TEXAS A&M UNIVERSITY-KINGSVILLE

CITRUS CENTER

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ADVISORY COMMITTEE THANKS JIMMIE STEIDINGER

The Citrus Center Advisory Committee held its first meeting for 2003 recently with Bob Smith assuming the chair. The committee expressed its thanks to Jimmie Steidinger who had served as chairman for the past two years. The Dean of Agriculture & Human Sciences, Dr Ron Rosati presented a plaque to Jimmie, and highlighted the work done by him in supporting the center, and thanked him for his continuing efforts, especially for his contributions in Austin during legislative sessions.

John da Graca

Jimmie Steidinger receiving his plaque from Ron Rosati

TRIFOLIATE ORANGE – A POTENTIAL SOURCE OF VALUABLE GENES

The trifoliate orange (*Poncirus trifoliata*) is a close relative of citrus with some properties of interest to citrus breeders, namely resistance to *Citrus tristeza virus* (CTV), root rot, and nematodes, and cold hardiness. A number of its hybrids have proved useful as rootstocks (citranges, citrumelos), but attempts to transfer its genes to commercial citrus scion varieties by conventional breeding have failed because of the genetic linkage of undesirable properties.

A collaborative project between Erik Mirkov's lab in Weslaco and Dr Mike Roose of the University of California using positional cloning methods has identified 12 CTV resistance candidate genes, of which 11 have been used to transform citrus seedlings; over 100 presumably transgenic shoots have now been generated. Once these have been established in pots in the greenhouse by micrografting onto seedlings, the effects of the transgenes on resistance to CTV will be tested. Further studies on the ways in which these genes and their promoter genes are expressed will be conducted, and more transgenic plants will be produced and evaluated. Once the gene is identified, the possibility of introducing it into any susceptible citrus variety should be possible.

Meanwhile, Dr Louzada has been searching for the gene that controls cold hardiness. Genetic expression in trifoliate orange seedlings kept for 24 hours at temperatures ranging from 82°F down to 23°F were studied. Two identical genes were identified; one appears to operate continuously, but the second is switched on as the temperature drops below 50°F. One plant was kept at 14°F for a further 6 hours, demonstrating the high level of cold hardiness in trifoliate orange. The protein produced by these genes is very similar to a cold induced protein in barley.

See Orange Page 4

ANDRES LEDESMA

On March 20 we lost one of our retirees. Andres Ledesma had a life-long love of plants and was employed by Hoblitzelle Farms from 1943 until 1965. He worked there again through TAES from 1975 until 1978 when he moved across to the Citrus Center to take up a position as Farm Worker. He retired in January 1990. His hobby of gardening kept him busy, and he was a regular visitor to the Center, especially for the annual Christmas lunch. He will be missed by all at the Center who send their condolences to his wife Elvira and family.

DIAPREPES ROOT WEEVIL UPDATE

A rigorous quarantine, trapping and chemical eradication program has been on-going since the *Diaprepes* root weevil was first identified in an orchard on Hobbs Drive North of McAllen in October, 2000 (Citrus Center Newsletter, Dec. 2000). A second *Diaprepes* find was in a nearby orchard on Northgate Road. Both orchards and 18 residential properties within a 300 yard radius are under a strict quarantine enforced by the Texas Dept. of Agriculture. Both orchards are being sprayed in the spring and late summer with a tank mix combination of: Sevin 80WSP or Supracide 25WP + Micromite 25W + citrus spray oil. The foliar spray kills adult weevils and emerging larvae (neonates). Capture 2EC is also being applied twice per season beneath the tree canopy to kill neonates as they enter the soil. Citrus, palms, shrubs and ornamentals in the quarantined residential sites are also receiving two or more foliar sprays per season of Sevin 80S or Carbaryl 4L and two ground barrier applications of Talstar granules or Talstar 10WP drench sprays. All residential treatments are by licensed pest control operators as approved by the Texas Dept. of Agriculture.

Twenty 'Tedders' Traps placed in each orchard and 3-4 per residential site, are being monitored weekly for emerging *Diaprepes* weevil adults by personnel from the TAMUK Citrus Center and the USDA Mission Plant Protection Laboratory. *Diaprepes* weevils continue to be caught even after the rigorous chemical spray program. During 2002, weevils were trapped in the Hobbs Drive orchard in all months except Feb., March and May, with the highest number (15) recorded in September (Figure 1) . In the residential sites, two or more

