Texas A&M University-Kingsville

Citrus Center

Weslaco, Texas

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Texas Citrus Pest Update

Mamoudou Sétamou

In recent weeks populations of several arthropod pests including the barnacle scale, the citrus rust mite, the Texas citrus mite and the citrus red mite have been on the rise in some Texas groves. The localized outbreak of barnacle scale has been blamed by few stakeholders on the ongoing area-wide management psyllid control.

FEATURES

Although extensive psyllid control program may negatively affect the biological control of barnacle scale, reasons of the recent rise in barnacle scale population ***are not known*** and need a thorough investigation in order to mitigate the situation and develop a sustainable integrated pest management program for our growers. Citrus groves are a dynamic ecosystem with a continuously changing pest profile. Arthropod pest species and their numbers present in a grove varied from year to year and from one season to another within the same year, with weather conditions and grove care practices as major driven forces.

Some historical data clearly indicated that freezing temperatures have impacted Texas citrus pest management by releasing pests that were apparently previously maintained at acceptable levels by naturally occurring organisms. For instance, following the 1983 freeze, citrus blackfly populations have become more widespread than pre-freeze levels and after the 1989 freeze, the California and Florida red scale have become more devastating. Given that two major freezes occurred during the winter in 2011, one cannot entirely rule out that freezing events might have contributed to the drastic reduction in natural enemies of barnacle scale, creating the outbreaks noticed in some groves.

Asian Citrus Psyllid

The ongoing area-wide management psyllid control is very important to reduce the threat of the deadly citrus greening disease. This program has been well adopted by growers−85% of the 28,000 acres citrus acreage has been treated with insecticides for psyllid control. The program has been very effective in dramatically reducing psyllid populations in our groves. **(cont'd on page 2)**

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Our field surveys also showed that not all groves that have received dormant psyllid control sprays have barnacle scales. This problem seems to be localized in some groves in the Upper Valley. Different insecticides and spray methods were used during the dormant sprays. It is possible that a specific insecticide-spray method combination may have contributed to the flare-up of barnacle scale, but this is just pure speculation and we continue to investigate the real causes of the problem. At this point, it is important to contain the problem.

Our recommendation is that growers aggressively control barnacle scale pest by using insecticides such as Esteem, Movento, Provado, Actara, Agri-Flex, and 1.5% to 2% of spray oil in tank mix. Repeated applications of scalicide with a different mode of action may be required in areas with heavy densities of the scale. We also plan to conduct some inoculative releases of scale natural enemies to boost the biological control of this pest. Our major goal is to develop in collaboration with growers, effective methods of keeping pest populations under control in order to minimize fruit damage so that growers can provide affordable, healthy fruit to consumers.

Evaluating Water Use and Yield from Irrigation Systems in Citrus Production

Shad D. Nelson, Texas A&M University-Kingsville Citrus Center, Weslaco
Mac Young, Texas AgriLife Extension Service, Corpus Christi
Juan Enciso, Texas AgriLife Research and Extension Center, Weslaco, TX

Scientists from the Texas A&M system have been collaborating with and gathering data

from citrus grower participants in the ADI program throughout the Lower Rio Grande Valley between 2005 to 2009. Location of citrus groves covered three counties in the LRGV with demonstration sites located in the McAllen, Edinburg, Weslaco and Harlingen regions of South Texas. One objective of this work was to evaluate the impacts of different irrigation types on overall irrigation water use and its associated effect on 'Rio Red' grapefruit yield. Four irrigation methods were focused on for this study: conventional large pan flood (Flood), border flood (Brd Fld), microjet sprinkle spray (MJ Spray), and drip (Drip) irrigation.

