AGRO

Chemistry for and from Agriculture

American Chemical Society
234th National Meeting and Exposition
August 19-23, 2007
Boston, Massachusetts, USA

PICOGRAM v. 73 and Abstracts

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FALL 2007 MEETING SCHEDULE

Notes from the Program Chair page 25
Technical Program begins on page 43
Abstracts can begin on page 57

SYMPOSIUM OR SESSION	ORGANIZER(S)	Sun	Mon	Tue	Wed	Thu
Immunochemistry	W. Shelver J. Van Emon	AM PM				
Agrochemical Residue and Metabolism Chemistry	J. Johnston D. Smith T. Wehner	AM PM				
AGRO Business Meeting (Open to all members)	L. McConnell J. Johnston K. Ambrust	EVE				
AGRO Division Posters	J. Johnston		AM			
Sterling Hendricks Lecture	J. Seiber M. Tunick		AM			
VOC's from Pesticide and Fumigant Applications	B. Bret P. Green L. McConnell		PM	AM		
Sci-Mix	J. Johnston		EVE			
ACS International Award Symposium in Honor of Dr. Fred Perlack	W. Ridley J. Clark			AM		
AGRO Graduate Student Lunch	L. McConnell			Noon		
Issues in Integrated Pest Management	A. Herbert S. Ratcliffe			PM		
AGRO Awards and Social Banquet				EVE		
Nanotechnology in Agriculture	N. Scott				AM PM	
Modern Chiral Agrochemicals	A. Garrison R. Williams J. Gan				AM PM	
Future Symposium Organizers – Brainstorming, Blues & Brews	L. McConnell J. Johnston K. Ambrust				EVE	
New Developments and Issues in Agrochemical Sciences	J. Johnston					AM
AGRO – Past, Present, and Future	J. Johnston					PM

ALL SYMPOSIA will be at the BOSTON CONVENTION & EXHITION CENTER (BCEC) in Rooms 259 A and B.
The AGRO POSTER SESSION will be at the BCEC in Exhibit Hall B2.

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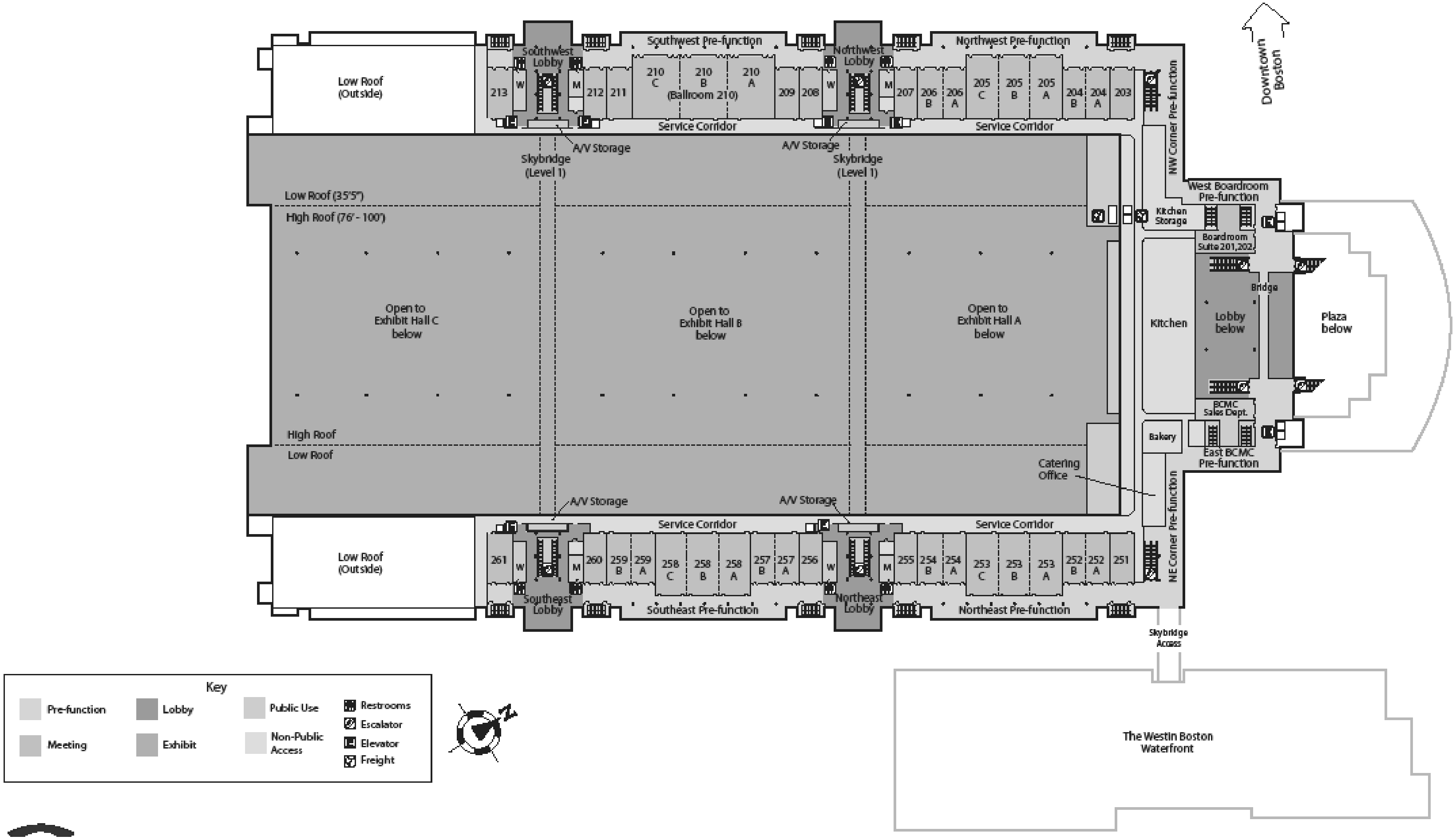

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Official Properties for ACS National Meeting in Boston, MA

1.	Boston Park Plaza	64 Arlington Street
2.	Colonnade	120 Huntington Avenue
3.	Courtyard by Marriott Tremont	275 Tremont Street
4.	Doubletree Downtown	821 Washington Street
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6.	Hilton Back Bay	40 Dalton Street
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13.	Radisson Boston	200 Stuart Street
14.	Seaport	One Seaport Lane
15.	Sheraton Boston	39 Dalton Street
16.	Westin Boston Waterfront	425 Summer Street
17.	Westin Copley Place	10 Huntington Avenue

Editor's Notes

Welcome to Boston!

More changes have come to the PICOGRAM. In response to members' requests, the meeting schedule and venue maps appear at the beginning of the PICOGRAM. A new section has been added just for students and new investigators to address opportunities and issues of concern to AGRO's newest scientists. Additional notices are welcome!

With this issue, we begin our venture into annual meetings. You will notice that the programming section only contains a general call for symposia and papers for one National ACS Meeting, similar to a Save-the-Date announcement. In early March 2008, members will receive PICOGRAM volume 74 which will contain the detailed call for papers and other sections typically found in the Spring PIOCGRAM. It will have a new look and will contain no abstracts.

If you would like to have other changes made or have other suggestions to make the PICOGRAM more useful to you, please drop me an email or give me a call.

Enjoy the Meeting!

Cathleen J. Hapeman
PICOGRAM, Editor

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Students and New Investigators

Programming

AGRO Division Business

AGRO Membership and Services

New from AGRO

AGRO Members Receive a 40% Discount
ACS Members Receive a 30% Discount

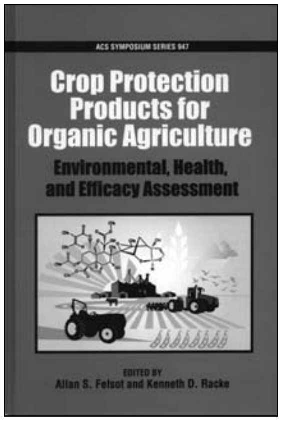
CERTIFIED ORGANIC AND BIOLOGICALLY DERIVED PESTICIDES

Environmental, Health, and Efficacy Assessment

Allan S. Felsot, *Washington State University*, and **Kenneth D. Racke**, *Dow AgroSciences*

This book covers environmental chemistry, toxicology, and efficacy of biopesticides and certified organic pesticides. The book examines hazards of currently certified organic pesticides and potential exposures after use. The book will start with an overview of the process used by the National Organic Materials Standards Board to judge the acceptability of products for certification. The decision making process of the NOMSB is compared to the risk assessment paradigm used for all pesticides. Biologically derived pesticides that are candidates for certified organic status are discussed from the perspective of development, mode of action, and potential limitations to certification.

(ACS Symposium Series 947)
(An American Chemical Society Publication)
2006 326 pp.; 41 halftones & line illus.
978-0-8412-3881-7 $174.50

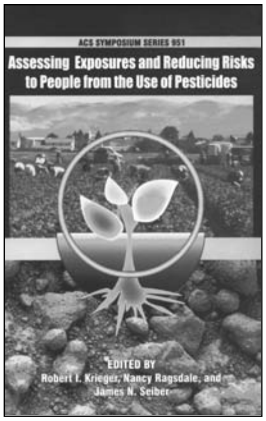


ASSESSING EXPOSURES AND REDUCING RISKS TO PEOPLE FROM THE USE OF PESTICIDES

James N. Seiber, *U.S. Department of Agriculture*, Edited by **Robert I. Krieger**, *University of California, Riverside*, and **Nancy Ragsdale**, *U.S. Department of Agriculture*

Assessing Exposures and Reducing Risks to People from the Use of Pesticides practices that have been developed in the past 10 years marked from the passage of the Food Quality Protection Act and other pertinent legislation (eg the Clean Air Act Amendments), which deal all, or in part with reducing risks associated with pesticides.

(ACS Symposium Series 951)
(An American Chemical Society Publication)
2007 304 pp.; 33 halftones & line illus.
978-0-8412-3974-6 $154.50

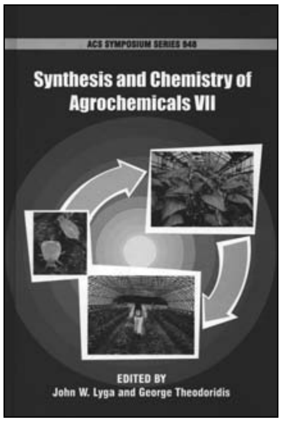


SYNTHESIS AND CHEMISTRY OF AGROCHEMICALS SERIES VII

Edited by **John W. Lyga**, *FMC Corporation*, and **George Theodoritis**, *FMC Corporation*

This book is a continuation in the series of Synthesis and Chemistry of Agrochemicals. The focus of this volume is the translation of pesticidal activity from the lab to the greenhouse to the field. The book covers the chemistry, ADMET and biochemistry research lending a better understanding of the issues involved with loss in activity going from lab assays to greenhouse and field. The second topic covered is synthesis of agrochemicals. This topic addresses the good ideas that never made it to products, chemistry work done in the field of agriculture that was based on a good hypothesis yet never made it to a product. The chapters cover insecticide, herbicide, fungicide and specialty products.

(ACS Symposium Series No. 948)
(An American Chemical Society Publication)
2007 286 pp.; 5 color illus.; 116 b/w halftones & line illus.
978-0-8412-3967-8 $144.50



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Hospitality Committee Report

Coffee Lounge – San Francisco

Thirteen wonderful companies contributed $2350 to give us coffee in our technical sessions in Chicago. We thank them for their generosity and trust that our members took advantage of their informative literature displayed in the hospitality desk area. You could become a sponsor, also. By providing coffee at our technical sessions, we helped uphold the comfort and cultural standards for which Chicago and the AGRO Division are famous.

❧

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❧

This year we changed the format somewhat, for the better, of course. We gave special recognition to the Winner of the International Award for Research in Agrochemicals, Dr Gerry Brooks and also introduced the winners of the Young Scientists Pre- and Post-Doctoral research Award Symposium. Merriment prevailed, as did our traditional, unavoidable Door Prize Drawing, at the Hyatt Chicago, Grand B.

SOCIAL CO-CHAIRS - Al Barefoot & Jeff Jenkins
COFFEE LOUNGE CO-CHAIRS - Terry Spittler & Liliana Schwartz

With this final event, Liliana and Terry surrender their Co-chairs on the Hospitality Committee to Patricia Rice, James Brady, and Steve Lehotay. Please give them your support and assistance. Thank you.

From the Chair's Desk

Laura L. McConnell

The chemistry of agriculture encompasses a fascinating array of topics, cutting across many disciplines. Diversity is one of the strengths of AGRO. Our division members work in a variety of fundamental and applied research areas of chemistry, biochemistry, microbiology and engineering. This diversity is an asset as we expand our mission area to include new topic areas like bioenergy, while maintaining our core programming in pesticide-related research. AGRO is uniquely positioned to provide a forum for the latest developments in agricultural chemistry. In order to continue with the current growth and success of our division, we must take the time to consider the future. We must envision our place not only within the American Chemical Society, but within the scientific community at large – and take steps to realize that vision. What will AGRO look like in five or ten years? What services will the division provide to its members? What impact will we have on the future of agricultural research?

In the Spring 2007 Issue of the *PICOGRAM*, I provided an update on our progress with respect to several initiatives from the long range planning meeting held in January 2006. Many of these initiatives have provided momentum towards improving our programming and increasing participation at the Nationals Meetings. However, AGRO does not currently have a strategic plan for the future. A comprehensive approach which includes activities outside the National Meetings and takes advantage of new technological developments in communications is required to meet the needs of our membership. A strategic plan, if utilized properly, can be a powerful instrument to achieve success.

At the Chicago business meeting, the Executive Committee voted to hold a strategic planning meeting in January 2008. During this meeting, a small group of division leaders will participate in a moderated strategic planning process. ACS will provide a moderator and several other services to support this activity. The process will result in a draft strategic plan document. The draft will be circulated to the entire membership via the Spring 2008 *PICOGRAM*. Feedback from division members will be used to finalize the document by the Fall 2008 National Meeting in Philadelphia. The strategic plan will be used as a guide for division activities and resources for the next 3-5 years. If there are ideas that you have for improving the division, please submit them to me or to one of the other officers.

AGRO relies on the hard work of many volunteers. All of us struggle to balance commitments in their jobs and at home with the time they can commit to ACS activities. I would like to thank all the many active AGRO members who work with enthusiasm and creativity to keep the division moving forward. I have enjoyed immensely serving as your Chair this year, and I will enjoy passing the reigns over to John Johnston, our new Chair for 2008. I also look forward with anticipation to the exciting contributions that AGRO will make to the future of agriculture.

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Awards Committee Report

Dr. Bruce E. Dale, Michigan State University, will receive the 2007 Sterling B. Hendricks Memorial Lectureship Award. Bruce E. Dale is internationally recognized for his work on biomass conversion and sustainability. USDA-ARS is seeking nominations for the 2008 Sterling B. Hendricks award. Deadline for nominations is November 6, 2007. Additional information can be found on page 17.

Dr. Frederick J. Perlak, Monsanto Company, St. Louis, MO will receive the International Award for Research in Agrochemicals at the Fall 2007 ACS Meeting in Boston, MA for his research contributions that led to the development of insect protected crops. This award will be sponsored by BASF Company. Dr. William P. Ridley will organize the award symposium.

Dr. David Soderlund, Cornell University, will receive the International Award for Research in Agrochemicals at the Fall 2008 ACS National Meeting in Philadelphia, PA for his discoveries on the insect sodium channel and insecticides that disrupt its action. DuPont Crop Protection and BASF Company will co-sponsor the award. An award symposium will be organized by Dr. Jeffrey Bloomquist.

Only one International Award will be presented in 2008. Nominations for the 2009 International Award for Research in Agrochemicals are currently being solicited by the Awards Committee. The Awards Committee is also accepting new award nominations for the Division Fellow Award. The nomination forms and criteria for both awards can be found in the *PICOGRAM* on pages 13 and 15, respectively. Please consider nominating a deserving colleague. The deadlines each year are December 31 for the International Award and May 31 for the Fellow Award.

Congratulations to Drs. Perlak and Dale!

Respectfully submitted,

Jim Seiber

James N. Seiber, Chair
Awards Committee

You Are Cordially Invited To

The AGRO Division
Awards & Social

Meet with Friends Old and New

**Celebrate the Winner
of the
International Award for
Research in Agrochemicals**

Dr. Fredrick J. Perlak

**and the Winners of the
AGRO Education Awards**

*Fun, Food, Good Company, Door Prizes, and a Cash Bar
6:00 – 8:30 pm   Tuesday, August 21
Georgian Room, Boston Park Plaza*

ALL AGRO DIVISION MEMBERS, SPEAKERS AND THEIR GUESTS, SPOUSES/SOs,
ARE INVITED TO JOIN US

ACS INTERNATIONAL AWARD FOR RESEARCH IN AGROCHEMICALS

Presented by the AGRO Division of ACS
Sponsored by BASF Corporation

Dr. Frederick J. Perlak will receive the International Award for Research in Agrochemicals for his work in the discovery, development, and commercialization of insect-protected crops. Through his efforts and those of his colleagues at Monsanto Company, Bollgard® cotton was developed and introduced in 1996, and became one of the first commercially successful plant products that could protect itself from damage by insect pests. The use of *in planta* insect control proteins as agrochemicals provided farmers with a new technology that offered many benefits over the existing insecticide products. Similar strategies have been applied in other crops such as corn and as a result insect-protected crops are now grown in at least nine countries including India, China, the Philippines, Australia, South Africa as well as the United States providing economic and environmental benefits for large and smallholder farmers.

Fred grew up in Springfield, Massachusetts and received his Bachelor of Science degree in Biology at Fairfield University in Fairfield, CT. He received his Ph.D. in Microbiology from the University of Massachusetts in Amherst, MA. Following a post-doctoral appointment at Ohio State University, he joined Monsanto Company in 1981 within the Agricultural Division as a research scientist focused on the isolation and characterization of genes that code for proteinaceous insect toxins.

In April 1991, Dr. Perlak and his colleagues at Monsanto published a key paper in the *Proceedings of the National Academy of Science* 88:3324-3328 in which they described a breakthrough in the development of genetically improved plants with acceptable levels of insect resistance. Under Fred's leadership the team modified the nucleotide sequence of the gene, *cry1A(c)*, for an insecticidal protein from *Bacillus thuringiensis* (Bt) and achieved up to a 100-fold increase in the levels of Cry1A(c) protein responsible for insect protection. This technical advance made possible the development and future commercial success of Bollgard® cotton and other Bt crops.

In 1993, Fred was appointed a Monsanto Fellow in recognition of his technical achievements and became Project Team Coordinator and Technical Leader for Insect Resistant Potatoes and Insect Resistant Cotton. In 1996, he was named Crop Technology Director for Cotton and in 2003, Fred became Director for Cotton and Specialty Crop Technology and Distinguished Fellow. Fred Perlak is the author or a co-author of numerous scientific articles in a broad cross section of peer reviewed journals including *Proceedings of the National Academy of Science*, *Journal of Food and Agricultural Chemistry*, *The Plant Journal*, *Plant Molecular Biology*, and *Bio/Technology*. In 1999, Fred was named the Alfred M. Boyce Lecturer at the University of California-Riverside Department of Entomology and in 2000 he was presented the Friend to Indian Cotton Farmer Award by the Federation of Indian Farmers for his efforts to commercialize insect-protected cotton in India. Also in 2000, Fred received the Edgar M. Queeny Award for Science and Technology, the highest award within Monsanto for scientific achievement.

