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PLP News

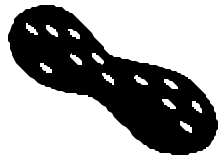
From the Students of
the Plant Pathology
Department to our com-
munity.

Volume 4 • Issue 4
Sept-Oct 2000

Around Florida: A Brief Treatise on the Evolution of Plant Disease Control in Peanut

By: Dr. Thomas A. Kucharek

The first evidence that someone was trying to minimize the impact of a plant disease in peanut in Florida was for peanut leaf spot. This work was published by a District Extension



Agronomist, J. Lee Smith in 1953. He published a summary of his work within an Extension publication titled "Tracks of Men, A Type of Agricultural Extension History." In one section of the publication, he summarizes his work with 16 major peanut-producing counties in Florida. He initiated dozens of demonstration tests with growers beginning in 1940. He demonstrated that the suppression of leaf spot with sulfur dust resulted in yield benefits that ranged from 120 to 305 lbs/A. While we would consider these responses low by modern day standards, with the types of disease control programs that have evolved, his studies were likely to have been the reason that some growers related suppression of leaf spot with increased yields and monetary returns. Immediately after World War II, W.E. Stokes

and Fred Clark in the Agronomy Department at the University of Florida, conducted some tests with fungicidal dusts and they attained similar results to that of Smith.

It is not known when the first identification of peanut leaf spot (PLS) was made in Florida. Those involved with peanut production in Florida in the earlier part of this century probably heard about and learned about this disease directly or indirectly from information available from the University of Georgia and Auburn University where studies on peanut diseases were being conducted. The Plant Pathology Department at the University of Florida had very little interaction with agronomic crop production in northern Florida during the early to mid 1900s. Vegetables and citrus were the tails that wagged the dogs in those days. Now we have too many tails and too many dogs.

Peanut leaf spot (PLS) is a name of a complex that is composed of early leaf spot, caused by *Cercospora arachidicola*, and late leaf spot, caused by *Cercosporidium personatum*. While both have had their respective teliomorphic

stages described in the literature, neither teliomorphic stage has been seen in over 40 years in the United States.

Over the years, many of us working with peanut have learned that PLS can cause extremely high yield losses. In one test in Florida, a yield loss of 91.8% resulted from PLS; this is particularly high even in a test. Typically, in contemporary times within



individual commercial fields, yield losses from zero to 20%

occur, and in a few situations, yield losses of 30 to 50% still occur.

During the 1960s and up to 1972 or so, most peanut growers in Florida were using a few applications of sulfur dust or sulfur dust combined with a fungicidal copper dust (often referred to as copper-sulfur) for suppressing PLS. An avid research program on disease control in peanut in Florida began in 1968 by Dr. Carol Miller, a research plant pathologist in our department. His investigations

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coincided with the advent of some new fungicides such as benomyl, chlorothalonil, and triphenyltin hydroxide; he also evaluated mancozeb which had been labeled since 1965.

In 1970, when I began as an Extension Plant Pathologist, Dr. Miller and I conducted numerous tests on experiment station land at Marianna, Florida and on commercial farms. Naturally, the tests that had the greatest "convincing power" for the growers were those located on commercial farms. The first thing we convinced growers of was that they did not have to use the messy dusts that covered them (and us) from head to foot during the application process with the tractor-drawn dusting machines. Moreover, the volume of dust that had to be handled was as much as 20 to 25 lbs/A. Our tests demonstrated that they could use Benlate as a spray, six to seven times/season at 0.38 lb/A, and achieve yield increases of over one ton/acre when compared to the use of 20 lbs/A of Dithane M-45 (mancozeb) formulated as a dust. The responses in yield we attained with dusts when compared to the treatments without any fungicide was similar to that of J. Lee Smith. I can assure you that when the growers came to field days and looked at our results with the new sprays in the early 1970s, they were impressed, but they were very suspicious of these "professors." Growers told me repeatedly that such a response could only occur on "University Land". Gradually, growers bought sprayers, treated the crop, not themselves, and ditched the dusters. With the contemporary restoration craze, at least one old Hudson Duster has been restored for posterity.

Since those early tests, we have had access to several new compounds (e.g. new formulations of copper-containing fungicides, strobilurins, sterol biosynthesis inhibitors) and we

have learned how to use them. The availability of a diverse array of chemicals has allowed us to counter the presence of resistant strains to Benlate that occurred commonly by the mid 1970s. Benomyl (generic name of Benlate) is a compound which has a single site mode of action. However, we must be vigilant with the use of resistance management strategies because certain new fungicides (e.g. the strobilurins) are functional at a single site.

