

INTERNATIONAL ORGANIZATION OF CITRUS VIROLOGISTS

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IOCV NEWSLETTER

July, 2002

FROM THE CHAIRMAN

Dear IOCV members,
Almost eight months have already passed since our last meeting at Paphos (Cyprus) and it is time to receive news from IOCV members and to be updated on general IOCV topics. Firstly I have to tell you that, after several reminders from John da Graca and myself, manuscript submission was achieved within a reasonable period and the editorial committee is working hard to get the Proceedings issued within this year. I wish to thank the reviewers for their help to improve the scientific quality of the papers, but for the general benefit, I would like to urge them to quickly send their suggestions and criticisms to the editors, and the authors to not delay revision of their manuscripts. Details on the situation of the Proceedings is provided by John.

Organization of the 16th IOCV Conference in Mexico and Texas have started and John and Mario Rocha Peña are giving some information on the first steps. This conference will be held in 2004, the same year as the congress of the International Society of Citriculture in Morocco. Fortunately, the ISC has recently decided to hold its congress in February, which is reasonably separated in time from the usual dates of celebration of IOCV conferences in the northern hemisphere (November-December).

Following the last amendments of our by-laws two committees have been nominated: the 'Conference Location' and the 'Wallace Award' committees -- Josy Bové, Luis Navarro, Steve Garnsey and Pat Barkley have kindly accepted to serve in the first, which has to be co-chaired by the IOCV Chairman and Chairman-Elect. This committee will search for possible locations to hold the 17th Conference in 2007. After studying different options, a proposal will be presented in Mexico for approval at the business meeting. IOCV members willing to offer their country as possible location of the following conference are encouraged to contact any member of this committee. The Wallace Award committee will evaluate the full papers presented in the past conference, after the Proceedings will be issued, to select that or those deserving this prize. According to the by-laws this committee and the authors to be awarded will be announced in the banquet of the next conference.

Finally, the new by-laws also open the possibility to honor prominent IOCV members with the nomination of IOCV Fellow. The Board of Directors can select potential candidates or accept those suggested by members of the organization, after examining documents or information available on the achievements of the nominees in relation to the IOCV objectives. Nomination has to be approved at a business meeting. Although selection of candidates is not easy and may be even controversial, I consider that it is time to grant this honor to some of the IOCV members deserving it. Therefore, I encourage all you to conscientiously consider potential candidates and send to the Chairman your proposals accompanied by a memo documenting or explaining those achievements which would justify their nomination as IOCV Fellow. Proposals as supported by several members will be specially welcome.

Of the 113 papers and posters presented in Cyprus, we received 76 manuscripts, of which 23 were submitted as short communications and 53 as full papers. The remainder will be published as abstracts. Most of the short communications have been revised and edited, and about 12 of the full papers are now complete. Bob and Nuria are receiving the last few reviewers reports, so it looks like we are on track for publication before the end of the year. When you receive reviewers/editors comments, we ask you to revise your paper as speedily as possible; similarly when the galleys are sent out. We will not send any papers to the printers until all are ready. We thank all contributors and reviewers for their cooperation thus far. (Nuria Duran-Vila, Bob Milne & John da Graça)

APPROVAL OF MEXICO AS SITE FOR THE 16TH IOCV CONFERENCE, NOVEMBER, 2004.

OFFICE OF THE DIRECTOR GENERAL

June 18, 2002

DR. PEDRO MORENO

CHAIRMAN, INTERNATIONAL ORGANIZATION OF CITRUS VIROLOGISTS

INSTITUTO VALENCIANO DE INVESTIGACIONES

AGRARIAS MONCADA, VALENCIA, ESPAÑA.

I am delighted and honored to learn that the members of the International Organization of Citrus Virologists (IOCV) have selected Mexico as the venue for their XVI Conference in 2004.

As you may be aware, citriculture in Mexico is of major economic and social importance, covering approximately half a million hectares. Thus the visit of distinguished citrus virologists from around the world to our country would represent a great benefit to the entire citrus industry.

