

Horticulture CRSP News



Reducing poverty, improving nutrition and health, and improving sustainability and profitability through horticulture.

Volume 3, Issue 1, January 2012

In this issue

- Farewell from Director, Ron Voss
- Focus on West Africa Projects
 - Nigerian GAP Development
 - Ghana Specialty Crops
- Partner Profile: Mathieu Ngouajio
- Factsheet: Postharvest and Horticulture

HortCRSP editorial staff:

- Mark Bell
- Amanda Crump
- Peter Shapland
- Elana Peach-Fine
- Kelsey Barale

Greetings and Farewell from the Director

As those of us in the U.S. approach the Holiday and New Year, I extend my best wishes for a peace filled season and personal thanks to everyone who is a part of the Hort CRSP family, and to those who will become part of the Hort CRSP family.

Horticulture CRSP has now completed its first two years of addressing hunger and poverty among smallholder farmers in priority developing countries. This marks the transition from 15 one-year Immediate Impact Projects and 10 one-year Exploratory Projects, to a portfolio of 5 three-year Pilot Projects, 10 one-year Trellis Projects, and 2 three-year Comprehensive Projects. During year 3, Hort CRSP will fund 3-4 three-year Focus Projects and 2- three-year Special Projects, in addition to 3-4 Hort CRSP Regional Innovation Centers. All of these projects and centers have the purpose of developing and adapting research based technologies and information that will address income and nutrition issues of smallholder farmers. All of these projects have institutional and human capacity building components so the efforts can be sustained through local leadership of educational programs. Each of these types of projects has unique scopes of program activities, however, and illustrates both the breadth and depth of innovative approaches necessary to effectively and efficiently address our goals and priorities with limited resources. Through access to the vast U.S. public university and in-country scientific and educational resources and with the support and guidance of USAID/Washington and the collaboration with USAID Missions, Hort CRSP will continue to develop successful research and implementation teams.

I will be retiring as Director of Hort CRSP at the end of 2011 and extend my best wishes to incoming Director, Dr. Elizabeth (Beth) Mitcham, who has already demonstrated her unique abilities while serving as Hort CRSP Program Leader and Hort CRSP Associate Director since its inception. She is also the Director of the UC Davis Postharvest Technology Center. Beth will be the leader of a very talented

continued next page

Director farewell continued from page 1

and very special management team at UC Davis and partner institutions. This is only appropriate, as the hundreds of Hort CRSP leaders and collaborators around the world, who have become passionate members of the Hort CRSP effort, deserve no less. I thank each of you for who you are, for what you do, and for your gift of kindness and support you have given me. Finally, I would like to extend a special thanks to my wife, Helen, who supported my un-retiring to accept this exciting opportunity and who accompanied me to meet many of you in your respective countries.

It has been an honor and privilege to have been a part of the beginning of an exciting program that is already improving the livelihoods of many smallholder farmers and their communities, and that promises to have much greater impacts in the future.

Ron Voss

Director, Horticulture CRSP

Professor Emeritus and Extension Vegetable Specialist



Editors' Note: Issue Focus on West Africa

As the 16 countries of West Africa surge towards 300 million people, chronic under-nutrition and food shortages are core challenges. 37% of children throughout the region suffer from stunting and 28% are underweight. Food insecurity is aggravated by political turmoil and human rights abuses.

West Africa is a diverse region in terms of climate, culture, population distribution and agricultural production. Northern regions of coastal countries and landlocked countries are the most severely affected by food scarcity.

Agriculture is the best engine for generating sustained economic growth for the most marginalized populations. Agriculture currently employs 60% of the active labor force and accounts for 35% of the West African gross domestic product. Yet agricultural development in the region is limited by weather variability, soil fertility degradation, and infestations of pests and diseases.

Horticulture CRSP teams within the region have worked to overcome these limitations to improve rural livelihoods. With over 50% of West Africans living on less than \$1.25 each day, high value horticultural crops like tomatoes and sweet potatoes have the potential not only to improve nutrition, but also incomes.

Horticulture CRSP is proud to showcase the benefits of horticultural development in West Africa in this January newsletter. Enjoy!

