The *Rong Nam* farming system: Boating to manage vegetable agroecosystems year-round

In the lowland areas of south-central Thailand such as Pathumthani province, located around 100 km north of Bangkok, many smallholder farmers are growing vegetables year-round by adopting the *Rong Nam* farming system. With good access to water and markets, farmers in these peri-urban sites grow vegetables and supply Bangkok City with their produce throughout the year.

In Thai language, ‘Rong’ means canal and ‘Nam’ means water. Growing fruits and vegetables on raised fields (beds) surrounded by canals is popularly called the *Rong Nam* farming system. It is conceptually similar to ‘Chinampas’, a centuries-old farming practice by native Americans in Mexico in which crops are cultivated on floating islands in a lake system; and to the ‘Surjan system’ in lowland areas of Java, Indonesia wherein vegetables are grown on raised beds and rice is planted in furrows. These well-adapted local cropping systems evolved in response to adverse environmental constraints (abiotic stresses) to farming in lowland and swampy areas.

In the *Rong Nam* farming system, vegetables and fruits such as banana, orange and mango are grown on raised beds 1.5 to 2 m wide and separated by canals wide enough for a small boat to navigate. The crops planted on the raised beds are rotated seasonally to minimize the risk of damage from insect pests.
and diseases and restore soil fertility. Two hose-pipes and a pump-engine mounted on the boat are used for irrigation in which canal water is sprinkled on the plants. This farming system reduces risk of crop failure from flooding during the rainy season as well as provides secure water for irrigation during the dry season, and allows year-round diversified cropping from rice to vegetables, fruits and other high value crops.

Khot Cha San village in Pathumthani province started adopting the Rong Nam farming system about 50 years ago. The system was first introduced to the village by a Chinese ethnic community that migrated from Ratchaburi province, western Thailand. In Khot Cha San village and similar other peri-urban areas near Bangkok, farmers grow vegetables intensively and almost 100% of the produce is for market sale. Yard-long bean is a very popular vegetable in Khot Cha San village and other peri-urban areas of Bangkok, and is grown year-round.

Mrs. Nongyao, a farmer from Pathumthani province uses two hose-pipes and a pump-engine mounted on a small boat (left) to draw the water from the canal and sprinkle it on the plants (top); farm laborer harvests yard-long bean (right)
Under a vegetable-based Rong Nam farming system, as shown in photographs above, two rows of yard-long beans are grown at the center of the raised beds and are surround-
ed by sponge gourds planted along both sides of the beds. A trellis-support between two beds is set up over the canal to secure more spacing for fruiting, prevent the fruits from contacting the soil and canal water, and obtain good quality, well-shaped and straight fruits.

Mrs. Nongyao, a vegetable grower from Khot Cha San village has practiced the Rong Nam farming system on her 1.2 ha land and she harvests about 100 kg of yard-long bean almost every day. She also collects about 100 kg daily of sponge gourd over a 5-6 month period. She plants yard-long bean with 20 days difference across the rows and beds so that she can harvest yard-long bean continuously all year-round. The price of yard-long bean in November to December is very high but much lower in summer time. “After applying this system, I can grow vegetables all year-round and minimize the risk of excessive seasonal fluctuation of vegetable prices at local markets,” said Mrs. Nongyao.

Farmers reported that the Rong Nam farming system helps them to reduce the labor cost in growing vegetables, is convenient for them to irrigate and harvest the crops, and eases on-farm transportation of the produce. Farmers use the canal water to clean and wash away the dirt on vegetables immediately after harvesting. Farmers also raise fish in the canal to generate additional cash income. Furthermore, grass carp fish raised in these canals help control weeds surrounding the beds. In the dry season, farmers dig out the soil from the canal bottom and top up the raised bed to enhance the soil fertility for sustainable farming. The Rong Nam farming system has indeed evolved over time with good synergy in managing water, land, insect pests and other resources for growing vegetables and other high value crops in lowland and swampy areas of Thailand.

