PICOGRAM
And Abstracts

AMERICAN CHEMICAL SOCIETY

231st National Meeting & Exposition

March 26 – 30, Atlanta, Georgia

Division of Agrochemicals

Spring 2006 Issue No. 70

www.agrochemical.org

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You Are Cordially Invited To The

AGRO/AGFD JOINT SOCIAL HOUR

When: *Tuesday evening, March 28, 6:00 – 8:00 PM*

Where: *Westin Peachtree*

ALL AGRO DIVISION MEMBERS, SPEAKERS, GUESTS, SPOUSES, AND INTERESTED PARTIES ARE INVITED TO JOIN US

HOSPITALITY COMMITTEE REPORT

COFFEE LOUNGE – WASHINGTON, DC

Ten generous companies contributed $2000 to give us coffee in our technical sessions at this meeting. Bless them! Please take note of these sponsors and be sure to thank them for their kindness. Also, please consider encouraging your company to become a sponsor. Among AGRO's many fine distinctions has always been that we provide coffee for the attendees of our programs. It is greatly appreciated by the audiences and speakers alike.

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THE SOCIAL HOUR – WASHINGTON DC

On Tuesday evening in the Washington Convention Center, the AGRO Division and *Pest Management Science* co-sponsored the graduate student awards presentations, exotic food, fun, drinks, door prizes, and the introduction of Steven O. Duke, the new North American Editor of *Pest Management Science*. Members, speakers, guests, spouses, and a few random lost souls were all welcomed.

SOCIAL CO-CHAIRS - Aldos Barefoot & Jeff Jenkins
COFFEE LOUNGE CO-CHAIRS - Terry Spittler & Help Wanted*

**We are delighted to announce that Liliana Schwartz is joining the Hospitality Committee and will serve as Coffee Lounge co-chair beginning 2006.*

Welcome and Thank You, Liliana!

MESSAGE FROM THE CHAIR

Don Wauchope, AGRO Chair 2006

Ladies and Gentlemen:

We have an interesting program for Atlanta; thanks to Laura McConnell for much hard work and creative arrangements. Again, we are having our program in the main convention hall. See you there!

We also have the makings of an unusually interesting Division Meeting. The Executive Summary of the Report from the AGRO Long-Range Strategic Planning Conference held in early January 2006 can be found pages 10 – 11. We had an extraordinary meeting that generated a host of good ideas. The results, including 10 specific proposals, will be presented at the Programming, Strategic, and Combined Governance AGRO Division meetings in Atlanta on Sunday evening, March 26. If it is at all possible for you to attend these important meetings, I urge you to do so.

The 10 proposals include some major strategic and programming changes to be considered by the executive committee. In my opinion, they have the potential to revitalize our Division. The full report of the Conference will be out in about 2 weeks from this writing, and will be sent to the Division LISTSERV, AG-LIST.

This reminds me. If you want to play an active role in the Agrochemicals Division, YOU NEED TO GET YOUR NAME ON AGROCHEMICALS DIVISIONS' listserv. See the back inside cover of the PICOGRAM for information on subscribing to AG-LIST. We want to communicate with you, and we are in the process of proposing new products, services, and policies which we believe will significantly increase our value to you. We need your help and your feedback--and the only really effective way is to use email to get it.

ATLANTA PROGRAMMING, STRATEGIC PLANNING, AND EXECUTIVE COMMITTEE MEETINGS

As Chair, I am required to set the Agenda for our so-called "Combined Governance" meeting in Atlanta. In the past, all has been handled at a single meeting but we have a LOT to discuss this year and we need to do it in a certain order, so I am calling for three CONSECUTIVE meetings with agendas (see page 9). The working committees will be voting on the proposals and/or any amendments offered in the meetings prior to dinner. Then, after dinner, the Committees (or someone they designate, such as a "Champion" for a proposal) will present the proposals and make motions to the Executive Committee meeting.

PLEASE NOTE that these are all open meetings and you are welcome and encouraged to attend. We need your input on the ideas summarized below. Please read the Executive Summary and the full report when it is posted on AG-LIST.

I hope you will join in the discussion - pro, neutral, or con - on each of these and any other proposals. In this PICOGRAM is contact member for every officer and committee member in this Division. They will be happy to listen. I look forward to seeing you in Atlanta, and if not in Atlanta, in San Francisco.

Don

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COMBINED GOVERNANCE MEETING AGENDA

DIVISIONAL STRATEGIC PLANNING COMMITTEE 5:00-6:00 PM

- Chair: Division Chair
- Working Committee: Long Range Planning
- Business: discuss outcomes of Strategic Conference (Proposals 1,4,5,7,9 to be presented by "Champions")
- Begin to develop written Strategic Plan.
- In future, business of this meeting is to revisit Strategic Plan and to revise about every 4 years.

PROGRAM PLANNING COMMITTEE 6:00-7:00

- Chair: Program Chair
- Working Committee: AGRO Program Committee
- Business: discuss outcomes of Strategic Conference (Proposals 2,3,6,8,10 to be presented by "Champions") --discuss short-term and long-term program planning
- consider workshops;
- In future: also discuss input from "future programming session" at previous ACS meeting.

Dinner Break 7:00-8:00

EXECUTIVE COMMITTEE 8:00-10:00

- Chair: Division Chair
- Working Committee: Executive Committee
- Committee Reports (Omnibus Motion)
- New Business: motions from Program Committee and Long-Range Planning Committee

MEMBERS OF THE LONG-RANGE STRATEGIC PLANNING COMMITTEE

Front Row: John Hall, Allan Felsot, John Johnston, Joe Massey, Joe Glickman, Ken Racke, Merk Ogzewalla
Second Row: Don Wauhope, Raj Boina, Bill Hall, Jason Sandahl, Ray Putman, Joel Coats, Laura McConnell, Peter Ampim, Liliana Schwartz, Pat Rice, Kevin Armburst, Pam Rice, Rob Bennett, Terry Spittler, Nancy Ragsdale, John Bourke, Aldos Barefoot
Not pictured: Betsy Behl, Nelson Thurman, Dale Gaddy, Steve Lehotay, Judd Nelson

AGRO LONG-RANGE STRATEGIC PLANNING CONFERENCE REPORT

EXECUTIVE SUMMARY

BACKGROUND

Megatrends in science, agriculture and the agrochemical industry have resulted in a 1/3 decline in Agrochemicals Division (AGRO) membership in the last 10 years, and decreased attendance at AGRO programs at ACS national meetings. While we cannot affect the megatrends, a strategic analysis of the Division's science niche, "products" and operations is needed. The AGRO Executive Board authorized Vice-Chair Don Wauchope to plan a Long-Range Strategic Conference (LRSC) in 2004, and authorized $20,000 to fund the meeting in the fall of 2005. A Steering Committee was formed by officers of the Division, and an invitation list was developed. This list was designed to keep the meeting small but to include all sectors of our Division: scientists from industry, academia, and government. A special effort was also made to include (a) younger members who have been active and (b) regulatory scientists.

AGENDA

The meeting was held at the Washington Plaza on January 6 – 8, 2006. Twenty-eight of the 30 invitees attended and were joined by Dale Gaddy of ACS Membership Services. Presentations on the history and trends of AGRO were made by Allan Felsot, Past Chair; Rod Bennett, Past Chair; Terry Spittler, Treasurer; Laura McConnell, Program Chair; Bill Hall, FERT Subdivision; and Al Barefoot, Secretary. Dale Gaddy talked on similar issues/trends in ACS as a whole.

Then, led by Joe Gliksman of Mosaic Co., we brainstormed ideas based on the following meeting "charter":
How can we revitalize our division (or whatever institution which results) and make it a stronger part of the scientific community and a creative and constructive contributor to human and environmental welfare??

- *Envision a model of what the division should look like and what it could do*
- *Determine our customers and list a set of needs from a customer perspective – improve customer satisfaction*
- *Address high priority problems including membership decline, weakening financial support, and changes in science*

Some 120 ideas were suggested by attendees; these were classified by vote in terms of potential impact, doability, and time frame for initial progress. Pooling overlapping ideas and priority voting led to the selection of nine ideas for study by breakout teams. These teams' analysis resulted in the following nine *proposals*, each of which has "Champions," who will bring them to the Atlanta Meeting.

RESULTS: PRIORITY ACTIONABLE PROPOSALS, IN PRIORITY ORDER

1. Have Technical Program & Business Meeting only at the Fall ACS National Meeting Each Year. *This major change will require study before implementation and a 3-year trial period will be suggested. The experiences of those Divisions that do this now need to be examined. Idea was strongly supported by most LRPC attendees, but there was a dissident minority. Champions: Al Barefoot, Joe Massey.*

2. Add workshops (both training and goal-driven; both at ACS and at separate meetings) to AGRO programming. *AGRO has successfully programmed workshops in the past and an intentional mechanism for planning these is needed. If we go to one meeting/ year this might free resources for a smaller specialty meeting away from the ACS circus, perhaps in conjunction with a regional meeting. Champions: John Clark, Ken Racke.*

3. Recreate the program planning structure of the Division to provide continuity and sustained outstanding scientific programs. *Proposals include (a) facilitate long-range program planning by appointing two long-range program coordinators with overlapping, staggered 4-year terms and well-defined roles. These coordinators would assist the Program Chair and Vice Chair, providing continuity in program planning for the division; (b) hold a public session on Wednesday at each national meeting to obtain ideas from our membership for future programs and to train new Symposium Chairs; (c) restructuring of Program Planning Committee. Champion: Laura McConnell*

4. Change the name of the Division to reflect more broadly its multidisciplinary focus. *It was strongly felt by some attendees that the current name is too limiting relative to the broad range of our programming. Proposal: re-examine the AGRO Mission Statement; develop a "white paper" on the issue for March Meeting; involve Membership; move for new name at the San Francisco Meeting. Champion: Allan Felsot*

5. Increase the Division's international participation, outreach, and visibility. *Globalization of our programs and membership is a basic objective of the Division (and we are uniquely positioned to do that) and of ACS. Past IUPAC and Pan-Pacific activity has been beneficial. Proposal: a range of short-range and long-range ideas will be developed and presented to Executive Committee. Champions: Rod Bennet, Jason Sandahl*

6. Include regulatory agencies in program planning (determine their science gaps). *The Division and FERT Subdivision have provided successful forum for a technical exchange between regulatory agency and agrochemical industry scientists. To build on this, there is a need to identify science gaps. Proposal: potential regulatory clients to be identified and contacted, and a Regulatory Concerns member of Programming Committee to be appointed. Champion: Don Wauchope*

7. Increase Travel Grants for Young Scientists/Students (including international). *The Young Scientists Travel Award Program has been a bright spot in our programming and very successful for attracting younger scientists into the Division. The program should be expanded and opened to post-docs and foreign contestants, and additional financial support for the program sought through private individual and corporate contributions. Champion: John Johnston*

8. Involve students in program planning. *Principal ideas are (a) to Mentor a student program committee to organize and moderate one student symposium and a student lunch at national and possibly regional meetings, and (b) add student representation on Program Committee. Organization of programs and outreach to students has been initiated. Champion: Joel Coats*

9. Propose AGRO Division involvement in the FAO/IAEA "infocris" pesticide information web site. *"Infocris" is a voluntary community website giving information on water pollutants including pesticides. Proposal is to offer cooperation by AGRO individuals to input information in exchange for AGRO attribution and links to our web site. Champion: Don Wauchope*

10 [This one was unranked]. Webcasting of selected presentations from AGRO Meetings. *Wauchope "attended" a webcast by ACS BIOT Division on webcasting and presented the concept to the meeting. Although this presentation occurred after the brainstorm- idea ranking, it was generally agreed by attendees that this is a potentially powerful way to reach and service our members who do not attend meetings. This will be pursued by a team to be named. Champion: Don Wauchope*

CONCLUSION

The attendees at this meeting brought energy, ideas, and considerable creativity. They also brought concerns. The megatrends which have impacted us are likely to continue, and there may be nothing we can do to counter their effects. But there was almost unanimous agreement that we ought to try! We have much of value in this organization--in our programs and especially our people--and though our Division may continue to grow smaller, we do not want to see that happen through a lack of attention, planning, and innovation--we can do all that.

We owe a big debt of gratitude to the attendees.

Let's pull together, work hard, and see what happens.

Respectfully Submitted to the Executive Committee, January 30, 2006
Don Wauchope, Chair
Division of Agrochemicals
American Chemical Society

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Joel Coats is Professor of Entomology and Toxicology, in the Department of Entomology at Iowa State University. He is originally from Kenton, Ohio, and he received his B.S. in Zoology (Chemistry minor) from Arizona State University. He went to graduate school at the University of Illinois at Urbana-Champaign, receiving his M.S. and Ph.D. in Entomology (Chemistry minor), with specialization in insecticide toxicology and environmental toxicology. Professor Robert L. Metcalf served as his major professor there. He was a Visiting Professor for two years in the Department of Environmental Biology at the University of Guelph in Ontario, Canada.

Since 1978 he has served at Iowa State University, as Assistant, Associate, and Full Professor, and as Department Chairman for five years. He also was Guest Scientist at the Forschungszentrum-Jülich in Germany for six months. At Iowa State, he was the primary organizer of the Interdepartmental Toxicology Graduate Program and served as the first Chair of that program. He teaches all or parts of six graduate courses: Insecticide Toxicology, Pesticides in the Environment, Special Topics in Insect Toxicology, and small parts of Principles of Toxicology, Laboratory Methods in Toxicology, and Natural Toxins.

Joel has had the opportunity to mentor many excellent graduate students and postdocs, and most have continued to have significant impact in the field after they have graduated from his laboratory. He has served as major professor for 41 graduate students (including 8 current ones) and as adviser for 12 postdocs.

Joel's research program includes two main areas: (1) environmental toxicology and environmental chemistry of agrochemicals and (2) insect toxicology. The first topic addresses environmental effects and environmental degradation and mobility of modern agrochemicals, including conventional and natural insecticides, herbicides, insecticidal Bt protein toxins from transgenic plants, and veterinary drugs. His research in the insect toxicology area is focused primarily on natural products as insecticides and insect repellents, including investigations of their activity, modes of action, selectivity, metabolism, identification, synthesis of derivatives and analogs, and quantitative structure-activity relationships. Dr. Coats' research has covered the spectrum from very applied to very basic studies. His scientific publications include 7 books, 6 review articles, 30 book chapters, and 112 peer-reviewed journal articles; he also holds 7 patents.

Joel is extremely proud of his former graduate students and postdocs and the excellent contributions they are making to the agrochemicals field, e.g., in industry, government, and academia. He is also very proud of his wonderful family, including his wife, Becky, their five children, Sarah, Jesse, Beth, Aaron, Annie, and two grandchildren, Leola and Chloe. He is appreciative of their understanding, support and encouragement over the years.

The Officers and Executive Board of the AMERICAN CHEMICAL SOCIETY - AROCHEMICALS DIVISION and DuPont Crop Protection will host a banquet in honor of Dr. Joel Coats on Monday March 27, 2006, 6 – 9 pm.

RSVP TO: Laura McConnell, (301) 504-6298, mcconnel@ba.ars.usda.gov prior to March 19, 2006

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YOUNG SCIENTIST PRE- AND POST-DOCTORAL RESEARCH AWARDS & SYMPOSIUM

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The Agrochemicals Division organizes an annual competition for the Young Scientist Pre- and Post-doctoral Research Awards. The purpose of the awards, which are open to both graduate students and post-doctoral research associates, is to recognize outstanding young agrochemical researchers and to encourage their participation in the Division.

The 2006 awardees highlighted below will present their work during the annual Young Scientists Recognition Symposium at the 231st ACS National Meetings in Atlanta, GA. Their awards will be presented to them during the Agrochemicals Division social hour on Tuesday evening. The symposium will also feature presentations by a total of 14 outstanding graduate students and post-doctoral associates on Sunday morning starting at 8:30 AM in the Georgia World Congress Center (Room C103). The speakers (and affiliations) include Michael Farkas (State University of New York at Buffalo), Lynne Heighton (University of Maryland), Dingfei Hu (Iowa State University), Perihan Binnur Kurt-Karakus (Lancaster University), Artem Lyubimov (University of California-Santa Cruz), Paula Macedo (Montana State University), Kelsey Prihoda (Iowa State University), Sujie Qin (University of California-Riverside), Gretchen Schultz (Iowa State University), Jong-Su Seo (University of Hawaii), Bart van den Berg (Mississippi State Chemistry Lab), Chinta Venkat Reddy (Iowa State University), Amanda Watts (Minot State University), Kyong Sup Yoon (University of Massachusetts). The presentations will include a wide diversity of topics (synthesis, environmental chemistry, pest control, toxicology) and cover all types of agrochemicals during the all day symposium. (See Abstracts 1 – 14 on pages 57 – 59.)

Link to the national meetings website through the AGRO website at http://membership.acs.org/a/agro/ to view the Agrochemicals Division programming for Atlanta and please plan to attend the symposium.

Kelsey Prihoda, runner-up winner for 2006, entered the paper *Examination of the fate of BtCry1F protein in an aerobic aquatic system.* Kelsey conducted the research in the laboratory of Dr. Joel Coats at Iowa State University, Department of Entomology. Congratulations to Kelsey and Dr. Coats for important research that enhances our understanding of the fate of plant incorporated toxins now widely used for controlling insect feeding injury.

Kyong Sup Yoon, runner-up winner for 2006, entered the paper *Detection and mechanisms of pediculicide resistance in the human head louse, Pediculus capitis*. Kyong conducted the research in the laboratory of Dr. John Clark at the University of Massachusetts. Congratulations to Kyong and Dr. Clark for an outstanding public health contribution that will allow a more facile screening of future pediculicides and a more rapid monitoring of resistance development.

Perihan Binnur Kurt-Karakus is the 2006 first-place winner with the entry *Real-time measurement of DDT fluxes from historically treated agricultural soil in Canada*. Perihan had conducted her research under the direction of Dr. Terry Bidleman while in Canada. Congratulations to Perihan and Dr. Bidleman for an excellent study of the environmental chemistry of historical recalcitrant insecticide residues and its potential contributions to exposure assessment at the landscape level.

Awardees will receive a cash award, award plaques, and travel reimbursements to the Atlanta meetings. All other presenters will receive a travel stipend from AGRO. The Agrochemicals Division would greatly appreciate your efforts to encourage students and post-doctoral research associates to apply for future award competitions.

Further information about the Young Scientist Pre- and Post-Doctoral Research Awards and application information for next year can be found on page 25 in this edition of the PICOGRAM. Applicants and their advisors/supervisor can obtain additional information from Dr. Allan Felsot at Washington State University (509-372-7365; fax: 509-372-7460; afelsot@tricity.wsu.edu) or by visiting the Division of Agrochemicals web site http://membership.acs.org/a/agro/.

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AGROCHEMICAL EDUCATION 2005 AWARDS

The Agrochemical Division of the American Chemical Society hosted a graduate student research poster competition at the 230th American Chemical Society National Meeting in Washington DC (August 28 – September 1, 2005). Twelve students, representing eight universities, presented research findings on a wide range of agrochemical related topics including pesticide exposure, repellency and metabolism in fish, antibiotic bioavailability and binding to soil constituents, insect repellency of natural products, modeling approaches for estimating aerial pesticide concentrations and identification of enzymes for pesticide detoxification. All student presenters received a $600 travel grant.

The first prize winner received an additional $500 award

Daniel Nomura, University of California, Berkeley
A brain detoxifying enzyme for organophosphorus nerve poisons. D. K. Nomura, D. Leung, K. P. Chiang, G. B. Quistad, J. E. Casida

Additional cash awards were presented to

Anuba Goel, University of Maryland
Modeling the variability in aerial concentrations of atrazine, endosulfan and chlorothalonil at a rural location on the Delmarva Peninsula. A. Goel, L. L. McConnell, A. Torrents,

Catherine Curran, University of Washington
Responses of juvenile salmon to aquatic herbicides. C. A. Curran, J. M. Grassley, C. E. Grue

Graduate students interested in applying for a travel grant for the 2006 Fall ACS meeting in San Francisco (September 10-14, 2006) should contact John.J.Johnston@aphis.usda.gov by April, 2006. Additional information can be found on page 24.

GRADUATE STUDENT RESEARCH POSTER PARTICIPANTS 2005

Front row: Keri Henderson (Iowa State), Kelsey Prihoda (Iowa State), Catherine Curan (U. Washington), Anubha Goel (U. Maryland)
Back row: Daniel Nomura (U.California - Berkeley), Dingfei Hu (Iowa State), Gretchen Shultz (Iowa State), Lindsey Gereszek (Iowa State), Pankag Kulshrestha (SUNY- Buffalo),Sanjay Mohanty (U. Hawaii)
Not shown: Yun Cheng (U. Florida), Ola Bowardi (U.California - Riverside)

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LFR

AWARDS COMMITTEE REPORT

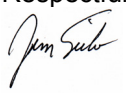
Dr. Joel Coats, Professor of Entomology and Toxicology, Iowa State University, will receive the International Award for Research in Agrochemicals on Monday, March 27, 2006, at the Spring National Meeting of the American Chemical Society, in Atlanta, GA. This award is sponsored by DuPont Crop Protection. An award symposium around the topic of environmental toxicology and chemistry of agrochemicals including insect toxicology and organized by Ralph Mumma, Pat Rice, Ellen Arthur, and Aldos Barefoot will recognize Dr. Coat's contributions in these areas.

Dr. Isamu Yamaguchi, Plant Sciences Center, Riken (Japan) will receive the International Award for Research in Agrochemicals at the Fall 2006 ACS National Meeting to be held in San Francisco, CA for his research in the chemistry of pest management, particularly the biochemistry of fungicidal action. Nancy Ragsdale and Fumio Matsumura will organize the award symposium in Dr. Yamaguchi's honor. This award will be sponsored by BASF Corporation.

Nominations for the 2006 International Award for Research in Agrochemicals received prior to the December 2005 deadline are currently being considered by the Awards Committee. The Awards Committee is accepting new nominations for the 2007 International Award for Research in Agrochemicals (Deadline: Dec 31, 2006) and Division Fellow Award (Deadline: May 31, 2006). Please consider nominating a deserving colleague.

Congratulations to Drs. Coats and Yamaguchi!

Respectfully submitted,



James N. Seiber, Chair
Awards Committee

PAST AWARDEES OF THE STERLING B. HENDRICKS MEMORIAL LECTURSHIP

SPONSORED BY AGRO & AGFD DIVISIONS AND USDA-ARS

1981 Norman E. Borlaug, Nobel Laureate and Director of International Maize and Wheat Improvement Center, Mexico City.

1982 Warren L. Butler, Professor of Biology and Past Chairman, Biology Department, University of California at San Diego.

1983 Melvin Calvin, Nobel Laureate and University Professor of Chemistry, University of California at Berkeley.

1984 Frederick Ausubel, Professor of Genetics, Harvard Medical School and Massachusetts General Hospital.

1985 Alan Putnam, Professor, Department of Horticulture and Pesticide Research Center, Michigan State University.

1986 Ralph Hardy, President, Boyce Thompson Institute for Plant Sciences, Cornell University, and Deputy Chairman, BioTechnica International.

1987 Mary-Dell Chilton, Director of Biotechnology Research for Ciba-Geigy Corporation, Research Triangle Park, North Carolina.

1988 Bruce N. Ames, Chairman, Department of Biochemistry, University of California at Berkeley.

1989 Sanford A. Miller, University of Texas Health Science Center at San Antonio.

1990 Roy L. Whistler, Emeritus Professor of Purdue University.

1991 Peter S. Eagleson, Professor of Civil Engineering, Massachusetts Institute of Technology.

1992 John E. Casida, Professor of Chemistry and Toxicology, University of California at Berkeley.

1993 Philip H. Abelson, Deputy Editor, *Science*, and Scientific Advisor to AAAS.

1994 Wendell L. Roelofs, Liberty Hyde Bailey Professor of Insect Biochemistry, Cornell University.

1995 Winslow R. Briggs, Director Emeritus, Department of Plant Biology, Carnegie Institution of Washington.

1996 Hugh D. Sisler, Professor Emeritus, Department of Plant Biology, University of Maryland.

1997 Ernest Hodgson, Head, Department of Toxicology, North Carolina State University.

1998 Martin Beroza, Chief, Organic Chemicals Synthesis Laboratory, Agricultural Research Service.

1999 Bruce D. Hammock, Professor, Department of Entomology, University of California at Davis.

2000 William S. Bowers, Professor, Department of Entomology and Chemical Ecology at the University of Arizona.

2001 Malcolm Thompson, Research Chemist, USDA-ARS, Beltsville, MD (retired)

2002 Ervin E. Leiner, Professor Emeritus, Biochemistry Department, University of Minnesota.

2003 Dr. Kriton Kleanthis Hatzios, VA Agricultural Experiment Station

2004 Dr. Robert L. Buchanan, Food & Drug Administration

2005 Dr. Donald Sparks, University of Delaware

CALL FOR NOMINATIONS

2007 STERLING B. HENDRICKS MEMORIAL LECTURESHIP

The Agricultural Research Service (ARS), USDA's primary research agency, is seeking nominations for the **2007 Sterling B. Hendricks Memorial Lectureship**.

This Lectureship was established in 1981 by ARS to honor the memory of Sterling B. Hendricks and to recognize scientists who have made outstanding contributions to the chemical science of agriculture. Dr. Hendricks contributed to many diverse scientific disciplines, including soil science, mineralogy, agronomy, plant physiology, geology, and chemistry. He is most frequently remembered for discovering phytochrome, the light-activated molecule that regulates many plant processes.

Nominees may be outstanding, senior scientists in industry, universities, or government positions. Current ARS employees are not eligible. Nominations may be made by sending (1) a letter explaining the nominee's contributions to chemistry and agriculture and (2) a current curriculum vitae to:

Kim Kaplan, Lecture Coordinator
at either
kaplan@ars.usda.gov
or
ARS Information Office
Room 1-2253, Mail Stop # 5128
5601 Sunnyside Ave.
Beltsville, MD 20705

Electronic transmission is best; otherwise, use a carrier, such as FedEx.
The deadline for nominations is November 6, 2006

The Lecture, on a scientific topic, trend, or policy issue of the Lecturer's choice, will be presented at the Fall American Chemical Society National Meeting (Boston, MA, August 19-23, 2007). The Division of Agricultural & Food Chemistry and The Division of Agrochemicals co-sponsor the Lecture which will be held in a joint session of these divisions. The award includes an honorarium of $2000, a bronze medallion, and expenses to attend the meeting.

CALL FOR NOMINATIONS
AGROCHEMICALS FELLOW AWARD

The Division has established the Fellow Award to recognize its members whose dedicated and enthusiastic service has kept the Division moving forward. Criteria shall be "continued and substantial contributions of time, talents, and service to the Division of Agrochemicals, ACS, and the agrochemical science over a period of at least six years."

Nominations include a letter noting the contributions to the Division and a current curriculum vitae. Contact the Awards Committee for further information.

Dr. James Seiber
USDA-ARS, WRRC
800 Buchanan St.
Albany, CA 94710
510-559-5600 – phone
510-559-5963 – fax
jseiber@pw.usda.gov

Deadline for submitting nominations is May 31 of each year.

PAST WINNERS OF THE AGROCHEMICALS FELLOW AWARD

1971	Dr. Louis Lykken
	Dr. Tom H. (Bucky) Harris
	Dr. Herman Beckman (Posthumous)
1972	Mr. Wendell F. (Bud) Phillips
	Dr. Don G. Crosby
	Dr. Elvins Y. Spencer
1973	Mr. Roger C. Blinn
	Dr. Philip C. Kearney
	Dr. Julius J. Menn
1974	Dr. Morton Beroza
	Dr. James P. Minyard, Jr.
	Dr. Joe C. Street
1975	Dr. Hank F. Enos
	Dr. Maurice B. Green
	Dr. Charles H. Van Middelem
1976	Dr. Marguerite L. Leng
	Dr. Jack R. Plimmer
	Dr. Gerald G. Still
1977	Dr. Gustave K. (Bob) Kohn
1978	Dr. S. Kris Bandal
	Dr. Paul Hedin
1979	Dr. Rodney D. Moss
1980	Dr. G. Wayne Ivie
	Dr. John B. Siddall (Posthumous)
1981	Dr. Robert M. Hollingworth
	Dr. Gino J. Marco
1983	Dr. John Harvey, Jr.
1985	Mr. Henry Dishburger
	Dr. Richard C. Honeycutt
1986	Dr. Gunter (Jack) Zweig
1987	Dr. Willa Garner
1988	Dr. Jan Chambers
	Dr. James Seiber
1990	Dr. Joseph Fenyes
1991	Dr. Nancy N. Ragsdale
1992	Dr. Don Baker
	Dr. Joel Coats
	Dr. Guy Paulson
1993	Dr. Larry Ballantine
1994	Dr. James Heitz
	Dr. Ralph Mumma
	Dr. Willis Wheeler
1996	Dr. John Bourke
1998	Dr. Hank Cutler
	Mr. Paul Giesler
2000	Dr. Barry Cross
2003	Dr. Judd Nelson

PAST AWARDEES OF THE BURDICK AND JACKSON INTERNATIONAL AWARD

1969 Prof. John E. Casida, University of California, Berkley, CA.
1970 Prof. Richard D. O'Brien, Cornell University, Ithaca, NY.
1971 Prof. Robert L. Metcalf, University of Illinois, Urbana, IL.
1972 Prof. Ralph L. Wain, Wye College, University of London, England
1973 Dr. Hubert Martin, British Crop Protection Council, England.
1974 Prof. T. Roy Fukuto, University of California, Riverside, CA.
1975 Dr. Michael Elliot, Rothamsted Experiment Station, England
1976 Dr. Morton Beroza, USDA-ARS (retired).
1977 Prof. Francis A. Gunther, University of California, Riverside, CA.
1978 Dr. Julius J. Menn, Stauffer Chemical, CA.
1979 Mr. Milton S. Schecter, USDA (retired).
1980 Dr. Minuro Nakajima, Kyoto University, Kyoto, Japan.
1981 Dr. Philip C. Kearney, USDA-ARS, Beltsville, MD.
1982 Dr. Jack R. Plimmer, USDA-ARS, Beltsville, MD.
1983 Dr. Karl Heinz Buechel, Bayer AG, Germany.
1984 Dr. Jacques Jean Martel, Roussel Uclaf, Paris, France.
1985 Dr. Junshi Miyamoto, Sumitomo Chemical Co., Japan.
1986 Dr. James Tumlinson, USDA-ARS, Gainesville, FL.
1987 Prof. Fumio Matsumura, Michigan State University, East Lansing, MI.
1988 Dr. Ernest Hodgson, North Carolina State University, Raleigh, NC.
1989 Dr. Toshio Narahashi, Northwestern University, Chicago, IL.
1990 Dr. David Schooley, University of Nevada, Reno, NV.
1991 Dr. Stuart Frear, USDA-ARS, Fargo, ND.