~Mark, Amanda, Peter, Elana, and Kelsey

Improving Food Safety and Quality of Tomato Production in Northern Nigeria

With over 158 million people, Nigeria is the most populous country in Africa and the second largest producer of tomatoes on the continent. Tomato cultivation is largely centered in the tropical savannahs of Northern Nigeria where much of the production occurs on small holdings, and is undertaken by low income growers, including women, who have little or no formal education.

While the growing conditions of the savannah are generally favorable, some tomato diseases like bacterial wilt and tomato yellow leaf curl virus can be problematic. These diseases not only lower yields and profits for smallholder farmers, but also are quarantine pests blocked by Europe and North America. In addition to plant diseases, tomatoes can be contaminated with potentially lethal human pathogens like *Salmonella* and *E. coli*, further impeding efforts to increase trade in regional and international markets. Intra-continental

Recognizing the opportunity to promote Nigeria's horticultural export capacity and simultaneously improve the lot of smallholder farmers in Nigeria, Horticulture CRSP funded Dr. Sally Miller to lead an international team of researchers to work with local extension agents to respond to farmer and vendor concerns about tomato diseases and contamination. Training modules for local extension agents now include adjusted Good Agricultural Practices (GAP) guidelines that fit the economic, cultural and environmental context of Northern Nigeria.

Increased tomato production and improved quality add value to smallholders' operations and grant them greater access to regional and international markets. These impacts increase incomes of smallholder farmers in Northern Nigeria, which in turn, lead to both enhanced food security and poverty reduction.

Training modules for local extension agents now include Good Agricultural Practices guidelines that fit Northern Nigeria.

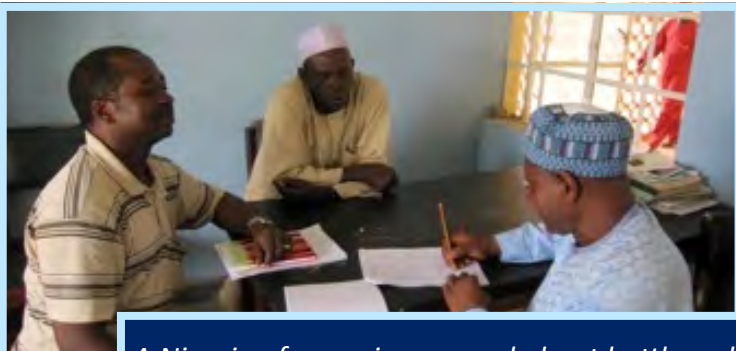
--- Elana Peach-Fine

References:

Abayomi, O.T (2002), "Vegetable Retailing in Selected Markets in Jos". B.Sc Dissertation, University of Jos.

"Nigeria Country Specific Information." Bureau of Consular Affairs U.S. Department of State. 26 July 26, 2011.

http://travel.state.gov/travel/cis_pa_tw/cis/cis_987.html



A Nigerian farmer is surveyed about bottlenecks in tomato production.

trade of tomatoes in Africa is informal and unregulated, with a large portion of Nigeria's produce going to neighboring countries. In order to eventually pass the stringent requirements of North American and European quarantine and public health regulatory agencies, Nigeria must begin to develop tomato food safety and quality standards for domestic and regional markets. Such standards will help lay the foundation for future trade in international markets while immediately improving the quality and safety of locally marketed tomatoes.



Dr. Miller's team from The Ohio State University and Ahmadu Bello University.

(photos provided by Sally Miller)

Natural Products Raise Profits in Ghana

While people in developing countries have steadily increased their demand for imported foods, pharmaceuticals and cosmetics, Western consumers have acquired a growing appetite for indigenous and natural products, creating an international market worth \$65 billion per year. The natural products craze is a boon for developing countries like Ghana, where rural populations increase their incomes by collecting and growing the botanical raw materials that comprise natural products. Natural products have an estimated annual worth of \$65 billion. Growing at an annual rate of 10 to 15%, this large and diverse market continues to increase demand for the botanical raw materials that comprise natural products. This has, in turn, created new commercial horticultural opportunities in many areas of the developing world.

This one-year project created 250 jobs and at least \$190,000 in revenue.

Over 70% of the natural products exported from Ghana come from the Guinean forest,

which cuts through the nation and is one of the Earth's 34 Biodiversity Hotspots. Ghana is home to over 3,600 native plant species, including a motley array of spices, medicinals and aromatic plants. The major indigenous products of the area are medicinal plants (*Voacanga* and *Griffonia* species), spices (Grains of Paradise and African Birds Eye Chili), and plant-based butters (African nutmeg and Shea butter).

