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Sol Newsletter

Community News

International workshop on food security through potato production

By Teresa Mosquera



An international workshop on food security through potato production and human nutrition was held in Bogotá, Colombia on June 24 -25, 2013. It was organized by McGill University and Universidad Nacional de Colombia, with participation of specialists from Bolivia, Brazil, Canada, Colombia, Ecuador, Guatemala, Peru and the United States.

There were more than three hundred participants, which included policy makers, potato researchers and growers, social workers, and nutritionists. They reviewed current Colombian public policies and research related to nutrition; gender, family and nutrition; contributions of potato breeding to food security and nutrition; and new technologies in potato post harvest.

An interesting poster session provided research results from McGill University and the Universidad Nacional de Colombia under the project "Global food security of indigenous communities in Colombia, through nutritive potato production and community education", which is funded by IDRC and CIDA from Canada. The results regarding the nutritional quality of *Solanum phureja* were quite interesting because they showed variability, which demonstrated that a breeding program is feasible. Relationships between intra family violence and nutrition were found and monotony in food intake was found to be a significant problem in native family nutrition.

Update on the 10th Solanaceae Conference (SOL 2013)

Provided by Hongling Jiang

You are cordially invited to the 10th Solanaceae Conference (SOL 2013) to be held at the Beijing Friendship Hotel in Beijing, China, from October 13-17, 2013. SOL 2013 program comprises four plenary sessions including eight keynote lectures, eight scientific sessions and eight parallel sessions. For more information, please refer to the conference website: <http://www.sol2013.org/>.

Keynote speakers are:

- Jiayang Li** (Institute of Genetics and Developmental Biology, CAS) **Topic:** TBA
- Dani Zamir** (Hebrew University of Jerusalem, Israel) **Topic:** Yield Canalization in Crop Plants
- David Baulcombe** (University of Cambridge, UK) **Topic:** Engineering Improved Crops –Examples with Disease Resistance and Epigenetics in Potato, Tomato and Arabidopsis
- Harry Klee** (University of Florida, USA) **Topic:** The Chemistry and Genetics of Good Tomato Flavor
- Ian T. Baldwin** (Max Planck Institute for Chemical Ecology, Germany) **Topic:** TBA
- Jim Giovannoni** (Cornell University, USA) **Topic:** Genetic and Epigenetic Regulation of Tomato Fruit Ripening
- Yongbiao Xue** (Institute of Genetics and Developmental Biology, CAS) **Topic:** Breaking Down the Barriers to Interspecific Hybridization in Solanaceae
- Klaus Palme** (Freiburg University, Germany) **Topic:** Plant Growth and Yield Control by Hormones

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Grant Awarded

The Biotechnology and Biological Sciences Research Council, along with the Scottish Government, awarded £3M in funding to four projects to improve food security for some of the world's most important crops. One of the projects funded is directed by Dr. Glenn Bryan of the James Hutton Institute, Dundee, Scotland. Here is an excerpt from the website that contains the announcement (<http://www.bbsrc.ac.uk/news/food-security/2013/130807-pr-bbsrc-scottish-gov-fund-for-crop-research.aspx>):

Dr. Glenn Bryan, The James Hutton Institute, Dundee, working with: PepsiCo, Albert Bartlett, AHDB-Potato Council, and Mylnfield Research Services. The funded project is:

Controlling dormancy and sprouting in potato and onion

Long-term storage of onion and potato is often necessary, but can lead to losses when these crops sprout during storage. Storage techniques to prevent sprouting are often expensive and environmentally unsustainable.

This research will use advances in biochemistry, genetics and molecular biology to identify the genetic basis of dormancy and sprouting in onion and potato and seek to understand the physiological and molecular control steps, with a view to improve storage and reduce losses.

Highlight Articles

Bittersweet (*Solanum dulcamara*) as a next top model

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Solanum dulcamara plant

Most organisms are competitive in specific niches only. By contrast, *Solanum dulcamara* (bittersweet), a native Eurasian *Solanum* species has a remarkably broad habitat. In the Netherlands, thriving populations of bittersweet plants can be found in the dry and salty coastal dunes as well as in continuously wet borders of fresh-water lakes, and plants occur both in full sunlight as well as in shady undergrowth situations (Golas et al., 2010a). In addition, *S. dulcamara* possesses resistance traits against a number of important herbivores and pathogens. This, together with its diploid genome ($2n=2x=24$) and close relatedness to other solanaceous genomic model and crop species, such as tomato, potato and *Petunia*, makes it an ideal plant to study fundamental and strategic questions regarding adaptation and acclimation to environmental stress factors.

In the Plant Science group at the Radboud University Nijmegen, the Netherlands, we apply expertise from genetics, molecular biology, physiology, chemical ecology and population ecology to answer questions on the biology of this interesting species (<http://www.ru.nl/bsweet/>). Together with researchers from Wageningen University, SGN and CRA, Italy, we have now generated a *de-novo* transcriptome assembly and genetic map of the species (D'Agostino et al., 2013). Based on gene orthology, the map was anchored to the genomes of other *Solanum* species, which revealed novel chromosomal rearrangements and

indicated that breakpoint regions are regularly re-used during evolution.