Naturally, when the sprayers were being bought in the early 1970s, some growers decided that extremely high spray pressures (e.g. 300-400 psi) were necessary to penetrate the peanut canopy. Certain sales folks helped the growers cling to such notions. Over time and with many experiments such as those done by John Riabov, a former graduate student in our department, we learned that we could back off the high spray pressures and deposit more spray in the canopy rather than seeding clouds. Thus at that point, we were already reducing adverse environmental impacts by reducing the amount of fungicide applied per acre with the use of the new fungicidal sprays, by minimizing contact of the loader/applicator with the fungicide, and by minimizing spray drift.

By the mid 1970s, the Environmental Protection Agency (EPA) was at full throttle, and our environmental gains needed follow up. Other types of studies then began that benefited growers by integrating non-chemical tactics in the disease control program. For example, the benefits of using crop rotation for suppressing PLS was brought to the forefront from our field tests for integration into a disease control program. However, this tactic is highly dependant upon the amount of land growers have available.

By the mid 1970s, an increasing number of growers were attaining yields in the range of 2 to 2 ½ tons/acre. Since that time occasional yields of 3 tons/acre have occurred. Compare this to the less than 1 ton/acre statewide yields that occurred commonly prior to the advent of pest control. I use the term pest control because another story, not outlined herein, is the impact of nematode control on peanut. While disease control contributed significantly to the rapid yield increases up through 1978, the cancellation of DBCP (a highly effective nematicide), by the EPA, caused reductions in statewide yields. Actually, during the 1970s, disease and nematode control, along with utilization of better agronomic practices and the availability of an easy to grow cultivar, Florunner (developed by Drs. Al Norden, Ralph Lipscomb, and W.A. Carver in the Agronomy Department at the University of Florida), all contributed to the "golden years of peanut production." In 1978, our statewide average yields were 3310 lb/A. Prior to 1970, average statewide yields ranged between 1400 to 1600 lb/A. In recent years, we have averaged between 2300 and 2900 lb/A. The contemporary reduction in yields compared to the "Golden Years" is a function of reduced nematode control, inadequate crop rotations, the use of the "additional peanut" marketing option on increased acres where production and pest control inputs are minimized, the occurrence of some new disease situations, and the seemingly more extreme variations in weather patterns.

Before we had even completed some of the above mentioned accomplishments during the "Golden Years", Dr. Dan Gorbet, a recently hired plant breeder at that time in the Agronomy Department, initiated a search in 1972 for resistance to PLS

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within the germplasm base of peanut. He and I both agreed that such a program must be initiated even though certain power brokers in the plant breeding arena stated that such was not attainable, and therefore, such would be a waste of time. Fifteen years later, the registration of 'Southern Runner' (developed by Drs. Dan Gorbet, Al Norden, Fred Shokes, and David Knauff), a cultivar with partial resistance to late leaf spot, southern stem rot (*Sclerotium rolfsii*), and rust (*Puccinia arachidis*) was published. This was first leaf spot-resistant cultivar developed in the United States. After growers used the standard cultivar, Florunner, for 18 years, almost exclusively, we thought the benefits of Southern Runner would be useful to growers by reducing their production costs. However, these benefits were overridden by certain agronomic characteristics such as reduced seedling vigor, smaller seed size, and late maturation. Late maturation increases its hazard time for other problems and conflicts with hunting seasons. The weak seedling vigor coupled with its late maturation restricted the planting time to a narrower window because it did not emerge well in cooler soils and one can not plant it too late or it would be exposed to cold weather at the end of the season. Peanut is a tropical crop. Southern Runner is still grown by a few growers to save on costs associated with spraying or because they have contracts to grow it for specific markets. So, if you think that resistance is a panacea to curb disease problems, keep in mind the reality of what it takes to grow a crop successfully. Plant diseases are just one component within a production scheme. Such disappointing scenarios have occurred repeatedly with other cultivars in other crops multiple times all over the world.

As the search for and development of pedigrees with disease resistance evolved, several graduate students in the departments of Plant Pathology and Agronomy conducted research for their theses and dissertations on the mechanisms of resistance, epidemiological parameters, or ecological patterns associated with resistance. In Plant Pathology the students were: Jan Plaut, Greg Watson, Vermando Aquino, Carlos Forcelini, and Bob Kemerait. These students were advised by Drs. Richard Berger, Fred Shokes and Tom Kucharek. In Agronomy, Drs. Dan Gorbet, David Knauff, and Ken Boote advised several students including Albert Chetika, T. Monasterios, Kevin Pixley, and Gagan Bourgeois

One of the attributes of Southern Runner and numerous other recently released cultivars from universities and commercial companies is their partial resistance to tomato spotted wilt virus (TSWV), a disease which was first found in peanut in Florida in 1986. Yield decreases of greater than 50% has been caused by TSWV. While some in this department stated repeatedly that TSWV would never be a problem, the fact is that it is the first virus to have a negative impact on peanut production in Florida, and it has been devastating to peanut production in Georgia and the entire industry. The impact of TSWV on several other crops is a topic for another treatise.

