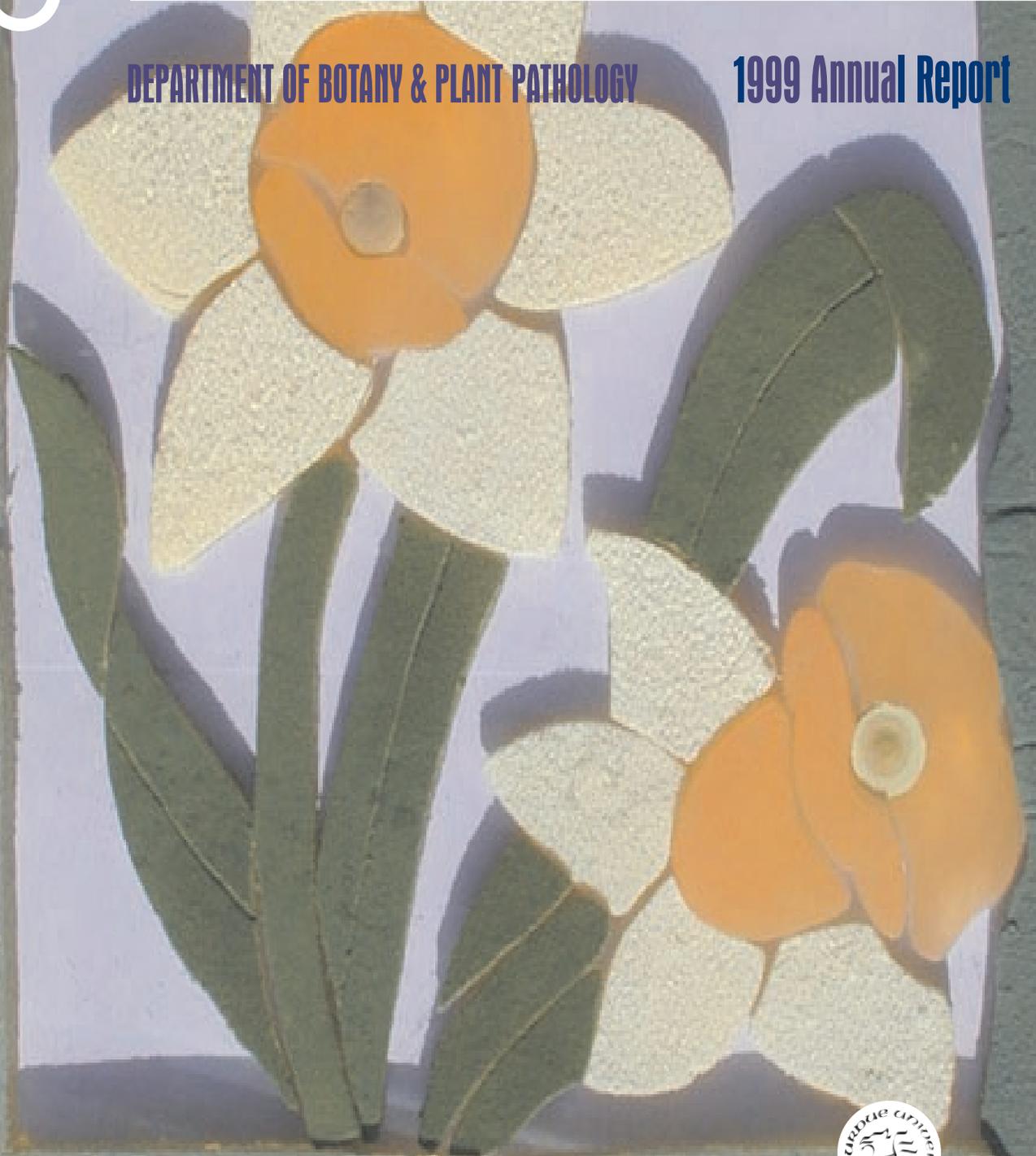




The Meristem

DEPARTMENT OF BOTANY & PLANT PATHOLOGY

1999 Annual Report



Purdue University

Welcome to the Department of Botany and Plant Pathology. 1999 was once again a very busy year. Key personnel changes included the retirement of Dr. Thomas K. Hodges, J.C. Arthur Distinguished Professor of Plant Physiology, in December after 28 years of service; Dr. Tom Jordan, Professor of Weed Science, promoted to Director of Agriculture and Natural Resource Program; and, unfortunately, the death of Dr. Robert Hanau. We welcomed four outstanding faculty and professional staff to our department in 1999. They include Dr. Robert Pruitt, Associate Professor of Molecular Weed Science; Dr. Jin-Rong Xu, Assistant Professor of Fungal Biology; Dr. Case Medlin, Assistant Professor of Weed Science, and Dr. Markus Scholler, Curator of the Purdue University Herbarium. Dr. Pruitt joined us from the Department of Molecular and Cellular Biology at Harvard University and Dr. Xu previously was with the Fungal Targets Laboratory at Novartis Agribusiness Biotechnology Research, Inc. Dr. Medlin is a recent graduate of the weed science program at Mississippi State University and Dr. Scholler is from the Botanical Institute at the University of Greifswald, Germany. These are outstanding individuals and I invite you to get to know them better by reading their brief bios inside.

In addition, two faculty were promoted this past year. Dr. Keith Perry was promoted to associate professor with tenure and Dr. Steve Goodwin, USDA, ARS was promoted to adjunct associate professor. We extend our congratulations to both.

We also are anticipating the addition of two more faculty members this year: an assistant professor of plant pathology and an assistant professor of weed science. These new additions, along with our current staff, will help the Department of Botany and Plant Pathology continue to set new standards for excellence in teaching, research, and service.

This past year saw the completion of many renovation projects. The remainder of the construction and renovation project for the Lilly Plant Growth Facility was completed in November. A new state-of-the-art plant growth chamber facility was added, as well as, the complete renovation of the existing greenhouses. Work included new structural framework, glass, cooling systems, and plant benches. This, along with the new Horticultural Plant Growth Complex completed last year, places Purdue University near the top in quality plant growth research and teaching space. In addition, six new research laboratories and the renovation of a classroom laboratory are nearing completion. All should be finished this summer in time for the new fall semester. The Department of Botany and Plant Pathology continues to venture boldly into the new millennium. I invite you to stop by for a visit. We would love to show off our new facilities.

A new section in this year's report is a profile of our faculty's research and extension programs. We intend for this to be an annual addition. In this way you can get to know our faculty's contributions to science and Purdue Agriculture. This year we feature three faculty: Dr. Ralph Nicholson, Professor of Plant Pathology; Dr. Rick Latin, Professor of Plant Pathology and Extension Specialist; and Dr. Jody Banks, Associate Professor of Plant Molecular Biology. I hope you enjoy learning more about them and some of the exciting things they are doing.

Our instructional and Extension programs continue to expand and excel. Eleven new graduate students joined our department last year, and, with a highly successful recruiting season this year, even more are expected this fall. Our undergraduate program continues to attract outstanding individuals. We continually evaluate our curricula and modify as necessary to ensure that our students are well prepared. Last year,



our Extension staff presented nearly 100 educational programs and workshops on disease and weed management of corn, soybeans, wheat, vegetables, turf, ornamentals, fruit trees, and many other crops, to thousands of Indiana citizens, as well as, those from surrounding states. Additionally, several received university awards for outstanding service.

Later this year, our department is scheduled to undergo a comprehensive 5-year CSREES review. This will be an excellent opportunity for us to take a critical look at where we are and where we want to be as a department. As we invite a panel of external reviewers to look into the soul of our department we must be ready to embrace the opportunities that lay ahead and meet the challenges that will propel us to the top. I have no doubt that we are up to the task and will be better and stronger for it.

We welcome your comments about any issue in our department. You may send them to us by e-mail, fax, or regular mail.

A handwritten signature in black ink that reads "Ray D. Martyn". The signature is written in a cursive, flowing style.

Ray D. Martyn
Department Head

Purdue University

The Meristem

Department of Botany and Plant Pathology

1999 Annual Report

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On the Cover
 "BEAUTIFUL FUNGI" Produced by Charles Woloshuk and his graduate students, this composite made entirely of fungi, was on display at this year's Purdue Spring Fest. The flower petals are a white spore mutant of *Aspergillus flavus*. The corolla tube is a *Rhodotorula species*, an orange yeast. The leaves are a green wild-type *Aspergillus flavus* and the frame is a *Penicillium species*.

The Meristem Editor, Ms. Pam Mow, Administrative Assistant, 765-494-4615, mow@btny.purdue.edu

Dr. Richard Latin, Professor of Plant Pathology

Richard Latin is a professor of plant pathology and has research and extension responsibilities in the areas of turfgrass and vegetable diseases. He has been a member of the faculty since 1981, having earned a B.S. degree in biology from Waynesburg College and M.S. and Ph.D. degrees in plant pathology from The Pennsylvania State University. Dr. Latin teaches courses in vegetable disease management and turfgrass disease management. He also serves as the department extension coordinator.

In 1997, Dr. Latin welcomed the opportunity to change directions and assume extension, research, and teaching responsibilities for management of diseases of turfgrass. He has initiated a turfgrass disease research program at Purdue's new Daniel Turfgrass Research and Diagnostic Center on the north edge of campus. His research emphasis remains in the areas of disease etiology and epidemiology. Current projects include investigations of the influence of environmental factors on the development of take all patch and dollar spot of creeping bentgrass and gray leaf spot of perennial ryegrass.

Dr. Latin has been recognized for his excellence and dedication in service with awards from several associations allied to the midwestern vegetable industry. They include the 1993 Research Award presented by the Indiana/Illinois Watermelon Growers Association; the Meritorious Service Award (1995) from the Southwest Indiana Melon and Vegetable Growers Association, and the 1997 R.R. Romanowski Award sponsored by the Mid-America Food Processors

Association. Dr. Latin also received the 1999 Purdue University Cooperative Extension Specialists Association Senior Division Award.

An important objective of Dr. Latin's extension activities is to advance the disease management skills of commercial vegetable farmers to a level that is consistent with modern technology. The MELCAST project represents his most extensive and successful effort in development and delivery of disease management information. MELCAST (MELon disease foreCASTer) is a program that has transformed melon disease management in Indiana. It helps growers schedule fungicide sprays based on prevailing environmental conditions. Using MELCAST, sprays are recommended only when disease outbreaks are imminent. As a result, compared with traditional weekly spray schedules, farmers who apply fungicides according to a MELCAST schedule make 2 - 3 fewer sprays during a season, without increasing the risk of disease-related losses. The development of MELCAST began in the 1980s, when Dr. Latin



establishment. The model allowed them to translate daily temperature and moisture data into the risk of disease outbreaks.

Another graduate student (J.S. Monroe) added to a model that currently provides control recommendations for the three major foliar diseases of muskmelons and watermelons. Transforming the prototype model into a deliverable, user-friendly system required a novel blend of weather monitoring instrumentation and telecommunications. New versions of the MELCAST delivery system were produced as technology advanced through the early 1990s. The system offered in 1998 used remote estimates of

important environmental data and a toll free voice mail recording that was accessible to all farmers who wished to use the system (Figure 1).

In 1999, more than half of Indiana's melon acreage was sprayed according to the latest version of MELCAST. The MELCAST system is the first computerized disease warning system developed for cucurbit diseases. MELCAST adoption programs are underway in Florida, South Carolina, Georgia, Texas, and Oklahoma.

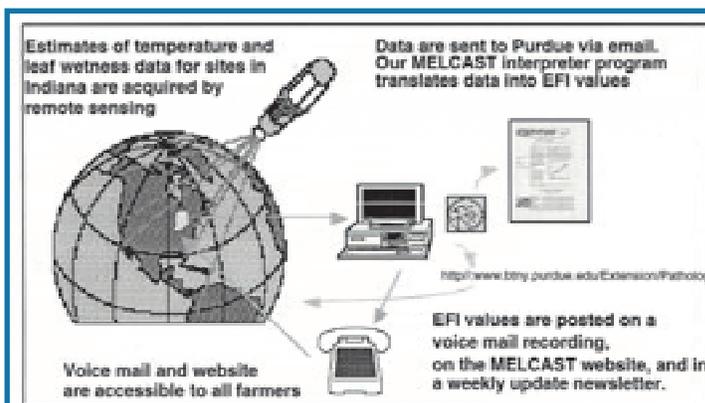


Figure 1. Remote sensing technology provides hourly estimates of temperature and leaf wetness data at various sites in Indiana. The data are transformed into an EFI value that indexes the daily threat of disease. These data are delivered to farmers daily throughout the season via a toll free voice mail recording. Farmers are advised to apply protective fungicides when cumulative EFI values reach a predetermined threshold.

and a graduate student (K.J. Evans) initiated research to model the temperature and moisture requirements for disease

Dr. Jody Banks, Associate Professor of Botany

Jody Banks is an associate professor of botany with research and teaching responsibilities. Dr. Banks received a B.S. degree from the University of Wisconsin-La Crosse in biology, a Ph.D. from Ohio State University in genetics, and was a postdoctoral fellow at the Carnegie Institution of Washington at Johns Hopkins University. Dr. Banks became a member of the Botany and Plant Pathology Department in 1991. She has been the recipient of many research awards and fellowships from the National Institutes of Health and the National Science Foundation in recognition of her research activities.