Most citrus growers in the LRGV utilize Flood irrigation where multiple (2 to 5) rows of trees are irrigated, where the irrigation water is allowed to run over the entire area under the trees until all rows of trees are covered in water. A typical Flood event will apply 4 to 6 inches of water over the entire land area. This method of irrigation has been considered to use more water than is necessarily needed, as extra water is applied between the tree rows where the tractors and equipment maneuver. An alternative form of flood irrigation is 'border flood', where raised berms are formed between each row of citrus trees so that irrigation water can be channeled down the citrus rows at a faster rate and localizing. In this study, all growers using Brd Fld practices maintained a single wide 3 to 4 foot border between the tree rows. This is thought to save water as water is localized underneath the tree canopy and not between the tree rows. Drip and MJ Spray irrigation methods are thought to save even more water because they are high pressure systems applying water at a lower rate. In this study, growers using MJ Spray had one sprinkler per tree, where sprinkler placement was 12 inches above ground level, underneath the canopy and placed between two adjacent trees within the same row. Drip irrigation growers used single-line or dual-line irrigation systems placed underneath the tree canopy within the same tree row. **(Cont'd on page 3)**

Evaluating Water Use..cont'd from page 2

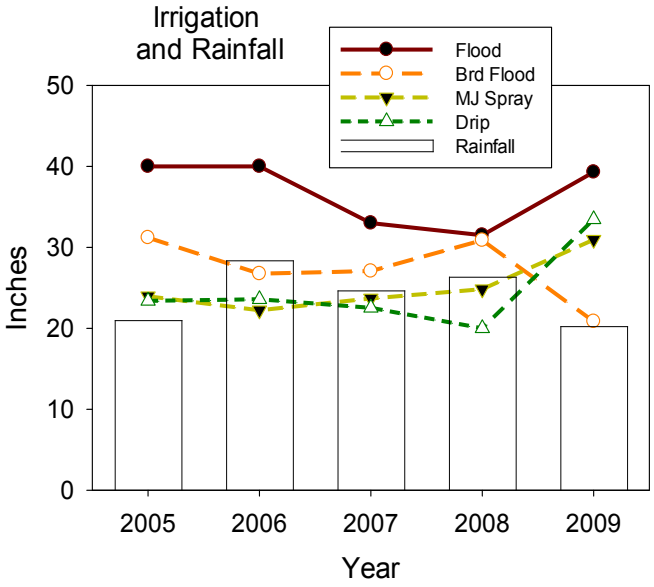


Fig. 1. Average annual irrigation amount applied per irrigation system and rainfall.

Observations and Results

Total rainfall was monitored for each growing season from 2005 through 2009. Although monthly rainfall patterns can differ substantially from demonstration site to site, the total annual rainfall only differed between 2 to 4 inches annually at each site. The average annual rainfall for the LRGV is shown in Figure 1 and varied from 20 to 28 inches annually between 2005-2009. Although rainfall averages are informative, such data does not represent years of low rainfall or excessive rainfall. For example, one hurricane in 2008 supplied over half of the total rainfall observed in that year, whereas, throughout the rest of the year rainfall was low. Regardless of precipitation levels during the 2005-2009 growing seasons, there was not a strong inverse correlation between rainfall and irrigation use among the citrus growers (Fig. 1). The amount of total irrigation water applied by citrus grower was more dependent upon the irrigation system used, with water use following the trend of Flood > Brd Fld > MJ Spray = Drip throughout the growing seasons.

Compiling all five growing seasons together, total average irrigation use per irrigation system was applied, Flood was statistically higher than all other amount applied, Flood was statistically higher than all other irrigation methods. Whereas, Brd Flood, MJ Spray and Drip were not statistically different from one another, but there was a consistent trend with Brd Fld slightly higher than MJ Spray and Drip irrigation. It should be noted that Drip growers using a dual-line irrigation system typically used twice the amount of irrigation water annually compared to single-line drip systems, but single-line systems on mature trees typically did not adequately meet citrus evapotranspiration demand during periods of drought and/or summer heat. On average, there was no direct correlation of irrigation method used to citrus yield (Fig. 2). Total average grapefruit yield were statistically similar among all four irrigation system evaluated, with higher yields typically more dependent upon other than individual grower's management practices than irrigation method used. Although total average yields shown here were not dramatically different among irrigation systems, it has been shown that grapefruit pack out percentages and the amount of fruit going into the fresh market for fancy and choice classification was more closely linked to the irrigation method used (Young et al., 2010).