In recent years we studied the genetic basis of resistance against *Phytophthora infestans* (Golas et al., 2010b). The newly available genomic information enabled us to locate a second Rpi resistance gene in a next-generation mapping approach (Golas et al., 2013). Interestingly, from the point of view of gene evolution, the location of both genes corresponds to that of Rpi resistance loci in several wild potato species. In fact, the *Phytophthora* resistance of *S. dulcamara*, in itself, is remarkable as the species evolved outside of South America, and thus largely without pressure of the pathogen. Resistance gene isolation and trait distribution analysis may shed light on these issues in the near future.



Solanum dulcamara
fruit

At the same time, we have started analyzing the responses of *S. dulcamara* to drought and flooding, alone and in combination with insect herbivory (Calf and van Dam, 2012; Dawood, 2013). We have, for example, uncovered that a signalling network consisting of the plant hormones ethylene, abscisic acid and auxin controls outgrowth of aerenchymatic stem-born roots, which functionally replace the primary root system upon flooding. In these studies, transcript profiling by RNA-Seq or using the recently developed *S. dulcamara* microarrays (A. Steppuhn, FU Berlin, Germany, unpublished) helps us understand the molecular basis of adaptation and acclimation. Furthermore, we are employing phenotypic and genetic characterization of selected populations to reveal whether the broad habitat of the species is purely based on plasticity or a local adaptation component.

Taken together, this new research line adequately shows how current genomic tools generate realistic possibilities to study ecologically relevant, non-model species, at all biological levels. And, indeed, we hope you may enjoy many more bittersweet publications in the years to come!

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Improving diet adequacy through primary school children in urban and peri-urban areas of Kampala, Uganda

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One in three Ugandan children suffers from stunting, a lifelong condition that results when children miss out on critical nutrients such as proteins, vitamins and minerals while in the womb or in the first five years of life, costing the country 5.6% of its gross domestic product¹. More alarming is that the Nutrition Department-Mwanamugimu Child Nutrition Unit, at Mulago National Referral Hospital in Kampala demonstrated a four-fold increase in admissions to therapeutic feeding programs in the six months between January and June 2011²! Such trends reflect the poor nutrition and food security status of households in Kampala. The most common staple foods in Uganda are low in vitamins. Urban agriculture on the other hand has potential to make a positive impact on household food security and nutritional status of low-socioeconomic status groups. Most of the malnutrition, especially in low income communities, is largely due to lack of knowledge in food preparation but also irregular access to nutritious food which may be a result of high market costs of vegetables or space limitations for gardening. This project sought to reduce malnutrition in low income communities in urban and peri-urban Kampala by integrating nutrition and vegetable gardening in limited spaces. Funding was sought from the Virginia Gildersleeve International Fund (VGIF).

The project had two goals:

1. To empower primary school girls and young community women with knowledge on diet adequacy (especially micronutrient deficiency) and how to grow vegetables in the confines of their spaces.
2. To provide basic business skills such as bookkeeping, saving and marketing of their vegetable products.

The project was undertaken through the University Association of University Women (UAUW), an affiliate of the International Federation of University Women (IFUW), in two different primary schools around Kampala and their surrounding communities. The major activities were in two vegetable growing seasons (four months each), including a sensitization or reflection meeting, garden preparation and maintenance, harvesting of vegetables, cooking demonstrations, a bookkeeping workshop, and individual follow-up visits. A vegetable growing and food preparation pamphlet was also produced in English and a local language, Luganda.

There were 126 school girls, 28 boys, and 42 community women at Mawanda Road primary school and 220 girls and 16 community women from Kikaya Primary School. The schools and communities selected the vegetables to grow which included *Solanaceae* family members - tomatoes (*Solanum lycopersicon*), different types of African eggplants (*S. aethiopicum*, locally known as nakati and ntula), eggplants (*S. melongena*), sweet pepper (*Capsicum annum*); other vegetables were from *Brassicaceae* – cabbage (*Brassica oleracea*, Capitata group) and kales (*Brassica oleracea*, Acephala group); Alliaceae- onions and garlic among others.

The two seasons accomplished the following:

1. Mobilization: Key stakeholders in each community were identified and workshop reports created.
2. Sensitization workshops: Two sensitization workshops on nutrition and the importance of including vegetables in diets were held in each community. The vegetables preferred by the school children and community women were selected during these meetings.

3. Seed bed preparation and garden maintenance: Tools, equipment and materials were purchased.
4. Harvesting: Vegetables were harvested from 2 - 5 months with season I and II overlapping.
5. Food preparation: Participants were trained on best cooking methods for vegetables.
6. Reflection and learning meeting: This was a point of evaluation between seasons I and II. We got feedback especially from the women.
7. Bookkeeping and marketing workshop: Participants were trained in bookkeeping and marketing strategies.
8. A pamphlet on vegetable growing prepared in both English and Luganda (one of the local languages widely used in the communities).
9. A 10-minute documentary on the lifetime of the project.