An all-day symposium to honor Dr. Perlak will be held on Tuesday, August 21.

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2007 STERLING B. HENDRICKS MEMORIAL LECTURESHIP AWARD

Sponsored by USDA-Agricultural Research Service
Co-Sponsored by AGRO & AGFD

Dr. Bruce E. Dale will receive the 2007 Sterling B. Hendricks Memorial Lectureship Award and will present a lecture entitled, “Why Cellulosic Ethanol is Nearer than You Think: Creating the Biofuels Future.”

Bruce E. Dale is internationally recognized for his work on biomass conversion and sustainability. His research and professional interests lie at the intersection of chemical engineering and the life sciences. Specifically, he is interested in the environmentally sustainable conversion of plant matter to industrial products- fuels, chemicals and materials- while meeting human and animal needs for food and feed.

Dr. Dale leads the Biomass Conversion Research Lab at Michigan State University and is associate director of the MSU Office of Bio-based Technologies. In addition, he is a professor of Chemical Engineering and former Chair of the Department of Chemical Engineering and Materials Science at Michigan State University as well as holding an appointment in the Michigan Agricultural Experiment Station.

In 2000, Dr. Dale led the National Research Council team that authored the report “Biobased Industrial Products: Research and Commercialization Priorities."

Among Dr. Dale's 15 U.S. and foreign patents is one for the process of ammonia fiber expansion (AFEX) used to pretreat biomass to enhance the breakdown of cellulose and hemicellulose. He is now at work to integrate the AFEX process with ruminant animal feed production and biofuel production in regional biomass processing centers. These regional centers may help rural communities capture more economic value from the biofuel revolution.

Dr. Dale has authored over 100 referred journal papers. Among his honors and awards, are the Charles D. Scott Award for his contributions to the use of biotechnology to produce fuels, chemical, and other industrial products from renewable plant resources, the Abell Young Faculty Research Award, and the Halliburton Outstanding Young Faculty Award. He is a member of the American Institute of Chemical Engineers and the American Chemical Society.

Dr. Dale will deliver his lecture immediately following presentation of the Sterling Hendricks Award on August 20 at 11:30 am. A reception will follow at 1 pm.

PAST AWARDEES OF THE BURDICK AND JACKSON INTERNATIONAL AWARD

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

PAST WINNERS OF THE ACS INTERNATIONAL AWARD FOR RESEARCH IN AGROCHEMICALS

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1992-F	Dr. Bruce Hammock, University of California, Davis
1993-S	Dr.Morifuso Eto, Kyushu University, Fuoka, Japan
1994-F	Dr. Toshio Fujita, Kyoto University, Kyoto, Japan
1995-S	Dr. Mohyee Eldefrawi, University of Maryland, Baltimore
1995-F	Dr. Koji Nakanishi, Columbia University, New York
1996-S	Dr. Günther Voss, Ciba, Basel, Switzerland
1996-F	Dr. Klaus Naumann, Bayer, Leverkusen, Germany
1997-S	Dr. Fritz Führ, Jülich, Germany
1997-F	Dr. Izuru Yamamoto, University of Tokyo, Japan
1998-S	Dr. George Levitt, DuPont, Wilmington, DE
1998-F	Dr. Leslie Crombie, University of Nottingham, England
1999-S	Dr. Don Baker, Zeneca, Richmond, CA
1999-F	Dr. James Seiber, University of Nevada, Reno
2000-S	Dr. George P. Georghiou, University of California, Riverside
2000-F	Dr. Herbert B. Scher, Zeneca
2001-S	Dr. Donald Crosby, University of California, Davis
2001-F	Dr. Ralph Mumma, Pennsylvania State University
2002-S	Dr. Keith Solomon, University of Guelph, Ontario, Canada
2002-F	Dr. Marinus Los, American Cyanamid
2003-S	Dr. Bob Hollingworth, Michigan State University
2003-F	Dr. Hideo Ohkawa, Kobe University, Japan
2004-S	Dr. Stephen Duke, USDA-ARS, Oxford, Mississippi
2004-F	Dr. John Marshall Clark, University of Massachusetts
2005-S	Dr. Robert Krieger, University of California, Riverside
2005-F	Dr. Janice E. Chambers, Mississippi State University
2006-S	Dr. Joel Coats, Iowa State University
2006-F	Dr. Isamu Yamaguchi, Agricultural Chemicals Inspection Station, Tokyo Japan
2007-S	Dr. Gerald T. Brooks, West Sussex, UK

CALL FOR NOMINATIONS
ACS INTERNATIONAL AWARD FOR RESEARCH IN AGROCHEMICALS

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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


United Kingdom
Switzerland
United States

CALL FOR NOMINATIONS
AGRO Division 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 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*. Deadline for submitting nominations is May 31 of each year. 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

PAST WINNERS OF THE AGRO DIVISION 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
2001	Dr. Robert Hoagland
2003	Dr. Judd Nelson
2005	Dr. Rodney Bennett
2006	Dr. Terry Spittler

PAST AWARDEES OF THE STERLING B. HENDRICKS MEMORIAL LECTURESHIP

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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, Maryland (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
2006	Dr. Stanley B. Prusiner, Institute for Neurodegenerative Diseases, University of California, San Francisco

CALL FOR NOMINATIONS 2008 STERLING B. HENDRICKS MEMORIAL LECTURESHIP

The Agricultural Research Service (ARS), USDA's primary research agency,
is seeking nominations for the

2008 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.

The lecture should address a scientific topic, trend, or policy issue related to agriculture. Nominees may be outstanding, senior scientists in industry, universities, or government positions. Current ARS employees are not eligible.

The Award will be presented during the American Chemical Society National Meeting held in Philadelphia, PA on August 17-21, 2008 prior to the Lecture. (Giving the presentation is a requirement of the honor.) The Divisions of Agrochemicals and Agricultural & Food Chemistry co-sponsor the Lecture which will be held in a joint session of these divisions. The lectureship is presented at an AGFD symposium in even-numbered years and in an AGRO symposium in odd-numbered years. The award includes an honorarium of $2000, a bronze medallion, and expenses to attend the meeting.

To make a nomination, send

(1) a letter explaining the nominee's contributions to chemistry and agriculture, and
(2) a current *curriculum vitae* to:

Kim Kaplan, Lecture Coordinator
(301) 504-1637
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 5, 2007 (COB, EST).

federal register
WATER
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AGRO EDUCATION AWARDS FOR GRADUATE STUDENT TRAVEL

Sponsored by Dow Agrosciences

Sixteen graduate students have been awarded AGRO Division travel grants to present their research posters at the ACS National Meeting in Boston. First and second place winners will be announced at the AGRO Awards & Social on Tuesday evening. Abstracts can be found beginning on page 62.

Todd C. Andrade, Donald W. Boerth, Erwin Eder, and Paul Wanek, Analysis of DNA adducts from herbicide interactions. *Department of Chemistry and Biochemistry, University of Massachusetts Dartmouth.* AGRO 36

Jeffrey J. Doherty, Raymond A. Putnam, and J. Marshall Clark, Assessing pesticide exposure from treated turf. *Environmental Toxicology and Risk Assessment, University of Massachusetts.* AGRO 33

Amrith S. Gunasekara and Ronald S. Tjeerdema, Clomazone sorption and desorption to soils. *Department of Environmental Toxicology, University of California, Davis.* AGRO 43

Patrick L. Hayes, Jennifer J. Kruk, and Franz M. Geiger, Nitrate and oxytetracycline: Agricultural residues and antibiotics at environmental interfaces studied by nonlinear optics. *Department of Chemistry, Northwestern University.* AGRO 40

Juan He and Urs Jans, Role of reduced sulfur species in promoting the degradation of organophosphate pesticides in aqueous solution. *Department of Chemistry, City College of CUNY*. AGRO 41

Keri LD. Henderson, Thomas B. Moorman, and Joel R. Coats, Fate of sulfamethazine in surface water microcosms. *Department of Entomology, Iowa State University.* AGRO 38

Hilliary E. Hodgdon, Richard K. Frisbie, and John M. Clark, Binary mixtures of pyrethroids crosstalk between voltage-sensitive calcium and chloride channels in isolated presynaptic nerve terminals from rat brain. *Department of Veterinary and Animal Science, University of Massachusetts.* AGRO 34

Ronald E. Hunter, Jr., Anne Riederer, and P. Barry Ryan,Method development for multiresidue pesticide extraction from natural and processed foods. *Department of Chemistry and Rollins School of Public Health, Emory University.* AGRO 29

Pankaj Kulshrestha, Rossman F. Giese Jr., and Troy D. Wood, Molecular-level interactions of tetracycline with oligomers of a model humus constituent and soil organic matter. *Department of Chemistry, University at Buffalo, The State University of New York.* AGRO 28

Deok Ho Kwon, Byung Ryul Choi, Si Woo Lee, Hyoung Man Park, John Marshall Clark, and Sihyeock Lee, Molecular cloning of sodium channel and identification of point mutations putatively associated with fenpropathrin resistance in Tetranychus urticae. *College of Agricultural Biotechnology, Seoul National University.* AGRO 30

Kate Neafsey and Ann T. Lemley, Degradation of sulfonamides in aqueous solution by membrane anodic Fenton treatment. *Graduate Field of Environmental Toxicology, Cornell University.* AGRO 31

Gretchen E. Paluch and Joel R. Coats, Mosquito repellency of Amyris and Siam-wood essential oils. *Department of Entomology, Iowa State University.* AGRO 39

Dhana Raj Boina and Jeffrey R Bloomquist, Toxicity and mode of action of the anion transporter blockers against the European corn borer. *Department of Entomology, Virginia Tech.* AGRO 42

Joseph P. Strycharz and John M. Clark, Resistance to dichlorodiphenyltrichloroethane (DDT) in resistant (91-R) and susceptible (Can-S) Drosophila melanogaster. *Department of Veterinary and Animal Science, University of Massachusetts.* AGRO 35

Fan Tong and Joel R. Coats, Effects of some monoterpenoids on [^{3}H]-TBOB binding to mouse GABA receptor. *Department of Entomology, Iowa State University.* AGRO 37

Peng Ye and Ann T. Lemley, Kinetics of carbaryl degradation by anodic Fenton treatment in a humic acid amended soil slurry. *Graduate Field of Environmental Toxicology, Cornell University.* AGRO 32

Congratulations to all our winners!

ptrl Laboratories

We are a contract research organization with an excellent reputation in the conduct of GLP studies for EPA, Japan MAFF and EU registration of agrochemicals and industrial chemicals since 1987.

Product Chemistry:	Solubility, partition coefficients, vapor pressure, etc. GLP certification. Batch analysis. Stability studies.
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Metabolism and Kinetics:	Animal and plant metabolism, PK/TK, ADME and tissue distribution, *in vitro* and *in vivo* bio-transformation, metabolite identification.
Analytical Chemistry:	Method development and validation, ILV, clinical sample analysis, analysis of agrochemicals and metabolites in soil, water, air, crops and animal tissues.
Field Studies Design and Analytical Phase:	Terrestrial and aquatic dissipation, rotational crops, nature and magnitude of residues in crops, lysimetry and small plot dissipation studies utilizing radiolabels. Volatility and Flux determination.
Exposure:	Cow and hen feeding studies, dislodgeable foliar and turf residues, mixer/loader and applicator dosimetry. Tobacco pyrolysis. Environmental monitoring (air and water).

Our laboratories are modern facilities equipped with state-of-the-art instrumentation, including GC- and LC-MS/MS (LCQ ion traps and API3000 triple quadrupoles). Licensed for use of radiotracers.

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625-B Alfred Nobel Drive
Hercules, CA 94547
Phone: 510-741-3000
Fax: 510-741-3030

Contact:
Dr. Luis Ruzo (Ext. 228)
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PTRL Europe GmbH
Helmholtzstrasse 22
Science Park
D-89081 Ulm Germany
Phone: 49-731-400-693-14
Fax: 49-731-400-693-25

Contact:
Dr. Thomas Class
E-mail: Thomas.Class@ptrl-europe.de
Website: www.ptrl-europe.de

Internet Home Page: www.ptrlwest.com

Good science, no surprises.

ANNOUNCING THE AGRO NEW INVESTIGATOR AWARD

Sponsored by Dow AgroSciences

Following this Fall's meeting in Boston, the Young Scientist Pre- and Post-Doctoral Research Award will be evolving in to the New Investigator Award as the AGRO Division moves to meeting at only the Fall ACS National Meeting each year. The award will be opened to new investigators at research institutions, industries, and universities who have received their doctoral degrees within the last five years prior to the application deadline.

Details for application to the New Investigator Award are being finalized and will appear in the on the AGRO website following the Fall 2007 ACS National Meeting. This information will also be mailed using the AGRO email list. For further information about the AGRO New Investigator Award, contact Dr. Allan Felsot at Washington State University (afelsot@tricity.wsu.edu) or visit the AGRO web site (http://membership.acs.org/a/agro/).

Undergraduate and Graduate students are still invited to submit applications for the Education Awards for Graduate Student Travel. Undergraduate and Graduate students should direct their inquiries about the AGRO Education Awards to Dr. John Johnston at the USDA/National Wildlife Research Center, Fort Collins (john.j.johnston@aphis.usda.gov).

Graduate Students and Recent Post Docs

You Are Cordially Invited To Attend

The Graduate Student Box Luncheon

Attendees will discuss:

- Potential outreach activities for graduate students and post docs
- Student-led symposia in Philadelphia and Washington, DC

Tuesday 12:15 – 1:15 pm

Boston Conference & Exhibition Center, Room 259A

CONTACT ANY DIVISION OFFICER IF YOU WISH TO ATTEND
AS RESERVATIONS ARE REQUIRED

THE FOOD IS FREE!

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ADPEN specializes in analytical services:

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- **PAM Multi-Residue Methods (MRM)**
- **Environmental Fate, Method Development, Agricultural Commodity Screening**
- **Community Water System monitoring**
- **GC/MS, LC/MS, HPLC, GC, Immuno Assay**
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CALL FOR APPLICANTS
AGRO Education Awards

UNDERGRADUATE AND GRADUATE STUDENT RESEARCH

SUPPORT FOR POSTER PRESENTATIONS AT THE 2008 FALL MEETING IN PHILADELPHIA

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. Potential topics include 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 2008 awards. Undergraduate and graduate students will be awarded up to $600 each to help defray costs of attendance to give poster presentations at the ACS 2008 Fall Meeting, which will be held August 17 – 21, 2008 in Philadelphia. Posters will be displayed in a special poster session of the ACS Division of Agrochemicals. First, Second and Third place winners will receive an additional cash award. 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 April 2, 2008:

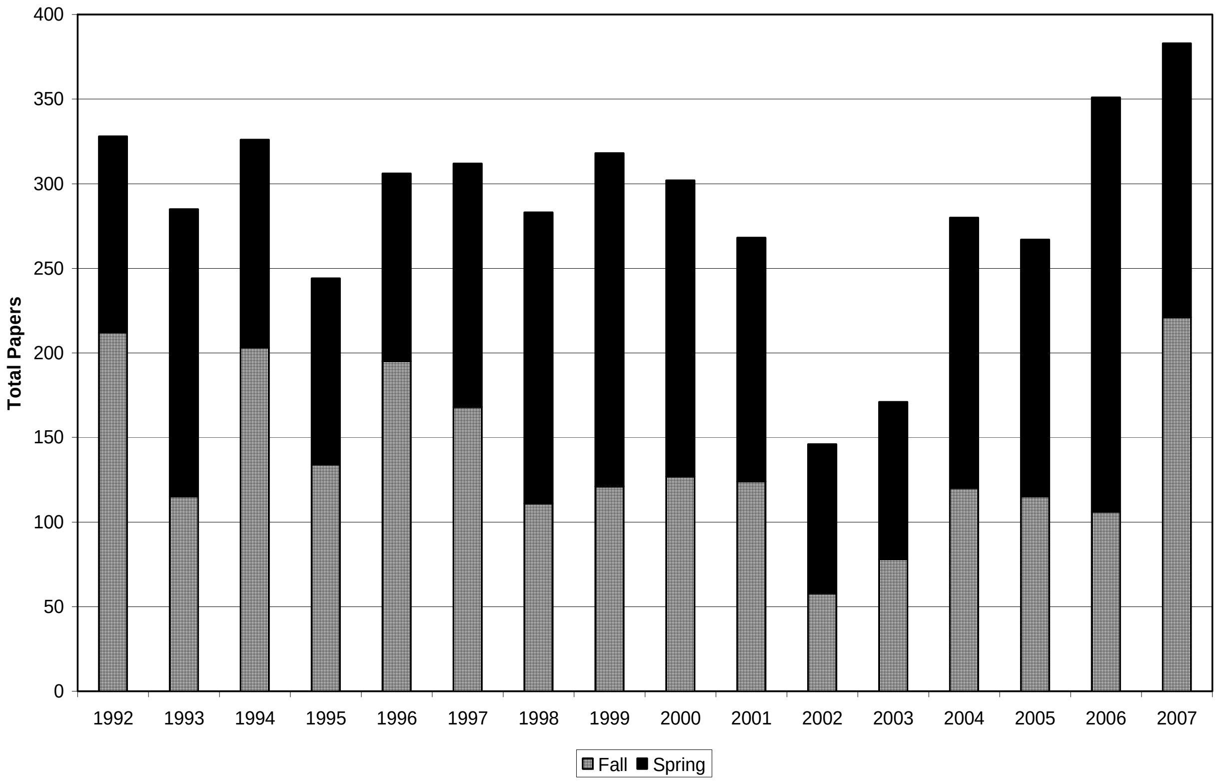
1. An abstract formatted according to the directions given on the ACS website. Be sure to include name (of applicant), address, and e-mail address.
2. A two page extended abstract giving more detail of the research/presentation.
3. A short letter of nomination from the faculty advisor.

Submit items 1 and 2 to the ACS OASYS abstract submission website.
Submit item 3 as a Word or pdf file to Dr. John Johnston at
john.j.johnston@aphis.usda.gov.

Direct questions to:
Dr. John J. Johnston
USDA/APHIS/National Wildlife Research Center
4101 LaPorte Avenue
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 2008.

Total AGRO Papers & Posters By Year



Notes from the Program Chair

John J. Johnston

Programming for the 234th National Meeting in Boston continues to illustrate AGRO's strategy to expand our areas of interest to include all areas of Agricultural Chemistry – chemistry for and from agriculture. Symposia included at this meeting address agricultural applications of Nanotechnology, Chiral Chemistry and Immunochemistry. Symposia on Integrated Pest Management, Residue and Metabolism Chemistry and Volatile Organics from Pesticide and Fumigant Applications will also be presented. AGRO will be sponsoring two award symposia. The Sterling Hendricks Award Lecture, "Why Cellulosic Ethanol is Nearer than You Think: Creating Biofuels in the Future", will be presented by Dr. Bruce Dale. AGRO's International Award for Research in Agrochemicals symposium will honor Dr. Fred Perlack. Dr. Perlack's award address is titled "Bollgard Cotton: A decade of success and a glimpse of the future of cotton". Finally, our very successful Developments and New Issues in Agrochemical Sciences Symposia will have both an oral and poster session.

