

Texas A&M University-Kingsville

Citrus Center Highlights

FY 2017-2018



1951



1970



1997



2000



Dr. Paul Rohrbaugh



Dr. Richard Hensz



Dr. Jose Amador



Dr. Darek Swietlik



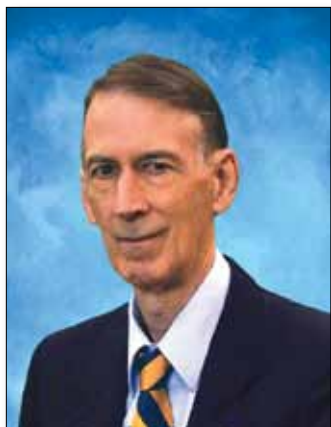
Dr. Mike Gould



Dr. John da Graca

Citrus Center Leaders, 1948-present

Message from the Director



John da Graca
Director

The Citrus Center opened its doors in 1948 – 70 years ago! Despite the challenges (freezes, droughts, floods, pests, diseases, etc.) through the decades, the Texas citrus industry is still here, and so is the Citrus Center.

The challenges continue, but fortunately, our citrus growers are tough. The cut in the line-item funding for the Citrus Center from the Legislature presented a challenge this past year, but because of the productive work by faculty and staff, the University was able to justify making up the difference from its reserves. For that, we are truly grateful to President Tallant for this support.

Faculty responded by bringing in over \$3.7 million in grants and contracts for FY 2018, and have already lined up nearly \$2 million for FY 2019 to fund the wide range of projects they manage. All our efforts are designed to support the industry. We greatly appreciate the investment growers make through the Texas Citrus Producers Board. This enables them to secure additional funding from the California and Florida industries, as well as private companies, and state and federal agencies.

Another measure of recognition our faculty receives is the invitations they receive to serve as co-project investigators on projects led by other research institutions, and to serve on various federal and industry research review panels.

While we all continue the fight against HLB/ACP and other threats, there are some bright spots. The new orchard establishment project is looking promising, the new red grapefruit patent has been submitted, and pathogen clean-up has been started. Also, testing of potentially tolerant HLB rootstocks is underway, and a potential biocontrol agent, along with a resistant sour orange selection, is in the works to deal with the ongoing Phytophthora issues. The Valley's 2018-19 crop is looking good, and if prices hold up, we should all benefit.

We again appreciate the support we receive from the citrus growers of Texas.

A handwritten signature in black ink that reads "John da Graca".

Message from the Editor



Dr. Catherine Simpson
Editor

The first issue of the 'Citrus Center Highlights' magazine was met with an overwhelmingly positive response. This year, we hope to bring you a more refined and polished version with updates on our research, accomplishments, and information on events that we conducted throughout the year.

The 2017-18 fiscal year has brought many changes to the Citrus Center. We have had students graduate and several new students join us. Our staff, research associate, and post-doctoral researcher numbers have increased to meet research expectations. We have had new grants funded, projects started, new collaborations, visitors from near and far, and many successful events. All of which are facilitated, enhanced, and supported by our collaborations with growers. We celebrate this year and look forward to many more serving the citrus industry of Texas.

Thank you,

A handwritten signature in blue ink that reads "Catherine Simpson".

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Our special thanks to all our sponsors and to all who submitted photos and information. This publication would not have been possible without the cooperation of everyone.

Graphic Design and Editorial Production by Alex Blinder, Rod Santa Ana, RGV1.com



Dr. Shad Nelson
Dean

A Message from Dr. Shad Nelson, Dean of the Dick & Mary Lewis Kleberg College of Agriculture & Natural Resources (AGNR)

The College has been going through an exciting time of growth and change, with an overall 12 percent undergraduate growth and a college growth exceeding eight percent this fall compared to last year.

You may notice the name of the College has been shortened a bit. This, along with other strategic changes within departments, was initiated to better serve our students and stakeholders, and is in line with our current College mission statement. It reads: *"Founded upon student career success through experiential learning, critical thinking and leadership. Through applied research, outreach and service, we improve the well-being of stakeholder."*

One highly research-centric department will be renamed the **Department of Rangeland and Wildlife Sciences**, inclusive of the Caesar Kleberg Wildlife Research Institute. The King Ranch Institute of Ranch Management will move from the **Department of Agriculture, Agribusiness & Environmental Sciences (AGSC)** into a newly created **Department of Animal Science and Veterinary Technology**.

This will allow AGSC faculty to maintain their high research focus in connection to the **Citrus Center** where external grant funding is \$3.5 million annually - a tremendous accomplishment for a group of only six faculty.

The Plant and Soil Science MS graduate program housed in AGSC is a growing (28 percent increase this year), and Citrus Center faculty play a critical role in mentoring these students. In addition, we are finalizing a new MS program in Environmental Systems Management, effective Fall 2019, where students will be trained in Environmental Sciences, Systems Thinking and Business Management to prepare them to be leaders and managers.

Your support of the Citrus Center is greatly appreciated, and your voice is needed in defense of why the Lower Rio Grande Valley needs a research-focused Citrus Center that aims to preserve, protect and serve a \$100,000,000 industry for the good of agriculture and the people of south Texas.

Thank you for all your caring support for the most fruitful industry in Texas.

Sincerely,



TEXAS CITRUS MUTUAL

A Message From Dale Murden, Texas Citrus Mutual President



I'm pleased to report that the Texas citrus industry is alive and well. The 2017-2018 crop year showed increases in all areas of harvest. Total tons and cartons packed were both above last season's levels. Exports were up, and quality was remarkable. New plantings are on the increase and cautious optimism is prevailing.

Your industry, the citrus industry in Texas, accounts for over \$465 million annually in total economic impact to our state. You also are responsible for well over 6,000 jobs. This, for a commodity of approximately 28,000 acres, is extremely impressive, and has the attention of lawmakers, both state and federal, as well as universities and the U.S. Department of Agriculture.

