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PLP News

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Anthracnose: The Most Important Disease in Much of the Mango-producing World

By Randy Ploetz



This short article by Ronald French and current student worked on *PLP News*. It took time and effort that produce quarterly FPS. My hat goes off to you who has been responsible for this letter.

When

Ronald French asked me to write this article, he mentioned mango anthracnose and recent encounters he had had with the disease: "A couple months ago, a huge shipment of Florida mangos came in to Fifi (probably for Dr. Bartz) and many were covered in anthracnose just like the ones you sent."

Ronald grew up in Peru where most of the commercially produced mangos are grown in low rainfall environments that are not conducive to the development of anthracnose. Thus, he may not have seen much anthracnose on mangos before this summer. High



summer rainfall in Florida provides ideal conditions for this disease, and as a consequence, mangos in the state (especially from backyard trees like mine that are not sprayed) are often affected by at least some anthracnose.

Mango, *Mangifera indica*, is one of the world's most important and esteemed fruits. Described by some as the "king of all fruits," the mango is most popular in Asia. It probably originated in the Indo-Burma region, and has been cultivated for at least 4,000 years on the Indian subcontinent. It holds a prominent place in Hindu mythology, religion, ritual, culture, ceremony and customs.

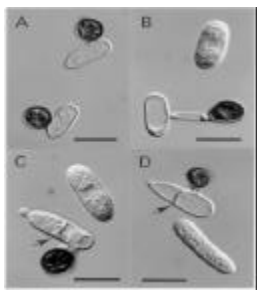
FAO estimated that over 23 million metric tons (MT) of mangos were produced in 1998, about half of which were grown in India. Mexico, however, is the world's largest exporter of fresh fruit; it shipped about 187,000 MT in 1997. To put this in perspective, this figure is almost 100 times higher than that for Florida during the entire 1997 season. During the summer after NAFTA was enacted, more mangos were exported into Florida from Mexico in one week than were produced in the state during

that season. Mexican mangos have little or no anthracnose since they are produced on the arid Pacific coast of that country. Thus, they are often esthetically superior to Florida mangos. These factors, coupled with low production costs in Mexico, have severely crippled the Florida mango industry.

Ironically, many of the commercial cultivars of mango that are now produced worldwide originated in Florida. Florida's role as a secondary center of mango diversity resulted from the early introduction to the state of superior cultivars from India, most notably Mulgoba in 1889. Mulgoba and other introductions hybridized freely, and some of the seedling progeny from these trees were found to produce better and more dependably under Florida conditions than the original parents. Haden, the first of the important Florida cultivars, was followed by many others including Eldon, Glenn, Lippens, Osteen, Springfels and Tommy Atkins. The latter cultivar possesses moderate resistance to anthracnose, is a reliable bearer and is highly colored. Despite its mediocre taste, Tommy Atkins is currently the most important commer-

cially grown mango cultivar in the world.

Anthrachnose is caused by, *Colletotrichum gloeosporoides* (the fungus's teleomorph, *Glomerella cingulata*, is observed rarely on mango). Anthrachnose occurs in essentially all mango-producing regions that have high rainfall. It affects leaves, stems and floral panicles, but its most important damage occurs on fruit. Typically, **conidia** of the fungus initiate infection by producing appressoria shortly after germination.



Infection may then proceed with the formation of infection pegs from the base of the appressoria and the

subsequent ramification of hyphae throughout the epidermis; this usually occurs, however, only after fruits have begun to ripen. The reason that these infections remain quiescent is not known, but may be related to antifungal compounds that are found in the peel of mango fruits. Researchers in Israel have shown that two compounds, 5-12-*cis*-heptadecenyl resorcinol and 5-pentadecenyl resorcinol, occur in the peel at high concentrations prior to ripening, and that the concentrations of these compounds decrease dramatically once the ripening process begins. Although there is compelling evidence to suggest that the post-harvest development of another mango fruit disease, alternaria rot, is synchronized with concentrations of the resorcinols and related to their effects on the causal agent, *Alternaria alternata*, similar work has not been conducted on anthrachnose.

