS is playing a key role to link the Japanese scientific capacities to African communities, and IITA is the entry point for many overseas research institutions to tackle certain constraints on the ground in Africa. The knowledge and techniques gained from the IITA-Japan collaborative research would boost the development of improved yam and cowpea varieties that can help promote rural livelihood improvement through enhanced productivity and income generation.

West Africa accounts for 93% of global yam production.

Expectations from new IITA leader, Dr Sanginga Nteranya, on capacity building of African and Japanese researchers

More Japanese researchers are expected to contribute to solve global issues such as poverty reduction through agriculture and rural development, coping with climate change, environmental issues including biodiversity, and other important concerns. To realize that, Japanese students and young researchers need to be educated and trained to build their capacity, although they need to make every effort by themselves.

There are several ways to promote such education and training. The following seem important: (1) exposing them to the problems facing agriculture and rural farming, (2) convincing them that they could contribute well to solve these problems through agricultural research, and (3) training them in the international community of agricultural researchers and/or international agricultural research collaboration.

I am sharing with some recognized educators and researchers of Japan a strong expectation to establish a platform tentatively called Japan/Africa Agricultural Research and Education Base in Africa, where we can teach and conduct research both with Japanese and African students and train these young researchers so that they could develop their capacity to properly understand agricultural problems through field studies and discuss with each other on the field. Through such education and training courses, Africans would experience the Japanese way of conducting research based on field study, and the Japanese students are also given the opportunity to learn and interact with other cultures.

It was not a great surprise for me to hear that Dr Sanginga Nteranya is the new DG of IITA. He had shown his invaluable ability of leading an international agricultural research center while he was the Director of CIAT-TSBF, and I am convinced that he will be a good leader for IITA. He is a prominent soil microbiologist/agronomist who knows what is happening on the ground (literally and otherwise) and what the most urgent and important problems need to be tackled through research, based on lots of experiences in research on N-fixation and related soil fertility management in Africa. He joined IITA for the first time in the early 1980s as a postgraduate student when I was a postdoctoral fellow. Since then he had built himself up to become a prominent researcher and science manager throughout his career. Now he is helping young students and researchers to build up themselves. This provides plenty of opportunities for IITA and colleagues from Japan to work together in building up the capacities of young agricultural professionals.

Shuichi Asanuma
Professor, International Cooperation Center for Agricultural Education (ICCAE), Nagoya University and Secretariat of Japan Intellectual Support Network in Agricultural Sciences (JISNAS), and JISNAS