All this said...while TCM and the university are here to celebrate tonight, we still have our work cut out for us. HLB, or greening, is on the rise, and is now found in all areas of the RGV. Also, the 'W' strain of canker is still being found, and of course our never-ending battles with Mexican fruit flies are ever prevalent. Together we must work to solve these challenges and new ones as they arise.

We'd like to congratulate the Citrus Center on hosting it's 3rd Annual Appreciation event, and also let them know it is we who appreciate them as well. So, thanks to all the scientists, staff and administrators for helping our industry remain a viable part of the Texas economy.

Dale Murden

The Citrus Center Turns 70 Years Old

By: Dr. John da Graça



Paul Rohrbaugh

The Texas A&M University-Kingsville Citrus Center has been serving the Texas citrus industry since 1948. The center came about after a group of local citizens and citrus growers approached the then-Texas A&I University to establish a research and training facility specializing in citriculture in the Lower Rio Grande Valley.



Richard Hensz

Since then, the Citrus Center's research field plots have grown to over 200 acres located in Weslaco and Monte Alto.

Now, in 2018, the Center just turned 70. A lot has changed over the years, but the mission of serving the citrus growers has not. To this end, the administration of the Center has been remarkably stable.

The first Director, **Dr. Paul Rohrbaugh**, died unexpectedly at the end of 1963. He was succeeded by **Dr. Richard Hensz**, the horticulturist best remembered for his development of the Star Ruby and Rio Red grapefruit varieties.



Jose Amador

In 1991, the administration of the Center was combined with that of the Texas Agricultural Experiment Station in Weslaco, with **Dr. Jose Amador** as overall Director. Dr. Hensz retired in 1994, and **Dr. Vic French** served as interim until 1996.

Dr. Darek Swietlik was then appointed as Assistant Director of both centers until he left for the U.S. Department of Agriculture. In 1999, **Dr. John da Graça** was hired as Deputy Director. Dr. Amador retired in 2005 and was replaced by **Dr. Michael Gould**. In 2008, the administration of



Bob Leyden

the two centers was divided again and Dr. da Graça assumed the position of Director of the Citrus Center and continues to do so.

The faculty of the Center has also been stable. Many growers will remember **Rex Reinking**, **Bob Leyden**, **John Fucik**, **Pete Timmer**, and **Mike Davis**. More recent former faculty include **Vic French** and **Mani Skaria**, both now emeritus professors. Also, **Darek Swietlik**, **Bhimu Patil** and **Juan Carlos Melgar**, who all moved on to successful careers elsewhere. Collectively, they made significant contributions to the citrus industry of Texas.



John Fucik



Pete Timmer



Mike Davis

More recent developments at the Citrus Center have included a new building completed in 2010, the establishment of the budwood program and the graduate student program. For growers, research has been ongoing into improved IPM, pesticide/fungicide tests for registrations, new orchard design, water-saving strategies, improved disease detection, and new varieties. All these endeavors use a mix of established and cutting-edge technologies.

Both the citrus growers and the Citrus Center have faced and overcome many challenges during the past 70 years. Together, we will strive to continue serving each other in the future.



Vic French



Mani Skaria



Darek Swietlik



Bhimu Patil



Citrus Center Winter Festival

This year marked the third annual Citrus Center Winter Festival. This event was a fun and enlightening opportunity to educate and interact with local homeowners, Winter Texans and other community members. We shared information about citrus health, care, pests and diseases.

Faculty, staff and students gave advice to people from all over the country and the community about how to maintain healthy citrus trees. Several information booths focused on citrus nutrition and irrigation, new varieties, pest control, diseases, budwood, and the greening control program.

The greening booth was especially interesting to our visitors because more than just information, it also provided activities and interaction opportunities. And we reached an even wider audience because the Citrus Center Winter Festival was broadcast live on KGBT Channel 4's *Daytime @ Nine* show.





Legend Bios



Fred Karle

The Karle family settled in Mercedes in 1911 where Fred's grandfather established a citrus farm. While growing up, Fred learned all about citrus farming. After graduating from Mercedes High School, he studied Animal Science at Texas A&M, graduating in 1967. In 1965, he married Karen Kappler. After serving in the Ag Extension Service for two years, he joined Joe Metz and Howard Kappler in the farm chemical and fertilizer industry, working over four decades serving the needs of citrus growers. In the 1970's the Karle family began their own citrus production business, and Fred served as member and chairman of several organizations, including TCM, Texas Valley Citrus Committee, TexaSweet, TCPB and TPDMC. He was recognized as King Citrus in 2000, and TCM Man of the Year in 2010. Most recently he was inducted into the TIPA Hall of Fame.



Earl Neuhaus

Earl was born in southern Illinois in 1943, and in 1947, the family moved to Mercedes TX to farm cotton, grain, livestock and citrus. After graduating from Texas A&M in 1966 in Agricultural Economics, he began working for Sherry-Barbee Implement Co., the John Deere dealership in Weslaco. He became a joint owner of the dealership which expanded across the Valley as the Barbee-Neuhaus Co., and later Neuhaus & Company, with his sons and son-in-law joining the company. All the while he continued farming citrus, sugarcane and cattle. Earl has served, and continues to serve, on several boards, including TCM, ECA, and the Citrus Center Advisory Committee, serving as chair of all at various times. He has received the TCM Merit Award, and was elected Texas Citrus Fiesta King in 2014. In 2017, he sold the John Deere dealership to AgPro, but continues farming, and is still planting new orchards, including participating in the demonstration project for raised beds/ground cover technology. Throughout his career, his wife Billy Jo has been by his side.



Victor French

Vic was born in Colorado, and obtained his BS and MS degrees from Colorado State University, and a PhD from Michigan State. In 1973, he was hired by the Citrus Center, and worked his way up the academic promotion ladder to associate in 1977, then full professor in 1982. From 1994 to 1996, he served as interim Center Director. His research was directed entirely on finding solutions to growers' pest problems, and was instrumental in collecting data needed for numerous pesticide registrations, as well as working on biocontrol programs such as the very successful control of citrus blackfly. He was always available to visit growers' orchards and gave advice freely. His contributions were recognized with the Arthur T. Potts Award from the RGV Horticultural Society in 2001, and the TCM Special Award in 2003. Vic retired from the university in 2008, and was named emeritus professor in 2015. In retirement, for several years he continued to scout for pests, advise growers and run pesticide trials. He had strong support throughout his career from his wife Lee Ann, who, sadly, passed away last year, and from their daughter and son.