We have learned how to manipulate plant populations and planting times to partially suppress TSWV in peanut. Cultivar selection has become another major tactic for suppression of TSWV. Georgia Green is currently the predominate cultivar grown in the southeastern United States because of its somewhat acceptable agronomic type and partial resistance to TSWV, southern stem rot, and rust. How-

ever, Georgia Green has a seedling vigor problem. Growers and shellers would prefer a different peanut and thus, the future of Georgia Green is likely to be short-lived. Hopefully, the recently developed cultivar C-99R from Florida will be adequate. It has partial resistance to leaf spot, white mold, TSWV, and rust.

Southern stem rot (white mold), caused by the soilborne fungus *Sclerotium rolfsii*, was a constant problem all through the "Golden Years" and even before. Its impact on yield was not always visualized by the growers until they minimized PLS. With PLS minimized, they could see the wilting associated with white mold. Prior to that, it was generally accepted by growers that when the "vines went back", it was time to hook up the digger to the tractor and begin the harvesting process. After they attained good control of PLS, they wanted to know how to stop the wilt caused by *S. rolfsii*. With the many new fancy, brick farm homes that were being erected during that era and the new modern farm equipment that was being purchased, bills had to be paid. Growers were not about to have some white fungus get in their way. During the 1970s, our only controls for white mold were crop rotation and steel in the form of a bottom plow. For many situations, those tactics were not adequate and our administrators in IFAS were told by some Extension Agents that we must have a control of white mold. In 1975, Dr. Gary Sandin, a Plant Pathologist located at Quincy, Florida, initiated studies on the chemical control of white mold. It was not until 1984 in my tests in Suwannee County and after Gary's leaving the University of Florida, that a new fungicide (flutolanil) was developed by Nor-Am (now Agrevo) and it provided significantly improved suppression of white mold. Since

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then, Dr. Fred Shokes (formerly at Quincy) and I tested several efficacious foliar fungicide sprays that are now labeled for suppression of white mold. In tests, we commonly demonstrated yield increases of one ton or more/A by suppressing white mold and growers have attained high levels of control also. However, the costs of the "new generation" fungicides are extremely expensive.

Another fungal disease of peanut that must be considered is *Cylindrocladium* black rot (CBR) caused by the soilborne fungus *Cylindrocladium crotalariae* (*Calonectria parasiticum*). It first occurred in Florida in 1975. By the mid to late 1980s, CBR became a severe problem in some fields, particularly in Santa Rosa County. This disease has reduced yield by as much as one ton per acre. Beginning in 1989, John Atkins, an Extension Agent in Santa Rosa County, and I conducted many on-farm tests related to control of CBR. Over the past 12 years, we have found foliar fungicides that are partially effective and cultivars with partial resistance. In recent years we have manipulated planting dates for suppression.

The diseases mentioned above are the main plant disease problems, but there are several others. For example, yellow mold, caused by *Aspergillus flavus* (sometimes *A. parasiticus*), can colonize peanuts prior to or after harvest. If detected at the buying point, the grower can lose big bucks. If he normally would get \$610/ton without yellow mold, he would get less than half of that if yellow mold was detected. This is a drastic pay cut. Fortunately, the percentage of peanuts that are graded Segregation III (with yellow mold), is typically less than a percentage point or two statewide. Maintaining adequate soil moisture and suppression of pod damage from in-

sects and other causes is helpful in reducing this problem. Jessie LaPrade, a graduate student with Dr. Jerry Bartz in the early 1970s, found that some cultivars are less likely to be infected or colonized by *A. flavus*. This is a prime area for future research.

A related fungus, *Aspergillus niger*, has caused serious stand problems by rotting young plants. Some plant pathologists are surprised to hear that *A. niger* is a true pathogen. Plant pathologists relate to this fungus as a laboratory contaminant or a pathogen of the human ear. Maybe this is the cause of listening impairments in old professors. We have some rescue treatments for *A. niger* in peanut, but by the time the cause is determined, the stands are drastically reduced and the chance for TSWV is increased. Because of some legitimate regulatory actions by the EPA and priorities established by commercial companies in response to some maleficent regulatory actions, we no longer have adequate seed treatment fungicides which used to be adequate for suppressing this fungus.

Pod and peg rots are caused by several fungi, including *Rhizoctonia* spp., *S. rolfsii*, and *C. parasiticum*. The complexity of pod and peg rots is well illustrated by the research of Roberto Garcia and Bob Kemerait, two PhD graduate students in Plant Pathology who were advised by Drs. David Mitchell and Tom Kucharek, respectively. Some of the tactics that have been used successfully to reduce peg and pod rots include crop rotation, control of nematodes, maintaining high levels of calcium in the pegging zone, and the strategic use of certain foliar fungicides.

