A tomato grafting pioneer in the island of paradise

Mr. I Ketut Santika is the owner of a vegetable nursery in Tabanan district, Bali, Indonesia. In mid-2012, he was invited by AVRDC – The World Vegetable Center to attend a training workshop on tomato grafting technology under the USAID-funded ‘Vegetables for Indonesia’ project. Grafting tomato plants onto AVRDC’s eggplant rootstocks EG195 (VI046103) and EG203 (VI045276) has been validated in East Java and Bali as an effective method to render tomato plants tolerant to flooding and bacterial wilt, a devastating soil-borne disease caused by *Ralstonia solanacearum*. Vegetable farmers in Bali usually purchase seedlings from nurseries rather than raise their own; therefore the project decided to train nursery operators such as Santika to produce grafted tomato plants.
Santika’s second innovation was to build a walk-in chamber with larger capacity (left); grafted tomato plants are placed in the plastic grafting chamber during the healing process (right).

Santika mastered the grafting method quickly. However, providing the grafted seedlings with optimum light intensity, humidity and temperature to help the grafted interface to heal was more problematic. AVRDC’s tunnel type grafting chamber has been proven to work very well for the healing process, but he found the design to be costly and complicated. He decided to design a simpler grafting chamber using locally available materials. He utilized a glass display case with a sliding door and placed it under his nursery roof to reduce light intensity. He put a pan of water on the bottom shelf and frequently sprayed mist inside to keep the humidity high. Grafted tomato plants survived under such conditions; however, the chamber size was too small.

He then built a bigger chamber with a wooden frame covered with thick plastic sheets and included a walk-in space so he could stand up when taking care of the grafted seedlings. In addition to putting pans of water on the bottom shelf, he also sprays mist on the seedlings several times during the 4-day healing process. This simple design with larger capacity works quite well and he is satisfied with it.

Early on, Santika gave 10-20 grafted tomato seedlings for free to each of his customers who bought tomato seedlings so they could plant the grafted seedlings side by side with non-grafted ones for comparison. He gladly trained some students from Udayana University so the students could use the grafted seedlings in their research or disseminate the technology to other districts where the students conducted their community services.

By late 2014, about 100 farmers in the Baturiti area had purchased and planted grafted tomato seedlings. Santika sells approximately 10,000 grafted seedlings every month for IDR 1,000 (US$ 0.08) per seedling. For farmers who provide tomato scion seeds, Santika only charges IDR 700 (US$0.06) per seedling. He earns around US$ 560-800 every month.

At the moment, he is the sole provider of grafted tomato seedlings in Bali and he is now receiving orders from other districts such as Badung, Denpasar, Buleleng and Gianyar. His business also provides employment for women in his neighborhood to graft tomato seedlings during their spare time. Each of these women is now able to graft 200 seedlings per hour.

A small vegetable export company that placed orders for grafted seedlings from Santika’s nursery is now trying to prepare its own grafted seedlings. Santika is not worried and plans to keep promoting grafted tomato seedlings in Bali. His orders for grafted seedlings continue to rise. He hopes that his efforts will benefit more farmers as well as his own nursery.

Source and photos:
Kartini Luther, Office of the Deputy Director General-Research; Greg Luther, Mandy Lin, Global Technology Dissemination, AVRDC-The World Vegetable Center.
Increasing household vegetable consumption through seed kit distribution and home gardening in Uganda

Mukono and Wakiso districts are located in Central Uganda in the Lake Victoria Crescent Zone. High population density in these two districts creates high market opportunities. However, due to decreasing agricultural farming acreage in peri-urban areas and competition with construction and other sectors, households in these two districts are actually facing food security challenges.

To overcome these challenges and improve household nutrition and income through utilizing homestead areas, AVRDC worked with local partners through the Humidtropics program to train 50 farmers each from Mukono and Wakiso districts on seedbed preparation, vegetable production, pest and disease management, postharvest handling and value addition. After training, each farmer received an AVRDC seed kit which contains five crops and 12 cultivars, including amaranth, spider plant, Ethiopian mustard, African eggplant and tomato. These vegetables were selected based on a survey among farmers to identify the most commonly grown and consumed vegetables.