Don Grossman

Don was born in Kansas City, MO, and grew up in Dallas. He graduated from Texas Tech with a degree in Agronomy and Range Management, and joined the family farm in the Texas Panhandle. In 1957, he moved to the LRGV with his wife Lou, and worked for the Port (Niagra) Chemical Company. He then worked for Tide & Elanco Chemicals for many years. After that, he started his own consulting firm, Grossman Ag Services, and provided advice to citrus and other crop growers for 25 years. He built up a great knowledge of citrus pest management, and spent these years passing this knowledge and advice to both growers and younger consultants. He established close friendships with Citrus Center entomologists Vic French and Mamoudou Setamou. Sadly, his wife of 62 years passed away this January.



John Williams



Clay Everhard

TAMUK Provost, Dr. Allen Rasmussen, presents
Citrus Legends Awards to John Williams and Clay
Everhard at the Citrus Growers' Appreciation dinner.

Faculty and Student Awards



Dr. John da Graca receives the Citrus Center's 10-year participation award from the Academic Leadership Alliance for hosting high school teacher summer interns



Dr. da Graca, 2018 Arthur T. Potts Award, Subtropical Agriculture and Environments Society



Amanda Lewis-Phi Kappa Phi Award



Ruby Saldaña – 3rd Place Poster, Subtropical Agriculture and Environments Society



Mounica Tammineedi – 2nd place poster, 2018 Subtropical Agriculture and Environments Society



Estephania Bernal receives graduate student award from Dr. Shad Nelson at the College Awards Banquet

New Students



Liliana Cantu – Ph.D. student



Amanda Lewis – Ph.D. student



*Estefania Ramirez – Visiting
Ph.D. student from Mexico*



Jim Thomas III – M.S. Student



Andy Ly – M.S. Student



Cynthia Puente – M.S. Student



Victoria de Leon – M.S. Student



Cecilia Villegas – M.S. Student



Rajitha Kavuri – M.S. Student



Victoria Mora – M.S. Student



Alberto de la Garza – M.S. Student

Recent Graduates



*Julian Gonzalez III – M.S.
Dec. 2017 "Evaluating roots
in South Texas citrus"
Chair: Dr. Catherine Simpson*



*Jay Alejandro – M.S. May 2018
Coursework Masters
Chair : Dr. Mamoudou Sétamou*



*Ruby Saldaña – M.S.
August 2018 "Development of integrated pest
management for barnacle scale in South Texas"
Chair: Dr. Mamoudou Setamou*

*Meena Gurung – M.S.
August 2018 "Evaluation of
the use of Trichoderma asper-
ellum as a biocontrol agent
for Phytophthora Foot and
Root Rot disease on citrus"
Chair: Dr. Veronica Ancona*





Dr. Catherine Simpson

Raised Beds and Groundcovers in Texas Citrus

Catherine Simpson, Mamoudou Setamou, and Shad Nelson,
Texas A&M University –Kingsville Citrus Center, 312 N. International Blvd., Weslaco, TX 78599.

Summary

Several growers have implemented raised bed plantings with plastic mesh groundcovers as part of several projects in cooperation with the TAMUK Citrus Center. Over the past 6 years we have seen much progress and have collected a large amount of data in multiple sites. The original site at the Citrus Center was planted in 2012 with Rio Red grapefruits, a more recent grower demonstration site was planted with Valencia oranges in 2016 in Mission, TX. One of the most distinct findings is that tree height, trunk diameter, and canopy circumference were greater for trees planted with groundcovers. Groundcovers also affected growth rates, which fluctuated over time depending on location. Overall, groundcovers improved growth rates in critical establishment years. In terms of yield, trees initially showed some alternate bearing behaviour. However, yield was greatest in flat beds with groundcovers followed by raised beds with groundcovers, then the treatments without covers. Overall, the groundcover increased soil moisture. Below ground, soil moisture was lowest in the flat bed with no groundcover treatment at one site and raised bed treatments at another; although, the soil moisture varied more in raised bed treatments with young trees. Soil salinity initially started high at establishment, but has declined well below the threshold for salt damage over time. Root surface area is greatest in raised bed treatments with groundcovers at both the 0-6 and 6-18 inch depths compared to all other treatments. Water use efficiency has been highest in the flat bed treatments with groundcover (2.5% greater) at the new planting site, however, as trees are becoming more established the water savings for raised beds with groundcovers is improving.

Grapefruit demonstration site

Tree height in the grapefruit site was greatest in treatments with groundcovers over 6 years. Soil moisture was also higher deeper in the soil profile. Root density was also greater in raised bed with groundcover treatments.



Original raised bed and groundcover experimental site at the TAMUK Citrus Center



Demonstration site in Mission Texas with Mr. Jimmy Pawlik

Table 1. Estimated grapefruit yield 2014-2017

Treatment	Estimated Yield (tons acre ⁻¹ year ⁻¹)				All Years
	2014	2015	2016	2017	
Raised + Cover	2.08	2.56c	14.52a	5.70b	B
Raised + No cover	1.14	5.61b	2.64c	8.65ab	C
Flat + Cover	1.13	10.53a	7.66ab	10.47a	A
Flat + No cover	0.95	6.61b	6.81bc	7.24ab	BC
P treatment	0.201	0.0001	0.004	0.037	0.0001

Yield showed some tendencies toward alternate bearing, especially after heavy yielding years. However, groundcover improved yield.

