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## RECENT RESEARCH

# Does protected cultivation have a place in sub-Saharan Africa?

A review of the transfer of protected cultivation methods into the region raises questions about performance, profitability, and environmental impact.

Vegetable production in sub-Saharan Africa faces numerous agronomic constraints that will have to be overcome to feed the increasing population and to fight malnutrition. Technology transfer and the adoption of low-tech protected cultivation techniques affordable for smallholders are believed to be able to meet this challenge.

Protected cultivation techniques aim to control the crop environment through the use of soil covers and/or plant covers to manage pests and climatic conditions. Although protected cultivation techniques may increase the yield and quality of vegetable crops and extend their production periods worldwide, the



**Nordey T, Basset-Mens C, de Bon H, Martin T, Déletré E, Simon S, Parrot L, Despretz H, Huat J, Biard Y, Dubois T, Malézieux E.** 2017. Protected cultivation of vegetable crops in sub-Saharan Africa: limits and prospects for smallholders. A review. *AGRONOMY FOR SUSTAINABLE DEVELOPMENT* 37:53. DOI: 10.1007/s13593-017-0460-8 (<http://dx.doi.org/10.1007/s13593-017-0460-8>).

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Assessing the sustainability of vegetable production practices in northern Ghana

transfer of these techniques in sub-Saharan Africa raises questions about their performance, profitability, and environmental impact.

Are low-tech protected cultivation techniques adapted to the sustainable production of vegetables by smallholders in sub-Saharan Africa? To answer this question, a team of researchers from the World Vegetable Center, CIRAD, International Centre of Insect Physiology and Ecology (*icipe*), L'Institut Sénégalais de Recherche Agricole (ISRA), and Campus Agro-environnemental Caraïbe reviewed the agronomic, economic, and environmental performance of low-tech protected cultivation techniques in sub-Saharan Africa as reported in the literature.

Major conclusions from the review are (1) low-tech protected cultivation techniques are not suitable in all climatic conditions in sub-Saharan Africa and need to be combined with other methods to ensure adequate pest control; (2) the profitability of protected cultivation techniques relies on the capacity to offset increased production costs by higher yields and higher selling prices to be obtained with off-season and/or higher quality products; (3) breaking with existing cropping systems, the lack of technical support and skills, and the limited access to investment funding are major obstacles to the adoption of protected cultivation techniques by smallholders; and (4) life cycle assessments conducted in northern countries suggested that more efficient use of agricultural inputs would offset the negative impacts of protected cultivation techniques if they are properly

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Characterization of pre- and postharvest losses of tomato supply chain in Ethiopia

managed, but further studies are required to be sure these results can be extrapolated to the sub-Saharan Africa context.

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## 2017 Seed & Seedling Festival



Super Vegetable Soybean meets some young admirers.



Visitors to the WorldVeg booth received brochures and vegetable post-it notes.



Willie Chen explains grafting techniques.

It was a great day: The sun was shining and the vegetables came out to play! The annual **Seed & Seedling Festival** hosted by the **Tainan District Agricultural Research and Extension Station (DARES)** in Xinhua, Taiwan delighted thousands of visitors who attended the event on Saturday, 25 November 2017.

Local seed companies showcased the fruit of their latest varieties and sold the seed and seedlings to crowds ready to buy improved tomatoes, eggplant, peppers, pumpkin, sweet corn, herbs and more. Food vendors offered delectable Taiwan specialties and local products, from red rice to mulberry vinegar.

The World Vegetable Center booth was situated at a busy crossroads with heavy foot traffic on the Tainan DARES campus. Center staff—decked out in new “Eat More Vegetables” T-shirts—guided curious visitors through displays on grafting, bacteriology, traditional vegetables, entomology, nutrition, virology, breeding, and genebank





Curious visitors examine the cucurbit plants on display.

activities. The new Taiwan Seed Industry Exchange Platform was introduced. Plenty of WorldVeg swag (pencils, pens and post-it notes in the shape of eggplant and tomato) went home with visitors.

Our Vegetable Ambassadors sparked plenty of smiles—and countless photos! Thanks to Tainan DARES for the opportunity to participate!



A word to the wise: Eat More Vegetables!



Vegetable Ambassadors greet the WorldVeg Management team.



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## The benefits of WorldVeg tomato breeding

World Vegetable Center breeding programs produce the materials national research institutes need to bring new resilient and productive varieties to farmers.



Vigorous vines of 'NIAB JAUHAR'—a cross of WorldVeg line LBR10 and 'Roma'. Pakistan's farmers will appreciate the outstanding agronomic qualities of this hybrid tomato.