PAST WINNERS OF THE ACS INTERNATIONAL AWARD FOR RESEARCH IN AGROCHEMICALS

CO-SPONSORED BY BASF COMPANY (SPRING) AND DUPONT CROP PROTECTION (FALL)

1992-Fall Dr. Bruce Hammock, University of California, Davis
1993-Spring Dr.Morifuso Eto, Kyushu University, Fuoka, Japan
1994-Fall Dr. Toshio Fujita, Kyoto University, Kyoto, Japan
1995-Spring Dr. Mohyee Eldefrawi, University of Maryland, Baltimore
1995-Fall Dr. Koji Nakanishi, Columbia University, New York
1996-Spring Dr. Günther Voss, Ciba, Basel, Switzerland
1996-Fall Dr. Klaus Naumann, Bayer, Leverkusen, Germany
1997-Spring Dr. Fritz Führ, Jülich, Germany
1997-Fall Dr. Izuru Yamamoto, University of Tokyo, Japan
1998-Spring Dr. George Levitt, DuPont, Wilmington, DE
1998-Fall Dr. Leslie Crombie, University of Nottingham, England
1999-Spring Dr. Don Baker, Zeneca, Richmond, CA
1999-Fall Dr. James Seiber, University of Nevada, Reno
2000-Spring Dr. George P. Georghiou, University of California, Riverside
2000-Fall Dr. Herbert B. Scher, Zeneca
2001-Spring Dr. Donald Crosby, University of California, Davis
2001-Fall Dr. Ralph Mumma, Pennsylvania State University
2002-Spring Dr. Keith Solomon, University of Guelph, Ontario, Canada
2002-Fall Dr. Marinus Los, American Cyanamid
2003-Spring Dr. Bob Hollingworth, Michigan State University
2003-Fall Dr. Hideo Ohkawa, Kobe University, Japan
2004-Spring Dr. Stephen Duke, USDA-ARS, Oxford, Mississippi
2004-Fall Dr. John Marshall Clark, University of Massachusetts
2005-Spring Dr. Robert Krieger, University of California, Riverside
2005-Fall Dr. Janice E. Chambers, Mississippi State University

NOMINATION FORM
ACS INTERNATIONAL AWARD
FOR
RESEARCH IN AGROCHEMICALS

Co-Sponsored by BASF Corporation (Spring)
and DuPont Crop Protection (Fall)

I hereby nominate _____ as a candidate for this award.
(First) (Middle) (Last)

Complete the following for your candidate:

1. Birthplace Date of Birth Citizenship

2. Business Address:

3. **IMPORTANT** Please Attach:
   a. A **Curriculum Vitae** for your candidate which describes the individual's career data including, places and nature of employment, professional affiliations, honors received, and a list of publications and patents. Please provide 11 copies.
   b. A **description** (200-1000 words) of the reasons why your nominee should receive this award, stressing the individual's major accomplishments.
   c. Nominations often include one or two letters of support, but this is optional.

Submitted by: _____ Date: _____

Address: _____

Deadline: Nominations should be received by the committee chair by December 31 of each year. Balloting will be conducted in January/February and results will be announced at the spring meeting of ACS.

The nominating official(s) should be prepared to assist in organizing a symposium and dinner at the National ACS meeting in honor of the awardee.
Please, return this completed form to:

Dr. James Seiber
USDA-ARS, WRRC
800 Buchanan St.
Albany, CA 94710
510-559-5600 – phone
510-559-5963 – fax
jseiber@pw.usda.gov

CALL FOR APPLICANTS
AGROCHEMICAL EDUCATION AWARDS

SUPPORT FOR GRADUATE STUDENT POSTER PRESENTATIONS AT THE 2006 FALL MEETING

The Division of Agrochemicals has established an endowment fund that will be used to promote an understanding of the role of chemistry in agriculture as embraced in the following areas related to pest management chemistry: synthesis, metabolism, regulatory, biotechnology, delivery, risk assessment, resistance, residues, mode of action, and fate/behavior. To address this mission, awards will be made through the Division's Education Committee.

Proposals are sought for the 2006 awards. Graduate students will be awarded up to $600 each to help defray costs of attendance to give poster or oral presentations at the ACS 2005 Fall Meeting, which will be held September 10 – 14, 2006 in San Francisco. Posters will be displayed in a special section of the Division of Agrochemicals' poster session as well as the ACS Sci-Mix. A winner and two runners up will be selected for display at the Division's Social. The winner will receive an additional cash award of $500. The subject of the presentation should fall within the areas listed in the introductory sentence.

To apply, a graduate student should submit the following, to be received no later than May 1, 2006:

1. An abstract formatted according to the directions given on the ACS website. Be sure to include name (of applicant), address, and e-mail address.
2. A 2-page extended abstract giving more detail of the research/presentation.
3. A letter of nomination from the faculty advisor.

Please submit the above electronically with the three items as attachments in either Word or Word Perfect to:
Dr. John J. Johnston at john.j.johnston@aphis.usda.gov. If there are any questions, please contact Dr. Johnston at USDA/APHIS/National Wildlife Research Center, 4101 LaPorte Ave., Fort Collins, CO 80521, (970)-266-6082.

Abstracts will be reviewed by the Education Committee; submitters will be notified of their selection status in May 2006.

CALL FOR APPLICANTS
YOUNG SCIENTIST PRE- AND POST-DOCTORAL RESEARCH AWARDS & SYMPOSIUM

AGROCHEMICALS DIVISION
with Sponsorship by Dow AgroSciences
Co-sponsored by the ACS Younger Chemists Committee
233rd ACS NATIONAL MEETING, Chicago, IL, March 25 – 29, 2007

Who is qualified to enter competition?
- --**Pre- & post-doctoral students**
- --Only work conducted primarily at North American institutions

Winner and runner-up will receive:
- --Cash award ($750 & $500) and plaque
- --Travel costs to meeting (up to $600)
- --Partial meeting per diem costs
- --3 years free AGRO membership

NAME_____ DATE_____

Current affiliation including address, phone & fax number, and email:

Place where research was conducted if different from above: _____

Date work was completed:_____ Date of expected/actual degree:_____

Briefly describe **your** contribution to the work:

SIGNATURES:
Applicant _____

Major Professor/Supervisor _____

Will you present this paper even if you do not receive an award: YES_____ NO_____

WITH THIS APPLICATION FORM INCLUDE THE FOLLOWING:

1. An extended abstract of your presentation (4 pages maximum including figures and tables) that clearly describes the nature of the work (hypothesis, methods, results), its relationship to previous research, and its significance for the field of agrochemicals.
2. An abstract of 150 words (submit directly to http://oasys.acs.org/oasys.htm); this short abstract will be printed in the Agrochemicals Division biannual publication, PICROGRAM.

MAIL OR FAX THIS SIGNED APPLICATION, & FAX OR EMAIL EXTENDED ABSTRACT TO:

Dr. Allan Felsot, Washington State University, FEQL, 2710 University Dr., Richland, WA 99354
Phone: 509-372-7365; Fax: 509-372-7460; email: afelsot@tricity.wsu.edu

Deadline for submittal of application materials: November 5, 2006.

NOTE: Two awards will be made based on the merits of the submitted applications. Applicants not winning the awards will be invited to present their research in the Young Scientist's Recognition Symposium and will be eligible to receive a small travel grant.

NOTES FROM THE PROGRAM CHAIR

Laura McConnell

The AGRO Program in Atlanta reflects the strengths of the AGRO Division:

1. Highlighting the achievements of young scientists
2. Honoring our distinguished members
3. Addressing the most relevant regulatory issues related to pesticides
4. Bringing emerging research areas of agricultural chemistry to light for our members.

First, I would like to acknowledge the significant efforts of our symposium organizers. These hard working scientists have done a wonderful job of gathering an excellent group of speakers together for our benefit. They began working very early on recruiting their speakers, they kept the speakers informed throughout the process, and worked to make sure the papers presented are of the highest quality.

Second, I would like to bring to your attention my efforts to form a new and revitalized Long Range Program Planning Committee. The aim of this committee would be to recreate the program planning structure of the Division to provide continuity and a sustained outstanding scientific program. Currently, there is no formal mechanism in the division to create a programming agenda for the next three to five years into the future.

AGROCHEMICALS DIVISION PROGRAMMING CONTACTS

2006 Program Chair	L. McConnell	(301) 504-6298
Vice Chair (2007 Program Chair)	*not available at press time*	
Standing Program	D. Smith M.G. Beconi-Barker	(701) 239-1238 (616) 385-5597
Synthesis-Special Topics Standing Program	J. Fenyes D. Baker	(901) 278-0330 (510) 231-1093
Residues-Special Topics Standing Program	J.J. Johnston	(970) 266-6082
Metabolism-Special Topics Standing Program	T.A. Wehner H. Cutler	(732) 729-5713 (770) 986-3240
Mode of Action	R. Hollingworth J.M. Clark	(517) 533-9430 (413) 545-1052
Environmental	R. Honeycutt J. Seiber A. Felsot	(336) 294-5559 (702) 784-6460 (509) 375-9365
Analytical	R. Grazzini	(841) 231-8032
Resistance	T.M. Brown J. Nelson	(803) 656-5038 (301) 405-3919
Biotechnology	J. Seiber J. Nelson W.P. Ridley	(702) 784-6460 (301) 405-3919 (314) 694-8441
Toxicology	J.M. Clark J. Coats	(413) 545-1052 (515) 294-4776
Regulation	N. Ragsdale	(301) 504-4509
Special Conferences	J.M. Clark	(517) 545-1052
ACS Awards Symposia	J. Seiber	(510) 559-5600
Young Scientists Award	A. Felsot	(509) 372-7365

SPRING 2006 SCHEDULE

ALL PROGRAMS WILL BE AT THE GEORGIA WORLD CONGRESS CENTER.
A=AM, P=PM; D=AM & PM, E=EVE

SYMPOSIUM OR SESSION	ORGANIZER(S)	Sun	Mon	Tue	Wed	Thu
Young Scientist Pre- and Post-Doctoral Research Award Symposium	Allan Felsot	D				
ACS International Award for Research in Agrochemicals: Symposium in Honor of Joel Coats	Ralph Mumma Patricia Rice Ellen Arthur		D			
Sci-Mix	Laura McConnell		E			
Advances in Pesticide Environmental Fate and Exposure Assessments	Ellen Arthur Krishna Balu Aldos Barefoot Dan Dyer Glenn Miller Pamela Rice Patricia Rice			D	D	A
General Papers	Laura McConnell			D		
General Posters	Laura McConnell			P		
Plant Response to Biotic Insults	James Tumlinson Ralph Mumma Gary Felton				D	D

AGRO 2006
CALL FOR SYMPOSIA & GENERAL PAPERS

The following are symposia currently in place for the ACS National Meeting 2006 in San Francisco. Proposals for additional symposia are now being accepted. Please contact:

Dr. Laura McConnell, AGRO Program Chair
USDA-Agricultural Research Service
10300 Baltimore Ave
Bldg. 007, Rm. 225 BARC-W
Beltsville, MD 20705
e-mail: mcconnel@ba.ars.usda.gov
Phone: (301) 504-6298
Fax: (301) 504-5048

232nd ACS NATIONAL MEETING
SAN FRANCISCO, CA
SEPTEMBER 10 – 14, 2006

ACS International Award for Research in Agrochemicals: Symposium in Honor of Isamu Yamaguchi: Fungicides (Invited papers only)
Organizer: Nancy Ragsdale, U.S. Department of Agriculture, Agricultural Research Service, 5601 Sunnyside Ave., Beltsville, MD 20705-5140

Agricultural Impacts on Air Quality (Oral and Poster session – see announcement p. 31)
Organizers: Laura L. McConnell, Agricultural Research Service, Environmental Management & By-Products Utilization Laboratory, U. S. Department of Agriculture, 10300 Baltimore Ave., Bldg. 007, Rm. 225 BARC-W, Beltsville, MD 20705; Cathleen J. Hapeman, Beltsville Agricultural Research Center, USDA-ARS, 10300 Baltimore Avenue, Beltsville, MD 20705; James N. Seiber, Western Regional Research Center, USDA-Agricultural Research Service, 800 Buchanan Street, Albany, CA 94710; Michael S. Majewski, U.S. Geological Survey, Placer Hall, 6000 J Street, Sacramento, CA 95819; Ole hertel, Department of Atmospheric Environment, National Environmental Research Institute, Frederiksborg vej 399, P.O. Box 358, Roskilde DK-4000 Denmark

Agrochemical Education Awards For Graduate Student Travel: Research Poster Presentations (Poster symposium)
Organizer: J. J. Johnston, National Wildlife Research Center, USDA/APHIS/WS, 4101 LaPorte Avenue, Fort Collins, CO 80521-2154

Agrochemical Residue & Metabolism Chemistry (Oral symposium)
Organizers: Teresa A. Wehner, Pharmacokinetics & Drug Metabolism, Merial Ltd, 631 Route 1 South, North Brunswick, NJ 08902; J. J. Johnston, National Wildlife Research Center, U.S. Department of Agriculture/APHIS/WS, 4101 LaPorte Avenue, Fort Collins, CO 80521-2154; David Smith, Biosciences Research Laboratory, USDA-ARS, P.O. Box 5674, University Station, Fargo, ND 58105

Alternatives to the Use of Methyl Bromide in Pre-Plant Soil Fumigation and Stored Commodities (Oral symposium – see announcement p. 32)
Organizers: Luis Ruzo, PTRL West, 625-B Alfred Nobel Dr, Hercules, CA 94547; Rodney M. Bennett, Cerexagri, Inc, 900 First Avenue, Building # 10, King of Prussia, PA 19406-0936

AGRO 2006
CALL FOR SYMPOSIA & GENERAL PAPERS
(continued)

Characterizing Natural Products as Pesticides, Repellents, or Biomarkers (Oral Symposium – see announcement p. 33)
Organizer: Randal Stahl**,** USDA/APHIS/WS/NWRC, 4101 LaPorte Ave., Fort Collins, CO 80521, (970)266-6062, randal.s.stahl@aphis.usda.gov

General Papers (Oral symposium)
Organizer: Laura L. McConnell, Agricultural Research Service, Environmental Management & By-Products Utilization Laboratory, U.S. Department of Agriculture, 10300 Baltimore Ave., Bldg. 007, Rm. 225, BARC-W, Beltsville, MD 20705

General Posters (Poster symposium)
Organizer: Laura L. McConnell, Agricultural Research Service, Environmental Management & By-Products Utilization Laboratory, U.S. Department of Agriculture, 10300 Baltimore Ave., Bldg. 007, Rm. 225, BARC-W, Beltsville, MD 20705

Recent Advances in Immunochemistry and Their Applications to Agrochemicals (Oral symposium – see announcement p. 37)
Organizers: J. M. Van Emon, Human Exposure Research Branch, U.S. Environmental Protection Agency, Human Exposure and Atmospheric Sciences Division, National Exposure Research Laboratory, Las Vegas, NV 89139; Weilin L. Shelver, Biosciences Research Laboratory, USDA-ARS, 1605 Albrecht Boulevard, Fargo, ND 58105

Sterling Hendricks Memorial Lectureship (Invited papers only) Sponsored by USDA-Agricultural Research Service., Cosponsored by the Division of Agricultural & Food Chemistry and the Division of Agrochemicals
Organizers: Michael H. Tunick, Dairy Processing and Products Research Unit, USDA, ARS, Eastern Regional Research Center, 600 E. Mermaid Lane, Wyndmoor, PA 19038; Kim Kaplan, U.S. Department of Agriculture, Agricultural Research Service, 5601 Sunnyside Ave., Beltsville, MD 20705-5140

Synthetic Pyrethroids and Surface Water Quality (Oral symposium – see announcement p. 34)
Organizers: Jay Gan, Department of Environmental Sciences, University of California Riverside, Riverside, CA 92521; Frank Spurlock, Environmental Monitoring, California Department of Pesticide Regulation, 1001 I Street, Sacramento, CA 95812; Paul Hendley, Head, Global Environmental Risk Assessment, Syngenta Crop Protection, Inc, 1200 South 47th Street, Richmond, CA 94804

The Future Role of Pesticides in Agriculture (Oral symposium – see announcement p. 35)
Organizers: Steven J. Lehotay, Eastern Regional Research Center, USDA Agricultural Research Service, 600 East Mermaid Lane, Wyndmoor, PA 19038; Laura L. McConnell, Agricultural Research Service, Environmental Management & By-Products Utilization Laboratory, U.S. Department of Agriculture, 10300 Baltimore Ave., Bldg. 007, Rm. 225, BARC-W, Beltsville, MD 20705

Weed Resistance to Herbicides (Oral symposium – see announcement p. 36)
Organizers: William P. Ridley, Product Safety Center, Monsanto Company, 800 N. Lindbergh Blvd, St. Louis, MO 63167; Douglas R. Sammons, Monsanto Corporation; A. S. Felsot, Food & Environmental Quality Lab, Washington State University, 2710 University Drive, Richland, WA 99338

AGRO 2007
CALL FOR SYMPOSIA & GENERAL PAPERS

Now is also the time to begin thinking about programming in 2007. If you are interested in planning a symposium for Chicago or Boston, please contact me. Or if there is a topic that you would like to see included in the AGRO program, give me a call or send an email.

Dr. Laura McConnell, AGRO Program Chair
USDA-Agricultural Research Service
10300 Baltimore Ave
Bldg. 007, Rm. 225 BARC-W
Beltsville, MD 20705
e-mail: mcconnel@ba.ars.usda.gov
Phone: (301) 504-6298
Fax: (301) 504-5048

233rd ACS NATIONAL MEETING
CHICAGO, IL
MARCH 25-29, 2007

ACS International Award for Research in Agrochemicals

Veterinary Pharmaceuticals in the Environment
Organizers: Keri Henderson, Joel Coats

Young Scientist Pre- and Post-Doctoral Research Award Symposium
Organizer: Allan Felsot

General Papers (Oral symposium)
Organizer: vice chair elect

General Posters (Poster symposium)
Organizer: vice chair elect

234th ACS NATIONAL MEETING
BOSTON, MA
AUGUST 19-23, 2007

ACS International Award for Research in Agrochemicals

Agrochemical Education Awards For Graduate Student Travel: Research Poster Presentations
(Poster symposium) Organizer: J. J. Johnston

General Papers (Oral symposium)
Organizer: vice chair elect

General Posters (Poster symposium)
Organizer: vice chair elect

CALL FOR PAPERS

Agricultural Impacts on Air Quality: Pesticides, Pharmaceuticals, PM, VOCs, and Odors

232nd ACS National Meeting
San Francisco, CA
September 10 – 14, 2006

Purpose of Symposium

Agricultural emissions from use of formulated pesticides and animal operations can be significant and are undergoing increased scrutiny state and federal regulatory bodies. The symposium will examine the state of the science for measuring and discerning the chemistry of emissions to the risks to human and ecosystem health.

Suggested Topics

Current regulatory issues
Novel measurement techniques
Measurement and chemistry of odors and VOCs/ROGs
Atmospheric fate of pesticides (ai and inerts)
Source tracking
Mitigation strategies
Modeling of emissions and fate

For additional information contact the organizers

Laura McConnell, USDA-ARS, mcconnel@ba.ars.usda.gov (301) 504-6298
Cathleen Hapeman, USDA-ARS, hapemanc@ba.ars.usda.gov
James Seiber, USDA-ARS, jseiber@pw.usda.gov
Michael Majewski, USGS, majewski@usgs.gov

CALL FOR PAPERS

Alternatives to the Use of Methyl Bromide in Pre-Plant Soil Fumigation and Stored Commodities

232nd ACS National Meeting
San Francisco, CA
September 10 – 14, 2006

Purpose of Symposium

To examine the various chemicals and processes being currently evaluated as potential methyl bromide replacements from the point of view of their chemical and environmental behavior, efficacy and toxicology

Suggested Topics

For chemicals used as fumigants:

- Physico-chemical properties
- Environmental fate and metabolism
- Analytical techniques
- Environment monitoring and exposure
- Emission control
- Efficacy and toxicology
- Regulatory requirements and registration status

For processes:

- Methodology and efficacy of solarization
- Heat treatment
- Composting and other procedures aimed at minimizing or eliminating the need for chemical treatment of soils and stored products

For additional information contact the organizers

Luis Ruzo, PTRL West, (510) 741-3000 ext 228, l.ruzo@ptrlwest.com
Rodney Bennett, Cerexagri, (610) 878-6476, rodney.bennett@cerexagri.com

CALL FOR PAPERS

Characterizing Natural Products as Pesticides, Repellents, or Biomarkers

232nd ACS National Meeting
San Francisco, CA
September 10 – 14, 2006

Purpose of Symposium

Many natural products are being evaluated for possible use in agricultural or urban settings as a low cost, efficacious, and possibly low risk means of addressing specific pest problems. This symposium seeks to provide a forum to examine the methods being used to purify, analyze and characterize the effectiveness of natural products when used as a pesticide, repellent or biomarker.

Suggested Topics

For natural products being evaluated:

- Chemical properties, mode of action, metabolism
- Analytical techniques for purification, characterization
- Methods of delivery, and effectiveness
- Efficacy, toxicology, environmental fate, risk assessment

For additional information contact the organizer

Randal Stahl, USDA/APHIS/WS/NWRC, 4101 LaPorte Ave., Fort Collins, CO 80521
randal.s.stahl@aphis.usda.gov, (970)266-6062

CALL FOR PAPERS

Synthetic Pyrethroids and Surface Water Quality

232nd ACS National Meeting
San Francisco, CA
September 10 – 14, 2006

Purpose of Symposium

Use of synthetic pyrethroids is rapidly increasing in both urban and agricultural sectors. Contamination to surface water systems and the implied ecotoxicity is an emerging concern. This symposium will highlight current advances in source identification, sampling and analytical methodology, transport mechanisms, bioavailability, mitigation options, and regulatory challenges.

Suggested Topics

Pyrethroid use patterns and trends
Monitoring and source identification
Sampling and analysis
Runoff and pyrethroid transport
Transformation and persistence
Bioavailability
Aquatic toxicity
Mitigation measures
Regulatory opportunities and challenges

For additional information contact the organizers

Jay Gan, Department of Environmental Sciences, University of California, Riverside, jgan@ucr.edu, (951) 827-2712
Frank Spurlock, California Department of Pesticide Regulation, Sacramento, CA, fcspurlock@cdpr.ca.gov, (916) 324-4124
Paul Hendley, Senior Scientist, Syngenta, paul.hendley@syngenta.com

CALL FOR PAPERS

The Future Role of Pesticides in Agriculture

232nd ACS National Meeting
San Francisco, CA
September 10 – 14, 2006

Purpose of Symposium

The pesticide industry has changed drastically over the past decade, consolidating and becoming more innovative. The pace of technological advancement in all fields of science is increasing exponentially. Mapping of genomes and the use of computational and combinatorial chemistry has improved the speed and efficiency of product development. Newly developed products must be highly effective while minimizing the risk to humans and the environment. What does the future hold for the industry, and what are the most important new developments in pesticide or crop protection science? What are the regulatory, economic, and socioeconomic factors that are driving or limiting the development of new products? What are the primary research needs for the next decade and beyond?

Suggested Topics

Emerging technologies in crop protection and production
Advances in computational and combinatorial chemistry
Developments in transgenic crops and biopesticides
Newly discovered modes of action and resistance mechanisms
The effect of socioeconomics on agricultural practices
Reducing the ecological impacts of modern agricultural practices
Development of products to protect human health in developing countries
Agriculture in Sub-Saharan Africa and other tropical regions of the world
When the Food is Safe – What Next?

For additional information contact the organizers

Steven J. Lehotay, USDA Agricultural Research Service; Eastern Regional Research Center; Wyndmoor, PA; (215)233-6433; slehotay@errc.ars.usda.gov
Laura L. McConnell, USDA Agricultural Research Service; Beltsville Agricultural Research Center; Beltsville, MD; (301)504-6298; mcconnel@ba.ars.usda.gov

CALL FOR PAPERS

Weed Resistance to Herbicides

232nd ACS National Meeting
San Francisco, CA
September 10 – 14, 2006

Suggested Topics

Mechanisms of herbicide resistance
Molecular biology of resistance
Ecology of resistance expansion

Potential joint sponsorships

Weed Science Society
American Society of Plant Biologists

For additional information contact the organizers

R. Douglas Sammons,
Monsanto Company
700 Chesterfield Parkway West
St. Louis, MO 63017
636-737-7325, FAX: 636-737-7670
r.douglas.sammons@monsanto.com

William P. Ridley
Monsanto Company
800 N. Lindbergh Blvd.
St. Louis, MO 63167
314-694-8441, FAX: 314-694-8562
william.p.ridley@monsanto.com

11th IUPAC
International Congress of Pesticide Chemistry
Kobe, JAPAN

Evolution for Crop Protection, Public Health and Environmental Safety

Sunday, August 6 to Friday, August 11, 2006
Kobe International Conference Center and Kobe Portopia Hotel

Come join more than 1500 of the world's leading agrochemical scientists and regulators for this premiere event which is held every four years.

CALL FOR POSTERS

As for all IUPAC Congresses, the primary means of scientific presentation at the Congress will be via extensive poster sessions.

Poster abstract submissions are due no later than March 31, 2006, and will be accepted for the following categories:

----Synthesis and Discovery
----Mode of Action, Resistance Mechanism and New Targets
----New Technologies for Lead Generation and Drug Design
----Biopesticides and Transgenic Crops
----New Technologies for Pest Control
----Resistance Management and IPM
----Metabolism and Toxicology
----Formulation and Application Technology
----Residue Analysis
----Human Exposure
----Environmental Fate and Ecological Effects
----Risk Assessment and Regulation
----Monitoring and Remediation of POPs

Instructions for poster submissions and registration details are available via the Congress website:
http://www.iupac2006.jtbcom.co.jp

POSTER AWARDS

Excellence of poster presentations will be recognized in several ways. A series of "best poster" awards will be presented on behalf of both the Pesticide Science Society of Japan and IUPAC, with a top prize of JPY 100,000. In addition, some poster authors will be invited to participate in short oral presentation/discussion sessions during the Congress.

FURTHER INFORMATION

Kobe Congress Secretariat
Prof. Mitsuru Sasaki
Kobe University, Japan
Tel: +81-78-803-5919
email: msasaki@kobe-u.ac.jp

IUPAC Advisory Committee on Crop Protection Chemistry
Dr. Ken Racke
Dow AgroSciences, USA
Tel: +1-317-337-4654
email: kracke@dow.com

CONGRATULATIONS FROM THE DIVISION OF AGROCHEMICALS

On April 6, 2006, Dr. Hideo Ohkawa will be an awardee of the Japan Prize of Agricultural Science. The award title is Gene Engineering of Cytochrome P450 monooxygenase-Mediated Biotransformation. His work is cutting edge on Biomonitoring and Bioremediation of Environmental Chemicals.

Dr. Ohkawa is a Professor and Director of the Research Center for Green Science at Fukuyama University in Fukuyama, Hiroshima, Japan. He has made unique contributions in the field of both agrochemicals and gene engineering of cytochrome P450 in industry, with Sumitomo Chemical Co. for 19 years, as well as in his academic position, with Kobe University for 13 years. His research includes stereoselectivity of organophosphorus insecticides, biodegradability of pyrethroid insecticides, gene engineering of cytochrome P450 monooxygenases, and engineered antibodies specific to environmental chemicals.

Dr. Ohkawa is chairperson of the organizing committee, 11th IUPAC International Congress of Pesticide Chemistry, Kobe, Japan, August 6-11, 2006

NOTES FROM A PAST, PAST CHAIR

Rodney Bennett

The Agrochemical Division is continuing its display of ACS Symposia Books and Literature at various local, regional and special meetings and conferences that are being held throughout the USA and worldwide.

These displays help to provide “Added Value” to our current and future membership. Not only are members and non-members able to review a wide selection of recent books and literature, but they also receive a 20% discount (offered through ACS-Oxford Books) for any books purchased during the meeting on these book order forms.

Our most recent Book Display was at the Pacifichem 2005 Meeting in Hawaii. This was a very successful meeting. **The papers and attendance were great!**

If you have any suggestions for future meetings where our book and literature displays may be appropriate, please contact the division chair.