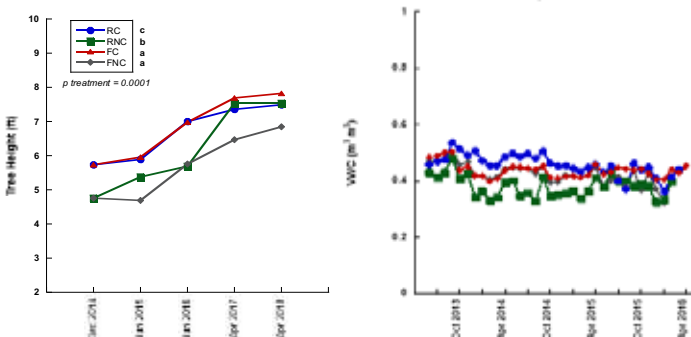


Figure 2. Left: Tree height in grapefruit under raised bed and groundcover over time. Right: Soil moisture over time

Orange demonstration site

Orange trees also grew more rapidly when planted with groundcover. Soil moisture varied between treatments and depths, but was lowest in the raised beds. Water savings varied, with the flat beds and groundcovers averaging more water savings over time (2.5%) compared to other treatments. This difference is likely due to the size and age of trees.

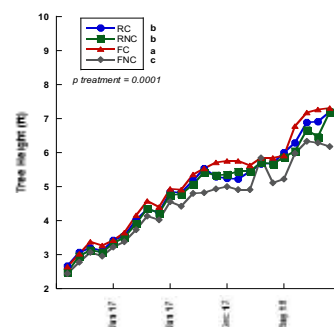


Figure 3. (above) Orange tree height under different treatments.

Table 2. Estimated water savings

		Traditional	FC	RC	RNC
Total	Ave Water applied	0.0846	0.0820	0.0974	0.1087
	2016 (acre-feet)	0.0805	0.0837	0.1026	0.1220
	2017	0.0860	0.0805	0.0911	0.1037
	2018	0.0667	0.0660	0.0785	0.0865
Average	Difference		0.0020	-0.0116	-0.0231
	% water savings		2.5005	-14.5650	-29.0327

Acknowledgements

Thanks to the Texas Water Development Board grant #1513521823 for funding.



Dr. Veronica Ancona

Phytophthora Foot Rot

Veronica Ancona
Texas A&M University –Kingsville Citrus Center, 312 N. International Blvd., Weslaco, TX 78599.

Citrus is highly susceptible to foot rot, gummosis, root rot and fruit brown rot diseases caused by *Phytophthora nicotianae* (Syn. *P. parasitica*), *P. citrophthora* and *P. palmivora*. *Phytophthora* is an oomycete that invades the phloem vessels, causing root rot and gummosis in the trunk, which in turn leads to poor yield, tree decline, and eventually tree death. In South Texas, 96 percent of citrus orchards have foot rot and gummosis infections, several of them with more than 50 percent of trees affected.

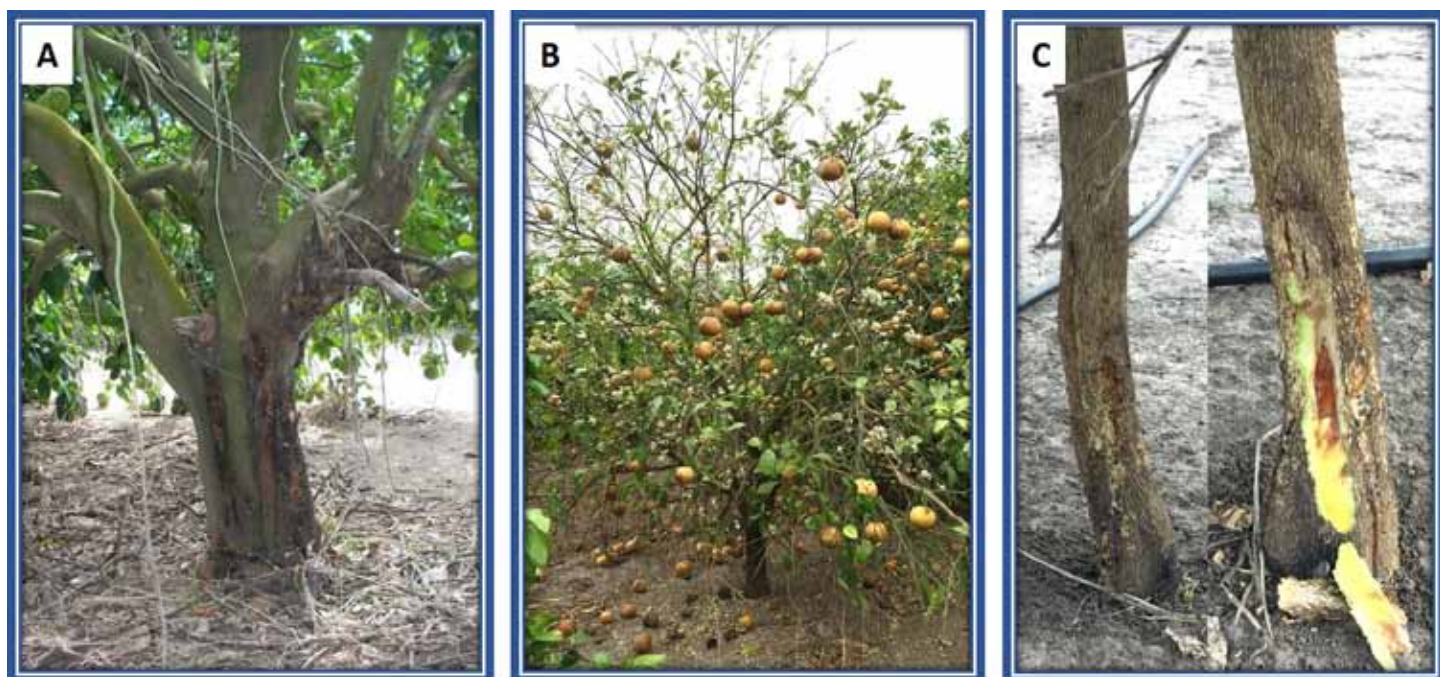


Fig 1. Symptoms associated with *Phytophthora* infection. A) Foot rot and gummosis of main trunk in mature grapefruit tree. B) Grapefruit tree in severe decline due to *Phytophthora* infection. C) Gummosis in trunk on young citrus tree.