The AGRO research poster symposium features 56 poster presentations including 16 posters by AGRO Educational Award for Graduate Student Travel winners. Selected AGRO posters will also be featured in the ACS Sci-Mix on Monday Evening. Poster symposia attendees will have the opportunity to cast their ballot for the best poster award which will be presented at Tuesday's AGRO Awards and Social Banquet.

This has been a record setting year for AGRO. For 2007, 386 technical presentations are being delivered at AGRO organized symposia. This is the greatest number of AGRO papers and posters ever presented in a single year! Combined with AGRO's stellar performance in 2006 (the second highest number presentations/year), it's clear that the AGRO division is a vibrant and growing division. Our interest in expanding into new relevant areas of science and our commitment to student research appears to be moving the division in a positive direction. Thanks to the dedicated and enthusiastic membership of the AGRO Division, our future looks bright. If you are not an AGRO member, please consider joining this fun, exciting and growing division.

Some specific programming notes to keep in mind:

1. The AGRO poster sessions will be held on Monday morning from 8:00 – 11:00 am, in the Convention Center. To encourage attendance at the poster session, we have postponed all other AGRO presentations until after the poster session.
2. The Sterling Hendricks award lecture will follow the AGRO poster session on Monday morning. Refreshments will be served.
3. The International Award Symposium will begin on Tuesday at 10:00 on Tuesday. Please support our International Award winner by attending Dr. Perlak's presentation.
4. The AGRO Division Awards Reception and Membership Social will be held on Tuesday evening. This year's event promises to be our best ever - don't miss out on this one.
5. Our AGRO future symposium Brainstorming, Blues & Brews Happy Hour will be held on Wednesday afternoon, from 5:00 – 6:30 pm (Convention Center Room 259A). This is a wonderful opportunity to participate in the future of AGRO programming which is the life blood of our division. Please share your ideas about the future symposia and find out more about being a symposium organizer. Refreshments will be served!

AGRO Program Committee Report

The Program Committee is made up of the Division Officers, Executive Committee members, Standing members, Volunteer members, and a Long Range Program Coordinator to keep a continuous record of past and future programming. Some names are listed twice as they are serving in more than one category. If you have an interest in serving as a volunteer member of this committee, or if you would like more information on participating in AGRO programming, please contact Laura McConnell, Joe Massey, or one of the division officers.

A list of standing topic areas was established which reflects better the broader areas of agricultural research being addressed by AGRO. These topics will be part of each AGRO program beginning in 2008 along with our normal awards, programming, and symposia to address ACS themes for each meeting and special topics of emerging or continuing interest.

If you have additional ideas for standing topics or programming that you would like to see included in AGRO, please contact one of the division officers or attend our AGRO future symposium Brainstorming, Blues & Brews Happy Hour on Wednesday, August 22 from 5:00 – 6:30 pm in the Convention Center, Room 259A.

AGRO Program Committee

John Johnston, 2007 Program Chair	John.J.Johnston@usda.gov
Joseph Massey, 2006 – 2010 Long Range Program Coordinator	jmassey@pss.msstate.edu

Division & Subdivision Officers

Laura McConnell	Division Chair	laura.mcconnell@ars.usda.gov
Kevin Armburst	Vice Chair	armbrust@mscl.msstate.edu
Bill Hall	Chair, FERT Subdivision	bill.hall@mosaicco.com
Terry Spittler	Treasurer	tds2@cornell.edu
Liliana Schwartz	Secretary	Liliana.Schwartz@usa.dupont.com
Donald Wauchope	Immediate Past Chair	pmsci@friendlycity.net
Barry Cross	Councilor	barry.cross@worldnet.att.net

Standing Members

Jim Seiber	Awards Committee Chair	jseiber@pw.usda.gov
Allan Felsot	Young Scientist Award Chair	afelsot@tricity.wsu.edu
John Johnston	Education Award Committee Chair	John.J.Johnston@usda.gov
John Clark	Special Conferences Chair	jclark@vasci.umass.edu
Cathleen Hapeman	Publication Committee Chair	hapemanc@ba.ars.usda.gov
Jason Sandahl	International Outreach Chair	Jason.Sandahl@usda.gov

Executive Committee Members

Matthew Brooks	mwbrooks01@yahoo.com	Luis Ruzo	l.ruzo@ptrlwest.com
Marty Kovacs	marty@toxcel.com	Jeanette Van Emon	vanemon.jeanette@epamail.epa.gov
Ann Lemley	atl2@cornell.edu	Tim Ballard	tballard@en-cas.com
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Cathleen Hapeman	cathleen.hapeman@ars.usda.gov	Jay Gan	jgan@ucr.edu
Patricia Rice	ricep@basf-corp.com		

Volunteer Members 2006 – 2009

Ellen Arthur	ellen.arthur@bayercropscience.com	Scott Yates	syates@ussl.ars.usda.gov

Status of
Planned AGRO Programming & Outreach Activities
2008 – 2011

Activity/Event	Leader(s)	Status	Actions Required
4th Pan Pacific Conference on Pesticide Science June 1-4, 2008 Honolulu, Hawaii	Al Barefoot Joel Coats	• Organizing & Science Program Committees holding preliminary meetings • Pesticide Science Society of Japan will co-sponsor	• Committees are working on various aspects and securing sponsorships • AGRO to provide some financial support
236th ACS National Meeting August 17-21, 2008 Philadelphia, Pennsylvania	Kevin Armburst	• Call for Symposia & Papers TBA in PICOGRAM vols. 73 & 74	• Contact Kevin if you are interested in organizing a symposium
Activities beyond 2008			
AGRO Activity in Winter/Spring 2009	John Clark Ken Racke Others?	• Human exposure assessment workshop is under consideration	• Volunteers are needed to move this forward
238th ACS National Meeting August 16-20, 2009 Washington, DC	2008 Vice Chair	• Call for Symposia & Papers TBA in PICOGRAM vols. 75 & 76	
240th ACS National Meeting August 22-26, 2010 Boston, Massachusetts	2009 Vice Chair	• Call for Symposia & Papers TBA in PICOGRAM vols. 77 & 78	• Decide in 2010 if AGRO is returning to 2 national meetings per year
IUPAC Pesticide Congress Summer 2010 Melbourne, Australia		AGRO should exert a strong presence at this meeting. In the meantime, AGRO should decide whether to pursue a proposal to host the 2014 Pesticide Congress in the U.S.	
241st ACS National Meeting March 27-31, 2011 Anaheim, California	2010 Vice Chair		
242nd ACS National Meeting August 28-September 1, 2011 Chicago, Illinois	2010 Vice Chair		

Standing Programming

- Environmental Fate, Transport, Risk Assessment and Modeling of Agriculturally-Related Chemicals
- Technological Advances and Applications in Agricultural Science: Nanotechnology, Genetically Modified Organisms, and Biocontrol Agents
- Development of Value-Added Products from Agricultural Crops and Byproducts
- Bioenergy and Biofuels from Agriculture
- Natural Products, Pheromones, and Chemical Signaling in Agriculture
- Human and Animal Health Protection: Veterinary Pharmaceuticals, Antimicrobials, Worker Protection Products
- Advances in Agrochemical Residue and Metabolism Chemistry
- Urban Agriculture – Turf, Ornamentals, Household Products, and Water Re-Use
- Developments in Integrated Pest Management and Resistance Management
- Soil and Nutrient Management for Sustainable Agriculture
- Agrochemical Toxicology and Mode of Action
- Residue and Metabolism Chemistry
- Synthesis of Bioactive Compounds
- Exposure and Exposure Assessment Modeling

AGRO 2008
CALL FOR SYMPOSIA & PAPERS

236th ACS National Meeting & Exposition
August 17-21, 2008
Philadelphia, Pennsylvania USA

The following symposia are planned for the ACS National Meeting 2008 in Philadelphia. Proposals for additional symposia are now being accepted. Please contact Dr. Kevin Armburst (AGRO 2008 Program Chair) or Dr. John Johnston, AGRO 2007 Program Chair.

ACS International Award for Research in Agrochemicals (Nomination form on page 13)

Sterling B. Hendricks Award Symposium (Nomination form on page 17)

AGRO Awards for New Investigators (Additional information on page 21)
Organizer: Allan Felsot, Washington State University, 2710 University Drive, Richland, WA 99354, 509-372-7365, afelsot@tricity.wsu.edu

AGRO Education Awards for Undergraduate and Graduate Student Travel: Research Poster Presentations (See page 23)
Organizer: John J. Johnston, USDA/APHIS/WS/National Wildlife Research Center, 970-266-6082, john.j.johnston@aphis.usda.gov

Reduced Risk Pesticides: Environmental Chemistry, Toxicology, & Compatibility with IPM.
Organizers: Allan Felsot, Washington State University, 509-372-7365, afelsot@tricity.wsu.edu

Agrochemical Residue & Metabolism Chemistry
Organizers: Teresa A. Wehner, Merial Ltd; J. J. Johnston, USDA/APHIS/WS, 970-266-6082, john.j.johnston@aphis.usda.gov; David Smith, USDA-ARS, 701-239-1238, smithd@fargo.ars.usda.gov

Climatic Issues and Research: Impacts on Agriculture
Please contact AGRO Program Chair if you are interested in participating in this symposium

Energy Issues and Agriculture
Organizers: Cathleen Hapeman, USDA-ARS, Beltsville Agricultural Research Center, 301-504-6451, cathleen.hapeman@ars.usda.gov; Joseph Massey, Mississippi State University, 662-325-4725, jmassey@pss.msstate.edu

Biological and Chemical Transformations of Animal Hormones and Veterinary Pharmaceuticals in Plants, Soil and Wastewater Treatment Systems
Organizers: Diana Aga, SUNY Buffalo, 716-645-6800, ext. 2226, dianaaga@buffalo.edu; Pamela Rice, USDA-ARS, 612-624-9210, pamrice@umn.edu

AGRO 2008
CALL FOR SYMPOSIA & PAPERS
(continued)

236th ACS National Meeting & Exposition
August 17-21, 2008
Philadelphia, Pennsylvania USA

Evaluation of Agriculturally-Related Chemicals
Impacts on Environmental, Animal, and Human Health
Organizers: Pamela Rice, USDA-ARS, 612-624-9210, pam.rice@ars.usda.gov; Todd Anderson, Texas Tech University, 806-885-4567, todd.anderson@tiehh.ttu.edu; Patricia Rice, BASF Corporation, 919-547-2668, patricia.rice@basf.com; Ellen Arthur, Bayer CropScience, 913-433-5328, ellen.arthur@bayercropscience.com

New Developments and Issues in Agrochemical Sciences (Gen. Presentations/Posters)
Organizer: Kevin Armbrust, Office of the State Chemist – Mississippi, 662-325-3324, armbrust@mscl.msstate.edu

Natural Products
Organizer: Paul Zubkoff, USEPA (retired), 113 West Queens Dr., Williamsburg, VA 23185, 757-229-4037, plzubkoff@msn.com

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You Are Cordially Invited To

AGRO Brainstorming, Blues & Brews

Happy Hour

Wednesday, August 22, 5:00 – 6:30 pm
Boston Convention & Exhibition Center, Room 259A

- **Share your ideas about the future AGRO programming**
- **Learn more about organizing a symposium**
- **Let us know what topics are the most important to you**

Free refreshments will be served

OPEN MEETING FOR ALL AGRO MEMBERS

4th Pan Pacific Pesticide Conference

Waikiki Beach Marriott
Honolulu, Hawaii

June 1 – June 4, 2008

Crop and Public Health Protection Products
Science to Meet Consumer and Societal Needs

The AGRO Division of the American Chemical Society and the Pesticide Science Society of Japan are pleased to announce their co-sponsorship of the 4th Pan Pacific Pesticide Conference. The focus of this conference is research directed toward identification and resolution of issues related to discovery, selection, evaluation and use of pesticides intended for crop, public health, and environmental protection.

Session topics will include:

- Global trade issues
- Environmental issues
- Invasive Species
- New products and product discovery
- Mode of action
- Worker protection concerns
- Toxicology and metabolism
- Pesticide product characterization
- Process analytical technology
- Resistance to pesticides
- Residue analysis
- Government regulations and standards
- Applications of biotechnology

For further information:

Vernar Beatty
American Chemical Society
Office of Conference Management and Vendor Relations
202 872-4398
Organizing Committee Chairs:
Dr. Aldos Barefoot (aldos.c.barefoot@usa.dupont.com)
Dr. Koichi Yoneyama (yoneyama@cc.utsunomiya-u.ac.jp)
Program Committee Chairs:
Dr. Joel Coats (jcoats@iastate.edu)
Dr. Hiroshi Matsumoto (hmatsu@biol.tsukuba.ac.jp)

Abstracts can be submitted from October 5, 2007 to March 2, 2008

www.panpacificconference.org

Ecological Risk Assessment Workshop

Waikiki Beach Marriott
Honolulu, Hawaii

June 5, 2008

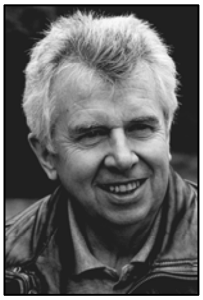
Following the 4th Pan Pacific Conference

Workshop Format and Content

- Presentations on the state of the science in agrochemical risk assessment
- Use of exposure and toxicological data in the risk assessment process
- Formulating risk hypotheses; use of ranking, hazard quotients, & probabilistic techniques in risk assessment.

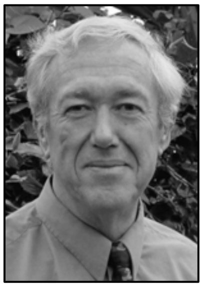
Registration

There will be in additional fee for participation in the workshop to cover costs of workshop materials and to defray the expenses of the instructors. Participants are expected to bring their own laptops computers. Check the website for further details as they are finalized.



Don Mackay will address agrochemical fate, transport and transformation assessment, especially using mass balance models. Applications to coupled soils and aquatic systems will be described. Participants will be encouraged to run and interpret the results from steady-state and dynamic models (both concentration and fugacity format) for substances and environmental conditions of their choice. The benefits of models as a vehicle for identifying and understanding key environmental fate processes will be discussed.

Frank Gobas will address bioaccumulation processes, primarily in aquatic organisms and food webs, but also in terrestrial organisms. The factors influencing uptake by respiration and from food and losses by respiration, egestion, metabolism and growth dilution will be described with a focus on their dependence on chemical properties such as the octanol-water partition coefficient.



Keith Solomon will address how exposure and toxicological data are combined in the risk assessment process. The theory behind basic concepts of ecotoxicology will be presented and practical examples used to illustrate these concepts. Future directions for risk assessment science will be presented, including measures to increase the credibility and applicability of predictive fate, transport and bioaccumulation models by closer integration with monitoring data and with data required for registration purposes. Participants will run bioaccumulation models describing these phenomena for chemicals of their choice.

Attendance will be limited so early registration is recommended.

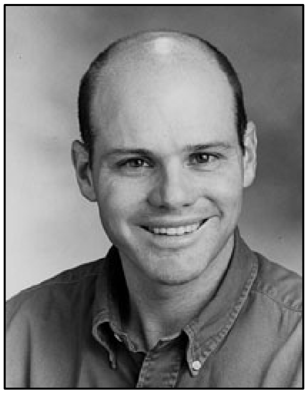
This is an event not to be missed!

www.panpacificconference.org

Division Officers

Dr. Laura L. McConnell
Division Chair

Dr. John J. Johnston
Program Chair



Dr. Kevin L. Armbrust
Vice-Chair

Dr. Terry D. Spittler
Treasurer

Dr. Lilana Schwartz
Secretary

Officers and Committees of the AGRO Division

AGRO DIVISION OFFICERS

Division Chair			
Dr. Laura L. McConnell	(301) 504-6298	FAX: (301) 504-5048	laura.mcconnell@ars.usda.gov
Program Chair			
Dr. John J. Johnston	(970) 266-6082	FAX: (970) 266-6089	John.J.Johnston@aphis.usda.gov
Vice Chair			
Dr. Kevin L. Armbrust	(662) 325-3324	(662) 325-7807	Armbrust@mscl.msstate.edu
Secretary			
Dr. Lilana Schwartz	(302) 451-5842	FAX: (302) 451-5943	Liliana.schwartz@usa.dupont.com
Treasurer			
Dr. Terry Spittler	(315) 787-2283	FAX: (315) 787-2320	tds2@cornell.edu

EXECUTIVE COMMITTEE

2005 – 2007	2006 – 2008	2007 – 2009
Dr. Matthew Brooks	Dr. Todd Anderson	Mr. Tim Ballard
Dr. Marty Kovacs	Dr. Cathleen Hapeman	Dr. Scott Jackson
Dr. Ann Lemley	Dr. Patricia Rice	Dr. Diana Aga
Dr. Teresa Wehner	Dr. Luis Ruzo	Dr. Will Ridley
Dr. Paul Zubkoff	Dr. Jeanette Van Emon	Dr. Jay Gan

COUNCILORS

2004 – 2007	2005 – 2008	2006 – 2009
Dr. Barrington Cross	Dr. Joel Coats	Dr. Barrington Cross
Dr. Judd Nelson, Alternate	Dr. Nancy Ragsdale, Alternate	

Division Committees

FERT Program Committee

Mr. William Hall, **Chair**	(863) 428-7161		bill.hall@mosaicco.com

Nominating Committee

Dr. R. Donald Wauchope, **Chair**	(229) 386-3892	FAX: (229) 386-7215	pmsci@friendlycity.net
Dr. Allan Felsot	(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

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	cathleen.hapeman@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	tds2@cornell.edu
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Dr. Don Baker	Dr. Ralph Mumma		
Dr. Willa Garner	Dr. Willis Wheeler		

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Octanol/Water Partition Coefficient
Product Storage Stability
Corrosion Characteristics
Physical Chemical Properties
Release Rate of Biocides

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Project Management
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Magnitude of Residue
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Aquatic & Terrestrial Phytotoxicity
Sediment Toxicity Studies
Non-Target Insect Tests
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Additional Information at: www.abclabs.com

Officers and Committees of the AGRO Division
(Continued)

Hospitality Committee			
Coffee Hour			
Dr. Patricia Rice	(919) 547-2668	FAX: (919) 547-2850	patricia.rice@basf.com
Dr. Jim Brady	(336) 643-1158	Cell: (336) 708-0097	jfbrady@bellsouth.net
Dr. Steve Lehotay	(215) 233-6433		steven.lehotay@ars.usda.gov
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

PROGRAM COMMITTEE LISTING

See page 26

Past Chairs of the Pesticide Chemistry/AGRO Division

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	R. Donald Wauchope

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2006 Treasurer's Report
AGRO Division

233rd ACS National Meeting & Exposition
March 25, 2007
Chicago, Illinois

INCOME	**2006**
Contribution Income	$47,461
Publications Income	8,624
Dues And Assessment Income	23,568
Investment Income	70,531
Other Income	2,380
TOTAL OPERATING INCOME	**$152,565**
Grants, Awards And Donations	$ 34,371
National Meeting Expenses	55,915
Investment Expenses	4,220
Publication Expenses	19,004
Conferences & Workshops	8,905
Administrative Expenses	14,536
TOTAL OPERATING EXPENSES	**$136,950**
GAIN (LOSS) OPERATING ACCOUNT	**$15,615**

ASSETS	**2005**	**2006**
Checking Account	$22,493	$2,217
INVESTMENTS		
T. Rowe Price	190,082	205,996
ACS Investment Pool	22,606	25,406
JP Morgan*	436,102	439,716
TOTAL ASSETS	**$671,285**	**$673,335**

*$25,000 transferred from JPM to Operating Account

Terry D. Spittler – Treasurer

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Minutes from the AGRO Division Business Meeting

Governance Meeting
Long-Range Planning Committee Meeting
Program Planning Committee Meeting

233rd ACS National Meeting – Chicago, Illinois
Sunday, March 25, 2007, 5:00 – 10:00 pm
Laura McConnell – Chair

A. Introduction – Laura McConnell, Chair

Laura called the meeting to start at 5:05 pm. She made the following announcements:

- ACS offers Leadership training workshops in 2007 - See ACS homepage.
- ACS offers Strategic Planning Training on April 27-28, 2007; contact Laura if interested.
- New ACS Strategic Plan – See ACS homepage.
- ACS offers on-line poster viewing – ACS Posters2ViewTM representatives in the Grand Ballroom Lobby of the Hyatt Regency to upload posters.