The natural product industry is an important source of employment for Ghanaians within the forest region. Over 10,000 collectors, 400 agents and 30 exporters make a living in the natural products industry. The industry is nevertheless characterized by inefficiency and missed opportunities. The majority of the suppliers are smallholder farmers who are frequently unaware of modern production practices, good collection practices and industry standards. Consequently, the industry has inadequate and irregular supply volumes and poor product quality.

Under past projects, Dr. James Simon of Rutgers University and a Ghanaian NGO, Agribusiness in

Sustainable Natural African Plant Products (ASNAPP) have used a strong science-based approach to improve production practices and develop grades and standards to improve the quality of Ghana's natural products. Their past initiatives have supported the commercialization efforts of several spices, medicinal plants and herbal teas. In each case, the introduction of grades, standards, and good agricultural practices (e.g. "Do's and Don'ts for collectors and producers) have led to significant increases in the quality and



Jim Simon (kneeling) working with Ghanaian agronomists on the production practices of natural products.

(photo provided by Jim Simon)

consistency of supplies of the target products. Such changes have increased market opportunities, helping producers fetch higher prices for their plant products. Despite ASNAPP's past successes, one of the persistent gaps in the value chain continues to be the availability and quality of a number of natural products. Several of these, including Grains of Paradise, Birds Eye Chilli, *Griffonia* and *Voacanga*, have an especially robust demand and have unique culinary and medicinal uses.

This project is specifically designed to strengthen the commodity chain for these four crops while strengthening the overall product supply and quality and ensuring profitability at the rural community level. Under the umbrella of the Horticulture CRSP project, Dr. Simon and ASNAPP established nurseries and

see Ghana Natural Products on page 6

Partner Profile: Dr. Mathieu Ngouajio, Michigan State University

Dr. Mathieu Ngouajio was born and raised in Cameroon and educated in the U.S. Since 2001, Dr. Ngouajio has been a horticulture professor at Michigan State University where, amongst other activities, he is using his expertise in microclimate modification to deliver an innovative pest management technique to smallholder farmers in Benin and Kenya. Dr. Ngouajio's Hort CRSP project "Developing Low-Cost Pest Exclusion and Microclimate Modification Technologies for Small-Scale Vegetable Growers," looks at how specially designed nets can facilitate high-quality tomato and cabbage production and reduce pesticide use among smallholder farmers in Benin and Kenya.

Dr. Ngouajio's interest in microclimate modification stems from his research at Michigan State, where he works on plasti-culture techniques including solarization, row covers, and low tunnels. He and his international team of scientists and development practitioners are building upon this expertise to explore how net covers can be used to improve crop yields by reducing insect damage and modifying the microclimate, allowing farmers to grow vegetables year-round in Benin and Kenya. This project is indicative of his greater interest in developing robust, resilient, and profitable vegetable cropping systems.

Dr. Ngouajio first started working with Hort CRSP in 2010. He was a partner on Stephen Weller's African Leafy Vegetable Project, where he researched amaranth and edible nightshade in Kenya. "We have this [pest-exclusion] project because I learned so much on the African Leafy Vegetables Project," says Ngouajio, "it gave us ideas on how to put together a good project" as well as an understanding of some of the challenges of working in Africa. Some of the key lessons were the importance of selecting good, reliable partners and the need for persistence when working with local governments. Dr. Ngouajio is working with African students, researchers, agricultural extension agents and government agencies to test the nets in Kenya and Benin; the project also includes a French entomologist and A to Z textile Mills International, a Tanzanian company that is making the nets.

Dr. Ngouajio is working with these partners to first address and identify technical constraints, and then disseminate the technology to farmers.

"This project is using a single technology to solve two problems, water limitation and insect pests," explains Dr. Ngouajio. The nets can be used to modify the relative humidity around the crops, allowing farmers to grow crops with reduced irrigation when it wouldn't be possible otherwise. The nets are also useful during the wet season, when insect populations explode. "If you look at growing some of the vegetables [in Benin and Kenya] without any protection [yields plummet]. In some cases, it is a comparison between good yields and nothing," says Dr. Ngouajio. White flies and cabbage loopers, the major pests of tomatoes and cabbage, are primarily nocturnal, so crops are only covered at night during the wet season. This is beneficial because it allows crops to dry out during the day, thereby reducing incidence of fungal disease, and allowing beneficial diurnal insects and pollinators to reach the crops.