Management

Preventing trunk wetness for extensive periods of time is important as *Phytophthora* spores are spread by irrigation water, especially in flood and furrow irrigation. Chemical products are available for treatment of *Phytophthora* diseases (Table 1), but in order to prevent resistance to any chemistry, it is

very important to avoid using one product exclusively. So, restrict the number of treatments applied per season and apply only when strictly necessary, maintain manufacturers' recommended dose, use integrated disease management practices, and use chemical diversity.

Fungicide	Manufacturer	Active ingredient	Rates
Ridomil	Syngenta	Mefenoxam	➤ New plantings, resets and established orchards have different requirements
Orondis	Syngenta	Oxathiapiprolin	
Aliette	Bayer	Aluminum-tris	
Ultra Flourish	Nufarm	Mefenoxam	➤ Different irrigation methods have different rates
Agri-Fos	Agrichem	Mono- and di-phosphorous acid	
OxiPhos	Biosafe	Mono- and di-phosphorous acid & Hydrogen peroxide	➤ Follow the label instructions
OxiDate	BioSafe	Hydrogen peroxide & Peroxyacetic acid	



Dr. Madhurababu Kunta

Citrus dry rot is causing sudden wilt and death of trees in the Rio Grande Valley

Madhurababu Kunta, Marissa Gonzalez, John da Graca, Eliezer Louzada, Mamoudou Setamou
Texas A&M University –Kingsville Citrus Center, 312 N. International Blvd., Weslaco, TX 78599.

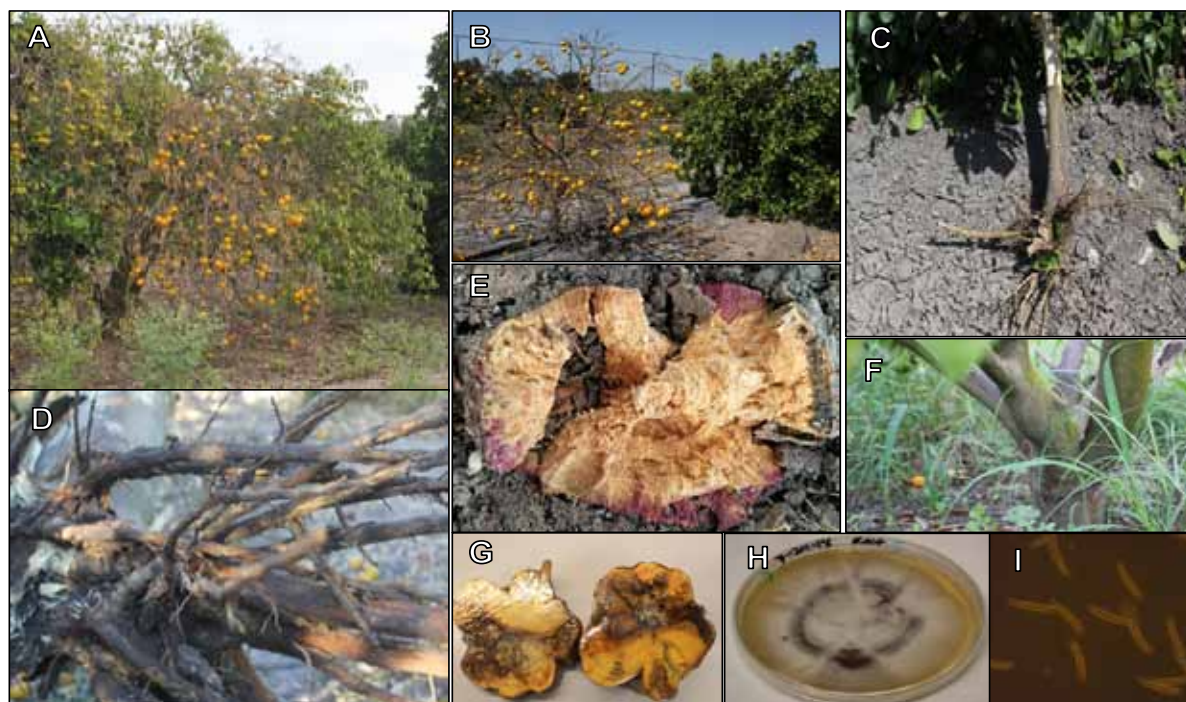


Figure: Trees showing wilt and sudden death. (A) Mature sweet orange, (B) Young grapefruit, (C) Apparently healthy looking tree where the root system is completely damaged, (D) Rotted and brown roots, (E) Base of tree trunk, (F) Apparently healthy looking tree trunk, (G) Base of the tree trunk cross section, (H) *Fusarium solani* culture, (I) Spores of the fungus.

- The cause of the disease is not HLB or *Phytophthora*, it is a dry root rot caused by a fungus, *Fusarium solani*.
- Sweet orange and grapefruit trees in orchards throughout the Lower Rio Grande Valley have shown sudden decline and death due to dry rot.
- Apparently healthy trees suddenly wilt and die.
- The roots are blackened and rotted with a brown discoloration, and the leaves are desiccated showing dieback of the canopy.
- Recent weather conditions such as heavy rains, poor drainage, and water logging conditions resulted in stress for the trees. This coupled with hot and humid conditions might have aggravated the fungal pathogen infection.
- No tolerant rootstocks or effective chemical control are known.
- Currently, we are evaluating the efficacy of several fungicides including Proline 480 SC fungicide (active ingredient: Prothioconazole) in suppressing the fungal culture growth. Fungicide recommendations will be made based on the results obtained.
- Effective management of *Phytophthora* is presumably essential for management of the disease as it predisposes the trees to *F. solani* infection.

Funding source: U.S. Department of Agriculture APHIS Citrus Commodity Pest Survey.