Characterization of worldwide populations of *C. gloeosporoides* indicates that strains from mango comprise a genetically and pathogenically distinct population of this species. The mango

population of the pathogen always predominated on mango, was not found on other tropical fruit crops, and had a restricted host range insofar as individuals from the population were highly virulent only on mango. The genetic and geographic data were used to suggest that the mango population had been disseminated worldwide from a single source, perhaps as an endophyte in mango germplasm.

Chemical control of anthrachnose is difficult, especially in areas such as Florida that experience heavy rainfall. Some fungicides that were previously available, such as the EBDCs, have been withdrawn from registration by the EPA, and resistance problems (benzimidazoles) or poor efficacy (coppers) plague others that are available. Among the new fungicides that have been tested, the strobilurins have demonstrated the greatest potential for controlling the pre- and post-harvest development of anthrachnose. Work is currently underway to register these fungicides and devise cost-effective management schemes with them that will not result in the development of resistance problems in the future.

Variation in the susceptibility of different mango cultivars to **anthrachnose** is recognized, but more than moderate resistance does not exist in any of the commercial clones; in high rainfall environments, all cultivars must be treated with fungicides. To date, classical breeding has not produced any anthrachnose-resistant clones. This is due, mainly, to: 1) the crop's long juvenile phase; 2) its highly heterozygous nature; 3) the very low retention of fruit in controlled crosses; 4) the single, zygotic seed that each fruit produces, and 5) the absence of parents with high levels of resistance. The recent collection of an anthrachnose-immune clone in Borneo, Mangaa air, has led to the hope that it could be used to breed an anthrachnose-resistant



mango. To date, minimal progress has been made towards the biotechnological improvement of this crop.

In conclusion, I will make a plug for Florida mangos (even those that are covered with anthrachnose!). Mangos that are imported from overseas must be hot-water treated per APHIS guidelines. Although this reduces post-harvest disease and insect problems, it also "cooks" mangos and reduces their organoleptic qualities. Furthermore, anthrachnose is a superficial disease. Since it progresses past epidermal tissues only after fruits become over-ripe, even fruits that are severely affected taste great after their peels have been removed. With apologies to the Lite beer commercials, I think most mango connoisseurs, given the choice, would choose a mango that tastes great, rather than one that looks great.



Faculty, staff, students, alumni, and colleagues of our department...

Announcing the 1st Annual International Luncheon!!



This event will be held Friday, October 15, 1999, in Fife Hall. We are pleased to have various graduate students exhibiting their native cuisine. This luncheon will benefit the Plant Pathology Grad Student Association. All faculty, staff, and students are invited.



University of Bochum, Germany, in July, as

1999

part of an NSF-funded project on the role of RNA editing in the restoration of male fertility in sorghum. He also visited collaborators in the Department of Botany, Ulm University, Ulm, Germany, as a guest of Dr. Axel Brennicke. He presented seminars on male sterility in sorghum at both Universities.

Dr. James Kimbrough has just completed a book on "Common Mushrooms of Florida" that will be published jointly by the Cooperative Extension Service and the University of Florida Press. The book will contain keys, descriptions, and color photos of 270 local mushroom species. It should be available in early November 1999.

Dr. Kimbrough presented the keynote address to the 23rd Annual Texas Mycological Society Meeting and Foray at Huntsville, TX on Sept. 24-26, 1999. The topic of his address was "Flesh Ascomycetes common to the Southern States." In addition to this address, he presented a seminar on "The Twilight Years of W.A. Murrill at the University of Florida." Dr. Murrill described approximately 750 new species from around Gainesville in the first half of the 20th century.

Dr. Kimbrough has been asked to participate in Archbold Biological Station Fall 1999 Scientific Seminar Series. He will present a seminar on Oct. 21, 1999 on "The Impact of Ultrastructural Studies on the Systematics of the cup-fungi and truffles."

On October 12, 1999, he will present a seminar to the Ethnobotany Club at the University of Florida entitled "The Impact of Fungi on Human Affairs".

Dr. Kimbrough has been recently invited to serve on a newly formed "Faculty Proposal Review Committee" established by the Office of Research, Technology and Graduate Education. This Committee will evaluate and select the most competitive proposals for funding opportunities.