Source:
Madhusudan Bhattarai, Socioeconomics, AVRDC-The World Vegetable Center; Sopana Yule, AVRDC-The World Vegetable Center, East and Southeast Asia, Thailand
Photos:
Madhusudan Bhattarai, Socioeconomics, AVRDC-The World Vegetable Center

AVRDC-developed rootstocks for tomato and pepper production

Rootstocks for tomato grafting
‘Hawaii7996’ of tomato, and ‘EG203’ and ‘EG195’ of eggplant were selected as rootstocks for grafting tomato in 2003. Tomato scions grafted onto ‘Hawaii7996’ showed resistance to bacterial wilt under non-flooded conditions. These scions grafted onto both ‘EG203’ and ‘EG195’ rootstocks showed the resistance to flooding, bacterial wilt, fusarium wilt and nematodes.

Source:
Deng-lin Wu, Global Technology Dissemination, AVRDC-The World Vegetable Center

Rootstocks for pepper grafting
Three chili pepper lines-‘PI201232’, ‘PBC535’ and ‘PP0237-7502’-were selected as rootstocks for grafting sweet and chili peppers in 2009. Sweet and chili pepper scions grafted onto these three chili pepper rootstocks increased the resistance to Phytophthora blight, bacterial wilt, flooding and nematodes.

Source:
Deng-lin Wu, Global Technology Dissemination, AVRDC-The World Vegetable Center
Tomato grafting technology successfully adopted by farmers for off-season production in Tarlac, Philippines

Farmers in Tarlac province of the Philippines originally did not grow tomato during the rainy season. Through the introduction of tomato grafting technology developed by AVRDC-The World Vegetable Center, farmers learned that tomato grafted onto eggplant rootstock line ‘EG203’ showed flooding tolerance and considerable resistance to bacterial wilt during the rainy season. To promote this technology, eight training workshops on tomato grafting for off-season production and utilization were conducted by Tarlac College of Agriculture since 2002, and were attended by 106 agricultural technicians, extension workers and farmers. Among all the participants, 52% tried the technology while 46% pursued adoption of it. However, time and budgetary constraints in the procurement of costly structures and production inputs, limited and inaccessible supplies of grafted tomato seedlings, and other factors have hindered interested adopters to continue.

Nevertheless, three farmer-adopters claim an average return of investment (ROI) ranging from 80 to 130% was generated from a 200 m² tomato production area. Thus, they decided to expand their production areas and raise their own seedlings. Adopters claim that their income derived from off-season tomato production helps them finance the schooling for their children, purchase farm inputs, buy additional farm lots for expansion and avoid becoming victims of loan sharks. Off-season tomato production greatly contributes to the farmers’ socioeconomic well-being.

Similarly, farmer-adopters are empowered to maximize meager and locally-available resources. They become resourceful and establish more social capital that facilitates their production and marketing effort. Off-season tomato production requires huge labor inputs, which are mostly family and exchange laborers. This generates substantial employment to cater to seasonally unemployed rural farmers and turn their small and idle backyards into profitable home gardens.

Source and photos: Tessie Boncato and Rizalina Tablarin, Tarlac College of Agriculture, Philippines
AVRDC Headquarters responded to the seed relief request from World Vision Taiwan for Typhoon Morakot victims by donating about 130 kg of seeds. From Dec. 2009 to Mar. 2010, World Vision Taiwan distributed the seed packets to 32 vulnerable villages in Kaohsiung City and Pingtung, Taitung and Chia-yi Counties. The planting instructions were printed in Chinese on the backside of each packet for easy use. A total of 7,680 packets were distributed and 1,083 households benefited from this effort.

On 30 August 2010, AVRDC and World Vision staff visited three Typhoon Morakot-affected villages in Alishan township of Chia-yi County. During the visit, we found that World Vision Taiwan used two approaches for disseminating AVRDC seeds:

1. Seed packets were given to typhoon victims and all planting activities were left up to them to carry out on their own, using the planting instructions on the packet.