I wish to express to the IOCV the commitment of INIFAP to organize the XVI conference in Monterrey and the post-conference tour of Veracruz in 2004. The personnel of INIFAP have the background, expertise and capability needed to obtain the necessary financial and operative support to accomplish this commitment with the IOCV.

I express my sincere regards to all IOCV members, and we look forward to welcoming you in our country.

Respectfully

DR. JESUS MONCADA DE LA FUENTE

DIRECTOR GENERAL

PROCEEDINGS 15TH IOCV

VIRUS NOMENCLATURE (John daGraca)

Some authors of IOCV manuscripts may be a bit puzzled by the corrections we are making to virus and viroid names. The International Committee on Viral Taxonomy (ICTV) publishes a report every few years on how we should name viruses, and adding newly approved names. In the 1999 report, they introduced a controversial change, which some virologists and journals are ignoring. However, because most plant pathology journals accept the new system, the IOCV Proceedings will do the same. Viruses/viroids which are accepted by the ICTV as characterized species have their names printed in italics, with the first letter of the first word capitalized. Those viruses not yet accepted, plus those which have been reclassified but are still widely known by an old name (and may possibly be distinct strains), are not italicized. Accepted citrus virus/viroid species are *Citrus tristeza virus*, *Citrus psorosis virus*, *Citrus yellow mosaic virus*(*), *Citrus variegation virus*, *Citrus leaf rugose virus*, *Citrus exocortis viroid*, *Citrus bent leaf viroid*, *Citrus viroid III*, and *Citrus viroid IV*. Citrus tatter leaf virus is *Apple stem grooving virus*, and Citrus cachexia viroid is *Hop stunt viroid*. Satsuma dwarf virus, Citrus mosaic virus(*), Natsudaikai virus, Citrus vein enation virus, Citrus leprosis virus, Citrus leaf blotch virus, and Citrus Indian ringspot virus are proposed species. (*) - the ICTV incorrectly lists *Citrus mosaic virus*, but this is the badnavirus (CYMV) from India, and not CiMV from Japan which is probably in the family Comoviridae.

Bacteriologists can also have fun with names. They have decided that for non-culturable organisms, a *Candidatus* name is used, which is not italicized. So, the HLB bacteria are called “*Candidatus Liberibacter asiaticus*” and “*Candidatus L.africanus*”, and the WBDL organism is “*Candidatus Phytoplasma aurantifolia*”.

NEWS FROM TEXAS (John daGraca)

Caroline Herron continues her work characterizing Texas isolates of *Citrus tristeza virus* under Erik Mirkov's and John da Graca's supervision. Erik, in collaboration with Mike Roose (UCR), is making good progress in identifying the *ctv* resistance gene in trifoliolate orange, while Eliezer Louzada and his student Julio Hernandez are also looking at gene expression in CTV-challenged trifoliolate. Mani Skaria and Hongqin Miao have been doing some histological studies on CTV-infected lime leaves and report that there is a correlation of sclerenchyma cell degradation with the degree of vein clearing. Craig Kahlke continues to manage the citrus budwood program, and will

shortly be beginning a study on identifying what viroids are present in Texas, in collaboration with Mario Rocha-Peña in Monterrey. Entomologists at the USDA-ARS center in Weslaco, led by Don Thomas and Rob Mangan, are working with colleagues in Mexico on the movement of the brown citrus aphid and the effects of predators and parasites; they are also collaborating with John, Erik, Eliezer and the Citrus Center's entomologist, Victor French. Eliezer is conducting rootstock trials to identify suitable alternatives to sour orange (currently 98% of trees in south Texas are on sour orange), and is reporting promising initial results with some Sunki mandarin x Swingle trifoliolate hybrids.

Three recent publications from Texas:

French, J.V., C.J.Kahlke & J.V.da Graca (2001). First record of the Asian psylla, *Diaphorina citri* Kuwayama (Homoptera:Psyllidae) In Texas. *Subtropical Plant Science* 53: 14-15

Solis-Gracia, N., C.J.Kahlke, C.M.Herron, J.V.da Graca, K.L.Esau, H.Q.Miao & M.Skaria. 2001. Surveys for Citrus tristeza virus in Texas 1991-2000. *Subtropical Plant Science* 54: 4-8.