OFFICERS AND COMMITTEES OF THE DIVISION OF AGROCHEMICALS

AGRO DIVISION OFFICERS			
Division Chair			
Dr. R. Donald Wauchope	(229) 386-3892	FAX: (229) 386-7215	don.wauchope@tifton.usda.gov
Program Chair			
Dr. Laura L. McConnell	(301) 504-6298	FAX: (301) 504-5048	mcconnel@ba.ars.usda.gov
Vice Chair			
not available at press time			
Secretary			
Dr. Aldos C. Barefoot	(302) 451-5856	FAX: (302) 351-6656	aldos.c.barefoot@usa.dupont.com
Treasurer			
Dr. Terry Spittler,	(315) 787-2283	FAX: (315) 787-2320	tds2@cornell.edu

EXECUTIVE COMMITTEE		
2004-2006	**2005-2007**	**2006-2008**
Dr. Randy Weintraub	Dr. Matthew Brooks	*not available at press time*
Dr. Jeff Bloomquist	Dr. Marty Kovacs	
Dr. John Clark	Dr. Ann Lemley	
Dr. Kenneth Racke	Dr. Teresa Wehner	
Dr. Pamela Rice	Dr. Paul Zubkoff	

COUNCILORS		
2004-2007	**2005-2008**	**2006-2009**
Dr. Barrington Cross	Dr. Joel Coats	*not available at press time*
Dr. Judd Nelson, Alternate	Dr. Nancy Ragsdale, Alternate	

DIVISION COMMITTEES

AGRO Program Committee			
Dr. Rodney Bennett, **Chair**	(610) 878-6476	FAX: (610) 878-6475	rodney.bennett@cerexagri.com
Dr. Allan Felsot, **Co-Chair**	(509) 372-7365	FAX: (509) 372-7460	afelsot@tricity.wsu.edu
	Members		
Dr. Don Baker	Dr. Allan Felsot		Dr. Judd Nelson
Dr. John M. Clark	Dr. Rick Grazzini		Dr. James Seiber
Dr. Joel Coats	Dr. Robert Hollingworth		Dr. David J. Smith
Dr. Barry Cross	Dr. Mark S. Lee		
FERT Program Committee			
Mr. William Hall, **Chair**	(863) 428-7161		Wlhall@imcglobal.com
Nominating Committee			
Dr. Allan Felsot, **Chair**	(509) 372-7365	FAX: (509) 372-7460	afelsot@tricity.wsu.edu
Dr. Rodney Bennett	(610) 878-6476	FAX: (610) 878-6475	rodney.bennett@cerexagri.com
Dr. Jeanette Van Emon	(702) 798-2154	(702) 798-2243	vanemon.jeanette@epa.gov
Awards Committee			
Dr. James Seiber, **Chair**	(510) 559-5600		jseiber@pw.usda.gov
	Members		
Dr. John Casida	Dr. Robert Hollingworth		Dr. Willis Wheeler
Dr. Fritz Fuehr	Dr. Ralph Mumma		Dr. Izuru Yamamoto
Dr. Bruce Hammock	Dr. Nancy Ragsdale		
Dr. Ernest Hodgson	Dr. Jim Tumlinson		

Membership Committee			
Dr. Randy Weintraub, **Co-Chair**	(610) 878-6472	FAX: (610) 878-6475	Randy.weintraub@cerexagri.com
Dr. Christopher Peterson, **Co-Chair**	(662) 338-3104	FAX: (662) 338-3101	cjpeterson@fs.fed.us
Publications Committee			
Dr. Cathleen Hapeman, **Chair**	(301) 504-6451	FAX: (301) 504-5048	hapemanc@ba.ars.usda.gov
Members			
Dr. Rodney Bennett	Dr. Laura McConnell		Dr. Terry Spittler
Dr. John Clark	Dr. Judd Nelson		
Finance Committee			
Dr. Barry Cross, **Chair**			bcross@weidel.com
Dr. Terry Spittler, **Ex Officio**	(814) 272-1039	FAX: (814) 272-1019	ROM1@psu.edu
Members			
Dr. Don Baker	Dr. Ralph Mumma		
Dr. Willa Garner	Dr. Willis Wheeler		
Hospitality Committee			
Coffee Hour			
Dr. Terry Spittler	(315) 787-2283	FAX: (315) 787-2320	tds2@cornell.edu
Dr. Liliana Schwartz	(302) 451-5842	FAX: (302) 451-5943	Liliana.schwartz@usa.dupont.com
Social Hour			
Dr. Aldos Barefoot	(302) 451-5856	FAX: (302) 451-5941	aldos.c.barefoot@usa.dupont.com
Dr. Jeff Jenkins	(541) 737-5993	FAX: (541) 737-5001	Jeffrey.jenkins@orst.edu

SPECIAL COMMITTEES

Bylaws Committee			
Dr. Don Baker, **Chair**	(925) 254-108		
Committee on Patron Relations			
Dr. Luis Ruzo, **Chair**	(510) 741-3000	FAX: (510) 741-3030	l.ruzo@ptrlwest.com
Mr. Paul Giesler			
Future Special Conference Committee			
Dr. John M. Clark, **Chair**	(413) 545-1052		
Dr. Robert Hollingworth			
Public Relations Committee			
Dr. Jeff Jenkins, **Chair**	(541) 737-5993	FAX: (541) 737-5001	Jeffrey.jenkins@orst.edu
Members			
Dr. Ann Lemley	Dr. James Seiber		
Education Committee			
Dr. John Johnston, **Chair**	(970) 266-6082	FAX: (970) 266-6089	John.J.Johnston@aphis.usda.gov
Dr. John Bourke, **Investment Coordinator**			
Dr. Allan S. Felsot, **Young Scientist Recognition Coordinator**	(509) 372-7365	FAX: (509) 372-7460	afelsot@tricity.wsu.edu
Members			
Dr. David Barnekow	Dr. J. Harold Falls		Dr. Judd O. Nelson
Dr. John M. Clark	Dr. Vincent Hebert		Dr. Jack R. Plimmer
Dr. Joel Coats	Dr. Ann Lemley		Dr. Nancy Ragsdale
Dr. Barry Cross	Dr. Glenn Miller		Dr. William Ridley
Long Range Planning Committee (Ad Hoc)			
Dr. Don Wauchope	(229) 386-3892	(229) 386-7215	don@tifton.usda.gov
Members			
Dr. Dave Barnakow	Dr. Rod Bennett		Dr. Allan Felsot

DIVISION OF PESTICIDE CHEMISTRY/AGROCHEMICALS
PAST CHAIRS

1969	Donald G. Crosby
1970	Elvins Y. Spencer
1971	Wendell Phillips
1972	Philip C. Kearney
1973	Roger C. Blinn
1974	Charles H. Van Middelem
1975	Henry F. Enos
1976	Julius J. Menn
1977	James P. Minyard
1978	Gerald G. Still
1979	S.K. Bandal
1980	Jack R. Plimmer
1981	Marguerite L. Leng
1982	Gino J. Marco
1983	G. Wayne Ivie
1984	Robert M. Hollingworth
1985	John Harvey, Jr.
1986	Henry J. Dishburger
1987	James N. Seiber
1988	Paul A. Hedin
1989	Gustave K. Kohn
1990	Willa Garner
1991	Guy Paulson
1992	Joel Coats
1993	Larry Ballantine
1994	Nancy N. Ragsdale
1995	Don Baker
1996	Barry Cross
1997	Willis Wheeler
1998	Judd O. Nelson
1999	Richard Honeycutt
2000	Ann Lemley
2001	Jeffery Jenkins
2002	Terry Spittler
2003	Jeanette Van Emon
2004	Rodney Bennett
2005	Allan Felsot
2006	Donald Wauchope

WELCOME TO NEW AGRO MEMBERS

August 2005

Imtiaz Ahmad
Riyad A Alokab
John James Beck
Bill Bennett
Maurizio Bruno
Jeffrey N Clark
Alireza Ghiasvand
Suzan Golbabapour
Hongchao Guo
Clarence G Hermansky
Scott C Hicks
Peggy Leviton
Zhongmao Mi
Olukunle O Okunoye
Kelsey Prihoda
Joseph F Prochaska
Mira M Pucarevic
Lawal Olakunle Razaq
Noriyasu Sakamoto
Atalay Sokmen
Stefan Waliszewski
Vera L Williams
Koichi Yoneyama

MINUTES FROM THE AGROCHEMICAL DIVISION ANNUAL MEETING AND COMBINED GOVERNANCE MEETING

230th ACS National Meeting – Washington, DC
Sunday, August 28, 2005, 5:08 – 9:20 p.m.
Allan Felsot – Chair

Program Planning
Allan Felsot called the meeting to order at 5:08 pm. Members in attendance introduced themselves, and the Secretary passed around a sign up sheet. The sign-up sheet is retained in the archives. Terry Spittler asked for volunteers for the AGRO desk to answer questions about the division, sell books, and seek new members. The meeting continued with a short presentation by ACS books and Oxford Press.

ACS and Oxford hope to make better use of our contacts via our website and email communications. On-line orders will be possible, but access will be restricted to AGRO members who are eligible for a 40% discount on symposium books.

A new version of the ACS style guide will appear on-line. On-line access to symposium series volumes is in the future. ACS will pilot a program with two volumes.

Washington Update – Don Wauchope
There are 152 papers & posters in 11 symposia. The program includes the International Award Symposium (sponsored by DuPont) in honor of Janice Chambers; symposia on *Invasive Species, Agrochemical Residue and Metabolism, Chiral Pesticides, Turfgrass: Pesticide Exposure Assessment, Biological Pest Control, QSA;* and general paper and poster sessions. The Graduate Student Poster Session has12 posters, and FERT organized a symposium on *New Nutrient and Soil Amendment Products*

Don advised the incoming and Program Chair that the most important job of the program chair is to work with the symposium organizers and insure that they are doing their jobs. The symposium chairs are expected to work with speakers. ACS requires programming to go over all 5 days of the meeting. It may be possible to collaborate with another division so that the programming of both divisions goes over all five days.

Atlanta Program 231st ACS Natl Meeting, March 26 – March 30, 2006 – Laura McConnell
There are 3 symposia proposed for Atlanta. OASys is open with a deadline of end of November 21, 2005 for abstracts. The International Award symposium (sponsored by DuPont) will be held in honor of Joel Coats. The program will include the Young Scientist Research Award Competition. The symposium on advances in pesticide environmental fate has been moved to Atlanta to minimize overlap with other symposia planned for Washington. Ralph Mumma is working on a symposium on plant stress and chemical responses or on plant insect interactions. Ralph requested additional funding to support travel and registration expenses for invited speakers.

Action: Rod Bennett moved to increase funding for Ralph's symposium by $1000 to be used at the discretion of the symposium organizers.
Motion passed.

Action: Don Wauchope will communicate to Laura McConnell ways to access additional funding for registrations through ACS Divisional Activities Committee

San Francisco and Beyond – Laura McConnell
Metabolites of Veterinary Chemicals in the Environment – Organizers: Joel Coats, Keri Henderson. Teresa Wehner will suggest industry speakers and alternative language for the symposium title.

ACS International Award for Research in Agrochemicals: Symposium in Honor of Isamu Yamaguchi – Organizers: Nancy Ragsdale, USDA-ARS; James Seiber, USDA-ARS

Agricultural Impacts on Air Quality: Pesticides, Pharmaceuticals, PM, VOCs, and Odors – Organizers: Laura McConnell; Cathleen Hapeman; James Seiber, USDA-ARS, Michael Majewski, USGS

Agrochemical Education Awards For Graduate Student Travel: Research Poster Presentations –Organizer: J. J. Johnston, USDA

Alternatives to the Use of Methyl Bromide in Pre-Plant Soil Fumigation and Stored Commodities – Organizers: Luis Ruzo, PTRL West; Rodney Bennett, Cerexagri

The Future Role of Pesticides in Agriculture – Organizers: Stephen J. Lehotay, Laura McConnell, USDA-ARS

Toxicology and Ecotoxicology of Glyphosate – Organizers: Allan Felsot, Donna Farmer

Sterling B. Hendricks Memorial Lecture – Organizer: Kim Kaplan, USDA-ARS

Weed Resistance to Herbicides – Organizers: William Ridley, Douglas R. Sammons

Workshop on Non-Dietary Risk Assessment – Organizer: Angelina Duggan. Goal is to have 50 speakers with 150 people in the audience. Allan Felsot is working with ACS on the registration fees for the workshop.

Special Programming
Pan Pacific – 2008
Al Barefoot and Barry Cross met with Nancy Todd to begin preparations for the conference. Nancy has a proposal for the venue that we will accept. We have confirmed the interest of the Pesticide Science Society of Japan and will develop a budget for approval by the two sponsoring organizations.

2006 IUPAC International Pesticide Congress
Ken Racke gave a presentation on IUPAC, the status of the 2006 Congress and a proposal for hosting the 12th Congress. The 2006 Congress will be held in Kobe and has been organized into topics in three areas with workshops, poster sessions and an exhibition. Further information can be found at http://www.iupac2006.jtbcom.co.jp/. There are 5-6 sessions left that could be used by the Division if it chose to organize a session.

Action: Don Wauchope proposed a contribution of $5000 to support attendance at IUPAC 2006 of scientists from developing countries. We will have a booth to advertise the Division.
Motion passed. Allan directed the Treasurer to pay $5000 to the Pesticide Science Society of Japan.

Action: Don Wauchope and Laura McConnell will prepare a proposal for sponsoring an AGRO Division session. Rod moved that we form a committee to prepare a recommendation for funding a lunch session at IUPAC.

IUPAC 2010
Allan presented a proposal for hosting the 2010 congress. The proposal includes theme, dates, estimated size, venue, housing, co-sponsoring organizations, Chair and members of Organizing Committee, Chair of Scientific Committee, provisional budget (including planning funds). The IUPAC decision will come by the end of the year.

Action: Allan will revise the proposal and distribute to the organizing committee.

AGRO sponsored workshop in China
Phil Lee proposed a workshop in Beijing, August, 2006 following IUPAC meeting. The host would be the Chinese Agricultural University. Topics would include technology for evaluating pesticide risks, benefits; food safety, formulation and application technology, laws and regulations governing pesticide use, MRL harmonization, future interactions between China and US. The AGRO delegation should consist of representatives from government, industry, and academia. No action was taken on participation by the Division.

Executive Committee
Update from The Chair
Allan Felsot reported on his experiences at SETAC and proposed further interactions.

Secretary's Report – Aldos Barefoot
Al reported that he forwards membership lists for AGRO to membership chair and lists for FERT to subdivision officers. He worked with the membership chair to collect information from activity lists during the past two years. The secretary scheduled the business meeting and provided an agenda and announcement

for distribution via the email list. He asked for reports in an electronic form prior to the meeting for display during the business meeting and to facilitate preparation of the minutes after the meeting.

Treasurer's Report – Terry Spittler
Terry provided a summary of the AGRO financial status. The Treasurer usually must take $10,000-15,000 from the endowment each year to cover AGRO expenses.

Fertilizer Subdivision Report – Bill Hall
FERT has had good programming and stable membership but has difficulty finding leaders. Bill sees little future for the subdivision unless other people step forward to work as officers and symposium chairs. The industry is down to two phosphate companies in Florida. FERT has one session on perchlorate at this meeting.

Action: Bill will prepare a letter for FERT members soliciting views on continuing as a subdivision. He expects a vote at the Atlanta meeting.

Councilor's Report – Joel Coats, Barry Cross
Barry and Joel reported that the ACS had a budget surplus projected to be $3 million in 2005. The membership is down by about 1%. Future risks to the income stream include costs for publications and national meetings. By 2008, there may be significant difficulties with finances. ACS is looking for ways to diversify income and cut programs. M&E voted to increased registration fees for meetings. Member fees will be $305. The Divisional Activities Committee is looking at various alternatives to current division structure including mergers.

Publications Committee – Cathleen Hapeman
Cathleen Hapeman has taken over the publication chair from Laura McConnell. The Division expressed its appreciation to Laura for her diligent work and welcomed Cathleen to her new responsibilities. The PICOGRAM was successfully published for the Fall 2005 meeting with 5 half-page ads and 6 full-page ads. The names of new division members were added just after the message from the Division Chair. The list of previous award winners returns in this issue as requested. This list will be run at least once a year.

Thank you to Allan Felsot and Judy Rupert for working very hard to maintain the new AGRO division website. Allan and Judy would appreciate any feedback on the organization or information included.

E-mail Communications System – Tim Ballard, Terry Spittler
Tim has located a programmer to work on a directory and will hire a programmer to review and update email addresses.

Awards Committee – Jim Seiber
DuPont will sponsor the International Award for Joel Coats at the Spring 2006 meeting. The International Award sponsored by BASF will be presented to Isamu Yamaguchi in Fall 2006.

Actions: Ann Lemley will provide a nomination form for the Fellow Award. Al Barefoot will check minutes and update the list of Fellows.

Nancy Ragsdale noted that the Sterling Hendricks award will be given to Don Sparks.

Finance Committee – Barry Cross
Barry reported that we have approximately $200,000 in working funds and $400,000 in the education fund with an average return of 4-5% Barry noted that these funds should be used to advance the activities of the Division.

Hospitality Committee – Jeff Jenkins, Terry Spittler
Ten companies supported the coffee lounge for this meeting and contributed $2000. Please take note of the sponsors listed on the board at the AGRO desk and thank them for their contributions.

On Tuesday evening at 6:00PM the AGRO Division and Pest Management Science Journal will co-sponsor graduate student awards presentations and the introduction of Steve Duke – new North American Editor – Pest Management Science Journal. All members, speakers and spouses are invited: Room 206, Washington DC Convention Center.

Nominating Committee – Rodney Bennett (2006)
Rod has been unable to find two candidates for Vice-Chair as required by the by-laws. There is no candidate for the Secretary's office. He continues to look for candidates, but the election has been delayed indefinitely.

Education Committee – John Johnston
There are 12 students from 8 universities participating in the Graduate Student Research Poster Competition in Washington, DC. The next Young Scientists Research Award will be presented at the 2006 meeting in Atlanta. Applications should be sent to Allan Felsot. The deadline for entries is November 5.

Bylaws Committee – Don Baker
Don continues to look for needed changes in the By-Laws. The deadline for changes is October 1.

AGRO Division Procedures Manual – Nancy Ragsdale
Nancy has completed work on the manual and sought volunteers to edit the final version. The Division extends its sincere appreciation to Willa Garner and Nancy Ragsdale for their work on the manual. Rod Bennett and Chris Peterson agreed to edit the final.

New Business
Allan solicited volunteers for an ACS Joint Board-Council on Science. Nominations are due by October 3.

John Clark suggested that the budget discussion should be moved to the start of the meeting so that we know what money we have available. Also the mission of the Division should be read.

Don Wauchope proposed that standing committee reports should be submitted ahead of the business meeting and distributed prior to the meeting. Don also proposed a conference on the future of the Agrochemicals Division.

Allan suggested that the Agrochemicals Division should consider a change in name to better reflect the scientific disciplines represented by the members. He proposed Division of Crop and Public Health Protection.

Allan adjourned the meeting at 9:20 pm.

Respectfully submitted,
Aldos C. Barefoot, Secretary

TREASURER'S REPORT

Terry D Spittler – Treasurer

DIVISION OF AGROCHEMICALS - ACS
ANNUAL MEETING, AUGUST 30, 2005
WASHINGTON, DC

DATE	7/31/04	12/31/04	7/31/05
CHECKING ACCOUNT *	$ 31,856	$ 2,472	$ 17,178
INVESTMENTS			
Spectrum Income (T. R. Price)	172,999	184,436	187,213
Prime Reserve (T. R. Price)	16,015	16,097	1,159*
Educational Trust (JPMorgan)	394,441	444,502	466,712
ACS Investment Pool	19,391	20,632	21,012
TOTAL INVESTMENTS	**604,847**	**665,667**	**676,096**
TOTAL ASSETS	**636,703**	**668,139**	**693,274**

*$15,000 transferred to checking 3/05

*BYLAWS OF THE DIVISION OF AGROCHEMICALS of the AMERICAN CHEMICAL SOCIETY

Bylaw I. Name and Objects

Section 1. The name of this organization shall be the Division of Agrochemicals (hereinafter referred to as "the Division") of the AMERICAN CHEMICAL SOCIETY (hereinafter referred to as "the SOCIETY").

Section 2. The objects of the Division shall be to bring together persons particularly interested in agrochemicals, to consider all scientific aspects of chemistry relevant to the control of pests of agricultural or public health significance and to other methods for enhancing or modifying agricultural productivity, to develop and improve the professional stature of chemists with these interests, and to render whatever service it may to the scientific and lay communities on the topic of agrochemicals.

Bylaw II. Members and Affiliates

Section 1. Membership in the Division shall be open to all members of the SOCIETY. Application for membership shall be made in writing to the Secretary of the Division and shall be accompanied by one year's dues.

Section 2. A National Affiliate of the SOCIETY may apply to the Secretary to become a National Affiliate of the Division. Provided that Division dues established for National Affiliates are paid, a National Affiliate shall have all the privileges of membership in the Division except those of voting for or holding an elective position of the Division, voting on articles of incorporation or bylaws of the Division, or serving as a voting member of its Executive Committee.

Section 3. The Division may accept Division Affiliates who are not members or National Affiliates of the SOCIETY but who wish to participate in the activities of the Division. Such affiliates shall be entitled to all the privileges of membership in the Division save those withheld by the Bylaws of the SOCIETY.

Section 4. Members may resign their membership in the Division by submitting their resignation, in writing, to the Secretary during the year for which their dues are paid.

Section 5. The name of any member of the Division who is in arrears in payment of dues by as much as two years shall be stricken from the rolls. A member dropped for nonpayment of dues may be reinstated upon payment of arrearages.

Section 6. Affiliates shall retain affiliate status only so long as payment is made of Division dues. An affiliate's name is to be stricken from the rolls as soon as the affiliate is in arrears in the payment of dues.

Section 7. The anniversary date of Division members and National Affiliates of the Division shall coincide with their anniversary dates in the SOCIETY.

Bylaw III. Officers and Councilors

Section 1. The officers of the Division shall be a Chair, a Chair-Elect, a Vice-Chair, a Secretary, and a Treasurer. The Chair-Elect shall automatically succeed to the office of Chair upon expiration of the latter's term of office or if this office becomes vacant. The Vice-Chair shall automatically succeed to the office of Chair-Elect upon expiration of the latter's term of office or if this office becomes vacant. The offices of Secretary and of Treasurer may be held by one individual. Only MEMBERS are eligible to hold elective positions.

Section 2. The duties of the Chair shall be to preside at meetings of the Executive Committee, to carry into effect the decisions and recommendations of the Committee, to preside at stated meetings of the Division, and to appoint all committees except as otherwise provided.

Section 3. The duties of the Chair-Elect shall be to serve in the absence of the Chair of the Division and to act as Chair of the Program Committee.

Section 4. The duties of the Vice-Chair shall be to serve in the absence of the Chair-Elect and to act as Assistant Chair of the Program Committee, with particular emphasis on planning and developing technical programs.

Section 5. The duties of the Secretary shall be to keep minutes of all meetings of the Division and of the Executive Committee; to keep a roll of Division members and affiliates and to submit the same annually to the Executive Director of the SOCIETY for verification as provided in the Bylaws of the ~~national~~ SOCIETY; to conduct the business correspondence of the Division as assigned to the Secretary by the Chair or by the Executive Committee; to prepare and submit an annual report of Division activities to the SOCIETY as required in the SOCIETY's Bylaws; to perform such other duties as may, from time to time, be assigned ~~him~~ by the Chair or Executive Committee, or required by the SOCIETY's Bylaws. The Secretary shall send to each member, at least two weeks before the regular meetings of the Division, abstracts of papers to be presented at said meetings.

Section 6. The Treasurer shall act as custodian of the funds of the Division, collect dues and other revenues, and pay the bills of the Division after the same have been authorized by the Executive Committee. The Treasurer shall maintain accurate records of

*__Effective__
Approved, as amended, by the Committee on Constitution and Bylaws, acting for the Council of the American Chemical Society.

receipts and disbursements and shall submit a report of the financial condition of the Division at the annual meeting of the Division. The Treasurer shall furnish a surety bond, the premium for which shall be paid from Division funds.

Section 7. Councilors and Alternate Councilors shall represent the Division on the Council of the SOCIETY as provided in the Constitution and Bylaws of the SOCIETY.

Section 8. The Division shall have an Executive Committee, which shall consist of the officers of the Division, the Immediate Past Chair of the Division, and the Chairs, the Chairs-Elect, Councilors and Alternate Councilors, Vice-Chairs, and Immediate Past Chairs of Subdivisions, if any, and fifteen (15) Members-at-Large. The Chair of the Division shall serve as Chair of the Executive Committee.

Section 9. The officers of the Division other than the Chair and the Chair-Elect, Division Councilors and Alternate Councilors, shall be elected by mail ballot as described elsewhere in these bylaws.

Section 10. At the annual meeting of the Division, the Executive Committee shall appoint a Nominating Committee consisting of at least three members, one of whom shall be the Immediate Past Chair of the Division, who shall serve as Chair of this Committee. This Committee shall nominate two candidates for the office of Vice-Chair, and at least ten (10) candidates for the positions as Members-at-Large to be filled on the Executive Committee. This Committee shall nominate candidates for each of the following offices to be filled: Councilor, Alternate Councilor, Secretary, and Treasurer. This Committee shall submit a report in writing to the Chair of the Division for preparation of the ballot to be mailed to the membership. Additional nominations may be made in writing by any group of at least five members and presented to the Chair of the Division not less than three months prior to the fall meeting.

Section 11. Officers and Members-at-Large shall be elected by the members and Division Affiliates of the Division. Only members of the Division may vote for Councilors and Alternate Councilors. The Secretary or other designated officer of the Division shall prepare an election ballot on which shall appear the names in order chosen by lot of all candidates nominated and found willing to serve. In all Division balloting conducted by mail, the ballot voted shall be sealed, without voter identification, in a special ballot envelope. The special ballot envelope, bearing no voter identification, shall be enclosed in a larger envelope upon which—or within which, on a separate slip—shall be hand-inscribed the name of the member voting; the larger envelope shall then be sealed and forwarded to the Chair of the Tellers Committee. The Tellers shall count the ballots thus received, using the list of members provided by the Secretary to verify the eligibility of all those voting. Any ballot envelope not validated by the voter's accompanying hand-inscribed name shall be rejected. The Secretary shall set and announce in advance of the balloting the interval during which ballots must be received to be counted; this interval shall not be less than four nor more than seven weeks following the ballot mailing. The Tellers Committee, appointed by the Chair of the Division, shall be responsible for counting all valid ballots received within the interval and shall certify the results to the Secretary, who shall in turn certify the results to the SOCIETY, the elected officers, and the Division. Elections are to be by plurality, should there be more than two candidates for an office. Resolution of a tie vote shall be made by the Executive Committee.

Section 12. The Chair, the Chair-Elect, the Vice-Chair, the Secretary, and the Treasurer of the Division shall serve for one year or until their successors are elected.

Section 13. The terms of office of the Members-at-Large of the Executive Committee shall be three years. Five Members-at-Large shall be elected each year.

Section 14. The terms of Councilors and Alternate Councilors and all officers excluding the Chair, Chair-Elect, and Vice-Chair, shall begin on January 1 following their election. The terms for Chair, Chair-Elect, and Vice-Chair shall begin at the conclusion of the fall meeting of the SOCIETY.

Section 15. Vacancies in offices other than Chair and Chair-Elect shall be filled by the Executive Committee. Incumbents so selected shall serve until the next regular election.

Bylaw IV. Councilors

The Division shall have Councilors and Alternate Councilors whose terms of office shall be three years. Alternate Councilors shall serve only for specific meetings of the Council when a Councilor is not able to attend.

Bylaw V. Committees

Section 1. There shall be a Program Committee, consisting of three or more members, one of whom shall be the Chair-Elect of the Division, who shall serve as Chair of the Committee. A second member of the Committee shall be the Vice-Chair. The Program Committee shall have the entire responsibility for organizing the program of papers for all Division meetings. It shall work cooperatively with other Divisions of the SOCIETY and other bodies in planning joint sessions and symposia of mutual and timely interest.

Section 2. There shall be a Membership Committee of three or more members. This Committee shall aggressively promote membership in the Division by members of the SOCIETY.

Section 3. There shall be a Finance Committee of two or more members. This Committee shall audit the accounts of the Treasurer prior to the business meeting of the Division and report its findings at the annual meeting. This Committee shall advise the Executive Committee on financial resources.

Section 4. There shall be an Awards Committee of at least six members. This Committee shall maintain and develop the Division and International Awards Programs.

Section 5. There shall be a Hospitality Committee of at least two members. This Committee will direct social events in coordination with other committees and maintain a hospitality table at Division meetings.

Section 6. There shall be a Publication Committee of at least three members. This Committee shall be responsible for publication of the Division newsletter, *PICOGRAM,* and other Division publications.

Section 7. Special committees may be appointed to consider, conduct, and report upon such special matters as may be delegated to them.

Section 8. Except where otherwise provided, committee appointments shall be made by the Chair, with the advice and approval of the Executive Committee.

Bylaw VI. Dues

Section 1. Members of the Division shall pay annual dues, the exact amount to be decided by the Executive Committee. Dues are payable in advance. Members who have been granted emeritus status by the SOCIETY and who are interested in the work of the Division shall be granted all privileges of Division membership without the payment of annual dues.

Section 2. Affiliates shall pay annual dues of $2.00 more than members except that Division Affiliates who are regularly matriculated students specializing in a chemical science shall pay annual dues of an amount to be decided by the Executive Committee.