### Two new hybrids for Pakistan

Tomato is an important vegetable around the world, but in some countries productivity remains low—in part due to the use of old varieties that lack tolerance to heat, drought and other environmental stress and have limited resistance to pest and diseases.

In Pakistan, for instance, tomato growers produce about 9-10 tons per hectare (Agriculture Statistics of Pakistan, 2014-15) compared to 34.7 tons per hectare in other parts of the world (FAO, 2013). Only 67% of local demand for



### Ten lines, four new varieties, and more to come in Bangladesh

WorldVeg tomato breeder Dr. Peter Hanson regularly sends breeding materials to research institutions worldwide, including the **Bangladesh Agricultural Research Institute (BARI)**. Dr. Abu Masud, BARI tomato and cucurbit breeder, has been working with 10 WorldVeg tomato lines and reported on his progress:

#### ***Released varieties:***

*We have released two varieties of tomato utilizing World Vegetable Center breeding lines.*

*WorldVeg line AVTO 1010 has been released as a pure line variety under the name 'BARI Tomato-18' (for the winter season). 'BARI Hybrid Tomato-10' has been released as a summer variety; the female parent in this hybrid was AVTO 1006 and the male parent was line C41.*



tomato is being met, with the remainder imported at high prices.

Under the **Agricultural Innovation Program (AIP)** for Pakistan (October 2013 to March 2017) funded by the United States Agency for International Development (USAID) and supported by the International Maize and Wheat Improvement Center (CIMMYT) and the Pakistan Agricultural Research Council (PARC), the World Vegetable Center collaborated with Dr. Muhammad Yussouf Saleem and his team at the **Nuclear Institute for Agriculture and Biology (NIAB)**, Faisalabad to develop improved tomato hybrids.

NIAB breeders found many desirable traits in WorldVeg tomato lines and used these breeding materials to create four high-performing determinate hybrids. Of these, LBR-7, LBR-9, LBR-10, LBR-11 and LBR-17 showed tolerance to early and late blight. By crossing these lines with elite local lines, several high yielding hybrids (F<sub>1</sub>) tolerant to early and late blight were developed.

Among these hybrids, ‘NIAB GOHAR’ (NBH-2 (LBR7) x ‘Nagina’) and ‘NIAB JAUHAR’ (NBH-25 (LBR10 x ‘Roma’) were evaluated in a National Uniform Yield Trial conducted by the PARC National Coordinator (Horticulture) and in Distinctness Uniform Stability Studies (DUST) conducted by the Federal Seed Certification and Registration Department (FSC&RD) in Islamabad during 2015-16.

Both ‘NIAB GOHAR’ and ‘NIAB JAUHAR’ produce firm fruit with high yield (~40 t/ha), show moderate resistance to fruit borer and early and late blight, and are well-adapted to agroclimates in Punjab (Pakistan). The Punjab Seed Council has approved the hybrids for commercial cultivation.

*Story and photos:* Mansab Ali, Peter Hanson

### ***Proposed varieties:***

*We soon expect to release two more varieties based on WorldVeg breeding lines. One is AVTO 1005 as a pure line variety for winter. A hybrid for summer (experimental name S12Hybrid-61) used AVTO 1005 as the female parent and C11 as the male parent.*

*I am hoping one or two more summer hybrids may come out from those 10 lines in the near future. I will be testing those selected hybrids in the 2018 summer season for further confirmation of their performance.*

*Thank you for providing BARI with these 10 lines. Our growers and consumers are getting a lot of benefits from WorldVeg materials.*

*Best regards,*

*Masud*

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(Chinese), 25 November  
2017

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Centre: Le Centre mondial  
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## Doing things differently in Djalé

(This story originally appeared on the *Feed the Future* website)



Mariam Dembélé in the Djalé community garden.

The small village of Djalé, located in the Sikasso region of Mali, is the perfect example of a community determined to overcome malnutrition and poverty.

After observing a **Feed the Future** (<https://feedthefuture.gov/article/doing-things-differently-djal%C3%A9>) project at work in nearby villages and demonstrating their commitment to improving their village's food security, the women of Djalé asked to join the project. Their determination paid off, and they were soon invited to officially participate in the project, led by the World Vegetable Center.

Three village leaders, including the chief, gave them one hectare of land for vegetable production, and Feed the Future helped the women access seed. They later expanded this plot to 2.5 hectares to accommodate demand as more women in the village became interested in producing vegetables.



