FEEDBACK
from the field

AVRDC
The World Vegetable Center

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This bulletin provides information about application of AVRDC's technologies in the field and other topics of interest regarding vegetable production and consumption constraints around the world. It is issued quarterly. We welcome everyone to share any interesting news about vegetables – please send a short article with photos to tech_dissemination@worldveg.org. Thank you!

Tomato grafting delivers its promise in Vietnam

*Dr. Ngo Quang Vinh from the Institute of Agricultural Science (IAS) in southern Vietnam, looking at the grafted tomato field in Lam Dong province **(left)**; a farmer grades the tomatoes after harvesting **(right)***

Ms. Kinh and Ms. Hanh are vegetable farmers from Don Duong District, Lam Dong province, Vietnam who previously struggled with bacterial wilt and other soil-borne disease infestations on their small farm. Since adopting tomato grafting back in 2003 using 'Vimina' ('Hawaii 7996') as rootstock, they experienced higher yields. Last year, they harvested and sold about 75 t/ha, which contributed a large share of their total household income.

Grafting is a method of combining a rootstock and a scion (upper part of a grafted plant) to enhance the resistance of crops to soil-borne diseases, particularly bacterial wilt. This disease affects tomato plants severely and can lead to 100% yield loss. To combat this problem, AVRDC began conducting experiments in 1992 to develop quick and inexpensive grafting procedures to ascertain graft compatibility between tomato, pepper and eggplant scions, and eggplant rootstocks. In the succeeding years, the Center evaluated grafted plants and their resistance to bacterial wilt, Fusarium wilt and root-knot nematode; yield, growth and fruit quality parameters; effects of rain shelters and grafting on tomato yields; and the use of planting media on grafted seedlings. Results led to AVRDC recommending tomato line 'Hawaii 7996', and eggplant varieties 'EG190', 'EG203' and 'EG219', to be used as rootstocks because of their high levels of resistance to bacterial wilt and Fusarium wilt, and root-knot nematode.

AVRDC's grafting technique uses the tube splice method. It is explained in detail in the AVRDC International Cooperator's Guide, "Grafting Tomatoes for Production in the Hot-Wet Season". The technique was introduced in northern and southern Vietnam after several scientists from the Fruit and Vegetable Research Institute (FAVRI) and the Potato, Vegetable and Flower Research Center (PVFC) attended tomato grafting training at AVRDC headquarters in Taiwan in 2002. Both partners evaluated the technique in their respective institutes and disseminated it to farmers once tested. The use of rootstock varieties differed in the two regions to address location-specific problems: eggplant rootstock 'EG203' is used in the north since waterlogging is the predominant problem, and tomato rootstock 'Hawaii 7996' (Vimina) is used in the south due to the high incidence of bacterial wilt.

Graded and packed tomatoes waiting for collectors, ready to send to markets

*Mr. Nguyen Tuan Dung, an enumerator from FAVRI, interviewing a female tomato grower in Nam Dinh province **(left)**; Ms. Pham Thi Luyen, an enumerator from PVFC, interviewing a tomato grower in Lam Dong province **(right)***

Ms. Kinh and Ms. Hanh were among the 300 tomato farmers who took part in an evaluation conducted by AVRDC in August 2012 to assess the impact of AVRDC's tomato grafting on productivity and profitability of farmers and nursery operators 10 years after the technique was introduced in northern and southern Vietnam.

In general, the evaluation found that the use of grafted seedlings significantly increases the average tomato yield by about 30%. This significant difference means that the rootstock was effective in reducing waterlogging and soil-borne disease problems experienced by adopters. Grafted tomato fruits also commanded a higher price (US$0.41/kg) than non-grafted tomatoes (US$0.25/kg) in the market, which led to higher gross revenues large enough to offset the significantly higher production costs of grafted tomato cultivation.

In a nutshell, grafted tomatoes may be expensive to produce, requiring significant amounts of inputs like seedlings (additional costs of the rootstock), mulching materials and labor, but this can be compensated by their yield and market price advantage relative to non-grafted tomatoes. Grafted tomatoes had a benefit-cost ratio of 2.23 compared to 1.76 for non-grafted tomatoes, which means that farmers who adopt grafting can expect US$2.23 in benefits for every US$1 in cost.

Source and photos:
Christian Genova, Pepijn Schreinemachers, Socioeconomics, Headquarters; *Victor Afari-sefa,* Regional Center for Eastern and Southern Africa, AVRDC-The World Vegetable Center

*Mr. Linh owns a large nursery **(below)** in Lam Dong province and uses Hawaii 02 (Hawaii 7996) as rootstock **(left)***

Melons mean money to a Thai farmer


Wasana farm is located in Saraburi province of Thailand and produces different kinds of melons

Mr. Panuwat Arunrojsiri is a farmer from Nong Khae village in Saraburi province of Thailand. He began commercial melon cultivation in 2003 and mainly grows six hybrid cultivars all year-round on 180 rais (28.8 ha) at Wasana farm. Raised beds are prepared for planting melons and the distance between beds is 3.8 m. Two rows of melon plants are planted per bed (50 x 1 m) with 60 cm and 40 cm between rows and plants, respectively. Mr. Panuwat sows 56-75 g of seed of different melon varieties per rai (=1600m^2) to produce about 2500-3000 plants.