A desire to understand the genetic and molecular mechanisms underlying plant growth and development and plant evolution has driven Dr. Banks' research interests for many years. As a post doc, she studied the developmental regulation of transposable elements, or "jumping genes" in corn, originally identified by Barbara McClintock. Dr. Banks discovered that a plant cell could keep the genes from jumping by modifying (methylating) the transposable element's DNA sequence and also that the jumping gene itself could overcome this modification of the jumping gene by synthesizing a protein that "sits" on its own DNA and prevents the modification from occurring.

Since arriving at Purdue University, Dr. Banks has been trying to solve the mystery of how plants determine their gender or sex. Sex determination is an important process to understand for agricultural purposes, as the sex of a crop plant or flower influences, and often limits, how the crop is bred and cultivated. Dr. Banks has used an unusual plant, the fern *Ceratopteris*, as a model system. This fern produces individuals that are

sexually dimorphic, either male or hermaphroditic. What makes the fern so valuable for studying sex determination is that the determinant of sex type is known, and mutations that affect sex expression are relatively simple to identify. In *Ceratopteris*, the sex of each individual is determined by a pheromone, which is secreted by the hermaphrodite and causes other individuals to become male. How does each individual perceive the presence or absence of the pheromone and then either turn on or turn off genes necessary for the development male or female traits? To address this question, Dr. Banks has identified ~70 different mutants of *Ceratopteris* that express the wrong sex. One class of mutants is always hermaphroditic and unable to perceive the signal; a second class is always male, even in the absence of the male-inducing pheromone; and a third class is always female. By genetic tests, these different mutants have been ordered into a sex-determining pathway of interacting genes. This pathway describes, at the genetic level, how these genes interact with one another to ultimately specify male or female development depending on the absence or presence of the pheromone.



The next challenge is to clone these genes. Once they have been cloned, Dr. Banks and her students can determine how sex expression is regulated at the molecular and cellular level. The same genes can also be used to determine



whether or not and how these genes are involved in sex determination in important crop plants.

Dr. Banks also teaches undergraduate and graduate level courses at Purdue, including Plant Growth and Development and The Flora of Indiana, where students take field trips to study the major plant communities of Indiana. With support from the National Science Foundation, she also supervises undergraduate and graduate students in their independent research projects. Many of these students have published their work in highly respected scientific journals and have continued their studies at the graduate or post-doctoral level at other universities.

Banks recently attended the awards ceremony for the International Prize in Biology, held at the Japanese Academy of Science in Tokyo, Japan, as an invited symposium guest. This prestigious award is awarded to an individual who has made an outstanding contribution to the advancement of research in fundamental biology. The award is sponsored by the Japanese government in memory of the late Emperor Hirohito, who was an accomplished marine biologist. The highlight of the trip was meeting the Emperor and Empress of Japan.

Dr. Ralph Nicholson, Professor of Plant Pathology

Ralph Nicholson is a professor of Plant Pathology in the Department of Botany and Plant Pathology. He received his B.A. in 1964 from the University of Vermont, a M.S. in 1967 from the University of Maine, and a Ph.D. from Purdue University in 1972. Dr. Nicholson teaches courses in the Physiology and Biochemistry of Disease, Intermediate Plant Pathology, Phenolic Compound Biochemistry, and Photographic Methods for Scientific Publication. He joined the faculty of the Department in July of 1972 and was promoted to full professor in 1984. Nicholson has received several awards during his career; most recently he was named to Purdue's Book of Great Teachers. He is a fellow of the American Phytopathological Society, a fellow of the Japanese Society for the Promotion of Science and has served as a guest professor at the University of Konstanz, Konstanz, Germany. Dr. Nicholson presently serves as a senior editor for the journal *Physiological and Molecular Plant Pathology*.

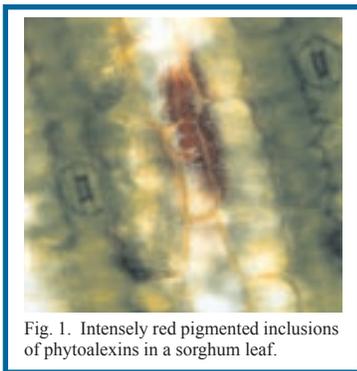


Fig. 1. Intensely red pigmented inclusions of phytoalexins in a sorghum leaf.

Nicholson's research program involves two broad areas. First is the area of disease physiology and biochemistry. His work is centered on the biochemical basis of the expression of resistance and susceptibility in maize and sorghum. His collaborations on disease physiology include work with colleagues at universities in Brazil, Denmark, and Iowa. His second area of research interest involves the fungal infection process and the study of the fungal extracellular matrix. His

collaborative work in this area involves colleagues in Wales, Japan, and Denmark. The primary focus in this work are the fungi *Erysiphe graminis* (causal agent of Barley Powdery Mildew) and various *Colletotrichum* species which cause anthracnose diseases of several plants.

Nicholson showed that to protect itself, sorghum plants produce antifungal compounds called phytoalexins. The phytoalexins are complex pigmented phenols and can be easily seen by light microscopy where they appear as intensely red, pigmented, bodies (Fig. 1). The compounds accumulate in structures which resemble inclusions in the cytoplasm of the host cell. The inclusions move to a position beneath a fungal appressorium that is attempting to penetrate the cell (Fig. 2). Eventually, the inclusions burst, releasing the fungitoxic phytoalexins where they accumulate in the cytoplasm of the fungus and act to kill the pathogen.

Nicholson's group works in close collaboration with the Mass Spectrometry Center on campus. Their joint efforts have allowed them to detect the accumulation of picogram levels of the phytoalexins within individual plant cells. This work has helped to support the phytoalexin concept and the importance of these compounds to the overall defense system of plants.

In Denmark, Nicholson works with colleagues at the Carlsberg Laboratories

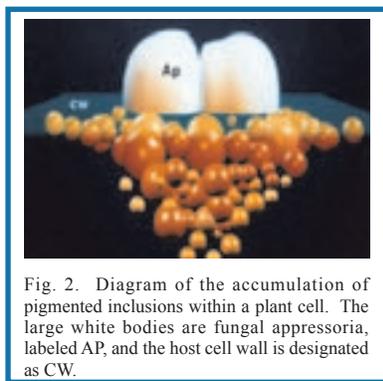


Fig. 2. Diagram of the accumulation of pigmented inclusions within a plant cell. The large white bodies are fungal appressoria, labeled AP, and the host cell wall is designated as CW.



on understanding the mechanism of biosynthesis and distribution of sorghum phytoalexins. Using light and confocal-microscopy, they have demonstrated that the phytoalexins are synthesized within the endoplasmic reticulum (ER) and move through the ER to sites of perturbation in the host cell. In other work with sorghum, Dr. Clive Lo, a former graduate student of Nicholson, has identified a multigene family of seven chalcone synthase genes. It is now known that some of these genes are upregulated in response to infection.

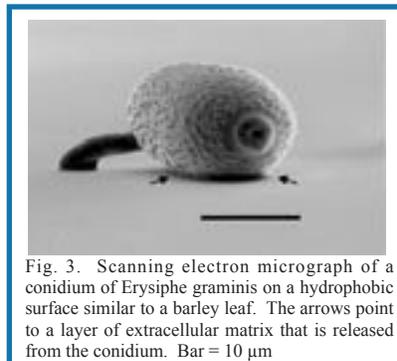


Fig. 3. Scanning electron micrograph of a conidium of *Erysiphe graminis* on a hydrophobic surface similar to a barley leaf. The arrows point to a layer of extracellular matrix that is released from the conidium. Bar = 10 μm

Work with colleagues on the fungus *Erysiphe graminis* has revealed that conidia of the fungus release a complex proteinaceous liquid exudate upon contact with the host surface (Fig. 3). Evidence suggests that this liquid matrix allows for recognition of the host surface and the uptake of low molecular weight anionic materials before the conidium germinates. It is believed that this could be a mechanism not only for recognition, but that it serves to determine the direction of growth of the emerging germ tube toward the host surface.

1999 Honorary Doctorate, Dr. M.V. Rao

Dr. Mangina Venkateswara Rao earned his Ph.D. from the Departments of Agronomy and Botany and Plant Pathology at Purdue University in 1966 under the direction of F.L. Patterson (Agronomy) and J.F. Schafer (Plant Pathology). On Saturday, May 15, 1999, Dr. Rao was honored with the distinction of the Doctor of Agriculture *honoris causa*. At a dinner honoring the occasion at Purdue President Beering's home, Dr. Ray Martyn, department head, had the honor of presenting Dr. Rao with gifts from the department and the University Distinction Lapel Pin.

Dr. Rao is, and continues to be, one of the most influential agricultural leaders in the world. In India, Dr. Rao distinguished himself with a career in improving the food supply of wheat and oil seeds. In 1997, Dr. Rao received the Ninth Srikantia Memorial Award from the Nutrition Society of India for his success in improving the production of oilseeds and making India self-sufficient in oilseeds production. He served as vice-chancellor (CEO) of Andhra Pradesh Agricultural University from 1991 to 1997. He also served in International Agricultural Programs of the World Bank, as well as, many national and societal committees and commission in India.

Dr. Rao's early role was that of a wheat breeder, researcher, and graduate student advisor in India. He contributed to

the breeding of a number of new wheat varieties, the successful introduction of the semi-dwarf varieties of wheat from Mexico, and the development of production practices for the high yielding wheats. He has authored or co-authored more than 175 scientific or popular publications. During his research career he served as major professor for 12 Ph.D. and 8 M.S. degree students.

Dr. Rao played a key role in research, extension, production, and education that helped his country increase wheat production from 6 million tons in 1952 to 68 million tons in the 1990s. Dr. Rao received the prestigious national Norman E. Borlaug Award from the vice-president of India in 1992 for his contributions and leadership in improving the food security of India.

As deputy director general for crop sciences of the Indian Council of Agricultural Research (ICAR) he gave a new thrust and impetus to all research pertaining to food, commercial and horticultural crops, and plant protection. He was instrumental in initiating, guiding, and coordinating research to improve the quality of life and laid foundations to establish 11 National Research Centers throughout the country.

Dr. Rao has contributed to other international efforts to improve agricultural research and education. He



served as trustee of the International Rice Research Institute (IRRI) for six years and also as an external panel expert of the International Maize and Wheat Improvement Centre (CIMMYT). He led Indian agricultural delegations to France, USSR, Canada and Bangladesh. He also served as a consultant to the World Bank, in Uganda, in 1990, to help promote agricultural research and higher education.

For his contributions in increasing the food supply in India, Dr. Rao was awarded the Linker's Award, Peddireddy Thimma Reddy Award, and the Padmabushan Dr. P. Siva Reddy Foundation Award.

Dr. Rao has distinguished himself as a scientist, an administrator of science, and in various high-level government posts. He is clearly the type of individual our department and Purdue University seeks to honor with the of distinction of the Doctor of Agriculture *honoris causa*.



Awards and Promotions

On January 22, 1999, at the Ag Alumni Fish Fry, **Dr. Don Scott** was presented with the Purdue Agricultural Alumni Association's Certificate of Distinction for his lifetime dedication to the field of agriculture. Don retired from Purdue in June of 1998.

In April, 1999, **Drs. Charles Bracker, Clare Kenega, Carole Lembi, and Ralph Nicholson** were inducted into Purdue's Book of Great Teachers. This inaugural class included 39 of the School of Agriculture past and present faculty. A bronze and walnut plaque shaped to look like a series of open pages in a book hangs in the Purdue Memorial Union. The plaque lists 225 of the best teachers Purdue has offered, from the first six faculty members in 1874, to the current crop of professors dedicated to inspiring young minds. The selection criteria included: at least 15 years of service, an outstanding record of teaching and scholarship, and a list of achievements recognized by peers, students, alumni, and administration. The second class of great teachers will be added to the book in 2003. Congratulations to our four "Great Teachers."

Dr. Keith Perry was recognized as the Department of Botany and Plant Pathology's Outstanding Teacher and Outstanding Counselor at the School of Agriculture Annual Awards Banquet, April, 1999.

Dr. Thomas Hodges, J.C. Arthur Distinguished Professor, and Dr. Leszek Lyznik, Pioneer Hi-Bred International, were issued a patent from the U.S. Patent Office in June, 1999, for "Controlled Modification of Eukaryotic Organisms."

Dr. T. Scott Abney, USDA/ARS, was appointed to the World Soybean Research Committee at the Sixth World Soybean Research Conference and Global Soy Forum in Chicago, Illinois in August,

1999. Dr. Abney is the only plant pathologist on this committee, and his appointment recognizes his expertise and years of research in soybean diseases.

Dr. Rick Latin has made significant contributions to Purdue's Extension effort and to Indiana agriculture through his experience, dedication, and leadership. In November, 1999, Rick was awarded the 1999 PUCESA Senior Division Award at the Annual CES Conference. Dr. Latin continues to provide the Indiana commercial vegetable growers, and the Extension educators who serve them, with comprehensive educational support in the areas of vegetable production and pest management.

Drs. Charles Woloshuk, Linda Mason (ENTM), and Dirk Maier (ABE), members of the Post-Harvest Grain Quality Team, were awarded the School of Agriculture Dean's Team Award on May 6, 1999. Many people from academia and industry attended the presentation ceremony. The purpose of the Dean's Award is to provide the opportunity to recognize groups that work across schools and disciplines to achieve goals in research and education that may not have been achievable by individuals working alone. This team also was honored later in the year at the Annual CES Conference with the 1999 PUCESA Team Award. Since the team's inception seven years ago, they have made a significant impact on the quality of food and feed throughout Indiana and the midwest region. They have accomplished this through their combined efforts in Research, Extension, and Teaching. The team provides laboratory support for grain quality testing and has had significant impact in Extension education. The publishing of the Post Harvest Pocket Guide, the Purdue Post Harvest IPM educator CD, and the S.L.A.M brochure and poster, along with numerous field days and farm tours has resulted in training programs

that have been adopted throughout the U.S. This team has also established a Post Harvest Education and Research Center at the Purdue Agronomy Research Center to expand Purdue's ability to replicate large-scale research projects and as a demonstration unit for post-harvest technologies.