Bylaw VII. Subdivisions

Section 1. Composition. The Division may sponsor Subdivisions devoted to specialized fields within the area of Division interest. Membership in the Division shall be a requirement for membership in a Subdivision.

Section 2. Formation. Formation or discontinuance of a Subdivision shall be at the discretion of the Executive Committee of the Division. Steps to initiate a Subdivision may be made by petition of a group of Division members to the Executive Committee or by the action of the Executive Committee. The scope of the activities of any Subdivision shall be defined by the Executive Committee.

Section 3. Officers. Upon approval of the formation of a Subdivision, the Executive Committee of the Division shall appoint a Chair, Chair-Elect, Vice-Chair, and Secretary for the Subdivision. The Chair-Elect shall assume the office of Chair after one year. In succeeding years the Subdivision shall elect at the annual meeting a Chair-Elect and a Secretary. The Chair, a Chair-Elect, and Secretary shall constitute a Steering Committee for the Subdivision. This Steering Committee shall report through the Chair of the Subdivision and be responsible to the Executive Committee of the Division, of which Subdivision Chairs shall be members *ex officio*.

Section 4. Funds. The necessary expenses for each Subdivision shall be authorized by the Executive Committee of the Division from Division funds and shall be paid by the Treasurer of the Division upon the usual authentication.

Bylaw VIII. Meetings

Section 1. There shall be a meeting of the Division at each national meeting of the SOCIETY unless the Executive Committee votes otherwise, provided the requirements for a minimum number of meetings as specified in the SOCIETY Bylaws shall be met.

Section 2. The annual meeting of the Division shall be held at the fall meeting of the SOCIETY. Division business requiring vote of the membership shall be conducted only at this meeting, except as provided elsewhere in these bylaws. However, voting by the membership may be conducted by mail or as directed by the Executive Committee.

Section 3. Special meetings of the Division may be called by the Executive Committee, provided notice is given to the membership in writing or by publication in *Chemical & Engineering News* at least two months in advance. Special meetings may not be held within one month before or after a national meeting.

Section 4. Fifteen (15) members of the Division shall constitute a quorum for the conduct of business.

Section 5. The fee for registration at any special meeting shall be decided by the Executive Committee in accordance with the Bylaws of the SOCIETY.

Section 6. The rules of order in the conduct of Division meetings not specifically provided in these bylaws or in the SOCIETY's documents shall be the most recent edition of *Robert's Rules of Order, Newly Revised.*

Bylaw IX. Papers

Section 1. The Program Committee may approve or reject papers submitted for presentation before any meeting of the Division.

Section 2. The rules for papers presented before meetings of the SOCIETY as outlined in the Bylaws and Regulations of the SOCIETY shall govern the Division.

Bylaw X. Amendments

Section 1. These bylaws may be amended at any annual meeting of the Division by a two-thirds (2/3) vote of the members present. All amendments shall be submitted in writing to the Secretary at least sixty (60) days prior to the meeting. Upon approval of the Executive Committee, the Secretary shall send the text of the proposed amendment to the members of the Division at least thirty (30) days prior to the annual meeting.

Section 2. Amendments shall become effective upon approval by the Committee on Constitution and Bylaws, acting for the Council, unless a later date is specified.

Bylaw XI. Dissolution

Upon the dissolution of the Division, any assets of the Division remaining thereafter shall be conveyed to such organization then existent as is dedicated to objects similar to those of the Division and the AMERICAN CHEMICAL SOCIETY, or to the AMERICAN CHEMICAL SOCIETY, so long as whichever organization is selected by the governing body of the Division at the time of dissolution shall be exempt under Section 501(c)(3) of the Internal Revenue Code of 1954 as amended or under such successor provision of the Code as may be in effect at the time of the Division's dissolution.

PROGRAM
American Chemical Society
DIVISION OF AGROCHEMICALS

231st ACS National Meeting
Atlanta, Georgia, March 26 – 30, 2006
L. L. McConnell, *Program Chair*

OTHER SYMPOSIA OF INTEREST:

Healthy Products from Agricultural By-products (see *AGFD*, Sun)

Advances in Surface-Mediated Transformation in Environmental Systems (see *ENVR*, Wed, Thu)

Creative Advances in Environmental Science and Technology (in memory of Joseph J. Breen): In Honor of Rene P. Schwarzenbach (see *ENVR*, Tue, Wed)

Environmental Occurrence, Fate and Transport of Chemicals and Nanomaterials (see *ENVR*, Sun, Mon, Tue, Wed)

Occurrence, Chemistry, Toxicity and Remediation of Arsenic (see *ENVR*, Sun, Mon, Wed)

ACS Award for Encouraging Women into Careers in the Chemical Sciences - Symposium in Honor of Cathy Middlecamp (see *WCC*, Mon)

Building Analytical Chemistry Communities through the Web and Beyond (see *ANYL*, Wed)

Secondary Equilibrium in HPLC and Capillary Electrophoresis (see *ANYL*, Wed)

Do You Know What You're Breathing? Exposure Assessment Strategies in Research Labs (see *CHAS*, Sun)

Ensuring the Effective Patent Protection of Innovative Molecular Technology (see *CHAL*, Tue)

Trends in Patenting and Protecting Your Chemical Inventions (see *CHAL*, Mon)

Joe Breen Student Poster Session in Green Chemistry (Sponsored by Green Chemistry and Engineering Sub-Division) (see *IEC*, Sun)

Nanotechnology and the Environment (Sponsored by Advanced Materials and Nanotechnology Sub-Division) (see *IEC*, Sun, Mon, Tue, Wed)

SOCIAL EVENTS:
Award Banquet: Mon 6:00 – 9:00 pm
Reservations required (see p. 13)
Social Hour: Tue 6:00 – 8:00 pm
See invitation on p. 4
Westin Peachtree

BUSINESS MEETING:
Division Business Meeting: Sun 5:00 – 10:00 pm

SUNDAY MORNING

Section A: Georgia World Congress Center -- C103

Young Scientist Pre- and Post-Doctoral Research Award Symposium
Cosponsored with Dow AgroSciences, and WCC
A. S. Felsot, *Organizer, Presiding*

8:30 — Introductory Remarks.

8:35 —1. Water vs. formic acid as additives in the microwave assisted synthesis of novel formamide fungicides. M. M. Bobylev, L. I. Bobyleva, **A. C. Watts**, C. L. Black, B. Provencher, C. J. Dion

9:00 —2. Nanocrystalline calcium oxide as catalyst for the preparation of biodiesel from vegetable oils at room temperature. **C. R. Venkat Reddy**, J. G. Verkade

9:25 —3. Determination of the physical constants of ferric and ferrous complexes of phytic acid by proton nuclear magnetic resonance and resistance of complexes to enzymatic dephosphoralation by Aspergillus Ficcum. **L. Heighton**, W. Schmidt, R. L. Siefert

9:50 —4. A structural study of the larvicidal cholesterol oxidase at atomic resolution. **A. Y. Lyubimov**, A. Vrielink

10:15 — Intermission.

10:30 —5. Spatial and contact repellency of four essential oils to mosquitoes. **G. E. Schultz**, J. R. Coats

10:55 —6. Novel non-electrophoretic proteomics for identifying resistance genes in a Salmonella model. **B. H. van den Berg**, S. J. Lamont, W. E. Holmes, S. C. Burgess

11:20 —7. Detection and mechanisms of pediculicide resistance in the human head louse, Pediculus capitis. **K. S. Yoon**, J. P. Strycharz, J. R. Gao, S. H. Lee, J. M. Clark

SUNDAY AFTERNOON

Section A Georgia World Congress Center -- C103

Young Scientist Pre- and Post-Doctoral Research Award Symposium
Cosponsored with Dow AgroSciences, and WCC
A. S. Felsot, *Organizer, Presiding*

1:30 —8. Human-health risk assessment for West Nile Virus and insecticides used in mosquito management. **P. A. Macedo**, R. K. Peterson, R. Davis

1:55 —9. Induction of glutathione transferase activity in plants after tetracycline treatment. **M. H. Farkas**, J. O. Berry, D. S. Aga

2:20 —10. Environmental fate of tylosin and analysis of immunological cross-reactivity among tylosin-related compounds. **D. Hu**, K. L. D. Henderson, J. Coats

2:45 —11. Metabolomics and proteomics of carbary and other N-methyl carbamate insecticides by Burkholderia sp. C3. **J -S. Seo**, Y -S. Keum, S - E. Lee, Y. Hu, Q. X. Li

3:10 — Intermission.

3:25 —12. Enantioselective degradation of pyrethroids in soils and sediments. **S. Qin**, J. Gan

3:50 —13. Examination of the fate of Bt Cry1F protein in an aerobic aquatic system. **K. R. Prihoda**, J. R. Coats

4:15 —14. Real-time measurement of DDT fluxes from a historically treated agricultural soil in Canada. **P. B. Kurt-Karakus**, T. F. Bidleman, R. Staebler, K. C. Jones

MONDAY MORNING

Section A: Georgia World Congress Center -- C103

ACS International Award for Research in Agrochemicals: Symposium in Honor of Joel Coats Natural Products and Mode of Action
Cosponsored with DuPont Crop Protection
R. O. Mumma and P. Rice, *Organizers*
E. L. Arthur, *Organizer, Presiding*

8:00 — Introduction and Award Presentation, R. Mumma and J. Seiber.

8:10 —15. Current and future challenges in agrochemicals research. **J. R. Coats**

8:35 —16. Studies on the mode of action and resistance to newer insecticides acting on neuronal ion channels. **R. M. Hollingworth**, M. Ahmad, J. Tan, D. L. Ryan

9:00 —17. Evidence for an isobutylamide associated with host-plant resistance to western flower thrips in chrysanthemum. **R. Tsao**

9:25 —18. The pyrethrins: The never ending story. **J. M. Clark**

9:50 —19. Positioning pesticides based on plant essential oils for agricultural applications. **M. B. Isman**

10:15 —20. Escalating use of neonicotinoids in the corn and soybean agroecosystem: A sound IPM and IRM strategy? **M. E. Gray**

10:40 —21. Agricultural pharmaceuticals in the environment: Fate, effects, and risks. **K. R. Solomon**, L. Lissemore, R. A. Brain, P. K. Sibley, S. A. Mabury

11:05 —22. Imidacloprid longevity, mobility and toxicity to termites in vegetated and non-vegetated soil columns. **C. J. Peterson**

MONDAY AFTERNOON

Section A: Georgia World Congress Center -- C103

ACS International Award for Research in Agrochemicals: Symposium in Honor of Joel Coats Environmental Toxicology, Chemistry, and Risk Assessment
Cosponsored with DuPont Crop Protection
R. O. Mumma and E. A. Arthur, *Organizers*
P. Rice, *Organizer, Presiding*

1:15 —23. Environmental fate of Spiromesifen. **E. L. Arthur**, P. Babczinski

1:40 —24. Scientific needs of ecological risk assessment in a regulatory context. **S. P. Bradbury**, T. C. J. Feijtel, C. J. Van Leeuwen

2:05 —25. Progress and pitfalls in harmonized approaches for the assessment and regulation of agrochemicals. **K. D. Racke**

2:30 —26. Mitigation of pesticide transport with runoff from agricultural and non-agricultural systems using management practices. **P. J. Rice**, B. P. Horgan, C. J. Hapeman, L. L. McConnell, A. M. Sadeghi

2:55 —27. Fate and behavior of bacteria and veterinary antibiotics resulting from swine manure applications in Iowa. **T. B. Moorman**, W. Lertpaitoonpan, K. L. Henderson, S. K. Ong, M. D. Tomer, J. R. Coats

3:20 —28. Bioavailability and toxicity of explosive metabolites to soil invertebrates. **T. A. Anderson**, C. M. Freitag, B. Zhang

3:45 —29. Using interspecies correlation estimates (ICE) to predict protective environmental concentrations. **S. D. Dyer**, D. J. Versteeg, S. E. Belanger, J. G. Chaney, F. L. Mayer

4:10 —30. Effects of biota on pesticide fate and the effects of pesticide fate on biota. **J. Belden**

4:35 —31. Short and long range atmospheric transport and deposition of pesticide residues to non-target areas: A global issue. **P. Rice**

MONDAY EVENING

Section A: Georgia World Congress Center Exhibit Hall B4

Sci-Mix
L. L. McConnell, *Organizer*

8:00 - 10:00
59-71. See subsequent listings.

TUESDAY MORNING

Section A: Georgia World Congress Center -- C103

Advances in Pesticide Environmental Fate and Exposure Assessments
Modeling and Predictive Tools
E. A. Arthur, P. J. Rice, K. Balu, G. C. Miller, and D. G. Dyer, *Organizers*
A. C. Barefoot and P. Rice, *Organizers, Presiding*

8:30 — Introductory Remarks.

8:45 —32. Predicting transport and the control of plant pests after soil fumigation. **S. R. Yates**, R. Dungan

9:15 —33. Acid and base equilibrium constants for pesticide active ingredients: Molecular connectivity calculations vs. experimental values. **J. Edwards**, R. D. Wauchope

9:45 —34. PLUS: A regional groundwater assessment and ranking tool. **S. H. Jackson**, P. Hendley, J. M. Cheplick

10:15 — Intermission.

10:30 —35. FOCUS guidance on the calculation of persistence and degradation kinetic endpoints of metabolites. **C. Beigel**, J. Boesten, R. L. Jones, K. Aden, S. Beulke, M. Dust, J. Dyson, I. Fomsgaard, S. Karlsson, J. O. Magrans, O. Richter, G. Soulas, T. van der Linden

11:00 —36. Overprediction of erosion in standard regulatory modeling scenarios for agrochemicals. **P. Hendley**, S. H. Jackson, W. Chen, M. H. Russell, G. J. Sabbagh, T. S. Ramanarayanan, U. Wanner

11:30 — Begin Surface Water and Runoff Topic Session.

11:31 —37. REMM: A simulation model for remediation of pesticide contaminants in runoff and leachate water by riparian buffer systems. **R. D. Wauchope**, R. G. Williams, R. Lowrance, G. Vellidis, P. Gay

Section B: Georgia World Congress Center -- C104

General Oral Presentations
L. L. McConnell, *Organizer, Presiding*

8:00 —38. Sulfadimethoxine degradation in manure as affected by initial concentration, moisture, and temperature. **Q. Wang**, S. Yates

8:20 —39. Fate of selected herbicides in a plasticulture system. **W. K. Vencill**, T. L. Grey, S. Culpepper

8:40 —40. A study of contamination level of organophosphorus pesticides and farmer's knowledge, perception, practices in rural India. **A. Taneja**, M. Bhanti, D. S. Seth, N. K. Sharma

9:00 —41. Adsorption of glyphosate in montmorillonite interlayers: Theoretical calculations. **L. Tribe**, G. A. Khoury, T. Gehris, M. dos Santos Afonso

9:20 — Intermission.

9:35 —42. Effectiveness and toxicity of LSP® product on white shrimp (Litopeneaus vannemei) and growth inhibition of Lemma sp (Duckweed). **W. J. Jimenez C Sr.**, D. Martucci U Sr., **C. M. Garcia Sr.**

9:55 —43. Development of underground bait stations and other baiting strategies for squirrels to reduce potential non-target hazards. **T. Ellis**, T. Salmon

10:15 —44. Monitoring of nano-level concentrations of persistent organic pollutants (POPs) in transgenic plants. **H. Ohkawa**, H. Inui, Y. Tanaka

10:35 —45. Isolation and identification of mosquito bite-deterrent constituents from leaves of Callicarpa americana and Callicarpa japonica. **C. L. Cantrell**, J. A. Klun, C. T. Bryson, S. O. Duke

TUESDAY AFTERNOON

Section A: Georgia World Congress Center -- C103

Advances in Pesticide Environmental Fate and Exposure Assessments: Surface Water and Runoff
A. C. Barefoot, P. Rice, K. Balu, G. C. Miller, and D. G. Dyer, *Organizers*
E. A. Arthur and P. J. Rice, *Organizers, Presiding*

1:30 —46. Bioremediation of herbicides in vegetative buffers: Considerations for design and species selection. **C -H. Lin**, R. N. Lerch, H. G. Garrett, M. F. George

2:00 —47. Utility of incorporating a conservative tracer and plastic tarp in turf runoff assessments. **J. H. Massey**, P. A. Ampim, M. C. Smith, R. Maiers, A. B. Johnson

2:30 —48. Influence of assumed rainfall intensity and duration on simulations of pesticide transport in artificially subsurface drained fields. **G. Fox**, S. H. Pulijala, G. J. Sabbagh

3:00 — Intermission.

3:15 —49. Effect of constant vs. variable intensity simulated rainfall on cotton preemergence herbicide runoff. **T. L. Potter**, C. C. Truman, D. D. Bosch, T. C. Strickland, C. W. Bednarz, T. M. Webster

3:45 —50. Exposure assessment of 2,4-D herbicide for aquatic uses. **K. Balu**, A. M. Ritter, M. W. Williams

4:15 —51. Dispersion and dissipation of 2,4-D residues associated with aquatic uses. **B. R. Jacobson**, **K. Balu**, M. W. Williams, L. E. Hammond, R. D. Wilson

Section B: Georgia World Congress Center -- C104

General Oral Presentations
L. L. McConnell, *Organizer, Presiding*

1:30 —52. Effectiveness of Canker Killer™ on the inhibition of the growth of Xanthomonas axonopodis pv. citri. bacteria (Citrus Canker). **W. J. Jimenez C**, D. Martucci U Sr., **C. M. Garcia Sr.**

1:50 —53. Use of SDS-PAGE to determine protein variability of soybean cyst nematode populations in Tennessee. **S. C. Goheen**, J. L. Wilgar, N. Castro, T. Simmons, P. Donald

2:10 —54. Detoxification of copper fungicide using unmodified and EDTA modified cellulosic material. **J. C. Igwe**, B. C. Gbaruko, A. A. Abia, A. K. Ekwuruke

2:30 —55. Learning how *Helicoverpa zea* copes with xenobiotics threats from molecular modeling comparison of CYP6B8v1 and CYP321A1. **T -L. Chiu**, Z. Wen, M. A. Schuler

2:50 — Intermission.

3:05 —56. Change of chemical composition of soil and plants during soil mulching. **T. C. Goziev**

3:25 —57. Estimation of possibility of use hard domestic city waste as an organic fertilizer. **S. B. Pardaev**

3:45 —58. Change of humus condition of soils in Zeravshan Valley in Uzbekistan under the influence of anthropogenic factors. **F. K. Khoshimov**, T. K. Ortikov, S. A. Khazratkulov

Section C: Georgia World Congress Center -- C110

General Posters
L. L. McConnell, *Organizer, Presiding*

1:30 - 4:30

59. Considerations for the prediction of crop protection product residues in crop commodities. **C. M. Kennedy**, S. F. McEuen, N. Snyder, J. J. Anderson

60. Effect of ultrasound on mechanics properties and light transmittance of soy protein isolate film. J. Xiong, Z -S. Song, **L. Li**

61. Effects of legume on the lead and copper dissolution. C. Green, **C. Kim**

62. Degradation of chloroacetanilide herbicides with plant cytochrome P450. H. Liu, **W. Liu**

63. Mechanisms of reactions between carbamates and model N-halamine compounds. **X. Fei**, G. Sun

64. Synthesis and properties of pyrazoles and isoxazoles designed from fipronil and related fiproles. **R. E. Sammelson**, J. C. Dunham, S. L. Pertler, A. D. Richardson

65. Photodegradation of 2-mercaptobenzothiazole disulfide. C. Parkanyi, **Z. Zajickova**

66. Enantioselective biodegradation of metalaxyl by sewage sludge and screening bacteria*. S. Chen, **W. Liu**, A. Zhang

67. Supramolecular catalysis of malathion hydrolysis by alfa-cyclodextrin. A. Zhang, X. Cai, **W. Liu**

68. Catalytic methanolysis of P=S pesticides with palladacycles. **Z -L. Lu**, A. Neverov, S. Brown

69. Zeolite catalysis of various seed oils for the production of biodiesel and chemicals. **T. Augustine**, **N. S. Chong**, J. M. Childress, B. M. Armstrong, K. Hill

70. Synthesis of wood-silica sol-acrylate hybrid composites. H. Guo, Y. Li, **Q. Wang**

71. Composite wood by infiltration silica sol/styrene-acrylic emulsion system. H. Guo, Y. Li, **Q. Wang**

WEDNESDAY MORNING

Section A: Georgia World Congress Center -- C103

Advances in Pesticide Environmental Fate and Exposure Assessments
Dissipation and Degradation of Chemicals
E. A. Arthur, A. C. Barefoot, P. J. Rice, P. Rice, and K. Balu, *Organizers*
G. Miller and D. G. Dyer, *Organizers, Presiding*

8:30 —72. Dissipation of the herbicide isoxaflutole in agricultural soils. **S. Papiernik**, W. C. Koskinen

9:00 —73. Genomics and biochemistry of atrazine biodegradation by soil bacteria. **M. J. Sadowsky**

9:30 —74. Isolation and metabolic and proteomic characterization of aromatic degrading bacteria from contaminated soil. **Q. X. Li**, J -S. Seo, Y -S. Keum, R. Harada, S -E. Lee, Y. Hu

10:00 — Intermission.

10:15 —75. Effect of temperature and pH on the microbial reductive transformation of pentachloronitrobenzene. **D. Okutman Tas**, S. G. Pavlostathis

10:45 —76. Studies on the aquatic chemical fate of formetanate hydrochloride. **C. Muhoro**

11:15 —77. Kinetic model of 2,4-D degradation in soil slurry by anodic Fenton treatment. **L. Kong**, A. T. Lemley

WEDNESDAY AFTERNOON

Section A: Georgia World Congress Center -- C103

Advances in Pesticide Environmental Fate and Exposure Assessments
Degradation and Sorption of Chemicals
E. A. Arthur, A. C. Barefoot, P. J. Rice, G. Miller, and D. G. Dyer, *Organizers*
P. Rice and K. Balu, *Organizers, Presiding*

1:30 —78. Photooxidation of chloride to perchlorate in the presence of desert soils and titanium dioxide. **G. C. Miller**, V. Lepak, R. Kempley, J. Awadh

2:00 —79. Drinking water treatment study procedures for evaluation of pesticide exposure. **A. R. Dominic**, E. L. Arthur, D. G. Dyer

2:30 —80. Study design for aged desorption and rate of degradation experiments and the use of the $K_{aged\ des}$ and DT_{50} in modeling of predicted environmental concentrations in groundwater. **K. Malekani**, A. Huber, P. Sarff

3:00 — Intermission.

3:15 —81. Improved methods for measuring K_d for strongly hydrophobic pesticides. **S. Bondarenko**, S. Kavanaugh, J. Gan

3:45 —82. Mobility determination of an experimental compound as a seed treatment in a greenhouse soil column study. **J. J. Shepherd**, E. L. Arthur, A. R. Dominic, G. J. Sabbagh, D. G. Dyer

4:15 —83. Modeling the fate and nonideal transport of pesticide from a slow-release, pesticide treated seed in a laboratory soil column. **G. J. Sabbagh**, G. Fox, L. Ma, R. Malone, E. L. Arthur, D. G. Dyer

Section B: Georgia World Congress Center -- C104

Plant Response to Biotic Insults
J. H. Tumlinson and R. O. Mumma, *Organizers*
G. W. Felton, *Organizer, Presiding*

1:30 — Introductory Remarks. **R. Mumma**.

1:40 —84. Chemical signals that regulate tritrophic plant-insect interactions. **J. H. Tumlinson**

2:10 —85. Production of semiochemical and allelobiotic agents as a consequence of aphid feeding. **J. A. Pickett**

2:40 —86. Chemical communication across tritrophic systems. **C. M. De Moraes**, M. C. Mescher

3:10 — Intermission.

3:25 —87. Volatile-induced plant defense responses in corn: Signals, effects, and specificity. **J. Engelberth**

3:55 —88. Herbivore-induced root signals help entomopathogenic nematodes to control maize pests. **T. C. J. Turlings**

4:25 —89. Chemical signals that mediate inducible responses in plants. H. Zhang, P. Payton, D. Kornyeyev, M. A. Farag, C -M. Ryu, **P. W. Pare**

THURSDAY MORNING

Section A: Georgia World Congress Center -- C103

Plant Response to Biotic Insults
R. O. Mumma and G. W. Felton, *Organizers*
J. H. Tumlinson, *Organizer, Presiding*

8:30 —90. Roles of herbivore-induced terpenes in multitrophic interactions between plants, herbivores and their enemies. **J. Degenhardt**, T. G. Köllner, C. Schnee, J. Gershenzon

9:00 —91. Role of jasmonic acid in the regulation of plant antiherbivore defense. **G. A. Howe**, H. Chen, A. L. Schilmiller

9:30 —92. Caterpillar secretions suppress the defensive genes of the tomato plant. **G. W. Felton**

10:00 — Intermission.

10:15 —93. Reactive electrophile species as signals in biotic and abiotic stress. **L. Mène-Saffrané**, E. E. Farmer

10:45 —94. Glucosinolate breakdown during Arabidopsis-aphid interactions. **G. Jander**, C. Barth, J. H. Kim

11:15 —95. A novel maize cysteine protease mobilized as an active defense against herbivores. **D. S. Luthe**, T. Pechan, S. Mohan, R. Shivaji, L. Lopez, A. Camas, E. Bassford, S. Ozkan, P. Ma, W. P. Williams

Section B: Georgia World Congress Center -- C104

Advances in Pesticide Environmental Fate and Exposure Assessments: Surface Water: Modeling, Monitoring, and Assessments
A. C. Barefoot, P. Rice, K. Balu, G. C. Miller, and D. G. Dyer, *Organizers*
P. J. Rice and E. A. Arthur, *Organizers, Presiding*

8:00 —96. Conceptual models for understanding agrochemical occurrence in surface waters. **P. Hendley**, R. D. Wauchope

8:30 —97. Site selection for surface water sampling locations in smaller watersheds using a GIS based procedure. **J. R. Trask**, C. M. Harbourt, C. Holmes, P. Hendley

9:00 —98. Spatial approaches to estimating pesticide spray drift exposure to surface water at the landscape level using GIS and remote sensing. **C. Holmes**, R. Williams

9:30 — Intermission.

9:45 —99. Using spatial and temporal pesticide concentration data to assess potential hazards to sensitive aquatic ecosystems in South Florida. **C. J. Hapeman**, R. D. Smith, J. A. Harman-Fetcho, L. L. McConnell, T. L. Potter, C. P. Rice, A. M. Sadeghi, K. A. Sefton, B. A. Schaffer, R. Curry, K. Bialek

10:15 —100. Comparison between the transport of isoxaflutole and its degradates to triazine and acetanilide herbicides in ten Iowa rivers. **M. T. Meyer**, S. J. Kalkoff, E. A. Scribner

10:45 —101. A multi-state small-stream and weather monitoring network: Equipment design, data handling, and reliability. **N. J. Snyder**, C. M. Harbourt, L. S. Carver, P. Hendley, G. Burnett

11:15 —102. Pesticide fate and exposure assessments: Perspectives from state regulatory agencies. **K. L. Armbrust**, J. E. Zachmann

THURSDAY AFTERNOON

Section A: Georgia World Congress Center -- C103

Plant Response to Biotic Insults
J. H. Tumlinson and G. W. Felton, *Organizers*
R. O. Mumma, *Presiding*

1:30 —103. Challenges in using plant responses to develop new methods of disease control. **A. Tally**

2:00 —104. Genomic approaches to develop nematode resistance. **S. Chaudhuri**

2:30 — Intermission.

2:45 —105. Harpin, a bacterial protein that functions in plant disease and stimulates plant defense. **S. V. Beer**

3:15 —106. Molecular and functional dissection of nematode resistance in tomato. **I. Kaloshian**

DIVISION OF AGROCHEMICALS

1. Water vs. formic acid as additives in the microwave assisted synthesis of novel formamide fungicides

Mikhail M. Bobylev, Lioudmila I. Bobyleva, ***Amanda C. Watts****, Courtney L. Black, Brittany Provencher, and Chad J. Dion, Department of Chemistry, Minot State University, 500 University Avenue West, Minot, ND 58707, mikhail.bobylev@minotstateu.edu, amanda.watts@minotstateu.edu*

Formamides are a novel group of fungicides discovered by Bobylev *et al*. Some of these fungicides were obtained via Leuckart reaction, where formamide was used both as a reagent and a solvent. Earlier it was discovered that the reaction proceeded faster in the presence of water or formic acid. Specifically, 10% (v/v) of either of the additives allowed the reaction to be completed in less than an hour at 180 - 190°C. Later it was found that with microwave assistance the reaction can be completed in 3 minutes at 200°C. However, a high pressure of 150 - 200 PSI developed in this reaction. In an attempt to lower the pressure, formic acid and water were reinvestigated as additives to microwave assisted reaction. It was found that 10% (v/v) of water or 2.5% (v/v) of formic acid lowered pressure to about 70 PSI. Further attempts to lower pressure will examine other options.

2. Nanocrystalline calcium oxide as catalyst for the preparation of biodiesel from vegetable oils at room temperature

Chinta Reddy Venkat Reddy *and John G. Verkade, Department of Chemistry, Iowa State University, Iowa, IA 50011, jverkade@iastate.edu*

A promising route for the production of biodiesel via transesterification of soybean oil (SBO) with methanol in quantitative yields up to 92% at room temperature has been developed using nanocrystalline calcium oxide as the catalyst. In contrast, laboratory grade CaO showed poor activity (2% conversion) under the same conditions. The soybean oil/methanol ratio under our conditions is 1:27. The catalyst was used for 8 cycles before it became deactivated. This may be attributed to the presence of organic impurities or adventitious moisture in the SBO. Additionally, THF under our conditions acts as a phase-merging agent that speeds up the transesterification. Nano oxides such as ZnO, TiO_2, and CeO_2 are inactive in this transesterification; nano MgO gave only 6% conversion. The biodiesel produced by this protocol meets the ASTM D-874 sulfated ash requirement for biodiesel.