At Wasana farm, Mr. Panuwat employs 60 laborers annually. To save water, control irrigation easier, and ensure each plant gets equal amounts of water and fertilizer, he uses a drip irrigation and fertigation system on his farm and follows Thai GAP (good agricultural practices) guidelines. He also monitors fruit quality (shape, size and disease infestation) regularly. To control fungal diseases, he cuts infected branches and removes virus-infected plants. To control insect pests, he uses pheromone traps and low quantities of chemicals as prescribed in Thai GAP. The fruit is harvested when it attains maximum sweetness (14°Brix), which is about 75 days after sowing. Around 1-1.5 t of melons can be harvested daily and the average yield is 19 t/ha.

Fruit weight varies from 1.2 to 1.8 kg among different cultivars. Each fruit is labeled with a specific code that contains information on plot number, sowing and harvesting dates, and cultural practices applied during production, so every fruit sold in the market can be traced. This provides timely, accurate and relevant traceability information for his melons to enhance emergency management, market access, industry competitiveness and consumer confidence.

Mr. Panuwat's melons were sold to consumers in various supermarkets in Thailand such as Big C, The Mall and Suwannachat Company (Royal Project). Costs of melon cultivation at his farm total 60,000-70,000 THB (US$1,886-2,200) per rai and net profit is 130,000 to 140,000 THB (US$4,087-4,400) per rai. Mr. Panuwat is the only farmer growing melons commercially in Saraburi province and he has found that March to May is the best season for melon cultivation. He hopes that melon breeders will develop varieties with thin rinds and resistance to viruses and fungal diseases such as Fusarium wilt which causes root rot, powdery mildew and downy mildew. Consumers like Mr. Panuwat's melons. He plans to expand his business in the future to meet the increasing demand.



*Mr. Panuwat Arunrojsiri applies drip irrigation and fertigation system for melon production **(left)**; harvested melons are cleaned, graded and packed **(middle)**; each melon fruit is labeled with a specific code that contains complete production information **(right)***

Source and photos:
Narinder Dhillon, Supunsa Phethin, Cucurbit Breeding; *Megan McEnany,* World Food Prize intern, Regional Center for East and Southeast Asia in Thailand, AVRDC – The World Vegetable Center

Raise healthy and vigorous vegetable seedlings with locally available potting mixtures in the Solomon Islands

*Mr. John Maeli grates old coconut husks for preparing potting mixtures **(left)**; John prepares new potting mixtures (soil : grated coconut husk = 2 : 1) for raising his vegetable seedlings **(top right)**; poor potting mixtures cause low germination and weak seedlings **(right)***

Vegetables account for only one-quarter of total household land holdings in the Solomon Islands, but provide sources of food for home consumption and contribute more than 50% of income per household. Over 90% of households engage in vegetable production. While there are growing numbers of small vegetable farms around Honiara, the capital city, local production and supply still cannot meet year-round domestic demand. Pest and disease problems are major production constraints as well as a lack of knowledge in crop management for improving production quality and quantity.

Farmers in the Solomon Islands usually broadcast vegetable seeds such as pakchoi, lettuce, tomato and eggplant directly onto the soil in pots under trees or other shady areas. This practice has caused poor germination, low survival and weak seedlings. To overcome this problem, in May 2013 AVRDC conducted a vegetable production training at Sasa, about 36 km from Honiara to a farmer group that sells vegetables and fruit to local hotels through the assistance of AVRDC with funding support from Australian Centre for International Agricultural Research. During the training, farmers learned and practiced potting mixture preparation for raising healthy vegetable seedlings to increase the productivity and meet the market demand.

The recommended potting mixture is soil, grated coconut husk and chicken manure at a ratio of 3:3:1 or soil, sand/decomposed sawdust and chicken manure/compost at 3:1:1. Poultry manure should be well decomposed before use. If chicken manure is not available, soil and old grated coconut husk at 2:1 can be used. Old coconut husk decomposes faster and provide nutrients to the seedlings. This mixture provides good water retention and aeration and it can be used for raising most vegetable seedlings in the Solomon Islands. Farmers are happy to know another option for potting mixtures and have expressed their appreciation and acceptance.

