

Horticulture Collaborative Research Support Program

Horticulture CRSP Projects in Asia

Pilot Projects - Ending Fall 2013

Safe Vegetable Production in Cambodia and Vietnam: Developing the HARE-Network to Enhance Farmer Income, Health, and the Local Environment

PI and Partners:

- Cary J. Trexler, University of California, Davis
- Johan Six, Glenn Young, Mark Van Horn, and David Miller, University of California, Davis
- Nguyen Quoc Vong, Nguyen Thi Bich Thuy, Pham Thi Huong, Pham Bao Duong, Pham Van Hung, and Thong Kong, Hanoi University of Agriculture, Vietnam
- Borarin Buntong, Asikin Yoeu, Lyda Hok, and Lor Lytour, Royal University of Agriculture, Cambodia
- Lam Thanh Hien, Phan Thi Giac Tam, Thai Anh Hoa, and Pham Thi Minh Tam, Nong Lam University, Vietnam

The rapid economic and population expansion of Cambodian and Vietnam within the greater SE Asian region presents opportunities for impacting the livelihood of many people where horticulture remains an important undeveloped business sector supported by small farmers. Our goal is to empower small farmers (59% of whom are women) with integrated experiential education and training for sustainable vegetable production that limits postharvest losses, increases food safety, increases market access and, importantly, increases income. We have designed an innovative participatory approach to meet these goals by networking experts in horticulture production through marketing. The inclusiveness as stakeholders of farmers communes, regional universities, local governments and national communications companies in the network provides continuity needed for continuation of farmer outreach training and education beyond the lifetime of USAID HORT-CSRFP funding. The successful completion of the project in Vietnam will serve as a model for implementation of the participatory action network in other, more challenging, countries like Cambodia and Laos with similar, but less developed, horticulture business sectors. Importantly, completion of this project will address essential capacity-building needs of Cambodia including an assessment of capabilities, research training, outreach development and promotion of communication between policy makers, universities and the agribusiness community. A direct impact from this project is that Cambodian and Vietnamese vegetable farmers will gain income.

<http://hortcrsp.ucdavis.edu/main/30hare.html>

Exploratory Projects - Ending Fall 2011

Strengthening Indigenous Informal Seed Systems in Southeast Asia

Building linkages between Northern Thailand hilltribe farmers and their neighbors, a local innovative seed bank, and extension training systems.

PI and Partners:

- Ricky M. Bates, The Pennsylvania State University
- Thomas Gill, The Pennsylvania State University
- Rick Burnette, ECHO Asia Regional Office, Thailand
- Laura Meitzner Yoder and Abram Bicksler, International Sustainable Development Studies Institute, Thailand
- Yongyooth Srigoifun, Maejo University, Thailand

Informal seed systems provide access to locally-adapted indigenous crops and constitute an essential component of sustainable production for resource-poor farmers. Current efforts to identify, conserve, improve and disseminate this rich genetic resource are insufficient. Development of these locally valued crops will set the foundation for increased and improved production, marketing and profitability. This project increases the impact and reach of these informal seed systems locally and regionally. Specifically, we are forming an effective team that builds linkages between Northern Thailand hilltribe farmers, a local innovative seed bank, and extension training systems.

Establishment of this linkage will result in: 1) surveys of key indigenous crops and collection of local crop knowledge, 2) activities promoting emergence of an effective regional seed bank, including training of key personnel, 3) development of an indigenous seed system conference and seed exchange, 4) improved human and institutional capacity, strategically focused on entrepreneurial women. This project potentially gives farmers access to new varieties and locally-adapted crops, many of which are unavailable from commercial sources, develops value chains around key species, and results in regional distribution of important seed resources to less developed neighbor nations such as Bangladesh, Cambodia, Laos and Vietnam.

http://hortcrsp.ucdavis.edu/main/16informal_seeds.html

A Regional Approach to Food Safety for Fruits and Vegetables in Bangladesh

Establishing a South Asia Consortium on Food Safety in Bangladesh and India that will improve public health, encourage export opportunities and increase smallholder profits.