Successes and challenges

The successes include:

- A community of women in Kikaya acquired skills to teach other women how to grow vegetables and increase acreage for commercial purposes. A few households outside the project also started growing their own vegetables at home. Three new community members have come to join two season activities. Some school children requested seed in both seasons to start their own gardens at home. This helped the students develop a sense of ownership and responsibility, foster relationships with family members, and increase parental involvement. The harvested vegetables were used fresh at home and shared with relatives and friends. This had a savings effect on household income as less was spent on purchasing vegetables. Some households were able to harvest their vegetables every two weeks from late November 2012 until the project end in May 2013.
- The target for community women at the Mawanda Road area was 15. However, 42 women attended the sensitization workshop and all expressed interest. Of those, 71% attended the demonstration/training on seed bed preparation. There was a big demand for the project and all interested women were allowed to participate. Most of the women were older than the target age group of 18 years, some up to 40 years old.
- Participants appreciated learning that vegetables can be grown in limited space and also about maintaining the quality (nutritional value) of different vegetables as they prepare meals for their families.
- Interest was raised to engage in other income generating activities such as baking and mushroom growing.

The challenges were:

- Too much rain in the first season which resulted in plant diseases especially in the tomato gardens.
- Some community women at Mawanda Road had poor performance of vegetables in the first season which discouraged them from participation in the second season. Numbers dropped by half in the community women group. It was also challenging to keep the commitment in this group as it was difficult to synchronize project activities with participants' other commitments. This delayed many of the activities and interventions.
- Some community women lost their gardens when the municipality authority started repair work on drainage channel where gardens were.
- Low literacy in some community women; about 2% could not read and write.

Project Pictorial



Training activities on the importance of vegetables and vegetable growing as a business. From left to right: school children being taught the importance of vegetables for good health at Kikaya Primary School; community women from Kikaya going through the importance of vegetables for good health; school children and community women at Kikaya being taught about vegetable gardening as a business.



Training on nursery and seed bed preparation. From left to right: school girls from Kikaya Primary School water a seed bed; prepare a seed bed, display a seed box for a nursery; school girls from Mawanda Road Primary School prepare a sack garden; a sack garden.



Preparation and cooking different vegetables. Left to right: *Nakati* (*S. aethiopicum*) preparation; community women from Mawanda Road; school children in the cooking session at Mawanda Road.

Acknowledgement: The technical assistance and support of the following team members: Pamela Kabod, Agnes Kayondo, Boniface Nkajja, James Isabirye and Prof Alice Kagoda.

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Conferences

7th Annual Convention of ABAP & International Conference on Plant Biotechnology, Molecular Medicine & Human Health

October 18 - 20, 2013

New Delhi, India

<http://www.abap.co.in/7th-annual-convention-abap-international-conference-plant-biotechnology-molecular-medicine-human-hea>

XVIIIth EUCARPIA Meeting on Genetics and Breeding of Tomato

April 22 - 25, 2014

Avignon, France

<https://colloque.inra.fr/eucarpia2014-tomato-avignon>

XXVI Congress of the Latin American Association of Potato

September 28 – October 2, 2014

Bogotá, Columbia

Crowne Plaza: Tequendama Hotel

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Solanaceae Recipes

Papas Chorreadas – Colombian Potatoes with Cheese Sauce

<http://southamericanfood.about.com/od/maincourses/r/papaschorreadas.htm>

Papas Chorreadas is a delicious Colombian specialty. Boiled red potatoes are smothered with onions and tomatoes. The verb *chorrear* means to flow or pour. The sauce in this dish is meant to be “gushing” over the potatoes. The simplest form of this dish has only six ingredients: red potatoes, onions, tomatoes, cream, and a melting cheese such as queso fresco. Many recipes call for scallions, cilantro, cumin, or chile peppers. Feel free to experiment with flavors. Although not traditional, you may add a garnish of crumbled bacon!

Ingredients

3-4 pounds red potatoes
 3 shallots or 1 small white onion
 1 bunch scallions
 1 teaspoon chile powder (optional)
 ½ teaspoon cumin
 3 tablespoons butter
 2 medium tomatoes, diced
 ¼ cup chopped cilantro
 1 tablespoon flour
 ¾ cup cream
 6 ounces queso fresco, whole milk mozzarella or other salted white cheese that melts well



Directions

- Scrub the potatoes and place in a large pot of boiling, salted water. Boil until tender when pierced with a fork. Drain potatoes and let cool slightly.
- Finely chop the shallots or onion. Chop the white part and an inch or two of the green part of the scallions into ½ inch lengths. Finely chop the rest of the green parts of the scallion and reserve as a garnish.
- Melt the butter in a large skillet. Sauté the ½ inch pieces of scallion, the shallots, the cumin, and the chile powder in the butter until soft for about 5 minutes.
- Add the diced tomatoes and cilantro and cook until the tomatoes are soft and fragrant. Add the tablespoon of flour and stir briefly.
- Stir in the cream and cheese and heat until sauce just comes to a boil and cheese is mostly melted. Remove from heat.
- Slice potatoes into halves or wedges and arrange potatoes onto a platter. Pour sauce over potatoes. Garnish with chopped green onion.

Serves 4 to 6 people as a main dish.