B. Governance Meeting

I) Secretary's Report (Aldos Barefoot)

Al presented the minutes of the last ACS meeting and introduced the new officers and Executive Committee members. He also informed the participants that the Annual Report was completed and submitted to ACS, the business meeting scheduled, and the Officers certified to ACS. The election results were communicated to Vice-Chair Candidates and Secretary. Barry Cross's term expired on December 31, 2006 and it was extended to December 31, 2007.

II) Treasurer's Report (Terry Spittler)

- We are in a recovery mode, and have been spending (investing) resources to increase our appeal and to focus our message on the right groups. This has resulted in our being over the burn rate recommended by the Finance Committee. While we are not losing ground, we are not increasing our assets to account for inflation. In 2005 we finished with total assets of $671,285; in 2006 we closed out with $673,335.
- The budgeting system has to be redone since it will be just one meeting/year in 2008, and forward.

III) Councilor's Report (Joel Coats, Barry Cross)

Barry informed the participants that:

- As of Sept 12, 2006 the Fall Meeting had attracted 15,601 registrants. M&E recommended that there be no increase of registration fees for 2007 since the National Meeting has been consistently meeting or exceeding the financial targets.
- The special discussion item considered ways of engaging younger members throughout the society's volunteer leadership. Perhaps the most useful idea put forward is to appoint younger members to be Associate Members on Committees. The ACS Board agreed to proceed with phase one plans to arrange for a 2008 ACS/AICHE joint meeting.
- The news from M&E is that computers will be available in all meeting rooms in Chicago.
- Visa letters may now be obtained directly from OASIS. Not sure how this helps our Pan Pacific Organizers. The chem jobs situation improved somewhat in San Francisco there were 892 candidates and 165 jobs compared with Atlanta 1256 candidates and 162 openings.

Counselors at the National Meetings: since ACS pays just a part of the expenses, Laura asked if the division can pay for the difference in the reimbursement. Terry suggested a motion and the motion passed.

IV) Membership Committee

Daniel Stout, of EPA NC, replaced Chris Peterson few months ago.

V) Publications Committee (Cathleen Hapeman)

- PICOGRAM for the Chicago meeting appeared on-line in January, but went in the mail later, on February 23rd.
- In the Fall's 2007 PICOGRAM all the announcements for the 2008 Philadelphia ACS Meeting will have to be made.
- Discussions were initiated around the PICOGRAM's publication in Spring 2008. She presented three different PICOGRAM alternatives.
- **Action**: To continue to have a paper copy for the Spring, but to minimize the size/budget and to have an electronic version too. **Motion passed**.

VI) Website (Allan Felsot)

- Allan requested permission to change the website.

- The Committee suggested that Allan has to bill us for the work he is putting in this website.
- The Committee thanked Allan and Judy for working very hard to maintain the AGRO division website.

VII) Awards Committee (Jim Seiber)

- **Dr. Gerald T. Brooks,** West Sussex, UK, Editor, Pest Science Management, will receive the International Award for Research in Agrochemicals at the Spring 2007 ACS Meeting in Chicago, IL for his research contributions in the study of the biochemical toxicology of insecticides. This award will be sponsored by DuPont Crop Protection. An award symposium has been organized by Dr. Derek W. Gammon.
- **Dr. Frederick J. Perlak**, Monsanto Company, St. Louis, MO will receive the International Award for Research in Agrochemicals at the Fall 2007 ACS Meeting in Boston, MA for his research contributions that led to the development of insect protected crops. This award will be sponsored by BASF Company. Dr. William P. Ridley will organize the award symposium.
- **Dr. David Soderlund**, Cornell University, will receive the International Award for Research in Agrochemicals at the Fall 2008 ACS National Meeting in Philadelphia, PA for his discoveries on the insect sodium channel and insecticides that disrupt its action. DuPont Crop Protection and BASF Company will co-sponsor the award. An award symposium will be organized by Dr. Jeffrey Bloomquist.
- Nominations for the 2009 International Award for Research in Agrochemicals are currently being solicited by the Awards Committee. Only one International Award will be presented in 2009. The deadlines each year are December 31 for the International Award and May 31 for the Fellow Award.
- USDA-ARS is sponsoring the 2007 Sterling B. Hendricks award. The awardee's name will be released shortly. A mini-symposium will be organized in association with this award, around the topic of bioenergy and biobased products.

VIII) Finance Committee (Barry Cross)

Since AGRO Division will have one meeting per year only, a re-assessment of the budget for the next year is necessary. Barry will work on the new budget.

IX) Hospitality Committee Report (Terry Spittler, Liliana Schwartz, Jeff Jenkins)

- 14 companies contributed $2,350 to give us coffee at our technical sessions in Chicago.
- It was stated that John Wiley & Sons had contributed $5,000 to Sponsor the Awards Social.
- Due to Liliana's new appointment as Secretary, the committee needs help. As a result, three new volunteers were welcome to the ranks: Pat Rice, Jim Brady and Joe Massey.

X) Committee on Patron Relations

The position is vacant. Scott Jackson has volunteered for this position.

XI) Educational Committee (Allan Felsot, John Johnston)

- Eighteen papers were submitted to the Young Scientist's Recognition Award & Symposium. The winner this year is Kelly Prihoda from Iowa State University (Joel Coats, advisor). The program contains a wide diversity of papers in the areas of environmental chemistry and toxicology. One paper on biodiesel will also be given.
- We will change focus of the award to new investigators holding a doctorate degree. We are open to new names and we'll offer "Division of Agrochemicals New Investigators Award & Symposium" as a starter. The objective will be to open up competition to scientists who have received their doctorate within the last three years of the current award year. Regarding the submission requirements and adjudication, please send your opinion to Allan Felsot (afelsot@tricity.wsu.edu).
- For the Fall 2007 Meeting in Boston we will be offering travel grants for graduate student research poster presentations. Deadline is April 2. **Please encourage graduate students to apply!**
- For the Fall 2008 Meeting in Philadelphia, educational program funding will be used to support two symposia:
  1. **AGRO Awards for New Investigators.** The award will be available to new investigators at research institutions, industries, and universities who have received their doctoral degrees within the last three years prior to the application deadline. Organizer: Allan Felsot, Washington State University, 2710 University Drive, Richland, WA 99354, 509-372-7365, afelsot@tricity.wsu.edu.
  2. **AGRO Education Awards For Graduate Student Travel and Research Poster Presentations.** Travel grants will be available to graduate students working in any area pertinent to AGRO division – chemistry for or from agriculture. Organizer: John J. Johnston, USDA/APHIS/WS/National Wildlife Research Center, 970-266-6082, john.j.johnston@aphis.usda.gov

C. Long Range Planning Meeting

- ***Laura*** gave an update on progress for the Long Range Planning Workshop
- Strategic Planning Support from ACS – ***Dale Gaddy (ACS)***
  ACS has sessions in strategic planning. Initially, 3 months before the session a survey is sent to the participants preparing the background. The sessions range from 10 to 13 hours comprising 10 topics of discussion. It includes goals and action, followed by the vision of the future. ACS provides the chair of the division with a copy within 2 working days. Dale recommended this training every third year since the real strategic planning never ends.
- Discussion on New Strategic Planning Meeting in 2007 - ***Laura***
  Laura said that last year was just a start for the AGRO Division and that yet we don't have a plan in place. She suggested the training between March and August or after Boston Meeting in August.
  Action: On January 2008 15 people will be trained for 13 hours of Long Range Planning Meeting. **Motion passed.**

D. Program Planning Meeting

I) Update on Boston, Fall 2007 (John Johnston)

- Change the Business Meeting structure according to ACS Publication Networking Meeting. This meeting is considered to produce one of the most fruitful interactions with Environmental and Ag Food Meetings.
- It was proposed to start the Business Meeting at 6:00 pm since usually the ACS Publication Networking Meeting starts at 5:00 pm and the Program Planning Meeting to be shifted to Wednesday night. Terry Spittler commented that holding the program meeting late in the week would exclude many of the new attendees that only get to come to the first 2-3 days of the meeting – they are our target!!
- OASYS closes one week from March 26 for the Boston Meeting. Please submit abstracts in a timely manner.
- **The Programming for Fall 2007, Boston Meeting was presented.**

II) International Award for Research in Agrochemicals, Boston 2007 (Will Ridley)

- **Awarded to Frederick J. Perlak, Ph.D** for development of insect protected crops

III) Update on Philadelphia, Fall 2008 (John Johnston, Kevin Armbrust)

- **The Programming for Fall 2008, Philadelphia Meeting:**
  ACS International Award for Research in Agrochemicals
  Organizer: Jeffrey Bloomquist
  Sterling B. Hendricks Award Symposium
  Organizers: 2008 Program Chairs AGFD & AGRO
  AGRO Awards for New Investigators
  Organizer: Allan Felsot
  AGRO Education Awards For Graduate Student Travel: Research Poster Presentations Organizer: John J. Johnston
  Agrochemical Residue & Metabolism Chemistry
  Organizers: Teresa A. Wehner, J. J. Johnston, David Smith
  Climatic Issues and Research: Impacts on Agriculture
  Please contact AGRO Program Chair if you are interested in participating in this symposium
  Agroenergy – Environmental Considerations
  Organizers: Cathleen Hapeman, Joseph Massey
  Evaluation of Agriculturally-Related Chemicals – Impacts on Environmental, Animal, and Human Health
  Organizers: Pamela Rice, Todd Anderson, Patricia Rice, Ellen Arthur
  Natural Products
  Organizer: Paul Zubkoff
  New Developments and Issues in Agrochemical Sciences (Gen. Presentations/Posters) Organizer: 2008 Program Chair
- ***Kevin*** indicated that the Urban Agriculture Turf topic needs an organizer, and that the ideal location would be Philly. It may include food production, pest control around food, urbanization, waste water. ***Daniel Stout*** will probably take action in this respect.
- It was initiated discussion around how the retirees may be financially helped so that they'll continue to be active in the division.

IV) Human Pesticide Exposure Assessment Workshop (Ken Racke)

- Ken suggested that he will organize a conference call to get some input in how to attract interesting participants, ways to highlight new books etc..
- The 2008 Meeting in Philly will be a good start
- A similar workshop is programmed to take place in DC in 2009.

V) IUPAC Crop Protection Workshop, October 2007, Beijing, China (Ken Racke)

- The first announcement on the 7th International Workshop in Crop Protection Chemistry and Regulatory Harmonization in Beijing October 2007 was made.
- Abstracts for lectures and posters are due July 1, 2007.

- Registration and program information are available on the web at http://www.pesticidechemistry.com/index_en.htm or contact Dr. Ken Racke, IUPAC Advisory Committee on Crop Protection Chemistry via e-mail at kracke@dow.com or phone (317)-337-4654.

VI) Summer 2008 Pan Pacific Pesticide Conference in Honolulu (Aldos Barefoot, Joel Coats, Nancy Todd)

- Al had mentioned that U.S. and Japan are the major organizers at this conference and that we are staring to collect funds for the conference.
- It was presented the Program committee.
- Joel shared a tentative list of 10 topics.

VII) Spencer Agrochemicals Award *(Eckerd Helmuth)*

Eckerd initiated a tour of discussions around the Spencer Award. He would like to put together with AGRO Division a proposal. For more information the contact person is ***Allan***.

Laura adjourned the meeting at 10:00 pm.

Respectfully submitted,
Liliana Schwartz, Secretary

Bylaws of the AGRO Division 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 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 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 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.

American Chemical Society
AGRO DIVISION
234th ACS National Meeting
August 19-23, 2007
Boston, Massachusetts
J. J. Johnston, *Program Chair*

PROGRAM

DIVISION MEETING

AGRO Business Meeting
Sunday 5:30 – 10:00 pm
BCEC 107A

SOCIAL EVENTS

AGRO Awards Social
Tuesday 6:00 – 8:30 pm
Georgian Room, Boston Park Plaza
Members/Guests welcomed; see page 8

Graduate Student Luncheon
Tuesday 12:15 – 1:15 pm
BCEC 259A
Invitation only; see page 21

Sterling B. Hendricks Award Lecture Reception
Monday 11:30-1:30 pm
BCEC 259A/B

Symposium Organizer Brainstorming, Blues & Brews
Wednesday 5:00-6:30 pm
BCEC 259A
All members welcomed; see page 29

SUNDAY MORNING

Immunochemistry Biotechnology & Environmental Applications
W. L. Shelver and J. Van Emon, *Organizers*

Section A
BCEC -- 259A
8:40 — Introductory Remarks.

8:45 —1. Application of immunoassay in agricultural biotechnology. **G. Shan**

9:10 —2. Molecular breeding of medicinal plant using single chain Fv gene. **Y. Shoyama**, W. Putalun, H. Tanaka

9:35 —3. Evaluation of a high-throughput magnetic-particle triclosan immunoassay and results of their application for continental waters monitoring in the Mediterranean area. **M. Farre**, F. Rubio, D. Asperger, S. Lacorte, M. Petrovic, W. L. Shelver, D. Barceló

10:00 — Intermission.

10:20 —4. Use of ELISA to aid management of the invasive gall wasp, Quadrasticus erythrinae Kim on native and landscape trees, Erythrina spp. **Q. X. Li**, T. Xu, C. Jacobsen, A. H. Hara

10:45 —5. Development of sensitive immunoassay formats for algal toxins. **F. Rubio**, L. Kamp, J. Church, R. Slawecki

11:10 —6. Immunoassays and immunoaffinity purification for persistent organic pollutants. **J. C. Chuang**, J. M. Van Emon

11:35 —7. Application and validation of polybrominated diphenyl ethers immunoassay for environmental and food matrices. **W. L. Shelver**, F. Rubio

12:00 — Concluding Remarks.

Agrochemical Residue & Metabolism Chemistry
J. J. Johnston and D. Smith, *Organizers*
T. A. Wehner, *Organizer, Presiding*

Section B
BCEC -- 259B
8:55 — Introductory Remarks.

9:00 —8. Pharmacokinetics and metabolism of firocoxib in horses after oral administration. **V. Kvaternick**, M. Pollmeier, P. D. Hanson, J. B. Fischer

9:20 —9. Tissue residue depletion of firocoxib in horses after oral administration. **V. Kvaternick**, B. Kunkle, A. Khunachak

9:40 —10. Distribution and residues of orally administered 2,4,6-trinitro-^{14}C-toluene in ruminating sheep. **D. J. Smith**, A. M. Craig, J. M. Duringer, R. L. Chaney

10:00 — Intermission.

10:20 —11. Determination of chlorophacinone in prairie dogs by microwave extraction and ion-pairing reversed-phase high performance liquid chromatography with confirmation by HPLC/MS. **T. M. Primus**, C. R. Wermager, J. J. Johnston

10:40 —12. Determination of organochlorine pesticide residues from eggs and liver. **D. A. Goldade**, D. L. Griffin, J. J. Johnston

11:00 —13. Analysis of nitrofuran residues in shrimp, channel catfish, and milk using liquid chromatography-tandem mass spectrometry. **P -S. Chu**, M. I. Lopez, A. Abraham, K. R. El Said, S. M. Plakas

SUNDAY AFTERNOON

Immunochemistry
Food Safety Applications

W. L. Shelver and J. Van Emon, *Organizers*

Section A
BCEC -- 259A
1:50 — Introductory Remarks.

1:55 —14. From biosensors to dip-sticks, immunochemical based methods are being employed in every aspect of food protection. **T. A. Grace**

2:20 —15. Immunochemical tests for the determination of nitrofuran metabolites. **M. Franek**, M. Vass, I. Diblikova, K. Hruska

2:45 —16. Preparation of antibodies and developments of ELISA test kits for drugs used in animal husbandry. **R. Xi**, S. Lu, Y. Zhang, C. Zhao, W. Liu

3:10 — Intermission.

3:30 —17. Red fluorescent dyes for immunochemical detection of staphylococcal enterotoxin A. **M. B. Medina**

3:55 —18. Cloning, expression, and characterization of recombinant antibodies with affinity for deoxynivalenol and related mycotoxins. **P. J. Doyle**, M. Arbabi-Ghahroudi, N. Gaudette, G. Furzer, M. E. Savard, S. C. Gleddie, H. Tong-Sevinc, T. Hirama, C. R. MacKenzie, J. C. Hall

4:20 —19. Comparison of the skerritt and R5 antibodies in gluten detection by ELISA. **B. W. Ritter**, L. K. Allred

4:45 — Concluding Remarks.

Agrochemical Residue & Metabolism Chemistry

J. J. Johnston and T. A. Wehner, *Organizers*
D. Smith, *Organizer, Presiding*

Section B
BCEC -- 259B
1:45 — Introductory Remarks.

1:50 —20. Use of crop protection product global regulatory magnitude and decline of residue data on produce for residue prediction purposes. **C. M. Kennedy**, S. F. McEuen, J. J. Anderson

2:10 —21. Methods for measuring worker exposure to pesticides during seed treatment. **M. E. Krolski**, J. R. Hudson, T. J. Gould

2:30 —22. Influence of azinphos-methyl metabolites in apples on organophosphate pesticide exposure estimates. **A. H. Ackerman**, K. A. Anderson

2:50 —23. Possibility of groundwater contamination by endosulfan leaching in different types of soils. **T. Jindal**

3:10 — Intermission.

3:30 —24. Mechanistic studies of formetanate hydrochloride decomposition under aquatic conditions. **C. N. Muhoro**, C. B. Divito, S. Masoudi

3:50 —25. Fate of methyl parathion in natural sulfidic water. **X. Guo**, U. Jans

4:10 —26. Catabolic network and protein profiles of *Mycobaterium sp* JS19b1 during degradation of aromatics. **Q. X. Li**, Y -S. Keum, J -S. Seo, S -E. Lee

4:30 — Concluding Remarks.

BioFuels: Biodiesel Chemistry and Implementation

Sponsored by FUEL, Cosponsored by AGRO
N. E. Leadbeater and R. S. Parnas, *Organizers*

Boston Park Plaza -- Arlington Rm
1:25 — Introductory Remarks.

1:30 — FUEL 30. Biodiesel production from canola oil and waste fryer grease and conversion of glycerol to value-added liquid chemicals. **A. K. Dalai**, T. Issariyakul, M. G. Kulkarni, K. Pathak, L. C. Meher, N. N. Bakhshi

1:50 — FUEL 31. Biodiesel from soapstock. **E. S. Olson**, R. K. Sharma, T. R. Aulich

2:10 — FUEL 32. Kinetics of soybean oil transesterification in a batch system. **R. S. Parnas**, J. D. Stuart, B. Wilhite, S -Y. li, C. weed, M. Boucher

2:30 — FUEL 33. Evaluation of partially hydrogenated soybean oil methyl esters as biodiesel. **B. R. Moser**

2:50 — FUEL 34. Testing biodiesel samples according to ASTM methods. **J. D. Stuart**

3:10 — FUEL 35. Novel heterogeneous esterification and transesterification catalysts for producing low-cost biodiesel from high-FFA feedstocks. **Y. Gao**

3:30 — Intermission.