Mr. John Maeli is a vegetable farmer from Sasa. He used to fill his pots with only soil to sow vegetable seeds. However, due to poor drainage, aeration and water-holding capacity, the seedling quality is very low. After attending the training held by AVRDC, he is now using the new potting mixtures to raise his vegetable seedlings. He is happy that his seedling survival rate is higher and his seedlings are healthier. He transplanted his tomato seedlings in the field and has already harvested three times with more to come. He is now able to raise enough seedlings for his vegetable production and supply to the market.

Source and photos: *Pitakia Tikai,* Liaison Officer for AVRDC, Solomon Islands

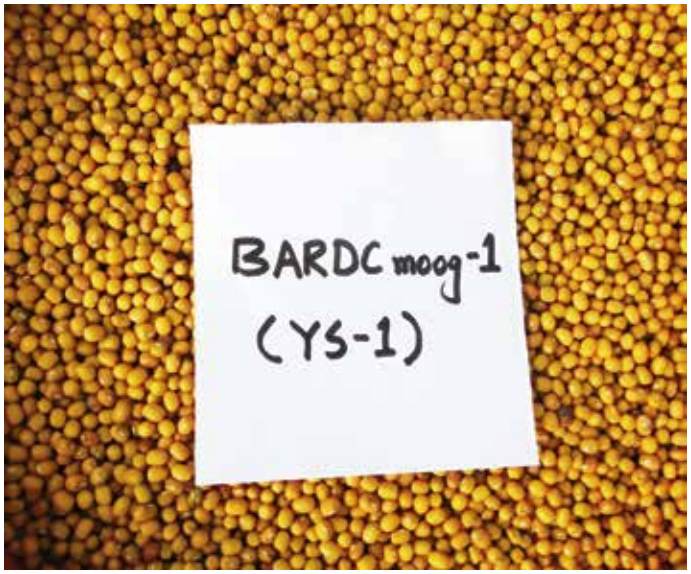
"Yellow revolution" on mungbean in Bangladesh

Field of yellow-seeded mungbean variety 'YS-1' at Natore district of Rajshahi division, Bangladesh

Mungbean is an excellent source of high quality vegetable protein in Bangladeshi diets. It is widely used by local confectionaries for preparing the popular and nutritious 'Dal Bhaja' (roasted mungbean seeds) or 'Papad' (a thin chapatti snack made from mungbean powder), in addition to its common use as 'Dhal' (a kind of soup). It is usually grown in the early summer when rainfall is available for irrigation. However, most varieties with longer growth duration suffer from early seed germination in the pods, or the pods and seeds completely rot before harvesting due to continuous rainfall in the monsoon season. To overcome this problem, BRAC Agricultural Research and Development Centre (BARDC) developed a yellow-seeded, short duration variety, 'YS-1', with moderate seed size in 2002.

'YS-1'can be grown in the local agro-climatic conditions in both Kharif-1 (March to May) and Kharif-2 (June to September) seasons. It is relatively tolerant to *Mungbean yellow mosaic virus* (MYMV) disease and can be harvested in 50-55 days after sowing with satisfactory yield, around 1,400-1,500 kg/ha. The yellow seed contains very fair levels of minerals, particularly calcium and zinc, with low fat content.

During the period of 2004-2009, 'YS-1' was improved further through rigorous and continuous selection as well as multi-location and adaptation trials. Demonstration plots of 'YS-1' were established and many positive responses from farmers were received due to its promising characteristics of early maturation and attractive golden-colored seed. Farmers in Natore and Meherpur districts have been growing 'YS-1' since



Mungbean variety 'YS-1' produces attractive golden-colored seeds

In Bangladesh, mungbean is widely used for preparing popular and nutritious 'Dal Bhaja', roasted mungbean seeds ***(top left)*** *or 'Papad', a thin chapatti snack made from mungbean power* ***(bottom left and right)***

2010 and the average yield is 1,100-1,200 kg/ha. They sell the yellow-seeded mungbean for 2-3 BDT per kg, a better price than for green-seeded varieties. Besides selling in the market, part of the harvest is used for their own consumption. Farmers also distributed the yellow-seeded mungbean to their relatives because of its good taste and finer quality.

Mr. Shekhar Nandi planted 'YS-1' in 400 m^2 in 2012 and obtained a very good yield. Observing the performances of yield and the quality of the seeds, some of his neighbors purchased seeds from him to grow yellow-seeded mungbean this year and they also received very good yield in Kharif-1 season.

Mungbean cultivation generates more income opportunities for many poor women who are employed to collect the ripened pods during harvest. Local consumers like to buy this yellow-seeded mungbean because it requires less turmeric for making 'Dhal' and other food preparations. Due to its golden color, the demand for some local food products made from mungbean has increased, such as 'Khichuri' (a cooked mixture of equal amounts of fine rice and moongdal) and 'Halim' ('Dhal' cooked with small pieces of meat). 'YS-1' fits well in the existing cropping pattern and not only ensures better returns to the Bangladeshi farmers in a shorter period but also helps to maintain the sustainability of the cereal system productivity as well.

Source and photos:
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