Yang,Z.N., X.R.Ye, S.Choi, J.Molina, F.Moonan, R.A.Wing, M.L.Roose & T.E.Mirkov. 2001. Construction of a 2.1Mb contig including the citrus tristeza virus resistance gene locus using a bacterial artificial chromosome library of *Poncirus trifoliata*. *Genome* 44: 382-393.

NEWS FROM COLUMBIA (Monica Guzman)

We are working in collaboration with CORPOICA to search for the presence of CTV and any possible variants in our citrus bank germplasm located at Palmira (Valle) and Villavicencio (Meta). We are using tissue printing and some ELISA protocols and CP sequences, searching for orange stem pitting strains and mild strains also. Oscar Oliveros after a 6 month study in Dr. Dawson's lab at Lake Alfred is now finishing his doctoral thesis on CTV genetic variants and possible evolution. We shall participate at the next Columbian Phytopathology Congress in July at Bogota. We are also preparing two papers for this Congress.

NAVEL BUD-UNION DISORDERS IN CALIFORNIA (Lawrence Marais)

Two seemingly unrelated bud-union disorders have recently been

discovered in commercial plantings of two different navel selections viz. Beck navel and Fukumoto navel. Fukumoto navels exhibiting this disorder are on Carrizo citrange, C35, Swingle citrumelo and 'Rich' trifoliolate rootstocks, whereas the Beck navels are on Carrizo citrange and C35. In both instances the disorder appears more severe on C35. Symptoms of the disorder appear 3 to 5 years after planting. Affected trees exhibit a brown stain and crease across the budunion when bark patches are removed. Initially only a sector of the budunion shows these symptoms and these sectors are associated with symptoms of chlorosis and die-back in the canopy. In Fukumoto there is a profuse growth of shoots above and below the budunion frequently accompanied by copious gumming and foaming, hence the description 'Foamy Bark Disease'. The latter symptoms are absent in the Beck navel. Affected trees of both selections succumb to the disorder at the age of 5-8 years. The disorder in Fukumoto is believed to be of a physiological nature as these trees are propagated from certified budwood sources. Indexing for citrus tatterleaf virus has been negative in both cases. Only old line sources of the Beck navel, infected with Group II and III viroids, exhibit this disorder whereas symptoms are absent from shoot-tip grafted sources. Growers have been recommended to discontinue propagation of Fukumoto navel on susceptible rootstocks. Inarching field trees with tolerant rootstocks or interplanting with a different navel selection are also options to prevent future decline and recoup losses in both selections, respectively. Propagation of the Beck navel selection should only be from certified budwood sources.

NEWS FROM HAWAII (Michael Melzer)

A facility dedicated to challenging citrus varieties resistant to Citrus tristeza virus.

Citrus tristeza virus (CTV) and the brown citrus aphid have been present together in Hawaii for over 50 years. A recent survey has revealed that CTV is widespread in the islands, with an overall incidence of about 74% (298/405). Molecular data has demonstrated that the Hawaiian CTV population contains strains which are closely related to those characterized elsewhere (T36, VT, T385, etc) as well as novel strains which have not been characterized elsewhere.

Hawaii is therefore an ideal location to test citrus varieties that have been developed for resistance to CTV, regardless of whether this resistance has been derived through traditional plant breeding, protoplast fusion, or genetic engineering. We are currently establishing a one-acre site on the island of Oahu that will have donor trees harboring a wide range of CTV strains collected from across the islands. Potentially

resistant varieties will be grown amongst these donor trees and will be challenged with the diverse collection of CTV strains by brown citrus aphid and graft inoculation.

