Efforts prove that vegetables can be grown in challenging coral atoll environments

As the plane descends to Kiribati, the island of South Tarawa looks like paradise, with idyllic beaches and palm trees lining the lagoon. However, after landing, one realizes that eking out a living in this land is quite challenging. Soils are very poor, rat populations are high, pigsties lining the beach pollute the lagoon, fresh water supplies are dependent on unpredictable rainfall, and the island is overcrowded with people. The highest elevation is 5 meters above sea level, so salinity is an ever-present factor that farmers face. In addition, this coral atoll is less than 100m wide in many places, so finding a spot to farm that is protected from the ocean spray is difficult.

Most vegetables grow very poorly in this coral-based soil, high humidity, brackish water and salt spray. Fortunately, one variety of pumpkin flourishes even in unimproved soils. This pumpkin is frequently seen in home gardens and along roadsides. Sweet potato also grows relatively well without inputs, but most vegetable crops require soil amendments such as compost or pig manure to yield satisfactorily.

Despite these challenges, the Taiwan Technical Mission (TTM) in Kiribati has proven that a wide range of vegetable crops can be grown successfully. According to the TTM Team Leader, P.K. Tsai, the two crucial ingredients to growing vegetables in Tarawa are compost and fresh water. The TTM has taught farmers how to make compost, and while some make it themselves, others have trouble coming up with enough materials, so the TTM also distributes compost to needy farmers.
The TTM also works closely with farmers to help them establish a variety of vegetables in their home gardens. Chinese cabbage has been widely adopted by farmers in Tarawa in recent years and is now commonly seen in home gardens and menus. At TTM headquarters, leafy crucifers, radishes, tomatoes, cucumbers, peppers, sweet corn and other vegetables are all demonstrated to grow successfully in compost-amended local soil.

The Centre of Excellence for Atoll Agricultural Research and Development was established two years ago in South Tarawa, Kiribati, to serve the needs of coral atolls. The Centre is doing R&D work to improve soils and increase crop diversity, including encouraging the use of legumes such as Mucuna pruriens. This bean has revolutionized agriculture in some Pacific islands. The Centre’s efforts are coordinated by Siosiua Halavatau of the Secretariat of the Pacific Community and Tokintekai Bakineti of the Government of Kiribati.

With efforts such as these the future is brighter for the people of Kiribati to have enough locally produced vegetables to meet their needs.

The Centre of Excellence for Atoll Agricultural Research and Development is encouraging farmers to plant legumes like Mucuna to improve soil fertility.

Source and photos:
Greg Luther, Global Technology Dissemination, AVRDC - The World Vegetable Center

Diets are improving in Nauru, with vegetables becoming increasingly popular

The Pacific island nation of Nauru has the unfortunate distinction of having the highest prevalence of diabetes in the world, with 30.9% of the population suffering from the disease (IDF Diabetes Atlas, 2009).

According to Mason Dick of the Commerce Industries Resource, Nauru, the older generation of the population consumes very few vegetables and high amounts of sugar. For example, one Nauruan senior citizen drinks a full can of sweetened condensed milk for breakfast every morning.

For their income, the older generation relied heavily on the mining of extensive phosphate reserves on the island. These phosphate reserves are now depleted and the younger generation has to work harder to make a living.

The younger generation is consuming increasing amounts of vegetables, which should bode well for reducing the prevalence of diabetes and enhancing overall health. Cabbage, sweet potato leaves and pumpkin shoots are among the favorite vegetables of the younger generation, according to Dick.

Sweet potato leaves are highly nutritious; this vegetable grows reasonably well on coral atolls, like Nauru and Kiribati, despite very poor soils.

Source and photos:
Greg Luther, Global Technology Dissemination, AVRDC - The World Vegetable Center
Sunn hemp borders reduce whitefly-transmitted geminivirus losses in chili production in Central Java, Indonesia

The Magelang area in Central Java, is one of the best areas in Indonesia for chili, but it is being threatened by whitefly-transmitted geminivirus (WTG). The Australian Centre for International Agricultural Research (ACIAR) funded Chili-Integrated Disease Management (IDM) project has explored various barrier materials to exclude whiteflies and reduce WTG incidence, including netting, maize, and yard-long beans.

Barriers can delay the initial infection, seen as bright yellow chlorosis of young leaves, and allow the crop to become well-established and productive. Maize was a favored barrier, because it also produced an economic crop, but it required a wide barrier planting, and was only partially effective.

Sunn hemp, or ‘Orok-Orok’ (Crotalaria juncea) is currently performing well and has been well-received by local farmers. They were familiar with this plant, which was widely used as a green manure before crop intensification and external fertilizer inputs displaced it. It rapidly establishes a tall, dense stand, remains effective longer than maize, and occupies less ground.