Another fungus, *Lasiodiopodia theobromae*, has been increasingly associated with dysfunctional peanuts in Florida. From greenhouse work, we have learned that this fungus is ex-

tremely virulent, but we do not have an adequate understanding about the conditions necessary for this pathogen to cause damage. Again, we have some rescue treatments, but their use is often too late. I am beginning to think that this fungus will be the target of several studies in the near future.

Probably the biggest problem we face now, and this problem will continue to increase in the future, is the loss of agricultural land. Crop rotation can be preached to the choir until Bobby Knight changes his demeanor, but without adequate land reserves, crop rotation will become a myth and a topic for history books. In many areas of southern Florida, some crops have had to be planted on the same land 30 or more consecutive years. We already have some peanut growers producing peanuts on the same land for eight years in a row. Twenty years ago those same growers would not have had peanuts on the same land for more than one year out of every three to four years. Times are "a changing" and from my vantage point, we (plant pathologists) are gradually losing our position to provide adequate information for control of plant diseases where crop rotation is no longer part of the integrated crop production systems.

Where in the World Wide Web??

Looking to give something back to Gainesville or just help out? Here's a few websites that can help you volunteer your time in Gainesville!

- The name pretty much sums up www.gainesvillepetrescue.org, a site where you can help Fido and Fifi find homes. Pet Rescue grants a reprieve to adoptable animals from the county shelter and places them

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in foster homes (all expenses paid) until a suitable home can be found. Check out the site to become a foster home or to adopt an animal.

- A volunteer clearinghouse for many years in Gainesville, The Volunteer Center (www.volunteer-center.org) helps place volunteers all over town in a variety of areas. The site offers information on their events as well as a sampling of the volunteer opportunities.
- Some sites offer volunteer positions and education- www.ncfan.org, the North Central Florida Aids Network homepage has a calendar of events, volunteer contacts and a list of the HIV/AIDS educational courses they offer.
- A cornerstone of volunteer efforts worldwide, the United Way of Alachua (www.unitedwayalachua.org) has a list of local civic, social and advocacy groups as well as support and therapy groups you can get involved in.

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



Graduate students in the department elected their officers for 2000-2001. **Marlene Rosales** (pictured) will serve as president for Fall 2000, **Ronald French** as vice-president, and **Eduardo Carlos** as treasurer. For Spring 2001, Ronald will serve as president, Marlene as vice-president, and Eduardo will remain as Treasurer. Good luck, officers!!!

At 5 a.m. on Saturday, August 12,



2000, **nine "adventurous" graduate students** hopped into an IFAS van that would take them to New Orleans, in order to attend the Annual American Phytopathological Society Meeting. "Survivors" of this 1000+ mile round-trip journey were: Aaron Hert, Alba Nava, Alvaro Urena, Camilla Yandoc, Denise Tombolato Francisco Ochoa, Marlene Rosales, Ronald French, and Yolanda Petersen.

Dr. Carlye A. Baker, Courtesy Assistant Professor in our Department, has recently assumed a position as a Plant Pathologist at the Division of Plant Industry's Bureau of Entomology, Nematology and Plant Pathology in Gainesville. Her specialty is plant virology and she replaces Dr. Lawrence G. Brown. Dr. Baker was born in Klamath Falls, Oregon and is married to Dr. Patrick T. Colahan, who works in the Department of Veterinary Medicine. They have one child, Caila, born in 1994.

Dr. Baker, who received her BS degree in Child Development at the University of California at Davis and her MS degree in Home Economics from Colorado State University at Fort Collins, joined our Department in 1986 as a Graduate Assistant. She received her Ph.D. degree in 1989 under the direction of Dr. D. E. Purcifull (dissertation entitled "Production and characterization of polyclonal and monoclonal antibodies to three virus-induced proteins of papaya ringspot virus type W"). After graduation, she



accepted a post-doctoral position under Dr. E. Hiebert. Between 1992 and 1998 Dr. Baker worked with Dr. F. W. Zettler in developing PLP 2000 ("Plants, Plagues, and


People"). She is presently teaching PLP 2000 as a distance learning class.

Dr. Pete Timmer was named Fellow of the American Phytopathological Society (APS) at the 2000 Annual Meeting held in New Orleans from August 12 through August 16. Congratulations!!!

Richard Blacharski, recent departmental graduate, sends his greetings from his new home in Seattle, Washington. You can send him a little note via his e-mail, rblacharski@excite.com or his home address : 1705 Belmont Avenue #206 Seattle, WA 98122.

Coffee Breaks and B-

Friday Coffee Break

- 9-15 Kucharek, Kimborough and Song 
- 9-22 Pring and Chourey
- 9-29 Disease Clinic, Zettler and Purcifull
- 10-6 Hiebert
- 10-13 Bartz, Berger and Stiles
- 10-20 Charudattan
- 10-27 Gabriel
- 11-3 Jones

Birthdays!!



