Horticulture CRSP News (text only)

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Grants Awarded to Support Horticultural Research in Developing Countries

Horticulture CRSP has awarded $2 million to support two comprehensive and wide-reaching projects to improve livelihoods through horticulture in the developing world. At $1 million each, the three-year projects add a research based approach to horticultural development by focusing on seed systems and African indigenous vegetables in Bangladesh, Nepal, Kenya, Rwanda, Tanzania, Uganda, and Zambia. These projects build on the lessons learned, successes and momentum of thirty completed and ongoing Horticulture CRSP projects. “I am excited about both projects and their potential to impact smallholder farmers.” says Elizabeth Mitcham, Horticulture CRSP Associate Director.

Stephen Weller from Purdue University is leading a comprehensive approach that will improve African indigenous vegetable (AIV) systems in Kenya, Tanzania, and Zambia. The project boosts production and market-chain development of AIVs to improve nutrition, health and income among smallholder farmers. This project targets the entire value chain from production to supply to postharvest handling and consumer acceptance. In addition to providing a much needed analysis of the nutritional value of these vegetables, the project links growers to better markets with a goal of not only improving their livelihoods but also improving nutrition in the region.

The seed systems project is led by Kent Bradford of the University of California, Davis and a team of scientists, innovators, and extension experts in Nepal, India, Kenya, and Thailand. Their project will demonstrate and disseminate a new technology to dry seeds in humid climates using desiccant beads. This offers a sound, affordable, and adaptable method to preserve viable seeds where high temperature and humidity would spoil seeds that are stored using traditional practices. Dr. Bradford’s team will create a sustainable market-based system to utilize this new technology in Bangladesh, Kenya, Nepal, Rwanda, Tanzania, and Uganda.

International Antifungal Synergy Tips the Scales for Beneficial Microbes!

Papayas, unique in their texture, flavor and nutritional value, are cultivated in most tropical countries and consumed all over the globe. Humans, however, are not the only consumers of papaya. In fact, large swaths of bacterial and fungal organisms thrive off the abundant sugars of the papaya fruit. While on the tree, a papaya has many ways of protecting itself and its precious seeds against these pests. However, after a papaya is harvested, these natural protective mechanisms become less effective and the fruit deteriorates rapidly. Losses from tree to table in developing countries range between 40% and 60%. This is especially significant for small-holder farmers.

Conventionally, postharvest fungal diseases are controlled by a combination of pre-harvest sanitation, including fungicide sprays, and postharvest fungicide application. However, the use of postharvest fungicides is being curtailed by the appearance of disease resistance, a lack of new fungicides and consumer concerns about pesticides. A promising scientific response to these issues has been to focus

research on the development of biological controls of postharvest fungal diseases. Biological control methods rely on natural biological processes to combat pest problems.

The tropical island regions of Hawaii and Sri Lanka have significant postharvest losses and researchers at both locations are looking at biological controls that limit the extent of these losses. In Sri Lanka, researchers have focused on a natural fruit coating, called oleoresin, and plant-produced essential oils. Oleoresins have antimicrobial properties that researchers hope to harness as an edible postharvest coating to inhibit fungal and bacterial development. Coupled with the use of benign essential oils, Sri Lankan scientists hope to use oleoresins to inhibit fungal growth.

Meanwhile, Hawaiian scientists led by Robert Paull are working with harmless microorganisms, like yeast and fungi, that are naturally found on papayas, to evaluate their ability to control postharvest disease. If these microorganisms can out-compete harmful pests for nutrients and space, they can inhibit the ability of the antagonists to colonize and harm the harvested fruit.

Horticulture CRSP, with the support of USAID, has both built upon and brought together these two parallel research programs. The international team of researchers has worked toward the development and evaluation of biological-based, nontoxic, environmentally suitable approaches for postharvest disease control. Beyond the mutual information exchange, Hawaiian researchers have been able to transfer advanced laboratory and analytical field research techniques to their Sri Lankan partners via postdoctoral training, scientific visits, and training of trainers workshops.

Through this Horticulture CRSP project, the Sri Lankan researchers have established a partnership with Link Natural Products PVT Ltd., a private sector institution that has the marketing skills and contacts to successfully introduce innovative postharvest treatments that are cost-effective and friendly to smallholder farmers.

As concerns about the dangers of conventional pesticides rise and the need for diverse pest control grows, interest and attention has turned toward the development of biologically based technologies for pest control. Horticulture CRSP is excited to be at the forefront of innovative scientific discoveries that can lead to alternative solutions.

--- Elana Peach-Fine

Flowers Empower Smallholder Farmers in Honduras

Ladybird Johnson once said, “Where flowers bloom, so does hope”. Although the former first lady was addressing a North American public, her words ring true for the benefactors of the growing ornamental sector in Central America. The competitive advantage of this region arises from ideal production conditions, low labor costs, and close proximity to rich export markets. However, there is a marked disparity among Central American countries’ ability to benefit from this high-value business. In 2006, Costa Rica earned more than $184 million and Guatemala more than $37 million in ornamental exports, while Honduras earned only $6 million.