Dr. Tom Jordan was named the new Ag and Natural Resources Program Leader and Assistant Director of the Cooperative Extension Service, effective November 1, 1999. Dr. Dave Petritz, new director of the CES, says he is pleased to have Dr. Jordan on his administrative team because of his experience and understanding of Extension. Dr. Jordan is a respected specialist and leader in Extension and weed management. In his new position, Dr. Jordan will help to maintain a competitive edge for Indiana agricultural communities, ensuring agriculturists have accurate and timely information and creating an awareness of agriculture with the general public. Dr. Jordan is a professor of weed science and has been in the Department of Botany and Plant Pathology for 21 years.

Gail Ruhl was appointed Senior Editor to the newly-formed Editorial Board for Electronic Publications of the American Phytopathological Society. This is a credit to her qualifications and peer recognition and an honor to our department.

Dr. Peggy Sellers, Director of the Plant and Pest Diagnostic Laboratory, was promoted to professional rank 5. Dr. Sellers received her Ph.D. degree in 1994 from Iowa State University and joined the Department of Botany and Plant Pathology in 1995.

Margaret S. Stueben was selected as a recipient of a professional development grant from the Administrative and Professional Staff Advisory Committee (APSAC). Suzy received a \$500 award to be used for professional development.

Suzy joined the department in March of 1998 as a computer assistant. She is studying part-time for her Ph.D. degree in educational technology.

Six of our administrative/professional staff members were recognized for their years of service in 1999. **George Buechley** (20 years), **Cheri Janssen** (10 years), **Andrew Martin** (15 years), **Karen Rane** (10 years), **Gail Ruhl**

(20 years), and **Debra Sherman** (10 years). These individuals were honored at the 10th Annual Awards Program held at the Purdue Memorial Union. Congratulations, thank you, and continued success to all.

The annual Clerical and Service Staff Recognition Luncheon was held on Thursday, December 9, 1999 at the Purdue Memorial Union. Staff members

celebrating 10, 15, 20, 25, 30, 35, and 40 years were honored. The Department of Botany and Plant Pathology had three honorees: **Janet Whaley**, Secretary in the Plant and Pest Diagnostic Lab, (10 years); **Ruth Brown**, Service Technician for Dr. Merrill Ross, (20 years), and **Juanita Young**, Laboratory Technician, (25 years).

“Down-Home Texas Barbecue”



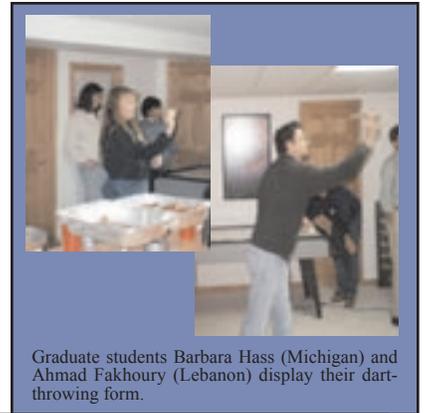
Graduate students Fidel Mendez (El Salvador) and James Ng (Singapore) compare notes on Texas style food.



Graduate students Kelli George (Alabama) and Barbara Hass (Michigan) consider their options.

In October, Ray and Carol Martyn hosted a “Down-Home Texas barbecue” at their home for the graduate students and post-docs. It was a first for many of the students to get a taste of such culinary treats as smoked brisket, smoked sausage, Texas-style nachos, and many other treats. The afternoon and evening were highlighted by numerous spirited games of air hockey and the 1999 Dart Championship. Fourteen teams competed for the coveted title of “Champion Dart Thrower.” This year’s winning team was LeeAnn Glomski and Wilfred Vermerris. Congratulations!!

All graduate students and post-docs are encouraged to practice their skills before next year’s barbecue.



Graduate students Barbara Hass (Michigan) and Ahmad Fakhoury (Lebanon) display their dart-throwing form.



Graduate student, Mauricio Antunes (Brazil) and post-doc, Wilfred Vermerris (The Netherlands) get ready for a game of air hockey.



Graduate students and post-docs lining up at the “feed trough.”

Tom Hodges Retires After 28 Years

On December 31, 1999, **Dr. Thomas K. Hodges**, J. C. Arthur Distinguished Professor, retired from the Department of Botany and Plant Pathology at Purdue University after 28 years of dedicated service. His fellow colleagues and friends honored him, and his career, at a reception on December 6, 1999, and a dinner at a local restaurant on January 27, 2000. Dr. Larry Dunkle served as Master of Ceremonies for the dinner. Dr. Dunkle, along with Dean Vic Lechtenberg, Nelson Balke, Randy Woodson, Chris Denz, (daughter of Dr. Hodges), Nick Carpita, Joe Key, and Andy Jackson (via videotape), shared many stories and memories of his activities and achievements over the past 28 years. Dr. Hodges has many students, colleagues, and friends throughout the world, several of whom came long distances to join in the celebration.

Dr. Hodges received his B.S. in Agronomy in 1958 from Purdue University and his M.S. and Ph.D. in plant physiology in 1960 and 1962 respectively, from the University of California, Davis. His early career began at the University of Illinois



as a research associate in the Department of Agronomy. In 1963, Dr. Hodges was hired as an assistant professor in the Horticulture Department and advanced to associate professor in 1968 at the University of Illinois. In 1971, he was hired by Purdue University as an associate professor in the Botany and Plant Pathology Department. He was promoted to full professor in 1973 and served as department head from 1977 to 1982. After stepping down as department head

to focus on his research, Dr. Hodges served as director of the Agricultural Biotechnology Center, Purdue University-Indiana Corporation for Science and Technology. In 1989, Dr. Hodges was named the Joseph C. Arthur Distinguished Professor in recognition of his outstanding achievements.

It has been said that Dr. Tom Hodges is an unusual man with unusual qualities that have formed the basis for his success. His record is multidimensional, with distinction in research, training of young scientists, and in service to Purdue and the field of science.

It was evident in his early work and throughout his subsequent endeavors that Dr. Hodges had a blend of personal characteristics and talents that made him a natural investigative scientist. He has a natural curiosity which he translated that sound experimental design by combining logic, intuition, and insight. He is an original thinker and innovator who relished new approaches to solving problems. All of these qualities have earned him a high level of respect and esteem among his peers.

The year 1977 began a period in Dr. Hodges' career that was dominated by service to the University. He was head of the Department of Botany and Plant Pathology for five years, and he guided the department in a direction that would place it in a favorable position for the biological revolution that was then getting underway. He introduced and promoted the concept upon which a new laboratory research building was planned and built. This building, named the Roy L. Whistler Agricultural Research Building (WSLR), now houses many of the plant cell and molecular biology laboratories on campus. During that time, he was active in a service and advisory capacity in such roles as program manager in the USDA Competitive Grants Program and by serving on external departmental review teams.

After stepping down as department head to focus on his research, he began his work on plant cell regeneration. He built a large research team of students



and postdoctoral scientists who worked cooperatively with him towards the research goals of his program. In all, he has graduated 18 students at the M.S. and Ph.D. levels. He has served on the thesis committees of more than 50 other graduate students. Twenty-one postdoctoral researchers have pursued their research under his guidance. In addition, nine faculty from other institutions have spent their sabbatical leaves in his laboratory, and he has collaborated with a number of other colleagues at Purdue and elsewhere.

Dr. Hodges was very successful in securing extramural research funds from such agencies as the National Science Foundation, the Rockefeller Foundation, Agrigenetics, the Indiana Corporation for Science and Technology, BARD, and others.

Tom has dedicated his life to advancing the science of plant physiology and improving the ability of people to feed themselves. Over the years he has developed an increasing sense of responsibility for contributing to human welfare on a large scale.

During his career he has received many honors, awards, and citations, including the Charles Albert Shull Award, A.E. Dimond Award, Herbert Newby McCoy Research Award, and the J.C. Arthur Distinguished Professorship.

Dr. Hodges and his wife Halina have purchased a farm on the Chesapeake Bay in Virginia and plan to relax and enjoy retirement by doing a lot of sailing on the bay waters.

Juanita Young Retires



Juanita Young began her position as a laboratory assistant in the Department of Botany and Plant Pathology on March 4, 1974. After 25 years of dedicated service, Juanita retired from Purdue University on

March 26, 1999. A reception was held in her honor, where her friends, co-workers, and family joined her for an afternoon of celebration.

Juanita has had many responsibilities during her 25 years in the department. Her duties ranged from washing glassware, preparing culture media for research, mixing photographic chemicals for the darkrooms, handling the proper disposal of hazardous chemicals, monitoring and maintaining the function of the equipment in the media prep area, and maintaining supplies. She assisted and demonstrated such activities as media preparation, storage of research materials, use of departmental laboratory equipment, and proper use and care of laboratory glassware to faculty, staff, and students. She watered plants in the greenhouse and was responsible for the general care and

maintenance of the greenhouses, among many other duties.

Juanita headed up a group of volunteers in 1998 that worked with the grounds department and helped transform an area between Lilly Hall and the Plant and Soils Building into a nicely landscaped picnic area. Her friends in Lilly Hall dedicated the area to Juanita and a plaque was hung in her honor that reads "Juanita's Garden."

Juanita has been noticeably missed during the past year, especially around the coffeepot. She always had fresh coffee and her pleasant smile and personality were always a welcome site to everyone. We all miss the daily interactions with her, but wish her the best as she spends time with her children and grandchildren.

International Visitors

The Department of Botany and Plant Pathology had the opportunity to host seven international visitors in 1999.

The first two visitors were from Zamorano, the Pan-American School of Agriculture in Honduras. **Fidel Mendez** and **Ana Saballos** were both in the last year of their undergraduate studies and came to our department to work on a project during the summer months to complete their degrees.

Mendez arrived in April 1999 and began working in the laboratory of Dr. Charles Woloshuk for the purpose of studying mold inhibitors in stored grain. Saballos arrived in May 1999 and began working in the laboratory of Dr. Sue Loesch-Fries for the purpose of studying expression of plant virus genes. We are pleased to report that both students had a successful stay at Purdue. They returned to Zamorano and completed their undergraduate degrees and have returned to our department as graduate students, continuing the research they began last summer.

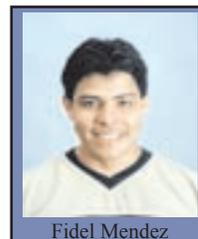
Caroline Josefsson, Alingsas, Sweden, came to Purdue in 1997 as an undergraduate exchange student with the School of Agriculture and worked in the

laboratory of Dr. Ron Coolbaugh. She returned to Sweden to begin work on her master's degree. She completed her M.S. in May 1999. Dr. Keith Perry invited her back to Purdue to work in his laboratory on the genetic analyses of barley yellow dwarf virus and cucumber mosaic virus. She will be a visiting scholar until May of 2000.

Dr. Fa-qi Wu, Chaanxi, China, was invited by Dr. Michael Hickman to work in his laboratory as a visiting scholar from September to December 1999. The research training focused on sloping soil erosion processes.

Marta Michniewicz, Torun, Poland, was invited by Dr. Tom Hodges to be a visiting scholar to learn how to genetically engineer plants. This training will assist her in completing her masters degree. Marta will be working in the Hodge's lab until June of 2000.

Dr. Catherine Rayon, Alencon, France, and **Dr. Wilfred Vermerris**, the Netherlands, joined the laboratory of Dr. Nick Carpita in September 1999 as post-doctoral research assistants. The focus of their research will be to characterize the CelA gene family of grasses, which may encode β -glucan synthases as well as cellulose synthases.



Fidel Mendez



Caroline Josefsson



Catherine Rayon



Wilfred Vermerris

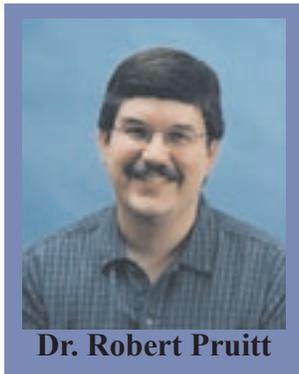
New Faculty and Staff

The Department of Botany and Plant Pathology was very fortunate this past year to hire three outstanding faculty and a professional curator. The first to arrive in West Lafayette was **Dr. Case Medlin**, Assistant Professor of Weed Science. Dr. Medlin received his B.S. and M.S. degrees from Oklahoma State University in 1994 and 1996, respectively. He received his Ph.D. in Weed Science from Mississippi State University in 1999. His research responsibilities here at Purdue involve the integration of yield loss prediction/herbicide recommendation models, remote sensing technology, and site-specific herbicide application techniques. Other interests include the evaluation of new and currently labeled herbicides, and mechanical and cultural control measures for their uses as weed management systems in corn and soybean. Dr. Medlin's extension responsibilities include the development of distance learning programs for weed science education as well as the continuation of traditional weed science Extension programs. Dr. Medlin, wife Gaylyn, and son Austin have settled into a new home in West Lafayette, where they are adjusting to this new assistant professor's busy schedule.