PI and Partners:

- Ronnie Coffman, Cornell University
- Glenn M. Young, University of California, Davis
- Vijay Vijayaraghavan, Sathguru Management Consultants Pvt, Ltd., India

Bangladesh horticulture produces 3.2 million metric tons/year but small farmers suffer economic losses due to lack of high yielding varieties and hybrids, postharvest technologies, food safety issues and processing facilities. Among them the food safety issues affect the marketable produce, human health and food quality resulting from high chemical and microbial content and due to unhygienic production and storage facilities. Postharvest losses in Bangladesh are 38%, and it accounts for significant potential income loss mostly to small farmers which are largely women. This project establishes the South Asia Consortium on Food Safety that will be a collaboration of Bangladesh, Indian and U.S. institutions that will be robust and flexible enough to include other South Asian nations later. The consortium will work towards solving researchable questions, improving technical skills, Good Agricultural Practices, and capacity building in Bangladesh with the help of

scientific expertise available within US institutions and local expertise available in India. India's involvement as a strategic partner will assist Bangladesh with both research and training.

http://hortcrsp.ucdavis.edu/main/18safety_consortium.html

Cell Phone Enabled Personalized Agro-Advisory Services for Horticultural Crops in South Asia

Establishing a cell-phone enabled extension center for horticultural farmers in India, Sri Lanka and Nepal.

PI and Partners:

- Mywish Maredia; Michigan State University
- Sangita Ladha; International Horticulture Innovation and Training Center, India
- Karim Maredia, Cholani Weebadde, and Nanda Joshi; Michigan State University
- Rajesh Urkude; Tata Consultancy Services, India

Recent advances in telecommunication technologies and rapid uptake of cell-phones by millions of growers provide excellent opportunities for delivering real-time information to growers in rural areas. Taking advantage of these developments, Michigan State University (MSU), in partnership with the International Horticulture Innovation and Training Center (IHITC) in India, proposes to explore and test the costeffectiveness of a cell-phone-mediated personalized advisory service for growers cultivating horticulture crops in poly-houses and shade-nets. Through public-private partnership, the Tata Consultancy Services will provide technological support for the implementation of the "Mobile-Agro-Advisory-System" (MAAS), which will allow growers to send queries, and receive real-time information and personalized advice through voice, text and photographic tools. MSU and IHITC will design and implement this pilot-scale initiative using rigorous methods of impact evaluation. The methodology will consist of assigning eligible farmers into treatment and comparison groups so as to measure and attribute project impacts, analyze program costs-benefits, and explore program sustainability by assessing the demand and willingness to pay for MAAS services. Participatory and gender inclusive training will be integrated in the project. Lessons learned from this exploratory project will help MSU and IHITC to expand and scale up the program to other parts of India and South Asia.

<http://hortcrsp.ucdavis.edu/main/22cellphone.html>

Integrated Postharvest Extension Program for Cambodia and Vietnam

Evaluating postharvest capacity and selecting postharvest leaders.

PIs and Partners:

- Robert E. Paull and Nancy Jung Chen; University of Hawaii at Manoa
- Nguyen Quoc Vong, Hanoi University for Agriculture, Vietnam
- Men Sarom, Royal University of Agriculture, Cambodia

Postharvest losses of fruits and vegetables in Vietnam and Cambodia are very high. In Vietnam, they range from 20 to 25% for fruits and more than 30% for vegetables. Cambodian vegetable losses have been reported to higher than Vietnam. The most common causes of postharvest losses are quantitative, losses in quality caused by improper handling, and microbial and pesticide contamination significantly influences the nutritional value and safety of fresh produces.