- 10-9 Matthew Petersen
- 10-19 Susan Carlson
- 10-19 Carlye Baker
- 10-26 Lisa Tomski
- 10-28 Jerry Minsavage
- 10-28 Camilla Yandoc
- 11-7 James Kimbrough
- 11-7 Amanda Bishop
- 11-7 Andy Hutchens



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11-8 Stacy Steger
 11-8 Robin Oliver
 11-9 Rupali Datta
 11-11 Ye Li
 11-16 Tom Kucharek
 11-18 Chuck Semer
 11-28 Anita Snyder
 11-29 Mark Elliot
 11-29 Jan Sapp
 11-29 Jim DeValerio

Recent Publications

Legard, D.E., Martin, F.G., Xiao, C.L., and Chandler, C.K. 2000. Reduced sampling frequency for evaluating fungicide efficacy on *Botrytis* fruit rot of strawberry. *Plant Disease* 84:743-748.

Murphy, J.F., Zehnder, G.W., Schuster, D.J., Sikora, E.J., Polston, J.E., and Kloepper, J.W. 2000. Plant growth-promoting rhizobacterial mediated protection in tomato against *Tomato mottle virus*. *Plant Disease* 84:779-784.

Seebold, K.W., Datnoff, L.E., Correa-Victoria, F. J., Kucharek, T.A., and Snyder, G.H. 2000. Effect of silicon rate and host resistance on blast, scald, and yield of upland rice. *Plant Disease* 84:871-876.

Timmer, L.W., Darhower, H.M., Zitko, S.E., Peever, T.L., Ibanez, A.M., Bushong, P.M. 2000. Environmental factors affecting the severity of Alternaria brown spot of citrus and their potential use in timing fungicide applications. *Plant Disease* 84: 638-643.

CVC and the *Xylella fastidiosa* Genome Project

Technology has transformed our world in several ways and genome projects are among the most noteworthy. The first plant pathogen genome

to be sequenced is that of *Xylella fastidiosa*, the causal agent of Citrus Variegated Chlorosis, CVC. One might wonder "Why would the Brazilians spend US\$ 13.5 million to sequence *X. fastidiosa*?"..

The presence of CVC has been traced to the mid-80's in northwestern São Paulo State, Brazil. At that time several sweet orange (*Citrus sinensis* L. Osbeck) groves started to show symptoms similar to the habitual foliar zinc deficiency, but with the not so common brown little spots underneath the leaves. They varied in size ranging from small spots to larger ones resembling leaf scorch in some cases. Symptoms on the tree may have been overlooked by growers if fruit marketability hadn't been decreased by the much smaller, harder and bitter fruits. Growers were concerned since fruits were being left on the trees or thrown away after harvesting.

Research institutes were called on to solve this problem and the first "hypothesis" was that there was some relationship with nutritional deficiency. Between 1993 and 1994, the contribution of several researchers and farmers were critical in proving that *Xylella fastidiosa* was in fact the real causal agent. In 1996, xylem-feeding sharpshooter leafhoppers were confirmed as vectors, the final piece of the puzzle. To the growers, the real question for the scientific community was "How can we control the disease?" The only answers so far are starting with disease-free buds or growing a citrus crop other than sweet oranges, that are unaffected by CVC.

Indeed, many growers in Brazil were forced to switch to other business enterprises because of CVC. Attempts made to control the insect vectors with insecticides and to prune affected branches, did not provide sufficient control in the long run. In spite of the ongoing huge Brazilian

sweet orange production, CVC had managed to spread out thus increasing the importance of *X. fastidiosa*. Finally, authorities came to the natural conclusion that "Hey, we have a problem!" Such statement catapulted this xylem-limited gram-negative bacterium to a potential candidate for any extensive project.

But, a stronger reason for a wide project would be the opportunity to train and educate people in science—especially if it was in a "hot" field of science—probably motivated many into becoming project mentors and leaders. This way of thought complemented the high demand for better education at all levels in Brazil and with a constant pledge of the local scientific community to try to help society. The result was a strong support for a project that would involve different fields of study from different institutions that would use their current expertise in areas such as biochemistry, molecular biology and informatics. Thus, the path was paved for a genome project. Further, a fancy network system was created to do the job, and was called ONSA (Organization for Nucleotide Sequencing and Analysis), which in Portuguese sounds exactly like 'Onça', the name of a jaguar-like big cat normally found in the Amazon forests.

The strong research drive and ultimately, the availability of funds were fundamental in launching the genome project. (The Brazilian economy had substantially improved in comparison to earlier years and thus the real constraint had more to do with the challenge of doing something new than the lack of resources. "We can do it! Why not?" braved some authorities.