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“I gave the land to establish the community garden because our wives were motivated to produce vegetables for their families, especially to improve the diets of our children,” said Kadary Dembélé, a village leader. “In the past, we had many malnourished children in our village. Nowadays our kids are healthy.”

Although Djalé’s women had the initial motivation, they knew Djalé’s men needed to understand how a community garden would benefit the village to keep it going. Feed the Future helped raise awareness among the village leaders and men about the importance of supporting their wives in the effort to improve the health and well-being of their families.

“Now, if it is his wife’s turn to water the garden and she is not available, a husband will take care of the job,” Kadary said.

Feed the Future also trained the women on nutrition, emphasizing the importance of vegetables and a diverse diet as well as good water, sanitation and hygiene practices to overall health. “We learned how to cook nutritious porridge with milk, vegetables, eggs, meat and peanuts,” said Mariam Dembélé and Djenebou Dembélé, neighbors who are active in the community garden. Families sell surplus vegetables to buy other food items, or dry and keep them for the lean period.

“The knowledge acquired during the training sessions and the awareness activities have made the adoption of new behaviors much easier for women,” said Rokia Dembélé, another community garden member. “Now in my household, I have the support of my husband and my mother-in-law to space my births, breastfeed my babies and to continue breastfeeding after I begin feeding other foods when my child reaches 6 months.”

Her husband built a new latrine for her family and keeps it stocked with soap so they can wash their hands, thereby reducing the risk of infections including diarrhea. “Now my kids are healthier, and the health expenses of our family have been reduced, Rokia said.

Other community activities are making Djalé a healthier place to live. The village dedicates Monday and Thursday mornings to cleaning, and households now have latrines with handwashing stations and soap.

The chief provided funds to repair the village’s manually operated water pump to restore a steady and safe supply of water. Now, all villagers have access to drinkable water.

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With help from their husbands and other villagers, the Djalé community gardeners have produced 250 kilograms (551 pounds) of tomatoes, 1441 kilograms (3176 pounds) of okra, 2330 kilograms (5136 pounds) of African eggplant, 115 kilograms (253 pounds) of amaranth and 50 kilograms (110 pounds) of hot pepper as of November 2017 — enriching the community's diets with vital nutrients.

*The USAID Mali Scaling: Deploying Improved Vegetable Technologies to Overcome Malnutrition and Poverty project is an integrated agriculture, nutrition, WASH and health project aiming to reduce malnutrition, especially among children, through diet diversification and improvement of nutrition, hygiene and care practices. It is funded by USAID through Feed the Future and Global Health efforts and is led by the World Vegetable Center.*

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## World Vegetable Center receives grants from Germany

Two new projects in Tanzania and Kenya will enhance tomato production and raise the profile of a traditional vegetable that can do double duty as a leafy green and a grain.



The World Vegetable Center (WorldVeg) is pleased to announce it has received two grants from Germany's **Federal Ministry for Economic Cooperation and Development (BMZ)** to support vegetable research and development activities in Tanzania and Kenya.

“Amazing Amaranth: Hardy and nutritious amaranth lines and food practices to improve nutrition in East Africa” (EUR 1,200,000) aims to increase availability and consumption of improved nutrient-rich **amaranth** cultivars. Leaves of amaranth provide essential vitamins and minerals such as vitamin C, magnesium, and potassium lacking in local diets, and the plant also produces a high-protein grain. WorldVeg will investigate amaranth lines that can serve both purposes, and also seeks to breed cultivars with low levels of oxalates in the leaves.



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*ILRI Clippings*, 30 November 2017

Sustainable agriculture: Key species in the seed bank

(<https://news.tvbs.com.tw/life/824949>)

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“GrAfrica: Introduce grafted plantlets to improve yield and income of smallholder tomato producers in sub-Saharan Africa” (EUR 100,000) builds on the Center’s decades of experience in **vegetable grafting**. The GrAfrica project plans to teach grafting methods to 50 trainers and 12 nursery operators (preferentially youth and women), who will in turn share their knowledge and skills with 2,500 tomato producers in Tanzania.

“We’re excited about the prospect of bringing the benefits of improved amaranth to people whose diets are deficient in important nutrients, and also to introduce grafting to Africa, where we expect it will have a significant impact,” said Dr. David Johnson, WorldVeg Deputy Director General – Research. “BMZ has been an outstanding supporter of the Center’s research for many years and we welcome the opportunity to continue this positive and productive relationship.”

