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Rice cultivation in Gabon

I worked in Gabon for 4 months as a JICA expert to improve production of NERICA rice. Gabon is an equatorial country on the western Atlantic coast of Central Africa bordered to the north by Equatorial Guinea and Cameroon, and to the east and south by the Republic of Congo. Those who used to listen to Radio Japan on short wave radio would have heard of the Moyabi transmission station in Gabon and many people would also know that the Nobel Peace Laureate Dr Schweitzer opened a hospital in the dense tropical forest in Lambarene here. My first encounter with the country was in 2002 when we received a participant from Gabon for "Rice Research Techniques" course in JICA Tsukuba. The participant said that "We don't produce rice, however there is potential for future rice cultivation because we have annual precipitation exceeding 2,000 mm. Please support Gabon in developing rice cultivation techniques." This made an impression in my mind.

Giant antennas at the Moyabi Transmission Station

The land area of Gabon is 268,000 km², about the same size as Honshu Island, the main island of Japan, with a small population of 1.48 million and a very low population density. 80% of the country is forest and 85% of the population is concentrated in urban areas. It is rich in resources and the economy is dependent on the oil industry which accounts for 35% of the GDP. Agricultural production is extremely low and food supply is heavily dependent on imports. Much of the vegetable import is from neighboring Cameroon.

The staple foods of the Gabonese are bananas and cassava but rice is widely consumed in urban areas (37 kg/person/year). In the past, there were several development projects for rice irrigation scheme and around 1,000 ha were cultivated in total. However, rice production did not sustain itself and all rice is currently imported. In recent years, the Government of Gabon has started prioritizing diversification of industries and rural development, as well as introducing upland rice and development of rice irrigation scheme driven by the necessity for ensuring food security. The National Office for Rural Development (ONADER) where I worked had a three year project starting in 2009 to promote participatory variety selection (PVS) for upland and lowland NERICA varieties guided by the Africa Rice Centre. Although they have been accumulating experience in this for the last two years, there is still insufficient experience on the part of the ONADER staff and collaborating farmers. Therefore, this time, I conducted training on how to conduct varietal trials, targeting the ONADER staff.

Farmers in Gabon live in clearings they make in the tropical rain forest. Their main livelihoods consist of cassava and banana cultivation supplemented by hunting of wildlife such as porcupines for protein and fishing in the rivers. Livestock is scarce and only a few goats and chickens are seen in the villages. Cropping and livestock husbandry of cows and pigs is not common. According to the counterparts, "To plant cassava and banana, the only thing farmers have to do is to dig holes – they don't even have to touch the soil." It may be a little exaggerated, however it is true that we do not really see open cultivated fields which have been worked over multiple years. The PVS collaborating farmers cultivated upland rice in forest or grassland clearings. Fields in the forest receive insufficient sun light and many suffered from bird and wild animals. Because of little experience in cultivating annual crops, farmers had no clear idea regarding cultivation periods based on rainy seasons.

Upland rice fields in the forest

A number of challenges were expected in our effort to extend upland rice cultivation among the farmers in Gabon. However, through training and discussions with farmers, we found out that there were many farmers with a high level of interest in rice cultivation as well as unique techniques and innovations. For instance, some farmers were practicing traditional techniques to prevent chickens eating seeds and seedlings by placing coconut leaves in rice plots. Some were using innovative materials for fencing to keep animals out of the plots. There was a farmer who polished rice using a pestle and mortar despite the fact that it was the first time for him to grow rice.

The government has been promoting rice cultivation through infrastructure placement, developing 3,500 ha rice irrigation scheme with support from the Africa Development Bank. It has also ordered ONADER to plant 5 ha of upland rice in every province, following the example of the former vice president's large scale mechanized upland rice cultivation project in his homeland after his retirement. However, it is also important to incorporate an approach to work with small scale farmers who have unique techniques and solve fundamental issues related to cultivation techniques.

The Japanese Embassy and JICA Gabon Office have been supporting development of rice production since the NERICA varieties were introduced, and the Government of Gabon is hoping to receive substantial and continuous support. The JICA ex-participant mentioned earlier has recently started working as an adviser to the Director General of ONADER, after obtaining a PhD in Agriculture from a Japanese university. This creates an ideal ground for Japan's further support for improving rice cultivation techniques in Gabon.

(By Kojima, August 2011)

From assistance to business-from support to collaboration <Part 2>

Environmental Issues in the Gulf Oil Producing States

In the last few years, we have been thinking what kinds of projects we can start which only AAI can do. Since its establishment, AAI has been consistently working for agricultural development in arid regions. We would like to start something effective and useful using our experiences and contacts. In order to explore future possibilities, we visited the UAE, with which we have a long-standing relationship, holding discussions with old friends and feeling the local air.