The goal of this exploratory project is to evaluate current capacity and needs with respect to postharvest handling and quality, leading to a full proposal whose aim would be to strengthen the capacity of Vietnamese and Cambodian growers and marketers to reduce losses and to improve fruit and vegetables' postharvest quality. The four objectives are: 1. To conduct a site visit to Vietnam and Cambodia to meet with potential

research and training counterparts to determine capacity building needs that address postharvest losses; 2. To meet with potential commercial Vietnamese and Cambodian partners to determine their current handling practices and possible approaches to assist them in maintaining quality and safety; 3. To determine what postharvest publications are available in Vietnamese and Khmer on fresh fruit and vegetables; and, 4. To select postharvest leaders for short course training in the US and to obtain additional training on postharvest quality evaluation and safe handling training in Hawaii.

http://hortcrsp.ucdavis.edu/main/23postharvest_vietnam.html

Market Oriented Sustainable Peri-Urban and Urban Garden Cropping System: A Model for Women Farmers in Thailand, Cambodia and Vietnam

Training urban and peri-urban horticultural growers in cropping systems, pre and postharvest handling and marketing techniques in Thailand, Cambodia and Vietnam

PI and Partners:

- Dharma Pitchay; Tennessee State University
- Surendra Singh and Sammy Comer; Tennessee State University
- Juan Carlos Diaz-Perez; University of Georgia
- Robert J. Holmer, AVRDC – The World Vegetable Center, East and Southeast Asia
- Yingyong Paisooksantivatana and Pariyanuj Chulaka; Kasetsart University, Thailand
- Prabhat Kumar; Asian Institute of Technology

The project's long term goals are to develop strategies to assist/promote a sustainable peri-urban and urban garden cropping enterprise system for small and minority women growers. Vibrant outreach, training and demonstration of market oriented sustainable peri-urban and urban gardening technology, which includes the production process, pre and postharvest handling, economic and marketing information, and cropping system will be a new paradigm in training of women growers. This will encourage the peri-urban and urban gardeners to be receptive and willing to adopt the technology. Hands-on workshops will be conducted to train the women trainers and growers on a regular basis on various cultural practices, pre and postharvest management technology, logistics, marketing and entrepreneurship. Gardening demonstration plots will be used to demonstrate as to not only how to grow more and better quality product but also how and where to market the product with profit. This empowers women to increase food production, reduce poverty and improve household health. The project is expected to stimulate economic activities by creating employment opportunities for women to improve their income in peri-urban and urban areas. It will create opportunities for local growers to supply locally grown garden produce as well for their own consumption family. Peri-urban and urban gardening will be significant contributor to overall quality of life for the communities.

<http://hortcrsp.ucdavis.edu/main/24periurban.html>

Immediate Impact Projects - Ending Summer 2011

New Technology for Postharvest Drying and Storage of Horticultural Seeds

Introducing novel, sustainable technologies to dry and store seeds in hot and humid areas of India, Nepal and Thailand.

PI and Partners:

- Kent J. Bradford, University of California, Davis
- Peetambar Dahal, University of California, Davis
- Jwala Bajracharya, Nepal Agricultural Research Council
- Bhartendu Mishra, Nepal Agricultural Research Council
- Keshavulu Kunusoth, Acharya N G Ranga Agricultural University, India
- Johan Van Asbrouck, Rhino Research, Thailand

High quality seeds of improved varieties are essential to enhance the production of annual horticultural crops. In tropical climates, high temperatures and humidities combine to cause rapid deterioration of seeds in open storage, resulting in loss of value, poor stand establishment, lower productivity and disincentive to invest in improved seeds. Most horticultural seeds in the targeted locations are locally produced or self-saved and are stored without facilities for drying them to moisture contents that would greatly extend their storage lives. We are demonstrating a simple, inexpensive and widely adaptable method for drying horticultural seeds and maintaining high seed quality during storage. A novel zeolite desiccant, combined with inexpensive hermetic containers, can both dry horticultural seeds and maintain them in a dry state during storage, greatly increasing their storage lifetime. As women perform most of the seed production, harvesting and storage operations for horticultural seeds in these regions, adoption of this system would have direct benefits by enhancing the value of their labor. This simple seed drying and storage system would enable the development and distribution of more productive varieties, marketing of higher quality products and increases in women's and families' incomes.