3:40 — FUEL 36. Catalytic production of biodiesel from high fatty acid-containing feedstocks. **W. Lin**, N. A. Zafiropoulos, H. L. Ngo, E. T. Samulski, T. A. Foglia

4:00 — FUEL 37. Designing a biodiesel fuel with optimized fatty acid composition. **G. Knothe**

4:20 — FUEL 38. Study of Mg-Al hydrotalcite derived catalysts for biodiesel synthesis from poultry fat. **E. Lotero**, Y. Liu, J. G. Goodwin Jr.

4:40 — FUEL 39. Synthesis and characterization of a novel solid acid catalyst for improved biodiesel production. **H. F. Webster**, S. R. Hash, C. S. Estes

5:00 — FUEL 40. Solid acid catalyst prepared from polysaccharid and glucose. **G. Chen**

5:20 — FUEL 41. Study on combustion performances of a new rapeseed oil monoester as biodiesel. **H. Guo**, D. Jiang, G. Li, X. Wang

5:40 — Concluding Remarks.

POSTER SESSIONS

MONDAY MORNING

8:00 - 11:00

AGRO Education Awards For Graduate Student Travel Research Poster Presentations

J. J. Johnston, *Organizer, Presiding*
BCEC -- Exhibit Hall – B2

28. Molecular-level interactions of tetracycline with oligomers of a model humus constituent and soil organic matter. **P. Kulshrestha**, R. F. Giese Jr., T. D. Wood

29. Method development for multiresidue pesticide extraction from natural and processed foods. **R. E. Hunter Jr.**, A. Riederer, P. B. Ryan

30. Molecular cloning of sodium channel and identification of point mutations putatively associated with fenpropathrin resistance in *Tetranychus urticae*. **D. H. Kwon**, B. R. Choi, S. W. Lee, H. M. Park, J. M. Clark, S. Lee

31. Degradation of sulfonamides in aqueous solution by membrane anodic Fenton treatment. **K. Neafsey**, A. T. Lemley

32. Kinetics of carbaryl degradation by anodic Fenton treatment in a humic acid amended soil slurry. **P. Ye**, A. T. Lemley

33. Assessing pesticide exposure from treated turf. **J. J. Doherty**, R. A. Putnam, J. M. Clark

34. Binary mixtures of pyrethroids crosstalk between voltage-sensitive calcium and chloride channels in isolated presynaptic nerve terminals from rat brain. **H. E. Hodgdon**, R. K. Frisbie, J. M. Clark

35. Resistance to dichlorodiphenyltrichloro ethane (DDT) in resistant (91-R) and susceptible (Can-S) *Drosophila melanogaster*. **J. P. Strycharz**, J. M. Clark

36. Analysis of DNA adducts from herbicide interactions. **T. C. Andrade**, D. W. Boerth, E. Eder, P. Wanek

37. Effects of some monoterpenoids on [^{3}H]-TBOB binding to mouse GABA receptor. **F. Tong**, J. R. Coats

38. Fate of sulfamethazine in surface water microcosms. **K. L. Henderson**, T. B. Moorman, J. R. Coats

39. Mosquito repellency of Amyris and Siam-wood essential oils. **G. E. Paluch**, J. R. Coats

40. Nitrate and oxytetracycline: Agricultural residues and antibiotics at environmental interfaces studied by nonlinear optics. **P. L. Hayes**, J. J. Kruk, F. M. Geiger

41. Role of reduced sulfur species in promoting the degradation of organophosphate pesticides in aqueous solution. **J. He**, U. Jans

42. Toxicity and mode of action of the anion transporter blockers against the European corn borer. **D. R. Boina**, J. R. Bloomquist

43. Clomazone sorption and desorption to soils. **A. S. Gunasekara**, R. S. Tjeerdema

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Congratulations to all our Student Winners!

POSTER SESSIONS

(continued)

MONDAY MORNING

8:00 - 11:00

New Developments and Issues in Agrochemical Sciences

J. J. Johnston, *Organizer, Presiding*

BCEC -- Exhibit Hall – B2

Agrochemical Residue & Metabolism Chemistry

44. LC-MS-MS analysis of imidacloprid and metabolites in hemlock trees. **F. B. Cook**, A. F. Lagalante

45. Investigations into physiological differences between glyphosate-resistant and -susceptible horseweed biotypes from Mississippi. **V. K. Nandula**, K. N. Reddy, D. H. Poston, K. R. Reddy

46. Study on pesticide residues in imported food in Japan. **M. Toda**, M. Yamamoto, K. Tanaka, T. Sugita, C. Uneyama, K. Morikawa

Immunochemistry

47. A high-sensitivity immunoassay for the detection of ruminant muscle protein in meat and feeds. **B. W. Ritter**, E. S. Park, L. K. Allred

48. Monitoring *Bt* proteins in soil using biomimetic extraction technology. **G. Shan**, S. K. Embrey, R. A. Herman, R. W. McCornmick

49. A sensitive immunoassay for the detection of spinosyns in industrial water. **G. Shan**, T. Sparks, G. D. Crouse, M. Abraham, C. Fess, T. S. Fan, B. A. Skoczenski

50. Detection of hen's egg white lysozyme in food: Comparison between a sensitive HPLC and a commercial ELISA method. B. Kerkaert, **B. De Meulenaer**

51. Explosives detection by HPLC-based immunoextraction coupled with LC-MS and CE. **R. Burks**, D. D. Snow, D. S. Hage

52. Selection and expression of recombinant single domain antibodies (V_HHs) against a low molecular weight hapten. **S. Makvandi-Nejad**, C. R. MacKenzie, **J. C. Hall**

53. Quantitative ELISA validation for GE crop expression. **V. A. Korjagin**, G. Shan, S. K. Embrey, A. D. Thomas

54. Use of laboratory automation in GE crop regulatory expression trials. **V. A. Korjagin**, P. Song, A. M. Phillips, A. D. Thomas

Modern Chiral Agrochemicals

55. Development of a single chiral HPLC method for the separation of brodifacoum enantiomers. **R. S. Stahl**, J. J. Johnston

56. Enantiomerization of pyrethroid insecticides in solvents. **S. Qin**, J. Gan

57. Enantioselective endocrine disruption effects of synthetic pyrethroids. **M. Nillos**, G. Rodriguez-Fuentes, D. Schlenk, J. Gan

58. Separation and aquatic toxicity of enantiomers of the pyrethroid insecticide lambda-cyhalcothrin. **G. Sheng**, C. Xu, J. Wang, **W. Liu**

59. Chiral and isomer-specific chlordane signatures for stormwater runoff representing various land use categories. **W. Lao**, K. A. Maruya, J. Peng, K. Schiff, J. Gan

Nanotechnology in Agriculture.

60. The antioxidants in natural plants affecting formation of alpha synuclein nanobioparticles. **N. A. Hodges**, B. Tonjanika, **S. Han**

Issues in Integrated Pest Managment.

61. Overcoming mutations in fp25k baculovirus gene on the way to continuous biopesticide production in insect cell culture. **L. Giri**, D. W. Murhammer, B. Bonning, M. Feiss

New Developments & Issues in Agrochemical Sciences.

62. Bioactive materials for organophosphorus pesticides decontamination and protection. **A. Mansee**, W. Chen, A. Mulchandani

63. Abraham descriptors relating to agrochemical transport processes. E. D. Clarke, J. Delaney, P. J. Jurgutis, **P. Japertas**

64. Agrochemicals and log P octanol: Evaluation of structure based predictions. E. D. Clarke, J. Delaney, P. Japertas, **P. J. Jurgutis**

65. Insecticide formulations for improved control of sand flies and mosquitoes in severe environments. **F. Shi**, Y. Kim, L. Kagumba, A. Giaya

66. Hydrolytic enzymes produced by a bioherbicidal strain of *Myrothecium verrucaria*. **R. E. Hoagland**, C. D. Boyette, M. A. Weaver

67. Molecular overlay as a tool to model biospecificity: A case study with mosquito repellents. **R. Natarajan**, S. C. Basak, W. Nowak, P. Miszta

68. 5-Thioalkyl-1,3,4-thiadiazole-2-carboxylic acid derivatives as nematicides. **W. Zhang**, Y. Bethel

69. Performance of a new organic herbicide based on d-limonene. **M. E. Koivunen**, L. E. Fernández, B. J. Campbell, J. Versman, P. G. Marrone

70. The contents of organic carbon and problems of soil fertility. **T. K. Ortikov**

71. The influence compost is on agrochemical qualities of soil. **S. B. Pardaev**

72. Production of beauvericin by *Fusarium sp. F-1.* K. Zhong, **F. Hong**

73. Influence of mulching by polyethylene film on the content of rolling nutrients in soil and chemical composition of plants. **T. C. Goziev**

74. Bioconversion of humic substances as a promising tool for obtaining beneficial plant growth-stimulators. **B. M. Hudaibergenova**, S. Jorobekova, K. A. Kydralieva

75. Withdrawn

76. A novel antifungal agent ilicicolin H produced by *Fusarium sp. F-4*. C. Deng, Y. D. Chen, Z. Y. Shao, **F. Hong**

77. Application of optical properties of the (3-methoxypropyl)silsesquioxanes hybrid films for green house. **L. Hu**, W. Wang, Y. Liu

78. Field investigation of stimulating effect for bamboo vinegar as potential plant growth regulator. **B. Bao**, Z. Shen, J. Ma, P. Wang, Q. Zhang, L. Ye

79. Bioactivity laboratory screening of bamboo vinegar as potential plant growth regulator. **B. Bao**, P. Wang, Z. Shen, Q. Zhang, L. Ye, J. Ma

80. Selection of an effective fungicide against *Rhizoctonia solani*, *Sphaerotheca fuliginea* and *Pseudoperonospora cubensis. L*. Zhang, **J. Ma**, P. Wang, Y. Sun, L. Ma

81. Insecticidal activity of camptothecin isolated from *Camptotheca acuminate* against aphids on cabbage, *Chilo suppressalis* and planthopper on rice. J. Ma, Y. Sun, P. Wang, **L. Zhang**, L. Ma

82. Discovery and optimization of novel 2-aryl-5-thienyloxadiazoles as nematicides. **W. Zhang**, Y. Bethel

MONDAY MORNING

BioFuels: Renewable Liquid Fuels & Chemicals from Biomass

Sponsored by FUEL, Cosponsored by AGRO and PETR

P. O'Connor, C. Leclerc, D. C. Dayton, J. E. Holladay, and J. E. Holladay, *Organizers*

Boston Park Plaza -- Arlington Rm

8:05 — Introductory Remarks.

8:10 — FUEL 58. Ethanol: A green raw material for the petrochemical industry. **A. R. Pinho**, J. A. R. Cabral, L. F. Leite

8:30 — FUEL 59. Alkaline hydrothermal conversion of carbohydrate biomass into formic acid at mild temperatures. **F. Jin**, J. Yun, G. Li, A. Kishita, H. Enomoto, K. Tohji

8:50 — FUEL 60. Ni-olivine catalysts prepared by direct thermal diffusion of Ni into olivine: Applications for biomass gasification. **L. G. Felix**, C. W. Choi, R. B. Slimane, D. M. Rue, S. L. Swartz, U. S. Ozkan, J. Kuhn, Z. Zhao

9:10 — FUEL 61. Conversion of gylcerol to gasoline over acidic zeolites and Pd/ZnO catalysts . **T. Hoang**, T. Danuthai, L. L. Lobban, D. E. Resasco, R. G. Mallinson

9:30 — FUEL 62. Production of hydrogen from biomass: Integrated biological and thermo-chemical approach. **S. M. Swami**, P. Ayyappan, M. Abraham

9:50 — FUEL 63. Sustainable energy and chemical sciences collaboration in biomass conversion research between the US and Brazil. **B. Miller**

10:10 — *Winner of the Brazilian poster competition on bioconversion energy.*

Determination of carbonyl compounds (C1-C4) emitted by diesel engine using blends of the biodiesel:diesel, **L. L. Nani Guarieiro**, D. Cardoso Santos, E. Andrade, P. A. de P. Pereira, J. B. de Andrade

10:25 — FUEL 64. Promoter effects on the reactivity of Rhodium based catalysts for conversion of biomass-derived syngas to ethanol. **A. A. Egbebi**, J. J. Spivey

10:45 — FUEL 65. Renewable FT-Liquids using Fe and Fe-Co catalysts supported on carbon nanotubes with novel catalyst docking stations. **U. M. Graham**, R. A. Khatri, A. Dozier, N. J. Coville, M. C. Bahome, L. L. Jewell, B. H. Davis

11:05 — FUEL 66. Renewable hydrogen and chemicals from polyols. **B. Liu**, Y. Zhang, J. W. Tierney, I. Wender

11:25 — FUEL 67. Co-processing in FCC units: Catalytic co-cracking of hydrocarbons and oxygenated biomass compounds. **Y. Schuurman**, M. E. Domine, A. C. Van Veen, C. Mirodatos

11:45 — FUEL 68. Millisecond catalytic conversion of nonvolatile carbohydrates for sustainable fuels. **P. J. Dauenhauer**, B. J. Dreyer, J. L. Colby, L. D. Schmidt

12:05 — Concluding Remarks.

Sterling B. Hendricks Memorial Lectureship

Sponsored by USDA-Agricultural Research Service
Cosponsored by AGRO, AGFD, and FUEL
MONDAY MIDDAY

M. H. Tunick, *Organizer*
J. N. Seiber, *Organizer, Presiding*
BCEC -- 259 A/B

11:30 — Introductory Remarks.

11:45 —27. Award Address: Bruce E. Dale
Why Cellulosic Ethanol is Nearer than You Think: Creating the Biofuels Future

12:30 — Panel Discussion.

1:00 — Reception.

MONDAY AFTERNOON

Investigating VOCs from Pesticide and Fumigant Applications: State of the Science and New Approaches to Protect Air Quality

B. L. Bret, *Organizer*
P. G. Green and L. L. McConnell, *Organizers, Presiding*

Section A
BCEC -- 259 A/B
1:45 — Introductory Remarks.

1:50 —83. Development of pesticide volatile organic compound (VOC) emission adjustment factors. **T. A. Barry**, R. Segawa

2:15 —84. Estimating fumigant emissions from agricultural soils. **S. R. Yates**, W. Zheng, D. Ashworth

2:40 —85. Research strategy for achieving emissions reduction in a regulatory framework. **J. A. Knuteson**

3:05 —86. Overview of methods to estimate emissions from agricultural fumigants. **D. A. Sullivan**

3:30 — Intermission.

3:50 —87. Alternative methods for evaluation of VOCs. **R. M. Bennett**, V. Srinivas, D. A. Sullivan

4:15 —88. 2006 methyl isothiocyanate near-field air assessments: Implications for air quality in south Franklin County, Washington. **V. R. Hebert**, J. LePage

4:40 —89. Use of chain_2d to model the effect of fumigant application mitigation strategies on volatilization from soil. **I. J. van Wesenbeeck**, S. A. Cryer

5:05 — Concluding Remarks.

MONDAY EVENING

8:00 - 10:00
Sci-Mix
J. J. Johnston, *Organizer, Presiding*

BCEC -- Exhibit Hall – B2
45, 47-50, 56-57, 59, 63-64, 67, 69, 76. See previous listings.

TUESDAY MORNING

Investigating VOCs from Pesticide and Fumigant Applications State of the Science and New Approaches to Protect Air Quality

P. G. Green, *Organizer*
L. L. McConnell and B. L. Bret, *Organizers, Presiding*

Section A
BCEC -- 259A
8:10 —90. Evaluation of a thermogravimetric analysis (TGA) method for assessing

volatile organic compound (VOC) emissions potential for crop protection products. **D. J. Linscott**, I. van Wesenbeeck, B. L. Bret, K. Swayze

8:30 —91. Pesticidal VOCs and the formation of ozone: An academic perspective. **P. G. Green**

8:50 —92. Photochemical ozone formation potential of pesticide solvent. **W. Yang**, P. G. Green

9:10 —93. Relationship between the evaporation rate and vapor pressure of moderately and highly volatile chemicals. **I. J. van Wesenbeeck**, D. J. H. Driver, J. Ross

9:30 —94. VOC testing of agricultural EC formulations. **A. K. Viets**

International Award for Research in Agrochemicals Symposium in Honor of Dr. Frederick J. Perlak

Cosponsored with BASF Corporation
TUESDAY MORNING
W. P. Ridley, *Organizer*
J. M. Clark, *Presiding*
BCEC -- 259B

First of two sessions

10:00 — Introductory Remarks.

10:10 —95. Award Address (ACS International Award for Research in Agrochemicals, sponsored by BASF Corporation). Bollgard® Cotton: A decade of success and a glimpse of the future of cotton. **F. J. Perlak**

10:45 —96. Protein discovery, design, and mechanistic analysis of Cry3Bb1. **L. English**, K. S. Giddings, J. W. Seale

11:10 —97. Peptidergic regulation of an innate behavioral sequence. **M. E. Adams**

11:35 —98. Insect resistance management in GM crops: Past, present, and future. **R. T. Roush**

TUESDAY AFTERNOON

Issues in Integrated Pest Management
S. T. Ratcliffe and A. Herbert, *Organizers, Presiding*

Section A
BCEC -- 259A
1:40 — Introductory Remarks.

1:55 —99. Chemical and biological control: 100 Years of research and adoption in the US. **L. P. Gianessi**

2:25 —100. Endangered species and their implications to IPM programs. **P. B. Goodell**

2:55 —101. Preparing the next generation for IPM roles in industry. **N. C. Leppla**, P. G. Koehler

3:25 — Intermission.

3:45 —102. The IPM-PIPE: What does it do to enhance IPM. **D. E. Hershman**

4:15 —103. Transgenic crops and IPM: Reassessing our icon. **K. L. Steffey**, M. E. Gray, R. A. Weinzierl

4:45 — Concluding Remarks.

International Award for Research in Agrochemicals in Honor of Dr. Frederick J. Perlak
Cosponsored by BASF Corp
W. P. Ridley, *Organizer*
J. M. Clark, *Presiding*

Section B
BCEC -- 259B
1:45 —104. DNA screening to monitor pink bollworm resistance to *Bt* cotton. **J. A. Fabrick**, S. Morin, Y. Carrier, T. J. Dennehy, B. E. Tabashnik

2:10 —105. Phytochemicals for pest control. **S. O. Duke**, K. K. Schrader, C. L. Cantrell, K. M. Meepagala, D. E. Wedge, F. E. Dayan

2:35 —106. Evolution of safety assessment and regulatory approval processes for insect protected crops. **R. L. Fuchs**

3:00 —107. Environmental fate and effects of *Bt* proteins in the environment. **J. R. Coats**, K. R. Prihoda, B. W. Clark

3:25 — Intermission.

3:45 —108. Unusual challenges, unusual rewards: Introduction of Bollgard II® in Burkina Faso, West Africa. **J. T. Greenplate**

4:10 —109. Yield effects of genetically-modified crops in developing countries. **D. Zilberman**

4:35 —110. Adoption, challenges, and future prospects for insect protected crops in India. **R. D. Ketkar**

5:00 — Concluding Remarks.