UAE recently changed the name of the Ministry of Agriculture and Fisheries to the Ministry of Environment and Water. This indicates that the country is placing increasing importance on environmental protection and sustainable development of resources over agricultural production. In particular, the water resource crisis is keenly felt, given the lowering of the ground water table and the increase in salinity which is happening around the country. Farms of the Mirak Company with large scale horticulture farms desalinize ground water reducing salt concentrations of 5,000 ppm to 100 ppm for use in irrigation and air conditioning of green houses. For this, people seem to be very much interested in horticulture (hydroponics), and wherever we visited discussions turned to hydroponics. Despite the serious situation of the country's water resource base and the level of high interest in hydroponics, the research institutes we visited did not conduct any experiments on hydroponics. This is because there is a lack of expertise in this field. On the other hand, AAI has a good amount of experience and knowledge of this subject, with staff who provide technical training at JICA Tsukuba on vegetable cultivation, who have studied horticulture for university degrees, and who supported horticulture in UAE in the 1980s. At an agricultural experiment station we visited, staff were extremely interested in our discussion on Japan's horticulture, and requested us to make a presentation to the relevant staff in the central government. Regrettably, we could not do much this time, but we felt AAI could make meaningful contributions in developing horticulture in UAE. In Japan, research in horticulture is being conducted for product quality enhancement and energy saving. However, there are many techniques that could be applied in the UAE, including environmental control, and irrigation water and fertilizer management. It may be possible to develop a business to foster cultivation systems that are suitable for the country and their wide extension, in collaboration with the experiment stations we visited this time and university experimental farms and companies that are interested in coming into the agricultural field.

In Dubai, excessive water front development has been promoted to the extent that it totally changes the natural geographical features of the coastal area. Oceanic pollution is becoming a serious issue and red tides have become frequent in recent years. At the fisheries experiment station established with support from JICA in the 1980s, active research work was conducted to find out reasons for red tide outbreaks and on coral multiplication and replanting technology, in addition to the traditional research areas dealing with development and extension of aquaculture techniques. In addition, at this research station, experiments are conducted on mangrove planting. There are impressive mangrove forests around the drainage channels, which were planted 30 years ago, and which sustain abundant fish populations. Seedlings are also produced continuously and are distributed to reforestation sites around the country every year. When we visited this experiment station, an environmental education program was being conducted targeting primary school students. In the UAE which is undergoing an unprecedented rate of development, it is extremely important to continue to pursue environmental education activities targeting young people who will be the next generation. AAI has experience in mangrove regeneration and conservation in Oman. The primary school students who participated in the reforestation activities said "trees have been growing lately and there are more birds and fishes." This kind of experience itself is environmental education. Moreover, AAI has also developed training programs identifying training needs in many developing countries. By utilizing these experiences, it may be possible to develop environmental education program which are rooted in the needs from the field, in collaboration with the UAE government or by establishing an NGO.

In this way, the business AAI seeks is not profit making. Our work is founded on the idea that we would contribute to solving problems in different parts of the world through the provision of long-term support. Would it be possible to make use of our past experience in developing organizations and activities to tackle environmental issues that emerge from the distortion in society and environment which fast and large scale development creates? This visit is the first step towards the effort and we hope to connect it to the next step.

Mangroves planted 30 years ago

Environmental education program at the experimentation station

Agriculture and farmers in Kurdish region <Part 2>

Kurdish grains

The main grain production in the Kurdish region consists of wheat and barley. Wheat is the most important grain and is the staple food of Iraqis. In restaurants, a large amount of Iraqi flat bread (naan) is served – so much in fact that it is impossible to finish. On the other hand, barley is mainly used as livestock feed. In this part, we would like to introduce what we learned in Erbil related to wheat cultivation.

Wheat production in the Kurdish region is mainly rain-fed, making use of the region's relatively abundant rainfall. However, rain dependent cultivation is heavily influenced by rainfall (quantity and patterns). As a result, both cultivation area and yields have a large annual variation. The 20-year data accumulated since 1980 shows variations between 200,000 and 600,000 ha for cultivation area and between 400 and 1,300 kg/ha for production. The actual total yield ranged from 120,000 to 650,000 tons.

In the Kurdish region, wheat is planted in winter. When we visited farmers in May, it was about 2 weeks before the harvest. The main farm work of wheat cultivation consists of plowing, seeding and harvesting. Although sometimes herbicide is applied after plowing and seeding, basically there is not too much to do until harvest. Generally, plowing and harvesting are done using machinery. The use of tractors is also becoming common. Many farmers rent a tractor and combine harvester to deal with plowing and harvesting, while smallholders sow seeds manually. Seed production is often done by farmers themselves collecting their own seed, although the Kurdistan Regional Government distributes seeds upon occasion.