3. Determination of the physical constants of ferric and ferrous complexes of phytic acid by proton nuclear magnetic resonance and resistance of complexes to enzymatic dephosphoralation by Aspergillus Ficcum

Lynne Heighton*, Department of Chemistry and Biochemistry, University of Maryland, 0107 Chemistry Building, University of Maryland, College Park, MD 20742-4454, Fax: 301-314-9121, heighton@umd.edu, Walter Schmidt, Beltsville Agricultural Research Center, USDA-Agricultural Research Service, and Ronald L. Siefert, Chesapeake Biological Laboratory, University of Maryland Center for Environmental Science*

Ferric and ferrous complexes of phytic acid (myo-inositol hexaphosphate) were investigated by proton nuclear magnetic resonance spectroscopy and enzymatic dephosphoralation with the enzyme *Aspergillus Ficcum* (E.C.3.1.3.8). Kinetic and equilibrium constants were derived from proton nuclear magnetic resonance spectra. Ferrous phytate was found to form quickly and persist for a longer period then ferric phytate. Kinetic constants for phytic acid, ferric phytate and ferrous phytate were 4.69, 4.21 and 3.95 x $10^{-6}s^{-1}$ respectively. The experimental equilibrium constant for the dissociation of ferric phytate (K_d) was 1.11 and the equilibrium dissociation constant for ferrous phytate was 1.19. The formation constants (k_f) were 0.899 and 0.843 for ferric and ferrous phytate respectively. The percentage of phosphate recovered from enzymatic dephosphoralation of ferrous and ferric complexes of phytic acid of 1:0, 1:0.6, 1:0.3 and 1:0.1 supported the magnitude of the kinetic and equilibrium constants.

4. A structural study of the larvicidal cholesterol oxidase at atomic resolution

Artem Y. Lyubimov *and Alice Vrielink, Department of Chemistry and Biochemistry, University of California Santa Cruz, 1156 High Street, Santa Cruz, CA 95064, Fax: 831 5024186, lyubimov@biology.ucsc.edu*

Cholesterol oxidase (CO) is a flavoenzyme which catalyzes oxidation and isomerization of membrane cholesterol, leading to lysis of the cell membrane. Thus, CO has been identified as a virulence factor in pathogenic bacteria such as Mycobacterium tuberculosis and Rhodococcus equi. In addition, CO is studied as a potential larvicidal agent against Coeloptera. As part of a structural study of the mechanisms of CO catalysis and inhibition, a series of atomic resolution structures have been solved. The resultant high quality electron density maps reveal mutually exclusive alternate positions for a number of active site amino acid sidechains, as well as the positions for individual catalytically important hydrogen atoms. This study has improved our understanding of the subtle phenomena in the CO active site, which, while not detectable at lower resolutions, nevertheless have a substantial effect on enzymatic catalysis.

5. Spatial and contact repellency of four essential oils to mosquitoes

Gretchen E. Schultz*, Department of Entomology, Iowa State University, 112 Insectary, Ames, IA 50011, Fax: 515-294-4757, gre@iastate.edu, and J. R. Coats, Pesticide Toxicology Laboratory, Department of Entomology, Iowa State University*

Numerous botanical extracts have been identified as having insecticidal or repellent activity, but research is needed to recognize the chemical characteristics (i.e. structure-activity) of active ingredients that relate to potency and mode of action. Essential oils and mixtures that differ in effectiveness of spatial and contact mosquito repellency were evaluated. Treatments included essential oils of catnip (*Nepeta cataria*), Osage orange (*Maclura pomiferia*), amyris (*Amyris balsamifera*), and siam-wood (*Fokienia hodginsii*). Elemol, a sesquiterpene found in Osage orange essential oil was also evaluated. All test solutions were compared to the commercial standard repellents, N,N-diethyl-*m*-toluamide (DEET) and citronellal. Data collected was on the repellent effects of two mosquito species in laboratory bioassays. Results show that catnip essential oil acts a potent spatial repellent whereas elemol and DEET are more effective contact repellents. Mixtures that included monoterpenes (good spatial repellents) and sesquiterpenes (good contact repellents) resulted in good efficacy via both modes of action.

6. Novel non-electrophoretic proteomics for identifying resistance genes in a Salmonella model

***Bart HJ. van den Berg**, Department of Basic Sciences, Mississippi State University, Box 6100, Mississippi State, MS 39762, bvandenberg@cvm.msstate.edu, Susan J. Lamont, Department of Animal Sciences, Iowa State University, William E. Holmes, Mississippi State Chemical Laboratory, Mississippi State University, and Shane C. Burgess, Center for Veterinary Medicine, Mississippi State University*

Selection for specific host resistance genes is a rational means to achieve consumer and environmentally-friendly Salmonella control in food animals. We aim to identify chicken gene products involved in genetic resistance or susceptibility to *S. enteritidis* (SE) infection using genetic crosses, proteomics and frozen spleens. Spleen is both a representative lymphoid tissue and a major site of SE colonization. We have developed a novel method for doing high throughput non-electrophoretic proteomics on frozen tissues and also an HPLC method for compensating for the massive amounts of hemoglobin from erythrocytes in spleens. These methods are supplying data that is being used, in conjunction with Gene Ontology functional gene annotation, to identify key regulatory genes of SE resistance and susceptibility. The laws of evolutionary conservation suggests that the regulatory genes that we identify may also shed light human susceptibility or resistance to salmonella infection.

7. Detection and mechanisms of pediculicide resistance in the human head louse, Pediculus capitis

***Kyong S. Yoon**[1], Joseph P. Strycharz[1], Jian Rong Gao[2], Si Hyeock Lee[3], and John M. Clark[2]. (1) School of Public Health and Health Sciences, University of Massachusetts, 639 North Pleasant Street, N418 Morrill 1, Amherst, MA 01003, kyoon@vasci.umass.edu, (2) Department of Veterinary and Animal Science, University of Massachusetts, (3) School of Agricultural Biotechnology, Seoul National University*

The human head louse (*Pediculus capitis, De Geer*) is an ectoparasitic insect that causes prevalent infestations of humans in the United States (U.S.) and other developed countries despite the availability of many over-the-counter pediculicidal products. Current research addresses four critical aspects to control pediculosis and manage resistance in head lice. First, a practical *in vitro* rearing system enabled the large-scale maintenance of pediculicide-susceptible and –resistant strains of human head lice. Second, controlled and reproducible bioassays using head lice collected from various regions of the U.S. and worldwide showed widespread resistance to permethrin and PBO-synergized pyrethrum and cross-resistance to DDT. Third, the genetic linkage analysis determined high correlation between permethrin resistance and kdr-type mutations at the population level. Fourth, electrophysiological investigations revealed that three point mutations identified in the voltage-sensitive sodium channel ?–subunit gene of permethrin-resistant head lice abolished permethrin sensitivity of house fly Vssc1 when expressed in Xenopus oocyte.

8. Human-health risk assessment for West Nile Virus and insecticides used in mosquito management

***Paula A Macedo**[1], Robert K Peterson[2], and Ryan Davis[2]. (1) Land Resources and Environmental Sciences, Montana state University, 334 Leon Johnson Hall, PO Box 173120, Bozeman, MT 59717, Fax: 406-994-3933, pmacedo@montana.edu, (2) Land Resources and Environmental Sciences, Montana State University*

West Nile Virus (WNV) has become a major public health concern in North America since 1999. Management of mosquitoes which vector WNV has necessitated using insecticides in areas where they traditionally have not been used or have been used less. This has resulted in concerns by the public about the risks from insecticide use. The objective of this study was to use reasonable worst-case risk assessment methodologies to evaluate human-health risks for WNV and the insecticides most commonly used to control adult mosquitoes. We evaluated documented health effects from WNV infection and determined potential population risks. We determined potential acute and subchronic multi-route residential exposures from each insecticide for several human subgroups. We then compared potential insecticide exposures to toxicological and regulatory effect levels. Results from our risk assessment and the current weight of scientific evidence suggest that human-health risks from residential exposure to mosquito insecticides are low and are not likely to exceed levels of concern.

9. Induction of glutathione transferase activity in plants after tetracycline treatment

***Michael H. Farkas**[1], James O. Berry[1], and Diana S. Aga[2]. (1) Department of Biological Sciences, State University of New York at Buffalo, 109 Cooke Hall, Buffalo, NY 14260, mhfarkas@buffalo.edu, (2) Department of Chemistry, University at Buffalo, The State University of New York*

Cropland application of animal wastes containing nonmetabolized antibiotics is a major source of pharmaceutical contamination in the environment. We investigated the effect of antibiotics on the proteins expressed in corn (*Zea mays*) and pinto beans (*Phaseolus vulgaris*) treated with tetracyclines. SDS-polyacrylamide gel electrophoresis indicated an increase in levels of proteins corresponding in size to glutathione s-transferases (GST) in extracts from treated plants. Similarly, GST activities increased 2-fold in root extracts from maize within one day after antibiotic treatment. Further characterization of the plant extracts by immunoaffinity chromatography together with electrospray mass spectrometry revealed that the induced protein has a molecular mass of 25500, providing additional confirmation of identity. GST enzymes play a major role in plant detoxification of many xenobiotics. While the mechanism by which such enhancement occurs is not known, these studies suggest the possibility of using agricultural plants as a natural means to remediate antibiotic-contaminated soils.

10. Environmental fate of tylosin and analysis of immunological cross-reactivity among tylosin-related compounds

***Dingfei Hu**, Keri L. D. Henderson, and Joel Coats, Department of Entomology, Iowa State University, 115 Insectary, Ames, IA 50011-3140, dingfei@iastate.edu*

Through application of organic fertilizers to farmland, antibiotic tylosin enters into the environment, and its degradation products may form to some extent. The objective of this study was to investigate their fate in the environment and determine their immunological cross-reactivity. Tylosin A, B, C, D, iso tylosin 1 and iso tylosin 2 were identified by HPLC/MS, and their specificities of immunological reactivity compared with tylosin A (set as 100.0%) are 25.7, 19.4, 105.8, 121.2 and 45.5%, respectively.Tylosin A is degraded more rapidly in the light than in the dark in ultrapure and pond water, with dissipation half lives of 201 and 1771 days, respectively. Slight increase of tylosin B and formation of two photo-reaction isomers of tylosin A were found under light exposure. Tylosin C and D are relatively stable except in the light in ultrapure water. No biotic degradation was observed by comparing results of dissipation pattern in sterilized and unsterilized pond water.

11. Metabolomics and proteomics of carbary and other N-methyl carbamate insecticides by Burkholderia sp. C3

***Jong-Su Seo**, Young-Soo Keum, Sung-Eun Lee, Yuting Hu, and Qing X Li, Department of Molecular Biosciences and Bioengineering, University of Hawaii, 1955 East-West Rd., Honolulu, HI 96822, Fax: 808-956-3542, jongs@hawaii.edu*

Burkholderia sp. C3 isolated from a petroleum contaminated site in Hilo, Hawaii can utilize various chemicals including polycyclic aromatic hydrocarbons (PAHs), heterocyclic aromatics, and 2,4-D. Strain C3 can decompose nine N-methyl carbamate insecticides with rates varying from 20% for pirimicarb up to 100% for aminocarb, carbaryl, and xylylcarb within 14 days. Eight metabolites of carbary including 1-naphthol, protocatechuate and catechol were identified. Hydrolytic cleavage of N-methylcarbamyl group as the major degradation pathway in all the other N-methylcarbamates and presence of several N-methylcarbamyl group metabolism enzymes suggest that carbon atoms from the N-methylcarbamyl group may be a primary growth substrate for strain C3 at least at the initial growth phase. Among several hundreds of proteins identified are alkylamine oxidase, hydroxyalkylamine utilization protein, formate acetyltransferase, PEP-protein phosphotransferase, barA proteins, heat shock proteins, oxidative stress proteins, catalase, peroxidase, glutathione synthetase and transporter proteins.

12. Enantioselective degradation of pyrethroids in soils and sediments

***Susie Qin**, Department of Environmental Sciences, University of California Riverside, Riverside, CA 92521, Fax: 951-827-3993, sqin002@student.ucr.edu, and Jay Gan, Department of Environmental Sciences, University of California*

Synthetic pyrethroids contain two or three chiral centers, making them a family of chiral pesticides with large numbers of stereoisomers. Our recent studies showed significant differences in aquatic toxicity between enantiomers from the same diastereomers. To better understand the ecotoxicological effect and fate of synthetic pyrethroids, chirality in biodegradation must also be considered. In this study, we examined enantiomer compositions of selected pyrethroids in sediment samples taken from the Newport Bay/San Diego Creek watershed in Southern California. Enantioselective degradation was often observed for bifenthrin, permethrin and other pyrethroids. We further conducted laboratory incubation experiments using single enantiomers of bifenthrin, permethrin and cypermethrin that were purified on chiral HPLC. Degradation was measured in soil and sediment under different conditions for extended time durations. Enantioselectivity in degradation was found to closely depend on the specific compound as well as experimental conditions.

13. Examination of the fate of Bt Cry1F protein in an aerobic aquatic system

***Kelsey R. Prihoda** and J. R. Coats, Pesticide Toxicology Laboratory, Department of Entomology, Iowa State University, 112 Insectary, Ames, IA 50011, Fax: 515-294-4757, kprihoda@iastate.edu*

Transgenic crops containing *Bacillus thuringiensis* (Bt) insecticidal proteins were introduced in 1996. Relatively little is known regarding Bt protein fate in the environment, especially within aquatic systems. The objectives of this study were to develop methods to investigate the degradation of transgenic Bt proteins in aquatic systems, to obtain an aquatic degradation curve for Bt Cry1F protein, and to examine the dissipation of Bt Cry1F protein in the sediment and overlying water column. Sediment and pond water were added to microcosms along with corn leaf and stalk material. There were three Cry1F treatment groups, in addition to the isoline control: corn harvested at anthesis, corn harvested at anthesis and dried, and corn harvested at senescence. Replicate microcosms were removed from the study and analyzed at days 0, 1, 3, and 7. Results indicate a rapid degradation of Cry1F in aquatic systems, with an estimated half-life between 0.4 and 0.7 day for leaf and stalk material in all three Cry1F treatment groups.

14. Real-time measurement of DDT fluxes from a historically treated agricultural soil in Canada

***Perihan B. Kurt-Karakus**[1], Terry F. Bidleman[2], Ralf Staebler[2], and Kevin C. Jones[1]. (1) Environmental Science Department, Lancaster University, Lancaster LA1 4YQ, United Kingdom, Fax: 44-1524-593985, p.kurt@lancaster.ac.uk, (2) Centre for Atmospheric Research Experiments, Environment Canada*

Organochlorine pesticide (OCP) residues in agricultural soils are of concern due to the uptake of these compounds by crops, accumulation in foodchain and reemission from soils to the atmosphere. Although it is more than two decades since the use of most OCPs was banned in agriculture in Canada, the levels in soils of some agricultural areas are still high. Volatilization of OCPs from soil is believed to be a continuing source of atmospheric contamination which must be assessed to determine the relative contributions of "legacy" residues and long-range transport from ongoing usage in other countries. Several studies have shown that OCP concentrations in air sampled directly above agricultural soils are often elevated compared to levels in ambient air. Moving from these relatively simple observations to estimating pesticide fluxes is more difficult. Models have been developed to predict pesticide emissions from agricultural soils and flux measurements have been made to determine volatilization rates of freshly applied pesticides. Nevertheless, there is no information on soil-air fluxes of well-aged OCPs which were applied many years ago. In this study, we performed the first direct measurements of fluxes of selected OCPs from soils. These were at a location last treated over two decades ago. We think this study will enable later estimates of regional fluxes and modeling to be undertaken.

15. Current and future challenges in agrochemicals research

***Joel R. Coats**, Department of Entomology, Iowa State University, Pesticide Toxicology Laboratory, Ames, IA 50011-3140, Fax: 515-294-4757, jcoats@iastate.edu*

The field of agrochemicals remains a fast-moving area of study, with numerous research challenges facing us today and tomorrow. Current investigations in our laboratory will be discussed. The environmental fate and effects of several types of agrochemicals are being investigated: conventional pesticides, natural insecticides, veterinary antibiotics, and Bt protein toxins from transgenic plants. Efforts to discover new active ingredients are focused on natural products; projects on modes of action, metabolism, and QSAR also focus principally on plant-derived insecticides and insect repellents. The outstanding research contributions of many graduate students and postdocs in this laboratory are greatly appreciated.

16. Studies on the mode of action and resistance to newer insecticides acting on neuronal ion channels

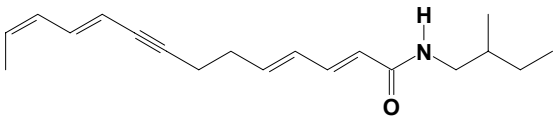
***Robert M. Hollingworth**[1], Mushtaq Ahmad[1], Jianguo Tan[1], and David L. Ryan[2]. (1) Department of Entomology and Center for Integrated Plant Systems, Michigan State University, 206 CIPS, East Lansing, MI 48824, Fax: 517-353-5598, rmholl@msu.edu, (2) Stine Haskell Research Center, DuPont Crop Protection*

A high level of resistance to indoxacarb was discovered in a field-collected strain of oblique-banded leafroller from Michigan. Resistance was antagonized by pretreatment with piperonyl butoxide. Studies on the metabolism and pharmacokinetics of indoxacarb revealed that resistance is primarily due to an enhanced level of a specific esterase that rapidly degrades indoxacarb, and, particularly, its activation product, DCJW. Synergism by piperonyl butoxide appears to depend on the ability of this compound to inhibit esterase activity *in vivo* rather than its better known capability to inhibit microsomal oxidases. Resistance to imidacloprid has been investigated in the Colorado potato beetle. The primary cause appears to be a change in the sensitivity of the central nervous system to neonicotinoids, although this is not reflected in any differences in the binding of imidacloprid to high affinity nicotinic acetylcholine receptors. Further studies on the variety of such receptors present in insects will be presented.

17. **Evidence for an isobutylamide associated with host-plant resistance to western flower thrips in chrysanthemum**

***Rong Tsao**, Food Research Program, Agriculture & Agri-Food Canada, 93 Stone Road West, Guelph, ON N1G 5C9, Canada, Fax: 519-829-2600, caor@agr.gc.ca*

Several studies have suggested the involvement of phytochemicals in host-plant resistance of Chrysanthemum morifolium against the western flower thrips, Frankliniella occidentalis, though to date no compounds have been identified as being associated with resistance. In the present study, metabolite profiles of leaves and flowers of several chrysanthemum cultivars were examined, and chemical factors for thrips resistance were investigated. The biological activity of extracts was assessed with a choice feeding test. The results indicated the presence of a compound whose concentration correlated with resistance of chrysanthemum plants against western flower thrips. Metabolite profiles of chrysanthemum cultivars may not only provide information about the resistance of a particular cultivar, but may also be useful in breeding programs for identification of resistant parent and progeny lines. The compound identified was a novel unsaturated isobutylamide, N-isobutyl-(E, E, E, Z)-2,4,10,12-tetradecatetraen-8-ynamide.



18. **The pyrethrins: The never ending story**

***John M. Clark**, Department of Veterinary and Animal Science, University of Massachusetts, N311B Morrill Science Center 1, 639 North Pleasant Street, Amherst, MA 01003, Fax: 413-577-4267, jclark@vasci.umass.edu*

The chemistry and toxicology of the pyrethrins and the evolution of the field-stable pyrethroids are certainly “success” stories in the use of natural products as insecticides. Their use has steadily increased in both agriculture and for human health protection as other insecticides are further restricted. Study of the pyrethrins/pyrethroids has greatly added to our knowledge of structure-activity relationships, xenobiotic metabolism, mode of action, resistance, and the effect of mixtures. Development of synthetic pyrethrins, the pyrethroids, led to a taxonomy based on their sign of intoxication in mammals: tremor (T)-, choreoathetosis with salivation (CS)-, or intermediate-syndromes. These findings fostered basic research on additional modes of action on targets other than neuronal voltage-sensitive sodium channels, including voltage-sensitive calcium and chloride channels. This new literature will be reviewed with regard to the relative sensitivity of these target sites, novel modes of action and their role in intoxication, and their combined effects when applied in mixtures.

19. **Positioning pesticides based on plant essential oils for agricultural applications**

***Murray B. Isman**, Faculty of Land and Food Systems, University of British Columbia, 2357 Main Mall, Suite 248, Vancouver, BC V6T 1Z4, Canada, Fax: 604-822-6394, murray.isman@ubc.ca*

Though not as potent as most conventional pesticides, certain plant essential oils have a broad spectrum of activity against pest insects and plant pathogenic fungi, and some oils have been used traditionally for many years to protect stored products. Recent investigations indicate that some of the chemical constituents of these oils interfere with the octopaminergic nervous system in insects, a target site not shared with mammals. As such, most essential oil chemicals are relatively non-toxic to laboratory animals and fish in toxicological tests, and meet the criteria for “reduced risk” pesticides. However, there are some notable exceptions. Many of these oils (or their major constituents) are widely used as flavouring agents in foods and beverages and a select few are exempt from pesticide registration in the United States. Owing to this special regulatory status along with the wide availability of essential oils from the flavour and fragrance industries, it has been possible to fast-track commercialization of essential oil-based pesticides in the U.S.A. These products have been well received by consumers for use against home and garden pests, and have made significant inroads in urban and industrial pest management where human safety is placed at a premium. In addition, they can also prove effective in certain agricultural situations, particularly for organic food production. Phytotoxicity of certain oils has even led to the development and commercialization of essential oil-based herbicides and they are under investigation as fruit-thinning agents. In this presentation, I will highlight some of the practical characteristics of these products, some useful applications, and some technical challenges to product development and use.

20. **Escalating use of neonicotinoids in the corn and soybean agroecosystem: A sound IPM and IRM strategy?**

***Michael E. Gray**, Department of Crop Sciences, University of Illinois, S-320 Turner Hall, 1102 South Goodwin Avenue, Urbana, IL 61801, Fax: 217-333-5245, megray@uiuc.edu*

Corn and soybean producers in the North Central Region of the United States are increasingly relying upon the use of two neonicotinoid insecticides applied as seed treatments: thiamethoxam, Cruiser®, (*EZ*)-3-(2-chloro-1,3-thiazol-5-ylmethyl)-5-methyl-1,3,5-oxadiazinan-4-ylidene (nitro)amine; and clothianidin, Poncho®, (*E*)-1-(2-chloro-1,3-thiazol-5-ylmethyl)-3-methyl-2-nitroguanidine. Many soil insects are target organisms for these seed treatments including the western corn rootworm, *Diabrotica virgifera virgifera* LeConte, the most important economic insect pest of corn in the United States. These seed treatments are increasingly used in the corn and soybean agroecosystem because of their convenience, perceived efficacy, competitive application costs, and their use on transgenic corn seed. Concerns have been raised by entomologists regarding the significant potential for resistance development because of the ubiquitous use of these systemic insecticides. Integrated pest management principles must be implemented to prevent or delay the onset of resistance.

21. **Agricultural pharmaceuticals in the environment: Fate, effects, and risks**

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Veterinary antimicrobials and pharmaceuticals (VMPs) may enter the environment through use in agricultural. Recent improvements in analytical chemistry have shown that these products are present in surface waters and soils at low concentrations, however, in many cases, exposures are chronic in nature (pseudopersistent) and mixtures of VMPs are frequently detected. Although many VMPs have not been shown to be highly acutely toxic to commonly used aquatic test organisms, the mechanisms of action of many of these substances in non-targets are not known and possible responses to chronic exposures are not well understood. Thus, there is considerable uncertainty as to their potential for environmental effects, if any, and this has implications for assessing risks of VMPs. This paper will provide an overview of the issue. A framework for assessing the possible effects of VMPs in aquatic and soil organisms, based on field studies conducted in Southern Ontario, bioassays in the laboratory, and studies at the community level in aquatic microcosms, will be suggested. This work was supported by the Canadian Network of Toxicology Centers, Agriculture Canada Livestock Environmental Initiative, and The Beef Cattle Research Council.

22. Imidacloprid longevity, mobility and toxicity to termites in vegetated and non-vegetated soil columns
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The mobility, longevity and termiticidal activity of imidacloprid (Premise® 2, Bayer Environmental Sciences) were evaluated in 60-cm vegetated and non-vegetated soil columns, the top 15 cm of which were treated with Premise at the termiticidal labeled rate. At three-month intervals for 30 months, soil columns were cut into eight 7.5-cm sections and the soil was extracted for imidacloprid content. For the first 15 months, imidacloprid residues were higher in the top 7.5-cm section of non-vegetated pipes than in the same section of vegetated columns. After 15 months, there was no effect of vegetation on imidacloprid residues. Imidacloprid was detected in lower, untreated sections of the columns, and residues in these sections of non-vegetated columns were consistently higher than in corresponding sections of vegetated columns. The effect of vegetation is likely a hydrological event; vegetated columns were significantly drier than non-vegetated columns, and applied water would not have penetrated as deeply.

23. Environmental fate of Spiromesifen
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Spiromesifen is a newly registered insecticide used to control whiteflies and mites, and is a member of a new class of pesticides known as the ketoenols. Within the NAFTA region, this insecticide is used in field agricultural scenarios and is registered for use on strawberries, vegetables, cotton, and potatoes. An overview of the environmental fate of this compound will be presented.

24. Scientific needs of ecological risk assessment in a regulatory context
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During the past decade the field of ecological risk assessment has progressed considerably; however, scientists and regulators are faced with remaining challenges. These include: streamlining the testing and assessment process; quantifying risks in a spatially-explicit manner; and acquiring environmental data to effectively focus environmental protection activities. Scientific advances to increase the focus and efficiency of the assessment process require further investment in computational chemistry; systems biology; molecular, cellular and biochemical toxicology; and exposure modeling. Estimating ecological risks in a spatially-explicit manner will be contingent on developing interactive information-management systems that link databases for species-specific toxicity, demographics, life history and habitat quality requirements. Finally, advanced eco-epidemiology and diagnostic capabilities are needed to track environmental outcomes. This abstract was reviewed by USEPA; approval does not signify that the contents reflect the views of USEPA.

25. Progress and pitfalls in harmonized approaches for the assessment and regulation of agrochemicals
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Harmonization of approaches for assessment and regulation of agrochemicals has been a desirable goal for a number of years. To this end, both international and regional harmonization efforts have been pursued. On some fronts, significant progress has been achieved. Examples would include the widespread adoption of OECD test guidelines and the common approach to regulation being practiced by EU member states. In other cases, despite significant efforts on the part of governments and international advisory bodies, a divergence of approaches continues to be practiced in various parts of the globe. Examples of areas reflecting continuing or increasing disharmony include establishment of maximum residue limits for pesticides in food and conduct of environmental risk assessments. Some aspects of assessment and regulation of agrochemicals appear to be quite amenable for adoption of a harmonized approach, whereas others may be better left to customized or local approaches. This paper will examine the rationale and importance of harmonization, key successes and notable failures, the potential impacts of harmonization on sustainable agriculture as practiced around the world, and future prospects for harmonization.

26. Mitigation of pesticide transport with runoff from agricultural and non-agricultural systems using management practices
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Water quality surveys have detected numerous pesticides in rivers and tributaries of agricultural and urban areas. The intense use of pesticides in agriculture and highly managed turf systems is of concern due to their potential adverse effects on the quality of surface waters and impact on sensitive aquatic ecosystems and drinking water resources. Although in most conditions, the average annual concentrations of pesticides measured in surface waters are below health-based limits, concentrations may briefly exceed these limits during runoff from the first storms after application of pesticides. Field research quantifying pesticide transport with runoff from agricultural and non-agricultural systems and the evaluation of management practices to mitigate chemical transport will be discussed. Identifying practices that reduce off-site transport of applied chemicals will increase pesticides efficacy at the intended sites of application and will also minimize their potential adverse impacts to the surrounding surface water resources.

27. Fate and behavior of bacteria and veterinary antibiotics resulting from swine manure applications in Iowa
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Swine manure applications introduce bacteria and antibiotics into agricultural fields where they are available for transport to surface waters. The fate of tylosin and sulfamethazine are governed by process occurring in manure storage and in agricultural fields following application. Sorption and degradation of these antibiotics in manure storage facilities and in soil mitigates their movement into surface waters. In contrast, *E. coli* and *Enterococcus* are introduced into fields in sufficient numbers to be detected in runoff events following manure application at levels exceeding 10^5 cells/100 ml of streamwater. Despite these runoff events, long-term monitoring in sub-basins with differing swine production capacities suggest that other sources are significant contributors to bacterial populations in streams.

