TEXAS A&M UNIVERSITY-KINGSVILLE

CITRUS CENTER

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NEWSLETTER

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CITRUS CENTER LOSES A TRUE FRIEND

The Citrus Center lost a dear friend when Raul Longoria, longtime Valley legislator and Judge, passed away recently. The former Valley resident and longtime member of the Citrus Center Advisory Committee died in Austin on Monday, May 7 at the age of 80. The president of the then Texas A&I University in Kingsville, appointed Longoria to the Advisory Committee in 1984 and he served in that capacity uninterrupted until 1997, when he retired from most activities and later on moved away from the Valley.

Dr. Richard Hensz director of the Citrus Center, invited Longoria to serve on the Advisory Committee. "Senator Longoria was always very interested in citrus, being a grove owner himself', said Cullen Looney who served with Longoria both in the Legislature and the Advisory Committee. Longoria accepted the invitation and soon distinguished himself as a member of the group, attending meetings and functions at the Citrus Center religiously, no matter how busy his schedule was.

I personally met Raul Longoria soon after coming to the Valley in 1965 to become South Texas Plant Pathologist with the Texas Agricultural Extension Service He was quite a personality in the Valley by then, having been elected to the House of Representatives in 1960. Our relationship was a long and unselfish friendship that spanned many years while Longoria served the people of the Valley and Texas in different capacities. In 1973, he was elected to the State Senate, serving as an outstanding Senator for the Valley area.

"He became a member of our Committee at a time when our industry and the Citrus Center could use some help from the folks in Austin," said Blaine Holcomb, a longtime member of the Advisory Committee who had served in the committee for several years before Longoria was appointed. "In spite of his

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SECTION 24(C) SPECIAL LOCAL NEED LABEL FOR RIDOMIL GOLD® EC

As a result of the recent discovery of citrus tree decline associated with root weevil(s) and *Phytophthora*, a Section 24(c) Special Local Need Label has been approved for Ridomil Gold® EC. This label includes application [of this Ridomil Gold EC] for all types of citrus grown in the Valley (grapefruit, lemon, lime, orange, tangelo, tangerine, citron, kumquats, satsuma, mandarin, etc). This product may also be used for citrus resets or new plantings at the time of transplanting. Soil surface application is permitted (apply 1 qt per treated acre), under the tree canopy, and application through low volume irrigation systems is permissible at a rate of ½ pt per grove acre. If the Phytophthora problem is severe, the rate may be increased to 1 qt. per acre per year. Applications of Ridomil Gold EC are ideal when

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ADMIRE 2F AND PROVADO 1.6F LABELED FOR CITRUS

Admire 2® Flowable and Provado 1.6® Flowable (Products of Bayer Corporation) recently received a Section 3 Federal Label for citrus. The active ingredient in both products is Imidacloprid, a highly systemic insecticide, effective against aphids, blackfly, citrus leafminer, leafhoppers, mealybug, armored and soft scale, root weevils, whitefly and termites. Admire 2F at a labeled rate of 16-32 oz/acre can be applied to field citrus as a surface band sprayed onto the soil on both sides of the tree row; or as a drench at the base of each tree; or put through the microsprinkler irrigation system below the tree canopy. It can also be applied to containerized citrus at a rate of 0.75 ml per cubic

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FIRST SWEET ORANGE-GRAPEFRUIT PARTIAL HYBRID TEST-TUBE BABY

Most citrus species produce seedlings which are mostly genetically identical to the mother tree, and this fact makes it almost impossible to carry out conventional breeding to produce new varieties. Consequently, most citrus varieties have been developed by selecting from natural or induced mutations.

A few years ago, a technique was developed for animal systems to transfer one or a few chromosomes to other cells, and subsequently a Dutch research group reported similar results for tomato and potato. No further work on any plants is being done, as far as we know. My lab has now established the technique for transferring one or a few chromosomes from one citrus species to another. The technique involves producing small wall-less citrus cells, called micro-protoplasts, containing one chromosome, and fusing these with wall-less cells from another species. The fused partial hybrid cells are then cultured on artificial growth media , and new plants are generated from them. Amongst the first plants produced in this way are some sweet orange plants containing two, four or six grapefruit chromosomes. Six months after fusion we now have small micro-grafted plants growing in the lab. They will later be transplanted into pots in the greenhouse, prior to field planting.

There is much more research to be done. So far we have just been establishing the technique. Later we hope to be able to use genetic markers to identify which chromosomes have been transferred, and then we may be able to do more directed hybridization. There will also still have to be long-term field trials to select suitable commercially useful varieties. This, however, is the first time anyone has been able to develop this technique for citrus, and opens up the possibility of producing an almost limitless range of combinations of citrus features. Imagine a sweet orange containing the health promoting substances from grapefruit, and the peelability of a tangerine!