We feel that this testing facility will benefit researchers who have or are developing CTV-resistant citrus but may not be able to adequately challenge their plants in the field due to a CTV population limited to only a few strains or the political constraints involved with transgenic organisms. We encourage all IOCV members who are developing CTV-resistant citrus varieties to contact us about testing their plants at our facility in Hawaii. Please contact:

Michael Melzer
(808) 956-2832 (fax)
melzer@hawaii.edu
johnhu@hawaii.edu

CERTIFICATION PROGRAM IN EGYPT (C. N. Roistacher)

Egypt has now embarked on a certification program in cooperation with the German Technical Agency (GTZ) and much progress is being made. As background, the average yield for citrus in Egypt is 7.4 T/Fedam compared to a world average of 18.3 T/Feddam. This low yield is due to many factors, but primarily due to the ravages of various graft transmissible diseases of citrus such as psorosis, tristeza, exocortis and cachexia viroids, gummy bark, concave gum, stubborn etc. These diseases are present in an extremely high amount of citrus currently growing in Egypt and there was no certification or indexing programs for their detection and elimination from propagating budwood. One of the most serious of these diseases is psorosis. Also, of serious concern is the fact that the tristeza disease is present in Egypt and little has been done for its eradication and in fact all talk of its presence had been suppressed. This is now changing.

A new citrus center for certification has been established at the City of Bahteem located north of Cairo and the achievements made at this Bahteem Citrus Center in the short period of just over two years has been remarkable. 1) Some 16,000 virus tested buds of 11 varieties were distributed to five nurseries in March, 2002. 2) Seedlings were ready at these selected nurseries for the propagation of these 16,000 buds from the Bahteem Citrus Center. 3) Sanitary conditions in and around the newly constructed tunnels at the Bahteem Citrus Center are excellent. 4) A high percentage of buds were successfully forced

in these tunnels. 5) A new steam sterilizing unit was obtained and put into operation. 6) A number of positive controls were imported and inoculated into receptive seedlings. 7) A laboratory has been established at the Center and will shortly be in full operation. 8) A recent edict by the Honorable Minister of Agriculture, Youssef Wali, announced the formation of a board to oversee a tristeza eradication program. Mariano Cambra will visit Egypt in the fall to consult on the best way to survey and test for CTV.

The program's success can be attributed to a group of dedicated people involved. Credit is directed to the leadership of Dr. Alberto Camacho of GTZ and Eng. Ibrahim Shetta and Salama Eid Salam on the Egyptian team. They are all working together to make this program succeed. The consultancy input of Dr. Anna Maria d'Onghia into the planning and development of

Shortly coming out in *Archives of Virology* is some further work from Torino (mainly by Gabriella Rustici and Gian Paolo Accotto) on the genome and taxonomic position of Indian citrus ringspot virus. At first it looked like a Capillovirus, then it turned into a Potexvirus with an oversize coat protein, and now it has distanced itself from any recognized genus, since it has sequence homologies with potexviruses but an extra open reading frame at the 3' end, more like carla- and allexiviruses. However, it does not appear to be any sort of straight hybrid. Does this remind you of Citrus leaf blotch virus from Nagami kumquat in Spain? Wrong! That's another filamentous virus that does not seem to fit anywhere, but it and ICRSV are apparently continents apart. (Rustici, G., Milne, R.G., Accotto, G.P. (2002). Nucleotide sequence, genome organization and phylogenetic analysis of Indian citrus ringspot virus. *Archives of Virology*, in press.)

Monoclonals work in Torino on *citrus psorosis virus* came to a halt (no funding) after production of the two successful mabs 2A3 and 13C5, the latter likely to prove a 'universal' reagent able to recognize all CPsV isolates. However the cell cultures remained, and include several other promising hybridomas. These will now be released to Pedro Moreno's lab in Valencia and Donato Boscia's lab in Bari, for potential further development. They may be useful for diagnostics and for further differentiating the apparently many variants of CPsV.

Please don't forget that other viruses exist outside of citrus, and some of them are close to CPsV in the genus *Ophiovirus*, and likely share some properties. Parts of the genome of one such virus, Ranunculus white mottle virus (RWMV), have been analyzed in Torino by Antonella Costantini and Anna Maria Vaira. They have evidence that the some of the closest neighbors of RWMV are famous nasties attacking humans, such as rabies and Marburg viruses. OK, closer than anything else but

the program has been outstanding.