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## Zanzibar's traditional tastes



Residents of Tasani, Chaani Kubwa and Fuoni villages sampled some tasty dishes prepared with traditional vegetables during three **field days and cook shows** held from 19-26 October 2017 as part of the Home Garden Scaling Project funded by the United States Agency for International Development (USAID) in Zanzibar.

Representatives from WorldVeg, Helen Keller International, local government, and Zanzibar's ministries of Health, Agriculture, Natural Resources, Livestock and Fisheries coordinated the events, which attracted 567 farmers in total. The attendees received updates on project implementation; reviewed the status of malnutrition in the Unguja region, where the three villages are located; and discussed different strategies for combating malnutrition—including ways to increase consumption of nutrient-dense vegetables.

All had the opportunity to taste African eggplant, okra, amaranth, and nightshade prepared with recipes designed to retain the vital nutrients these vegetables provide. Local media was not about to miss out on this important story:

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Reporters from the *Daily News* joined the Tasani field day to interview participants and learn more about growing and consuming traditional vegetables, and a journalist from Assalaam Radio covered the Chaani Kubwa event.



*Story and photos:* Alex Alen

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## The challenges of chili production and marketing

WorldVeg South Asia staff **Devender Pal Kaur**, **Ramashray Dubey** and **Souradeep Acharjee** discovered first-hand the complexities of the chili value chain during a study trip from 13-14 November 2017 in Andhra Pradesh, India.



Their journey began with a visit to the **Sri Veeranjaneya Chilies and Vegetable Nursery** in Bobbepalli village, Marturu Manda, Prakasham District, where they saw an automatic seeder machine capable of filling 600 nursery trays per hour with a planting medium consisting of decomposed cocopeat with 5-10% vermicompost, 5% neem cake and *Pseudomonas*. Chili seedlings are produced in trays in 40-mesh nethouses, with a 50% subsidy from the state government.

Chili producers in the region must contend with damping off and root rot. Major pests include leaf curl virus, whitefly, thrips, jassids, fruit borers, and mites. Trap crops including maize and marigold are planted in the open field,



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and yellow and blue sticky traps (using 20-30 cards per acre) help to keep sucking pests under control. The farmers follow a chili – cotton rotation, and most use drip irrigation systems. Green chilies account for about 80% of production, with dry red chilies making up the remaining 20%.

At **Annadata Cold Storage**, a solar-powered facility in Prakasham district, farmers can store their dry red chili in 40-kg bags at 151 INR per bag per year. Each farmer has a specific lot and registration number. The temperature of the storage room is maintained at 8°C, and the facility has a capacity of 82,000 bags. At the **Guntur Container Terminal**, farmers export their chilies through the Inland Container Depot, a private corporation that brings importers and exporters together under one roof. Exports to China, Vietnam, Malaysia, and Indonesia can bring good prices, provided the farmers meet specific requirements for size, shape, color, texture, and pungency. Producers need plant quarantine certificates and clearance from the Spice Board to send chilies for export. The board has developed an online application where buyers and sellers can register and trade in a transparent way, which promotes a more professional approach to production among growers.

On 14 November the WorldVeg team visited the **Guntur Chili Market**—the largest such market in Asia. More than 660 commission agents, 440 exporters, 552 traders, 350 employees and 10,000 farmers engage in chili trading activities at Guntur. Chili processing is a big business as well in Guntur as well; during a visit to Eastern Condiments Pvt. Ltd., a spice manufacturing company, the team saw how dry powdered chilies of different colors and pungency are combined into various spice blends.

The final stop was Anantavarpadu village, where model farmer and Indian Council of Agricultural Research awardee **Bhandar Srinivash Rao** has been cultivating chili organically for the past 10 years. Mr. Rao relies on vermicompost and green manures to enrich his soil, and controls pests and diseases with neem oil extract, neem kernel extract, pongamia leaf extract, and moringa leaf extract.

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*Story and photos:* Devender Pal Kaur, Ramashray Dubey, Souradeep Acharjee, PVL Bharathi

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## Mungbean makes news from West Africa to Australia

Mungbean has long been a popular crop in Asia, but other parts of the world are beginning to take greater notice of this nutritious legume.

### *Crazy about mungbean in Senegal*



Ozzie Abaye, an extension specialist at Virginia Tech running a United States Agency for International Development (USAID) project in Senegal, introduced mungbean to the country in 2012. Before 2017, the project relied on one hybrid – ‘Berken’ from Oklahoma, USA. Due to increasing demand, in 2016/2017, the project decided to test open-pollinated lines, including 60 lines from the WorldVeg mungbean breeding program. “The entire country is crazy about mungbean,” Ozzie said. “People simply love it.”



