

**KENYA AGRICULTURAL RESEARCH INSTITUTE (KARI),
NJORO**

**REPORT GIVING AN ACCOUNT OF MY
STAY AT THE INSTITUTE OF PLANT
SCIENCE RESEARCH (IPSR), OKAYAMA
UNIVERSITY IN JAPAN**

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Background information of the Fellowship at IPSR

First and foremost, I would like to appreciate Prof Wataru Sakamoto for arranging for my trip and Prof Kazuhiro Sato for accepting to work with me in his laboratory and to the Japan Society for the Promotion of Science (JSPS) under the Asia-Africa Science Platform Program for providing the necessary financial support. Message of appreciation would not be complete without recognizing the most important role played by the administration/business office of the Institute of Plant Science and Resources (IPSR), Okayama University. They all made my stay at IPSR very pleasurable and enjoyable by availing the financial resources on time.

My visit to IPSR became necessary as part of new initiative between IPSR of Okayama University and the Kenya Agricultural Research Institute (KARI), Njoro Centre. Although the initiative is still at its formative stage, it has been very active in the last one year starting 2011 to date, during which, two KARI Scientists (Dr Peter Njau and Patrick Ooro) have so far visited IPSR and a visit to KARI, Njoro by a high profile of IPSR Staff lead by Prof Sakamoto in 2011. Basically the purpose of the short visits are meant to create an opportunity for KARI Scientists to get hands on experience on some of the cutting edge research activities running in the laboratories at IPSR. At the same time while KARI Scientists are at the institute they will be able to interact with the Professors and staff of the institute and perhaps come up with possible areas of future collaboration. In doing so they should take cognizance of the fact that IPSR has a comparative advantage over KARI in terms of facilities and activities in the development of technologies some of which may become source of solutions to some of the constraints to our farmers in Kenya. At the same time, KARI may boast of comparative advantage in the area of field evaluation opportunities and number of staff available to conduct phenotyping activities.

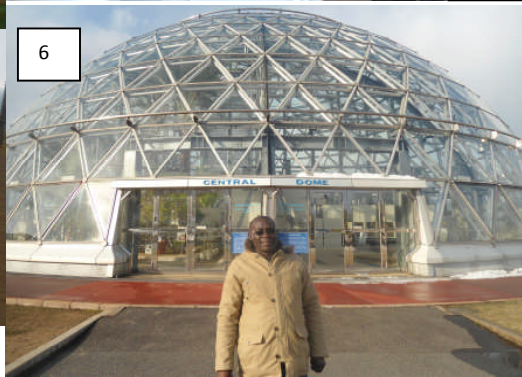
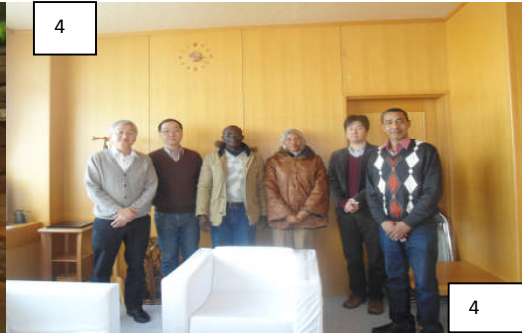
Participated in Social and welfare activities while at IPSR

The staff of IPSR through many social activities such as parties, site seeing tours and birthday celebrations made my stay at the institute enjoyable and very fulfilling. It is with great pleasure that I remember the many functions such as the welcoming and farewell parties and public holiday's celebrations. Of particular interests, was when Prof Sakamoto and staff organized the very first welcoming party¹ I had an opportunity to sample many Japanese fishes prepared in different styles eg predominantly by roasting whole fish and beef fillets etc.

One important thing I have noticed while at IPSR is about the togetherness. It did not matter which program you belong to when there are activities such as parties or any other. For example when the institute hosted a party for Dr Willis Owino² of Jomo Kenyatta University in Kenya we were all invited to celebrate with them and this is a very important lifestyle.



Many times Professor Sato made my stay very comfortable by exploring every single opportunity available to organize technical field trips but with a blend of site seeing. The most exciting of all was the visit we made to Tottori Prefecture between February 20th - 21st, 2013. During the tour we visited many sites of academic interest and also sites seeing venues. It was amazing experience when we visited the ⁴Arid Lands Research Centre (ALRC) of Tottori University. It was very challenging in terms of the quality of research⁶ activities undertaken at the institution. Not to say the least, Prof Sato together with our host Prof Hisashi Tsujimoto did not stop there, but