Visits were made by representatives of GTZ, Egyptian leaders and nurserymen to IVIA in Spain to study the Spanish indexing and certification program. Luis Navarro and his staff graciously hosted the representatives from Egypt and gave much of his time and effort to explaining the Spanish program.

FROM TORINO, ITALY (Bob Milne)

Here the problem is how to convince people you are retired and ought to be left in peace. Oh well! not really SO close. It's not that when you eat your next infected blood orange it will turn around and savage you! Hope not.

As already noticed at the Cyprus IOCV meeting and since published in *Phytopathology*, another ophiovirus, causing lettuce big-vein disease, has been shown to be vectored through the soil by the fungus *Olpidium brassicae*. We have made noises before about the possible field vector of psorosis, so this time, better keep quiet. (Lot, H., Campbell, R.N., Milne, R.G., Roggero, P. (2002). Transmission by *Olpidium brassicae* of Mirafiori lettuce virus and Lettuce big-vein virus, and their roles in lettuce big-vein etiology. *Phytopathology* 92: 288-293.)

FROM IRAN - K. Izadpanah

We are continuing work on citrus tristeza virus and lime witches' broom phytoplasma in southern Iran. A new natural host of lime witches' broom phytoplasma is Bakravi (a natural hybrid, probably *Citrus reticulata* X *Citrus limettoides*) which is sometimes used as a rootstock for other citrus species in Iran.

JOSE BOVE HONORED

(This letter came just after publication of the January, 2002 IOCV newsletter and presented here with our congratulations).

"Josy Bové was elected on December 2001 member of the Brazilian Academy of Sciences. He wishes to share this honor with Monique Garnier, and all those who worked with them on Citrus Variegated Chlorosis and *Xylella fastidiosa*: Victoria Rossetti, C.J.Chang, Leila Zreik, Fréédéric Laigret, Patricia Carle, J.Renaudin, Juliano Ayres, Patricia Monteiro, and Patrice Gaurivaud.

In 2001 also, Josy was elected member of the European Academy of Sciences, Humanities and Arts.

He is a member of the French Academy of Agriculture, the

American Academy of Microbiology, and a corresponding member of the French Academy of Sciences. He is a Fellow of the American Phytopathology Society."

FROM THE SECRETARY (C.N. Roistacher)

Abstracts of the 15th IOCV conference are still available. E-mail to Anastasia Kyriakou at: <kyriakou@arinet.ari.gov.cy>

Copies of the 14th Proceedings of IOCV are available for mailing (fill out form for the available proceedings of the IOCV or contact the Secretary by e-mail).

ECOPORT SLIDE LECTURES

There are some new and recent slide lectures available on the Ecoport web site. New slide shows include one on blight by Roistacher and Lee and a new slide lecture on bud union disorders of citrus by Roistacher.

This site is readily and quickly accessible anywhere in the world - Click on <www.ecoport.org>. Then, in the main menu on the left click on 'Use Resources' and then click on 'slide shows' located on the bottom half of the menu. A new menu will appear and enter either an author, a subject, citrus or the number of the slide show. Any or all of these slide shows can be downloaded using the 'Aladdin Expander'. Individual JPG slides can be downloaded. At this website you will find over 35 slide shows on various citrus diseases. Your contributions are sincerely appreciated by submitting new information on the subject with your slides and your input or any corrections. Any changes and updates are genuinely appreciated and will be recognized.

FROM MONCADA, SPAIN

(Pedro Moreno)

Molecular characterization of Citrus leaf blotch virus (CLBV) was continued at Pepe Guerri's lab. After completing the nucleotide sequence of the genomic RNA, Mari Carmen Vives succeeded to characterize the two types of subgenomic RNAs (sgRNAs) produced by this virus (two sgRNAs are 3' co-terminal and the other two are 5' co-terminal) and suggested a possible mechanism of formation of the 5' co-terminal sgRNAs. Finally, she analyzed the genetic variability of CLBV in isolates from various countries and found that it was very low. Those data were part of her PhD thesis, that she passed with the maximum score at the University of Valencia last June 17th, and have been recently published:

VIVES, M.C., GALIPIENSO, L., NAVARRO, L., MORENO, P., GUERRI, J. 2001. The nucleotide sequence and genome organization of *Citrus leaf blotch virus*: Candidate type species for a new virus genus. *Virology* 287, 226-233.