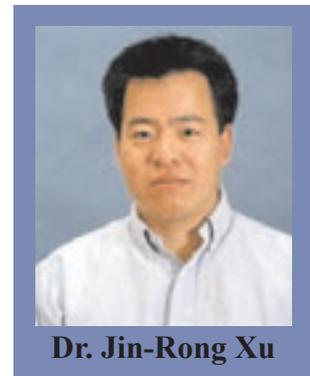
Dr. Case Medlin

Dr. Robert Pruitt, Associate Professor of Plant Molecular Biology arrived at Purdue in mid-August. Dr. Pruitt received his B.S. degree in biochemistry from the University of Minnesota in 1980 and his Ph.D. degree in molecular biology from the California Institute of Technology in 1986. Following two years of postdoctoral research at the Plant Breeding Institute in Cambridge, England, Dr. Pruitt took a faculty position in genetics and cell biology at the University of Minnesota in 1988. In 1992 he moved to the Molecular and Cellular Biology Department at Harvard University where he has spent the last 8 years. His current research interests include the genetic control of plant cuticle permeability and its impact on epidermal cell interactions, and plant reproduction and plant susceptibility to herbicide action. Dr. Pruitt looks forward to expanding the breadth of his research program at Purdue, using molecular genetics and genomics technologies to address basic questions in weed science. Dr. Pruitt's teaching responsibilities will include BTNY 504, Advanced Weed Science. Dr. Pruitt and fiancée, Susan Lolle, have purchased an old Victorian home in West Lafayette, and renovation plans are in the beginning stages.



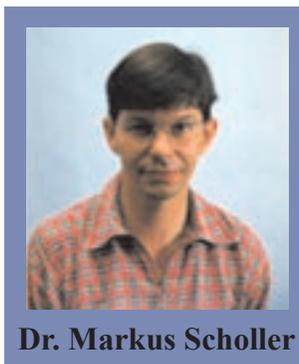
Dr. Robert Pruitt

Dr. Jin-Rong Xu joined the department in October 1999, as an Assistant Professor of Fungal Biology. Dr. Xu received his B.S. and M.S. degrees from the Beijing Agricultural University. He received his Ph.D. in plant pathology in 1994 from Kansas State University working under the direction of Dr. John Leslie. His dissertation work involved construction of a genetic map and analysis of the electrophoretic karyotypes of *Fusarium moniliforme*. After graduation, Dr. Xu worked on the rice blast fungus, *Maganporthe grisea*, for three years with Dr. John Hamer at Purdue University. He then went to Novartis Agribusiness Biotechnology Research, Inc. in North Carolina as a project leader working in the fungal targets group. At Purdue, he will continue his work on molecular mechanisms regulating host-pathogen interactions and infection-related morphogenesis in *M. grisea*. In addition, he will begin new studies in fungal pathogenesis of the necrotrophic pathogen *Botrytis cinerea* and the wheat scab fungus *Fusarium graminearum*. Dr. Xu, wife Feng Zheng, and their four-year old daughter, Nina are adjusting to the ever changing Indiana weather.



Dr. Jin-Rong Xu

In August 1999, **Dr. Markus Scholler** was named the new curator of the J. C. Arthur and Kriebel Herbaria. Dr. Scholler received his M.S. degree under the direction of Drs. Walter Gams, U. Braun and Hans Kreisel at the Free University in Berlin, Germany. He received his Ph.D. in 1995 from Greifswald University working on the ecological and taxonomical aspects of the rust, smut, and powdery mildew flora of Northeast Germany. He then worked as a research associate and lecturer at Greifswald University where he published more than 25 scientific papers, mainly on plant parasitic and nematophagous fungi. At Purdue, Dr. Scholler will place an emphasis on the study of the ecology and taxonomy of Northern Hemisphere rust fungi. The J. C. Arthur rust herbarium is well known for the world's largest collection (ca. 100,000) of rust fungi specimens. (see Program Highlights, Herbarium, page 18). Dr. Scholler is looking forward to rejuvenating interest in the Herbaria. He was joined in September by his wife, Annemarte Rubner and their two sons, Konrad and Friedrich.



Dr. Markus Scholler

We are pleased to introduce our new associate and assistant professors and the new curator of the J.C. Arthur and Kriebel Herbaria. We look forward to their contributions to the department and Purdue University.

Robert M. Hanau 1947 – 2000

Robert M. Hanau, Associate Professor of Plant Pathology in the Department of Botany and Plant Pathology at Purdue University, died March 15, 2000 at home with family and friends at his side. He had been recuperating from a liver transplant. While the transplant had been successful, complications from other factors resulted in his death.



Dr. Hanau was born November 12, 1947, in Dallas, Texas. He attended Temple University, Philadelphia, Pennsylvania, where he received a B.A. in biology in 1976 and a Ph.D. in bacteriology in 1981. His dissertation research was on nitrogen assimilation in *Klebsiella pneumoniae*. Dr. Hanau came to Purdue University in 1981 as a postdoctoral associate with Dr. J. E. Brenchley working on the molecular biology of glutamine synthetase in *Salmonella typhimurium*. In 1982, as a NIH postdoctoral fellow with Dr. A. O. Jackson in the Department of Botany and Plant Pathology at Purdue, he studied the molecular biology of plant viruses. It was at this time that he became interested in plant pathology.

In 1984, Dr. Hanau was hired as an assistant professor in the Department of Botany and Plant Pathology at Purdue University. His career track was the molecular biology of fungal pathogens of corn. His research program focused on developing *Glomerella graminicola* (*Colletotrichum graminicola*) as a model system for studying the genetics of host/pathogen interactions. He and his students developed fungal transformation protocols and methods for exploring the sexual cycle for genetic analysis. In his short career, Dr. Hanau published 23 journal articles. He mentored two postdoctoral associates and six graduate students, three who are now university professors. Dr. Hanau also taught several courses including *Plants and Civilization*, *Plant Pathology*, and *Molecular Basis of Host-Parasite Interactions*.

Surviving Dr. Hanau are his three children, Evan, Matthew and Caroline Hanau, West Lafayette, IN; his father Gordon Hanau, Plantation, FL; two brothers, David Hanau, Pittsburgh, PA, and John Hanau, St. Louis, MO; and four sisters, Diana Hanau-Strain, Chicago, IL, Kate Gaines, Pleasant Hill, CA, Joan Walsh, St. Louis, MO and Jean Hanau, Fort Lauderdale, FL.

Farm Progress Show 2001 comes to Purdue Country

The Farm Progress Show 2001, sponsored by Indiana Prairie Farmer, will be staged in Tippecanoe County. It's the first time America's premier farm show has traveled to the home county of the Purdue Boilermakers. The Alan Kemper and Jerry Smit families will serve as the primary hosts. Neighbors Steve Gamble, John Rice, and Forrest Johnson have all joined to assist the Kemper & Smit Farms in providing contiguous farmland for the event. The show site is located off U.S. 52 just south of Lafayette.



The hosts have assembled 2,500 acres for use by Farm Progress in presenting the 2001 event. Tippecanoe County is consistently among the highest corn and soybean producing counties in Indiana.

"We believe this will be a tremendous site for the 2001 Farm Progress Show," says Mark Randal, Farm Progress' National Shows Director. "Our host farmers have patiently worked through the screening process with us and I know will be a tremendous asset as we go about putting together the program for 2001. It also is definitely a plus to be so close to Purdue which has always provided tremendous educational exhibits at the Farm Progress Show."

Recognized as the "Super Bowl" for agriculture, the substantial economic activity generated by the Farm Progress Show and its hundreds of thousands of visitors makes it a highly sought prize for rural areas. Randal says the decision to locate in Tippecanoe County

followed several years of very active work on the part of local community leaders and the Greater Lafayette Convention & Visitors Bureau.

Purdue's involvement is expected to be considerable. **Dr. Peggy Sellers** and **Dr. Case Medlin**, are serving as the Department of Botany and Plant Pathology coordinators. Dr. Sellers may be contacted by e-mail (sellers@btny.purdue.edu) with any questions regarding the department's involvement.

More information on the 2000 and 2001 Farm Progress Shows can be obtained from the official Web site at: http://www.farmprogressshow.com/Farm_Main.htm

T. Scott Abney: Soybean Pathology Disease of soybeans with emphasis on mycological and epidemiological aspects of fungal diseases.

Jo Ann Banks: Plant Molecular and Developmental Biology. Genetic and molecular basis of sex determination and differentiation in plants.

Thomas T. Bauman: Weed Science. Interaction between chemical and cultural methods of weed management systems.

Nicholas C. Carpita: Plant Cell Enlargement. Biochemical and molecular aspects of plant cell growth and development; structure and biosynthesis of the plant cell wall.

Ronald C. Coolbaugh: Plant Hormones. Biochemical and molecular studies on the biosynthesis of natural plant hormones such as gibberellins and abscisic acid.

Larry D. Dunkle: Host-Pathogen Interactions. Synthesis and action of fungal toxins and genetic variability in fungal pathogens.

Steve Goodwin: Plant Pathology. Molecular genetics of host-pathogen interactions; population genetics, evolution and speciation of plant pathogenic fungi; genetics and genomics of disease resistance in small grains.

Michael V. Hickman: Weed Science. Weed control in field crops with emphasis on controlled release formulations of herbicides.

Don M. Huber: Soilborne Cereal Diseases. Biological and cultural control of soilborne diseases emphasizing mechanisms, microbial and nutrient-disease interactions.

Thomas N. Jordan: Weed Science. Effect of the environment, solution additives, and plant growth on herbicide activity.

Richard Latin: Turfgrass and Vegetable Diseases. Etiology, epidemiology, and management of bacterial and fungal diseases of turfgrass and vegetables.

Carole A. Lembi: Aquatic Biology. Aquatic weed science and phycology with emphasis on ecology, physiology, and management of aquatic algae.

L. Sue Loesch-Fries: Molecular Virology. Function of viral genes in virus replication, disease development, and virus control.

Ray D. Martyn, Department Head: Plant Pathology, Soilborne Diseases. Molecular evolution of pathogenic formae speciales and races of *Fusarium oxysporum*, and the epidemiology and control of soilborne diseases of cucurbits.

Case R. Medlin: Weed Science. Remote sensing and site-specific technologies for assessing spatial distribution of weeds and providing optimum measures for their control.

Ralph L. Nicholson: Disease Physiology. Phenolic compound biochemistry and metabolism of secondary plant products in disease

interactions. The fungal extracellular matrix, adhesion, and control of differentiation in the fungal infection process.

Paul C. Pecknold: Ornamental and Fruit Diseases. Epidemiology and management of apple scab, sooty blotch, and flyspeck.

Keith Perry: Plant Virology. Vector transmission of plant viruses and viral diseases of wheat.

Robert E. Pruitt: Plant Molecular Biology. Molecular and genetic regulation of growth and development of plants; fertilization and epidermal cell interactions.

Merrill A. Ross: Weed Science. Systems of control of johnsongrass, Canada thistle, and other perennial weeds.

Gregory E. Shaner: Plant Pathology, Field Crop Diseases. Epidemiology and management of diseases of corn, soybeans, and small grains. Disease resistance in small grains.

MaryAlice Webb: Plant Cell Biology. Plant cell and developmental biology; calcium oxalate accumulation in specialized cells.

Charles P. Woloshuk: Corn/ Mycotoxin Pathology. Genetics, biochemistry, and physiology of mycotoxin biosynthesis.

Jin-Rong Xu: Fungal Biology. Characterization of fungal pathogenicity genes and signal transduction pathways in *Magnaporthe grisea*.

1999 Departmental Seminar Series

During 1999, the Department of Botany and Plant Pathology Seminar Series was highlighted by many stimulating and enlightening speakers from other universities, industries, and agencies, in addition to contributions from the local talent at Purdue. The following guests were invited to present seminars in our departmental seminar series:

Clive Lo, Department of Botany and Plant Pathology, Purdue University, *Physiological and Molecular Basis of Phytoalexin Biosynthesis in Sorghum*. (Ph.D. research seminar)

Allan Konopka, Department of Biology, Purdue University, *Physiological Ecology of Planktonic Cyanobacteria in Thermally Stratified Lakes*.

Nick Carpita, Department of Botany and Plant Pathology, Purdue University, *Functional Genomics and the Plant Cell Wall*.

Joe Marencik, Department of Botany and Plant Pathology, Purdue University, *The Use of Several Forages and Straws as Bioalgcides*. (M.S. research seminar)

Jiming Jiang, Department of Horticulture, University of Wisconsin-Madison, *The DNA Structure of Grass Centromeres*.

Joe Ogas, Department of Biochemistry, Purdue University, *Regulation of Developmental Identity by Gibberellin and Chromatin Remodeling in Arabidopsis thaliana*.

Doug Cook, Department of Plant Pathology and Microbiology, Texas A & M Univ., *What's New With Symbiotic Nitrogen Fixation: The Utility of Comparative Genomics to Understand the Rhizobium-Legume Symbiosis*.

Lynn Epstein, Department of Plant Pathology, University of California, *Using DNA-tagged Mutants to Study Walls of Fungal Spores*.

Jon Duvick, Pioneer Hi-bred International, Johnston, Iowa, *Strategies for Reducing Fumonisin Mycotoxins in Maize*.

Deb Mohnen, Complex Carbohydrate Research Center, University of Georgia, *Biological Activity and Biosynthesis of Plant Cell Wall Pectins*.