<http://hortcrsp.ucdavis.edu/main/4Seeds.html>

Biological-Based Postharvest Quality Maintenance and Disease Control for Mango and Papaya

Researching biologically based controls of diseases to maintain postharvest papaya and mango quality in Sri Lanka.

PI and Partners:

- Robert E. Paull, University of Hawaii at Manoa
- Nancy Chen, University of Hawaii at Manoa
- Shanthi Wilson Wijeratnam, Ilmi Hewajulige, Shiranthi Perera, and Chamari Wickramathilaka, and Chamila Wijesinghe, Industrial Technology Institute, Sri Lanka

This proposal brings together two parallel research programs being done in Sri Lanka using natural coating and herbal extracts with efforts in Hawaii to use natural epiphytic microorganisms to control postharvest diseases. Essential oils are complex volatile compounds produced in various higher plant parts such as leaves, flowers, bark and roots. Volatile compounds from plants can inhibit the growth of fungal pathogens and evaporate without leaving residues and are considered benign from a health perspective. Epiphytic microorganisms isolated from papaya fruit are being evaluated for their ability to control postharvest disease by their actions as antagonistic microorganisms to pathogens. This Hawaii research follows from our successful isolation of a yeast for pineapple postharvest disease control. The proposal aims to develop and evaluate biological-based, nontoxic, environmentally suitable approach for postharvest disease control. The output from this project provides an alternative postharvest disease control approach to fungicide in

conventional and organic mango and papaya production. The technology developed in this research will be introduced to extension officers via workshops to be held at the Vidhatha collection and distribution centers in Sri Lanka.

<http://hortcrsp.ucdavis.edu/main/7Biological.html>

Coolrooms and Cool Transport for Small-Scale Farmers

Using solar power and innovative cooling technology to create storage and transport coolrooms in infrastructure and electricity limited areas of India, Uganda and Honduras.

PIs and Partners:

- Michael Reid and James Thompson, University of California, Davis
- Cecilia Chi-Ham, University of California, Davis
- Neeru Dubey, Amity University, India
- Royce Gloria Androa, Reach Your Destiny Consult, Ltd., Uganda
- Bal Vipran Chander Mahajan, Punjab Agricultural University, India
- Dinie Espinal-Rueda, Zamorano University, Honduras
- Ron Khosla, Store-it-cool, LLC

Temperature management is the key tool for reducing temperature losses in the developing world. Very few smallholder farmers have access to cooling or cool storage facilities, and even refrigerated transportation is a rarity. The unreliability of local electricity supplies, the expense of conventional coolers, and the lack of technical expertise for the installation and maintenance all have led to the search for alternative solutions such as evaporative cooling systems. Nevertheless, mechanical refrigeration still represents a simple and efficient solution to cooling produce, and is usually the only practical means for cooling to temperatures near freezing. For resource-limited farmers in the developing world, coolrooms and transportation systems employing mechanical refrigeration are economically and practically infeasible. We are testing an innovative system, the 'Cool-bot'(TM), which uses an intelligent thermostat system controlling a standard room air conditioner to create a small-scale cooler out of a well-insulated room. Experiments include testing a range of potential insulating materials that might be used in installing or retrofitting coolrooms, evaluation of the Cool-bot(TM)/window air conditioner combination, and evaluation of the use of photovoltaic panels to power the system. For short-distance transport to local markets, cool transit can be achieved by placing properly-cooled produce in a well insulated truck or cart. Studies on novel insulating materials will also be applicable to such transportation systems.

<http://hortcrsp.ucdavis.edu/main/9Coolrooms.html>