Dr. Mamoudou Sétamou

Barnacle Scale in Texas Citrus: A difficult problem that can be managed

Mamoudou Sétamou, Ruby A. Saldaña, R. R Saldaña and James M. Hearn
Texas A&M University –Kingsville Citrus Center, 312 N. International Blvd., Weslaco, TX 78599.

Barnacle scale (*Ceroplastes cirripediformis* Comstock) (Fig. 1a) is a soft scale with a globular body divided into one dorsal and six lateral plates covered with a thick wax. This scale insect is endemic in Texas citrus groves, infesting all citrus species, but with a strong preference for grapefruit trees. Adult females

lay between 400-600 eggs underneath their body (Fig. 1b). First stage nymphs hatch from eggs within 2 to 3 weeks, crawl to, and settle on young leaves, twigs and stems. These crawlers are mainly responsible for the spread of barnacle scale infestation within and between groves. Long distance spread occurs when crawlers are carried on the wind or by other animals. On leaves, barnacle scale nymphs will line up on the veins of the upper surface (Fig.1c); insert their needle-

like mouthparts into the plant and begin the secretion of wax in tufts around the body that give them a star-like appearance (Fig. 1d). They grow in size, but similar in appearance to female adults. Barnacle scales are active from March through November, and three generations are common in Texas citrus groves, with each taking between two to three months.

Impact of barnacle scale

While feeding, barnacle scales uptake substantial amount of plant sap and produce honeydew that supports the development of sooty mold fungi. Hence, barnacle scale damage occurs in two ways– directly and indirectly–both resulting in weakened plants, leaf loss, twig die back,

smaller fruit, and fruit drop. In case of severe infestation, fruit drop can be substantial (Fig. 5), and the resulting sooty mold negatively affect fruit set of the following season. Barnacle scales also make citrus trees susceptible to secondary damage from insects, diseases and environmental stresses such as drought.

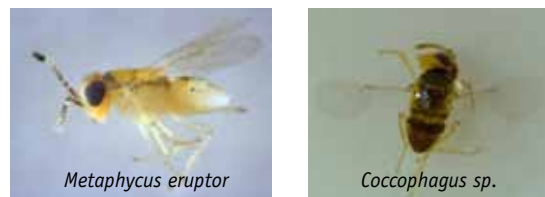


Figure 1. Barnacle scale life stages (A, adult female; B, Eggs; C, crawlers on leaf veins; and D, star-like nymph producing wax in tufts.

Figure 2. Sooty mold (left) and fruit drop (right) resulting from barnacle scale infestation in grapefruit.



Figure 3. Barnacle scale parasitoids recorded in citrus groves in Texas



Monitoring and Management

Barnacle scales are monitored using visual inspections of leaves and twigs for the presence of their life stages. Examine a minimum of 50 twigs with leaves per grove. Pay special attention to the presence of sooty mold and ants that are generally indicative of scale infestation. Once observed, check for the presence of egg masses underneath adults and crawlers, and ensure adults are alive by squeezing them. Live barnacle scales will produce a brown liquid when squeezed. Presence of eggs and/or crawlers indicates populations will likely increase rapidly, thus management action should be taken. Time insecticide application with the presence of crawlers as adults and eggs are less susceptible to insecticides.

Management of barnacle scales should focus on preventing infestations and managing populations before they can cause economic losses. Barnacle scales are difficult to control; their waxy covers protect them and adults protect their offspring from contact with insecticides. Effective barnacle scale management include a judicious combination of cultural, biological and chemical control options. Hedging/topping to remove infested branches and keep adequate canopy size to allow for greater air movement and increased insecticide coverage is critical. Several parasitoids (Fig. 3) that can effectively manage barnacle scales are present in Texas citrus groves. Avoid using broad-spectrum pyrethroids, especially via aerial applications to preserve these parasitoids

in groves. In case of severe infestations, two applications of insecticides within 30 days will be required. Insecticides available for control include buprofezin, carbaryl, chlorpyrifos, cyantriniiprole, dimethoate, flupyradifurone, malathion, neonics (e.g. acetamiprid, imidacloprid, thiamethoxam), pyriproxifen, spirotetramat, tolfenpyrad, insecticidal soaps, and oils. Using oils in tank mixes with insecticides result in better control. Care should be taking when using oils during the summer in South Texas. Be sure to follow label instructions.



Dr. Eliezer S. Louzada

Texas Red: Where Are We With This New Grapefruit?

Eliezer S. Louzada

Texas A&M University –Kingsville Citrus Center, 312 N. International Blvd., Weslaco, TX 78599.

Texas Red, the new grapefruit from Texas, was first found in 2004 in a Rio Red grapefruit grove at the Citrus Center's South Research Farm. The fruit's rind is dark red instead of a blush or yellow, like the Rio Red; the flesh is sweet with no bitter taste and there is no tingling at the lips as you eat them (Fig.1). The trees produce large numbers of fruit clusters with usually oval to round-shaped fruit and are very productive. (Fig.2)



Figure 1. Rio Red grapefruit (left), Texas Red grapefruit (right).



Figure 2. Harvested Texas Reds, Texas Red grapefruit clusters (right).

With the devastation of the Florida grapefruit industry, domestic and international markets were opened for Texas grapefruit. But the interest in planting grapefruit in other areas has also increased. We recently applied for a patent on the Texas Red grapefruit and sub-licensed it to a company called Biogold. So far, buds were requested and sent to California, South Africa and Spain. Buds are undergoing pathogen removal in California and will be returned to Texas to benefit the Texas citrus industry. Budwood has also been sent to the Spanish and South African budwood programs, but will only be available to their growers with the approval of Texas growers to allow Texas to establish orchards first.

South Africa



Figure 3. Distribution of the Texas Red budwood.

Legend's Perspective

Clay Everhard

Edited by: John da Graca and Catherine Simpson



1. How did you get into the citrus industry? How many years have you been a part of the industry?

I was born into a citrus producing family. Our three generations of Texas citrus production began 100 years ago this year! After college and the military, I joined the family enterprise for 48 years before I retired. At the time I joined Citraland Farms, we operated about 800 acres of citrus in Hidalgo, Cameron and Dimmit counties, plus two packing sheds and a nursery.