The above events made it possible for *Xylella fastidiosa* to be chosen as the organism of choice for such a project. The project was ultimately



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thought-out, created, and coordinated by FAPESP, a São Paulo State sponsorship agency, after deliberations with other institutions such as: Ludwig Institute, CCSM/IAC, USP, UNICAMP, UNESP, Instituto Biológico, INRA, Fundecitrus and several others that helped to solidify the project. This effort was allocated US\$13,000,000 from FAPESP, and US\$500,000 from Fundecitrus, an organization maintained by growers and juice processors devoted to protect the citrus industry. This fund was shared among 34 research labs on work-basis, with around 195 total people involved from several São Paulo State institutions. The discussions and formulation of procedures started on November 1997 and culminated with a publication in Nature on July 13th, 2000. During the project, labs were nicely equipped, scientists were trained, and, interesting enough, results were obtained.

The paper in Nature reported 2,679,305 base pairs (bp) in the main chromosome of the bacterium and 51,158 bp and 1,285 bp in two plasmids. No surprises were found in the basic functions of the genome content and the replication, translation and repair mechanisms were all there. Energy metabolism was thought to be based on carbohydrates and that would be expected since *X. fastidiosa* acquired strategies to survive in a poor environment, the xylem space, which has less nutrients but also less competitors. Small molecule metabolism pathways were present as well as putative transport-related proteins. Extracellular polysaccharides were thought to be synthesized by enzymes encoded by its genome and it seemed reasonable because *X. fastidiosa* apparently lives in clamps in the xylem vessels.

Toxicity factors to the host were also thought to be found, and they may play an important role in the disease symptom development be-

cause another constraint, Citrus Blight, has only xylem vessel obstructions and nevertheless has no similar symptom pattern to CVC. Pectolytic enzymes probably mediated migration of *X. fastidiosa* between xylem vessels and this potential mechanism may be important for host colonization. Bacteriophage sequences were found in the *X. fastidiosa* genome and potentially accounted for variability and evolution of the bacterium. Whether this fact might account for differences in CVC severity between Northern and Southern São Paulo State remains to be clarified. Finally in the report, there is an apparent inexistence of *Vir* genes since *X. fastidiosa* is found in many plant species and does not require host cellular infection. Maybe another mechanism is involved to attack a specific host. Obviously, many questions need to be answered and which, hopefully, the follow-up Functional Project can do in the near future.

The enthusiasm and commitment to the project was outstanding. People from different backgrounds only wanted to help and they brilliantly did. Major results: lots of learning for sure! Besides dwelling into molecular biology and bio-informatics, researchers even learned to distinguish oranges from tangerines. Growers' questions may still remain unanswered but the quality of the information obtained opened the doors for other projects such as Xanthomonas, Sugar Cane EST, Human cancer, and other genomes. The incredible support of society, the citrus industry and scientific community made the *Xylella fastidiosa* Genome Project a success story that surely marveled many faculty, staff and students.

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What Happened???

What a difference 50 years can make! The following is from an actual 1950's Home Economics textbook intended for High School girls, teaching them how to prepare for married life.

1. HAVE DINNER READY: Plan ahead, even the night before, to have a delicious meal - on time. This is a way of letting him know that you have been thinking about him, and are concerned about his needs. Most men are hungry when they come home and the prospects of a good meal are part of the warm welcome needed.

2. PREPARE YOURSELF: Take 15 minutes to rest so you will be refreshed when he arrives. Touch up your make-up, put a ribbon in your hair and be fresh looking. He has just been with a lot of work-weary people. Be a little gay and a little more interesting. His boring day may need a lift.

3. CLEAR AWAY CLUTTER. Make one last trip through the main part of the house just before your husband arrives, gathering up schoolbooks, toys, paper, etc. Then run a dust cloth over the tables. Your husband will feel he has reached a haven of rest and order, and it will give you a lift too.

4. PREPARE THE CHILDREN. Take a few minutes to wash the children's hands and faces if they are small, comb their hair, and if necessary, change their clothes. They are little treasures and he would like to see them playing the part.

5. MINIMIZE THE NOISE: At the time of his arrival, eliminate all noise of washer, dryer, or vacuum. Try to encourage the children to be quiet. Greet him with a warm smile and kiss, letting him know you're glad to see him.

6. SOME DON'TS: Don't greet him with problems or complaints. Don't complain if he's late for dinner. Count this as minor compared with what he might have gone through that day.

7. MAKE HIM COMFORTABLE. Have him lean back in a comfortable chair or suggest he lay down in the bedroom. Have a cool or warm drink ready for him. Arrange his pillow and offer to take off his



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shoes. Speak in a low, soft, soothing and pleasant voice. Allow him to relax and unwind.