Farmers planted and assessed all 12 cultivars. Some farmers identified one amaranth variety as early maturing. Many farmers were particularly attracted by the Ethiopian mustard that is commonly known as ‘Sukuma wiki’ because they were able to harvest seeds. To ensure a continuous vegetable supply to the family in the dry season, some farmers irrigated their African eggplant by using water bottles and some farmers even managed to sell surplus vegetables to their neighbors. Most of the farmers decided to multiply the seeds they received from AVRDC so they can have enough for planting in the upcoming season as well as to share with neighbors and friends who were not able to receive kits at the beginning of the program.

Ms. Nalwoga Jane, a farmer from Nama sub-county, Mukono district, was happy to have a homestead vegetable garden. On one occasion she had to leave her family to attend a burial for one week. At that time, she did not have a substantial amount of money to leave with her children to buy food. Luckily she had a vegetable garden that provided the source of food for her children. All her red amaranth was harvested and consumed by her children while she was away.
Ms. Nankya Jane succeeded in multiplying amaranth seeds for her next planting (left); members from Tukolerewamu farmers’ group in Mukono district arranged some of their farm produce on a stand at the group chairman’s place to sell to visitors (right).

From home and therefore she was not able to collect many seeds like other farmers did. Due to the need for home consumption in the dry season, Ms. Nalwoga decided to irrigate her African eggplant using the bottle technique that she learned from one of the Humidtropics trainings. Therefore, she had vegetables available throughout the dry season for her family.

Farmers are now multiplying vegetable seeds so they can have enough to grow on a larger acreage, and supply to their neighbors and friends. In the upcoming cropping season, some farmers plan to sell some vegetables to the markets such as amaranth, Ethiopian mustard and African eggplant. AVRDC seed kits have helped farmers in Mukono and Wakiso districts, Uganda establish their homestead vegetable gardens, increase their vegetable consumption and raise their incomes.

When Ms. Nalwoga is away from home, her children harvested African eggplant from homestead garden and consumed it with beans.

Ms. Nalwoga uses bottles to irrigate African eggplant during the dry season (left); Mr. Semuju Henry planted African eggplant in a swamp and was able to multiply the seeds for his next planting (right).

Source and photos:
Sylvia Namazzi, Site Coordinator, Humidtropics project, Uganda, AVRDC-The World Vegetable Center
Promising teasel gourd (*Momordica dioica*) developed for home gardening and commercial growers in Bangladesh

Teasel gourd (*Momordica dioica*) belongs to the cucurbit family and it is widely grown in Bangladesh, India and other Asian countries. In Bangladesh, it is commonly known as 'Kakrol' and available in the market in summer (April to October). Various teasel gourd recipes are very popular. The crop can tolerate excessive soil moisture and is easily cultivated by Bangladeshi farmers during the monsoon season in homestead vegetable gardens or commercial production with yields around 10-12 t/ha.

It is dioecious (female and male flowers are separate in different plants) and can be harvested 70-75 days after transplanting. Each female plant usually produces fruits continuously for 5-6 months once the crop is established and no extra cost for inputs is required for 2-3 years. The fruits are relatively hard and good for distant transportation with long shelf life. Thus, a substantial quantity of teasel gourd is exported to the Middle East and United Kingdom every year as a fresh vegetable. Cultivation of teasel gourd has become popular in different places in Bangladesh in recent years.
The traditional practice of growing teasel gourd is from its tubers with limited variation. However, use of poor quality tubers is the main limiting factor for yields in Bangladesh, although other factors also contribute. Due to the increasing importance of teasel gourd and to improve the number of fruits per plant and the fruit size, BRAC Agricultural Research & Development Centre (BARDC) has developed a hybrid teasel gourd. Hybrid seeds were collected from ripened fruits, and sown, but these had only a 32% germination rate. Nineteen seedlings were obtained (18 female and 1 male) and only 17 plants survived after transplanting. Careful observation was carried out to identify the desirable variants and three promising F1 hybrid plants have been identified with suitable characters (HNF/P1, HNF/P2 & HNF/P3).

HNF/P1 was identified as the plant with desirable fruit shape and highest fruit number per plant. It can be reproduced through vegetative propagation and the good characteristics can be preserved for upcoming cropping and generations as well.

BRAC has promoted the benefits of this high yielding hybrid through various training programs and is multiplying the root tubers for distributing to the end users for home gardening and commercial production in the near future.

Source and photos:
Sitesh Chandra Biswas, Monjur Hasan, BRAC Agricultural Research & Development Centre (BARDC), Bangladesh