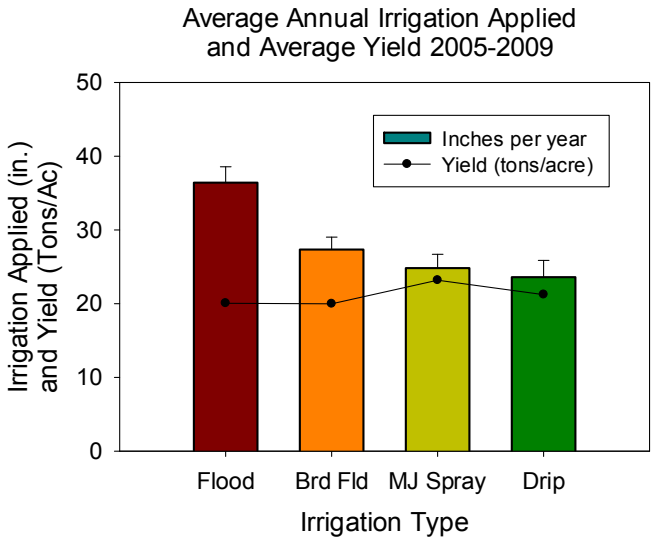


Fig. 2. Average irrigation water applied vs. average yield per irrigation system.

References: Young, M., S. Nelson, S. Klose, and J. Enciso. Aug 2010. Assessing irrigation methods based on grapefruit pack-out in the Lower Rio Grande Valley. Texas AgriLife Extension. FARM Assistance Focus 2010-4. pp. 1-3.
http://coastalbend.tamu.edu/Extension/Risk%20Management/2010-4.pdf

Department Has New Name

Shad D. Nelson, Department Chair

The Department of Agronomy and Resource Sciences, which the Citrus Center is affiliated to, was recently renamed as the **Department of Agriculture, Agribusiness and Environmental Sciences (Dept AGSC).** This name will provide students that are searching for undergraduate programs in agriculture and agribusiness using the internet to better find us as well, as giving us the identity to the diverse faculty and disciplines that are in our department. Furthermore inclusion of 'environmental sciences' replaces the former name that had resource sciences, as our program focuses on the interaction of soil and plant sciences and how they relate to environmental systems management.

The 65th Annual Meeting of the Subtropical Plant Science Society (SPSS)

***Shad D. Nelson*, 2010 SPSS President**

The annual meeting of the SPSS took place at the Citrus Center on February 9. Those in attendance received superior instruction on various research programs by invited speakers discussing topics related to the theme: "Facing the Challenges for Agriculture and the Environment in an Era of Sustainability". Two speakers were invited from out-of-state, **Dr. Jude Grosser**, citrus breeder from the University of Florida gave the keynote address on current and future new citrus varieties coming from research efforts in Lake Alfred region, while **Dr. Clinton Williams**, soil scientist from USDA-ARS in Maricopa, AZ provided the final morning address on emerging contaminants in water reuse. **Dr. Teresa Patricia Feria** from UT-Pan American discussed the implications of climate change on pest population expansion impact on prickly pear decline. Two faculty with Citrus Center appointments, **Dr. Juan Carlos Melgar** and **Dr. Roger D. Hanagriff**, discussed the topics of abiotic stress impacts on olive production and the Texas wine industry. **Mac Young**, Extension Specialist and Economist with Texas AgriLife discussed the economics of 'Rio Red' grapefruit pack-out as they relate to producers using various irrigation systems in the Lower Rio Grande Valley (LRGV). **Mr. Ray Prewett**, President of Texas Citrus Mutual ended the meeting discussing current and future challenges facing the sustainability of agriculture production in the LRGV. We thank all those involved and who attended to make this meeting a success.

The Arthur T. Potts Award was award posthumously to **Dr Paul Parker**, the former lab director of the USDA-APHIS-CPHST who passed away last July. His wife Eng was in attendance and received the award.