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She shared what mungbean growers and consumers are saying about this new legume in their country: “They like that mungbean is easy to grow, harvest and process,” said Ozzie. “Some farmers are harvesting up to 5 times. It’s a short-season crop (50-60 days) that fits well into rotations, and helps nourish the soil.”



The high-protein, easy-to-digest legume appeals to local palates. “Kids and adults like it and eat it when available – for breakfast or dinner,” Ozzie said. “Several people mentioned that if you eat mungbean, ‘you can go a long time without being hungry.’ And breastfeeding mothers said if they eat mungbean they produce plenty of milk and don’t need to buy formula to feed their infants.”

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## *Machinery to harvest mungbean in Asia*



The **inception workshop** for the Australian Centre for International Agricultural Research (ACIAR)-funded project on “Improved Mungbean Harvesting and Seed

Production Systems for Bangladesh, Myanmar and Pakistan” was held from 11-12 October 2017 in Nay Pyi Taw, Myanmar. Major project activities include developing a package of cropping practices to facilitate mechanical harvesting, including desiccation; developing the most suitable mungbean harvesting system for each country; and assessing and communicating the likely impact of mechanization on women and providing management options to benefit the livelihood of women. Participants from the partner countries including the private sector participated in the workshop.

The project launch was followed by a **five-day workshop on statistical design and analysis** for plant breeders, practical plant breeding, and hands-on training with the KDDart plant breeding software suite at the World Vegetable Center South Asia office in Hyderabad, India from 23-27 October 2017. Twenty project staff from Bangladesh, India, Myanmar and Taiwan attended to work with experts from the Queensland Department of Agriculture and Fisheries and Diversity Arrays Pty Ltd, Canberra. The trainers sought to develop the skills, knowledge and scientific rigor of project participants, enabling them to deliver increased value in a vital project that is directly supporting the development of profitable and resilient mungbean varieties through this ACIAR investment.

Robust datasets generated from improved international mungbean trials and shared through the project will underpin development of relevant new germplasm with key traits, including tolerance to biotic and abiotic stress in South & Southeast Asia, and Australia.



*Story and photos: Ram Nair*





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December 12th, 2017 | Categories: Articles, DEC2017, Latest News, South Asia, West and Central Africa - Coastal and Humid Regions | Tags: mungbean

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## 52nd Board of Directors Meeting



(front row, left to right) Sophia Kaduma, Julie Howard, David Sammons, Junne-Jih Chen, Buncha Chinnasri, Myoung Rae Cho, Gordon MacNeil (back row, left to right) Cathy Reade, Marlis Lindecke, Masa Iwanaga, Marco Wopereis, Jen-Pin Chen, Hsueh-Shih Lin

The **World Vegetable Center Board of Directors** held its 52nd meeting in conjunction with the **2017 Global R & D Week**, 4-8 December 2017 at WorldVeg headquarters in Taiwan. The dual event gave board members the opportunity to interact with staff, engage in meaningful discussions, and provide perspective on the Center's new direction.

Board members **David Sammons** (USA), **Dae Geun Oh** (Korea), **Takashi Hamada** (Japan) and **Vivencio Mamaril** (Philippines) completed their terms. The Center is grateful for their service and thoughtful advice over the years.

Incoming members are **Myoung Rae Cho**, Director General, Department of Horticultural Crop Research, National Institute of Horticultural and Herbal Science Rural Development Administration (Korea); **George Culaste**, OIC-Director Bureau of Plant Industry, Department of Agriculture (Philippines); **Bonnie McClafferty**, Director, Food Value Chain, GAIN (USA); and **Shigehiro Nishiumi**, Deputy Representative, Japan-Taiwan Exchange Association (Japan).

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## 2017 Global R & D Week

Eighty-eight WorldVeg staff representing more than 25 countries traveled to Taiwan to participate in the **2017 Global R & D Week** to propose ideas, debate issues, and plan activities for the coming year. The intensive presentations and discussions

brought forward many new concepts to explore. All enjoyed the chance to meet face-to-face with colleagues and work together on a research agenda that will lead to healthier lives and more resilient livelihoods for small-scale farmers and their families.





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# NUDGING CHILDREN TOWARD HEALTHIER DIETS

*Nudging children toward healthier food choices: An experiment combining school and home gardens*



**Start date:** January 2018

Do school garden programs in developing countries prompt children to make healthier food choices? Although previous studies demonstrated that school gardens can improve children's knowledge of and preferences for healthier foods, bringing about positive change in children's food choices may depend on the availability of fruit and vegetables and the overriding influence of caregivers on children's diets.

