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THE WATER DEAL—

Thanks to Ray Prewett's assessment in the TCM Grower (March, 2005) of the much-heralded water debt retirement issue, based on data provided by the Rio Grande Valley Watermaster, Carlos Rubinstein, I think I understand it now. Following the in-storage transfers that occurred in March, the debt stood at 449,135 acre feet. There will be three means by which that amount will be transferred to the U.S. in order to erase the debt by the end of September.

First, Mexico intends to try to deliver 145,928 acre feet towards the debt by June, 2005, but that could be delayed until as late as September. Second, Mexico will provide 149,981 acre feet from either the San Juan watershed (El Cuchillo and Marte Gomez reservoirs) which enters the Rio Grande above Anzalduas. Credit for this water, which can be used by U.S. interests, commenced on March 13, 2005. In the event that the entire amount delivered through Anzalduas falls short of the target, the balance will be made up from in-storage transfers.

So far, that's a total of 295,909 acre feet to be applied against the remaining debt of 449,135 acre feet, leaving a shortfall of 153,226 acre feet. That shortfall doesn't or won't really exist, as Mexico will receive conveyance loss credit in the amount of 154,846 acre feet on the original 716,670 acre feet debt that existed as of October 1, 2004, before the recent transfer.

In other words, the debt to be paid is substantially less than what you would think—because of the conveyance loss credit. Taking out the conveyance loss credit, Mexico currently owes only 294,289 acre feet, not the 449,135 acre feet above, on the overall debt—less any inflows since the transfer in March and less any credits for waters from the San Juan into the Anzalduas Pool since March 13, 2005.

There was also clarification of the 350,000 acre feet annual delivery for the current year. Most of us have always assumed that 350,000 acre feet is 350,000 acre feet—but that's not necessarily so. Conveyance losses could take as much as a third of that, apparently depending on where the water actually enters the Rio Grande. Thus, the annual 350,000 acre feet could be as little as about 230,000 acre feet of water that actually shows up in the reservoirs.

So, if Mexico is able to retire its debt on schedule and also meet its annual requirement, the U.S. stands to receive somewhere in excess of about 525,000 acre feet of water by the end of September. Given that U.S. water ownership is currently very near 100 percent of conservation level, you might wonder where we will put it.

While the reservoirs will hold considerably more water than conservation level, there has been little rainfall to date this year, so irrigation demand is quite high. At historic usage levels, we'll easily run through enough water to make room for that which we hope will be forthcoming without pushing the reservoir levels much above conservation level. Any bets on a wet hurricane going upriver this summer?

Julian Sauls, Ph.D.
Professor and Extenion Horticulturist

LEAF-CUTTING ANTS

Texas Leaf-cutting ants, *Atta texana* (TLCA), are becoming an increasingly serious problem not only on citrus and dooryard plants, trees and shrubs, but now even on cotton. Dr. Shoil Greenberg, Research Entomologist USDA-ARS, recently brought to my attention the destruction of cotton by marauding TLCA. Several rows of small newly-emerged cotton at the USDA North Cotton Research Farm were totally destroyed by TLCA and had to be replanted. Dr. Greenberg and I will be collaborating in research to find more effective controls for TLCA.

Based on data from earlier trials various chemicals formulated as baits in citrus pulp are most attractive to foraging TLCA. A fipronil bait (Blitz®), product of Bayer CropScience, has been most promising in earlier trials. It is a slow-acting toxicant in citrus pulp granules, which are retrieved and carried

See Ants Page 3

MEMBRANE FILTER TECHNIQUE FOR CITRUS NEMATODE ASSAY

In a previous article (http://primera.tamu.edu/kcchome/newsltr/december2003.htm) dated December 2003, we reported an improved Baermann funnel technique for citrus nematode assay. This improved assay utilizes a membrane filter. Membrane filter (MF) technique is a standard procedure used worldwide to assess bacterial contamination in water. This technique is simple and has use in several different applications in addition to bacteriology. The technique allows filtration of a large volume of water to retain microorganisms and particulates on a membrane placed on a filter holder with a seal to prevent water leak. We have adapted the bacterial MF technique to screen a large volumes of soil samples to assay for the citrus nematode, *Tylenchulus semipenetrans*. The stored membranes can be kept in a refrigerator for months and can be re-evaluated for counting, photography, and/or scanning.