Brent Sellers, Department of Botany and Plant Pathology, Purdue University, *Erosion-Reducing Soil Amendments in Indiana Crop Production*. (M.S. research seminar)

Christy Watson, Department of Botany and Plant Pathology, Purdue University, *Expression and Characterization of CYP86B1 in Arabidopsis*. (M.S. research seminar)

Chris Schardl, Department of Plant Pathology, University of Kentucky, *Genetic Analysis and Roles of Alkaloids Produced by Mutualistic Fungal Endophytes of Grasses*.

Ian Thompson, Department of Botany and Plant Pathology, Purdue University, *Manganese Oxidation State Dynamics in Soils, Rhizospheres, and Plant-Pathogen Interactions as Probed by X-ray Absorption*. (M.S. research seminar)

Ralph Nicholson, Department of Botany and Plant Pathology, Purdue University, *First Touch: An Immediate Response to Surface Recognition in Conidia of Blumeria graminis*.

Merrill Ross, Department of Botany and Plant Pathology, Purdue University, *Advances in Johnsongrass Control*.

Sophien Kamoun, Department of Plant Pathology, Ohio State University, *Dissection of Nonhost Resistance of Nicotiana to Phytophthora infestans*.

Xinnian Dong, Department of Botany, Duke University, *The Regulation of Systemic Acquired Resistance by NPR1 and its Partners*.

Scott Gold, Department of Plant Pathology, University of Georgia, *A Galling Dilemma: Signaling Pathways Controlling Dimorphism and Pathogenicity in Corn Smut*.

Dean DellaPenna, Department of Biochemistry, University of Nevada/Reno, *Nutritional Genomics: Vitamin E in Plants as an Example*.

Karen Schumaker, Department of Plant Sciences, University of Arizona, *Mechanisms Underlying Cellular Polarity in Moss*.

Jeanne Romero-Severson, Department of Forestry, Purdue University, *The Impact of Biotechnology on Breeding for Pest Resistance: Better Than We Ever Dreamed, Worse Than We Ever Imagined*.

John Williamson, Department of Horticultural Science, North Carolina State Univ., *Potential Roles for Mannitol and Mannitol Dehydrogenase in Active Oxygen Mediated Plant Defense*.

Sondra Lazarowitz, Department of Plant Pathology, Cornell University, *Intracellular and Intercellular Trafficking in Plants: What We Can Learn From Plant Virus Movement*.

Vicki Vance, Department of Biological Sciences, University of South Carolina, *A Viral Suppressor of Gene Silencing in Plants*.

Anibal Tapiero-Ortiz, Department of Botany and Plant Pathology, Purdue University, *Testing a 'Lineage-Exclusion' Strategy for Breeding Rice Resistant to Blast Disease*. (Ph.D. research seminar)

From the Archives...

A.



B.



C.



Do you recognize any of these individuals? If you can't figure it out, the answers are on page 25.



Plant and Pest Diagnostic Laboratory

Dr. Peggy Sellers, Director

The Plant and Pest Diagnostic Laboratory (PPDL) is a multi-discipline diagnostic clinic administratively housed in the Department of Botany and Plant Pathology. The purpose of the clinic is to serve as the state's diagnostic clinic for plant and pest disorders and identification. Plant samples, insects, and weeds are sent to the clinic by farmers, homeowners, commercial nurseries, and numerous other individuals, for diagnosis and recommendations. There is a small fee for all samples submitted. For more information on submitting samples, please see their Web page at <http://www.pddl.purdue.edu> or contact the clinic directly (765-494-7071).

During 1999, the staff of the PPDL) comprised of specialists from the departments of Botany and Plant Pathology, Agronomy, Entomology, Horticulture and Landscape Architecture, and Forestry and Natural Resources, diagnosed 1,888 samples throughout the year (Figure 1). Seventy-six percent of the diagnoses were completed in five days or less (Figure 2). The types of problems diagnosed during 1999 are similar to those in previous years, with 37% of the samples dealing with noninfectious disorders and 31% being infectious diseases. (Figure 3).

This past year was eventful, as always, in the P&PDL. The staff participated in several educational events and training opportunities throughout the state. The P&PDL was represented at several events

including the Indiana State Fair, the Indiana Horticulture Congress, Indiana Flower and Patio Show, and the Purdue University SpringFest. In addition, the staff of the P&PDL gave presentations or workshops to a variety of audiences throughout the state including Master Gardener Programs, Turf and Ornamentals Workshops, Pesticide Applicator Training, Plant Science Workshop, Purdue Garden Day, and commercial grower and association meetings.

Two training programs were offered to county Extension staff: 1) Ornamental Problems-Nip Them in the Bud! and 2) BYOS - Bring Your Own Scope. For the BYOS program, participants brought their own dissecting microscopes and received hands-on training for identifying grasses and diagnosing insect and disease problems. The ornamental problems workshop included topics on proper plant placement, symptoms of plant problems, identifying and managing diseases and insects, and calibrating pesticide application equipment for the homeowner. Both training programs were well received by the participants.

In an effort to respond to the needs of the citizens of Indiana more efficiently, and to enhance the diagnostic capabilities of the lab, the P&PDL will begin a pilot program, Digital Diagnostics for Indiana, in 2000. Digital imaging sites will be established throughout the state, and a Web-based submission method will be developed to transmit digital images of insect and plant problems from the Extension field staff to

the P&PDL. Select digital images, diagnostic data, and management information will be compiled into a digital diagnostic library of Indiana plant and pest problems that will be available on the PPDL Web site.

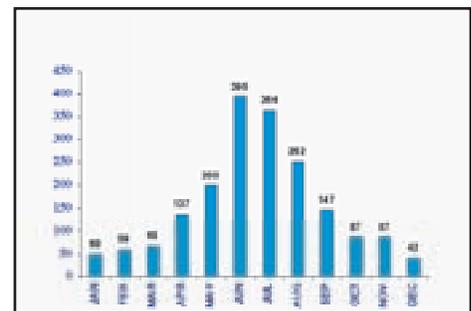


Fig. 1. Number of samples diagnosed in 1999 (total = 1,888).



Fig. 2. Turn-around time for samples diagnosed in 1999.

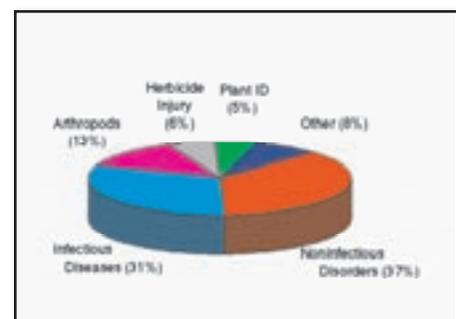


Fig. 3. Problem types diagnosed in 1999.

Southwest Purdue Agricultural Center

Dr. Daniel Egel, Coordinator, Agricultural Programs

A significant portion of the watermelon crop in southwestern Indiana suffered from sudden wilt in 1999. This disease, which has occurred sporadically since the 1980s, causes the vines to wilt and die. Usually the disease begins to affect plants when the fruit are beginning to rapidly enlarge. Once the plants begin to decline, they rarely recover enough to produce fruit. The disease seems to prefer low areas in the field that remain wet. From these low areas, the disease seems to progress up hillsides. The roots of affected plants are often discolored and rotten. The disease does not affect muskmelons.

Aside from these symptoms, little is known about the disease. **Dr. Daniel S. Egel** is trying to learn more. Last summer he made field observations and conducted a greenhouse experiment in the fall. In two separate watermelon fields Dr. Egel mapped the progress of the field and took root and soil samples. Above ground symptoms were not correlated with soil texture, organic matter, or soil fertility. The disease was not halted in either field by pulling the plastic away from under the vines, digging a trench to eliminate root-to-root contact, or stripping the fruit off of plants before they became affected. Root isolations did not reveal any consistent known pathogen.

In greenhouse experiments, root samples from both fields, as well as healthy roots, were dried and ground before being added to watermelon seedlings in pots. A control treatment was included in which no roots were added. Plants that had been inoculated with roots from one of the fields were significantly more likely

to become seriously diseased than any of the other treatments. However, the disease observed in the greenhouse experiment did not resemble all of the symptoms associated with the disease as observed in the field. No one fungus was consistently isolated from roots of plants in the greenhouse experiment. Dr. Egel plans to continue field work and greenhouse work on the possible causes of sudden wilt of watermelon.



Farm in southern Indiana showing visible watermelon fruit due to the decline and wilt of the plants which is due to root rot.

1999 represented the third year of field trials designed to determine the most efficient method to apply protective fungicides for reducing disease on muskmelons. These trials have examined nozzle type and spray pressure in their effect on plant disease.



The root rot syndrome includes a lack of fine roots and cortical necrosis of major roots.

No difference has been found in any of the three years in fungicide applications performed with flat fan versus hollow cone nozzle types. In addition, spray pressures ranging from 30 to 150 psi have not had

a significant affect on control of *Alternaria* leaf blight of muskmelon. The results of this work have been shared with growers in numerous Extension formats. This work has been sponsored in part by a grant from the North Central Region Pesticide Impact Assessment Program.

The weather-based disease forecasting program, MELCAST, continues to represent a major Extension and research effort by Dr. Rick Latin and Dr. Egel. By following this program, muskmelon and watermelon growers may reduce fungicide applications and cost by applying sprays when they are most needed. Previously, growers had little choice but to apply fungicides on a calendar-based schedule, i.e., a predetermined time interval. Fungicide compounds are tested yearly at the Southwest Purdue Ag Center for their efficacy in both calendar-based and weather-based application schedules. Research last summer included Quadris, a compound representing a new class of fungicides in the MELCAST fungicide application system.

Any questions or comments regarding the Southwest Purdue Agriculture Center or MELCAST can be directed to:

Dr. Dan Egel, SWPAC
Box 139A, R.R. #6
Vincennes, IN 47591
(812) 886-0198
egel@btny.purdue.edu

The Purdue University Herbarium

Dr. Markus Scholler, Curator

It is not an easy task to explain what an herbarium is and how it is used. The “New International Dictionary of the English Language” has two definitions for a herbarium: 1) a collection of dried plants scientifically arranged and 2) a room or building containing such a collection. It should be noted, however, that herbaria also contain specimens of dried fungi and that the collections are not only “scientifically arranged” but also scientifically studied.

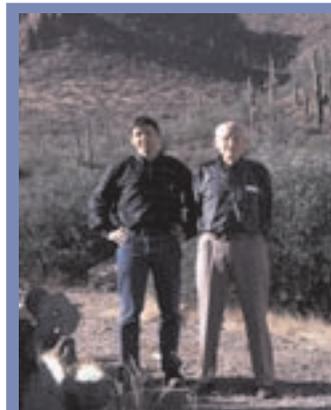
But what are dried specimens good for, particularly in a modern botany and plant pathology department? To answer this question we must look back to the beginning of the 16th century. During that time, botanists in Europe discovered that dried, pressed plants were much more useful for identification and demonstration (teaching) of species than hand drawings. At the time plants were glued to empty book pages, which can be considered the first herbaria. Later, especially under the influence of the famous Swedish botanist Carl von Linné, specimens were used for comparative taxonomy (studying relationships between species) and to ascertain the distribution of plants. Linné and his students glued the specimens on single pages and wrote additional information about the origin, date of collection, collector, etc. on these pages, much as we do it today. In the 19th and 20th centuries, when floras changed rapidly under the influence of human activity, specimens and data were also used to obtain information about ecological characteristics of species, including economic importance or environmental issues (e.g. recent and former distribution of endangered

species for nature conservationists). Today we still use herbaria for these purposes. With the application of modern analytic techniques, herbaria have gained even more importance. These new techniques make it possible to add new data in the herbarium archive.

Scientists from numerous fields, even non-biologists, have used specimens to document such things as environmental change by comparing specimens collected from different times. For example, in the U.S. and Europe the ancestral and population genetics of the potato late blight fungus, *Phytophthora infestans* using dried specimens collected many years ago, has been studied.

In Europe, changing SO₂ levels have been traced by the examination of herbarium specimens, and increases in the concentration of heavy metals and nitrogen have been demonstrated by analysis of moss specimens. With the help of herbarium material, mycologists have shown that the radioactive cesium concentration in mushrooms was much higher after the nuclear power plant accident in Chernobyl in 1986. Molecular studies are carried out with specimens from the Purdue herbaria as well. In cooperation with scientists from the University of California, Berkeley and Tübingen (Germany), DNA will be isolated and sequenced to study the spread and the co-evolution of certain plant parasitic fungi.

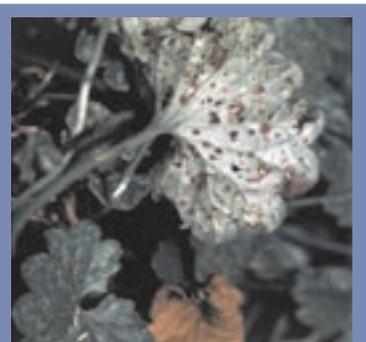
Herbaria have always been important botanical information centers for the public. In the Purdue herbaria, people can obtain assistance in the identification of unknown species and learn about poisonous plants and mushrooms, rare and protected species, or invasive weeds. They can also receive guidance about botanical literature - and a lot of other botanical information. In addition, herbaria often serve as exhibition areas, and as meeting points for botanical societies and public talks. Curators often function as nature guides for the public in botanical gardens or natural habitats. The Purdue herbaria staff also help to identify weeds and fungi for the Plant Diagnostic Laboratory within the Department of Botany and Plant Pathology.



Two generations of uredinologist curators of the Arthur Herbarium: “Lord of the rusts”, 95-year-old George Baker Cummins (r) and present curator Markus Scholler. This picture was taken in the Sonoran desert near Tucson, Arizona in December 1999.