A new WorldVeg study funded by the **Bill & Melinda Gates Foundation** and **UK aid** will test the hypothesis that school garden programs can nudge children aged 8-12 toward healthier diets if these constraints are addressed explicitly. The project builds on an existing WorldVeg school garden program (including hands-on gardening and nutrition education), but adds a home garden component that

Countries

**Nepal**

Donors

On the team

trains parents in gardening and nutrition—and encourages parents and children to work together to improve family nutrition. Using a combination of quantitative and qualitative methods, the study will provide a deeper understanding of the mechanisms through which school-based interventions can **influence children's food choices**. The two-year, USD 270,000 study will be conducted in Nepal with the Nepal Agricultural Research Council (NARC), Asia Network for Sustainable Agriculture and Bioresources (ANSAB), and Leibniz Institute of Vegetable and Ornamental Crops (IGZ).

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December 12th, 2017 | Categories: Project Profiles | Tags: children, diet

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## Best bitter gourd on trial



Noble Seeds (India) organized **Bitter Gourd Field Days** from 25 November to 5 December 2017 in Bangalore. The event showcased 180 hybrids using WorldVeg lines in field trials along with commercial checks. Noble's marketing, sales and product managers selected >20 hybrids of this popular and nutritious crop for multilocation trials. Cucurbit breeder Narinder Dhillon and the WorldVeg cucurbit team closely with seed companies to ensure farmers have access to improved bitter gourd varieties with pest and disease resistance that thrive in the tropics.



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## VISITORS: Oct – Nov – Dec 2017



**25 October 2017:** 43 students from National Tainan First Senior High School (TNFSH) at WorldVeg HQ.



**27 October 2017:** Siew-Hoong Chang and Kok-Eng Ooi from Malaysia are accompanied by James Kuo, R&D Manager, Crop Protection, DuPont Taiwan Ltd. at WorldVeg HQ.



**2 November 2017:** 12 visitors led by **Chao Bing**, Vice President, Hainan Academy of Agricultural Sciences, PRC visit WorldVeg HQ.



**3 November 2017:** **Kenta Shirasawa**, Researcher, Department of Plant Genome Research Kazusa DNA Research Institute, Kisarazu, Japan. *(left to right)* **Roland Schafleitner**, WorldVeg Flagship Program Leader – Vegetable Diversity and Improvement and Head – Molecular Genetics; **Mohamed Rakha**, WorldVeg Plant Breeders; **Kenta Shirasawa**; and **David Johnson**, WorldVeg Deputy Director General – Research.





**6-10 November 2017:** Muryanto (*right*), Biotech Lab Manager, East-West Seed, Indonesia, visited the Center to discuss the possibility of future cooperation on molecular breeding. With Yung-kuang Huang, WorldVeg Genebank scientist.



**8 November 2017:** 18 participants attending an agricultural study trip from LECKAT Corporation, Malaysia visited WorldVeg HQ. They receive a tour of the Vegetable Demonstration Garden by Shiu-luan Lu, Visitors Coordinator.



**10 November 2017:** 46 international students from 13 countries led by Chifumi Takagi, Assistant Professor, International Master's Program of Agriculture from National Chung Hsing University, visited WorldVeg HQ to tour the Demonstration Garden and Genebank.



**13 November 2017:** Narayana Reddy Punyala, Managing Director, Raghupathi Reddy Kotla, Research Director, Ganesh Kothawar, Director (Operations), and Geetha Madhuri Punyala, Chief Operating Officer, from Nu Genes Private Limited, India visited WorldVeg HQ to learn about the Center's breeding research work from Vicky Cheng, Cucurbit Breeder and Sanjeet Kumar, Pepper Breeder.



**14 November 2017:** Ming-Che Shih (*left*), Distinguished Research Fellow and Secretary General of Academia Sinica, Taiwan visited WorldVeg HQ with Zhengbiao Yang, professor of the Center for Plant Cell Biology, Institute of Integrated Genome Biology, and Department of Botany and Plant Sciences, University of California, Riverside, and Chizuko Yamamuro, Fujian A&F University's Outstanding Scientists Recruitment Project from the People's Republic of China to discuss future cooperation with the Center. Ming-Che Shih (*left*), with Yung-kuang Huang, WorldVeg Genebank scientist.



