

FEEDBACK

from the field

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!

Improved tomato packaging reduces postharvest losses in Tanzania



Tomatoes (variety 'Tanya') in Kilombero wholesale market (**above**), Tanzania are often damaged when packed in wooden crates (**below**)

Tomato is a very important crop in Tanzania because it is not only for food consumption and income generation but also has high nutrition and market demand. Production is mainly from July to November (peak season, low price) and February to June (off-season, high price). In Tanzania, tomatoes are usually packed tightly in poor quality, traditional standard wooden crates (around 40 kg/crate) and the fruits are squashed, crushed, rubbed or damaged by the rough wooden surface. This is the usual situation at the Kilombero wholesale and retail market after tomatoes were transported from farm gate to the markets in Arusha, a city in northern Tanzania. Such poor transportation and packaging result in 30-40% postharvest losses.





Standard wooden crates with brown paper lining (left) and hessian lining (right)

With funding from USAID, AVRDC Eastern and Southern Africa is conducting postharvest research on identifying improved packaging methods for reducing damage to horticultural crops during transportation. A small trial on comparing different packaging materials including standard wooden crates, wooden crates lined with paper and crates with hessian linings was carried out in May 2014. Each crate can hold approximately 40 kg of tomatoes. Thirty crates of high quality tomatoes of variety 'Tanya' were purchased at Kilombero wholesale market and sorted to 23 crates of nearly undamaged high quality tomatoes. These were packed into 7-8 crates per each packaging material, stacked in a 2-ton truck and transported 40 km on a bumpy road, a similar distance and road condition for tomatoes to be transported from farm gate to the wholesale market.

The level of damage was evaluated one day later. Good and bad tomatoes were separated. Bad tomatoes were further sorted into 'bruises' (internal bruise, mainly caused by being squeezed or compressed by surrounding tomatoes) and 'cuts' (open cuts and abrasions, mainly caused by rough wooden crates). The results showed that the lining has no effect on physical tomato damage caused by dropping and compression, contrary to expectations.

Internal bruising of tomato fruits with all three packaging materials was around 33%. However, the percentages of 'cuts' tomatoes were only 10-11% when fruits were packed in wooden crates with paper or hessian linings versus 17% with the rough wooden crate packaging. Around 6-7% overall loss reduction can be achieved by packing tomatoes in wooden crates with lining – either hessian material (reusable but expensive) or brown paper (cheap but can be reused once or a few times only).

The price of good quality tomatoes is TZS 8,000-20,000 per crate (USD 4.8-12) during peak season and TZS 40,000-50,000 (USD 24-30) in the off-season. Even damaged or lower quality tomatoes can still reach USD 0.6-4.2 in the peak season and USD 12-18 during the off-season. The net profit of tomato packed in the wooden crates with paper linings was

increased by 3% in the off-season. However, due to lower prices in the peak season, no differences were observed between different packaging materials. Although hessian material is more expensive than paper, higher net profits per crate can be obtained in the long run with hessian material.



Half-size of the standard wooden crate (left) and plastic baskets (right) are other packaging alternatives

Other packaging materials such as small wooden crates (half-size of the standard wooden crate) or plastic baskets can also be introduced as tomato packaging alternatives. However, such changes could present big challenges for tomato supply chains in Tanzania. A pilot survey identified traders as the most powerful and dominant supply chain actors and they act either as wholesalers or broker/commission agents. The adoption of improved packaging materials may be influenced by other factors, especially psychological behavioral factors of the adopters. A further study will be undertaken to analyze the acceptance of improved packaging materials.



Tomatoes packed in wooden crates with paper (upper) and hessian (lower) linings

Source and photos: Carolin Kamrath, intern from University of Bonn, Germany; Ngoni Nenguwo, Srinivasulu Rajendran, AVRDC Eastern and Southern Africa, Tanzania

Improving household nutrition and income generation through homestead vegetable gardening in Mwanza region, Tanzania



Mrs. Kezia George, a farmer who grows amaranth on a larger scale in Bukungu village, Ukerewe district, Tanzania

Enhancing homestead traditional African vegetable production for small-scale farmers is essential for food and nutrition security and income diversification for resource-poor people. To this end, a collaborative project between AVRDC – The World Vegetable Center Eastern and Southern Africa and Helen Keller International Tanzania (HKI) was initiated in 2012 in Mwanza region in northwestern Tanzania. The Mwanza region's northern frontier borders and includes part of Lake Victoria and the project was conducted in two districts: Ukerewe (an island in Lake Victoria) and Sengerema (along the southern shore of Lake Victoria).

Farmers in these two districts are struggling with poor soil fertility and low water-holding capacity. There is no formal seed supply system for vegetable crops, especially in Ukerewe district. Farmers don't have access to good quality seeds and improved vegetable varieties. They do not have cash for purchasing necessary inputs. Fish and staple crops (mainly cassava, maize and rice) are the main sources of food in the two districts, but both lack some essential micronutrients and vitamins. The average land holding area is 1 ha per household and mainly used for subsistence farming. Among all the crops grown, local cultivars or landraces dominate the farming system. Vegetables are not well-known in the region and only small areas of local amaranth and vegetable cowpea are grown.