2. How do you think the Texas citrus industry has changed over time?

Undoubtedly, the biggest change I have seen is the size and concentration. The present acreage of citrus orchards is roughly a quarter the size of the industry during the 1940s when almost every irrigable tract of land was in citrus. The economics and cold weather of the early 1950s and later discouraged many growers establishing new orchards. Other significant changes include new grapefruit varieties, denser spacing and tremendous reduction in the number of shippers handling our fruit.



3. What is the most positive change that you have seen?

Fruit prices for the 2017/18 season were extremely positive. Of course, Florida's bad fortune has contributed to our good fortune. How soon and well the recovery of the competition from all other citrus areas happens is the key to our future prosperity. This taste of success will hopefully encourage all our marketers to work together for the benefit of our industry.



4. What would you like to change most about the Texas citrus industry?

Actually, I feel good about our South Texas citrus industry. Our researchers are working on disease-tolerant scions and rootstocks, our shippers seem to be financially stable and global warming is protecting us from devastating freezes. I know very well that there are no

guarantees that all these factors will continue, but that is agriculture and risks are implied.

In my view, our most vulnerable areas for the future are disease, labor, irrigation water, weather and government regulation. Constant monitoring and skillful reaction to problems with these elements are absolutely critical – thank goodness for Texas Citrus Mutual.

5. What direction would you like to see the citrus industry in Texas go?

With stable production and quality packouts, I would like to see the citrus produced here play to the superior quality reputation it deserves. Wind scar will probably never let us attain the exterior perfection of some other areas, but they will never attain the interior perfection of our fruit. The color and sweetness of our orange juice is unmatched elsewhere, and the flavor and interior appearance of our grapefruit is unmatched. Those other citrus areas buy fruit and juice from us for a reason.

6. What has been your most rewarding experience?

Accomplishment in any field is great reward. Two inspiring views come to mind: First, the picture of a conveyer full of fruit, just from the waxer. That quality is the culmination of years of work and care, of covering threats of disease, dodging insects, hail and freezes. Someone is rewarding you for doing a good job.

No less striking, the view of the sun setting on a freshly planted orchard. Almost like a proud parent, you shaped the trees from seedlings to a well-formed part of an organized production unit. You have lined them up in proper formation and now they are out of your care and ready to benefit a new owner.

7. What advice would you like to give current and future citrus producers?

Citrus producers are a breed apart. Patience is probably their most significant characteristic. Few farmers have to wait so many years for their first crop, and wait so many years for the next crop if damage has occurred.

My advice is to learn patience, it will reward you. Second, citrus trees are like pets; you treat them well and they will respond. You can't starve a profit from citrus trees. Good and timely care produces quality fruit.

Student Spotlight

Last November, three Citrus Center graduate students, accompanied by a faculty member and the department's dean, were given an amazing opportunity to travel to Spain.

Making the trip were Ruby Saldana, master's student of entomology, Julissa Rodriguez, master's student of physiology, and Amanda Lewis, PhD student of physiology. Also on this trip with the students were Dr. Catherine Simpson, assistant professor of plant physiology and horticulture, and Dr. Shad Nelson, professor and dean for the Dick and Mary Lewis Kleberg College of Agriculture and Natural Resources.

The Citrus Center team exchanged fascinating information with their European counterparts about citrus research and production.

Historically, there are reports of citrus being grown in Europe as early as the 15th century. By the 16th century, citrus was widely grown. Sweet orange trees are described growing in the kitchen garden of the King at Sevilla in 1525.

Southern Spain has a rich history of citrus cultivation dating back many centuries. The Citrus Center students learned about the history of the area, as well as current practices in Spanish citrus production. By learning about ongoing research, the students were also able to get a glimpse of the future of production in the region.

The group visited the Institute of Natural Resources and Agrobiology of Seville, where they learned about current research on irrigation and precision agriculture. The students and Dr. Simpson gave brief presentations about their research.

Ruby spoke about her work with natural enemies of citrus pests. Julissa presented her work on citrus sunburn, and Amanda presented her proposed research on uses for thermal imaging in plant science.

As a representative of the Citrus Center, Dr. Simpson introducing the center to their hosts and presented some of the research currently being done. This was followed by a discussion about research in general, as well as a lively discussion about academic life in Texas and Spain.

A visit to the Universidad de Cordoba followed, where a tour of the university's citrus orchard was offered. They shared information about their extensive research on olive propagation, cultivation and harvesting.

The students also learned about the efforts and reasoning behind the certification of propagation material, and how a certified propagation facility is operated.

In Murcia, the group toured BabyPlant, a business which produces seedlings of horticultural plants. The facility had a range of greenhouse technologies on display, including a sophisticated fertigation system, automated seeding machines and germination chambers.

The group learned about the importance of southern Spain in the production of horticultural products for all of Europe.

The final stop of the trip was the Instituto Valenciano de Investigaciones Agrarias. Here the group learned about current efforts in citrus breeding, biological and mechanical pest control, development of harvesting technology, and outreach to their growers.

While the trip offered many opportunities for learning and exchange of research-related information, it also offered the chance for cultural enrichment.

The students were exposed to new cuisines, including the region's famous *jamón Iberico*, a type of cured ham produced in Spain and Portugal from an ancient breed of pigs found only on the Iberian Peninsula.

Awe inspiring cathedrals and lush plazas were visited at almost every stop. A quick detour to the Mediterranean Sea was made for an enchanting seaside lunch.

Many other culturally and historically important sites were also visited. Overall,

the trip was an immensely invaluable opportunity for the group to learn, explore and exchange ideas.

This trip was funded by the U. S. Department of Agriculture's NIFA National Needs Fellowship program; grant award # 2014-38420-21798, "Sustainable agriculture in semi-arid areas: An international and interdisciplinary approach to graduate education."