The Purdue University herbaria consist of two main collections. The first one, the Kriebel Herbarium, is named after the botanist Ralph Kriebel. It is the oldest herbarium in Indiana (established in 1873) containing about 78,000 specimens of mainly higher plants from Indiana. The Kriebel Herbarium is important for scientists mainly studying the local or state flora. The second herbarium, the Arthur Herbarium, is a well-known collection of rust fungi with an international reputation. Rusts are obligate plant parasites of ferns and higher plants and have a high degree of host specificity.

One reason why rust fungi are studied by plant pathologists is the enormous economic losses some species cause on agricultural crops. In addition, rust fungi have gained increasing importance as biocontrol agents against invasive weeds. Rust fungi differ in many aspects from other fungi and are the largest group of plant parasitic fungi with more than 7,000 known species and perhaps at least another 10,000 species still undescribed. Rust species have a lot of morphological diversity with up to seven different spore types. Some species are capable of infecting two unrelated hosts within a life cycle, a phenomenon only seen in parasitic protists and animals, but not in other fungi. These extraordinary features make rust fungi ideal model organisms to study evolutionary pathways, adaptations, host-parasite interactions, functions of parasites in plant communities, etc.



Species representing the changing flora of Indiana: Ground Ivy (*Glechoma hederacea*), an introduced weed from Europe and its rust parasite, *Puccinia glechomatis* which followed its host into the New World.

The Arthur Herbarium was established in 1888 by Joseph Charles Arthur, the first head of what is today the Department of Botany and Plant Pathology at Purdue University. After Arthur, four additional generations of rust researchers (uredinologists) followed as curators of the Arthur Herbarium. These were Drs. George B. Cummins, Joe F. Hennen, Greg Shaner and Markus Scholler, the present curator. The Arthur Herbarium mirrors the history of the department and its research activities. Today, the Arthur Herbarium contains the largest rust fungus collection, at one time reaching 100,000 specimens. Mycologists from all over the world request specimens from the Arthur Herbarium or come to Purdue University to study them.



Virgil E. Dome, born in 1905, was a high school teacher and naturalist who collected plants at the end of the 1920's in the Terre Haute region. His daughter recently donated his collection to the Purdue Herbaria.

The importance of a herbarium is not only determined by the total number of specimens, but also by the number of "type specimens", of which the Arthur Herbarium contains several thousand. A type specimen is permanently associated with a species name. Taxonomists who now, or in the future, study a species with a view to redefining it must be able to examine the type specimen. A type specimen is comparable to an important work of art. It is unique and irreplaceable. The large number of type specimens in the Arthur Herbarium is the main reason why there are so many requests

for rust specimens. Rust specimen loans from the Arthur Herbarium make up more than 90% of all loans.

There are several goals and objectives for the herbaria: First, regain the former status of the Arthur Herbarium as a center of rust research. Second, completely computerize the collections to provide quick information to researchers about any specimen. Finally, although several hundred people visit the herbaria every year, there is a need by the general public to obtain botanical information, particularly in the identification of

higher plants and for protection of endangered native wildflowers. Therefore, the herbarium staff hope to make it even more attractive and easier to use for the general public.

The department would like to express thanks to those who recently have made specimen donations to both the Arthur and the Kriebel Herbaria in the preceding months (a total of about 3,000 since August 1999). The herbaria received many important fungal specimens from around the world, as well as a very nice plant collection from the 1920s collected by V.E. Dome from Terre Haute. Also, thanks for the rust literature donations, mainly from former curator Dr. G. B. Cummins, who sent all his reprints and books. All this will make the herbaria even more useful.

Finally, we encourage you to visit the Purdue Herbaria. They are located in Lilly Hall, Department of Botany & Plant Pathology, Room 1-430, Purdue University, West Lafayette, IN 47907-1155. Please call, write, or e-mail the curator to make arrangements for a visit. Markus Scholler, Ph.D., Curator, Arthur & Kriebel Herbaria, (765)494-4623, fax: (765)494-0363, email: <scholler@bttny.purdue.edu>

Dow AgroSciences Scholarship for Plant Pathology

The first annual Dow AgroScience Scholarship for Plant Pathology was awarded in April, 1999, to Ph.D. student, **Clive Lo**, and M.S. student, **Alex Cochran**. Each student was given a \$500 award. Dr. Matthew Henry of **Dow AgroSciences** presented the award to each student at an afternoon seminar. Dr. Henry graciously hosted all of our graduate students to a luncheon and later that evening, he hosted the scholarship recipients and their major professor to dinner at a Lafayette restaurant.

These scholarships will be presented annually for excellence in academics and research while pursuing a graduate degree in plant pathology. This is great recognition for these students, their major professors and our department. It is the first of what we hope will be a long standing tradition in our department.



Dow AgroScience Scholarship presentation. (L to R) Scott Abney, Matthew Henry, Alex Cochran, Clive Lo, Ron Coolbaugh, and Ray Martyn.

Alex J. Cochran

Ph.D. Student in Plant Pathology

As an undergraduate, Alex Cochran worked as a greenhouse assistant, teaching assistant, and lab assistant in horticultural research in the N.A.S.A. Specialized Center for Research and Training. All this, while working on his B.S. degree in wildlife science from the Department of Forestry here at Purdue University. He completed his degree in 1994 and began working as a sales executive for various companies. After two years of acquiring some practical experience and business skills, and doing some soul-searching, he determined that his career aspirations lay elsewhere. His passion for learning and a wish to continue his education led him to the Department of Botany and Plant Pathology to obtain an advanced degree in plant pathology.

In the fall of 1996, Alex began work on a master's program. Under the direction of Dr. Scott Abney, he worked on the soybean pathogen, *Phytophthora sojae*, the causal agent of soybean root rot. During his master's research program, Alex initiated a statewide survey of *P. sojae* in order to determine the race-population structure. This turned out to be an enlightening data set. There are approximately 45 races of *P. sojae* known and Alex identified 19 of them in Indiana. In addition, races that are virulent, specifically to the *Rps 1c* gene in soybean cultivars most widely grown in Indiana, were identified in 87% of the 47 counties studied. While

this is not good news, it is extremely valuable information and can be used by the soybean industry to stack new genes in cultivars where they are most needed. In December of 1998, Alex completed his M.S. degree and continued his research toward a doctoral degree under Dr. Abney's guidance.

Alex has distinguished himself as an exceptional undergraduate and graduate student, researcher, and future leader. In recognition of his efforts and talents, Alex has been nominated for several honors during his academic career. In 1994, he was inducted into the Honor Societies of Gamma Sigma Delta and Sigma Xi. He received the first place graduate student award for his oral presentation at the 1998 North Central Division meetings of the American Phytopathological Society in Ames, Iowa. Alex was one of two graduate students to receive the "Dow AgroSciences Scholarship for Plant Pathology Students," established by Dow AgroSciences. In May of 1999, Alex was selected to participate in and successfully completed, the Applied Management Principles Program in the Krannert School of Management, Purdue University. He was also selected

as our department's representative to receive the University's Graduate Student Award for Outstanding Teaching. In addition, he was awarded an APS travel scholarship to attend the North Central Phytopathological Society Conference in Lincoln, Nebraska. At the Indiana Crop Improvement Association annual meeting, Alex received the organization's annual scholarship

award for his outstanding work on improving Indiana agriculture.

Alex has been very active in the department. For three semesters he has served as a teaching assistant for Introductory Plant Pathology, BTNY 301, and is currently serving as the president of the departmental Graduate Student Organization.

Together with Dr. Scott Abney, he has made presentations during SpringFest and at the 1998 Farm Progress Show. Alex actively participates in hosting visiting seminar speakers and potential graduate students.

Alex was born in Akron, Ohio in 1972 and moved to South Bend with his parents, John and Linda Cochran, in 1983. Alex and his wife, Maura, and their dog Bandit, live in West Lafayette while he finishes his work toward his doctoral degree. Maura works for Visiting Nurse service in Lafayette. They will be celebrating their fifth wedding anniversary in August 2000.

Alex Cochran is a very capable, enthusiastic, and involved student and ranks as one of the Department of Botany and Plant Pathology's outstanding graduate students. Our congratulations to him.



Alex Cochran (left) receiving the Indiana Crop Improvement Association Scholarship award from Dr. Eldon Ortman, Assistant Director of Agricultural Research.



Alex and Maura Cochran enjoying the evening at the Indiana Crop Improvement annual meeting.

Graduate Student Awards and Congratulations

Degrees Awarded in 1999

Master of Science

Kathryn Evers-Alford
Eric Mowen
Brent Sellers
Ian Thompson
Christy Watson



Doctor of Philosophy

Sze-Chung "Clive" Lo

New Graduate Students in 1999

Kelli George, Auburn, AL - Ph.D. student with Dr. Charles Woloshuk.

Amanda Gevens, Allentown, PA - Ph.D. student with Dr. Ralph Nicholson.

Philip Harmon, Fort Branch, IN - Ph.D. student with Dr. Rick Latin.

Fidel Mendez, San Salvador, El Salvador - M.S. student with Dr. Charles Woloshuk.

Amr Ibrahim, Giza, Egypt - Ph.D. student with Dr. Robert Pruitt.

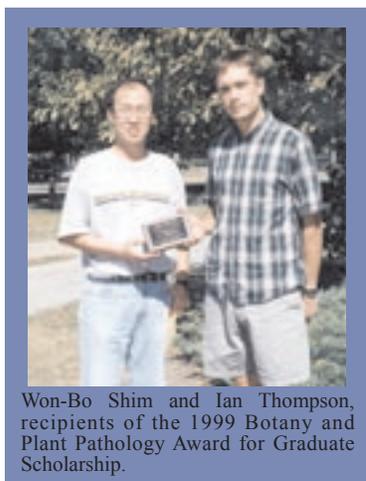
1999 Gamma Sigma Delta Induction

In March 1999, masters students, **Christy Watson**, **Ian Thompson**, **Brent Sellers**, and doctoral students, **Barbara Hass** and **Claudia Vergara** were inducted into the Gamma Sigma Delta Honor Society at a banquet at the Purdue Memorial Union. Dr. Ray Martyn and Dr. Scott Abney attended the event to participate in honoring our five inductees. Annually, the Membership Committee invites nominations from among faculty and graduate students for induction into this nationally recognized Honor Society of Agriculture, Consumer and Family Sciences, and Veterinary Medicine.

Outstanding Graduate Student Awards

Annually, the Botany and Plant Pathology Award for Graduate Scholarship is awarded to one M.S. and one Ph.D. student nominated by their major professor. The award is based on their academic and research performance and their professional activities. The 1999 recipients were announced during an awards presentation in September.

Ian Thompson received \$200 and an engraved plaque as the outstanding master's student and **Won-Bo Shim** received \$300 and an engraved plaque as the outstanding doctoral student from the department.



Won-Bo Shim and Ian Thompson, recipients of the 1999 Botany and Plant Pathology Award for Graduate Scholarship.

Ian Thompson completed his master's degree in August 1999. His thesis was entitled, "X-ray Absorption Near Edge Structure Spectroscopy in the Illucidation of Manganese Dynamics in Soils and Plant Rhizospheres." Ian is continuing work toward his Ph.D. under the direction of Dr. Don Huber and Dr. Darrell Schultz.

Won-Bo Shim is a Ph.D. student working under the direction of Dr. Charles Woloshuk. His research is focusing on the isolation and characterization of genes affecting fumonisin biosynthesis in maize by the fungus *Gibberella fuikuroi* (*Fusarium moniliforme*).

1999 Departmental Travel Awards

The Department of Botany and Plant Pathology awards travel grants to graduate students attending regional, national, or international meetings who are presenting results of their research in either poster or oral communication format. The following graduate students received travel grants in 1999.

Ian Thompson, North Central: American Phytopathological Society Meeting, Nebraska, June 27-29, 1999. *Applications of x-ray absorption near-edge structure (XANES) spectroscopy and x-ray fluorescence spectroscopy (SXR) to the study of metals in soils and plant disease interactions.*

Claudia Vergara, American Plant Physiology Society, Baltimore, Maryland, July 24-28, 1999. *Characterization of the C_{el}A gene family members in rice (*Oryza sativa* L.).*

Barbara Hass, XVI International Botanical Congress, St. Louis, Missouri, August 1-6, 1999. *Analysis of an antheridiogen-induced gene, ANII, in *Ceratopteris ricardii*.*

Anibal Tapiero-Ortiz, Annual American Phytopathological Society Meeting, Montreal, Canada, August 7-11, 1999. *Testing a "Lineage-exclusion" strategy for breeding rice resistant to blast disease.*

Ahmad Fakhoury, Annual American Phytopathological Society Meeting, Montreal, Canada, August 7-11, 1999. *Inhibitors of the alpha-amylase from *Aspergillus flavus*.*

Won-Bo Shim, Annual American Phytopathological Society Meeting, Montreal, Canada, August 7-11, 1999. *Characterization of the locus FICI of *Fusarium moniliforme* affecting fumonisin biosynthesis.*

Undergraduate Students News & Info.