2. Seed packets were given to World Vision (WV) staff based in the typhoon-affected villages, and these staff facilitated planting activities on WV-managed farms in the villages. These staff invited farmers to participate in cultivating these vegetables on the WV farm, and all produce was given to villagers free of charge. Seeds were multiplied, saved and given to farmers in the village.
The first approach appears to have failed in most cases, and only created a small amount of impact where it succeeded. The second approach has already created significant impact and has good potential for sustaining the impact into the future. The village farmers’ interest in the WV farm appears to be growing over time.

In addition, we observed that even if a disaster victim is well-educated, this is no guarantee that s/he will read the vegetable planting instructions, even if the instructions are on the packet itself. One person we interviewed spoke English well and said she “learned it in school,” indicating a significant level of education. However, she did not read the planting instructions and instead just opened the seed packets and broadcasted the seed on the ground. The planting density was too high and no thinning was done. The vegetables were for her own family consumption, and therefore she did not want to spray them with chemical pesticide even though the pest damage was quite serious. She did not know how to make botanical pesticides either. The result was failure to produce any vegetable yield.

Based on the rural appraisal of the impacts from seed distribution, two recommendations can be made to improve future seed distribution efforts:

1. If the seed packets will be given directly to the victims, distribute them just before the optimal cropping season, together with AVRDC scientists’ instructions on planting, field management, composting and botanical pesticide preparation to enhance the survival rate and distribution impacts.

2. Impacts are likely to be greater if the seeds are distributed to the local farmers’ group or other organization that can facilitate planting. The group can sow the seeds and cultivate the vegetables together as a team, and the harvest can be shared with the disaster victims free of charge. This will help avoid planting failures by inexperienced people and ensure the victims who have no land for cultivation can also benefit from the harvest. Furthermore, the organization or group receiving the seeds can be responsible for seed multiplication. The multiplied seeds can be used for future planting and shared with local residents/farmers who have gained interest in joining vegetable planting efforts. This can create more sustainable impacts from seed distribution.
Home vegetable gardens for improved nutrition in Nauru

Nauru is the smallest island republic in the world with a land area of 21 km² inhabited by around 10,000 people. Its central plateau which is about 85% of the area is studded with coral pinnacles exposed by decades of extensive phosphate mining. It has a narrow coastal belt for residential and agricultural areas, with the latter being around 250 ha in size.

The Nauruan people, who used to consume fish, coconut and root crops are now hooked on canned foods and processed sugary products. Poor nutrition and sedentary lifestyles have made Nauru the world’s leading country in the percentage of overweight and obese people. About a third of its population has type 2 diabetes, a disease that is inflicting a heavy financial burden on the country.

The Taiwan Technical Mission (TTM) is working with the government to promote diverse vegetables to improve nutrition and health in Nauru. It has established a 3,500 m² demonstration farm that can grow vegetables year-round. Some of the harvested vegetables are included in the free breakfast program of the TTM, Ministry of Education, and Ministry of Health to kindergarten and elementary school children to develop healthy eating habits. Other harvests are channeled to the Kitchen for Diabetic Program and sold during TTM’s Saturday market.

Imported vegetables are expensive. Thus, TTM collaborates with the Agriculture division to promote home gardening. Seeds/seedlings and small amounts of fertilizers are provided to interested home gardeners. Training on integrated vegetable home gardening is generally provided to the community and to junior high school students in Nauru College. Cooking demonstrations are conducted for new vegetable crops.

Availability of fresh water is a major constraint in vegetable production. During the dry season, water supplies are

Phosphate mining strips away soils and vegetation, leaving behind an uncultivable landscape of pits and pinnacles

Plant residues are common materials used in preparing compost
inadequate for watering plants. Underground water is salty. With limited fresh water resources and porous soils, drought is a common constraint. Home gardeners collect and store rain water during the wet season. They are also encouraged to mulch the vegetables to conserve water and use organic matter to improve nutrient and water holding capacity of the soil.

*Nauruans grow vegetables not only in soil beds but also in various types of containers, such as planting sweet potato in plastic containers (left) or kangkong in used metal containers (right)*

Source and photos:
*Edwin Javier, Global Technology Dissemination, AVRDC-The World Vegetable Center*