**16 November 2017:** Emmanuelle Platzgummer (*right*), Deputy Head of Culture Section, in charge of Higher Education and Research, French Office in Taipei accompanied by Ruey-Hua Lee (*left*) from Institute of Tropical Plant Sciences, National Cheng-Kung University visited WorldVeg HQ. They toured the Vegetable Demonstration Garden WorldVeg Director of Communications Maureen Mecozzi.





**15-24 November 2017:** Aditya Pratap, Principal Scientist of the Crop Improvement Division of the ICAR-Indian Institute of Pulses Research, Kanpur, India exchanged information and research results with WorldVeg scientists and gave a seminar on "Mungbean Improvement Programme in India."



**20 November 2017:** Cécile Desbiez (*right*), Research Scientist at INRA, Institut National de la Recherche Agronomique (National Institute of Agronomic Research), Montfavet, France accompanied by Ching-Ming Cheng, Associate Professor, Department of Life Science, Tzu-Chi University in the WorldVeg genebank.



**17 November 2017:** Irene Chou, reporter and a cameraman from TVBS Channel, Taiwan visit WorldVeg HQ to film a TV news program – "Flip the World," which was broadcast on 26 November 2017.



**23 November 2017:** A 10-person delegation from the U.S. Congress toured the Genebank during a visit organized by the U.S. State and Local Affairs Section, Department of North American Affairs, Ministry of Foreign Affairs (MOFA) Taiwan. They were accompanied by May Lin, Officer, Congressional Liaison Division, Taipei Economic and Cultural Representative Office (TECRO).



**22 November 2017:** 60 teachers from Dacheng Primary School, Shanhua, Tainan, Taiwan visited WorldVeg HQ for a tour of the Demonstration Garden with Shiu-luan Lu.



**22-24 November 2017:** Ric de Vos, Researcher, Wageningen University and Research, Netherlands gave a seminar to WorldVeg HQ staff on "Metabolomics as a powerful tool in plant research."





**21-22 November 2017:** Gert-Jan de Boer (*left*), Manager Research and Applications Biotechnology Research Biochemistry/Molecular Bio and Joep van Balen (*third from left*), Product Development Manager Asia, Enza Zaden Seed Company, met with WorldVeg Plant Breeder Peter Hanson (*second from left*), Postdoctoral Scientist Derek Barchenger, Pepper Breeder Sanjeet Kumar (*fourth and fifth from left*), Vegetable Breeder Mohamed Rakha, Head of Molecular Genetics Roland Schafleitner, and Genebank Manager Marteen van Zonnenfeld (*not shown*).



**27 November 2017:** 13 teachers from **National Tainan Chia-Chi Senior High School**, Taiwan visit the WorldVeg Vegetable Demonstration Garden and Genebank.



**24 November 2017:** 65 participants from **Vietnam Association of Corporate Directors** attending the "2017 Agricultural, Industrial Trade Investment Cooperation and Exchange between Vietnam and Taiwan" organized by Tainan City Government enjoyed a visit to the WorldVeg Vegetable Demonstration Garden with Shiu-luan Lu (*right*).



**30 November 2017:** A 19-person delegation headed by **Carlito P. Laurean**, Vice President for Research and Extension and **Darlyn D. Tagarino**, Director for International Relations from **Benguet State University**, Philippines at WorldVeg HQ. After a briefing and a tour of the Genebank, they held discussions to explore potential opportunities for cooperation with the WorldVeg management team.



**28 November 2017:** 25 international students from 10 countries led by Professor Wen-Chi Huang from the Department of Agribusiness Management, **National**



**10-12 December:** **Bill Bellotti**, Professor and Director Food Systems Program, Global Change Institute, the University of Queensland, Australia met with Center scientists and gave a presentation on "Creating space for smallholder farmer innovation to diversity agriculture, diversity diets and empower women."

Pingtung University of Science and Technology  
(NPUST), Taiwan toured the Demo Garden.

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December 15th, 2017 | Categories: DEC2017, Visitors | Tags: visitors

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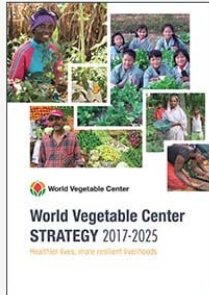
<https://avrdc.org/>

## HAVE YOU READ...

### Tapping the economic and nutritional power of vegetables

This groundbreaking review by Pepijn Schreinemachers, Emmy B. Simmons, and Marco Wopereis points to the urgent need for greater public and private investment in vegetable crop research. *Global Food Security*, 4 September 2017. <https://doi.org/10.1016/j.gfs.2017.09.005>

### World Vegetable Center Strategy 2017-2025



Over the past year, **World Vegetable Center** staff, board members, and partners embarked on a series of meetings and discussions to develop a **new strategy** that better orients the Center to realize the immense potential of vegetables to improve nutrition and incomes. This nine-year strategy introduces a new structure in which discovery research, piloting innovations, and scaling best technologies and practices continuously inform and improve the Center's work and impact.