Degrees Awarded in 1999

Bachelor of Science

Brian Bush
Philip Harmon
Sarah Kinder
Alisa Ponomarenko
Erin Uhlemann
Jennifer Wichman



Current Undergraduate Students

1999-2000 Academic Year:
(name - option/advisor)

Erin Berger - PS/Coolbaugh
Jarod Brames - PS/Lembi
Elizabeth Burkle - PS/Coolbaugh
Ravan Carter - PS/Coolbaugh
Alan Culwell - PS/Perry
Matthew Eckerle - PS/Coolbaugh
Clinton Fettig - CP/Lembi
Pamela Flaig - PS/Lembi
Amelia Hammond - PS/Perry
Stephen Jordan - PS/Coolbaugh
Mark Kinsey - PS/Perry
Joseph Knoll - PS/Lembi
Ryan Lee - PS/Coolbaugh
Heather Myers - PS/Lembi
David Smith - CP/Lembi
Melanie Uplinger - PS/Lembi
Quintin Wade - PS/Coolbaugh
Kurt Wilhelm - CP/Coolbaugh
Jeffrey Wolheter - CP/Perry

Botany Club News

The Undergraduate Botany Club continued several activities this past year including an attempt to grow some mushrooms and passing out flowers at the SpringFest. The club also is researching the possibility of building and maintaining a garden on the agricultural campus. In the fall, several members participated in a trip to the Oliver Winery near Bloomington, the oldest winery in Indiana. The trip included a special tour of the vineyard and winery facilities and wine tasting. In the spring, **Amelia**

Hammond was elected President. Fall 2000 semester participation is greatly needed to determine which activities would be most interesting to members. Tentative activities include: visits to local gardens, parks, commercial greenhouses, medicinal greenhouses, and research firms. Also, several speakers will be invited to speak and social events will be held. If you would like to help out with any of these events, please contact Amelia. A call out for those interested in the Botany Club will held in early fall. If you are interested, please contact Amelia Hammond by e-mail: <ameliahammond@hotmail.com>.



1999 Scholarship Recipients

Botany and Plant Pathology Freshman Scholarship

Jarod Brames, \$500
Pamela Flaig, \$500

Botany and Plant Pathology Undergraduate Minority Scholarship

Ravan Carter, \$1,000

Botany and Plant Pathology Sophomore Scholarship

Matthew Eckerle, \$1,000
David Smith, \$1,000

Botany and Plant Pathology Junior Scholarship

Amelia Hammond, \$1,000

Monsanto Plant Science Junior Scholarship

Joseph Knoll, \$1,500

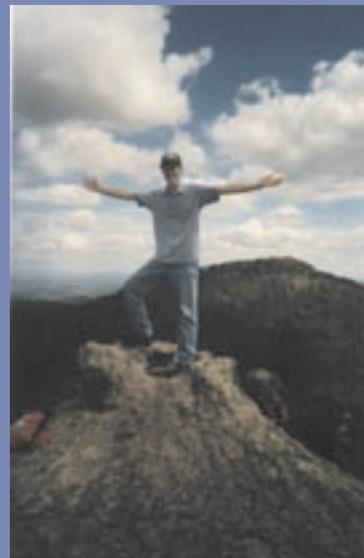
Botany and Plant Pathology Senior Scholarship

Kurt Wilhelm, \$1,000

Study Abroad Program

It has become apparent that if the U.S. is to compete effectively on a global scale, we must train a new generation of young agriculturists who have the knowledge, skills, attitudes, and aspirations to understand not only the new international economic system, but also its cultures, languages, and scientific output. One important way to accomplish this goal is providing opportunities for agriculture undergraduates to experience part of their education outside the United States.

The Department of Botany and Plant Pathology Department is extremely pleased to have three of our undergraduates in the study abroad program. **Joseph Knoll**, a senior in the plant science program, studying at Drummond & Smith College in Armidale, Australia; **Matthew Eckerele**, a sophomore in the plant science program, studying at Lincoln University in Canterbury, New Zealand; and **Erin Berger**, a junior in the plant science program, will be spending the summer of 2000 in Japan. These students will enhance their educational experience by participating in this program.



Senior, **Joseph Knoll**, at Cathedral Rock in Armidale, Australia. Joe is spending a semester in the study abroad program and attending classes at Drummond & Smith College, Australia.

ERCERIM - 17



The 17th Eastern Regional Conference on the Ecology of Root-Infecting Microorganisms (ERCERIM-17) was held March 14-16, 1999, at the Purdue

University Memorial Union. This conference was organized and hosted by the Department of Botany and Plant Pathology. The local arrangements committee was comprised of **Ray Martyn, Chairman, Don Huber, Scott Abney, and Greg Shaner**. A special thanks to graduate students Alex Cochran, Ian Thompson, James Ng, Bong-Suk Kim and Won-Bo Shim for assisting with the many duties that helped make the conference a success.

This conference, held every two years, brings together 75-100 of the best scientists in the country working in the area of soilborne plant pathogens and other microorganisms. The purpose of the sessions was to provide a forum for the exchange of information in the area of disease management.

The conference was divided into seven sessions.

Session 1 - "Nematode-Fungus Interactions" Chairman, Jim Starr, Texas A & M University.

Session 2 - "Biology and Control of *Sclerotium rolfii*" Chairman, Tim Brenneman, University of Georgia.

Session 3 - "Virus Diseases with Soilborne Vectors" Chairman, Charlie Rush, Texas A & M University.

Session 4 - "Soilborne Diseases of Soybean" Chairman, Scott Abney, Purdue University.

Session 5 - "Biology and control of *Gaeumannomyces*" Chairman, Don Huber, Purdue University.

Session 6 - "Precision Agriculture" Chairman, Charlie Rush, Texas A & M University.

Session 7 - "Potpourri" Chairman Greg Shaner, Purdue University.

The 1999 ERCERIM-17 organizers wish to acknowledge the generous financial support of Great Lakes Chemical, Novartis, and Zeneca Ag Products.

ERCERIM-18 will be held at the Tidewater Research and Extension Center, VPI & SU, in Suffolk, VA in 2001. Contact Dr. Fred Shokes <fshokes@ut.edu> or call (757)657-6450 for more information.

Cytochromes P450

The Midwest Cytochromes P450 Symposium was held September 9-10, 1999, at Purdue University. The symposium was sponsored by the Departments of Botany & Plant Pathology, Biochemistry, and Entomology. This event is co-chaired by Professors **Ron Coolbaugh, Clint Chapple, Jonathan Neal and Craig Marcus**.

The purpose of this symposium is to provide a forum for the exchange of information among scientists who study cytochromes P450, within a variety of disciplines, utilizing a broad array of approaches. The symposium was intended as an informal and affordable session to share information, goals, and problems, and to seek solutions and collaborations.

The 1999 symposium was a success with more than 50 participants. More information is available via the Web at <<http://www.btny.purdue.edu/P450/Symposium.html>> . The Organizers wish to gratefully acknowledge the generous financial support of the Environmental Protection Agency/National Center for Environmental Assessment and Eli Lilly and Company. Their support of the 1999 Midwest Cytochromes P450 Symposium has contributed greatly to making this conference a success and maintaining registration fees at a modest level for all participants, especially students and postdoctoral researchers.



SpringFest 99

Despite the rain and chilly temperatures, thousands of people flocked to the Purdue campus for SpringFest 99. Once again, the Department of Botany and Plant Pathology teamed up with eight departments in the School of Agriculture to show off several special programs at the annual outdoor event. Faculty, staff, and students volunteered many hours to showcase our department.

Along with the Bug Bowl, and the Horticulture show, the Department of Botany and Plant Pathology had exhibits that included "Fun with Mushrooms and Other Microbes," "Root Rot Soybean Discovery," "Diagnosis of Plant Problems." Other things included pesticide awareness games, face painting, free balloons, and other activities were sponsored by the Purdue Pesticide Programs (PPP) and the Plant and Pest Diagnostic Lab (PPDL).

Faculty, staff, and students all joined together to provide this fun and informational weekend.



Dr. Greg Shaner explains black stem rust of wheat to a SpringFest visitor.

Publications

- Abney, T.S.**, J.C. Melgar, and A.J. Cochran. 1999. Pathogen strains and disease resistance genes. Proc. World Soybean Res. Conf. VI: 86-87.
- Banks, J.** 1999. Gametophyte development in ferns. Ann. Rev. Plant Phys. Plant Mol. Biol. 50:163-186.
- Aso, K., M.Kato, **J. Banks**, and M. Hasebe. 1999. Characterization of homeodomain-leucine zipper genes in the fern *Ceratopteris richardii* and the evolution of the homeodomain-leucine zipper gene family in vascular plants. Mol. Biol. Evol. 16:544-552.
- Wen, C., R. Smith and **J. Banks**. 1999. ANI1: A sex pheromone-induced gene in *Ceratopteris* gametophytes and its possible role in sex determination. Plant Cell. 11:1307-1317.
- Buckeridge, M.S., C.E. Vergara, and **N.C. Carpita**. 1999. Mechanism of synthesis of a cereal mixed-linkage (1→3), (1→4)-β-D-glucan: Evidence for multiple sites of glucosyl transfer in the synthase complex. Plant Physiol. 120:1105-1116.
- Dorrance, A.E., D.A. Inglis, M.L. Derie, C.R. Brown, **S.B. Goodwin**, W.E. Fry, and K.L. Deahl. 1999. Characterization of *Phytophthora infestans* populations in western Washington. Plant Dis. 83:423-428.
- Goodwin, S.B.**, D.E. Legard, C.D. Smart, M. Levy, and W.E. Fry. 1999. Gene flow analysis of molecular markers confirms that *Phytophthora mirabilis* and *P. infestans* are separate species. Mycologia 91:796-810.
- Vaillancourt, L.J. and **R.M. Hanau**. 1999. Sexuality of self-sterile strains of *Glomerella graminicola*. Mycologia 91:53-596.
- Vaillancourt, L.J., J.Wang, and **R. Hanau**. 2000. Genetic regulation of sexual compatibility in *Glomerella graminicola* in host specificity, pathology and host pathogen interaction of *Colletotrichum*. (in press).
- Magalhaes, J.V. de, M.V.C. Alves, R.F. de Novais, P.R. Mosquim, J.R. Magalhaes, A.F.C. Bahia-Filho, **D.M. Huber**. 2000. Influence of phosphorus stress on ammonium uptake by maize. J. Plant Nut. 23:263-273.
- Huq, E., and **T.K. Hodges**. 1999. An anaerobically inducible early (aie) gene family from rice. Plant Mol. Biol. 40:591-601.
- Huq, E., S. Harrington, M.A. Hoosain, F. Wen, S.R. McCouch, and **T.K. Hodges**. 1999. Molecular characterization of *pdcc2* and mapping of three *pdcc* genes from rice. Theor. Appl. Genet. 98:815-824.
- Choi, J. and **L.S. Loesch-Fries**. 1999. Effect of C-terminal mutations of alfalfa mosaic virus coat protein on dimer formation and assembly *in vivo*. Virology 242:1-5.
- Lo, Sze-Chung Clive, K. de Verdier, **R. L. Nicholson**. 1999. Accumulation of 3-deoxyanthocyanidin phytoalexins and resistance to *Colletotrichum sublineolum*. Physiol. and Molec. Plant Pathol. 55:263-273.
- Sugui, J.A., K.V. Wood, Z. Yang, C.C. Bonham, and **R.L. Nicholson**. 1999. Matrix-assisted laser desorption ionization mass spectrometry analysis of grape anthocyanins. American J. Enology and Viticulture. 50: 199-203
- Lo, Sze-Chung Clive, J.D. Hipskind, and **R.L. Nicholson**. 1999. cDNA cloning of a sorghum pathogenesis related protein (PR-10) and differential expression of defense-related genes following inoculation with *Cochliobolus heterostrophus* or *Colletotrichum sublineolum*. Molec. Plant-Microbe Inter. 12: 479-489.
- Carver, T.L.W., H. Kunoh, B.J. Thomas, and **R.L. Nicholson**. 1999. Release and visualization of the extracellular matrix of conidia of *Blumeria graminis*. Mycological Res. 103:547-560.
- Sugui, J.A., H. Kunoh, and **R.L. Nicholson**. 1999. Detection of protein and carbohydrate in the extracellular matrix released by *Cochliobolus heterostrophus* during germination. Mycoscience. 40: 11-19
- Bergstrom, G.C, and **R.L. Nicholson**. 1999. The biology of corn anthracnose. Knowledge to exploit for improved management. (Feature article) Plant Dis. 1999, Vol. 83: 596-608.
- Sharma, H., M. Francki, Crasta, G. Gyulai, D. Bucholtz, H. Ohm, J. Anderson, **K. Perry**, and F. Patterson. 1999. Cytological and molecular characterization of wheat lines with *Thinopyrum intermedium* chromosome additions, substitutions and translocations resistant to barley yellow dwarf virus. Cytologia 64:93-100.
- Ng, J. and **K.L. Perry**. 1999. Stability of the aphid transmission phenotype in cucumber mosaic virus. Plant Pathology 48:388-394.
- Ohm, H.W., V.M. Cook, **G.E. Shaner**, G.C. Buechley, H. Sharma, **K.L. Perry**, R.H. Ratcliffe, and S.E. Cambron, 2000a. Registration of 'Jay' Spring Oat. Crop Science (In press).
- Ohm, H.W., **G.E. Shaner**, R.H. Ratcliffe, D.M. Huber, H. Sharma, **K.L. Perry**, G.C. Buechley, and S.E. Cambron. 2000b. Registration of 'Goldfield' Wheat. Crop Science (In press).
- Lolle, S.J. and **R.E. Pruitt**. 1999. Epidermal cell interactions: a case for local talk. Trends Plant Sci. 4:14-20.
- Pruitt, R.E.** 1999. Complex sexual signals for the male gametophyte. Cur. Opin. Plant Biol. 2:419-422.
- Bai, G., F. Kolb, **G. Shaner**, and L.