WEDNESDAY MORNING

Nanotechnology in Agriculture

Cosponsored by BIOHW
N. Scott, *Organizer, Presiding*

Section A
BCEC -- 259A
8:30 — Introductory Remarks.

8:35 —111. Nanotechnology opportunities in agriculture and food systems. **N. Scott**

8:55 —112. Plant power: electrochemical energy conversion using photosystem I. **D. E. Cliffel**, M. Ciobanu, G. K. Jennings, Y. Xun, M. Krim

9:15 —113. Storage and delivery of aquatic microorganisms in emulsions stabilized by surface-modified silica nanoparticles. **J. S. VanderGheynst**, H. B. Scher, H. Guo

9:35 —114. DNA with zip codes: Addressable DNA molecules and their applications in agriculture and biotechnology. J. B. Lee, Y. Cui, H. Funabashi, N. Park, Y. F. Chang, **D. Luo**

9:55 — Intermission.

10:20 —115. Societal dimensions of agrifood nanotechnology: Project overview. **J. V. Stone**

10:40 —116. Recognition of conformational changes in β-lactoglobulin by molecularly-imprinted thin films. **D. W. Britt**, N. Turner, X. Liu, S. Piletsky, V. Hlady

11:00 —117. Carbon nanotubes as near-infrared agents for photothermal nanotherapy of bacterial infections. **J -W. Kim**, V. P. Zharov

11:20 —118. Single molecule analysis of bacterial 16s rdna pcr products in submicrometer fluidic channels. S. Stavis, S. C. Corgié, B. R. Cipriany, H. G. Craighead, **L. P. Walker**

Modern Chiral Agrochemicals Importance of Enantioselectivity in Fate and Effects

A. W. Garrison and R. Williams, *Organizers*
J. Gan, *Organizer, Presiding*

Section B
BCEC -- 259B
8:30 — Introductory Remarks. **A. Wayne Garrison**.

8:55 —119. Enantioselectivity in pyrethroid insecticides. **J. Gan**, S. Qin, M. Nillos, G. Sheng, D. Schlenk

9:20 —120. Estrogenicity of enantiomers of the synthetic pyrethroid insecticide (Z)-cis-bifenthrin. **W. Liu**, G. Sheng, L. Wang, C. Yang, J. Gan

9:45 —121. Utilizing in silico techniques to elucidate the stereoselective behavior of pyrethroids within carboxylesterase. **D. T. Chang**, M -R. Goldsmith, R. Tornero-Velez, J. Rabinowitz, C. C. Dary

10:10 — Intermission.

10:35 —122. Comparison of aquatic toxicity of pyrethroid isomers and isomer mixtures. **J. M. Giddings**

11:00 —123. Enantioselective degradation of fungicides in soils: Chiral preference changes with soil pH. **I. J. Buerge**, T. Poiger, M. D. Müller, H -R. Buser

11:25 —124. Enantioselective formation of the triazole fungicide triadimenol from triadimefon in mammal and fish hepatic microsomes. **J. F. Kenneke**, C. S. Mazur, A. W. Garrison

11:50 —125. Enantioselective carcinogenesis of agrochemicals and other xenobiotics. **I. Ali**

WEDNESDAY AFTERNOON

Nanotechnology in Agriculture

Cosponsored by BIOHW
N. Scott, *Organizer, Presiding*

Section A
BCEC -- 259A

1:25 — Introductory Remarks.

1:30 —126. Novel magnetic nanobars for diagnosis and sampling in food safety and security. **Z. -Y.Cheng**

1:50 —127. Nanoencapsulation of triclosan through ethanol mediated dissociation of the casein micelle: Implications in antimicrobial and drug delivery systems. **A. L. Roach**, F. M. San Martin, F. M. Harte

2:10 —128. Food pathogen detection using Au/Si nanorods. **B. Park**, J. Fu, Y. Zhao, G. R. Siragusa, Y -J. Cho

2:30 —129. Fabrication of functional food nanocomposites utilizing microdispensing technology and engineered edible films. **P. Takhistov**

2:50 — Intermission.

3:15 —130. Nanostructured bacteriophage reporter system for the detection of bacterial pathogens. **S. Ripp**, J. Fleming, A. V. Melechko, M. J. Doktycz, G. S. Sayler

3:35 —131. Electronic nanosemiconductor biomolecular pathogen detector. **G. K. Maki**, N. Mishra, S. K. Rastogi, B. Filanoski, R. Nelson, E. Cameron, P. Winterrowd, W. C. Maki

3:55 —132. Biocompatible nanoparticles trigger rapid bacteria clustering. **M. U. Larsen**, M. Seward, A. Tripathi, N. C. Shapley

4:15 —133. Luminescent and magnetic nanoparticles in assays for toxins and DNA. M. Nichkova, D. Dosev, A. Son, K. R. Hristova, Z. Ma, S. Gee, B. D. Hammock, **I. M. Kennedy**

4:35 — Concluding Remarks.

Modern Chiral Agrochemicals Importance of Enantioselectivity in Fate and Effects

A. W. Garrison and J. Gan, *Organizers*
R. Williams, *Organizer, Presiding*

Section B
BCEC -- 259B

1:45 —134. Enantiomeric separation of new substituted N-(2-benzolthiazol)- 1-(fluorophenyl)- O,O-dialkyl-α-amino-phosphonates by normal HPLC on polysaccharide-based chiral stationary phases. Z. Yuping, **S. Baoan**, L. Mei, L. Ping, L. Dongmei, H. Deyu

2:10 —135. Chiral analysis of S-metolachlor in surface water samples collected from four Ohio watersheds. **A. K. Kabler**, S. M. Chen, J. Kramer, D. B. Baker

2:35 —136. Quality assurance issues related to environmental monitoring of stereoselective degradation of metolachlor. **M. J. M. Wells**, M. Y. Z. Aboul Eish

3:00 — Intermission.

3:25 —137. Stereoselective behavior of chiral pesticides in environment. **Z. Zhou**

3:50 —138. Environmental fate of chiral pesticides used in Canada. **P. B. Kurt-Karakus**, T. F. Bidleman, D. Muir, J. Struger, S. Cagampan, J. Small, L. Jantunen

4:15 —139. Importance of enantioselectivity in fate and effects to ecological hazard assessment of chiral contaminants. **J. K. Stanley**, B. W. Brooks

4:40 — Concluding Remarks. **A. Wayne Garrison**.

THURSDAY MORNING

New Developments and Issues in Agrochemical Sciences

J. J. Johnston, *Organizer, Presiding*

Section A
BCEC -- 259A
8:45 — Introductory Remarks.

8:50 —140. Ecology and evolution of the British super rat. **R. H. Smith**

9:10 —141. Recent finding in the development of noninvasive method to monitor wildlife exposure to bromadiolone. **M. Sage**, M. Coeurdassier, I. Fourel, J. Barrat, P. Berny, P. Giraudoux

9:30 —142. Irrigation incorporation and tillage impacts on runoff, erosion and preemergence herbicide loss. **T. L. Potter**, T. C. Strickland, C. C. Truman, D. D. Bosch, T. Webster

9:50 —143. Carbonate and magnesium interactive effect on phosphorus recovery from dairy manure wastewater. **X. Cao**, W. Harris

10:10 — Intermission.

10:25 —144. Fipronil residues remaining in heavy clay soils seven years after application effect nontarget arthropods. R. Horsak, **R. E. Woodward**

10:45 —145. Electrochemical degradation of obsolete pesticide stocks. **A. Vlyssides**, D. Arapoglou, E. Barampouti, T. Mai

11:05 —146. Vitamin C protection against aluminum stress. **E. S. Shaker**, H. M. Helmy

11:25 —147. Studies on blends of polyvinyl alcohol and natural polyphenols: Specific interactions and properties. **Q. Shen**, L - H. Zhang

11:45 — Concluding Remarks.

THURSDAY AFTERNOON

Past, Present, and Future of the AGRO Division

J. J. Johnston, *Organizer, Presiding*

Section A
BCEC -- 259B
12:30 — Introductory Remarks.

12:40 —148. AGRO symposia: Past and future. **J. J. Johnston**

12:50 —149. Technical programming: The lifeblood of the division. **K. L. Armbrust**

1:00 —150. AGRO membership trends and plans. **D. M. Stout II**

1:10 —151. PICOGRAM: AGRO's communication pipeline. **C. J. Hapeman**

1:20 —152. AGRO strategic planning: A recipe for success! **L. L. McConnell**

1:30 — Discussion.

2:15 — Concluding Remarks.

AGRO DIVISION

AGRO 1

Application of immunoassay in agricultural biotechnology

Guomin Shan, *Regulatory Laboratories, Dow AgroSciences LLC, 9330 Zionsville Rd, Indianapolis, IN 46268, gshan@dow.com*

Since their commercial introduction two decades ago, genetically engineered (GE) crops have been cultivated globally and continue to grow in popularity. Immunoassays have played an important role in various areas across the AgBiotech industry. This technology is widely used by AgBiotech companies in trait discovery, product development, seed production, and environmental risk assessment. Other stakeholders from the food and feed supply chains, such as commodity, food and feed companies, as well as third-party diagnostic testing companies rely on immunoassays for a number of purposes. The primary use of immunoassays is to verify the presence or absence of GE material in a product, or to quantify the amount of GE material present in a product. In addition, this technology has been developed further to meet the need of higher throughput for handling large quantity of samples, and the need of fast, robust and simple process for field testing. Two most commonly used formats are: lateral flow strips (LFS) and plate-based Enzyme-Linked Immunosorbent Assays (ELISA). The main applications of both formats in agricultural biotechnology will be discussed and the benefits and drawbacks will be discussed in detail as well.

AGRO 2

Molecular breeding of medicinal plant using single chain Fv gene

Yukihiro Shoyama[1], *Waraporn Putalun*[2], *and Hiroyuki Tanaka*[1]. *(1) Faculty of Pharmaceutical Science, Kyushu University, 3-1-1 Maidashi, Higashi-ku, Fukuoka 812-8582, Japan, Fax: +81-92-581-7491, shoyama@niu.ac.jp, (2) Faculty of Pharmaceutical Science, Khon Kaen University, Khon Kaen 40002, Thailand*

The gene of scFv of anti-solamargine monoclonal antibody was cloned and transfer to the expression plasmid. The expressed scFv protein was confirmed to have the affinity agains solasodine glycoside ELISA. The gene was induced to *Solanum khasianum* through Agrobacterium resulting hairly roots. After subculturing of hairly roots for one month on the solid medium, a green spot appeared from the hairly root cultures, then regenerated plantlet. Expression of scFv protein and the concentration of solasodine glycosides were determined by ELISA using anti-His tag monoclonal antibody and anti-solamargine monoclonal antibody, respectively. We discovered that transformation with the scFv fragment improves the concentration of solasodine glycoside resulting in at least 3 times increase compared to the control plant. This system established here may open up new plant breeding methodology.

AGRO 3

Evaluation of a high-throughput magnetic-particle triclosan immunoassay and results of their application for continental waters monitoring in the Mediterranean area

Marinella Farre[1], *Fernando Rubio*[2], *Daniela Asperger*[3], *Sílvia Lacorte*[1], *Mira Petrovic*[1], *Weilin L. Shelver*[4], *and Damià Barceló*[1]. *(1) Environmental Chemistry, IIQAB-CSIC, Jordi Girona 18-26, Barcelona 08034, Spain, Fax: 3493-2045904, mfuqam@cid.csic.es, (2) Abraxis LLC, Warminster, PA 18974, (3) Faculty of Chemical Engineering and Technology, Department of Analytical Chemistry, 10000 Zagreb, Croatia, (4) Biosciences Research Laboratory, USDA-ARS, Fargo, ND 58105*

Triclosan is a microcide, registered in the EPA as a pesticide, and has been incorporated into a wide variety of household and healthcare products. A magnetic particle-based immunoassay to determine triclosan was evaluated against a gas chromatography-mass spectrometry (GC-MS) method for the determination of triclosan and its metabolite, methyl triclosan in tap water, river water, and wastewater in an environmental monitoring study carried out in Catalonia (Spain). Water samples were prepared to contain 25% methanol and analyzed directly without any sample extraction or preconcentration by the triclosan ELISA, and after solid phase extraction measured by GC-MS. Good agreement was obtained between chromatographic results and the immunoassay for samples which triclosan content was lower than 5 ppb. This study is of great interest given the frequency with which triclosan and methyl triclosan were found in natural samples of Spanish rivers, as well as the high concentrations found in river waters and wastewater.

AGRO 4

Use of ELISA to aid management of the invasive gall wasp, Quadrasticus erythrinae Kim on native and landscape trees, Erythrina spp

Qing X Li[1], *Ting Xu*[1], *Christopher Jacobsen*[2], *and Arnold H. Hara*[2]. *(1) Department of Molecular Biosciences and Bioengineering, University of Hawaii, 1955 East-West Rd., Honolulu, HI 96822, qingl@hawaii.edu, (2) Beaumont Agricultural Research Center, University of Hawaii, Hilo, HI 96720*

The gall wasp Quadrastichus erythrinae Kim was first described as a new species infesting *Erythrina variegata*, *E. fusca*, and *E. indica* in 2004 in Singapore, Mauritius and Reunion, and soon after reported infestations on five Erythrina species in Taiwan. In April 2005, the wasp was first detected on the island of Oahu and rapidly established on five islands in Hawaii by August 2005. In Hawaii, about all Erythrina trees including the endemic wiliwili tree, E. sandwicensis are now infested. After a number of insecticides applied by drench, spray and injection were tested, imidacloprid by injection was selected for further studies due to promising control efficacies of the wasp. An ELISA was evaluated for its reproducibility, accuracy, matrix interference, recoveries, and comparability to HPLC results for the analysis of imidacloprid in wiliwili trees. An inverse relationship between the leaf infestation severity rating and imidacloprid concentrations shows that imidacloprid can control the wasps.

AGRO 5

Development of sensitive immunoassay formats for algal toxins

__Fernando Rubio__, Lisa Kamp, Jennifer Church, and Richard Slawecki, Abraxis LLC, 54 Steamwhistle Drive, Warminster, PA 18974, Fax: 215-357-5232, frubio@abraxiskits.com

Cyanobacteria (blue-green-algae) are known to produce various toxins that can be assigned to different substance classes, such as alkaloids, lipopolysaccharides, polyketides, or peptides. Cyanobacteria live in terrestrial, fresh, brackish, or marine water. Some of the toxins they produce can be toxic, others can cause severe taste and odor problems in drinking water supplies. Cyanobactreial toxins can make drinking water and recreational use of water unsafe. Animals die yearly as a result of cyanotoxins, and though human death is not commom, many people experience symptoms indicative of cyanotoxin exposure. Very little is known about the long-term side effects of ingestion of cyanotoxins, although there is a guideline set by WHO for safe concentrations, minimal concentrations could cause an effect over time. Concerns about contamination of lakes and reservoirs with algal toxins have led to the need for more rapid, sensitive, and selective methods of analysis.
This paper describes the development and assay performance of microtiter plate ELISAs for microcystins, cylindropsermopsin, and saxitoxin in water samples, and an immunochromatography device for the quick analysis of microcystins in recreational water samples. The results showed that the ELISA exhibits excellent sensitivities: 0.1, 0.04, and 0.02 ppb respectively in water samples. Average recoveries in water were between 85-115% and within and between assay precision of < 12%. Data obtained with water samples as well as sample comparison will also be presented.

AGRO 6

Immunoassays and immunoaffinity purification for persistent organic pollutants

__Jane C. Chuang__, Battelle Memorial Institute, Columbus, 505 King Avenue, Columbus, OH 43201-2693, Fax: 614-424-3638, chuangj@battelle.org, and Jeanette M. Van Emon, National Exposure Research Laboratory, U.S. Environmental Protection Agency, Las Vegas, NV 89119

Persistent organic pollutants (POPs) including polycyclic aromatic hydrocarbons (PAHs), pyrethroids, and polychlorinated biphenyls (PCBs) present a growing environmental and human health concern. Reliable and cost effective analytical methods for POPs are required for large-scale environmental monitoring studies. Immunoassay and immunoaffinity purification procedures are sensitive antibody-based bioanalytical methods that provide many advantages over conventional instrumental and traditional cleanup methods. Enzyme-linked immunosorbent assay (ELISA) methods have been developed for monitoring PAHs, permethrin and PCBs, in complex sample media. The method precision for PAH ELISA was within ±30% and recovery of benzo[a]pyrene in ranged from 46 to 140% for soils. The ELISA data were highly correlated with data obtained from the GC/MS ($r > 0.77$). Another magnetic particle ELISA for measuring permethrin in soil and dust giving a positive correlation ($r = 0.99$) with GC/MS data. Overall method precision was within ±30% and recoveries of mixtures of cis- and trans-permethrin (1:1) ranged from 92 to 116%. ELISA methods for Aroclors (96-microwell plate) and coplanar PCBs (magnetic particle) were evaluated for soil and sediment. A positive correlation ($r = 0.90$ for Arochlors and 0.66 for coplanar PCBs) was observed between ELISA and GC/MS data. Notice: The United States Environmental Protection Agency (EPA) through its Office of Research and Development funded and collaborated in the research described here under contracts 68-D4-0023 and 68-D-99-01 to Battelle. Although this work was reviewed by EPA and approved for publication, it may not necessarily reflect official Agency policy. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

AGRO 7

Application and validation of polybrominated diphenyl ethers immunoassay for environmental and food matrices

__Weilin L. Shelver__, Biosciences Research Laboratory, USDA-ARS, 1605 Albrecht Boulevard, Fargo, ND 58105, Fax: 701-239-1430, shelverw@fargo.ars.usda.gov, and Fernando Rubio, Abraxis LLC, Warminster, PA 18974

A sensitive magnetic particle enzyme-linked immunoassay (ELISA) was developed to analyze polybrominated diphenyl ethers (PBDEs) in water, milk, fish, and soil samples. The assay is rapid and can be used to analyze fifty samples in about one hour after sample cleanup. The assay has a limit of detection (LOD) below 0.1 ppb towards the following brominated diphenyl ether (BDE) congeners: BDE-47, BDE-99, BDE-28, BDE-100, and BDE-153, with the LOD approximately the same as GC-NCI-MS. The assay gave good recoveries of PBDEs from spiked water samples and a very small within and between day variance. The cleanup methods prior to ELISA were matrix dependent, no pretreatment was needed for environmental water samples; while fish, milk, and soil samples required various degrees of cleanup. Analysis of this wide variety of environmental and food samples by both ELISA and GC-MS demonstrated ELISA provides a timely and cost effective method to screen for PBDEs.

