Texas A&M University-Kingsville

Citrus Center

Weslaco, Texas

Volume 31 No. 1 NEWSLETTER Spring 2013

Bumper Crop of New Graduates

Eliezer Louzada, Mamoudou Sétamou, Juan Carlos Melga, Madhu Kunta, Shad Nelson and John da Graça

The December, 2013 commencement ceremonies saw several Citrus Center students receive their graduate degrees. In Kingsville, five of our students received their masters degrees:

Dr Louzada supervised two of the students – **Carolina Parra**, who studied the genetic responses in citrus to greening disease, and **Amanda Garcia** whose research was on the over-expression of a calcium signal modifier (CSM) gene in sweet orange. Dr Kunta assisted in supervising their research.

Left to right: Marisol Esparza, Amanda Garcia, Diego Garza-Erdmann, Laura Luna Guzman and Carolina Parra

Laura Luna Guzman worked under the direction of Drs Melgar and Louzada, and studied the effects of the CSM gene on cold tolerance.

Dr Setamou and Dr Nelson co-chaired the committees of two students – **Marisol Esparza** studied the effects of calcium application to citrus in the Asian citrus psyllid, and **Diego Garza-Erdmann** looked at the effect of micro- and macro-nutrition on psyllids.

Three other students associated with the Citrus Center graduated in December at other universities:

Rajmohan Uckoo, who obtained his MS from Kingsville in 2006, completed his PhD at Texas A & M University under the guidance of Dr Bhimu Patil, with Dr Nelson

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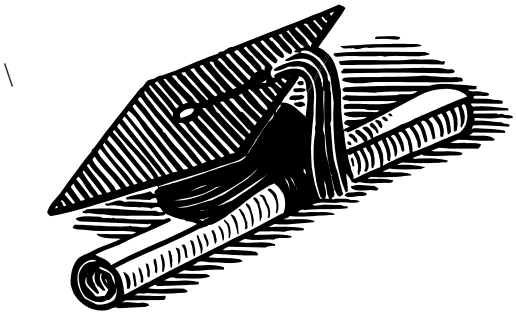
serving as co-chair of his committee. He obtained materials form the Citrus Center for his research on pre- and post-harvest factors on citrus phytochemicals.

Dara Stockton, who is working in Dr Setamou's lab, completed her master's thesis through the University of Texas-Pan American. Dr Setamou served on her committee, and her research was on evidence for olfactory and visual learning by the Asian citrus psyllid.

Antonia Romero, an M.S. student from the Universidad de Cordoba (Spain) who developed several research experiments at the Citrus Center in 2012, successfully defended her thesis titled *"Physiological Responses of Citrus to Different Irrigation Strategies for an Efficient Water Use"* and graduated at the Universidad de Cordoba on December 13th, 2012. Antonia worked at the Citrus Center under Dr Melgar's guidance between May and November 2012. A poster with her results will be shown in the next American Society for Horticultural Science Annual Meeting, and a research paper is in the process of being submitted to a scientific journal.

Congratulations to all, and we wish you success in your future careers



Tribute to Joe LaDuke

(1934-2013)

One of the Citrus Center's retirees, Joe LaDuke, passed away at his home in Weslaco on January 24, 2013.

Before joining the Citrus Center, Joe served in the United States Army for 2 years, stationed at Fort Huachuca in Arizona. He then began his 30-year career at the Center, working as a research technician in the Soil Science laboratory, first under Dr Bob Leyden until his retirement in 1984, and then under Dr Darek Swietlik.

Joe retired at the end of January, 1990. He continued to live in Weslaco with his wife, Nancy, applying his skills to repairing anything and everything, as well as doing some fishing. He and Nancy were regular visitors to the Center, and always joined us for the Christmas lunch.

Everyone at the Center sends their condolences to his wife and family. He will be remembered and greatly missed.

Texas Citrus Budwood and Nurseries Go Under Cover

John da Graca and Mark Van Ness

Texas has had a mandatory citrus budwood certification program since 1997, managed by the Citrus Center. Because diseases such as tristeza and greening are carried by insects, the Citrus Center constructed a screenhouse for foundation trees in 2008. A greenhouse at the Texas A&MAgriLife Center in Stephenville, TX (440 miles north of the Valley) was also renovated for a reserve foundation collection.

In mid-2009, a grant was obtained from the US Department. of Commerce - Economic Development Administration (EDA), to construct an insect-resistant screenhouse for increase budwood trees.

(Budwood cover cont. from pg.2)

This project was completed in the summer of 2011, and is currently being populated with trees using budwood from the protected foundation trees.

After the confirmation of citrus greening in Texas in January, 2012, protecting all foundation and increase budwood production became a top priority. Plans to convert part of the EDA-funded structure to a positive-pressure with funds from the industry were abandoned because of cost-overruns. Instead it was decided to use two of the four sections of the current partitioned screenhouse space for the main commercial foundation trees, with the older screenhouse to be used for foundation trees of the non-commercial varieties. Industry funds were made available to help build non-permanent screen structures over existing commercial increase trees until the new increase trees are in production in 2014. These trees have been regularly tested for tristeza and greening, and will be tested for the second time since being covered this spring before any budwood is released.