The 'Enhanced Homestead Food Production' project was conducted to improve the availability of micronutrients and vitamins in the diets of villagers by increasing their access to nutritious traditional African vegetables. It focused on supplying quality seeds of improved varieties of six traditional African vegetables — amaranth, Ethiopian

mustard, African eggplant, African nightshade, cowpea and okra — via seed kits. The seed distribution was followed up by training farmers, village and district extension workers, and extension staff of HKI. Training activities were conducted in two batches each in Ukerewe and Segerema. A total of 1200 farmers were involved in the project and 159 farmers were trained (54% male and 46% female). In addition, 16 extension workers participated in the training. The training course covered both theoretical and practical aspects of vegetable and seed production, recipe preparation, and safe handling and hygiene. The importance and use of traditional African vegetables in human nutrition and health was discussed with farmers in detail. Supporting training materials were distributed during the training activities.



Mr. Malimbe Magafu is a farmer from Bukungu village, Ukerewe district who was inspired by other farmers involved in the vegetable gardening project and now grows amaranth to feed his family



4 During vegetable planting, farmers were supported by village extension workers. A total of 1200 farmers received the seed kits. The amount of seeds distributed to each farmer was enough to establish a 36 m² vegetable plot. A brochure containing information on vegetable cultivation, food preparation and nutritional composition of these six crops was provided in Kiswahili language along with each seed kit.

Most farmers involved in the project showed great interest in vegetable production. Households use home waste (cow and/or chicken manures) to make compost for vegetable cultivation and obtain safe and good quality vegetables for their family's daily consumption along with staple foods. Many of the farmers involved in the project started growing vegetables for sale to generate income. Farmers with enough land started expanding their vegetable production areas and selling the surplus produce.

Mr. Musa Shimbi is one of the beneficiaries from Lushamba village, Sengerema district. He started growing vegetables with a seed kit provided by AVRDC. Currently he is growing vegetables for both consumption and marketing, and was able to build his own house with the income generated from selling vegetables.

Mr. Malimbe Magafu and Mrs. Kezia George are farmers from Bukungu village, Ukerewe district who were not involved in the project. However, they were inspired by their neighbors who benefited from the project, so they decided to cultivate amaranth. They grow amaranth in neat moist sunken beds



Mr. Musa Shimbi harvests Ethiopian mustard grown in his vegetable garden in Lushamba village, Sengerema district to sell to Mrs. Dolores Felix (**top**); he used the income generated from vegetable production to build his own house (**bottom**)

that are irrigated from Lake Victoria. Their vegetable plots are about 10 m x 12 m which are larger than other farmers'. Farmers' awareness of the nutritional and economic values of vegetables was increased through training, technical support and follow up by the trained village extension staff who worked closely with farmers in the project area. It is expected that the demand for vegetable production will increase and attract more people to get involved in vegetable cultivation for home consumption and marketing.

Source and photos:

Tsvetelina Stoilova, Fekadu F. Dinssa, Hassan Mndiga, Omary Mbwambo, AVRDC Eastern and Southern Africa, Tanzania

AVRDC's improved bitter gourd lines developed and released



Bitter gourd line AVBG1301 evaluated in the field at Kamphaeng Saen, Thailand

Bitter melon is a commercially and nutritionally important cucurbitaceous vegetable in Asia where approximately 340,000 hectares are planted annually. Bitter melon fruits are rich in vitamin C, folic acid, magnesium, phosphorus, and potassium and are often used in folk medicine to manage type 2 diabetes, which currently affects 347 million people worldwide with 80% of affected people residing in low-income and middle-income countries.

Nearly 60% of the bitter melon production area is planted with open-pollinated varieties which yield less (8-10 t/ha) than commercial hybrid cultivars (30-35 t/ha). To address this issue, AVRDC has developed open-pollinated lines of bitter melon for various market segments. Lines AVBG1301, AVBG1304, AVBG1310, AVBG1323 and AVBG1324 are for South Asia markets, while lines AVBG1313, AVBG1314 and AVBG1327 are for Southeast Asia markets. These improved lines are well-adapted to hot-dry and hot-wet open field cultivation and possess better yield performance and fruit quality. Vegetable growers and gardeners can easily save the seeds for successive plantings.

Seeds have been distributed to AVRDC Eastern and Southern Africa in Tanzania and AVRDC South Asia in India for conducting yield and consumer preference evaluation

trials in farmers' fields. Feedback on the field performance has been received. "Line AVBG1301 has exhibited overall resistance to fungal diseases in field trials, possessed strong vine vigor and shown good yield potential," remarked Mr. M. Anil from HyVeg – Rasi Seeds Pvt. Ltd. in Bangalore, India.



Fruits of bitter melon line AVBG1301



Bitter melon line AVBG1313 was evaluated in the field at Kamphaeng Saen, Thailand

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“Line AVBG1304 showed very early appearance of first female flower (22 days after transplanting) and very vigorous vines.”

“Line AVBG1301 has shown promise in terms of plant health, fruiting potential, fruit shape, fruit size and color that can be further tested in replicated yield trials next year,” noted Dr. Mohammed Abu Taher Masud, Principal Scientific Officer at Bangladesh Agricultural Research Institute (BARI).

“After completing our replicated trial in Bangalore, we have observed that lines AVBG1304, AVBG1324 and AVBG1325 stand as priority lines because they are very vigorous, slightly tolerant to diseases and high yields,” said Mr. Murali Kumar, bitter melon breeder from Sakata Seeds India Pvt. Ltd. He emphasized that lines AVBG1301, AVBG1304, AVBG1323 and AVBG1324 are useful to them for breeding Pali and Abhishek segment hybrids.

These genetically improved lines have been released by AVRDC and detailed information on them is available on AVRDC website under the SEED heading. The seeds of these

improved lines have been acquired by the breeders from 11 seed companies and a few public institutes including BARI for multi-location testing and use in their breeding programs.



Bitter melon line AVBG1324 was evaluated in Bangalore, India

Source and photos:

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