28. Bioavailability and toxicity of explosive metabolites to soil invertebrates

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RDX is a second generation explosive that has demonstrated adverse effects on a number of organisms. In the environment, RDX can break down to some nitroso metabolites including hexahydro-1-nitroso-3,5-dinitro-1,3,5-triazine (MNX) and hexahydro-1,3,5-trinitroso-1,3,5-triazine (TNX). Although several studies have evaluated the effects of RDX, the toxicity of MNX and TNX is less understood. The kinetics of uptake of these two metabolites into passive sampling devices (PSDs), and the ability of PSDs to serve as surrogates for evaluating bioavailability of MNX and TNX were investigated in laboratory sand and two soil types. A good correlation between MNX and TNX uptake into PSDs and uptake into earthworms was obtained. The correlation coefficients were greater than 0.82 for all test soils spiked with MNX or TNX, indicating that C18 PSDs may be used as a surrogate for soil organisms such as earthworms and provide a simple and easy chemical test for assessing the bioavailability of contaminants in soils. Acute toxicity of MNX and TNX to Eisenia fetida was also evaluated. Both MNX and TNX had lethal and sublethal effects on earthworms. Exposure to MNX- or TNX-contaminated soil caused a significant concentration-dependent decrease in survival and growth of earthworms. Earthworms were more sensitive to TNX than to MNX. The Lowest Observed Lethal Concentration (LOLC) for both MNX and TNX was 100 mg/kg in the sandy loam soil, and 200 mg/kg in the silt loam soil. RDX metabolites did not have gross adverse effects on adult cricket (Acheta domesticus) survival, growth, and egg production. However, MNX and TNX did affect cricket egg hatching in a dose-dependent manner.

29. Using interspecies correlation estimates (ICE) to predict protective environmental concentrations

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Environmental risk assessments often use data from multiple single species toxicity tests and species sensitivity distributions (SSDs) to derive a predicted no effect concentration, e.g., the HC5 level. We explored the potential of the USEPA's Interspecies Correlation Estimation (ICE) program to predict single species toxicity values from a single known toxicity value. Toxicity values for three surrogate species, (*Pimephales promelas, Onchorhynchus mykiss*) and Daphnia magna, were used to predict values for dodecyl linear alkylbenzenesulfonate (LAS), nonylphenol, fenvalerate, atrazine and copper. SSDs were created from predicted values. The ICE-based SSDs had HC5 values which were within an order of magnitude of the measured HC5 values and model stream ecosystem NOECs. Examination of species placements within the SSDs indicated that the most sensitive species were coldwater taxa (e.g., salmonids and *Gammarus pseudolimnaeus*). These results raise the potential of using quantitative structure activity models to estimate protective environmental concentrations.

30. Effects of biota on pesticide fate and the effects of pesticide fate on biota

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Partitioning and degradation of pesticides within the environment can be influenced greatly by the type of biota present. Likewise, partitioning and degradation of the pesticide within an environment greatly influences the risk posed by a pesticide to nontarget organisms. To support these statements, my presentation discusses two separate lines of studies that I have worked on during the last 5 years. In the first study, the effects of prairie grasses on herbicide fate and mobility were investigated. The grasses increased the degradation rate of the herbicide residues. More surprisingly, the grasses stabilized the herbicide residues decreasing the amount that could leach toward groundwater and decreasing the amount that was available for uptake by earthworms. In the second study, adsorption constants for an antibiotic and a pyrethroid insecticide were determined using different types of organic debris that may be found in streams. Specifically, maple leaf derived coarse particulate matter (CPOM) and fine particulate matter (FPOM) that had been processed by aquatic amphipods were used. Both contaminants adsorbed at a higher rate to FPOM. This indicates that microbial communities and filter feeding organisms that are associated with FPOM may be at greater risk due to higher exposures as compared to organisms that are primarily associated with CPOM.

31. Short and long range atmospheric transport and deposition of pesticide residues to non-target areas: A global issue

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Pesticides have been detected in air, fog, and rain in agricultural, urban, and supposed pristine environments. Short and long range atmospheric transport and deposition of volatilized residues to non-target areas and their potential adverse effect to ecosystems is a global concern. What impact and significance does this have on the environment, human health, and the agricultural chemical industry? Monitoring studies, predictive models, and procedures for assessing the exposure and risk of off-site atmospheric transport and deposition of air-borne pesticides will be discussed.

32. Predicting transport and the control of plant pests after soil fumigation

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For decades, U.S. agriculture has relied heavily on soil fumigation to control plant pests. After 2005, only three fully registered chemical fumigants will remain. This is a significant reduction in available materials and demonstrates that soil fumigants share intrinsic properties that can cause environmental problems. The future use of fumigants must become more efficient and have fewer negative environmental impacts, or they too will become susceptible to adverse environmental regulation. New, reduced-emission methods have been proposed to reduce human and environmental health risks. However, the effect on pest control efficacy requires expensive long-term field-testing. To assist in this activity, new and easy-to-use tools are needed to help integrate new and improved fumigation methods into agricultural operations. A new method will be presented to predict fumigant fate, transport and the control of plant pests after soil fumigation. A description of the methodology and a comparison between predicted and measured pest control will be presented.

33. Acid and base equilibrium constants for pesticide active ingredients: Molecular connectivity calculations vs. experimental values

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Modern pesticide active ingredient molecules, in contrast to older persistent hydrophobic compounds such as DDT, are more water soluble and often acidic or basic. Knowledge of the acid-base properties of these pesticides is fundamental to understanding their behavior in the environment, but for many important compounds this information is not known. The USDA Pesticide Properties Database developed at Tifton, GA has compiled many values but also has missing data. The SPARC computer simulation program at The University of Georgia at Athens has been shown to calculate accurate ionization equilibrium constants as a function of molecular structure. We computed the pK_a or pK_b of 80 pesticide molecules using SPARC and compared the results with experimental values from the literature.

34. **PLUS: A regional groundwater assessment and ranking tool**
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Regulatory exposure assessments for drinking water exposure to ground water are currently made with EPA's Tier I model SCI-GROW. SCI-GROW is the US EPA's coarse screen tool for estimating expected ground water concentrations using a few basic chemical parameters and label information. However, SCI-GROW can only provide a single, fixed-point estimate of exposure. Both industry and the regulatory community are interested in developing a higher tier modeling tool that can provide ground water exposure estimates across an intended use area. Therefore, industry initiated a prototype project based on the PRZM model, which uses regional soils and weather with an easy-to-use interface. The goal of the prototype is to assess the value of this approach for facilitating the refinement of ground water exposure estimates. The focus of this paper is to report on the effectiveness of the tool as a regional estimator of potential ground water contamination.

35. **FOCUS guidance on the calculation of persistence and degradation kinetic endpoints of metabolites**
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Guidance is provided by FOCUS to derive kinetic endpoints for metabolites from studies performed with the parent substance. Because metabolite formation and degradation occur simultaneously and the formation and degradation rates are directly related, proper description of the metabolic pathway and of the precursor(s) degradation using the appropriate kinetic model are prerequisites for accurate description of the metabolite degradation. All dissipation/degradation pathways in the conceptual model must be realistic regarding the chemical, biological and physico-chemical processes involved. The most simple and flexible approach for implementing conceptual models for metabolites is to use compartmental kinetics based on differential equations describing the dissipation flows between compartments. Various software tools can solve these systems of differential equations with analytical or numerical methods. Recommendations are provided regarding the selected kinetic models for parent and metabolites, procedures to derive metabolites trigger and modeling endpoints, and use of a stepwise approach for complex datasets.

36. **Overprediction of erosion in standard regulatory modeling scenarios for agrochemicals**
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Aquatic exposure assessments for US agrochemical registrations are typically conducted using the PRZM-EXAMS model suite; runoff and associated erosion are often indicated to be significant loading routes with transport on eroding sediment predominating for highly lipophilic compounds. Standard scenarios have been developed for particular crop/soil/weather combinations judged to represent 90th centile transport risk. These scenarios have been examined using the EXPRESS model shell. The resulting erosion and runoff outputs were compared with a baseline dataset developed to rank all soil/weather combinations. Many EXPRESS predictions agree reasonably well with the baseline values but at least 8 scenarios predict exceptional levels of erosion of up to 123 ton/ha which would be non-sustainable relative to typical T values (approx. 5 tons/ha/year). Key parameters driving these estimates of erosion potential will be discussed and recommendations provided on how best to evaluate data developed at these scenarios.

37. **REMM: A simulation model for remediation of pesticide contaminants in runoff and leachate water by riparian buffer systems**
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The Riparian Ecosystem Management Model (REMM) has been enhanced by the addition of pesticide process description algorithms. REMM simulates the daily flow of water, sediment, and agrochemicals through a 3-zone (horizontal) and 3-layer (vertical) plant/soil system which is designed to intercept and remediate agricultural water pollution in surface and subsurface flows as they leave fields and move toward streams. The model can provide information for the design and placement of such buffers as part of soil and water conservation programs, and has become an accepted tool for agricultural nutrient nonpoint pollution analyses. The new pesticide module includes algorithms for input of pesticides in runoff and subsurface flow, transport and degradation within the buffer compartments, sorption by soils as affected by solute ionization, temperature and soil moisture, and prediction of output loads. We have tested the model using data from field experiments at Tifton in which attenuation of subsurface and surface transport of alachlor and atrazine in a 3-zone buffer was measured.

38. **Sulfadimethoxine degradation in manure as affected by initial concentration, moisture, and temperature**
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The degradation kinetics of sulfadimethoxine, a widely used sulfonamide antibiotic, in manure under aerobic condition was investigated. Based on the first-order kinetics and the assumption of the availability of sulfadimethoxine in manure for the degradation process, a new kinetic model was developed and was found to fit the degradation kinetics well. The degradation rate in sterilized manure was found to be much lower than in non-sterilized manure, indicating that microorganisms are responsible for a significant portion of degradation of this antibiotic in manure. In non-sterilized manure, the degradation rate constant decreased with increasing initial concentration of sulfadimethoxine, implying that the bioactivity of degrading microorganisms was gradually inhabited. Increasing moisture and temperature greatly enhanced the degradation of sulfadimethoxine. Model calculation results showed that both the degradation rate and the desorption rate of sulfadimethoxine from manure particles increased along with increasing moisture and temperature. Mixing highly contaminated manure with less contaminated, while keeping manure at a high moisture and storing the manure in a moderately warm place under aerobic conditions, can greatly enhance the degradation of sulfadimethoxine in manure. This approach will effectively eliminate this contaminant from the environment.

39. Fate of selected herbicides in a plasticulture system
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Laboratory studies were conducted to determine their dissipation patterns in relation to the level of herbicide that could be leached off plastic mulch. Herbicides that leach off plastic mulch could injure vegetable crops. ^{14}C-clomazone, ethalfluralin, flumioxazin, halosulfuron, metolachlor, and paraquat were applied to plastic at a concentration equivalent to a 1x and 2x field application at 20°C and 30°C in controlled environment chambers. Six hours after application (HAT), 83 and 90% of applied clomazone had volatilized from the plastic surface at 20°C and 30°C, respectively. As expected, more clomazone volatilized at 30°C than at 20°C. Six hours after application, 62 and 83% of applied ethalfluralin remained adsorbed to the plastic mulch at 20°C and 30°C, respectively. Approximately, 22 and 25% of applied flumioxazin remained adsorbed to the plastic at 6 HAT at 20° and 30°C, respectively. Flumioxazin concentration did not affect dissipation form plastic. Thirteen and 15% of applied halosulfuron remained on the plastic 6 HAT at 20° and 30°C, respectively. Sixty-five and 76% of applied metolachlor remained on the plastic at 20°C and 30°C, respectively. By 96 HAT, 60 and 75% were still adsorbed to the plastic at 20°C and 30°C, respectively. No appreciable paraquat was rinsed off after the initial wash.

40. A study of contamination level of organophosphorus pesticides and farmer's knowledge, perception, practices in rural India
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Today India is the second largest producer of vegetables after China and accounts for 13.4% of world crop production. To protect these crops from pests, a widespread use of pesticides is one of the common features in Indian farming. Thus, this study was aimed to determine the contamination levels of organophosphorus pesticides in the vegetables and to identify the causes at farmer's end (knowledge, perception and practices). This is crucial in terms of health hazards and potential environmental risks from the use of these pesticides. The study was divided into two phases. The first phase was targeted to determine farmer's knowledge, perception and pesticide use practices (KKP) in rural Agra (renowned worldwide for Taj Mahal) by conducting a baseline survey. Summer vegetables were collected from the subject farmers in the second phase and were extracted and analyzed to determine the contamination levels of organophosphorus pesticides. The analysis was carried out on gas chromatograph-electron capture detector, using capillary columns. The results demonstrate that the average contamination levels of methyl parathion, chlorpyriphos and malathion in spinach, bottle gourd and cucumber ranged from 0.567 - 24.854 ppb, 0.527 - 29.824 ppb and 0.530 - 7.135 ppb, respectively, in all the 15 blocks of the study region. The concentration of these organophosphorus pesticides in summer vegetables were well below the established tolerances but continuous consumption of such vegetables even with moderate contamination level can accumulate in the receptor's body and may lead to chronic effects that could be fatal for a healthy society.

41. Adsorption of glyphosate in montmorillonite interlayers: Theoretical calculations
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The herbicide glyphosate (*N*-phosphonomethylglycine) interacts strongly with many soil components. It forms strong complexes with many metals in solution, and it is adsorbed through innersphere complexation to iron- and aluminium oxides. Glyphosate can also be adsorbed by clay minerals by forming complexes with interlayer cations. Montmorillonite is a layered clay, with interlayer surfaces composed of silicon and oxygen atoms. This work explores the possible ways in which glyphosate molecules may interact with the surfaces in the interior of the layers, using molecular modeling and semi-empirical level theoretical calculations. The effects of solvation and pH are considered.

42. Effectiveness and toxicity of LSP® product on white shrimp (Litopeneaus vannemei) and growth inhibition of Lemma sp (Duckweed)
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Bioassays were conducted using water of the Maracaibo Lake of Venezuela to evaluate the effectiveness of LSP®, a chemical compound, in the growth inhibition of the aquatic plant Lemna sp (Duckweed) and the LSP® toxicity on PL10 of the white shrimp (Litopeneaus vannamei). The LSP® is an equilibrated mixture of controlled strong and weak acids, of pH<1 and innocuous to the tissues and mucous. The results showed the fast growth inhibition of the Lemna sp by chlorosis as a mechanism of action in just 30 seconds and the total discoloration of the leaves in less than 3 hours after the application of the compound. The toxicity assays 96 LC_{50} established the following results: 84% of the PL10 survive. These shrimp showed more growth and development than the PL10 in the control pool. Pathological studies showed that LSP® does not produce degenerative, inflammatory and necrotic alterations. The levels of nitrates, ammonium, phosphates, potassium, sulfates, fluorides, chlorides and pH of the water were not altered.

43. Development of underground bait stations and other baiting strategies for squirrels to reduce potential non-target hazards
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California ground squirrels cause damage throughout California, and significant damage can occur in agricultural settings including avocado, citrus, nut orchards, other fruits, vines and nurseries. Research was conducted to develop underground bait stations and other baiting strategies for squirrels to reduce potential non-target hazards. Specifically, a study was carried out to test the efficacy and practicality of in-burrow baiting for California ground squirrel control using CDFA 0.005% chlorophacinone bait. Additionally, a test of the efficacy and practicality of an underground bait station using a plastic sprinkler box design was conducted. Results will be presented.

44. Monitoring of nano-level concentrations of persistent organic pollutants (POPs) in transgenic plants

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Contamination of the environment and agricultural products with persistent organic pollutants (POPs) including dioxins is a serious problem. These chemicals were found in the environment and agricultural products at nano-level concentrations. However, many of them are suspected to accumulate highly on the top of food chains and to expand in the whole earth particularly through aquatic ecosystems. Therefore, it is important to develop novel technologies to monitor nano-level concentrations of POPs on site at real time. Certain plant species are grounding and have spreading deep roots. Some of these plants absorb and accumulate nano-level concentrations from a wide area through spreaded root systems. On the other hand, certain biological systems including arylhydrocarbon receptor (AhR) recognize dioxins. We attempted to utilize AhR together with β-glucronidase (GUS) reporter genes for biomonitoring of dioxins. Genetically engineered plants carrying the receptor and reporter genes were evaluated for monitoring of AhR ligands.

45. Isolation and identification of mosquito bite-deterrent constituents from leaves of Callicarpa americana and Callicarpa japonica

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Based on botanical lore of insect repellent properties, essential oil extracts from *Callicarpa americana* and *Callicarpa japonica* were investigated. Bioassay-guided fractionation of *C. americana* extracts using the yellow fever mosquito, *Aedes aegypti*, led to the isolation of α-humulene, humulene epoxide II, and intermedeol, and a newly isolated terpenoid (callicarpenal). Similar work involving *C. japonica* resulted in the isolation of an additional compound, spathulenol, as well as the four compounds isolated from *C. americana*. Structure elucidation was performed on all isolated compounds using a combination of GC-MS-EI, high resolution LC-MS-ESI, and one- and two-dimensional NMR experiments. Heretofore, 13,14,15,16-tetranorclerodane, callicarpenal, has never been identified from natural sources. In bite-deterrent studies spathulenol, intermedeol, and callicarpenal showed significant bite-deterring activity against *Aedes aegypti* and *Anopheles stephensi*.

46. Bioremediation of herbicides in vegetative buffers: Considerations for design and species selection

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Multiple species riparian grass buffer has been recommended as one of the most cost effective approaches to eliminate the herbicides derived from agronomical operations. However, many design criteria including species selection and arrangement and buffer length required to meet satisfied herbicides removal rates are not well documented. Both field experiments and walk-in growth chamber study using ^{14}C-herbicides were conducted to identify physical, chemical and biological processes that are involved in herbicide mitigation in vegetative buffers. Among various buffer designs, grass buffers with C4 warm-season native species were most consistently effective at reducing herbicide transport. The 8-m native species buffers removed about 75-80% of the atrazine, metolachlor and glyphosate in surface runoff. Four meters of buffer resulted in similar or equivalent reductions in transport of atrazine and metolachlor as eight meters of buffer. The results from growth chamber and field lysimeters studies also have shown significantly higher microbial enzymatic activities and degradation rates of herbicides in the rhizosphere of C4 warm-season species as compared to that of C3 cool-season species. Thus, the implementation of native species buffers could provide desired reductions in herbicide transport with less land taken out of production. The inclusion of native species in the multi-species buffer will also facilitate rapid degradation of deposited herbicides before they have a chance to be released to surface and subsurface flow.

47. Utility of incorporating a conservative tracer and plastic tarp in turf runoff assessments

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Interest in the environmental fates of pesticides and other substances in turfgrasses is growing with increased urbanization. This study was designed to assess the utility of incorporating a conservative tracer (KBr) and a plastic tarp in simulated-rainfall runoff assessments. Analysis of Br- in runoff indicated that the tracer behaves differently than pesticides normally considered highly mobile, suggesting that including tracers may improve our understanding of water and solute movement in turf. Inclusion of a plastic tarp in the experimental design allowed verification of important aspects of study conduct such as efficiency of the runoff collection system and the whole-plot rainfall application rate. Inclusion of tarps may also improve site-to-site comparisons by allowing for differences in plot slopes and simulated rainfall intensities to be accounted for in multi-site studies.

48. Influence of assumed rainfall intensity and duration on simulations of pesticide transport in artificially subsurface drained fields

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The impact of assumed rainfall intensity is unknown in regard to simulating long-term pesticide fluxes in the subsurface. This research modeled pesticide transport with temporally discrete versus coarse rainfall data using the Root Zone Water Quality Model (RZWQM) in three artificially subsurface drained sites: a metalochlor/atrazine field experiment in Baton Rouge, LA and isoxaflutole/metabolite field experiments in Allen County, IN and Owen County, IN. RZWQM was calibrated based on measured subsurface drain flow at the Baton Rouge and Allen County sites and bromide concentrations in drain flow at the Owen County site. Annual and long-term model simulations were performed with hourly rainfall data, average storm duration with uniform intensity data, and distributed daily data. Assumed rainfall intensity and duration influenced simulated subsurface drain flow more than runoff. As the magnitude of macropore flow at a site decreased, it was appropriate to use average duration storms in place of hourly data.

49. Effect of constant vs. variable intensity simulated rainfall on cotton preemergence herbicide runoff

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Rainfall simulations continue to be widely used to evaluate pesticide runoff potential. Most simulations are conducted at constant intensity, i.e., at a fixed rainfall rate. In contrast, large within-storm intensity variation in natural rainfall is common. To assess implications, field-based simulations were conducted comparing runoff of two cotton herbicides. Runoff expressed as percent of applied was evaluated stepwise by simulation pattern: constant versus variable; tillage: strip-(ST) versus conventional (CT); and pesticide transport characteristics: aqueous phase dominated (fluometuron) versus sediment associated (pendimethalin). The variable pattern was representative of spring storms in the southern Atlantic Coastal Plain of Georgia (USA) where the work was conducted. For both compounds under both tillages, simulation intensity pattern strongly impacted runoff kinetics. However, event-based runoff totals were not significantly different with one exception, fluometuron runoff from CT plots. The variable yielded about 25% more than the constant intensity pattern (P=0.10). This was linked to fluometuron's tendency to leach and that the soil was freshly tilled and relatively dry when simulations were initiated. Tillage and herbicide transport characteristics had a much stronger impact on runoff. CT plots delivered 8 to 10 fold more pendimethalin in runoff than ST plots. Mean differences were significant (P=0.05). This was also the case when pendimethalin and fluometuron runoff from CT plots were compared. An opposite trend was observed on ST plots. Fluometuron was greater than pendimethalin runoff. Fluometuron runoff was also greater from ST than CT plots; but differences in response were not significant due to high variability in fluometuron ST plot runoff. This study indicates that use of constant versus variable intensity rainfall in simulations will not substantially impact runoff trends with the possible exception of relatively water soluble compounds like fluometuron under CT conditions.

50. Exposure assessment of 2,4-D herbicide for aquatic uses

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This paper is a summary of available data from published sources and studies conducted by the Industry Task Force II on 2,4-D Research Data (Task Force) on the environmental impact of the use of 2,4-D [2,4-dichlorophenoxyacetic acid] for aquatic weed control. A number of dissipation studies have been conducted as part of aquatic weed control programs by several federal and state agencies. Also, controlled aquatic dissipation studies have been conducted by the Task Force to support the registration of 2,4-D for aquatic uses including recently completed aquatic dispersion studies in Minnesota and Florida under lake and river environments. Results of these studies are discussed to address the potential impacts of 2,4-D residues to drinking water under a comprehensive range of product use conditions. In addition, impacts on both target weeds and nontarget plants and other organisms are summarized for addressing ecological concerns.

51. Dispersion and dissipation of 2,4-D residues associated with aquatic uses

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This report is a summary of controlled aquatic dissipation and dispersion studies conducted by the Industry Task Force II on 2,4-D Research Data (Task Force) under label use conditions for control of Eurasian watermilfoil in a lake in Minnesota (MN) and water hyacinths under both lake and river environments in Florida (FL). The use pattern for MN study for control of Eurasian watermilfoil required direct injection below the water surface at the rate of 10.8 lbs a.e./acre, whereas studies conducted in FL for control of water hyacinths required foliar treatment over the surface at a rate of 3.8 lbs a.e./acre. The Task Force also conducted an in situ microcosm upstream from the St. Johns River study site in FL. Results of these studies showed rapid dissipation of 2,4-D within and outside the treated area to levels below the drinking water standard within a short duration. Factors influencing the rapid dispersion and dissipation of 2,4-D in the aquatic medium are discussed including treatment rate and dilution effect from untreated areas.

52. Effectiveness of Canker Killer™ on the inhibition of the growth of Xanthomonas axonopodis pv. citri. bacteria (Citrus Canker)

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Canker Killer™ is an equilibrated mixture of controlled strong and weak acids, non-toxic to human tissues and mucous, with a pH <1, which uses hydrofluoric acid (HF), sulfuric acid (H_2SO_4), hydrochloric acid (HCl), and phosphoric acid (H_3PO_4) as active compounds. The evaluation of the effectiveness of Canker Killer™ in inhibiting the *Xanthomonas axonopodis pv. citri* bacteria, (the cause of canker in citric plants) were performed. The experiment was divided in two stages: (1) an *in vitro* assay by means of the preparation of cultures with the bacteria to measure the inhibiting capacity of bacteria growth; and (2) two field tests executed on citrus growing farms. Canker Killer™ was applied by means of spray application directly onto randomly selected leaves of citrus, with the purpose of measuring the capacity to induce chlorosis (chlorophyll rupture) in treated leaves, while preserving the integrity of the plant. *In vitro* tests showed growth inhibition and death of the *Xanthomonas bacterium axonopodis pv. citri* bacteria in less than 24 hours, with dilutions 1:1 and 1:30. Testing after 96 hours showed total inhibition of growth and death of the bacteria. *In vivo* tests were conducted at the agricultural farms using a sprinkler method over the foliage in order to measure the capacity of Canker Killer™ to induce chlorosis in treated leaves, and the ability to preserve the integrity of the plant. Field testing results indicated total chlorosis in treated leaves upon reaching 96 hours. Seven (7) months and twenty-three (23) days after application of Canker Killer™, the integrity of the exposed plants was preserved.

53. Use of SDS-PAGE to determine protein variability of soybean cyst nematode populations in Tennessee

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Soybean cyst nematodes, Heterodera glycines (SCN) are the most serious pest to soybean crops in the U.S. Previously published research on the variability in members of the Heteroderidae (cyst nematode family) has examined biological differences to identify different populations of this species and to attempt to describe population variability. The 16 populations identified using the race scheme, have been differentiated by their rate of reproduction on different sources of SCN resistance in soybean. It had not previously been known whether major biochemical differences existed between races of SCN, or whether all were biochemically similar. In this study, the eggs of six different populations (races) of SCN were homogenized and analyzed by sodium dodecyl sulfate-polyacrylamide gel electrophoresis (SDS-PAGE). The SDS-PAGE gels were scanned and compared. There were approximately 30 major proteins in the nematodes. Few differences were observed in any of the race populations. A large high molecular weight (ca. 200,000) band was the predominant protein in all samples. Evidence suggests that this large protein is a membrane-associated glycoprotein. These results suggest that more extensive studies are needed to specify biochemical differences between SCN populations.

54. Detoxification of copper fungicide using unmodified and EDTA modified cellulosic material

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The use of pesticides constitutes an important aspect of modern agriculture. Unfortunately, pesticides are poisons and can be particularly dangerous when misused or carelessly disposed. Pesticide losses from areas of application and contamination of non-target sites such as surface and ground water represent monetary losses to the farmer as well as a threat to the environment. Therefore, there is a need for careful management of pesticides, to avoid environmental contamination. The detoxification of a copper fungicide (KOCIDE 101), using maize cob, a cellulosic material, was studied in this paper. Based on copper as the active agent, after a sorption period of 1 hour, the concentration of the fungicide decreased from an initial value of 2000 ppm to 206 ppm for the unmodified maize cob and 24 ppm for the modified maize cob. The pseudo-first and second order rate equations were used to model the detoxification process. The intraparticule diffusivity and mechanism of the sorption process were proposed. Also, equilibrium sorption isotherms were evaluated. These results show that maize cob is an effective adsorbent for copper fungicide deactivation.

55. Learning how *Helicoverpa zea* copes with xenobiotics threats from molecular modeling comparison of CYP6B8v1 and CYP321A1

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Helicoverpa zea feeding on hundreds of host plant species encounter an overwhelming spectrum of xenobiotics everyday. What approach does it take to cope with these potential threats? Here, we provide our answer based on a molecular modeling comparison of *H. zea* CYP6B8v1 and CYP321A1, two P450 proteins reported to metabolize the same allelochemicals and insecticides. Specifically, we have built homology models for both and docked several allelochemicals and insecticides into these apo-protein models. Our results show that *H. zea* CYP6B8v1 and CYP321A1 proteins have employed very different structural strategies to metabolize xenobiotics with predicted side chain in nearly all of the substrate recognition sites showing variation due to the high degree of sequence divergence in these P450s. Despite these variations in the catalytic sites, nearly all of the docked substrates exhibited similar binding modes within the CYP6B8v1 vs. CYP321A1 catalytic sites suggesting similar attack positions on each substrate. Analysis of the products generated from each of these heterologously expressed P450s has provided evidence supporting the similarities of their products. Our results suggest that *H. zea* is able to survive in the midst of xenobiotic threats because of its ability to recruit equally versatile P450s with dramatic sequence and structural variations for xenobiotic metabolism.

56. Change of chemical composition of soil and plants during soil mulching

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The content of ammonium and nitrate nitrogen, mobile phosphorus and metabolic potassium in soil ahd nicotine, water soluble carbohydrates, protein in plants were determined by different methods. The results of tests show, that during soil mulching the content of ammonium nitrogen increases. Such regularity is observed during the whole experiment. The soil mulching by polyethylene film increases considerably the content of nitrate nitrogen in the soil. This is observed in two soil layers - in arable and subsoil. In the serozemic soils, where the experiment was carried out, the content of nitrate nitrogen was greater, than ammonium nitrogen. The increase of the content of ammonium and nitrate nitrogen took place simultaneously. This is why during the soil mulching, the content of mineral nitrogen increased sharply. Thus, the mulching of soil by polyethylene film during the tobacco cultivation in serozems significantly increases the content of mobile nutrients. The change of the content of mobile nutrients in the soil during the mulching led to the improvement of chemical composition of tobacco plant. During the mulching, the content of nicotine, water-soluble carbohydrates and protein in tobacco increased. In turn, the number of chimuk increased, which is the relation of carbohydrates to protein. All these resulted in the improvement of the quality of raw material during the mulching of soil by polyethylene film. Thus, the mulching of serozems by polyethylene film during the cultivation of tobacco improves the chemical composition of soil and plant.