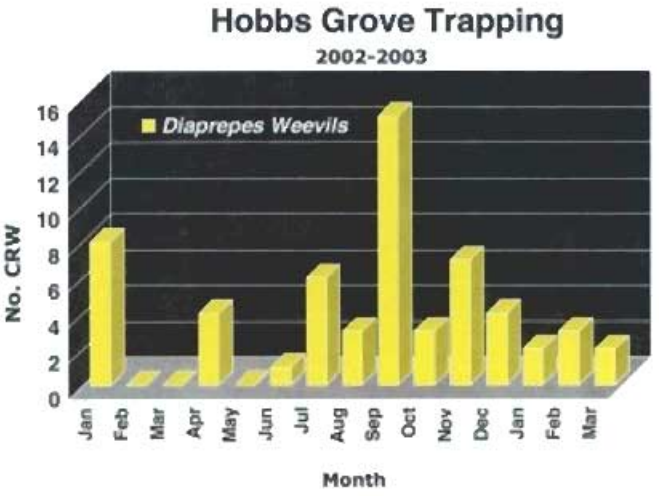


Figure 1

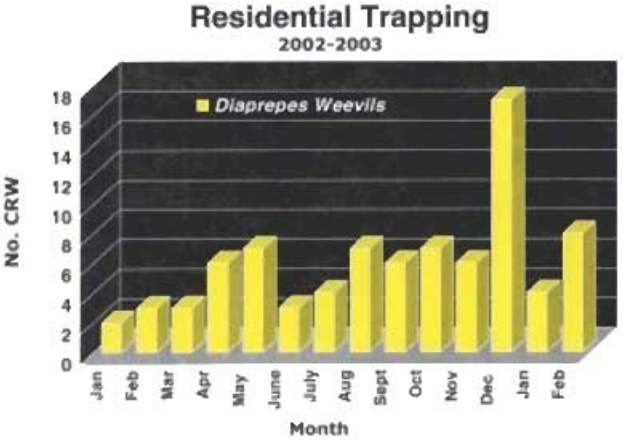


Figure 2

See Root Weevil Page 4

SPRING BLOOM

The spring flush and bloom have been uncommonly later than normal and rather longer than usual. While winter weather conditions were extremely favorable for a substantial bloom, cooler than normal conditions that have prevailed through both February and March have both delayed the onset of flowering and extended the bloom period. For example, bloom of navel oranges typically peaks in late February, other oranges in early March, with grapefruit coming on in mid-March. However, all types have been rather late this season–some navels, oranges and grapefruit are still showing lots of open flowers, while others have already bloomed out–and that's all in the same orchards.

The amount of bloom has been substantial, however. If the trees can handle it, the potential set will exceed anything we have seen in recent memory. Critical to fruit set and ultimate sizing of the crop is the availability of irrigation water supplies and the occurrence of timely rainfall–neither of which is assured.

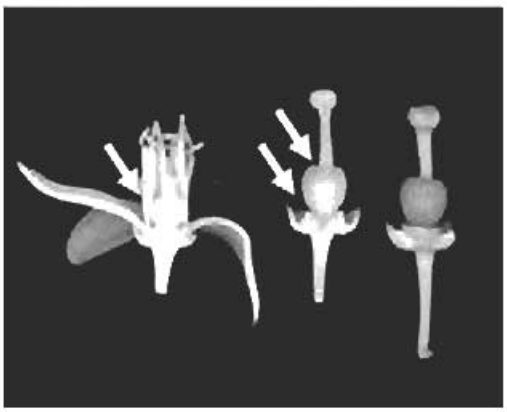
Given the report of the Rio Grande Watermaster at last week's TCM Mid-Year meeting, current irrigation supplies are a little better than in recent years–but even that good news is tempered by the fact that we will still need substantial, timely rains to support the sizing and maturation of the potential crop.

The most critical need for water will occur during the next two months as fruit set is being determined. Adequate soil moisture is necessary not only to set the crop, but is indispensable to maximize cell division within the fruit. After all, it is cell division during fruit set and early fruit development which determines the maximum potential size that fruit can attain, so any shortage of soil moisture during this time will negatively impact final fruit size. If cell division is limited by moisture stress, fruit size potential is limited and all the water in the world during the rest of the season won't make the fruit get any bigger than the size predetermined by the number of cells it has. As I have said in the past, try to maintain excellent soil moisture during the spring, and hope for the best with regard to water supplies for the rest of the season.