8. LISTEN TO HIM: You may have a dozen things to tell him, but the moment of his arrival is not the time. Let him talk first.

9. MAKE THE EVENING HIS: Never complain if he does not take you out to dinner or to other places of entertainment; instead try to understand his world of strain and pressure and his need to be home and relax.

10. THE GOAL: try to make your home a place of peace and order where your husband can relax.

WELCOME TO 2000!

1. HAVE DINNER READY: Make reservations ahead of time. If your day becomes too hectic just leave him a voice mail message regarding where you'd like to eat and at what time. This lets him know that your day has been bad and gives him an opportunity to change your mood.

2. PREPARE YOURSELF: Make sure to change out of your work clothes into something comfortable. Who cares if he likes it or not . . . after all, it's most likely his T-shirt and boxers.

3. CLEAR AWAY CLUTTER: Yeah right! Tell the kids and your husband if they want maid service, they better call one!

4. PREPARE THE CHILDREN: Send the children to their rooms to watch television or play Nintendo.

5. MINIMIZE THE NOISE: Yell to him over the loud music your kids are playing, that this is what you had to put up with while he was gone. And mention that it was his decision to buy the kids a new CD player in the first place.

6. SOME DON'TS: Don't greet him with problems and complaints. Let him speak first, and then your complaints will get more attention and remain fresh in his mind throughout dinner. Don't complain if he's late for dinner, simply remind him that the leftovers are in the fridge and you left the dishes for him to do.

7. MAKE HIM COMFORTABLE: Tell him where he can find a blanket if he's cold. This will really show you care.

8. LISTEN TO HIM: But don't ever let him get the last word.

9. MAKE THE EVENING HIS: Never complain if he does not take you out to dinner or other places of entertainment; go with a friend or go shopping (use his credit card). Familiarize him with the phrase "Girls' Night Out!"

10. THE GOAL: Try to keep things amicable without reminding him that he only thinks the world revolves around him. Obviously he's wrong, it revolves around you.

An Event Not To Be Missed

Many people pass through Gainesville without ever noticing one of the town's best features- transience. And why is this such a beautiful thing? Moving students don't want to move their books so they donate them.



And where does the overflow of books from the student exodus go? The Friends of the Library Book Sale! Each time I introduce people to this sale, the disbelief on their faces that people actually sleep in the parking lot overnite to get the front space in line is worth arriving 2 hours early to avoid the worst of the rush. Held each fall and spring in a warehouse (that's right, a warehouse of books), the sale charges between ten cents and a few dollars for books in every category imaginable. If you're looking to build up your personal library or looking for textbooks for next semester for dirt cheap, this is the place to look. This year's sale will be Oct. 21-25, starting at 9am on the 21st. Get there early- the line winds several blocks down the street by the time the

doors open. I'll be waiting in line, see you there!

Who's Who - New Graduate Students

Fabricio Avila Rodrigues is a new PhD student from Aragrari, Brazil. His main advisor is Dr. Lawrence Datnoff, from the Everglades Research and Education Center (EREC) in Belle Glade. Fabricio obtained his B.S. at Uberlandia Federal University in Agronomy in 1996. This past spring he received his M.S. degree from Vicoza Federal University in Plant Pathology. He studied the effects of silicon on rice sheath blight control.

Fabricio spent the past summer at the EREC writing up the journal articles on his recent research, which will be submitted in both English and Portuguese. His PhD project will be studying the mechanisms of resistance by Si in the control of blast (*Magnaporthe grisea*) on rice. Here in Gainesville, his co-advisers are Dr. Jones and Dr. Kucharek, and Fabricio will be working in Dr. Jones lab. Also advising Fabricio is Dr. Gaspar Korn-dorfer, a professor in Brazil and a strong advocate of silicon in agriculture.

Fabricio enjoys playing soccer, swimming, movies, travel, and reading. He was my roommate at the EREC this past summer, is a good friend, and will no doubt be a great addition to our PLP family.

Another new grad student this semester is **Botond "Bo" Balogh** from Üllés Hungary. His undergraduate career is interesting in that it consists of many parts. Bo first spent four years studying in Hungary at Gödöllői Agrártudományi Egyetem (Godolli Agricultural University). While attending the university he spent 3 months studying abroad at the famed Pushkin

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Russian Language Institute in Moscow, learning Russian. It was there that in the midst of speaking Russian and drinking vodka, he met his wife Justyna. He then came to the US as a trainee of the Communicating for Agriculture Exchange Program (CAEP) and worked in Amesbury, Massachusetts. He then continued working for the CAEP at their sister facility in Rockledge, Florida and did 2 semesters at Brevard Community College. Finally Bo came to UF for 2 more semesters and graduated with a major in plant science.