VIVES, M.C., GALIPIENSO, L., NAVARRO, L., MORENO, P., GUERRI, J. 2002. Characterization of two kinds of subgenomic RNAs produced by *Citrus leaf blotch virus*. *Virology* 295: 328-336.

VIVES M.C., RUBIO, L., GALIPIENSO, L., NAVARRO, L., MORENO, P., GUERRI, J. 2002. Low genetic variation between *Citrus leaf blotch virus* isolates from different host species and geographic origins. *Journal of General Virology* (In press).

Now Mari Carmen will try prepare an infectious cDNA clone of CLBV for additional molecular studies and to set up a reliable serological detection procedure. Surprisingly, we have a fairly good knowledge of the genetic privacy of this virus but do not have an easy and convenient diagnostic method. Also, we are not sure of its degree of contribution to the bud union crease that it usually appears associated with.

Regarding other citrus viruses, we have recently published our results on detection of *Citrus psorosis virus* by conventional and immunoprinting ELISA in comparison with psorosis diagnosis by symptom observation and cross protection against psorosis B:

MARTÍN, S., ALIOTO, D., MILNE, R.G., GUERRI, J., MORENO, P. (2002). Detection of *Citrus psorosis virus* in field trees by direct tissue blot immunoassay in comparison with ELISA, symptomatology, biological indexing and cross-protection tests. *Plant Pathology* 51, 134-141.

And also the use of SSCP analysis to differentiate CTV isolates and to monitor cross protection:

SAMBADE, A., RUBIO, L., GARNSEY, S.M. COSTA, N., MÜLLER, G.W., PEYROU, M., GUERRI, J. MORENO, P. 2002. Comparison of the viral RNA populations of pathogenically distinct isolates of *Citrus tristeza virus*. Application to monitoring cross protection. *Plant Pathology* 51, 257-265.

THE EXOTIC CITRUS PATHOGEN COLLECTION IN BELTSVILLE (John da Graca)

In the 1980s a collection of exotic strains of Citrus tristeza virus, as well as other graft transmissible pathogens, was established at the USDA-ARS Beltsville Agricultural Research Center quarantine facilities. This collection has been extensively used by researchers, and has grown in size. In 2001 the greenhouse containing the plants was extensively damaged by a tornado - most of the plants were saved, and are now temporarily housed in a nearby glasshouse. The technician who oversees the collection, Tina Gouin, asked her boss, John Hartung, to arrange a meeting of users to decide what to keep, and to draw up guidelines for new accessions. So in May a number of citrus virologists from Florida (Lee, Bransky, Garnsey, Dawson, Hilf, Sieburth), California (Yokomi) and Texas (da Graca) met in Beltsville with John, Tina, Laurene Levy and Vern Damsteegt, and went through the collection. The plan is for the limited resources to be better used maintaining those pathogen isolates which were regarded by the attendees and other users contacted by email afterwards as essential.

VIRUS AND VIRUS-LIKE DISEASES ON MADEIRA ISLAND - ACTUAL SITUATION (2002) - (Adelaide Fernandes)

The Citrus Tristeza Virus (CTV) was detected here for the first time in 1994, and also the Brown aphid of citrus, *Toxoptera citricida*. Since then, both have spread all over the Island. This aphid colonizes all varieties of citrus plants including rootstocks, even in nurseries, and they prefer the young flushes of lemon trees. Madeira does not have natural enemies for this pest.