Eliezer Louzada

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many responsibilities, he always found time to attend the meetings of the Advisory Committee to lend his expertise, knowledge and influence for the betterment of the Citrus Industry", said Holcomb.

In 1981, he became a District Judge until his retirement in 1993. "After Raul retired from the Senate he became a very active member of the Citrus Center Advisory Committee. He continued to contact his friends in the legislature and governor's office to successfully obtain help and funding for the Center. He was a true friend and advocate for the Center and the industry," said Looney.

I fondly remember his interest in plants. He told me repeatedly of his efforts in growing different types of fruit trees in his home in San Juan. Raul and I personally planted two Lula avocado trees in his backyard. The trees were especially grown and given to us by Norman Maxwell, of the Experiment Station. They did well and prospered, but unfortunately, the trees died during one of the cold spells that hit the Valley. But that did not diminish his interest in plants. Every time we ran into each other, we would talk about trees, shrubs and plants in general. He would seldom miss a meeting of the Advisory Committee, and although not as directly involved in the citrus industry as some of the other members, he recognized the importance of the industry to the economy and welfare of the Valley and rightly earned the respect of the leaders of the industry. It was during the latter years, when I personally became involved with the Citrus Center and began attending the meetings of the Advisory Committee, that I really learned to appreciate his interest and deep commitment and dedication to the citrus industry and the Citrus Center.

Gracias, Raul, for a job well done.

Jose Amador

VISITORS TO THE CITRUS CENTER

Mr Joe Mitchell & Mr Kevin Hagedorn, BASF Corp. Field Development and Sales Representatives, respectively visited on April 17th.

Dr Alan Dalrymple, Product Development Manager, Uniroyal Chemical Co. visited on May 24th.

Dr Drew Palrang, Field Development Representative, Bayer Corp. visited on May 30th.

Dr French gave an update on the Texas Citrus IPM and new pest problems at the Citrus growers meeting sponsored by Syngenta Chemical Co. June 3rd.

2ND GRADUATE STUDENTS SYMPOSIUM AND AWARDS CEREMONY

The 2nd Department of Agronomy & Resource Sciences Graduate Students' Symposium was held recently in Kingsville. Sixteen students, eight of them from the Citrus Center, presented papers describing their research projects. The center's presentations were on the attempts to develop tristeza resistant citrus (Caroline Herron), citrus tatterleaf virus surveys (Craig Kahlke) and tissue alterations (Liza Vela), biological control of citrus mites (Tianye Chen) , citrus breeding by chromosome transfer (Sonia Del Rio), gene identification by differential display (Magarita Rojas), studies on limonoids in grapefruit (Jiaxing Li) and postharvest treatment effects on phytochemicals and their health benefits (Jairam Vanamala).

At the end of the symposium, the Department awarded the recently instituted awards for excellence in teaching, graduate studies and undergraduate studies. Two of the awards went to the Citrus Center: Dr Bhimu Patil was given the teaching award, while Dianren Xia, who completed his MS degree at the end of last year, won the graduate student's award. Congratulations to both.

John da Graca

Left to Right-Sonia del Rio, Craig Kahlke,Margarita Rojas, Tianye Chen, Jairam Vanamala,Jiaxing Li, and Julio Hernandez (Absent, Caroline Herron and Liza Vela)

GRADUATE STUDENT PROGRAM AT THE CITRUS CENTER

The Citrus Center did not historically have a role in training graduate students, but this has changed in recent years and faculty are now all actively engaged in supervising graduate students. While priority is obviously given to students registering through Kingsville, supervision is also given to students from other institutions which request our expertise. The new cooperative PhD program between the Department of Agronomy & Resource Sciences in Kingsville and the Department of Horticulture in College Station will enhance the graduate student activities. The students are all involved in research projects which have benefits for the agricultural industry of the Valley. A look at the numbers below will give an idea of the successes so far.

The first to graduate was Caroline Herron (1997), who registered at Bristol University in England. The next three MS students who subsequently graduated (Barbara Cutrer, Yan Liu and Dainren Xia) were all TAMUK students. Nine students, three PhD (Caroline Herron, Jairam Vanamala and Jun Yu) and six MS (Margarita Rojas, Jiaxing Li, Craig Kahlke, Mayra Arredondo, Tianye Chen and Julio Hernandez), are currently registered at either Kingsville or College Station. Only two students who have begun their studies have left the program, although one who has completed all the course work and research plans to return next year. Two others are taking courses part time with the intention of obtaining a PhD.