Domier. 1999. Amplified fragment length polymorphism markers linked to a major quantitative trait locus controlling scab resistance in wheat. *Phytopathology* 89:343-348.

Francl, L., **G. Shaner**, G. Bergstrom, J. Gilbert, W. Pedersen, R. Dill-Macky, L. Sweets, B. Corwin, Y. Jin, D. Dallenberg, and J. Wiersma. 1999. Daily inoculum

levels of *Gibberella zeae* on wheat spikes. *Plant Dis.* 83:662-666.

Shim, W-B and **C.P. Woloshuk**. 1999. Nitrogen repression of fumonisin B1 biosynthesis in *Gibberella fujikuroi*. *FEMS Microbiol. Lett.* 177:106-116.

Fakhoury, A.M. and **C.P. Woloshuk**. 1999. Amy1, the a-amylase gene of

Aspergillus flavus: Involvement in aflatoxin biosynthesis in maize kernels. *Phytopathology* 89:908-914.

Dixon, K., **J.-R. Xu**, and N. J. Talbot. 1999. Appressorium turgor generation is independent of the OSM1 osmoregulation pathway in the rice blast fungus *Magnaporthe grisea*. *Plant Cell* 11:2045-2058.

Grants Awarded in 1999

T.S. Abney, Indiana Soybean Board, \$35,000, "Phytophthora Root Rot: Soybean Phytophthora Races and Resistance."

T.S. Abney, Indiana Soybean Board, \$35,000, "Sudden Death Syndrome: Disease Progress and Response of Popular Public and Private Varieties Including Roundup Ready Soybeans."

T.S. Abney, and **G.E. Shaner**, University of Wisconsin-Madison, \$20,000, "Indiana White Mold Soybean Research - Part of North Central Soybean White Mold Project."

J. Banks, National Science Foundation, \$145,000, "The Genetic and Molecular Basis of Sex Determination in *Ceratopteris*."

N.C. Carpita, and **T.K. Hodges**, U.S. Dept. of Energy, \$99,000, "Biosynthesis and Assembly of Cell Wall Polysaccharides in Cereal Grasses."

R.C. Coolbaugh, Environmental Protection Agency, \$2,000, "1999 Midwest Cytochromes P450 Symposium."

R.X. Latin, and **D.S. Egel**, National Watermelon Promotion Board, \$21,631, "Multi-State Evaluation of a Weather-Based Disease Warning System for Gummy Stem Blight Management."

C.A. Lembi, Indiana Office of the Commissioner of Agriculture, \$26,263, "Alfalfa as a New Bioalgaicide."

G.H. Sullivan, C.R. Edwards, R.E. Foster, **R.D. Martyn**, G.E. Shively, and S. C. Weller, Virginia Polytechnic Institute and State University, \$75,807, "Year Six Integrated Pest Management Collaborative Research Support Program for Latin America."

K.L. Perry, Monsanto Company, \$6,600,

"Testing of Transgenic Wheat for Resistance to Barley Yellow Dwarf Virus."

K. L. Perry, Cooperative State Research Service, \$165,000, "Surface Architecture of Cucumber Mosaic Virus and Aphid Vector Transmission."

C.Y. Oseto, and **P.R. Sellers**, Animal Plant Health Inspection Service, \$4,000, "Karnal Bunt Survey."

G.E. Shaner, Agricultural Research Service, \$57,561, "Fusarium Head Blight Research."

G.E. Shaner, and **K.L. Perry**, Agricultural Research Service, \$12,000, "Comprehensive Oat Improvement through National Germplasm Enhancement at Purdue University."

M.A. Webb, National Science Foundation, \$5,000, "CAA: Differential Gene Expression Related to Calcium Oxalate Formation in Grape."

C.P. Woloshuk, Cooperative State Research Service, \$100,000, "Molecular Biology of Fumonisin Biosynthesis in *Gibberella fujikuroi*."

D.E. Maier, L.J. Mason, and **C.P. Woloshuk**, The Anderson Research Grant Program, \$30,000, "Carbon Dioxide Monitoring for Early Detection of Grain Spoilage."

D.E. Maier, R.L. Stroshine, and **C.P. Woloshuk**, Optimum Quality Grains, \$24,029, "Storability Analysis of Selected Optimum High Oil Corn Hybrids - A Preliminary Study."

L.J. Mason, S.A. Kells, D.E. Maier, and **C.P. Woloshuk**, Cooperative State Research Service, \$158,394, "The Efficacy and Economics of Stored Food Grain Ozonation to Maintain Grain Quality."

F. Whitford, Agricultural Research Service, \$5,000, "Human Health Risk Assessment: Rating the Risk."

F. Whitford, U.S. Dept. of Agriculture, \$25,652, "CSREES National Agricultural Pesticide Impact."



The following 1999 Agricultural Genomics Initiative Competitive Grants were selected for funding by the Purdue Office of Agricultural Research Programs (ARP). ARP will provide \$5,000 in support for each project. **Dr. Jody Banks**, "Developing an EST Database of Genes Expressed in Germinating Spores of *Ceratopteris*," **Dr. Charles Woloshuk**, "Expressed Genes During Fumonisin Biosynthesis," **Dr. Jin-Rong Xu**, "Genomic Studies on Pathogenicity Factors in the Gray Mold Fungus *Boyrytis cinerea*," and **Dr. Ron Coolbaugh**, "Transfer of fungal cDNA library to nylon filters." **Dr. Steve Goodwin** had two projects funded; "Generating a Normalized Serial-Subtracted EST Database as a Preliminary Step for Characterizing Defense Responses in Wheat" and "Developing Microarray Technology for Genomic Analysis of Non-Host Resistance to Fungi in Cereal Crops."

Archive photo answers from page 15:

- A. Carol Lembi
- B. Scott and Sue Abney
- C. Ralph Nicholson

Alumni News – From Around the Land

Dr. and Mrs. Marvin Schreiber celebrated their 50th wedding anniversary in December 1999 with a cruise in the Eastern Caribbean. Their daughter and son-in-law, who were celebrating their 10th anniversary, joined them. Dr. Schreiber and the former Phyllis Altman were married December 18, 1949, in Springfield, Massachusetts. Dr. Schreiber retired in 1994 from the Botany and Plant Pathology Department where he was a USDA Adjunct Professor of Weed Science.

Steve Siegelin of Adams County won the Junior Award in Agriculture and Natural Resources at the Annual Extension Conference held at Purdue University, November 1999. Steve works with his Extension crops advisory committee to expand the local soybean variety trial program. Steve raised \$12,000 to purchase two custom-built plot sprayers and an all-terrain vehicle and a trailer to assist in test plot experiments. Under his leadership, the number of soybean experiments in Adams County has doubled. Steve received his master's degree from the Department of Botany and Plant Pathology in May 1995 under the guidance of Dr. Merrill Ross.

Greetings from Oregon. I received my Ph.D. from Purdue in the dim and distant past, during the era of Sharvelle and Shay, Cummins and Caldwell. This is to report that my wife and I spent two weeks in May 1999 in the Tucson, AZ area and had a good visit with George and Mrs. Cummins. George is a bit fragile, as the British would say, walks with a cane, but mentally is just as sharp as ever. The 3rd edition of his "Genera of Rusts" was published in the fall of 1999.

When I was getting my master's at Purdue, we graduate students took Plant Pathology 201, taught by J. Ralph Shay. Our class mottos were "Have fun with 201" and "Swing and Sway with J. Ralph Shay." We wrote volumes on such important diseases as black

stem rust, apple scab, and late blight. We also studied some minor diseases, peach bleach, spud crud, burn up of turnip, and blossom rot of forget-me-not, and also Iris virus.

I guess research is addictive. After I retired, I continued doing it for about 10 years, then kicked the habit. I worked mostly on host ranges and physiologic races of some western rusts, including peppermint rust. Sincerely, **Dr. John W. Baxter.** (M.S. plant pathology, 1950; Ph.D. plant pathology 1952)



Sally Leva in 1977 collecting some weed samples from a pond for Dr. Carole Lembi.

This is from a holiday letter sent to Carole Lembi and Merrill Ross

Dr. Lembi and Dr. Ross:

I thought I would bring you up-to-date on my career. It has been an interesting experience. After we moved to Wilmington, Delaware, I spent two years with my two babies (they were 21 months apart!) just trying to survive! At the time, I did not want to let my knowledge of weed science waste away, so I attended seminars at University of Delaware. The problem was that this school is very strong in soil science, but weak in weed science. So, I decided that if I could not do weed science, I would do something that would make me more marketable when I decided to go back to work. I attended computer classes at University of Delaware for a couple of years. Little did I know that every job I would

have in DuPont would be because of my computer skills and not my science background!

I was in the information science group in DuPont for 8 years. I did training, consulting, project management, and supervision. In 1989, I moved into the artificial intelligence group that consulted on, designed, and programmed expert systems for manufacturing, research, and marketing groups. By now, I figured I had slammed the door on my botany background for good. After a year in this group, I moved into the Ag supply chain group, consulting with their manufacturing and marketing organizations to improve customer service and inventories. Now, I really thought I had closed the "botany" door again.

After a year or so, I connected with the Ecotoxicology group. This group needed people with field experience, plus, as luck would have it (for me), they were losing someone who was in the middle of four large-scale field studies. And, yes, it would be very nice to get someone who knows computers.

So now I am in the Ecotoxicology group in DuPont Ag Products. My expertise is non-target aquatic plants and earthworms (earthworms are easy, algae are not). I probably should consider moving back into the weed science field, however, I love my job and I am glad that I was able to use what I learned from Purdue (and you two!). I still try and "botanize," however, the skill is fading- I can't identify most of the weeds I see, and there isn't anyone to ask. My favorite memories of Purdue are driving from farm to farm (field days, I think they were called) and having Ross and Lembi quiz us on the weeds growing in the fields. I think we called it botanizing at 60 m.p.h.!

Regards to everyone I knew in the department, and Happy New Year from Delaware.

Sally Leva (M.S. aquatic weed science 1979).

Message from David Alexander, son of Thelma McWilliams Alexander:

I am responding for my mother, **Thelma Loretta Alexander**, who was Thelma McWilliams when she graduate from Purdue with a major in botany in 1925. She was thrilled to receive the Meristem last year. She cannot imagine how you found her address, but I explained that we are all connected now with the computer revolution. As you may or may not know, after she graduated from Purdue, she went to the University of Wisconsin and got a Ph.D. in botany; no small accomplishment for a woman in the early 1930s. While there, she met and married Leonard Jay Alexander, who was working on his Ph.D. in the plant pathology department. After getting his degree, Alex went to work for the Ohio Agricultural Research Station in Wooster, OH. She also worked there for a few years until her first son was born in 1932, and then again during WWII when so many of the men were called into the armed forces. She

and Alex lived in Ohio until 1975 when he semi-retired. They moved to Gainesville, FL where he obtained a half-time appointment on the staff of the plant pathology department there. After Alex died in 1987, Thelma moved to Fishkill, NY to be close to her family. She is doing well for a woman who is about to celebrate her 95th birthday. She has some vision and hearing problems, but is able to live alone in her own apartment. She tries to take a short walk every day, and carries on an active correspondence with people all over the world. She has six grandchildren and two great-grandchildren. She doesn't travel much anymore. She did get to her 65th reunion a few years ago, but that was her last trip. It meant a great deal to her to receive news of the department and she was happy that she is not completely forgotten.

A few days after this e-mail message, we received a short letter from Thelma Alexander.

Dear Pam: In a recent conversation with my son, David Alexander, he did not tell you I was born on Schuyler Avenue in Lafayette, Indiana. My father, John McWilliams, was a builder and cabinetmaker for railway cars for the Monon Shops. Later he had a grocery. It is a weird coincidence that Mortar Board sent me an invitation to their tailgate party at the Purdue - Michigan State game. I was practically a charter member in 1925 and 1926. When I went to Purdue in 1921, botany was taught in Stanley Coulter Hall. Dr. Heimlich recommended me for an assistantship at the University of Wisconsin. I was accepted and started in 1926. I received my Doctor of Philosophy degree in 1930. In 1929, I was married to another assistant who received his degree later. Sincerely,
Thelma Alexander.



Holiday Fun and a Time of Giving

Each December, as the fall semester is coming to a close and holidays are fast approaching, the department takes time to join together for the “Annual Chili-Cook-off” and holiday party. Everyone brings their favorite holiday treats to share and a few brave souls volunteer to bring in a pot of their own chili. Each cook dishes out a small portion of their chili for everyone to sample and votes are cast. This year the grand prize winner was **Jody Banks** (actually, her husband George Rutherford). Jody received a Botany and Plant Pathology mug filled with goodies. There was a tie for second place between **JoAnn Fisher** and **Ruth Brown**. Each of these ladies received an empty mug and a candy bar was split between them. All the chili was eaten and the department enjoyed the rest of the goodies all afternoon.

The holiday season is truly a time of giving. The Department of Botany and

Plant Pathology has a lot of generous and giving people. For the past several years, the department has “adopted” a local needy family from the American Red Cross. The Red Cross provides a list of the most needed items and the department donates gifts or money to help make this a special holiday for the family.

A special thank you to **Anita Eberle**, Extension Secretary for coordinating the “Chili Cook-Off” and the Red Cross “adopt-a-family.”



1st place winner
Jody Banks.



2nd place winner
JoAnne Fisher.



Everyone tasting and discussing who made the best chili.



2nd place winner
Ruth Brown.