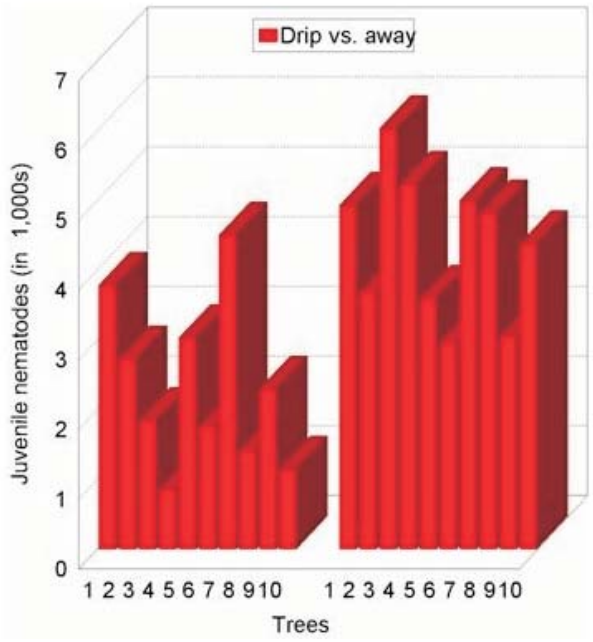
Membrane filters: We used 0.45 µm pore size, circular (47 mm diameter) cellulose nitrate filters from Whatman Inc. (Clifton, NJ) and Gelman Sciences Inc. (Ann Arbor, MI). Cellulose nitrate filters are used in general purpose analytical filtration, when protein binding is not important. It has good wetting property and has a fast flow rate with aqueous solutions. The membrane has a total of 151 full squares (each 9 mm^2 size). The filters are placed on a filter holder and are available either sterile or non-sterile.

Soil sampling and nematode extraction: The Baermann funnel procedure is a routine process for extracting drawing-out nematodes from soil and root. In its simplest form, soil samples (with or without root pieces) are placed on tissue paper on a wire-screen support. The wire screen is placed on top of a funnel filled with water. The funnel tip is extended with rubber tubing that is sealed with a clamp. Additional water is added to keep the soil moist. Juvenile nematodes leave the soil and roots, pass through the wire-screen support and accumulate at the end of the funnel.

Citrus nematode: Adult females of citrus nematode, *Tylenchulus semipenetrans* feed on feeder roots. The posterior part of the body is outside the root, extruding a gelatinous material into which eggs are deposited. The life cycle from an egg to the next generation eggs requires 4 to 8 weeks. Second-stage nematodes emerge from eggs. Males are smaller and do not feed. The second-stage female undergo four molts or form-changes. They penetrate and embedded in the feeder roots. The citrus nematode also reproduces on olives and grapes.

Figure above left to right. Adult female nematodes established in a feeder root; an adult female with an enlarged posterior reproductive part, a long neck, and the head; a portion of a membrane filter with stained nematodes evenly distributed.

Recent assay results: In March 2005, we evaluated more than 300 soil samples using the MF technique. This study was part of our research on citrus nematode management in orchards using new products, viz., a biological control agent, a growth regulator, and an insecticide. The studies were conducted under flood, drip, or micro-sprinkler irrigation. We found the MF technique accurate, simple, and it provides us with a long-term record. In drip irrigated orchards, the nematode population around the drip emitters was found to be consistently higher than the population at the drip line of the tree. The following chart shows results from 10 trees. The bars on the right represent the population of citrus nematodes at the emitters and the bars at the left show sampling results from the drip line away from the emitters.