Tested in five locations in Magelang district, yields from blocks protected by sunn hemp or maize barriers were 20-100% better than unprotected blocks (yields were up to 11 t/ha in protected blocks); sunn hemp was consistently better than maize.

Maize (above) barriers require wide planting to effectively reduce whitefly movement, while a single bed of sunn hemp (top) is just as effective.
The Chili-IDM project initially tested barriers using netting; these were soon imitated by local farmers using plastic mulch, plastic panels, and other available materials.

After attending a Farmer Field Meeting demonstrating the technology, one farmer was sufficiently impressed that he asked our cooperation in establishing a trial comparing net and sunn hemp barriers to conventional practice on his farm. This has attracted attention within his community, even from politicians. While the unprotected crop has been turned down and replaced by another crop, the barrier plantings continue to produce a profitable yield, and have been retained for at least one additional month.

Right: Indonesian project cooperators Asti Hidayat, Virologist, Bogor Agricultural University (left), and Sutoyo, pathologist, Central Java Assessment Institute for Agricultural Technology (next left), discuss geminivirus, whiteflies, and barriers with farmers at a demonstration planting near Magelang.

Source:
Anna Dibiyantoro, IDM project site coordinator; Paul Gniffke, Pepper Breeding, AVRDC - The World Vegetable Center; Joko Mariyono, Socioeconomic support specialist for IDM project

Photos:
Paul Gniffke and Anna Dibiyantoro
Low-cost solar pumps for vegetable irrigation in Sudano-Sahelian zone, West Africa

Water scarcity is increasing worldwide at an alarming rate, and it is more serious in dry regions of the tropics where basic water infrastructure is not yet developed. Water shortages and rising fuel prices have adversely affected smallholder farmers, especially in dry tropical areas.

The Sudano-Sahelian zone in West Africa is semi-arid with intense sunshine in the day and cool nights, and it is suitable for vegetable farming. Groundwater and river water are available in the region; however, difficulty accessing the water for irrigation is one of the limiting factors of smallholder farming. With increasing fuel prices, many rural development agencies, planners, and progressive farmers in the Sudano-Sahelian zone are now becoming interested in low-cost solar pumps for irrigation, especially for producing high value vegetables.

With grant support from the Ministry of Foreign Affairs, Taiwan, AVRDC-The World Vegetable Center and the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) have set up a low-cost solar pumping unit in a farmer’s field in Niger, with a total cost of US$3,750. The cost is 50% less than the solar pump unit available in the local market. The farmer is very happy because he can save on fuel costs and just pay negligible operation and maintenance costs for the solar pump. In addition, the solar pump operates quietly and it turns on automatically in the morning when the sun gets brighter. After learning about the benefits from the solar pumps, one of his neighbors has recently installed a solar pumping system. The initial installation cost is the main hurdle for wider-scale adoption. Nevertheless, farmers can form a group to share the cost and install the low-cost pumping system, and share the water as well. The local farm community is now getting excited about this low-cost solar pumping system.
The low-cost solar pumping unit can successfully pump about 23 and 30 cubic meters of water per day from 7 m and 5 m depth, respectively. This amount of water is sufficient for intensively irrigating 0.25-0.4 ha of vegetable farmland in Niger's agroecological conditions.

ICRISAT, Niamey has included the solar pumps in a new project that aims to develop vegetable production in the region. Compared to the fuel-operated pump, the solar pump is more user-friendly, requires minimal operational and maintenance costs, and has much more durable performance.

However, due to the fluctuation of sunshine in the Sudano-Sahelian zone, the solar pumping is irregular. Lennart Woltering, Associate Scientist from ICRISAT, Niamey says that the best way to use the solar pump is to pump the water to fill the reservoir so that farmers can use the water whenever they need, even at night or during cloudy days. He also says that the low-cost solar pumping system is compact and can serve as a mobile solar panel; it can be placed on a pickup truck to move around the field to avoid theft and related social problems.

"Although average farmers can pay back the installation cost of solar panels in a couple of years from the income generated from vegetable sales, making the solar pumps, panels, and other accessories locally available in Sudano-Sahelian zone is the major bottleneck for wider adoption of low-cost solar pumps now," said Sanjeet Kumar, AVRDC vegetable breeder for the Sudano-Sahelian zone.

Dov Pasternak, a senior scientist from ICRISAT, Niamey says that low-cost solar-based irrigation is the way for farming development in the Sudano-Sahelian zone now. Due to sufficient solar radiation and minimal cloudy days per year, the Sahel is a perfect site for harnessing solar energy, even for smallholder farming. "Solar energy is more reliable, convenient and cheaper for average farmers in the long-run," added Pasternak.