The winners of the student poster competition were:
Marisol Esparza (1st place winner), *Effect of Soil and Foliar Calcium Sources on the Survival of Asian Citrus Psyllid.* Undergraduate research project supervised by Drs Nelson and Sétamou

Jose L. Perez (2nd place winner), *Screening of Phenolic Secondary Metabolites in Citrus Leaves by HPLC for Possible Psyllid Management.*. Cooperative Horticulture Ph.D. research project supervised by Dr Nasir Malik (USDA-ARS, Weslaco)

N. Prasad Peddabhoini (3rd place winner), *Testing the Efficacy of an "Attract and Kill" Strategy for the Control of Citrus Leafminer in Texas.*. Master graduate research project supervised by Drs Sétamou and Nelson

Another recent student presentation winner was **Catherine Simpson** (cooperative PhD student under Drs Nelson and Sétamou) who was place 2nd in the oral paper contest at the Southern Region American Society of Horticultural Science annual conference held Feb 5-8, 2011 in Corpus Christi, TX. Her paper was entitled *Evaluation of Salinity on Citrus and Watermelon Rootstock Seed Germination.*

The new 2011 President for the Subtropical Plant Science Society is Dr. Rod Summy, entomologist at the University of Texas-Pan American.

Melanose Disease, Pathogen and Control

Mani Skaria

Faces of Melanose: (left) mud cake symptom , (middle) tear stain, and sandpaper effect on fruit and leaves

Melanose, a fungal disease of citrus is a serious limiting factor that Texas growers have to overcome when growing citrus for the fresh fruit market. There are different chemicals available in the market that can be used for Melanose control. The fungicides that are available in the market fall into various classes, for example, chemicals such as Enable that inhibit sterol synthesis. Sterols are required for reproduction of spores. Another series of fungicides is a class called strobilurins (examples, Abound, Headline, Gem, Quadris Top, etc) which block electron transport through the mitochondria, thereby, make the fungi run out of energy. These are examples of single site fungicide mode of action – i.e., the fungicides are active against only one point in one metabolic pathway of the fungus. There is another type called multi-site fungicides, for example, copper products. A detailed information sheet on Melanose control is given in a multi-page document called **Disease and Pathogen Information Sheet: Melanose** that you may download from our Citrus Center Home page given below.

The Melanose fungus is identified in two different growth stages – 1) an asexual stage or pycnidial stage (= a flask-shaped spore fruit that bears spores called pycnidiospores), produced on deadwood throughout the trees with lots of dead branches. This stage of the fungus is scientifically called *Phomopsis citri* and 2) a sexual stage or ascospore producing stage with an official name *Diaporthe citri*. This fungus produce oval or tubular spore sacs called ascus that contains sexually produced ascospores, typically 8 in number. Citrus growers should remember the following for effective Melanose control.

1. Effectively remove dead branches, especially from freeze damage
2. *Phomopsis* stage causes all local infections on trees with deadwood
3. *Phomopsis* also causes stem end rot fruit decay in the packinghouse
4. *Diaporthe* stage causes long distance spread of Melanose by air-borne spores
5. Fruit are susceptible only when they are young, for example, grapefruit is susceptible from fruit set to 3 inches in size; therefore, chemical treatments should be done during this period
6. Young fruits are rapidly expanding and therefore repeated chemical sprays are needed, depending on the amount of dead wood on the tree
7. Once Melanose pustules are formed, they cannot be reversed by chemicals
8. Alternate chemicals to avoid resistance build up
9. Please familiarize yourself with the information given in the Melanose Information from the Citrus Center website.
10. Repeated copper sprays would be required for effective control in severely affected orchards.
11. PLEASE SEE FULL DOCUMENT AT http://kcc-weslaco.tamu.edu

The Freeze of February 2011

John da Graça and Mark Van Ness

Citrus growers across the Lower Rio Grande Valley watched anxiously during the first week of February as forecasters predicted a mixture of sleet, snow, icy conditions and prolonged sub-freezing temperatures. At the Citrus Center, we took precautions to protect budwood supplies. The plastic sides of the foundation screenhouse were lowered and plastic was pulled over the frame structure which contains some of the increase budwood trees. Thermometers were place in the screenhouse and in the exposed increase rows.