In addition, four graduate students registered at other universities have done some of their research at the center - Liza Vela (UTPA), Gabriella Garcia (UTB), Jose Moran (Monterrey Tech) and Celeste Clark (Natal University).

One of the MS students, Margarita Rojas will graduate in August, but two more students, Shibu Paulose and David Ochoa, will be starting their studies in the fall. We are continually receiving enquiries for graduate studies, many from foreign countries, but there is also now an interest from Valley students.

John da Graca

KATYDID (OR DIDN'T!)

Although the Katydid is considered a minor Texas citrus pest, it is frequently found in early to mid season damaging new flush foliage and fruit. Green in color and resembling a grasshopper with very long antennae, it is therefore often referred to as a 'long horned grasshopper' (Figure 1). The species most common on Valley citrus is *Scudderia furcata* Brunner, or fork-tailed katydid. It is so named because of a distinct forked appendage at the tip of the abdomen of the male. The eggs of *S. furcata* are inserted into the edges of older leaves, with the small katydid nymphs emerging in early spring. There is generally only one generation a year lasting from petal fall into early summer (February-June).

S. furcata feed mainly at night on young leaves and new developing fruit, particularly in the interior tree canopy. Sweet orange varieties ('Marrs' especially) are preferred, but grapefruit also come under attack from katydids. Feeding injury on fruit appears as circular, depressed areas which become callused, with the damage sometimes confused for 'wind-scarring.' The injury is cosmetic and doesn't affect the internal fruit quality. However, fresh fruit marketability can be affected. In 1991, fruit on many of the Citrus Center's "Marrs " orange trees just recovering from the 1989 freeze—sustained serious katydid feeding injury and most were marketable only for juice.

Figure 1. Katydids or 'longhorned Grasshoppers' and feeding injury on 'Marrs' orange foliage & fruit.

Foliar feeding injury varies from distinct notching of leaf margins (often confused with the damage caused by the common leaf notching weevils—*Compsus* and *Epicaerus* spp.), to large 'eaten-out' areas often extending to the mid vein of the leaf (Figure 1). At times irregular holes or elongate 'slashes' are cut in the interior of the leaf, with no apparent damage along leaf margins. Severity of fruit and leaf injury is dependent both on the size and predominating developmental stage of the population i.e., adult katydids obviously causing far more feeding damage than that inflicted by the small immature or nymphal stages.

Seldom is it necessary to recommend a chemical spray specifically for katydid control. However, Lorsban 4E® is labeled at a rate of 2-7 pints/ acre for control of katydids on citrus. Since Lorsban 4E is routinely included in the early summer spray for armored scale insect control it has the added benefit of taking out incipient katydid infestations.

J. Victor French

NEW FACES AT THE CITRUS CENTER

The Center welcomed four new hires in late May and early June to work on various projects. Working in Dr French's lab is David Alejandro who will mainly work on monitoring root weevils, while Dr Mani Skaria has hired Zeke Avila and Rene Garza to provide assistance in his Phytophthora and greasy spot research programs. David and Zeke are part-time students at the University of Texas Pan-American. We also just employed Lucio Aguila to replace Beto Garza Jr as Craig Kahlke's assistant in the Budwood program; Beto left in April to work full-time in the family nursery business, while Lucio comes to us with 17 years nursery experience at Guinn's Nursery.

Left to right Lucio Aguila, David Alejandro, Rene Garza and Zeke Avila

CENTER'S RESEARCH ON HEALTH BENEFITS OF CITRUS PECTIN PUBLISHED IN LEADING JOURNAL

Traditionally pectin has been used by the food industry as a thickening agent, such as in the production of jams and jellies. Recently it has been shown to have potential beneficial effects in human health. Dietary supplementation of pectin decreased blood cholesterol levels and reduced serum glucose in patients with diabetes mellitus. In addition, modified citrus pectin has been shown to prevent spontaneous cancer metastasis and inhibit cancer cell proliferation. Recent studies also suggest that the beneficial effects of pectin are closely related to its structural characteristics.