AGRO 8

Pharmacokinetics and metabolism of firocoxib in horses after oral administration

__Valerie Kvaternick__[1], Matthias Pollmeier[2], Peter D. Hanson[3], and James B Fischer[1]. (1) PKDM, Merial, 631 Route 1 South, North Brunswick, NJ 08902, valerie.kvaternick@merial.com, (2) Opérations Cliniques Animaux de Production, Merial SAS, St. Vulbas, France, (3) PR&D, Merial, Duluth, GA 30096

Firocoxib (EQUIOXX® Merial) is a newly-approved second generation coxib for the relief of pain and inflammation associated with osteoarthritis in the horse. The pharmacokinetic study was a two period crossover design with a 20-day washout period. After a single oral dose, firocoxib was rapidly absorbed (T_{max} = 3.9 hr) with a maximum concentration of 75 ng/mL. Firocoxib plasma concentrations decreased exponentially and parallel to those following intravenous administration. The terminal elimination half-life was 30 hours. The absolute bioavailability was 79%. The metabolism of firocoxib was evaluated after horses were administered seven consecutive daily oral doses of ^{14}C-firocoxib. The majority of the radioactivity was excreted within 3 days after the last administered dose and accounted for approximately 83.5% of the total radioactive dose. The majority of the radioactivity was eliminated in the urine (~65-70%) with about 15-18% excreted in the feces. The major inactive metabolites were descyclopropylmethylfirocoxib, the dealkylated parent, and its glucuronide conjugate.

AGRO 9

Tissue residue depletion of firocoxib in horses after oral administration

Valerie Kvaternick[1], *Bruce Kunkle*[2], *and Alisa Khunachak*[1]*. (1) PKDM, Merial, 631 Route 1 South, North Brunswick, NJ 08902, valerie.kvaternick@merial.com, (2) Clinical Operations, Merial, Fulton, MO 65251*

Firocoxib (EQUIOXX® Merial) is a newly approved second generation coxib for the relief of pain and inflammation associated with osteoarthritis in the horse. To support registration of the product in the European Union, a tissue residue study was conducted. Twenty-five horses were administered 14 consecutive daily oral doses of firocoxib (0.1 mg/kg). The animals were divided into groups of five for tissue collection 0, 1, 3, 7, or 14 days post last dose. The kidneys, liver, and samples of muscle and fat were collected for processing and analyzed using a GLP validated determinative method. Residue levels were calculated for each tissue from each animal at each time point. The average kidney and muscle residue levels were below the limit of quantitation 14 days post last dose. The average residues in liver (target tissue) and fat were 63.7 and 20.5 ng/g, respectively. The method limit of quantitation is 5 ng/g.

AGRO 10

Distribution and residues of orally administered 2,4,6-trinitro-^{14}C-toluene in ruminating sheep

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2,4,6-Trinitrotoluene (TNT) is a persistent contaminant of some military and industrial soils. The purpose of this study was to determine the fate of ^{14}C-TNT in ruminating sheep. Animals were dosed with 35.5 mg each of dietary unlabelled TNT for 21 consecutive d. On d 22 sheep were orally dosed with 35.5 mg of U-ring labeled ^{14}C-TNT (129 µCi; 99.1% purity). Blood was serially collected; urine, feces, and tissues were quantitatively collected. Plasma radioactivity peaked within 1 h of dosing and was essentially depleted within 18 h. Approximately 76% of the radiocarbon was excreted in feces, 17% in urine, with 5% being retained in the gastrointestinal tract and 1% retained in tissues. Parent TNT, dinitroamino metabolites, and diaminonitro metabolites were not detected in excreta. Ruminal and fecal radioactivity was essentially non-extractable using ethyl acetate, acetone, and methanol. Ruminants may offer an economical means for bioremediation of TNT contaminated soils.

AGRO 11

Determination of chlorophacinone in prairie dogs by microwave extraction and ion-pairing reversed-phase high performance liquid chromatography with confirmation by HPLC/MS

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Chlorophacinone is an anticoagulant used to control ground squirrels, pocket gophers, and mountain beavers. Chlorophacinone is currently being assessed for control of prairie dogs. To assess potential secondary hazards to scavengers, residues of chlorophacinone in the carcasses must be determined and a risk assessment completed. Residues in liver and whole body tissue samples are typically determined by ion-pairing reversed-phase HPLC after microwave extraction of the sample combined with a solid phase extraction clean-up procedure. All samples were determined with the addition of diphacinone as a surrogate. Chlorophacinone and metabolites were detected. The metabolites were confirmed by HPLC/MS with atmospheric pressure chemical ionization and an ion trap detector after replacing the ion-pairing system with a HPLC/MS compatible mobile phase. Extracts were analyzed in full scan mode and with MS/MS to confirm the presence of chlorophacinone and to identify the metabolites of chlorophacinone. Hydroxy metabolites were observed and identified.

AGRO 12

Determination of organochlorine pesticide residues from eggs and liver

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The quantification of organochlorine pesticide (OCP) residues continues to be an important area in residue chemistry. Continual improvements in sample extraction and analysis provide more sensitive and robust methods for the determination of OCP residues in many matrices. Among the more challenging matrices are liver and eggs. With their high lipid content, clean-up of sample extracts from these matrices presents a unique challenge. Through the use of a combined-phase solid phase extraction cartridge, the extraction of OCP residues in these biological matrices has been greatly improved. Combining this improved extraction with a dual column ECD analysis has permitted the quantitation of twenty OCPs in these challenging matrices.

AGRO 13

Analysis of nitrofuran residues in shrimp, channel catfish, and milk using liquid chromatography-tandem mass spectrometry

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Nitrofuran drugs are effective in treatment and control of bacterial and protozoan infections in humans and animals. Because of their mutagenicity and carcinogenicity, nitrofurans have been banned for use in food-producing animals in many countries. Our laboratory has developed and validated methods for determining the side chains of the nitrofuran drugs furazolidone, nitrofurazone, furaltadone, and nitrofurantoin in several food products. As part of the method validation, we have also conducted nitrofuran incursion studies in food animals and measured residues in various matrices. Here, we describe and compare the incursion profiles of nitrofuran residues in shrimp and channel catfish muscle tissue and in cow milk. In these matrices, nitrofurantoin exhibits the lowest level of residues among the four nitrofurans.

AGRO 14

From biosensors to dip-sticks, immunochemical based methods are being employed in every aspect of food protection

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As the economies of scale increase in the food industry, the outcome of a single contaminant to the supply metrics can have worldwide devastating effects for the consumer. The recent contamination problems in spinach, peanut butter, meat or dog food illustrate that the effects of a single supplier can reach into every kitchen in N. America. We will explore how the industry is searching for more efficient, reliable methods for the detection of contaminants while trying to meet the increased pressures of large scale maximized production so as to compete in the market place of today. Hundreds of different detection devices are employed in food safety but none as versatile as the immunochemical. From biosensors to dipsticks, antibodies and receptors are being employed to monitor our food supply. We will explore how immunoassays are being employed to protect our food supply from farm to table.

AGRO 15

Immunochemical tests for the determination of nitrofuran metabolites

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Nitrofuran antibiotics have been banned in food-producing animals in the EU since 1995 due to health concerns, including a possible risk of cancer through long term consumption. Member States of European Union are required to monitor complience of the prohibition on the use of nitrofuran antibiotics through their annual national residues control plans. Effective control of the nitrofuran antibiotics (furazolidone, nitrofurantoin, furaltadone, nitrofurazone) is achieved by measuring tissue concentrations of bound nitrofuran metabolites known in short as AOZ, AHD, AMOZ and SEM. Method of analysis is based on the release of these metabolites from the tissue and derivatization with o-nitrobenzaldehyde. Immunochemical strategies (hapten design), the production of sensitive antibodies against the derivatised metabolites, sample preparation and assay validation will be presented. Particular attention will be devoted to the production of antibodies against the small molecule semicarbazide (SEM) which is occuring recently also in baby foods.

AGRO 16

Preparation of antibodies and developments of ELISA test kits for drugs used in animal husbandry

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Our research group has been working in preparing antibodies for small organic molecules that are used as veterinary drugs in animal husbandry. In these researches, fluoroquinolones such as pefloxacin, danofloxacin, lomefloxacin, and nitrofurans such as nitrofurantoin, nitrofuranzone, were conjugated with carrier proteins to form complete antigens, which were applied to immunize animals to prepare corresponding antibodies. The study on cross reactivity of the antibodies, which could be helpful for future's designation of new antigens, has been carried out based on the structures of related chemicals. The antibodies prepared show excellent specificities and sensitivities. The ELISA test kits based on these antibodies have been used in real systems such as chicken liver, milk, and drinking water. The testing results demonstrated that the test kits developed could be used for regulation purpose to detect drug residues in foods and food products.

AGRO 17

Red fluorescent dyes for immunochemical detection of staphylococcal enterotoxin A

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Staphylococcal enterotoxin A (SEA) is commonly detected in staphylococcal food poisoning outbreaks and is also heat stable. A sensitive method for detection of SEA is needed for food safety and food security monitoring. Fluorescent immunoassays have higher sensitivity than enzyme based immunoassays. This research presents the development of a novel fluorescent micro-particle immunoassay with detection of SEA below toxic levels of 1 ng/mL. Anti-SEA immunoglobulin covalently linked to the latex polystyrene micro-particles captured the SEA in samples followed by the competitive binding of added tracer, SEA labeled with Alexa Fluor 568 or Alexa Fluor 6162 red fluorescence dyes. The latex-anti-SEA complex, bound with SEA and tracer SEA, was separated by centrifugation, and the fluorescent density of the supernatant was measured. The concentrations of these reagents were optimized for detection of SEA in buffer and spiked food samples. SEA was detected at 0.25 to 10 ng/mL in buffer and in spiked hot dogs at 0.5 to 10 ng/g. This red fluorescent immunoassay can be utilized for detection of SEA in a multi-toxin detection system.

AGRO 18

Cloning, expression, and characterization of recombinant antibodies with affinity for deoxynivalenol and related mycotoxins

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Deoxynivalenol (DON) is a low molecular weight trichothecene mycotoxin commonly associated with Fusarium Head Blight (FHB) infection of cereals and maize crops. Mycotoxin accumulation within FHB-affected grain represents a serious economic problem as, once formed, DON is likely to persist throughout the food chain from harvest to storage to handing to processing of food and feed. A recombinant single domain antibody (sdAb) phage-display library was prepared from leukocyte RNA isolated from a llama (*Lama glama*) immunized with 15-DON-BSA protein conjugate. One sdAb clone with affinity for DON was repeatedly selected by panning against 15-DON-OVA and OVA alone (control). After isolation and purification as a soluble sdAb protein, monomer and pentamer forms were tested for affinity to DON and structurally-similar trichothecenes by fluorescence polarization and surface plasmon resonance formats. We confirmed that sdAbs capable of binding to low molecular weight haptens could be produced through the creation and panning of hyper-immunized sdAb libraries.

AGRO 19

Comparison of the skerritt and R5 antibodies in gluten detection by ELISA

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Many agencies are currently attempting to establish a definition for "glutenfree" foods, setting a threshold of safety for gluten-sensitive individuals. It has been proposed that non-cereal derived foods be considered gluten-free if gluten contamination is less than 20 ppm. To establish this cutoff, analytical tests are required that can accurately measure gluten levels. Several companies produce commercial immunoassay kits for the detection of gluten in foods. Eleven of the twelve available kits are based on one of two antibodies, referred to as Skerritt and R5. The purpose of this study was to compare the results of gluten immunoassays that use either the Skerritt or R5 antibody. A panel of 23 known and 117 unknown samples was run on two separate sandwich ELISAs, one using the Skerritt antibody and the other using the R5 antibody. The Skerritt and R5 antibody assays showed 100% specificity, and 92 and 77% sensitivity, respectively, to the known samples. The Skerritt antibody recognized 42 of the 117 unknown samples (35.8%) as positive (>5ppm), while the R5 assay recognized 16 of the same 117 unknowns (13.7%) as positive (>3ppm). While both the Skerritt and R5 antibodies detect gluten, it will be important to determine the cause of the discrepancy in sensitivity to known and unknown samples in order to ensure a safe food supply for gluten-sensitive individuals.

AGRO 20

Use of crop protection product global regulatory magnitude and decline of residue data on produce for residue prediction purposes

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Extensive magnitude and decline of residue data are generated on a variety of produce for crop protection products (CPPs) following application to crop test systems within global regulatory systems. These data are gathered primarily to support CPP national registrations and/or international commodity trade. The data can be utilized secondarily for the prediction of residues of CPPs on crop commodities to facilitate product development decisions. For the optimal utilization of data for predictive purposes, a mathematical method was developed to allow determination of the residue spray deposit at application and mass dissipation kinetics for typical regulatory decline study designs. Specifically, a non-linear least squares optimization routine was employed. The resultant predictive capabilities were cross-validated for two example scenarios, a faster declining CPP (Insecticide A) on melons and a slower declining CPP (Insecticide B) on peppers. The results illustrate the potential utility of available residue data for CPP predictive modeling on crop commodities.

AGRO 21

Methods for measuring worker exposure to pesticides during seed treatment

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Determining exposure levels for use in risk assessment has become an important part of the development process for pesticide registration. Increasingly, pesticide application especially for early season uses is performed as seed treatment immediately prior to planting. Two typical seed treatment scenarios are application by the seed distributor during seed transfer to delivery equipment and treatment by the individual farmer the day of planting. This paper will discuss the methodology used to measure both dermal and inhalation operator exposure of a test chemical during actual commercial and on-farm seed treatment and planting of cereal grains.

AGRO 22

Influence of azinphos-methyl metabolites in apples on organophosphate pesticide exposure estimates

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Exposure to azinphos-methyl is typically assessed by determination of dialkylphosphate metabolites in urine. This approach assumes that metabolism of azinphos-methyl is the only source of urinary dialkylphosphate compounds. However, recent work has indicated that dialkylphosphates may be found on fruit treated with azinphos-methyl in the absence of metabolism. Exposure to these pre-existing dialkylphosphates would also lead to elevated urinary levels in exposed individuals. Apples were collected at regular intervals over a four-week period between treatment and harvest. Fate of azinphos-methyl and formation of dialkylphosphates in apples were studied using LC/APCI/MS. This technique offers several advantages over more commonly used GC analysis. Accurate quantitation by GC is problematic as azinphos-methyl is thermally unstable and the metabolites require extensive derivatization prior to GC analysis. These problems do not arise with LC, and the use of APCI/MS permits greater confidence in identification and quantitation of analytes.

AGRO 23

Possibility of groundwater contamination by endosulfan leaching in different types of soils

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Although endosulfan has a low water solubility (1.4 mg/L), it has been detected in California well water. Endosulfan transport and soil binding were studied in sandy, sandy-loam, and clayey soils. PVC soil columns (35 x 6 cm) were filled to 25 cm with processed soils; water was passed through each column to maintain a 2 cm constant head of water. Leachate was analyzed in 4 fractions of 250 mL each. Soil columns were analyzed in 5-cm sliced sections. Endosulfan was recovered primarily in the top 0-5 cm soil layers: 86.7, 91.8, and 98.3% in sandy, sandy loam, and clayey soil, respectively. In sandy and sandy loam soil only 8.65% and 5.86% endosulfan reached the 5-10 cm soil fraction. Only 1.3-4.4 % of the endosulfan was recovered in leachate. The trend in leaching could be explained on the basis of soil properties, organic matter, and clay content.

AGRO 24

Mechanistic studies of formetanate hydrochloride decomposition under aquatic conditions

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The relative stability of the formamidine and carbamate groups in formetanate hydrochloride pesticide can be used to predict the identity of its degradation products in water. NMR and UV-vis spectroscopic studies showed that formamidine hydrolyzes more rapidly than carbamate under strongly basic conditions and under predetermined field conditions. The half-life of the formamidine group was determined to be 3.9 h under strongly basic conditions (pH 12.6) and 14.4 h under mildly basic conditions (pH 7.6). The longevity of the carbamate group may be useful in the design of more specific remediation technology for formetanate-contaminated surface water.

AGRO 25

Fate of methyl parathion in natural sulfidic water

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The degradation of methyl parathion was examined in water samples obtained from Lower Mystic Lake, MA. In order to investigate the roles that hydrogen sulfide and polysulfides could play as reductants and nucleophiles in natural waters, experiments were conducted by monitoring the disappearance of methyl parathion and appearance of products. Measured pseudo-first-order reaction rate constants for methyl parathion were compared to predictions based on measured polysulfide and bisulfide concentrations and their second-order rate constants. Seventy-eight percent of the degradation of methyl parathion can be explained by the nucleophilic attack of polysulfide/bisulfide at the methoxy-carbon. Fifty-three percent of the observed methyl parathion disappearance in filter-sterilized samples can be attributed to the reaction with polysulfide species and 25% resulted from the reaction with bisulfide with desmethyl methyl parathion as the product. The remaining 22% of the overall degradation of methyl parathion might be attributed to nitro-group reduction with natural organic water possibly acting as electron-transfer mediator.

AGRO 26

Catabolic network and protein profiles of *Mycobaterium sp* JS19b1 during degradation of aromatics

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Polycyclic aromatic hydrocarbons (PAHs) are ubiquitous in the environment and are derived from petrogenic, pyrogenic, biogenic, and synthetic sources. Microorganisms utilize PAHs for their growth. *Mycobaterium spp* are wide-spread in the environment from human pathogens to effective PAH-degraders. Novel *Mycobaterium sp* JS19b1 was isolated from petrogenic, PAH-contaminated soil. In minimum medium, JS19b1 can degrade many aromatics such as phenanthrene, fluorine, fluoranthene, pyrene, biphenyl, dibenzothiophene, and the pesticides temphos, diazinon, pirimiphos-methyl, and 2,4-D. Catabolism studies of phenanthrene, pyrene, biphenyl, dibenzothiophene, and 2,4-D in JS19b1 showed catabolic network and production of various potentially toxic intermediates. Among approximately 2000 proteins detected in JS19b1, more than 30 proteins and enzymes were directly involved in catabolism of those PAHs. The data suggest that the catabolism and degradation enzymes are regulated via complex mechanisms. It is in hope that the findings provide insight into difference of metabolism and protein profiles between pathogenic and saprophytic *Mycobaterium* species.

AGRO 27

Why cellulosic ethanol is nearer than you think: Creating the biofuels future

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Growing demands for alternatives to petroleum and rapidly improving technologies will make large scale cellulosic ethanol a reality much sooner than most people may realize. As a result, agriculture and society will be transformed. This lecture will explore some of the consequences of large scale biofuel production on sustainability and the opportunity to revitalize rural areas across the world.

AGRO 28

Molecular-level interactions of tetracycline with oligomers of a model humus constituent and soil organic matter

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Tetracycline is transformed by covalently bonding to oligomers of natural organic matter constituent through oxidative cross coupling reactions mediated by extracellular oxidoreductases. Appearance of new peaks in 1D [^{1}H] and new cross-peaks in 2D [^{13}C, ^{1}H] heteronuclear single quantum correlation nuclear magnetic resonance spectroscopy (HSQC NMR) was followed by confirmation of reaction products in solution using ion trap mass spectrometry with positive electrospray ionization ((+)ESI-IT-MS), which provide evidence of horseradish peroxidase

(HRP) mediated cross coupling of tetracycline with syringic oligomers. Incubation of tetracycline with Elliot soil humic acid and Waskish peat fulvic acid in presence of HRP for a period of 10 days showed appearance of new cross peaks in 2D [^{13}C, ^{1}H] HSQC and high molecular weight ion peaks in fast atom bombardment mass spectrometry (FAB-MS). This indicates a change in the chemical environment due to a fraction of tetracycline molecules being incorporated into soil humus via covalent linkage. The ^{1}H and ^{13}C spin-lattice relaxation times (T1) for aromatic protons and carbons of tetracycline were found to decrease with increasing additions of Elliot soil humic acid. Decreasing T1 values, significant change in the chemical shifts of hydroxyl and amide functionalities due to hydrogen bonding, lack of significant chemical shift change of aromatic and aliphatic protons due to hydrophobic interactions, and an increase in signal line broadening observed in ^{1}H-1D NMR indicate non-covalent nature of interactions between tetracycline and humus. Our results indicate that adsorption of tetracycline into soil initially occurs via non-covalent interactions. The longer adsorbed tetracycline residues remain sequestered in soil could result in their slow chemical incorporation into humus via covalent bonding. Because phenolic diketone moiety is the principal active center in tetracyclines, involvement of the phenolic oxygen attached to the tetracycline aromatic ring in covalent bonding with humic substances can diminish its mobility, bioavailability, and bioactivity.