Honduras is one of the poorest countries in the western hemisphere with approximately 65% of the population living in poverty. Despite recent economic diversification, much of Honduras’ rural

population still live on small agricultural landholdings. While large multinational producers have dominated the Honduran banana industry, smallholders are the primary producers of other high-value crops, such as coffee. The prevalence of this type of small-scale production demonstrates the potential for smallholders to significantly benefit from a growing Honduran ornamental industry.

The disparity in earnings between the ornamental industry in Honduras and that of its neighbors can be primarily attributed to limitations in both internal capacity and infrastructure for ornamental export. With support from Horticulture CRSP, Alan Bennett of the University of California Davis is working to advance trade, develop policy, and increase production capacity and postharvest infrastructure to raise the region's agricultural productivity and improve the incomes of smallholder farmers.

With the support of the US-based NovaFlora and the agricultural faculty at the University of Zamorano in Tegucigalpa, Honduras, the team worked to establish a strong base for a sustainable export industry. To reach this goal, they educated growers in best horticulture practices and advanced horticultural technologies like the Coolbot™, an innovative temperature control unit that allows the establishment of a postharvest cooling unit at the farm site. They also improved the logistics and infrastructure related to export trade by organizing smallholder growers into cooperatives, ensuring implementation of phytosanitary regulations and developing local and export market systems so that successful ornamental growers have the opportunity to expand their own businesses.

Expansion of the ornamental industry has created new business activities for women, for whom this horticultural niche market represents a culturally suitable entrepreneurial activity. The project has also helped develop a local market for garden and landscape plants and provided a diversified base from which to establish a sustainable export industry. The lessons and outputs of this project are directly transferable to the development of domestic and export driven horticultural businesses in other developing countries.

--- Elana Peach-Fine

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Research and Extension in Latin American Green Pepper Production

Farming a small tract of land is a risky business. Developing-world farmers face ever-changing production constraints, and they typically lack access to agronomic research that could help them adjust to the demands and quirks of their complex agroecological systems. Developing-world farmers, who are barely making ends meet, can rarely afford to devote a portion of their profits to long-term investment in expanding their region's agricultural knowledge base. Horticulture CRSP's goal is to fill this gap by (1) funding research and extension that addresses the diverse production, postharvest and marketing constraints endemic to developing-world horticultural growers and (2) building the capacity of their local research and extension institutions.

Bell peppers are a major export commodity for Central America and the Caribbean. Best of all, smallholder vegetable farmers are getting a piece of the action because they are being included in the value chain. Recognizing the importance of bell pepper production for rural development, Horticulture CRSP is employing USAID funds to conduct a collaborative research and extension project for these smallholders, to boost their yields and ensure they remain a robust part of this international value chain.

In Central America and the Caribbean, small and medium-size growers of bell peppers use passively-ventilated protective structures, like greenhouses and high tunnels, to control the production environment. These structures limit pests, improve fruit quality, increase yields and generate hundreds of direct and indirect jobs. However, high temperatures and humidity inside the protective structures result in fruit sun-scalding, foliar disease and postharvest losses. While American growers can use fans or cooling systems to lower temperatures and humidity inside growing structures, small- and medium-size growers in Central America cannot afford these technologies, and so the heat and humidity prove to be a major production constraint.

In collaboration with University of Florida's Bielinski Santos and several research institutes in Central America, Horticulture CRSP is implementing a research and extension project to help Central American growers overcome this production constraint. The international team of researchers has identified a number of improved agricultural practices that can significantly diminish the adverse effects of high temperatures and humidity in protective structures.

The international team of researchers are demonstrating and testing pruning techniques that reduce foliage and branches to concentrate the plant's energy into production. They are also experimenting with planting densities. Agronomists have hypothesized that by lowering plant density, they can improve air circulation and thereby lower the temperature and humidity. An additional cultural practice that could improve bell pepper fruit quality is the use of sun protectants. These are naturally-available calcium carbonate or kaolin clay-molecules that, when applied to the foliage and fruit, reduce transpiration, water loss, and increase the reflection of UV radiation. The Horticulture CRSP researchers have also discovered that farmers often over-irrigate their bell pepper crops, exacerbating high humidity and temperatures in the protective structures. Therefore, the researchers are determining the evapotranspiration rates of bell pepper crops in each production zone so they can advise the farmers how to more effectively irrigate.

To extend their results to local farmers, the international team of researchers is establishing the Protected Agriculture Information Network for Central America and the Caribbean. PAINet is a comprehensive education and research network designed for information exchange in protected agriculture. This international group ensures that the knowledge gained under the Horticulture CRSP project will reach local farmers, near and far, throughout the project's five target countries, Nicaragua, Haiti, Honduras, Dominican Republic and Costa Rica. Central American growers have come a long way to become an established partner in the green pepper value chain. They face unique production constraints that challenge their place in the market. USAID funds are establishing enduring research and extension mechanisms in developing countries, like PAINet, that conduct research on behalf of these growers and educate them with their results.

--- Peter Shapland, Bielinski Santos