A to Z Textile Mills, based locally in Tanzania, makes the pest-exclusion nets. "This is not something we are exporting from the U.S. We have a company working right there in Africa that makes the nets," says Dr. Ngouajio. Locally sourced nets keep the benefits of this project in the local economy, and contribute to overall project sustainability since farmers aren't dependent on an outside source for materials. The nets are low-cost and can be used for up to 5 seasons, which makes them a worthwhile investment for small farmers. "This is exactly the kind of technology you want for developing countries. We don't want to go tell farmers to use more pesticides," said Ngouajio. "It's the right



Mathieu Ngouajio
(photo by Manny Reyes)

see Partner Profile on page 6

Ghana Natural Products continued from page 4

kickstarted the production of 70 acres of target crops. The outputs included 12 metric tons of spices valued at \$42,000, 30 metric tons of *Griffonia*, 20 tons of *Voacanga* and 10 tons of *Kombo*. Their one-year project created 250 jobs for collectors and agents and at least \$190,000 in revenue.

While improving production and product quality, Dr. Simon and ASNAPP have also worked to ensure a market for the increased production. They matched exporters and importers to move over 100 metric tons of *Griffonia* valued at over \$900,000 per year, 14-ton monthly shipments of bird's eye chili worth over \$580,000 annually, and a 10-ton monthly shipment of black pepper worth \$480,000 annually. Dr. Simon and ASNAPP have helped Ghanaian farmers and agribusinesses address the bottlenecks in the value chain and capitalize on their competitive advantage in the natural products market. As a result, Ghanaians are building a robust horticultural industry and creating hundreds of jobs in rural communities .

---Peter Shapland and James Simon

Sources: (1) Aboagye, L.M., Obirih-Opareh, N. 2007. Underutilized Species Policies & Strategies. Council for Sci. & Ind. Research Ghana ; (2) Ariyawardana, A., R. Govindasamy and J.E. Simon. 2009. The Natural Products Industry: A Global Perspective. In: Juliani, H.R., J.E. Simon and C.T. Ho (eds). African Natural Plant Products: Discoveries and Challenges in Quality Control. (in press); (3) Govindasamy, R., J. Simon, V. Puduri, H. Juliani, J. Asante-Dartey, H. Arthur, B. Diawuo, D. Acquaye and N. Hitimana. 2006. A Comparison of Wholesaler/Retailer Business Characteristics of Natural Products between Ghana and Rwanda, P-15009-2-06; (4) Govindasamy, R., B. Onyango, V. Puduri, J. Simon, H.R. Juliani, J. Asante-Dartey, H. Arthur, B. Diawuo, D. Acquaye. 2007. Impediments to Marketing African Natural Products from Ghana: Preliminary Results. The ICAFI J. of Agr. Econ: 1:24-35.

Partner Profile continued from page 5

technology for the right environment.” The nets will not only improve both quantity and quality of crop yields for small farmers; they will also reduce pesticide use.

Dr. Ngouajio and his partners are working in both Benin and Kenya in order to get a better understanding of how the nets work under different agroecological conditions. Dr. Ngouajio explains, “You just cannot take something from one country and bring it to another country. The crops are different, the pests are different, the climate is different. This is why we are doing it in two areas with contrasting climates on the west and east coasts of the continent. In the end, when we gather all the data, it will probably tell us what we can do in each of the regions, and how far we can apply the results in each of the regions.” The net technology has been extensively tested on cabbage in Benin, and is already being spread to farmers through extension. The Beninois team is now working on adjusting the nets so that they will work for tomatoes. In Kenya, the Horticulture CRSP team is currently working at research stations to test the nets and plan to move to on-farm research as soon as initial research is completed.

In one year, says Dr. Ngouajio, “I hope to see a lot of farmers using these nets, and see them be happy because it’s working. I believe it’s going to work.”

---Kelsey Barale

To learn more about this project, see http://hortcrsp.ucdavis.edu/main/27pest_exclusion.html.