Nematode populations at the tree drip line.

Nematode populations at the emitters

Economic value of this type of analysis: One of the major limiting factors in assessing nematode populations in field soils is the cost of laboratory analysis. Moreover, high sample numbers are required to obtain realistic information of nematode infestation levels in a large field. The extraction

See Membrane Page 3

Membrane From Page 2

and MF are easy and straightforward processes that can be performed by the grower in the field. MF samples collected in this way can be sent to a professional laboratory (along with a limited number of fresh samples) for an accurate analysis of the nematode type(s) present in the soil.

Storage of membranes: The fact that the MF samples can be stored for several months without losing the identity of nematodes makes it very valuable in preserving them laminated. This enables the grower to compare the shape and size of nematodes from various extractions. Moreover, it is relatively easy to make both qualitative and quantitative assessment of the population level with the aid of a hand lens. These attributes are highly valuable to the grower for developing nematode control strategies. Moreover, this process is inexpensive.

Mani Skaria

Ants from Page 1

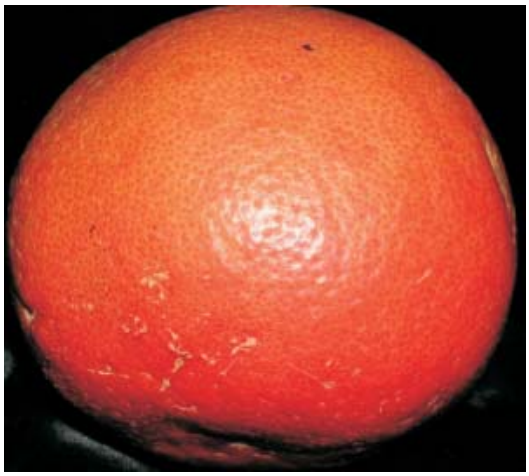
by worker ants into their underground nests, subsequently causing mortality of TLCA queens and workers. Long-term control (several months) was achieved of numerous large TLCA colonies treated with Blitz. Submission of data to the Environmental Protection Agency in support of a Section 18 Registration for Blitz (fipronil) against TLCA should occur in the near future. Meanwhile, we will also be testing other chemicals formulated in citrus pulp as TLCA baits—such as pyriproxyfen (Esteem®), product of Valent USA Corporation. Results of these trials will be forthcoming in future Citrus Center Newsletter articles.

Leaf-cutting ants on citrus leaves.

J. Victor French and Shoil M. Greenberg

UPDATE ON THE DEVELOPMENT OF THE PROSPECTIVE TEXAS RED GRAPEFRUIT

The development of new improved cultivars of any citrus species is a long term task due to their extensive juvenility period. At the same time, citrus has several barriers which hinder the use of conventional breeding for the most commercially important species such as orange, grapefruit, lemons and limes. Almost all the commercially important citrus originated by natural or induced mutation, and therefore mutation is an important technique for citrus breeding. The biotechnology laboratory at the Citrus Center has been looking for natural field mutations, as well as inducing mutations by irradiation. Last year we found a grapefruit with a beautiful bright red, strawberry-like, rind and a delicious sweet and tasty red flesh, darker than Star Ruby. We have tentatively called this grapefruit “Texas Red” (Citrus Center Newsletter Vol. 22, No 2, pg 4). It is the kind of fruit that would appeal to the consumer in a supermarket display. We collected buds from the mutated branch and multiplied it. At the same time we obtained 18 seedlings as well as a few others by tissue culture that has the potential to produce further variations. In an attempt to speed up the evaluation process, we have been top-working all of them onto mature orange trees. The field evaluation of a new citrus variety is a long process, and it will take around ten years for Texas Red or any other variety to be released.



‘Texas Red’ Grapefruit

Eliezer Louzada

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