57. Estimation of possibility of use hard domestic city waste as an organic fertilizer

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In Uzbekistan soils, the humus content has decreased approximately 50% and this process is increasing. The humus decrease leads to soil degradation and diminishes the efficiency of anti-erosion measures and technological methods. If this process continues, the soil will lose its main qualities. The use of composts, made from manure and domestic city waste, may play an important role in the resolution of these problems. Annually, Uzbekistan generates about 30 million m^3 of city hard domestic waste. One million tons of hard domestic waste contains 360 thousand tons of waste foodstuffs, about 160 thousand tons of paper and cardboard, 55 thousand tons of cloth, and 45 thousand tons of plastic. In the present time, reducing organic fertilizer and increasing city hard-domestic waste is under consideration. A criterion for using organic fertilizers with hard domestic waste is the content of heavy elements, such as Zn, Cu, Ni, Mn, Cr and others, and humus acids. From these wastes, composts rich with elements of feeding can be prepared and used as organic fertilizers. The use of these wastes not only increases the quantity of organic matter, but promotes the protection of the environment from pollution. When these composts are used, the erosion processes in soil decreased and the agrochemical and agrophysical qualities improved, promoting the activity of biological processes in the soil. Composted manure with city hard-domestic waste provides the soil with needed macro- and microelements. Therefore, the use of composts improves assimilation feeding elements by plants, strengthening their growth and development and decreasing the quantity of mineral fertilizers used, which decreases the economic expenses. Thus, the preparation of composts from agricultural and city hard-domestic waste significantly increases the humus content in soil.

58. Change of humus condition of soils in Zeravshan Valley in Uzbekistan under the influence of anthropogenic factors

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The content and quality of humus is of great importance in the determination of soil fertility. As the content and reserve of humus increases, the soil quality and fertility increases. Recently humus content has decreased and the soil quality has declined. In order to prevent such a phenomenon, it is necessary to study the influence of different factors on the humus condition of soils. Our investigations show, that the content and quality of humus strongly depend on alternation of agricultural crops, on the introduction of mineral and organic fertilizers, and soil treatment. After long cultivation of such tilling crops as cotton, tobacco, and maize, the content and quality of humus decreases; and after alfalfa production, humus increased. Under the fruit-bearing garden, the humus content increases. All these are connected with soil treatment. The row-spaces of tilling crops are often treated, improving soil aeration, which increases the mineralization of organic substances and decreases humification processes. There is no treatment when alfalfa is cultivated. This improves soil structure and increases humus content. Among mineral fertilizers, the nitrogen fertilizers are influenced very strongly by humus content and quality. Under higher doses of nitrogen fertilizers, humus mineralization increases and the humification of organic matter remaining in the soil decreases. Such results are obtained in special tests, carried out with isotopes of carbon-14 and nitrogen-15. The ratio of carbon to nitrogen (C:N) narrowed during the introduction of high doses of nitrogen fertilizers. The introduction of inhibitors of nitrification, to a certain extent, decreases the negative influence of high doses of nitrogen fertilizers on the content and quality of humus. Thus, the different anthropogenic factors have a strong influence on the change and formation of humus.

59. Considerations for the prediction of crop protection product residues in crop commodities

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The prediction of residues of crop protection products (CPPs) on crop commodities can facilitate product development decisions prior to the conduct of relatively expensive field residue trials. In this presentation, we will evaluate several of the controlling parameters relevant to prediction of crop commodity residues following foliar- or soil-application of CPPs. Literature-proposed initial residue deposits will be validated for foliarly applied non-systemic active substances on crop surfaces. Calculation methods for the determination of surface areas and volumes of irregularly shaped commodities will be proposed and validated. Crop commodity growth will be characterized across multiple fruits and vegetables and synchronized with respect to the timing of application and harvest. Suitable approaches will be proposed to address the distribution of compound dissipation half-lives and crop formation parameters across varieties, as additional contributors to the residue predictions ultimately developed.

60. Effect of ultrasound on mechanics properties and light transmittance of soy protein isolate film

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This study was conducted to determine the effect of ultrasound on some properties of soy protein isolate (SPI) films with glycerin as plasticizer. Films were cast from the alkaline aqueous solutions of SPI (5 g protein/100 mL water) (pH=10), peeled after dried in an oven at 323K for 17~18h. Its tensile strength (TS), percent of elongation at break (E) and light transmittance were determined after conditioning film specimens at 298K and 50% relative humidity (RH) for 2 days. The result showed that TS and E of the control film was 1.38 MPa and 52.7%, respectively; the light transmittance was 83%. When the solution of SPI was treated with 20kHz, 800w ultrasound, and then made into film as the conditions above, the TS and E value of the film were increased with increasing of the time of ultrasonic treatment. However, the light transmittance of the SPI films made at different conditions shows almost the same. We gratefully acknowledge the financial support from the NSFC (project 20436020 and 50573025).

61. Effects of legume on the lead and copper dissolution

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The impacts of two different kinds of beans on the lead and copper dissolution from metal contaminated soil have been studied. Soils ($\Phi < 0.25$mm) were mixed with different amounts of grounded bean ($0.125 \text{ mm} < \Phi < 0.250$mm) for 24 hours using a wrist-action shaker. The amounts of lead and copper in aqueous phase were determined using atomic absorption spectroscopy after filtration with either 2 μm and 0.45 μm membrane filters. The pH of the solutions were controlled using 0.1 M sodium hydroxide solution. The results showed that the addition of bean significantly increase the solubility of both lead and copper in wide pH ranges. It should be noted that as pH increases, more lead and copper were detected in aqueous phase. The mass ratio of bean to soil was also investigated. The experimental data confirmed that as the ratio increases, the solubility of lead and copper increases until the ratio reaches to approximately 1.3. When the ratio is higher than 1.3, the solubility of copper was constant while the solubility of lead drops significantly. Metal complexation and adsorption will be discussed on the presentation.

62. **Degradation of chloroacetanilide herbicides with plant cytochrome P450**

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Cytochrome P450s (P450s) constitute one of the major classes of enzymes that are responsible for detoxification of xenobiotics. In plant, they can represent a potentially significant metabolic sink for environmental contaminants which can be used for controlling herbicide tolerance and selectivity. The degradation rate of three chloroacetanilide herbicides by P450s microsome were compared in this study. V_{max} of butachlor, rac-metolachlor and S-metolachlor with rice cytochrome P450 were 58.93, 8.4 and 2.2 nmol/min, respectively. $T_{1/2}$ of rac-metolachlor is 4.10~4.48 times of butachlor, and $T_{1/2}$ of S-metoalchlor is 2.00~2.27 times of rac-metolachlor. The degradation rate of the three herbicides is: butachlor > rac-metoalchlor > S-metolachlor. Butachlor can be used in rice field to control weeds, but metolachlor will harm to rice. S-metolachlor is the S-isomer of rac-metolachlor with higher herbicidal activity. It showed that the metabolism of rice P450 is one reason of selectivity of butachlor and rac-metoalchlor, and maybe the reason of different activity between rac-metolachlor and S-metolachlor.

63. **Mechanisms of reactions between carbamates and model N-halamine compounds**

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N-halamine compounds are widely applied as disinfectants in water. The oxidative potential of N-halamines also enables to degrade many toxic compounds, such as carbamate pesticides. The detoxification properties of N-halamine containing fabrics were reported before. In this study, the detoxifying abilities of N-halamine compounds with different structures to oxidize carbamates were investigated elaborately to disclose the detoxification mechanisms. The halamines structures include imide, amide and amine halamine. The N-halamine compounds containing imide or amide halamines showed stronger reactivities to eliminate aldicarb and methomyl, which are carbamates with aliphatic chain and thio bonds, than those N-halamines with amine halamine structures. The first step of detoxification was an oxidative reaction starting on the site of sulfur atoms exiting in either aldicarb or methomyl. But all N-halamines were not able to effectively detoxify carbofuran and carbaryl, which are carbamates with aromatic ring and without thio bonds. The reaction kinetics of aldicarb and methomyl detoxification were studied by HPLC-UV. NMR and MS results were also tried to elucidate the reaction mechanisms.

64. **Synthesis and properties of pyrazoles and isoxazoles designed from fipronil and related fiproles**

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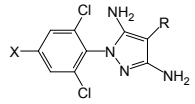
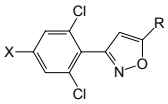
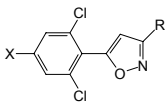
Fipronil, [5-amino-3-cyano-1-(2,6-dichloro-4-trifluoromethylphenyl)-4-trifluoromethylsulfinylpyrazole] is currently one of the most widely used and important pesticides in the phenylpyrazole class. Fipronil acts as a noncompetitive inhibitor of the GABA-gated chloride channel. New synthetic methodology from this lab (sodium borohydride promoted reductive alkylation of malononitrile) has been used to efficiently prepare monosubstituted malononitriles. Alkylation of these monosubstituted malononitriles prepared various disubstituted malononitriles. The monosubstituted malononitriles are also used to prepare novel 1-phenylpyrazoles. These phenylpyrazoles were designed with structural similarities to potent fiproles, such as fipronil. Investigations into the synthesis of isoxazoles with similar design will also be discussed. These 3-phenylisoxazoles and 5-phenylisoxazoles have been prepared via the 1,3-dipolar cycloaddition between nitrile oxides and alkynes.



1-Phenylpyrazoles



3-Phenylisoxazoles



5-Phenylisoxazoles

65. Photodegradation of 2-mercaptobenzothiazole disulfide

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As a continuation of our systematic studies of the photodecomposition of heterocyclic pesticides, we have investigated the photodegradation of 2-mercaptobenzothiazole disulfide (MBTS). MBTS is one of the biologically active benzothiazoles and it is used as a fungicide, microbicide, and insecticide, as well as a rubber vulcanization accelerator (natural and synthetic rubber). Traces of benzothiazole derivatives can be found in the wastewater, sediments, and soil and in the air of workshops. Their exposure to sunlight can result in photodecomposition and formation of toxic and potentially dangerous compounds. Thus, identification of the products of photolysis of MBTS under controlled laboratory conditions and understanding of the mechanism of degradation are of interest. Toxic 2-mercaptobenzothiazole is the major photodegradation product of MBTS - its dimer. This work will provide new information on the photodegradation of benzothiazole derivatives, their biological activity, and their impact in the environment.

66. **Enantioselective biodegradation of metalaxyl by sewage sludge and screening bacteria***

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Chirality in pesticides has great implications as ecotoxicity and biodegradation are commonly enantioselective. Enantioselective biodegradation of Rac-metalaxyl and metalaxyl-M (R-metalaxyl) by sewage sludge and screening bacteria were studied. The result showed that biodegradation of the S-enantiomer by sewage sludge was faster than the R-enantiomer. The half-life of the Rac-metalaxyl was 4.05 days, which was between two enantiomers of metalaxyl. The biodegradation process by sewage sludge followed first-order kinetics. Incubation with metalaxyl-degrading bacteria in different pH solutions showed that Rac-metalaxyl was degraded faster than metalaxyl-M and the S-enantiomer was preferentially degraded over the corresponding R-enantiomer of metalaxyl. The biodegradation of metalaxyl was affected by pH values of incubation solutions. Biodegradation rate followed the order pH 6.89>pH 4.57=pH 9.15 and the biodegradation enantioselectivity as indicated by ee followed the order too.

67. **Supramolecular catalysis of malathion hydrolysis by alfa-cyclodextrin**

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Supramolecular interaction between contaminants and environmental substance play a important role in deciding environmental behavior of contaminants. Cyclodextrins (CDs), with hydrophobic interior cavity and hydrophilic external surface, are capable of accelerating or inhibiting chemical degradation of organophosphorus pesticides through forming supramolecular complexes between CDs and pesticides. This work evaluated the effects of alfa-CD on hydrolysis of malathion in an attempt to assess the function of supramolecular complexation in environmental approach. It was found that alfa-CD had a remarkable supramolecular catalysis effect on the hydrolysis of malathion, and this was a function of pH and temperature; the catalysis effects increase with increasing concentration of alfa-CD and decreasing temperature between 15 and 35°C. Both 2M and 5M urea decrease the catalysis effects of alfa-CD on hydrolysis of malathion at 25°C at pH 9.0. The evidence of forming supramolecular complexes between alfa-CD and malathion is supported by NMR studies.

68. **Catalytic methanolysis of P=S pesticides with palladacycles**

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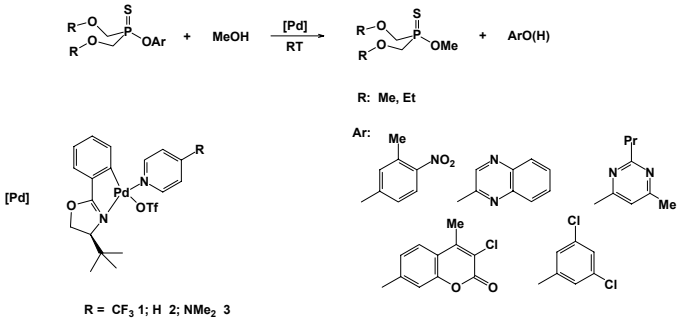
To discover effective methods for the destruction of organic phosphate (OP)-based pesticides, a series of palladacycle complexes with oxazoline functional group, (Pd(Phox)(py-R)OTf) (where Phox = 2-phenyl substituted oxazoline, Py-R = 4-trifluoropyridine complex 1; pyridine complex 2, or 4-N,N-dimethylaminopyridine, complex 3), were synthesized and their X-ray crystal structures were solved. Kinetic studies under buffered conditions in methanol have revealed that they are effective turnover catalysts for the methanolysis of P=S pesticides such as fenitrothion, diazinon, coumaphos, EPN, letophos, and dichlofenthion. They can accelerate the methanolysis of P=S pesticides by billions-fold over the background reaction. The higher activity of complex 1 can be attributed to the weak bonding of 4-trifluoropyridine ligand, which results in more active species at a given pH. The reaction mechanism of the catalyzed methanolysis is proposed, where a transiently coordinated S=P substrate is intramolecularly attacked by the Pd^{II}-coordinated methoxide.



69. **Zeolite catalysis of various seed oils for the production of biodiesel and chemicals**

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The commercial feasibility of biodiesel production is dependent on the prices of seed oils relative to the crude oil. The combined biodiesel and specialty chemicals production can significantly enhance the attractiveness of seed oils as a feedstock for fuel and chemicals. The three methods of production, namely acid catalysis using sulfuric acid, base catalysis using sodium hydroxide, and acidic zeolite catalysis are described. The base-catalyzed method provided greater yields of biodiesel esters whereas the acid-catalyzed reaction gave additional non-ester byproducts. The reaction yields and chemical composition of biodiesel derived from the seed oils of soya bean, corn, canola, peanut, and cottonseed will be compared using GC-MS and FTIR data. The bench scale production of 0.5-liter batches of biodiesel was also compared to the production based on a 75-liter reactor constructed using a home water heater. The use of acidic zeolites yielded a product mixture significantly different from that of the acid or base catalyses. The dependence of specific value-added oleochemicals via zeolite catalysis was investigated using triglycerides with fatty acids of various chain lengths.

70. **Synthesis of wood-silica sol-acrylate hybrid composites**
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To enhance the properties of wood, a hybrid system including silica sol and acrylate emulsion were introduced into poplar wood by impregnation treatment under vacuum condition. The status of hybrid component within wood pores were observed by SEM, which showed that the hybrid substances were deposited in the woody fibers and vessels of the cellular clearances and distributed along the cell wall. FT-IR indicated that the -OH group of wood cellulose were partially bonded with the hybrid components. TG and DTG curves of the hybrid wood composites showed a less weight loss with temperature than the untreated wood. The weight loss of the composite was only 31.5% at 630^{o}C, while that of the untreated wood was 67.88% at 360^{o}C. Thus the hybrid composite endowed the wood with better fire resistance. The properties of the hybrid wood composites were improved, compared with that of poplar wood. The hardness index values of organic/inorganic-wood composite are 9.051, 5.602 and 5.170 along longitudinal direction, radial direction and tangential direction, 2.88 times, 2.10 times and 2.07 times than the untreated wood, respectively. Compression strength is 80.2 Mpa along longitudinal direction, 18.1 Mpa along radial direction, and 11.0 Mpa along tangential direction.

71. Composite wood by infiltration silica sol/styrene-acrylic emulsion system
*Hongxia Guo, Yongqing Li, and **Qun Wang**, College of Material Science and Engineering, Beijing University of Technology, Pingleyuan No.100, Beijing 100022, China, Fax: 86-10-67392755, hxguo@bjut.edu.cn, wangq@bjut.edu.cn*

To improve some performance of poplar wood, such as low hardness, bad dimension stability, bad abrasion performance, silica sol and styrene-acrylic latex mixture system were introduced into pores of poplar wood. The factors affecting weight percent gains (WPG) and dimensional stability as well as mechanical properties of the composite wood were investigated. The results showed that WPG increased with the amount of precursors and the times of impregnation. And the dimensional stability and the mechanical performance and water resistant were enhanced.

72. **Dissipation of the herbicide isoxaflutole in agricultural soils**
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Isoxaflutole is a relatively new pre-emergence herbicide used in corn production. Isoxaflutole's phytotoxic metabolite (DKN) has a low sorption coefficient and may be persistent in soil, indicating that this herbicide may have a tendency to contaminate water resources through leaching and runoff. Two-year field dissipation studies were conducted in three soil types (sandy loam, loam, and clay loam) in west central Minnesota to indicate the rate at which isoxaflutole/DKN dissipates under the relatively cool, wet soil conditions typical of the northern Corn Belt. Separate plots were treated with isoxaflutole and potassium bromide, a non-sorbed, non-degraded tracer. Soil cores were collected to 1 m depth and sectioned into 0-10, 10-20, 20-40, 40-60, and 60-100 cm increments; bromide or herbicide concentration was measured at each depth. Leaching of both tracer and herbicide beyond 40 cm was observed. These results will provide information for the development of best management practices for this herbicide.

73. **Genomics and biochemistry of atrazine biodegradation by soil bacteria**
***Michael Jay Sadowsky**, Department of Soil, Water, and Climate; and BioTechnology Instutute, University of Minnesota, 1991 Upper Buford Circle, 439 Borlaug Hall, St. Paul, MN 55108, Fax: 612-625-2208, sadowsky@umn.edu*

Atrazine [6-chloro-N^{2}-ethyl-N^{4}- isopropylamino-1,3,5-triazine-2,4-diamine] is one of the most widely used herbicides in the United States for control of broadleaf weeds in corn, sorghum, and sugarcane. We have shown that hydroxyatrazine is the first intermediate in the atrazine mineralization pathway of atrazine-degrading bacteria. *Pseudomonas* strain ADP metabolizes atrazine as its sole source of nitrogen for growth and this bacterium initiates atrazine catabolism via three enzymatic steps encoded by *atzA*, *B* and *C*. These genes are present in different genera of atrazine-degrading bacteria isolated from geographically diverse locations in the World. The *atzA*, *B* and *C* genes were localized to a self-transmissible, plasmid, pADP-1 and the complete nucleotide sequence of pADP-1 revealed the relative locations of these genes. Computational and functional analyses indicated that three new catabolic genes, *atzD*, *atzE*, and *atzF,* hydrolyzing urea, biuret, and allophanate, respectively, were located on pADP-1. More recently, we have finished the complete genomic sequence of the gram positive, atrazine-degrading microorganism, *Arthrobacter aurescens* TC1. We have found that atrazine degradation genes are located on a large plasmid, and that catabolism is initiated by the *trzN* gene. This bacterium can degrade a large number of triazine herbicides, by funneling plasmid derived degradation products to chromosome-encoded enzymes. In this presentation, I will discuss how the genomics and genetics of soil bacteria can provide insight into how plasmid-borne pathways evolve to encode the catabolism of compounds recently added to the biosphere.

74. **Isolation and metabolic and proteomic characterization of aromatic degrading bacteria from contaminated soil**
***Qing X. Li**, Jong-Su Seo, Young-Soo Keum, Renee Harada, Sung-Eun Lee, and Yuting Hu, Department of Molecular Biosciences and Bioengineering, University of Hawaii, 1955 East West road, Honolulu, HI 96822, Fax: 808-956-3542, qingl@hawaii.edu*

Bacterial species recently isolated from a contaminated soil can degrade a wide range of pesticides and polycyclic aromatic hydrocarbons (PAHs). Analysis of the soil showed 13 PAHs in a range from 0.6 to 30 mg/kg each dry weight and 12 PAH metabolites. Nineteen bacterial strains were isolated from the soil and characterized by two different spray plated methods, turbidity test, and 16S rRNA gene sequencing. Strains C3, C4, P1-1, and JS19b1 were most close to Burkholderia sp. 56 (AY177370), Sinorhizobium sp. HF6 (AB195269), Arthrobacter sp. BS20 (AY452081), and Mycobacterium sp. RJGII.135 (U30661), respectively. Strains C3, C4, and P1-1 degraded phenanthrene (40 mg/l) completely after 7-day incubation. Strain C3 also decomposed nine carbamate pesticides (40 mg/l each) from 20% (pirimicarb) to 100% (aminocarb, carbaryl, and xylylcarb) in 14 days. Strain JS19b1 degraded 40% of 2,4-D (40 mg/l) and 100% of pyrene (40 mg/l) in 14 days. Metabolite and protein profiling showed comprehensive metabolism networks of the pesticides and PAHs.

75. Effect of temperature and pH on the microbial reductive transformation of pentachloronitrobenzene

Didem Okutman Tas *and Spyros G. Pavlostathis, School of Civil and Environmental Engineering, Georgia Institute of Technology, 311 Ferst Drive, Atlanta, GA 30332-0512, Fax: 404 894 8266*

The effect of temperature and pH on the microbial reductive transformation of pentachloronitrobenzene (PCNB), an organochlorine fungicide, was investigated with a mixed, methanogenic culture developed from a contaminated estuarine sediment. Cultures were incubated at a temperature range from 4 to 45°C at pH 6.89±0.16 and at a pH range from 2.7 to 7.8 at 22°C. PCNB (3 µM) was transformed to pentachloroaniline (PCA) in all culture series. However, sequential dechlorination of PCA was only observed at a temperature range from 4 to 35°C and a pH range from 6.2 to 7.8. The effect of temperature on the PCA dechlorination rate was modeled using an Arrhenius relationship which accounts for both enzyme activation and deactivation. The sequential dechlorination of PCA was simulated using a branched-chain Michaelis-Menten kinetic model and the kinetic constants were determined. Such results have significant implications relative to the fate and biotransformation of PCNB and PCA under various environmental conditions.

76. Studies on the aquatic chemical fate of formetanate hydrochloride

Clare Muhoro*, Department of Chemistry, Towson University, Towson, MD 21252, Fax: 410-704-4265, cmuhoro@towson.edu*

The aquatic fate of the acaricide/insecticide formetanate hydrochloride was investigated. Decomposition studies were directed specifically at studying the relative stability of the pesticide's two functional groups, formamidine and carbamate. Degradation occurred fastest under basic conditions via hydrolysis of the formamidine group to yield a carbamate product. Rates of base-catalyzed hydrolysis were measured by NMR and UV-vis spectroscopies, and found to closely resemble those of structurally similar formamidine pesticides. Decay was also monitored under pre-determined environmental conditions and found to yield the carbamate product. These findings imply that persistence of the pesticide-active carbamate group in degradation products is possible under environmental aquatic conditions, and may lead to unintended consequences on inadvertently exposed populations.

77. Kinetic model of 2,4-D degradation in soil slurry by anodic Fenton treatment

Lingjun Kong*, Field of Environmental Toxicology, Cornell University, TXA, 226 MVR Hall, Cornell University, Ithaca, NY 14853, Fax: 607-255-1093, lk97@cornell.edu, and Ann T. Lemley, Department of Textiles and Apparel, Cornell University*

Anodic Fenton treatment (AFT) has been shown to be a promising technology in pesticide wastewater treatment. However, no research has been conducted on the AFT application to contaminated soils. In this study, the pesticide degradation kinetics of AFT in a soil slurry were investigated for the first time and were found to follow a two-stage kinetic model. During the early stage of 2,4-D degradation (the first 4 to 5 minutes), experimental data follow a pseudo first-order kinetic model. In the later stage (i.e. after 6 minutes), the AFT kinetic model provides a better fit. The effects of initial 2,4-D concentration, Fe^{2+} delivery rate, H_2O_2:Fe^{2+} ratio, humic acid concentration, and pH on the degradation kinetics have also been studied. Correlations between various experimental conditions and reaction rate constants and/or Fe^{2+}/•OH lifetimes were developed, which could provide useful tools in future treatment of pesticide contaminated soils by AFT.

78. Photooxidation of chloride to perchlorate in the presence of desert soils and titanium dioxide

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Naturally occurring perchlorate has been observed in playa areas of the western United States, in nitrate deposits from northern Chile, and has also been observed at low concentrations in surface and groundwater in the southwestern United States, distant from industrial sources. Studies were conducted to determine if perchlorate could be formed when dry chloride salts were exposed to sunlight and laboratory ultraviolet light in the presence of desert soils and titanium dioxide. Several desert soils were surveyed to determine which soils contained the highest amounts of naturally occurring perchlorate. A soil from Death Valley (29/µg/kg) and a soil from the Black Rock Desert (16 µg/kg) were selected, along with titanium dioxide for further studies. The soils were washed to remove the existing perchlorate; additional chloride was added and exposed to sunlight and ultraviolet light for 1-4 months. Perchlorate was generated in both sunlight and ultraviolet light on the soils (<4-29 µg/kg). Higher amounts were generated on titanium dioxide. The mechanism proposed for formation is a step-wise oxidation of chloride. The presence of both chlorate and perchlorate was confirmed by ion chromatography-mass spectrometry. These data suggest a potential mechanism for natural generation perchlorate on soils in the desert southwest.

79. Drinking water treatment study procedures for evaluation of pesticide exposure

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Exposure to pesticide residues via drinking water is a critical component of the human risk assessments performed for registration or re-registration of active ingredients (a.i.) with the US EPA. A general strategy was developed within Bayer Crop Science to utilize drinking water treatment studies. The drinking water treatment study includes flocculation/sedimentation, disinfection (chlorination), and treatment with activated carbon. The degradation and removal of the a.i. is a key component of these studies, but EPA also requires information on the formation and removal of potentially toxic degradates, such as sulfoxides and sulfones formed from many organophosphates and carbamates. Thus, the use of radiolabeled a.i. and measurement of degradation products is critical to ensuring the use of these data by EPA. The study concept will be presented.

80. **Study design for aged desorption and rate of degradation experiments and the use of the $K_{aged\ des}$ and DT_{50} in modeling of predicted environmental concentrations in groundwater**
***Kalumbu Malekani**, Environmental Fate, DuPont Crop Protection, Stine-Haskell Research Center, Newark, DE 19714, Fax: 302-351-6905, kalumbu.malekani@usa.dupont.com, Andreas Huber, DuPont de Nemours (Deutschland) GmbH, and Phil Sarff, ABC Laboratories Inc*

Aged sorption is often used as a refinement in regulatory leaching modeling assessments in Europe. Adsorption-desorption studies are usually conducted using the traditional batch-equilibrium design. The adsorption coefficient and the Freundlich constants (K_d, K_f, and 1/n) obtained in these studies are used as input parameters for leaching model calculations along with degradation rates that are obtained from the same soil. Traditionally, these two sets of parameters are obtained in separate studies under different conditions. Combining the two sets of experiments provides a powerful tool for simultaneous generation of both degradation and aged sorption parameters, which can be used in a two-compartment kinetic sorption model for estimating pesticide PEC_{gw}. A study protocol design that will provide information on degradation rate, sorption, and aged sorption in a single study will be discussed in detail using aged sorption experiments conducted at more realistic moisture content, with nicosulfuron as examples. The use of aged K_d and DT_{50} in FOCUS-PEARL model, a standard leaching model in the European regulatory process, will also be described.

81. Improved methods for measuring K_d for strongly hydrophobic pesticides
***Svetlana Bondarenko**, Department of Environmental Sciences, University of California, Riverside, CA 92521, Fax: 951-827-3993, sbond@ucr.edu, Stacy Kavanaugh, Horticulture, Plant & Soil Science Department, California State Polytechnic University, and Jay Gan, Department of Environmental Sciences, University of California Riverside*

Measurement of adsorption coefficient K_d for strongly hydrophobic pesticides is often problematic as the conventional batch equilibration-solvent extraction approach tends to underestimate K_d due to a lack of true phase separation. Centrifugation does not completely exclude colloidal or dissolved organic matter from the aqueous phase, and the aqueous-phase concentration C_w measured by solvent extraction may thus be artificially enhanced, resulting in smaller K_d estimates. This artifact may be prevented by using a method that selectively detects the freely dissolved chemical concentration. In this study, we tested the use of solid phase microextraction (SPME) for detecting C_w and determined K_d for eight pyrethroid insecticides in two sediments. K_d obtained with SPME was 2-34 times greater than that with the conventional solvent extraction method. In addition, we evaluated the influence of operational conditions on K_d underestimation by the traditional method, and found that the underestimation decreased with increasing solution-to-solid ratio, increasing centrifugation speed, or addition of electrolytes (e.g., $CaCl_2$). However, even under optimal conditions, significant underestimation of K_d still occurred. Therefore, the use of a selective method (e.g., SPME) to detect C_w may offer significant improvements in K_d determination for strongly hydrophobic pesticides.

82. **Mobility determination of an experimental compound as a seed treatment in a greenhouse soil column study**
***Jennifer J. Shepherd**[1], Ellen L. Arthur[1], Anu R. Dominic[2], George J. Sabbagh[2], and Dan G. Dyer[1]. (1) Metabolism Soil & Water, Bayer CropScience, 17745 South Metcalf Avenue, Stilwell, KS 66085, Fax: 913-433-5389, jennifer.shepherd@bayercropscience.com, (2) Environmental Research, Bayer CropScience*
A soil column leaching study was performed with a new experimental compound as a corn seed treatment. The study was conducted using ten large soil columns which were each planted with a corn seed treated with the experimental compound. Water was applied to maintain the health of the crop. Intense evapotranspiration of corn plants lead to the need to apply excessive amounts of water in order to obtain leachate. Following addition of 165 cm of water over 4 months, only 0.12% of the applied radioactivity moved through the 60-cm soil column and was detected in the leachate. Ninety-six percent of the soil residues detected at the end of the study remained in the top 15 cm of soil. The amount of radioactivity in the leachate declined over time, indicating that the remaining residues became more tightly bound to the soil, thus reducing the potential for additional residues leaching into groundwater.