Producing disease-free budwood for Texas citrus nurseries is the first step in the fight against greening. The next step is to keep them disease-free once the trees are established in citrus nurseries. In 2012, a committee of citrus nurserymen and growers decided to voluntarily move towards producing trees in insect-resistant structures by September 30, 2013. To ensure that all production will be protected from insect vectors, the current legislative session of the Texas legislature is being asked to amend existing budwood legislation to require nurseries in the 'citrus zone' (described in current regulations as the eight counties making up deep south Texas) to produce citrus trees in approved, insect resistant structures.

Top: Foundation trees

Middle: New increase trees

Left; Original increase trees under non-permanent screen

Colony Forming Units (CFU) – Useful Data When Used Properly

Mani Skaria

Colony forming unit (CFU)

CFU is an abbreviation for colony forming units. When water is poured onto a bacterial culture medium, you will see colonies after an incubation period. In bacteriology, a colony is defined as a mass of cells in a group, visible to the naked eye. Each colony can arise from one bacterium or more than one bacterium of the same kind or different kinds. We can get an idea of how many colonies of bacteria grow from a given amount (example, 1 ml) of water. Here, CFU can be considered a quantitative measure. Naked eye exam cannot distinguish whether a mass of cells (colony) originated from one cell or more than one cell. Similarly, naked eye exam cannot distinguish whether a mass of cells (colony) originated from one species or to that matter from the same genus. A colony is not necessarily a pure culture. A colony forming unit or CFU is NOT strictly a quantitative term. Therefore, students and practitioners of plant pathology should learn how to properly benefit from the term, CFU. Furthermore, they should lean to understand when and how the CFU assessment can tread into a grey area of quantitative assessment.

The beauty of potable water

For all practical purposes, potable water is a homogenous fluid – it is a clean liquid with minerals and micro-organisms as contaminants. A CFU assay and the number of CFUs obtained are true to reality compared to the assay of a sample of water with substantial soil particles in it.

CFU assay taken to Plant Pathology

In the context of CFU, plant pathologists deal with bacteria and fungi, mostly with single cells and multiple cells, respectively. Moreover, fungi can exist in more than one form such as asexual conidia, sexual spores, mycelial fragments, chlamydospores, etc. The point to remember is that as plant pathologists try to engage CFU applications to their profession, the complexity increases from bacteria to fungi.

CFU applications in soil-borne fungal assays

CFU appears as a great tool for assay of soil-borne fungal pathogens. In fact, it is an applicable tool when and where the investigator(s) understand the limitations, because of the complexity of soil itself. Generally, soil consists of four components: inorganic mineral, organic matter, water, and air in different proportions, depending on the soil. In addition, the soil contains various levels of micro-organisms. Soil has another complex problem for the plant pathologists – the soil can have varying proportions of sand, gravel, silt, clay and organic matter. The micro-organisms present in the soil can be neutral or competing with the organism that is of interest to the plant pathologist. Then there are seasonal variations – winter, spring, summer and fall – microorganism are at different levels of activity during the four seasons. And the rain -little or too much rain; and the water drainage characteristics bring another complexity to CFU assay of a soil-borne pathogen. Consistency in soil sampling procedure and storage conditions bring other variables. When you do a CFU analysis of a particular fungal pathogen in the soil there are lots of factors to consider. The bottom-line is that soil sampling for CFU assay appears simple but has many inherent variables that can affect the result.

A Commonsense Approach

Well, with all the above variables would it be possible to get a straight forward answer? Of course, not.

But we can get an idea that may very well help us with disease management strategies. Relying on CFU as a gold standard, for example as in soil assay for *Phytophthora* probably can lead to unrealistic conclusions – all depends on how well you understood the soil complexities.

An analogy from a true situation

I was in east Texas years ago visiting a backyard with a Texas A&M Extension agent. His 7-year-old son, wearing shorts and slippers was with us. He

(CFU, cont. from pg. 4)

stepped into an ant mount and within seconds his bare legs were covered with ants – ant bites and blisters on his legs, crying and confusion! My limited familiarity with the ant colony and the ants made me believe that it is one of the Imported fire ants and I was satisfied with the identity of it as *Solenopsis*, spp. If I am very serious about it, I can take 100 cc soil and count the ants and report to the father the severity as X ants/cc soil. But what's the use? The bites on the young boy's legs were obvious.

A citrus tree, declining with *Phytophthora* needs help – in the form of balanced nutrition, water and treatment applied properly. *Phytophthora* propagule counts, if done properly will give a quantitative assay; however, it is not a straight forward single piece of information for disease management.

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April showers bring May flowers!

Thank you!

A special thanks goes to
Rosanna Elizondo-Villarreal
for the design and layout of this newsletter.