Julian W. Sauls, Ph. D.
Professor and Extension Horticulturist

EMBEDDED SPORES IN FLOWERS/FRUIT MAY BECOME PROBLEMATIC

'Embedded' is a common term that we hear a lot nowadays from news on war. Spores of numerous fungi that get deposited on flower parts become embedded, as flowers transform to fruit. The pictures below show the structure of a newly transformed fruit. Using an air sampler, we recently examined the type and number of spores that settle on flowers. This was done by impacting air from flowers onto a sticky microscope slides. The slides were examined under a microscope. Naturally, pollen was the most predominant one on the slides. However, the slides contained various spores of fungi such as *Alternaria, Cladosporium, Aspergillus/ Penicillium*-like, and *Diplodia*-like. Among these, spores of *Diplodia* that get embedded can create fruit decay during the early part of fruit harvest season. This happens because when green fruit are treated with ethylene — a standard procedure in packinghouses. *Diplodia natalensis* causes a major fruit decay called stem-end rot in Texas and elsewhere. Degreening of fruit using ethylene stimulates germination of *Diplodia* spores that are embedded or on fruit surface. Normally these spores remain harmless when not treated with ethylene. Moreover, the temperature and relative humidity required for degreening process favors spore germination. Control effort are required especially in the early season when fruit require degreening. No, or only limited, deadwood on trees, proper ethylene concentration, and climate control in degreening rooms help reduce the problem effectively.



Left: longitudinal section of a flower
Middle: longitudinal section of a developing fruit
Right: entire developing fruit, all showing possible location of spore embedding

Mani Skaria and Hongqin Miao

CITRUS FERTILIZATION STUDIES

Fertilization of citrus is necessary for maximum production but many questions continue to arise regarding what is the best program, particularly since fertilizers are expensive and can contribute to water pollution. A study has been conducted for the last two years and is continuing to look at the effect of various components of citrus fertilization programs.

Soil sampling prior to fertilizer application indicated the the grapefruit orchard being used had a high pH and very high levels of all nutrients except N. Various fertilizer treatments were then applied in December, January and February 2000-01. Summer soil and leaf tissue sampling 6 months later failed to show any effects due to fertilizer applications made the previous winter. Grapefruit yields the first year responded to N fertilizer application but were limited, with highest yields obtained where 40 to 60 lbs of N was applied; half of the normally recommended levels. Residual nutrient levels may have met much of the tree's needs. When comparing N sources, N–32 (a $CO(NH_2)_2$ - NH_4NO_3 blend) produced more fruit per tree than did 21-0-0 ($(NH_4)_2SO_4$).

The same fertilizer treatments were again applied in the winter of 2001-02. This time fertilizer treatment effects were evident in leaf samples taken the following summer. Fertilizer application increased fruit sugar content (brix) in December & January 2002-03 compared to the unfertilized check. The Actagro program being marketed by Wilbur-Ellis, which contains macro- and micronutricnts and both soil and foliar applications, increased brix and reduced acidity compared to 21-0-0 in samples taken in December, but this effect disappeared in January, indicating that Actigro is contributing to early maturity. Yields increases with fertilizer application were greater than the first year, indicating the effect of the fertilizer programs is building each year. Evidence of the fertilizer programs are also beginning to appear in the soil sample analyses.

Another fertilization study has been initiated on grapefruit this spring. This time the treatments consist of complete programs being widely used by citrus producers in the Lower Rio Grande Valley. Besides the Actigro program being evaluated in the first study, this study also includes a program incorporating Xtend, a product being marketed by Agriliance, which includes micronutrients and an organic component.

Bob Wiedenfeld
Professor and Soil Scientist, TAES

Root Weevil from Page 2

weevils were trapped every month, with the highest number (17) recorded in December (Figure 2).

Delimiting surveys are also being made with traps placed and monitored weekly in citrus orchards and residential properties outside the quarantined area. To date, no *Diaprepes* root weevils have been trapped in any of these sites. However, high numbers of two long-standing traditional Valley weevil species are being trapped in some locations—the golden headed weevil or little leaf notcher, *Compsus auricephalus* (Say) and the Brown or Mexican leaf-notching weevil, *Epicaerus mexicanus* (Boheman). More information on these two weevil species and trapping data from the delimiting surveys will be forth-coming in a future Citrus Center Newsletter article.

J. Victor French and Elma J. Salinas (Biologist, USDA-PPQ CPHST, Moorefield, Mission)

VISITORS TO THE CENTER

Recent visitors to the Center have been Dr Runzhi Zhang (a weevil expert from Beijing, China), Dr A. Krishnamoorthy (from Bangalore, India who is a visiting scientist with Dr Liu at TAES), Dr Brad Guice and Mr Joe Mitchell (BASF), and Mr Peter Bruno (Agricumbia Resources Co., Houston).

Orange from Page 1

Another gene coding for a hormone that is involved in cold acclimation has also been identified. The next stage in this research is to introduce these genes into cold susceptible varieties and then test their reaction to cold.

Erik Mirkov & Eliezer Louzada

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