83. **Modeling the fate and nonideal transport of pesticide from a slow-release, pesticide treated seed in a laboratory soil column**
***George J. Sabbagh**[1], Garey Fox[2], Liwang Ma[3], Rob Malone[3], Ellen L. Arthur[1], and Dan G. Dyer[4]. (1) Environmental Research, Bayer CropScience, 17745 South Metcalf, Stilwell, KS 66085, Fax: 913-433-5389, george.sabbagh@bayercropscience.com, (2) Department of Civil Engineering, University of Mississippi, (3) Great Plains Systems Research Unit, USDA-ARS, (4) Metabolism Soil & Water, Bayer CropScience*

This research evaluated the predictive ability of a pesticide transport model to simulate the potential for pesticide leaching from a slow release, insecticide treated seed. Column leaching studies were performed in the laboratory to determine the potential leaching of an experimental compound X. The column leaching studies were modeled using the Pesticide Emission Assessment and Regional and Local scales (PEARL), a one-dimensional (vertical) flow model. PEARL is capable of modeling both instantaneous equilibrium and kinetic sorption. The model was calibrated based on leachate water from and crop growth. Measured concentrations were compared to model predictions for two scenarios: one assuming equilibrium sorption and another assuming kinetic sorption. Assuming instantaneous equilibrium overpredicted the movement of peak pesticide concentrations in the profile. With sorption kinetics, the predicted movement of the compound in the soil profile was more in line with what was observed in the study.

84. **Chemical signals that regulate tritrophic plant-insect interactions**
***James H. Tumlinson**, Department of Entomology, Chemical Ecology Laboratory, Pennsylvania State University, University Park, PA 16802, jht2@psu.edu*

Volatile organic compounds (VOC), released by plants in response to insect damage, attract natural enemies of the insect. Blends of the VOC are composed of compounds synthesized by different pathways, including six-carbon aldehydes, alcohols and esters, monoterpenes, sesquiterpenes, and aromatic compounds. Blend composition varies qualitatively and quantitatively among different plant species and varieties of the same species, as well as when different species of caterpillars feed on the same plant. The elicitors of these plant defenses are fatty acid-amino acid conjugates, like N-linolenoyl-L-glutamine and N-(17-hydroxylinolenoyl)-L-glutamine, synthesized in the gut of the caterpillar. Additionally, corn seedlings attacked by herbivores emit 6-carbon compounds that trigger defensive reactions in neighboring plants. Plants previously exposed to these 6-carbon compounds are primed to respond much more strongly than unexposed plants to subsequent attack by herbivores.

85. **Production of semiochemical and allelobiotic agents as a consequence of aphid feeding**

***John A. Pickett**, Biological Chemistry Division, Rothamsted Research, West Common, Harpenden, Hertfordshire AL5 2JQ, United Kingdom, Fax: (44) 1582 762595, john.pickett@bbsrc.ac.uk*

Aphids have an extremely intimate relationship with their plant hosts. Although this might suggest that aphid infestation would be largely cryptic, there are a wide range of changes that can be detected behaviourally, chemically and also at the molecular genetic level. Colonisation by aphids can cause release of semiochemicals characteristic of the aphid species and besides reducing acceptability to incoming aphids, these can enable recruitment of specific parasitoids. Some semiochemicals involved in these processes can also influence the defence status of neighbouring intact plants through air or the rhizosphere. Electrophysiological and behavioural studies on the aphids, their parasitoids and other organisms, facilitates the identification of compounds having direct effects on plant defence. New developments will be presented from work on semiochemicals such as *cis*-jasmone and 6-methyl-5-hepten-2-one, and allelobiotic agents such as 6-hydroxy-1,2,3,4-tetrahydro-β-carboline-3-carboxylic acid and 2,4-dihydroxy-7-methoxy-1,4-benzoxazin-3-one, as well as new work on these and others as potential phytopheromones.

86. **Chemical communication across tritrophic systems**

***Consuelo M. De Moraes** and Mark C. Mescher, Department of Entomology, Penn State University, 535 ASI building, University Park, PA 1680, czd10@psu.edu*

Plant volatiles play important roles in mediating ecological interactions among plants herbivores and natural enemies. They serve as long range foraging cues both for herbivores and their natural enemies and convey complex and highly specific information regarding host identity and condition. Herbivore-induced plant volatiles can convey herbivore-specific information allowing parasitoids to discriminate even closely related herbivore species at long range. In this presentation, we discuss recent developments in the investigation of chemical mediated interactions and their potential significance.

87. **Volatile-induced plant defense responses in corn: Signals, effects, and specificity**

***Juergen Engelberth**, Department of Entomology, The Pennsylvania State University, 117 A Chemical Ecology Lab, University Park, PA 16802, jee11@psu.edu*

Plants under insect herbivore attack have evolved various mechanisms to counteract this threat. Besides direct defensive measures, plants often release volatile organic compounds (VOC) that can serve as signals to attract predators and parasites of attacking herbivores. Additionally, certain VOC can also be recognized by neighboring plants resulting in an enhanced preparedness against impending herbivory. In corn (*Zea mays*), green leafy volatiles (GLV) can act as this signal and activate specific sections of the octadecanoid signaling pathway in receiver plants. Moreover, exposure to GLV significantly induced the expression of three different putative 12-oxophytodienoate 10,11-reductase (ZmOPR1-3) genes, while wounding and application of insect-derived elicitors induced only subsets of these OPR genes. In conclusion, inter-plant communication via GLV signaling in corn activates distinct sections of the octadecanoid signaling pathway resulting in a specific linking of this signal to plant defense response.

88. **Herbivore-induced root signals help entomopathogenic nematodes to control maize pests**

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Plants under attack by arthropod herbivores often employ a strategy of indirect defense by attracting natural enemies of the herbivores. Such interactions also occur below ground when insect-damaged roots release compounds that attract entomophatogenic nematodes. We identified a potent nematode attractant, the sesquiterpene (*E*)-ß-caryophyllene, which is emitted by maize roots under attack by larvae of *Diabrotica virgifera virgifera*, a ferocious pest of maize. Interestingly, most North American maize varieties do not emit this signal. With the use of a newly-developed, below ground olfactometer it was shown that the emission of (*E*)-ß-caryophyllene is essential for the attraction of the nematode *Heterorhabditis megidis*. This was confirmed in field experiments, with clear differences in nematode attraction between maize lines with and without the signal and resulting in dramatically different nematode infection rates of pest larvae. These results show great promise for the use of the plants' natural defense signals to enhance the biological control of insect pests.

89. **Chemical signals that mediate inducible responses in plants**

*Huiming Zhang[1], Paxton Payton[2], Dmytro Kornyeyev[1], Mohamed A Farag[1], Choong-Min Ryu[3], and **Paul W. Pare**[1]. (1) Department of Chemistry and Biochemistry, Texas Tech University, Lubbock, TX 79409-1061, Fax: 806 742 1289, Paul.Pare@TTU.edu, (2) Cropping Systems Research Laboratory, USDA ARS, (3) Laboratory of Microbial Genomics*

Plant growth-promoting rhizobacteria (PGPR) are naturally occurring soil microbes that colonize roots, enhance plant growth, and activate plant defenses against plant pathogens. Recent chemical and plant-growth data indicate that certain PGPR release blends of volatile components are sufficient to promote growth and enhance protection against pathogens. Transcriptional profiling has established the existence of differential gene expression with plant exposed to PGPR volatiles. Down stream responses potentially influenced by modified gene expression including cell size, photosynthesis and accumulation of secondary metabolites were also examined. These results, in combination with studies using commercially available transgenic and mutant Arabidopsis lines, have provided sufficient data to formulate a preliminary model of how plant growth promotion and enhanced defense can be mediated by PGPR volatiles.

90. **Roles of herbivore-induced terpenes in multitrophic interactions between plants, herbivores and their enemies**

***Jörg Degenhardt**, Tobias G. Köllner, Christiane Schnee, and Jonathan Gershenzon, Department of Biochemistry, Max Planck Institute for Chemical Ecology, Hans Knöll Strasse 8, D-07745 Jena, Germany, Fax: +49 3641 571302, degenhardt@ice.mpg.de*

Despite the remarkable abundance and diversity of terpenoid secondary metabolites in plants, there are still large gaps in our knowledge of their function in defense against herbivorous insects. The key step of terpene biosynthesis is catalyzed by the enzyme class of terpene synthases which form multiple products from single prenyl diphosphate substrates. To identify the function of terpene blends generated by the maize terpene synthases in the tritrophic interactions between maize, lepidopteran larvae and parasitoids, we overexpressed the corresponding genes in Arabidopsis and measured the attraction of the transgenic plants to the parasitoid Cotesia marginiventris using an olfactometer. A second tritrophic interaction was studied in the roots of maize which emit sesquiterpene hydrocarbons after insect damage. Feeding by larvae of the Western corn rootworm caused release of (-)-(*E*)-β-caryophyllene which was shown to attract enemies of the corn rootworm.

91. **Role of jasmonic acid in the regulation of plant antiherbivore defense**

***Gregg A. Howe**, Hui Chen, and Anthony L. Schilmiller, MSU-DOE Plant Research Lab, Michigan State University, East Lansing, MI 48824, howeg@msu.edu*

Plant resistance to leaf-eating insects is governed in part by chemicals that negatively affect the growth and reproduction of the attacking pest. The plant signaling compound jasmonic acid (JA) plays a central role in promoting defense responses against a broad spectrum of herbivores. Although it is well established that JA controls the expression of a large set of target genes in response to herbivory, very few gene products have been shown to play a direct role in reducing herbivore performance. We employed a novel mass spectrometry-based approach to identify JA-regulated host proteins that accumulate in the midgut of *Manduca sexta* larvae reared on tomato plants. Our results indicate that several JA-regulated enzymes exert defensive activity by degrading essential amino acids within the midgut. Systematic identification of plant proteins that impair nutrient acquisition in the digestive tract may assist the development of new methods for pest control.

92. **Caterpillar secretions suppress the defensive genes of the tomato plant**

***Gary W. Felton**, Department of Entomology, Penn State University, 501 ASI Bldg, University Park, PA 16802, Fax: 814-865-3048, gwf10@psu.edu*

The phenomenon of induced plant defenses has been observed in virtually all plant species that have been examined. Because of the release of wound signals that occurs while chewing insect herbivores feed on plants, it is widely assumed that the herbivores are at the mercy of the induced responses of their host plant. Ongoing research in our laboratory has shown that the saliva of caterpillars plays a role in suppressing these induced responses. Here we report that multiple secretions of caterpillars (saliva, regurgitant, and eversible gland) can suppress defense gene expression in the tomato plant. Moreover, saliva suppresses long term plant developmental changes that occur as a consequence of wounding.

93. **Reactive electrophile species as signals in biotic and abiotic stress**

***Laurent Mène-Saffrané** and Edward E. Farmer, Department of Plant Molecular Biology (DBMV), University of Lausanne, BIOPHORE building, 1015 lausanne, Switzerland, Fax: +41-(0)21-692-4195, Laurent.Mene-Saffrane@unil.ch*

Oxygen is an essential component for aerobic organisms but represents, at the same time, a potential danger for cells. The non-enzymatic oxidation of lipids observed during oxidative stresses leads to the generation of a broad array of compounds amongst which are the reactive electrophile species (RES). Many of them display an α,β-unsaturated carbonyl function which confers strong reactivity and thus a potential toxicity. To study the occurence and the biological function of RES in *Arabidopsis*, we have focused our analysis on the malondialdehyde (MDA), a widely used lipid oxidation marker. In control conditions, we showed that *Arabidopsis* contains relatively high levels of MDA which originate mainly from the trienoic fatty acids. The study of lesion mimic mutants as well as the response of plants to avirulent bacteria has established a positive correlation between the accumulation of MDA and the development of tissue necrosis. These data suggest that MDA could act as a pro-cell death compound. However, we found that MDA can act as a potent signal to activate the expression of cell survival genes. This newly recognised biological activity in MDA provokes the question: are these reactive electrophile species only "passive" lipid oxidation products or could they act as important signals in the response of cells to oxidative events?

94. **Glucosinolate breakdown during Arabidopsis-aphid interactions**

***Georg Jander**[1], Carina Barth[2], and Jae Hak Kim[1]. (1) Boyce Thompson Institute for Plant Research, Tower Road, Ithaca, NY 14853, Fax: 607-254-2958, gj32@cornell.edu, (2) Department of Biology, West Virginia University*

Plants have evolved a variety of physical and chemical barriers to protect themselves against herbivory. In a characteristic defense of Arabidopsis and other crucifers, tissue damage causes the enzyme myrosinase to cleave glucosinolates, producing sharp-tasting compounds that can deter herbivory. However, the generalist herbivore *Myzus persicae* (green peach aphid) manages to avoid myrosinase-catalyzed breakdown of glucosinolates while feeding from the Arabidopsis phloem. Aphid reproduction is also not affected by the presence or absence of myrosinase in the plant. In Arabidopsis myrosinase mutants, indole glucosinolates still break down in response to tissue damage, though at a greatly reduced rate. This alternate glucosinolate breakdown pathway may represent a defense against herbivores such as *M. persicae* that manage to avoid myrosinase-catalyzed cleavage of glucosinolates. Further support for this hypothesis comes from experiments with purified glucosinolates in artificial diets and from Arabidopsis mutants with altered indole glucosinolate levels.

95. **A novel maize cysteine protease mobilized as an active defense against herbivores**

***Dawn S. Luthe**[1], Tibor Pechan[2], Srinidi Mohan[3], Renuka Shivaji[3], Lorena Lopez[3], Alberto Camas[3], Erin Bassford[3], Seval Ozkan[3], Peter Ma[4], and W. Paul Williams[5]. (1) Department of Crop and Soil Sciences, Pennsylvania State University, 116 ASI Building, University Park, PA 16802, Fax: 662-325-8664, dsluthe@ra.msstate.edu, (2) Life Sciences and Biotechnology Institute, Mississippi State University, (3) Dept. of Biochemistry and Molecular Biology, Mississippi State University, (4) Dept. of Entomology, Mississippi State University, (5) Corn Host Plant Resistance Laboratory, USDA-ARS*

We have demonstrated that the insect resistant maize (*Zea mays L.*) lines, developed by conventional plant breeding, have a novel response to attacking caterpillars. A unique 33-kD cysteine protease (Mir1-CP) rapidly accumulates at the feeding site in the mid-whorl region of the plant. When caterpillars feed on plants expressing Mir1-CP, nutrient utilization is impaired and their growth is inhibited. This is due to damage to the insects' peritrophic matrix (PM), the structure that surrounds the food bolus and protects the intestinal microvilli from mechanical and chemical damage. *In vitro* analysis indicated that recombinant Mir1-CP increases PM permeability to Blue Dextran 2000 by degrading specific integral PM proteins. In bioassays, either purified Mir1-CP or the Bt-toxin, CryIIA increased mortality and decreased the relative growth rates of both fall armyworm and southwestern corn borer larvae. Very low concentrations of Mir1-CP (ppb) synergized the effect of Bt-toxin on the larvae. Immunolocalization indicated that Mir1-CP accumulates in the thick-walled sieve elements in the phloem of the minor veins in the maize leaf. *In situ* hybridization showed that Mir1-CP transcripts were in the vascular parenchyma cells adjacent to the phloem. These results suggest that Mir1-CP may move through the phloem in response to caterpillar feeding.

96. Conceptual models for understanding agrochemical occurrence in surface waters

***Paul Hendley**, Global Environmental Sciences, Syngenta Crop Protection, 410 Swing Road, P.O. Box 18300, Greensboro, NC 27410, paul.hendley@syngenta.com, and R. Don Wauchope, Southeast Watershed Research Laboratory, USDA - Agricultural Research Service (retired)*

Effective discussion of a multiplicity of environmental variables such as those involved in the fate and transport of pesticides requires a common frame of reference – conceptual models serve this function. Unfortunately, no agreed “standard” conceptual models exist for most pesticide fate and transport processes and so authors frequently reinvent simple models, many of which fail to unify processes at different scales. This paper initiates a multi-scalar conceptual model for agrochemical entry into flowing and static surface waters and the chemical's subsequent fate; it addresses processes at micro, meso, field and watershed scales. This model will be made publicly available electronically to serve as an “open source” reference available for sharing and refinement by subsequent authors so that a unified model can develop with time. Such an agreed conceptual framework will facilitate constructive discussion of factors that lead to discrepancies between various modeling approaches and results from monitoring studies.

97. Site selection for surface water sampling locations in smaller watersheds using a GIS based procedure

***Jennifer R Trask**[1], Christopher M Harbourt[1], Chris Holmes[1], and Paul Hendley[2]. (1) Waterborne Environmental Inc, 897B Harrison Street S.E, Leesburg, VA 20175, traskj@waterborne-env.com, (2) Syngenta Crop Protection Inc*

Selecting appropriate medium term sampling locations in regional and national monitoring studies is a challenging process. The size of subwatersheds (in this case between 9 and 80 sq. mi.) complicates the ability of field personnel to assess watershed characteristics when in the field. This process becomes even more difficult when the area of interest is the entire midwestern United States. A recent local sampling site selection process began with a random spatially balanced selection of large watersheds (100 to 300 sq. mi.) that described the bounds for smaller scale watershed selection. A detailed GIS analysis using air photos, river networks, and raster watershed analysis helped identify where smaller subwatersheds within these random larger areas met study objectives. Applicable river sections were identified where watershed criteria met the specific study criteria for size and composition. Field teams then identified bridges and sampling locations in the office prior to verification for suitability via field visits. GIS approaches integrated the whole process from the office to the field and made the process very efficient and successful. Examples are presented in context demonstrating where the procedure worked well and challenges to be resolved in future studies.

98. Spatial approaches to estimating pesticide spray drift exposure to surface water at the landscape level using GIS and remote sensing

***Chris Holmes** and Ryan Williams, Waterborne Environmental Inc, 897-B Harrison St. SE, Leesburg, VA 20175, Fax: 703-777-0767, holmesc@waterborne-env.com*

This presentation will discuss approaches to evaluating the potential for spray drift exposure from agricultural pesticide applications near surface water using a Geographic Information System (GIS) and other spatial data. Utilizing knowledge of surface water characteristics along with detailed knowledge of the proximate land cover, the potential for spray drift exposure can be efficiently estimated for thousands of water bodies over a large agricultural landscape. Information on distance from crop to water, direction, and composition of natural buffers can all be assessed within a GIS. This information can be applied to standard methods for calculating drift-related concentrations in surface water (e.g., AgDRIFT, FOCUS, etc.). Using a GIS, the effect of no-spray buffers can also be quantified to examine the impact a specific label restriction may have on the exposure distribution. Estimated concentrations can be calculated for individual water bodies linked within a hydrologic network, creating the ability to assess potential watershed-level exposure.

99. Using spatial and temporal pesticide concentration data to assess potential hazards to sensitive aquatic ecosystems in South Florida

***Cathleen J. Hapeman**[1], Ramona D. Smith[1], Jennifer A. Harman-Fetcho[1], Laura L. McConnell[1], Thomas L. Potter[2], Clifford P. Rice[1], Ali M. Sadeghi[1], Kerry A. Sefton[1], Bruce A. Schaffer[3], Richard Curry[4], and Krystyna Bialek[1]. (1) Beltsville Agricultural Research Center, USDA-ARS, 10300 Baltimore Avenue, Beltsville, MD 20705, Fax: 301-504-5048, hapemanc@ba.ars.usda.gov, (2) Southeast Watershed Research Laboratory, US Department of Agriculture, (3) IFAS/Tropical REC-Homestead, University of Florida, (4) Biscayne National Park, National Park Service*

South Florida is a unique combination of highly productive agricultural lands: urban expansion, engineered canal structures for flood control, and critical terrestrial and aquatic wildlife habitat (Everglades, Biscayne and Florida Bays). In a multiyear study of currently-used pesticides, surface water samples from canals and Biscayne Bay were analyzed for 39 pesticides. Atrazine and chlorpyrifos concentrations were highest near corn production, while chlorothalonil and endosulfan concentrations were highest near vegetable production. No clear trend was observed for metolachlor which was used on multiple crops. The calculated aquatic-life hazard potential for the planting period (November) versus the harvest period (March) showed that a higher hazard potential occurs during harvest, primarily from the use of endosulfan. Coupling these data to the life cycles of the aquatic organisms will provide policy and decision makers with more realistic risk assessments and producers with information to reduce the impact of agricultural practices on sensitive ecosystems.

100. Comparison between the transport of isoxaflutole and its degradates to triazine and acetanilide herbicides in ten Iowa rivers

***Michael T. Meyer**[1], Stephen J. Kalkoff[2], and Elizabeth A. Scribner[2]. (1) U. S. Geological Survey, 4821 Quail Crest Place, Lawrence, KS 66049, Fax: 785-832-3500, (2) U.S. Geological Survey*

During 2004, the occurrence of 14 herbicides and 41 herbicide degradation products was examined in 80 water samples collected from 10 major Iowa rivers flowing to the Missouri and Mississippi Rivers. All samples were analyzed for herbicides and herbicide degradation products using previously developed liquid chromatography/mass spectrometry (LC/MS) methods. Analysis for isoxaflutole (a restricted-use corn protoherbicide) and its degradation products diketonitrile (the compound containing the herbicidal activity) and benzoic acid used a new LC/MS/MS method. Similar to previous studies, atrazine, metolachlor, and seven triazine or acetamide degradates were detected in almost every stream sample collected. By comparison, isoxaflutole was detected in only 5% of the stream samples, with diketonitrile (70%) and benzoic acid (55%) being detected much more frequently. Only sparse information is available on the occurrence of isoxaflutole and its degradates. These results suggest that isoxaflutole degrades rapidly after application and that its degradates are more likely to occur in the environment (similar to several other herbicides). However, the degradate of isoxaflutole, diketonitrile, is the active ingredient and thus may have greater environmental implications than most other degradates.

101. A multi-state small-stream and weather monitoring network: Equipment design, data handling, and reliability

***Nathan J Snyder**[1], Christopher M Harbourt[1], Les S. Carver[2], Paul Hendley[3], and Genee Burnett[3]. (1) Waterborne Environmental Inc, 1023 Carpenter Street, Philadelphia, PA 19147, snydern@waterborne-env.com, (2) Waterborne Environmental, Inc, (3) Syngenta Crop Protection Inc*

Chemical monitoring programs that are linked to river hydrology and weather data collection can be used to build confidence in environmental and ecological exposure estimates used to support pesticide registration and reregistration activities. A monitoring program is being conducted across the midwestern United States that

involves extensive instrumentation activities. The authors developed and deployed instruments using forms for electronic data handling matched with data redundancy approaches to ensure data delivery met or exceeded Good Laboratory Practice standards (GLPs). The study was planned to cover twice as many sampling stations during the second year of sampling; however, the year 1 efforts to establish an instrumentation methodology helped reduce costs and realize great efficiencies in the second year. In this presentation, the authors will present descriptions of the instrumentation design and installation challenges, data handling structure, and a review of the operational reliability of approximately 90 complex installations at unique/remote locations.

102. Pesticide fate and exposure assessments: Perspectives from state regulatory agencies

***Kevin L. Armbrust**, Mississippi State Chemical Laboratory, Mississippi State University, P.O. Box CR, Mississippi State, MS 39762, Fax: 662-325-7807, armbrust@ra.msstate.edu, and Joseph E. Zachmann, Agronomy and Plant Protection, Minnesota Department of Agriculture*

States are often compelled to address environmental issues after pesticide products are registered, with scant federal support. Federally required studies to assess pesticide fate, and subsequent exposure assessments, are designed to cover a range of conditions that may occur in environments across the US, yet realistically they cannot adequately account for all environmental conditions and agronomic use patterns that strongly influence a pesticide's behavior in individual states or counties. Ideally such issues are addressed prior to or as a condition of registration, but frequently are discovered only after the pesticide has been in use for a number of years. Additionally, the advent of new pesticide chemistry and analytical technology uncovers new mechanisms of environmental transport and fate, challenging the paradigms of environmental chemodynamics established by older chemistry. States may be faced with unintended effects such as unexpected persistence or detection of degradation products in water resources. To address these issues, states are challenged with working across federal agencies, and even across divisions within a single agency, that use different analytical methods with differing data quality objectives. We will illustrate the challenges through several examples of real-world situations faced by state regulatory authorities. It is critical that research continue to advance the understanding of mechanisms influencing pesticide fate under agronomic conditions unique to individual states.

103. Challenges in using plant responses to develop new methods of disease control

***Allison Tally**, Marketing, Syngenta Crop Protection, 410 Swing Rd, Greensboro, NC 27419, Fax: 336-632-2884, allison.tally@syngenta.com*

Acibenzolar-S-methyl (ASM) (Bion®, Actigard®, Boost®) has been registered for a number of years in several countries globally. The products have been successful in several niche markets, although it should be recognized that some variability in performance exists. While the mode of action appears to be the same/similar to the salicylic acid (SA) pathway that occurs naturally in plants, the plant responses differ between species. Higher levels of SA are required for SAR following natural induction compared to ASM. It is clear that there are other responses that have not been elucidated. The concept of triggering the plant to induce its own defense mechanisms is shown to be achievable commercially but such compounds are complex to develop. Each pathosystem must be evaluated, unlike many fungicides that control similar pathogens across many crops. There are other opportunities, especially for pathogens such as viruses and bacteria where few options are available for control.

104. Genomic approaches to develop nematode resistance

***Sumita Chaudhuri**, BASF, 26 Davis Drive, Research Triangle Park, NC 27709, chaudhs@basf-corp.com*

Plant parasitic nematodes are a major pathogen for all crops of economic importance, causing $100 billion of annual crop losses worldwide. Soybean cyst nematode (SCN) is the number one pest among soy diseases and over 80% soy acreage in US is infested. Current nematode control measures include crop rotation, use of nematode-resistant cultivars and use of chemical nematicides. All these practices have limitations. The natural resistance exists for only limited races of damaging nematodes. The effectiveness of resistance breaks down quickly as new virulent populations emerge. Crop rotation limits agronomic output of a field and some existing chemical nematicides are expensive and environmentally unsafe. Biotech approach offers great potential for effective, durable and broad-spectrum nematode control. The key for designing successful strategies is to understand nematode-host interactions. In collaboration with Hyseq Pharmaceuticals, we have applied a novel technology to capture soybean transcriptomes. Differing from the classic method that analyzes transcriptomes by sequencing each individual clones, Hyseq technology uses hybridization, clustering with similar signatures, and sequencing representative clones to capture transcriptomes including rare transcripts. We have obtained over 53,000 unique soybean transcriptomes and expression profiles of SCN infected vs uninfected roots. Combining with other genomic tools, we are able to select a list of candidate genes and evaluate their potentials for nematode control in a robust bioassay system.

105. Harpin, a bacterial protein that functions in plant disease and stimulates plant defense

***Steven V. Beer**, Department of Plant Pathology, Cornell University, 334 Plant Science Building, Ithaca, NY 14853, Fax: 607 255-4471, svb1@cornell.edu*

Harpin is produced by the bacterium *Erwinia amylovora*, which causes fire blight, a serious disease of apple, pear and related plants. The heat-stable protein (403 amino acids) is rich in glycine and serine and lacks cystine and almost all aromatic amino acids. It is critical to disease development, but its mechanistic role is unknown. Harpin interacts with a specific 60-amino-acid protein from apple, called HIPM, whose function also is unknown. Gene silencing experiments, now in progress with transgenic apples, may indicate whether harpin/HIPM interaction is critical to disease development. Like other bacterial proteins that effect their eukaryotic hosts, harpin is secreted from the bacterial cytoplasm by the type-three-secretion system. When the isolated protein is applied to plant foliage, roots or seeds, metabolic pathways are activated that result in increased resistance to several pathogens and pests. In addition, treated plants exhibit enhanced growth and yield of commercial significance.

106. Molecular and functional dissection of nematode resistance in tomato

***Isgouhi Kaloshian**, Department of Nematology, University of California, Riverside, CA 92521, Fax: 951-827-3719, isgouhi.kaloshian@ucr.edu*

Root-knot nematodes are important agricultural pests of a large number of crops and cause serious damage on tomato. In our lab, we have focused our efforts on the understanding of *Mi-1*-mediated resistance, a unique resistance gene that recognizes animals from distinct taxa: root-knot nematodes, potato aphids and whiteflies. In spite of this unique feature, *Mi-1* belongs to the largest class of plant resistance genes that encode for CC-NBS-LRR proteins. We are using molecular and functional approaches to identify host genes that play a role in the recognition of these animals or in the signal transduction downstream of Mi-1. We have discovered *Rme1* in genetic screens which seems to be specifically required for *Mi-1* resistance. In addition, using known genetic mutants in salicylic acid (SA) and jasmonic acid (JA) signal pathways, a role for SA-dependent pathway and no role for JA-dependent pathway were determined. Using virus-induced gene silencing, a number of genes required for *Mi-1* resistance were identified.

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-Tim Ballard, tballard@en-cas.com

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-Tim Ballard, ag-list manager

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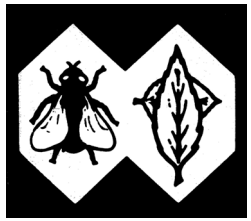

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