Fields of different varieties of wheat

As mentioned earlier, cultivation is heavily dependent on rainfall. Perhaps because there is no guarantee for harvesting, fertilizer use is generally low. The main fertilizer used is urea and DAP (Diammonium phosphate) and we heard that the average use is around 120 kg/ha. The amount also differs depending on the disposable income of the farmers. In the farmland in alluvial lands near rivers with stable water sources and irrigated areas, it is possible to have stable harvest and tasks such as fertilizer application and weeding are done more meticulously. While rain-fed cultivation can produce around 1 t/ha, in irrigated areas, this can be increased to more than 2-3 t/ha.

Given this, with the Kurdistan Regional Government support, irrigation facilities such as centre pivots have been introduced in recent years. The innovative farmer whom we visited was a full time farmer cultivating wheat in winter and maize in summer, and he was using 6 centre pivots in the 170 ha farmland, which he purchased himself. He seemed to be one of the largest wheat farmers in the Kurdish region. We were told that by introducing the irrigation facility, the yields increased by approximately five times. One aspect which worried us a little bit was related to water management. Determination of water amount for irrigation and irrigation intervals was done only based on the land owner's empirical knowledge. While it is praiseworthy, technical training on water management would still be beneficial for ensuring water saving and economic efficiency of operation.

We heard that the biggest challenge facing wheat cultivation these days is rust disease. Once rust breaks out, there is a major impact on yields. The Kurdistan Regional Government is making efforts to counter rust, testing rust-resistant varieties from abroad for introduction.

Incidentally, farmers ship wheat to 2 silos in Erbil to distribute the produce around the country. The price for wheat is fixed every year at an officially determined rate throughout Iraq. Wheat is categorized into different classes depending on the quality, degree of dryness and amount of impurity.

Silo in Erbil

A large amount of Iraqi government subsidy is invested in wheat production, supporting farmers to increase their yields. The Iraqi government also guarantees the purchase and price, providing stable income for farmers. In addition, the Iraqi government distributes free wheat to its nationals. In the long run, people may fear that this might establish the farmers' dependency on subsidies. Nonetheless, Iraq is putting a lot of effort into increasing wheat production and the Kurdish region with rain-fed cultivation possibility is seen as an important wheat production base.

Mini series

Facts about dry land vegetation <Part 2>

As the 2nd part in the series, we would like to introduce some parasitic plants unique to the area. *Cynomorium coccineum* (Cynomoriaceae family) and *Cistanche tubulosa* (Orobanchaceae family) are some of the parasitic plants occasionally seen on dunes in the Arabian Peninsula. These suddenly emerge on shifting dunes or salt accumulated areas and often surprise people. *Cynomorium coccineum* is called "tarthooth" locally and is translated as "red thumb" in some English language literature. As can be seen in the photos, the way they stick up their dark red heads is slightly eerie. This plant species is distributed from the Mediterranean, North Africa, Arabian Peninsula and extends to West Asia, and generally the host plants are *Atriplex* spp. and other halophytes. There are records of red thumb being used for food and medicine for millennia.

On the other hand, *Cistanche tubulosa* is locally known as "thanoon". The English name is "desert hyacinth" and it bears beautiful hyacinth-like flowers. The host plants for desert hyacinth are also halophytes such as *Tamarix* spp. and *Salvadora persica*. They are very visible, often growing quite far from the hosts. Their seeds can stay dormant for many years until the roots of the host plants reach them. This plant also is recorded as having been used medicinally. It is interesting to note that "tarthooth" is good for constipation and "thanoon" is good for stopping diarrhea.

Cistanche tubulosa

Cynomorium coccineum

After more than 10 years since I first encountered these unique parasitic plants, I came across *Orobanche* spp. of the same Orobanchaceae family in a vegetable field in Syria along the Mediterranean coast. AAI worked on the technical cooperation project, Development of Efficiency Irrigation Techniques and Extension (DETEX) in Syria from 2005 to 2012. The project's target areas include southern Syria where vegetables such as tomato, cucumber and eggplant are widely grown. In this area, *Orobanche* spp. which is locally known as "harook" is seen as a weed troubling farmers in tomato and eggplant fields. Many farmers seem to believe that they can suppress *Orobanche* spp. by keeping the soil moist, and therefore they tend to use excessive water through irrigation. This is a headache for our project aiming to extend water saving irrigation in Syria where water resources are being depleted. In other words, while the project is advising the farmers to use adequate amounts of water depending on the needs of individual crops, farmers tend to use more irrigation water than necessary to suppress the weeds. This has been having a negative impact on the project achievements.

Orobanche spp.

Furthermore, recently, we have encountered very similar plants in Sudan where we started working on an agricultural development project. These are *Striga* spp., which is also a species of Orobanchaceae family. This plant parasitizes on grains such as sorghum and maize, and sometimes cause catastrophic damage for a whole farm. Its damage has been spreading in particular in Africa. Once *Striga* spp. damaged, grain fields turn into wild flower fields instantly. The plant is also called witchweed, as the quick transformation is as if a witch has cast a spell on the field.

Striga spp.