The Functional Food Lab of Citrus Center in collaboration with Institute of Bioscience and Technology in Houston and University of Texas-Pan American undertook a study to characterize the pectin from four citrus species and to determine their ***in vitro*** inhibitory activity on the binding of Fibroblast Growth Factor (FGF) to the FGF receptor (FGFR). The fibroblast growth factor (FGF) signaling system is ubiquitous and a mediator of developmental processes in the embryo. Our results suggested that defects in this signal transduction system disturb the regulatory process and result in many diseases such as cancer, cardiovascular disease, and diabetes mellitus. Pectin from various parts of lemon, grapefruit, tangerine, and orange were isolated and characterized. Tangerine had the highest pectin content among four citrus species. Conventional belief has been that pectin is available only in the flavedo and albedo. We found that the segment membrane contained as much as, or more pectin than flavedo/albedo. The interdependency of heparin, a sulfated polysaccharide, on factor-receptor interaction provides a means for identifying new antagonists of growth factor activity and thus for treatment of various diseases. **For the first time**, our results demonstrated that citrus pectin inhibited the FGF-1 binding to FGFR1 by competing with heparin. Furthermore, pectin significantly inhibited the binding of FGF-1 to FGFR1 in the presence of 0.1 μg/mL heparin. The pectin from the segment membrane of lemon was the most potent inhibitor. The inhibition activity was significantly correlated with sugar content, methoxyl content and molecular size of pectin. Kinetic studies revealed a competitive nature of pectin inhibition with the heparin, a crucial component of the FGF signal transduction process. The observation that the heparin-dependent biological activity of FGF signal transduction is antagonized by citrus pectin should be further investigated as anti-growth factor agents for potential health benefits. The results of this research are published in the June issue of the prestigious Journal of Agriculture and Food Chemistry. Interested readers can access it on the web site **http://pus.acs.org/reprint-request?jf001020n/** or contact me through E-mail: **b-patil@tamu.edu**

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foot of container soil media (or a higher rate of 1.25-2.5 ml / cubic foot specifically for control of citrus root weevil larvae).

Provado 1.6F at a labeled rate of 10-20 fl oz/acre is applied as a foliar spray to orchard trees for control of the aforementioned pest species. It should be noted that—a maximum of 32 fl oz /acre of Admire is allowed per season, or 40 fl oz /acre of Provado allowed per season. Admire 2F and Provado 1.6F will be added to the Citrus Center Pest Control Guide and provide Valley growers with important alternative chemicals for incorporation into their citrus integrated pest management (IPM) program.

J. Victor French

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new root growth flushes occur in spring, summer, and fall.

Ridomil Gold EC is a systemic fungicide with a mode of action that may develop resistance to *Phytophthora*. However, the application of this product may be useful in managing some of the root weevil-related *Phytophthora* problems in the Valley orchards. Always read and follow the label instructions.

Ridomil Gold will be more applicable on trees that show decline symptoms associated with root weevil and *Phytophthora* damage. Another fungicide, Aliette, may be used as a pro-active foliar spray in healthy looking orchards that may be infested with root weevils. Results thus far from our field studies indicate that the healthy-looking trees in root weevil affected orchards already are infected with *Phytophthora*. Pro-active fungicide treatment is highly desirable in this type of situation.

TAMUK ADMINISTRATORS VISIT CENTER

At the beginning of June, the TAMUK Provost, Dr Kay Clayton, accompanied by the Vice President for Finance & Administration Mr Steve Crandall, and the Dean of Agriculture & Human Sciences, Dr Ron Rosati, paid a visit to the Center. After an intensive tour of the Center during which they saw the research activities of all the scientists and their technicians and students, they met with Center administrators, faculty and section heads to discuss the future of the Center. They then visited the South Research Farm, and the Experiment Station where they had lunch with faculty and staff from the Citrus Center, the Experiment Station and the Extension Services; the new Director of the USDA ARS Kika de la Garza Center, Dr Jerry Quisenberry, and the chairman of the Citrus Center Advisory Committee, Mr. Jimmie Steidinger were also introduced. After a tour of the laboratories, the visitors were taken to see the land at Rio Farms which the Citrus Center will lease in the near future.

This is the first time that Dr Clayton has been able to visit the Center since she became Provost, and commented that she was impressed by what she saw. The involvement of faculty in the training of students by involving them in programs to answer citriculture problems was particularly noted as was the continued services to the industry.

John da Graca

Subscriptions to the bimonthly Newsletter are $5 a year or $8 for two years. International rate is $7 a year. Make checks payable to Texas A&M University-Kingsville. Address comments or inquiries to Newsletter Editor, Texas A&M University- Kingsville Citrus Center, 312 N. International Blvd, Weslaco, Texas 78596 or, in the case of signed articles, directly to the staff member named. Articles appearing in the Newsletter may be reproduced, in whole or in part, without special permission. Newspapers,periodicals and other publications are encouraged to reprint articles which would be of interest to their readers. Credit is requested if information is reprinted.

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