Bo was employed as work study his last year of undergrad in Dr. Jeff Jones lab. Bo was just offered a full assistantship in August by Dr. Jones to obtain his Masters degree. His thesis project will be developing and testing different formulations to enhance the longevity of a bacteriophages life once sprayed on the tomato plant. These bacteriophages will be used as a biological control of *Xanthomonas campestris vesicatoria* (bacterial spot).

Bo shared with me an interesting anecdote of his marriage. He actually got married twice; first officially at the marriage office in Hungary with his folks, then to Poland where she was from for a more traditional church ceremony with her family. The ceremony was held at the catholic church of the Polish army and at the same time outside in the park of the church there was a Catholic heavy metal rock and roll concert. Even with the doors and windows to the church closed, the couple could barely hear each other's vows. And to top it all off his wife lost her ring one hour before the ceremony in a meadow where they had their pictures taken. His wife used Bo's mothers' ring to take its place and to this day they have never found it.

Bo enjoys reading humorous novels and his favorite writer is P. Howard. He practices his language skills with his wife, who teaches Russian and Polish at Santa Fe

Community College. Bo hopes to go on to a PhD in plant pathology and will see what the future holds from there. (Matt Brecht)

Biotech Briefs

By Anita Snyder

In today's world there is so much information available that it is impossible to keep up with everything. The disciplines within science are abstruse not only to the general public but also for scientists who concentrate in disparate fields.

Within the Department of Plant Pathology, a gap may form between folks who study classical plant pathology and those that concentrate on molecular plant pathology. With this much diversity, it is important to have a common ground to begin a discussion.

The aim of this column is to discuss molecular techniques and to give readers an overview of how a molecular tool works, what it can tell you, and how it may be used for purposes other than basic science. My hope is to be able to encourage discussion about molecular concepts and to discuss molecular techniques that are being used for applications such as disease diagnosis.

If anyone has a topic they would like to see within this column, please email the *PLP News*.

Perhaps the most fundamental concept in molecular biology is Francis Crick's "Central Dogma". Crick first published this hypothesis in 1958. At this time, scientists were working to define how biological organisms store information, inherit traits, and direct biological processes. Crick's Central Dogma became a fundamental concept that directed research in the burgeoning field of molecular biology.

Crick believed that the nucleic acids were the inherited material and the source of the information in proteins. He proposed that the biological information is stored in the form of DNA and directs the organism through its action as a protein. The Central Dogma proposed that biological information flows in one direction:

DNA → RNA → Protein

Protein is the end point for this information. Proteins can be enzymes, regulatory factors, or structural components, but not stores of biological information.

Early "molecular biologists" worked to understand the components of the Central Dogma. Researchers began to focus on DNA in order to



directly determine all protein sequences. This led to the study of the transcription and translation machineries and to the current work of sequencing the genomes of several organisms.

The discoveries of systems that do not linearly transfer information from DNA → RNA → Protein challenge the Central Dogma. These discoveries include reverse transcription, mRNA splicing, mRNA editing, epigenetic inheritance and prions.

RNA viruses have shown us that RNA can be the hereditary material and can be reverse transcribed into DNA. This exception is easily incorporated into the Central Dogma, as a flow of information between nucleic acids.

Therefore, the concise version DNA → RNA → Protein is oversimplified. The Central Dogma includes the following information pathways:

DNA can replicate to form DNA, DNA can transcribe to form RNA, RNA can duplicate, RNA can reverse transcribe to DNA, and RNA can

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translate to create protein. Currently, the Central Dogma predicts against information transfer from protein to protein and from protein to nucleic acids.

In eukaryotes, splicing and mRNA editing alter the sequence of the mRNA so that it no longer directly matches the DNA. mRNA editing can be extensive within certain genes; one noteworthy mRNA contains nearly 650 edited bases. The resulting mature proteins are not actually encoded within the genome, demonstrating that these mechanisms interfere with the ability to predict protein sequence directly from DNA sequence.

Epigenetic information, in the form of modifications to DNA such as methylation patterns, can alter the transcription of regions of DNA. These modifications can arise within the parent and be transmitted to the progeny, yet are not specified by DNA sequence.

An additional challenge originates at the protein level in the form of prions. Prions are infectious agents that

seem to consist only of protein, yet are able to multiply in the host. Does this mean that information from protein can go to protein or nucleic acid, or is the nucleic acid of prions so far undetected?

Some of these exceptions at the nucleic acid level have incorporated into the Central Dogma to form a model that has directed research and teaching for over 40 years. Will the Central Dogma tolerate exceptions such as mRNA splicing, mRNA editing, epigenetic inheritance, and prions? This Central Dogma has proven to be complex and flexible as additional discoveries expand the scope of molecular biology.

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The PLP Newsletter would like to thank Angela Vincent for devoting 2+ years to our publication. We appreciate your effort, staples and dedication. Good luck!

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

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