Most of the citrus orchards are very old and are grafted on sour orange rootstock. The newer plantings use tolerant rootstocks such as the Carrizo and Troyer citranges, but even these have been affected by the severe strains of the virus. We have here both mild and severe strains of CTV which causes stem-pitting. In 2000 we could see a great number of dead trees all over the Island. Presently, *T. citricida* and CTV, had not reached Porto Santo Island. Fortunately the brown citrus aphid is not present on the Portugal mainland, but the presence here in Madeira is a threat for all the big citrus plantations of Europe.

In 1994 the African psyllid *Trioza erythrae* the vector of the greening disease was detected and is now spread all over the island including Porto Santo Island, but is not present on the mainland. Like the brown citrus aphid, the psyllid prefers

lemon trees and also the young rootstocks. Recently this psyllid was found here in Madeira, colonizing the tropical Whyte Sapote, *Casimiroa edulis*. However, the greening disease is not found in Madeira..

In the Madeira Islands other virus and virus-like diseases are not important and we only saw some very old trees with scaly bark lesions probably caused by the psorosis virus but this has not been confirmed in laboratory).

SUDDEN DEATH DISEASE IN BRAZIL

(J. M. Bove)

Sudden Death (SDD) is a new disease of sweet orange grafted on Rangpur lime in Brasil. The disease appeared in the southern part of the Triangulo Mineiro (Minas Gerais State) in 1998, and has now reached the northern part of São Paulo State. The number of affected trees increased from about 500 in 1999 to 500,000 in April 2002. All commercial sweet orange varieties are affected. Valencia and Natal are the most susceptible one's, the disease resulting in death of the trees. On Hamlin, Pera, and Westin, symptoms are severe, but the trees decline more slowly before eventually dying. Symptoms are essentially tristeza-like decline and death. In the State of São Paulo, 90% of all sweet orange trees (180 million) are on Rangpur lime. SDD is thus a major threat to the Paulista citrus industry.

SDD has many points in common with tristeza or quick decline of sweet orange on sour orange. For instance:

- 1) Both sweet orange and Rangpur lime are tolerant when on their own roots, but the combination of sweet orange on Rangpur lime is susceptible. In SDD, Rangpur lime plays the same role than sour orange in tristeza.
- 2) Epidemiological studies have shown that spatial and temporal spread of the SDD agent is identical to the spread of Citrus Tristeza Virus (CTV) by *Toxoptera citricida*. This suggests that *T. citricida*, which is very abundant in São Paulo State, is a vector of the SDD agent.
- 3) The very first symptom of SDD is the appearance, below the bud union, of a yellow stain in the cambium of the Rangpur lime rootstock. The yellow stain goes all around the trunk, and literally girdles the trunk. Electron microscopy shows the sieve tubes to be occluded.
- 4) SDD affected trees can be recovered by inarching with tolerant rootstock seedlings, such as Cleopatra mandarin, Swingle citrumelo, or Sunki mandarin.

These data suggest that the causal agent of SDD might be a new CTV-like virus or a new strain of CTV. The new

putative CTV strain or mutant is different from the classic CTV strains in that trees on Rangpur lime are susceptible to the new strain. Apparently, the new, putative mutant CTV strain has arisen only in one region, the southern part of the Triangulo Mineiro. This strain is seen infecting not only susceptible trees, those on Rangpur lime, as seen by the symptoms, but also tolerant trees on rootstocks such as Cleopatra mandarin. Probably, all trees in the affected region are already infected, and carry the new, putative strain, in addition to the "classic" CTV strains present in all trees.

Several laboratories have undertaken to confirm (or reject) the "CTV" hypothesis. In Brasil, Fundecitrus is carrying out graft-inoculation and insect-transmission experiments, and has undertaken extensive surveys to study the spread of SDD within the affected region, but also out of it, into the neighboring São Paulo State. These studies are being carried out in collaboration with Professor Dr. Armando Bergamim Filho (Epidemiologist, University of São Paulo, Piracicaba, SP), and Dr. Tim Gottwald (Epidemiologist, US Horticultural Research Laboratory, Subtropical Plant Pathology Research Unit, Fort Pierce), as well as the major citrus growers. CTV populations from affected trees in comparison with CTV preparations from non-affected trees have been studied in Brasil (Dr Marcos Machado's group, Citrus Research Center, Cordeiropolis, SP) and Spain (Mariano Cambra, Nuria Duran, Pedro Moreno, Luis Navarro, IVIA, Moncada). Patterns of dsRNAs, viroids and other