Freezing temperatures were first recorded on Thursday, February 3, and the freeze watch continued through Saturday February 5. In the exposed rows, temperatures dropped to 28°F at 4.30 pm on Thursday, stayed there until midnight and then hovered around 27-28°F until they rose above freezing at 11 am Friday. There was considerable ice on trees, but fruit from our orchards did not appear to have frozen internally. Friday night had clear skies, and temperature dropped to 30°F by midnight, then to 28°F through to 5 am Saturday, and down to 26°F for an hour. After 8 am, temperatures rose above freezing.

In the foundation screenhouse, the lowest temperature recorded was 35°F. For most of the time, the temperature was in the upper 30s and lower 40s. Damage appears to have been minimal. In the foundation block, cold sensitive varieties such as the Mexican lime dropped most of their leaves, but have already begun to shoot.

Goodbye and Thank You

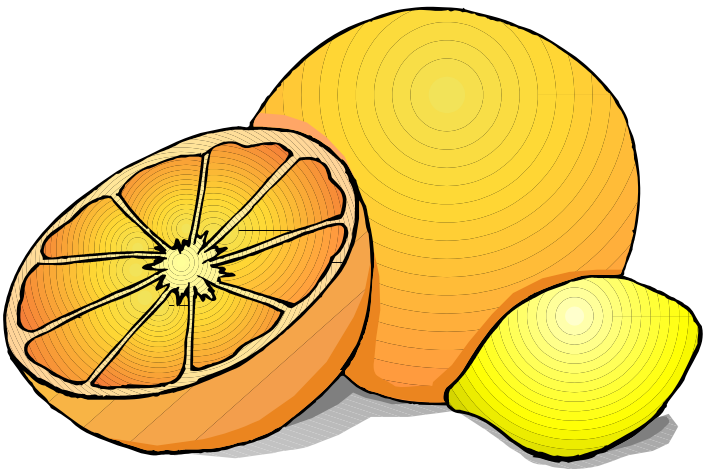
John da Graça

At the end of January, the Citrus Center said goodbye to two long-serving colleagues who retired - **Elias Hernandez** and **Marilynn Ambos**

Elias started work at the Center in 1988 working with Dr Vic French in the entomology unit overseeing his field experiments. In 1994, he became the Farm Superintendent, a position he held until his retirement. He had several years experience managing citrus orchards before joining the center, and this was valuable to us over the next 16 years.

Marilynn was hired a Librarian in 1984, but as more and more library access could be done via the Internet she assumed additional duties as Database Specialist. One of the duties she had was the compiling of the newsletter over many years.

We all thank both Marilynn and Elias for their many years of loyal and dedicated service and wish them well in the future.



Dr Wenbin Li visits the Citrus Center Diagnostic Lab

John da Graça and Madhurababu Kunta

The Citrus Center's USDA-certified laboratory for citrus greening disease diagnosis has now tested about 30,000 psyllids and 10,000 suspect plant samples collected by USDA-APHIS and Citrus Center surveyors. All the psyllid and citrus samples have tested negative, but several orange jasmine samples have given weak real-time PCR results. These samples were all sent to the USDA-APHIS-CPHST laboratory in Beltsville which determine that the results were 'inconclusive' because the greening-associated bacteria could not be detected by conventional PCR.

The protocols used by the laboratory have been rigorously developed and tested by the Beltsville lab, and the primary scientist there, Dr Wenbin Li, recently spent several days at the Center. He and Dr Kunta collected samples from the orange jasmine trees and analyzed them using primers for several genes of the greening organism. While a few samples gave a weak reaction, no clear evidence for the presence of disease was found. Further studies are being conducted to determine why we sometimes get these 'inconclusive' results.

Dr. Wenbin Li pictured with a healthy citrus tree.

We appreciate the time and effort put in by Dr Li and are also grateful for his positive comments about the diagnostic lab.

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A special thanks goes to Rosanna Elizondo-Villarreal for compiling this newsletter.