Gabriela S. Wyss attended the last SENVU (*Senecio vulgaris*) COST 816 Meeting. COST 816 is a European project with the name Biological Control of Weeds in Crops, lasting from 1994-2000. *Senecio vulgaris* is one of five weeds that has been investigated in terms of possibilities for biological weed control, besides *Chenopodium album*, *Calystegia sepium*, *Orobanche* spp., and *Amaranthus* spp. This working group SENVU met on a regular basis and this meeting was the last one. Therefore, everybody that contributed over the five years, (people from Great Britain, the Netherlands and Switzerland) summarized their research.

Gabriela, a post-doc working in Dr. Charudattan's lab, gave an oral presentation about Quantitative resistance in the weed-pathosystem *Senecio vulgaris*-*Puccinia lagenophorae*. Control of *Senecio vulgaris*, common groundsel, in Europe is followed by the so-called system management approach. The aim of this strategy is to manage the target weed population and to build-up epidemic on its by the rust fungus *Puccinia lagenophorae* to reduce competition between a crop and the weed. It is not the aim to eradicate the weed but to weaken the weed when the critical period of the crop is starting.

Participants discussed what was achieved during the research period, what could have been done better and then compiled the research necessary to tell an audience if the system management is able to follow with a certain weed and fungus combination.

Dr. Bartz attended the Fresh Citrus Juice Meeting at Lake Alfred last Aug. 30, 1999. This meeting was organized by the Florida Citrus packers and the Florida Gift Fruit Shippers Association. **YongXiang Zhang**, from Dr. Jones' lab, went to Colorado Springs from Aug 30 to Sept. 1st to set up experiments with their cooperator.

Shellie Huang and Tan Liu were married on Sept. 13, 1999. Congratulations and best wishes!

Camilla Yandoc passed her oral qualifying exam last Sept. 14.

Julianna Freitas-Astua passed her oral qualifying exam last Sept. 16.

Coffee Break Schedule and Birthdays for October 1999

Friday Coffee Break

- 10-1 Bartz and Berger
- 10-8 Hiebert
- 10-15 Charudattan
- 10-22 Gabriel
- 10-29 Jones
- 11-5 Kucharek, Kimbrough and Song



Birthdays!!

- 10/1 Ricardo Harakava
- 10/4 Linda Farr
- 10/9 Matthew Pettersen
- 10/19 Susan Carlson
Carlye Baker
- 10/28 Jerry Minsavage
Camilla Yandoc



Recent Publications

Cheng, WH, Taliercio, EW, and Chourey, PS. 1999. Sugars modulate an unusual mode of control of the cell-wall invertase gene (Incw1) through its 3' untranslated region in a cell suspension culture of maize. Proceedings of the National Academy of Sciences of the United States of America, 96(18): 10512-10517.

Csizinszky, AA, Schuster, DJ, and Polston, JE 1999. Effect of ultraviolet-reflective mulches on tomato yields



and on the silverleaf whitefly. *HortScience*, 34(5): 911-914.

Duan, YP, Castaneda, A, Zhao, G, Er-dos, G, and Gabriel, DW. 1999. Expression of a single, host-specific, bacterial pathogenicity gene in plant cells elicits division, enlargement, and cell death. *Molecular Plant-Microbe Interactions*, 12(6): 556-560.

Freitas-Astua, J, Rezende, JAM, and Kitajima, EW. 1999. Incidence of orchid viruses in the State of São Paulo, Brazil. *Fitopatologia Brasileira*. 24:125-130. 1999.

Henny, RJ, Norman, DJ, and Kane, ME. 1999. Gibberellic acid-induced flowering of *Syngonium podophyllum* Schott 'White Butterfly'. *HortScience*, 34(4): 676-677.

Howad, W., Tang, H. V., Pring, D. R., and Kempken, F. 1999. Nuclear genes from Tx CMS maintainer lines are unable to maintain atp6 RNA editing in any anther cell-type in the Sorghum bicolor A3 cytoplasm. *Curr. Gen.* 36:62-68.

Li, RH, Zettler, FW, Hiebert, E, Purcifull, DE, and Morales, FJ. 1999. Differentiation of dasheen mosaic potyvirus isolates based on variability in the apparent size of the capsid protein in Western blots. *Journal of Phytopathology-Phytopathologische Zeitschrift*, 147(6): 359-364.

Maffia, LA, and Berger, RD. 1999. Models of plant disease epidemics. II: Gradients of bean rust. *Journal of Phytopathology-Phytopathologische Zeitschrift*, 147(4): 199-206.