Budwood Program Highlights 2017-18

Mark Van Ness & John da Graça
Texas A&M University – Kingsville Citrus Center, 312 N. International Blvd., Weslaco, TX 78599



New scion trees established in Screenhouse 1



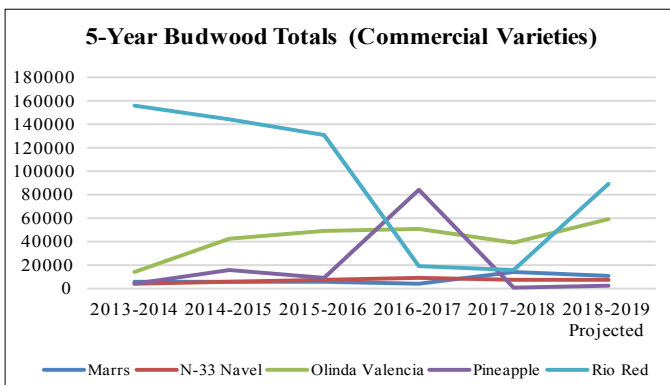
Mature foundation trees



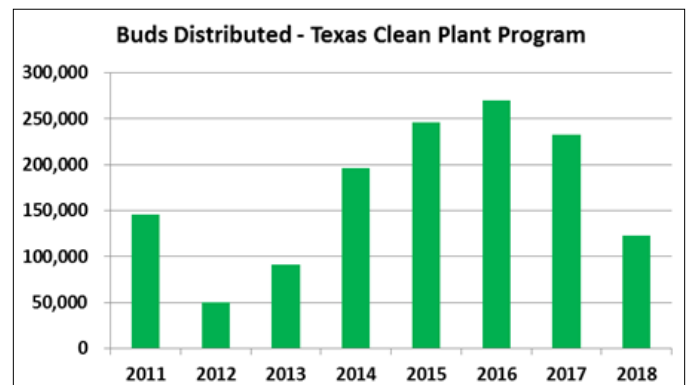
New increase trees budded to replace expired increase trees



New fertigation system installed in Stephenville back up screenhouse



Budwood sale trends – slowdown in new orchard establishment



Budwood variety trend shifts over past 5 years; Valencias gain popularity; grapefruit to return next year?

No-Bake Citrus Cheesecake

Blanca Garza, Julissa Rodriguez, adapted from Melissa Howell



Prep Time: 20 minutes

Total Time: 3 hours to 24 hours

Number of Servings: 5

Ingredients:

Crust: One package of graham crackers crumbs.

Half a stick of softened butter.

Filling: One package of cream cheese.

One cup of powdered sugar.

Half a cup of citrus puree.

(For this recipe we used tangerine.) One tablespoon of sweetened condensed milk.

Directions:

Crust: Mix graham crackers with the half stick of softened butter. Then place in 5 small cups.

Filling: Mix in the package of cream cheese, powdered sugar, citrus puree, and sweetened condensed milk in a large bowl. Once thoroughly mixed, divide in 5 equal parts and place on top of the crust in the small cups. Refrigerate for 2 hours or overnight and enjoy.

Orange White Chocolate Macadamia Nut Cookies

Julissa Rodriguez, Amanda Lewis adapted from Melissa Howell

Ingredients:

1/2 c. one stick butter, room temperature

1/2 c. brown sugar packed

1/3 c. granulated sugar

1 large egg

1 tsp. pure vanilla extract

1 Tbsp. fresh orange zest

3/4 c. flour

1/2 tsp. baking soda

1/4 tsp. salt

3/4 c. white chocolate chips

1/2 c. coarsely chopped macadamia nuts salted or unsalted, according to your preference.



Directions:

Preheat oven to 325 degrees. Line two baking sheets with Silpat or parchment paper.

Beat butter and sugars until light and fluffy. Add egg, vanilla extract, orange oil (or extract) and mix well.

Add one cup of the flour, along with the baking soda and salt and mix well. Add remaining 1/2 cup flour and mix until incorporated. If necessary, add more flour until the dough is thick and doesn't stick to your fingers when you pinch it. Add white chocolate chips and macadamia nuts and mix until evenly distributed.

Using a large cookie scoop, place dough two inches apart on baking sheets. Using your fingers, press the sides of the dough in to make the unbaked cookies look like tall rectangles or small pillars. (You just want them taller than they are wide. This will ensure that the cookies maintain a soft, chewy center).

Bake for 12 minutes, until edges just start to brown. Remove from the oven, even though the cookies will look puffy and slightly undercooked. They will finish cooking on the pan outside the oven. After about 10 minutes, transfer to a wire rack to cool completely.

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Events



Citrus Center scientists provide annual training to pest and disease scouts from USDA, TDA and the industry to recognize exotic pests and diseases.



BioGold representatives from California, South Africa and Spain meet at TCM with growers and Citrus Center scientists to move the new red grapefruit toward a patent.



TCM Annual Meeting:

The annual TCM meeting was marked by speakers from the Citrus Center, Drs. Veronica Ancona and Catherine Simpson. Also, Dr. Shad Nelson, the dean of the Dick and Mary Lewis Kleberg College of Agriculture and Human Sciences; and a lifetime achievement award presented to Mr. Jim Hoffmann.



Subtropical Agriculture and Environments Society Meeting:

The annual SAES meeting was held at Rio Farms this year. It was a highly attended event, with many regional and international universities and companies presenting their research. There were six invited speakers and 59 submitted abstracts, up 15 from last year!



Visitors



Visitors from Kenya – Left to Right: Dr. Mamoudou Setamou (TAMUK Citrus Center), Dr. Sunday Ekesi (Director of Research & Partnerships ICIPE, Nairobi), Dr. John da Graca (Director, TAMUK Citrus Center), and Dr. Samira Mohammed, ICIPE, Nairobi.

Megan Reid, MS student from Rhodes University, South Africa, collecting potential aquatic weed-eating insects from South Texas, visiting the entomology lab.





Texas A&M University Kingsville Citrus Center

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