small RNAs as well as titers of CTV have been determined. In Brasil, Elliot Kitajima (University of SP, Piracicaba) and Mariano Cambra in Spain, are studying the pathological anatomy of the bud union region of affected trees, and are trying to find evidence for a new, non-CTV agent. Sequencing of the CTV genomes from affected trees in comparison with those from non-affected regions is being seriously considered, in spite of the difficulties arising from mixed CTV populations.

At this time, the hypothesis is that SDD may be due to a new strain of CTV which might explain all currently known facts about SDD. The purpose of a hypothesis is to suggest experiments to confirm or reject the hypothesis. If, indeed, it turns out that SDD is caused by a new strain of CTV, many data relative to classic strains of CTV and tristeza disease, will be applicable to SDD. In particular, it will be possible to predict how SDD will spread. In view of the importance of SDD, as a major threat to citrus in Brasil and probably other countries, it is hoped that citrus pathologists throughout the world become involved in SDD, and contribute to a large international research programme.

MEMBERSHIP APPLICATION

IN THE

INTERNATIONAL ORGANIZATION OF CITRUS VIROLOGISTS

The International Organization of Citrus Virologists (IOCV) is an independent, non-profit association for the promotion of excellence and advancement of research with virus and virus-like diseases of citrus.

Membership is open to anyone who is interested in the exchange of information on diseases of citrus.

A membership fee of \$30.00 US, payable to IOCV is required for the period between the 15th and 16th conference of the IOCV (for the three year period 2001-2004) . Student fee is \$15.00.

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(MAIL OR FAX (DO NOT E-MAIL) TO:

Chester N. Roistacher, Secretary, IOCV

Dept. Plant Pathology, University of California

Riverside, CA 92521-0122 USA

FAX (909) 684 4324

NOTE TO MEMBERS - E-MAIL ADDRESS UPDATE --

PLEASE SEND YOUR UPDATED E-MAIL ADDRESS

TO C. N. ROISTACHER <chester.r@worldnet.att.net>

AVAILABLE PROCEEDINGS OF THE IOCV

Federal ID No. (FIDN) 51 014 8324

INVOICE

DATE: _____

NAME: _____

ADDRESS: _____

AMOUNT: US\$ _____

Vol	No.	Price	Surface	Air mail		
			Shipping	Shipping	Total	Total
		US\$	US\$	US\$	US\$	US\$
7	___	15.00	4.00	19.00	12.00	27.00
8	___	30.00	5.00	35.00	14.00	49.00
9	___	30.00	5.00	35.00	15.00	50.00
10	___	30.00	5.00	35.00	15.00	50.00
11	___	35.00	5.00	40.00	15.00	55.00
12	___	35.00	5.00	40.00	15.00	55.00
13	___	40.00	5.00	45.00	15.00	60.00
14	___	40.00	5.00	45.00	15.00	60.00
15	___	40.00	5.00	45.00	15.00	60.00

(15th Proceedings to be available later in 2002)

TOTAL: Surface Tot. _____ Air total _____

Send by International money order or International draft payable to:

INTERNATIONAL ORGANIZATION OF CITRUS VIROLOGISTS-

(Payments can also be made by checks on US banks only)

Or by credit card

CREDIT CARD PAYMENT

Name on Card: _____

Credit Card: VISA _____ MasterCard _____

Credit Card No. _____

(Please print or type credit card number clear and sharp)

Card Expiration Date: __ __ / __ __

Amount of Payment: \$ _____

Signature: _____

(MAIL OR FAX (DO NOT E-MAIL) TO:

Chester N. Roistacher, Secretary, IOCV

Dept. Plant Pathology, University of California

Riverside, CA 92521-0122 USA

FAX (909) 684 4324