Norman, DJ, Chase, AR, Stall, RE, and Jones, JB. 1999. Heterogeneity of *Xanthomonas campestris* pv. *hederiae* strains from araliaceous hosts. *Phytopathology*, 89(8): 646-652.

Norman, DJ, Henny, RJ, and Yuen, JMF. 1999. Resistance levels of pot anthurium cultivars to *Xanthomonas campestris* pv. *dieffenbachiae*. *HortScience*, 34(4): 721-722

Ploetz, RC, Haynes, JL, and Vazquez, A. 1999. Responses of new banana accessions in South Florida to Panama disease. *Crop Protection*, 18(7): 445-449.

Satyanarayana, T, Gowda, S, Boyko, VP, Albiach-Marti, MR, Mawassi, M, Navas-Castillo, J, Karasev, AV, Dolja, V, Hilf, ME, Lewandowski, DJ, Moreno, P, Bar-Joseph, M, Garnsey, SM, and Dawson, WO. 1999. An engineered closterovirus RNA replicon and analysis of heterologous terminal sequences for replication. *Proceedings of the National Academy of Sciences of the United States of America*, 96(13): 7433-7438.

Sinisterra, XH, Polston, JE, Abouzeid, AM, and Hiebert, E 1999. Tobacco plants transformed with a modified coat protein of tomato mottle begomovirus show resistance to virus infection. *Phytopathology*, 89(8): 701-706.

Taliercio, EW, Kim, JY, Mahe, A, Shanker, S, Choi, J, Cheng, WH, Prioul, JL, and Chourey, PS. 1999. Isolation, characterization and expression analyses of two cell wall invertase genes in maize. *Journal of Plant Physiology*, 155(2): 197-204.

Leisure and Culture in
Gainesville, Florida
October '99 and Beyond

* "Asian Art from the Permanent Collection" on display in the Harn Museum through January 2000.



* "Equal Partners" on display in the Harn Museum through November 28.

* "Two Centuries of American Drawings" on display in the Harn Museum through November 28.

* "American Impressionism from the Sheldon Memorial Art Gallery" on display in the Harn Museum through January 2.

play in the Harn Museum through January 2. Call 392-9826.

* "EarthQuest; The Challenge Begins", at the Florida Museum of Natural History. Through January 30.

* "Children's Natural History Gallery", at the Florida Museum of Natural History. Through January 30. Call 846-2000.

Important Dates



day, 5:15 pm. UNDERGRADUATE MEETING! Fifield, Room #1308. Free pizza and drinks! Please plan to attend;

we will be discussing this year's field trips and activities.

October 16, Saturday, 9:00 am: Graduate School Foreign language Exams

October 18, Monday, 4:00 pm: First submission of Doctoral Dissertations

October 19, Tuesday, Midpoint of term
Last day to complete doctoral qualifying exam if this term is to count as part of the time that must elapse between the exam and graduation

November 5-6, Friday-Saturday: Homecoming

All classes suspended. All offices closed.

Cool Web Sites

Job Hunting?

Check out www.careerpath.com. This site offers searches of online job listings as well as from 90 newspaper classifieds. You can also post your resume for free!

Searching for Knowledge?

Try www.scicentral.com. This site is the gateway to over 50,000 scientific sites and news articles pertaining to over 120 specialties in science, medicine and engineering. Includes searches, breaking news and journals.

Just web surfing?

Perhaps www.alienabduction.com can entertain you. Thousands of people claim to be abducted by extraterrestrials every year-- find out who the aliens choose and why they haven't chosen you!

Sad Note

E. P. DuCharme (1916-1999)

Ernest DuCharme, former plant pathologist at the Citrus Research and Education Center in Lake Alfred, passed away in Winter Haven on September 7, 1999. Ernie was born in St. Paul, Minnesota on July 15, 1916. He received his B.S. degree in biology at St. Mary's College in 1938 and his M.S. in Botany from DePaul University in 1943. Subsequently, he went to the University of Minnesota to begin work on his Ph.D. in plant pathology. He completed his course work and then joined the Florida State Plant Board (now the Division of Plant Industry). As an employee of the Plant Board, he was sent to Argentina to conduct research on the tristeza epidemic that was killing citrus trees there. He completed his doctoral dissertation there and received his Ph.D. from the University of Minnesota in 1949. Ernie continued his research project in Argentina until 1951.