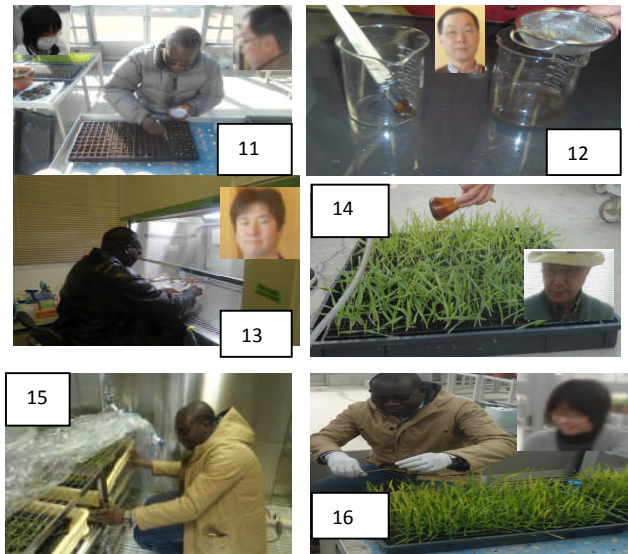
went further to take us for a conducted tour of sites of great touristic value such as sand dunes⁵ and hot springs⁷ and the most exciting being the Pear Museum³ among others. The visit presented me with the opportunity to observe snow in real perspective and damage that the sand dust blowing from China can do an environment if not carefully managed. It is important to note that with

appropriate technology there is no useless land. We witnessed that the seemingly sandy and completely sandy soils of Tottori is the best environment for the growing of certain type of onions in thousands of acres. All throughout the trip Prof Sato made sure were well fed with appetite arousing Japanese dishes⁶.

Participated in Research activities

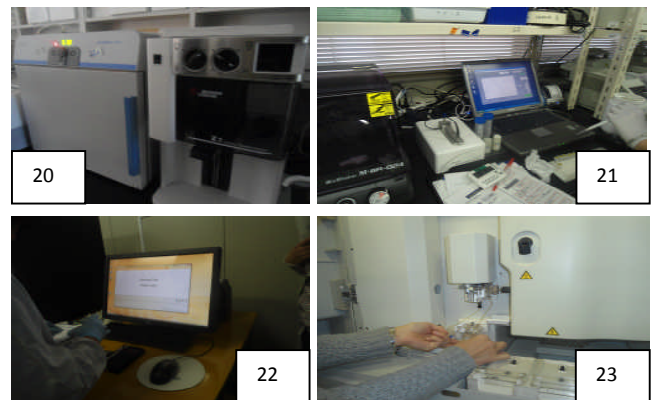
During my stay at the institute, I had an opportunity to work with the Group of Genome Diversity group headed by Professor Kazuhiro Sato^{11,12} and assisted by three competent Assistant Professors (Hiroshi HISANO¹³, DAISUKE Saisho and HIDEYA Yoshida) plus three other friendly and equally competent workers (MIKI Yamane, Yuka MOTOI¹⁷, YAMAJI Nami¹⁶ and MATOKO Ishii) who were always ready to assist me to learn almost everything they were doing. Through their able but collective efforts, I nearly got transformed into a biotechnologist/molecular biology expert. Some processes that I went through during the two months majorly involved an analysis of net blotch disease resistance on barley. My work in this area was preparation of an isolate for artificial inoculation on the double haploid mapping population derived from a cross between wild barley (H602) and a Japanese cultivar Haruna Nijo plus seven Kenyan barley cultivars. In addition I carried out a QTL analysis for the detection of genetic factor by interval and composite interval mapping approaches through which we managed to detect resistant QTLs.

in Barley group laboratories.



Most of the activities I participated in involved hands on experience such as planting the transplanting¹¹ of pre-germinated barley seedlings on plastic trays in readiness for inoculation and preparation of media^{12,13} for culturing the isolates. Once the seedlings had grown to appropriate stages we carried inoculation as shown in the picture¹⁴. Some of the seedlings would be harvested^{15,16} for DNA extraction for genotyping work. Many more activities were such processes like culture or media preparation² in the clean chamber for growing of disease isolates.

While in the barley genome diversity laboratories, I was exposed to the operations and usage of several equipments for the genotyping work. Some of the Equipments I worked with included: I had an access to modern equipment like the nano-drop spectrophotometer and the genetic analysis and I gathered new skills on several techniques used for genotyping. Among them, I have included a few such as media preparation, primers design, DNA extraction, PCR, electrophoresis, purification of PCR products, detecting of polymorphism, analyzing DNA sequences using windows based QTL cartographer. In addition I learned processes such as reading of DNA using methods such as GoldenGate



Genotyping in which HiScan (Illumina) and Agarose electrophoresis methods were used to detect genotypes. The techniques were used to generate some data which was used to run QTL analysis and results of which is presented in the next section of this report. Some of the equipments that I used included those shown on the photos listed [20:Incubator and Coulter Counter (Beckman), 21-Nano drop 22-HiSca (Illumina), 23-Capillary Sequencer 3130XL (Applied Biosystems)]. The experience gathered in the Group of Genome Diversity will be invaluable to my research work of trying phenotypically characterizing Kenyan wheat materials for drought tolerance.

CONCLUSION

Generally with the experience I acquired while at IPSR will help me perform my work better than before. I will also use the same skills to manage my work in Kenya in more organized way and be more focused with clear milestones easily achievable. More importantly I would wish to recommend that there is need for a stronger cooperation between IPSR and KARI-Njoro to strengthen the collaboration. This can only more be effective if there are structured arrangements that would define the specific milestones and long term goals to be achieved within a given period of time. This may be done by developing joint project proposals and using the IPSR strengths in the area of molecular work and Kenya's strength by having field capacities that may be used for phenotyping work.