## WORLDVEG IN THE NEWS

The World Vegetable Center Genebank  
*TVBS (Chinese)*  
29 November 2017

Project Seeks to Cut Use of Chemicals in Agriculture  
*Vientiane Times, Laos*  
21 November 2017

Health benefits from eating fruit and vegetables  
*Daily News, Tanzania*  
8 November 2017

## BRIEFING

### 52nd Board of Directors Meeting and 2017 Global R & D Week

The World Vegetable Center **Board of Directors** held its 52nd meeting in conjunction with the **2017 Global R & D Week**, 4-8 December 2017 at WorldVeg headquarters in Taiwan. The dual event gave board members the opportunity to interact with staff, engage in meaningful discussions, and provide perspective on the Center's new direction. Board members **David Sammons** (USA), **Dae Geun Oh** (Korea), **Takashi Hamada** (Japan), and **Wenceslao Mamaril** (Philippines)

## RECENT RESEARCH

- + Determinants of dietary diversity and the potential role of men in improving household nutrition in Tanzania
- + Protected cultivation of vegetable crops in sub-Saharan Africa: limits and prospects for smallholders. A review
- + Food legumes and rising temperatures: Effects, adaptive functional mechanisms specific to reproductive growth stage and strategies to improve heat tolerance
- + Does crop diversity contribute to dietary diversity? Evidence from integration of vegetables into maize-based farming systems.
- + Pathway analysis of vegetable farming commercialization
- + Distribution, pathological and biochemical characterization of *Ralstonia solanacearum* in Benin
- + Effects of variety and postharvest handling practices on microbial population at different stages of the value chain of Fresh Tomato (*Solanum lycopersicum*) in western Terai of Nepal.
- + Tapping the economic and nutritional power of vegetables
- + Screening mungbean (*Vigna radiata* L.) lines for salinity tolerance using salinity induction response technique at seedling and physiological growth assay at whole plant level



## WELCOME

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**Edoh Ognakossan Kukom**

(Togo) joined WorldVeg in November 2017 as the Production and Postharvest Specialist for the USAID-funded Mali Horticulture Scaling Project. Edoh has more than 7 years of experience in

agricultural research working on postharvest management of staple crops. His research interests include participatory development, testing and transfer of innovations that focus on reducing losses and adding value along value chains of common staple foods. Prior to joining the World Vegetable Center, he was a research fellow under the RELOAD (Reduction of Postharvest Losses and Value Addition in East African Food Value Chains) project at icipe (Kenya). He also has done a variety of consultancy assignments with the Natural Resources Institutes, University of Greenwich under the African Postharvest Losses Information System (APHLIS) project. He previously worked as a research assistant in the Postharvest Management and Food Safety Department of the International Institute of Tropical Agriculture (IITA) in Benin.



**Lutz Deppenbusch** (Germany)

joined the World Vegetable Center in November 2017 to work in the Center's impact evaluation team. Lutz obtained his PhD in Economics as part of the GlobalFood research training program at

the University of Goettingen, funded by the German Research Foundation. As part of his PhD he conducted quantitative research on gender-based price discrimination in Central Kenyan vegetable markets. Lutz holds a Bachelor in Economics from the University of Erfurt and a Master of Arts in Development Economics from the University of Goettingen. He participated in exchange programs with St. Paul University/University of Ottawa in Canada, and the University of Stellenbosch in South Africa.



**Maarten van Zonneveld** (The

Netherlands) joined WorldVeg in November 2017 to manage the Center's genebank operations. From 2006 – 2013 he worked on ex situ and in situ conservation and sustainable use of genetic

resources of crops and tree species in South America with Bioversity International, Colombia. From 2013 – 2017 he worked in Central America with Bioversity International, Costa Rica on conservation of plant genetic resources and in participatory research with farmers and forest communities for climate change adaptation, varietal selection, and seed testing. Maarten supported national institutions from Bolivia and Peru in expanding their national Capsicum pepper collections, and in the screening and regeneration to strengthen these important and diverse collections. He has experience with the International Treaty and the Nagoya protocol. Maarten has a background in GIS and in diversity analysis to screen plant genetic resources.