In 1951, he joined the experiment station at Lake Alfred as Associate Professor, primarily to conduct research on tree decline diseases. He was promoted to Full Professor in 1956. His most important contribution was the discovery with Ross Suit that *Radopholus similis*, the burrowing nematode, was the cause of spreading decline of citrus. Subsequently, these investigators helped develop measures such as certification of nursery stock and resistant rootstocks to control the problem. He was also involved in programs on citrus tristeza virus and young tree decline (now citrus blight). In the late 1970s, he began a project on citrus canker in Argentina to develop research information in order to deal with the disease, should it be introduced into Florida.

In 1974, Ernie was named Assistant Center Director of the experiment station in Lake Alfred and served under Herman Reitz in that capacity until his

retirement in 1981. After he retired, Ernie continued his interests in citrus diseases and did some consulting in Argentina, Florida, and elsewhere. He also enjoyed growing orchids and spent considerable time with that hobby. Ernie was fluent in French and Spanish and enjoyed his travels to many countries. (L. W. Timmer)

Special Request The Dover Research Center is searching for some issues of Plant Disease that they are missing at the center. The following is a list of the missing issues:

- 1997 May through November
- 1998 January, May, July
- 1999 January, March, May

If anyone has any of these issues and would like to donate them to the Dover Research Center, it would be greatly appreciated. You can contact Christine Manley via email at cranley@ufl.edu, or by calling Christine Manley at SunCom 512-1160.

Who is Who In Our Department



Dr. Robert (Bob) McGovern, currently



working at the Gulf Coast Research and Education Center in Bradenton, is originally from New York. He obtained both his Master's and PhD degrees from Cornell University. For his MSc., he worked on a non-characterized disease in chrysanthemum; while his doctoral project explored the interaction between viroids and *Erwinia chrysanthemi* and induced resistance. Before working at UF, Dr. McGovern worked in the flower industry for two years, where he was the director of horticulture and diag-

nostics. Dr. McGovern has been working at UF since 1990; initially, he was hired at the research station in Immokalee to run the Plant Diagnostic Clinic and to work on vegetable and citrus diseases. Then in 1995, he was transferred to Bradenton to work on fungal soil borne and foliar diseases of ornamentals and occasionally on viral diseases. He considers himself a general plant pathologist. "We have many projects going on right now, but mainly we are working on a *Fusarium* project, soil solarization for ornamentals and vegetables, *Colletotrichum* on several crops, recycling of pathogens from run-off from irrigation of vegetable fields, and low impact sustainable strategies for the management of diseases."

Teresa Seija, has been the Senior Biological Scientist in the lab for three years. She has a MSc. in Microbiology from University of South Florida (USF); she is in charge of overseeing all the laboratory components and participating in field research activities. Teresa brought the molecular component to the lab, now PCR and RFLP's are used in detection and identification.

Tim Davis, from Rockville, Maryland, is the lab technician. He has a Bachelor's degree in Biology from USF. Tim coordinates most of the field activities. "Here in our lab, 'contribution' is the key word, everybody is pretty much involved in all the projects."

David Myers, Senior Agriculture Assistant, the newest lab member is involved in field research.

Monica Hoffine and **Ezequiel Williams**, OPS and students at New College of USF, complete the whole crew of Dr. McGovern's lab.

Dr. McGovern wanted to mention **Eddie Anderson**, who worked in his lab, recently returned to UF to pursue the Doctor of Plant Medicine degree.

Did you know...

1. That Dr. McGovern plays the trumpet? Once he played at a meeting in San Remo, Italy.

2. He also collects music, primarily jazz, and also some Brazilian music and music from around the world.

3. Teresa and Tim spend their spare time with their little children. Teresa has a 2 year old little girl named Isabella and Tim has a soon-to-be 2 year old son.

Greetings to all PI's at REC's! We would like to hear from you! Do you have any visiting scientists/scholars or post-docs that we haven't heard about? If so, we would like to feature them in future issues of PLP News. Please send us a short summary of where they are from, their educational background, the

project they are working on, and personal interests and/or hobbies. You can email us at plpnews@gnv.ifas.ufl.edu. We look forward to hearing from you!

If you would like to join our staff or contribute an article, contact us!

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