AGRO 29

Method development for multiresidue pesticide extraction from natural and processed foods

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Effective extraction of pesticide residues from food matrices has been demonstrated using multi-residue extraction methods. However, in many instances the percent recovery of pesticide residues is sub-optimal (< 70%) and many of these methods are applicable to only one type of food (*e.g.*, vegetables or fruits). We are developing an accurate, high-throughput multi-residue method for extracting organophosphate and pyrethroid insecticides from a range of composite food matrices, including non-dairy beverages, fruits, and vegetables. A solid-phase extraction (SPE) cartridge composed of a Supelclean^{TM} ENVI-Carb-II (Sigma-Aldrich Co., Bellefonte, PA) layer and a polymerically bonded, ethylenediamine-*n*-propyl Supelclean^{TM} PSA phase (Sigma-Aldrich Co., Bellefonte, PA) resulted in the effective clean-up of food matrices after the fine-tuning of solvent polarity. Likewise, the combination of SPE layers allowed the retention and subsequent elution of the target pesticide residues. Multi-residue pesticide extraction recoveries for an assortment of composite food matrices (*e.g.*, non-dairy beverages, vegetables, fruits) were reproducible (n = 3) at > 70% with an average standard deviation of 7.9 ± 0.8. The extraction protocol will be evaluated further to show applicability to other food matrices in future work.

AGRO 30

Molecular cloning of sodium channel and identification of point mutations putatively associated with fenpropathrin resistance in *Tetranychus urticae*

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Tetranychus urticae Koch is a serious mite pest to various orchard trees and garden plants. A fenpropathrin-resistant mite strain (FenR) showed ca. 50-fold resistance. No significant differences were found in the activities of detoxification enzymes including carboxylesterase, glutathione-S-transferase, and cytochrome P450 between the susceptible (UDCM) and FenR strains. The FenR strain, however, showed ca. 10 fold slower knockdown response than UDCM as determined by knockdown bioassay, suggestive of the sodium channel insensitivity mechanism. We cloned cDNA fragments of para-homologous sodium channel α-subunit (*TSSMscg*) and determined its full length nucleotide sequences. The complete open reading frame of *TSSMscg* was 6618 nucleotides, encoding 2206 amino acids. The amino acid sequences of *TSSMscg* were 47% and 48% similar to the fruit fly and varroa mite, respectively. Amino acid comparison between the two strains revealed two mutations (L1031V and A1382D) found only in FenR mites, implying their possible role in knockdown resistance to fenpropathrin.

AGRO 31

Degradation of sulfonamides in aqueous solution by membrane anodic Fenton treatment

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Unmetabolized antibiotics enter the soil and aquatic environments via the practice of applying agricultural manure to fields; their presence may promote the growth of antibiotic-resistant bacteria and adversely affect ecosystem productivity. Degrading antibiotics in agricultural waste before their application to fields would eliminate these problems. The agricultural antibiotic sulfamethazine was successfully treated and removed from an aqueous system by Anodic Fenton Treatment (AFT), an advanced oxidation technique that effectively degrades pesticides but had never been applied to antibiotics. The degradation data were fitted to an AFT kinetic model that describes the degradation of triazine pesticides. The degradation of sulfamethazine was optimized for hydrogen peroxide to ferrous ion ratio and Fenton reagent delivery rate. The efficacy of the AFT in degrading other sulfonamides was also assessed. Finally, the degradation products of sulfamethazine and other sulfonamides were identified and analyzed to insure their lack of antibiotic or toxic properties and to propose a degradation pathway for each sulfonamide.

AGRO 32

Kinetics of carbaryl degradation by anodic Fenton treatment in a humic acid amended soil slurry

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Contamination of natural water and soil inevitably occurs due to the large usage of agricultural chemicals in agricultural or industrial activities, either as the direct consequence of the application process or as the result of accidental spills or leakages during chemical transportation, storage or application. A Fenton reaction-based electrochemical method, anodic Fenton treatment (AFT), developed for destroying and detoxifying pesticides in the aqueous environment, was evaluated in this study for degradation of a widely-used pesticide, carbaryl, in an artificial soil slurry. The effect of initial pH, humic acid content of the artificial soil, initial carbaryl concentration, Fenton reagent (ferrous ion and hydrogen peroxide) delivery ratio, and soil/water ratio (w/v) were investigated and discussed. A kinetic model was developed to describe the treatment process, and it fits the experimental data quite well. The results indicate that soil organic matter (SOM) content is the key factor that slows down pesticide degradation, most probably due to pH buffering and adsorption capacity of soil humic substances. The AFT method is a promising technology to remediate pesticide-contaminated soil.

AGRO 33

Assessing pesticide exposure from treated turf

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Exposure of golfers to pesticides following their application to turfgrass is of concern to regulators, turfgrass professionals, and consumers. Accurate assessment of golfer exposure to pesticides requires knowledge of the availability of pesticide residues following application, transfer and absorption kinetics of these residues, and major routes of entry into the body. Determination of the actual transfer of measured environmental residues to golfers during a round of golf and the subsequent penetration of the transferred residues was achieved by measuring the exposure of volunteers using dosimetry (pesticide residues on full body cotton suits and personal air samplers) and biomonitoring (measuring urinary metabolites), respectively. The central predictor of exposure in our model is the transfer factor (TF), which is the ratio between the amounts collected on the dosimeter suits versus dislodgeable foliar residues (DFR). This pesticide dose can then be used to calculate a Hazard Quotient (HQ) using the US EPA's established reference dose (Rfd). Hazard quotients calculated to date range from <0.01 for cyfluthrin and chlorothalonil to 0.55 for mecoprop-p, indicating levels of exposure at which adverse effects are unlikely (i.e., HQ less than or equal to 1.0).

AGRO 34

Binary mixtures of pyrethroids crosstalk between voltage-sensitive calcium and chloride channels in isolated presynaptic nerve terminals from rat brain

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Target sites other than voltage-sensitive sodium channels (VSSCs) are implicated in the neurotoxic response of pyrethroids. Both voltage-sensitive calcium (VSCCs) and chloride channels (VSClCs) are modified by pyrethroids in a stereospecific manner at toxicologically relevant concentrations. Our most recent research is focused on the cumulative risk of pyrethroids since environmental exposure to pyrethroids usually involves exposure to multiple compounds. Isolated presynaptic nerve terminals (synaptosomes) are an ideal *in vitro* model system to study the effects of pyrethroids since virtually all functional aspects of presynaptic nerve terminals are retained. Our results revealed that certain binary mixtures, which had deltamethrin as one of the pyrethroids, produced a more-than-additive effect on neurotransmitter release that was not calcium dependent. All of these mixtures had pyrethroids that act as VSClC antagonists, suggesting crosstalk between VSClCs and VSCCs. We will validate this assumption by using a chloride channel antagonist, rChlorotoxin, and a chloride channel agonist, pentobarbital.

AGRO 35

Resistance to dichlorodiphenyltrichloroethane (DDT) in resistant (91-R) and susceptible (Can-S) *Drosophila melanogaster*

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Resistance to dichlorodiphenyltrichloroethane (DDT) in certain *Drosophila melanogaster* strains is at extremely high levels compared to susceptible strains (>1000 times). Detoxification mechanisms involving, in part, increased expression of cytochrome P450 genes, play a role in DDT resistance but alone do not correlate to the high levels of resistance observed. Resistance in *D. melanogaster* is due to polyfactorial resistance mechanisms, which include reduced penetration, increased detoxification, and increased excretion. Rates of penetration, metabolism, and excretion were determined between resistant (91-R) and susceptible (Can-S) strains of *D. melanogaster* using ^{14}C-labeled DDT. Results show that there is ~20% more DDT being metabolized and ~4 times as much DDT being excreted by 91-R compared to Can-S. Differences in cuticular hydrocarbon abundance were determined between 91-R and Can-S, which may result in the penetration differences observed. The abundance of certain hydrocarbons in 91-R flies were between 50-78% greater than in Can-S flies.

AGRO 36

Analysis of DNA adducts from herbicide interactions

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Adduct formations between DNA bases and various xenobiotic molecules have been established as a main source of mutation in biological organisms. The presence of these nucleotide adducts within plants have been previously studied in our laboratory with the use of *in vivo* experiments along with ^{32}P postlabeling studies. Evidence was found for both direct adducts with the pesticide, as well as indirect adducts formed with products of lipid peroxidation. Many of these xenobiotic compounds, including numerous pesticides, are electrophilic and can react directly at various nucleophilic sites in the nucleic acid bases. The focus of this study was to investigate the susceptibility and reactivity of a set of herbicides towards various nucleotides. Herbicides considered in this study include triclopyr, dichlobenil, 2,4-D, dicamba, and sethoxydim. Another focal point of this research was to isolate possible adduct formations via HPLC methods and to identify the structure of such *in vitro* adduct products through mass spectroscopy. Information on the molecular structure of these adducts can assist the understanding of the probable reaction mechanisms and recognize various sites of reactivity within the nucleotides. This research confirms the formation of adducts between the DNA bases and several of the herbicides investigated.

AGRO 37

Effects of some monoterpenoids on [^{3}H]-TBOB binding to mouse GABA receptor

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In this study, four monoterpenoids (pulegone, thymol, α-terpineol, and linalool) were using to investigate their effects on [^{3}H]-TBOB (*t*-butylbicycloorthobenzoate) binding to adult mouse GABA (γ-aminobutyric acid) receptors. Those four types of monoterpenoids have different patterns on modulating the binding of [^{3}H]-TBOB to GABA receptor. Pulegone inhibited the binding of [^{3}H]-TBOB with IC_{50} = 30mM. The other 3 monoterpenoids potentiated the [^{3}H]-TBOB binding to the GABA receptor with the maximum potentiation of 143% (thymol), 127% (α-terpineol), and 156% (linalool). The data suggested that pulegone binds to GABA receptor as the same binding site as [^{3}H]-TBOB, and pulegone may affect GABA receptor as a non-competitive antagonist. The increasing of [^{3}H]-TBOB binding indicated the interaction of GABA receptor and the other three monoterpenoids, but the binding sites of them are different from the [^{3}H]-TBOB.

AGRO 38

Fate of sulfamethazine in surface water microcosms

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The antibiotic sulfamethazine can be transported from manured fields to surface water bodies. We investigated the degradation and fate of sulfamethazine in sediment-containing pond water microcosms. ^{14}C-Phenyl-sulfamethazine was added to the pond water column in a swine manure slurry or in water. Residual concentrations in water and sediment were measured over a 63-day period. Sulfamethazine uptake by the aquatic worm *Lumbriculus variegatus* was measured in the initial 14 days as an indicator of bioavailability.

AGRO 39

Mosquito repellency of Amyris and Siam-wood essential oils

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In recent years there have been efforts to develop new mosquito repellents. Previous studies in our laboratory on the repellent properties of essential oils have identified mixtures of natural products that yield residual repellency effects (both spatial and contact). Mixtures that include monoterpenes (provide good spatial repellency) and oxygenated sesquiterpenes (provide good contact repellency) result in good efficacy via both modes of action. Amyris (*Amyris balsamifera*) and Siam-wood (*Fokeina hodginsii*) essential oils contain large amounts of sesquiterpene alcohols including elemol, valerianol, and isomers of eudesmol. These individual components were isolated out of the parent essential oils and evaluated for mosquito-repellent activity in laboratory bioassays. Studies on the structure-activity relationships are currently underway to explain differences in the repellent effects observed in the bioassays. The results of this study will contribute to our understanding of the bioactivity of plant-derived sesquiterpenoids and provide insight for mechanistic studies on naturally-occurring repellent compounds.

AGRO 40

Nitrate and oxytetracycline: Agricultural residues and antibiotics at environmental interfaces studied by nonlinear optics

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The binding behavior of nitrate and oxytetracycline (OTC) with model environmental interfaces was investigated using the surface-specific spectroscopy technique second-harmonic generation (SHG). SHG allows us to track the interaction of nitrate or OTC with interfaces in real-time and measure surface-specific binding parameters. A nitrate adsorption isotherm at the quartz/water interface was obtained and fitted to the Langmuir model resulting in a binding constant and a free energy of adsorption that is consistent with the high mobility of nitrate in soils. For OTC, the strength of adsorption was found to depend on the organic moieties present at the functionalized quartz/water model interface, which indicates OTC mobility in the environment is dependent on the chemical composition of natural organic matter in soils. These SHG studies probe the fundamental interfacial processes that control the mobility of agricultural residues and antibiotics in soils providing insight into the threat posed by eutrophication and antibiotic resistance.

AGRO 41

Role of reduced sulfur species in promoting the degradation of organophosphate pesticides in aqueous solution

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The kinetics of diazinon (*O*,*O*-diethyl *O*-2-isopropyl-6-methylpyrimidin-4-yl phosphorothioate) and diazoxon (*O*,*O*-diethyl *O*-2-isopropyl-6-methylpyrimidin-4-yl phosphorate) reaction with reduced sulfur species, e.g., bisulfide, polysulfide, thiophenolate, and thiosulfate, were investigated in aqueous solution over a pH range of 5 to 9. The first-order rate constants for the reactions of diazinon or diazoxon with polysulfides and thiophenolate at concentrations commonly found in environment (approximate 0.3 millimolar for polysulfide) were significantly larger than their hydrolysis rate constants. Reactions of diazinon or diazoxon with hydrogen sulfide/bisulfide and thiophenol/thiophenolate were faster at low pH than that at high pH. The mechanistic investigation of reactions with thiophenol/thiophenolate indicated that the nucleophilic displacement occurs at the pyrimidyl carbon-6 (nucleophilic aromatic substitution) and the α-carbon of the ethoxyl group.

AGRO 42

Toxicity and mode of action of the anion transporter blockers against the European corn borer

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In this study, the anion transporter (AT) blockers, 4,4'-diisothiocyanato-stilbene-2,2'-disulfonic acid (DIDS), 5-nitro-2-(3-phenylpropylamino)-benzoic acid (NPPB), anthracene-9-carboxylic acid (9-AC), and indanyloxy acetic acid 94 (IAA-94), were tested for toxicity against larvae of the European corn borer (ECB), *Ostrinia nubilalis* (Hübner) using no-choice feeding bioassays. All the AT blockers significantly reduced larval weight at ≥ 12.5 ppm and larval survival at ≥ 25 ppm compared to control, when fed for 7 days on treated diet alone or fed for 7 days on treated diet and 14 days on untreated diet ($P < 0.05$). A significant decrease in midgut pH of fifth instar larvae fed for 3 hrs on the AT blockers treated diet at 12.5, 25, and 50 ppm was observed ($P < 0.05$). The existence of a positive correlation ($r^2 = 0.83\text{-}0.91$) between larval weight and midgut pH suggests that reduction in midgut pH may be responsible for the AT blockers toxicity against ECB larvae. Studies of midgut chloride transport with $^{36}Cl^-$ isotope indicated that the AT blockers significantly reduced chloride transport into the midgut epithelium from lumen ($P < 0.05$). Results from this study indicate the potential use of the AT blockers in pest management and as possible leads for new insecticides.

AGRO 43

Clomazone sorption and desorption to soils

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Clomazone (2-[2-chlorobenzyl]-4,4-dimethyl-1,2-oxazolidin-3-one) is a water soluble (1100 mg/L) broad spectrum herbicide effective in controlling annual grasses and broadleaf weeds. There are only a handful of studies that have evaluated the sorption of clomazone to soil while no reports exist on its sorption to humic acid (the major organic matter fraction of soils). Further, no reports have evaluated the desorption of clomazone from soils, especially flooded rice field soils. We studied the sorption and desorption of clomazone to several soils and their major organic matter fraction, humic acid. The results showed that sorption of the herbicide to the organic matter fraction was 5-10 times greater than to the whole soils. Overall, clomazone is not sequestered appreciably to whole soils nor to humic acid and this is consistent with high solubility model compounds such as benzene. However, desorption results showed that clomazone from whole soils and their organic matter fractions experience hystersis.

AGRO 44

LC-MS-MS analysis of imidacloprid and metabolites in hemlock trees

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Imidacloprid is a neonicotinic insecticide used worldwide against hemipteran insects. In collaboration with the USFS, research is aimed at controlling the hemlock woolly adelgid (*Adelges tsugae*) on eastern hemlock (*Tsuga canadensis*). A LC-MS-MS method was developed to provide unambiguous identification and quantification of imidacloprid and eight metabolites in hemlock foliage and xylem fluid exudates at the low ppb levels. Results will be presented in conjunction with previous analysis of imidacloprid levels in treated trees using a commercial ELISA test kit to assess the over prediction of imidacloprid levels due to cross reactivities. The measurement of individual metabolites spatially and temporally in treated hemlock will enable understanding of the biological transformations and effective residue levels for reapplication intervals.

AGRO 45

Investigations into physiological differences between glyphosate-resistant and -susceptible horseweed biotypes from Mississippi

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Differential translocation of glyphosate between glyphosate-resistant (GR) and glyphosate-susceptible (GS) horseweed (*Conyza canadensis*)) biotypes from Mississippi has been implicated as a glyphosate resistance mechanism. Sucrose and glyphosate translocate actively through plant phloem system. Absorption and translocation pattern of ^{14}C-sucrose were similar in GR and GS plants 48 hours after treatment (HAT), regardless of glyphosate-treatment. The GS biotype had more phenolic contents and exhibited higher cell membrane thermostability, but less net photosynthetic rate compared to the GR biotype. At 48 HAT with glyphosate, there was no change in phenolic content of both GR and GS biotypes. However, glyphosate reduced cell membrane thermostability and net photosynthetic rate more in the GS biotype than in the GR biotype. It has been conjectured that divalent cations such as Ca^{2+} and Mg^{2+} could immobilize glyphosate and reduce active translocation in plants. Chemical compositional analysis of GR and GS leaf tissue did not support this hypothesis.

AGRO 46

Study on pesticide residues in imported food in Japan

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In May 2006, a new positive list system for residues of pesticides and veterinary medicines in foods was introduced by the Ministry of Health, Labour, and Welfare (MHLW) in Japan. Numbers of regulated pesticides increased remarkably under the new system. We extracted pesticides/foods which should be monitored with high priority in order to carry out the pesticide residues monitoring more efficiently and effectively. We searched values of MRL (maximum residue limits) of pesticide residues in foods and the monitoring data reported by the United States, Canada, and European and other countries. We also compared these data with the Japanese data. The amount of pesticide used in the country of origin for foods which Japan imported in large quantity were searched. Some pesticides were suggested as highly recommended for pesticide residue monitoring in Japan, e.g, dithiocarbamates, carbendazim, captan, and chlorothalonil.

AGRO 47

A high-sensitivity immunoassay for the detection of ruminant muscle protein in meat and feeds

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Determination of the presence of ruminant content in feeds is essential to limit the spread of TSE. Regulations in both Europe and the United States require that there be no ruminant proteins in ruminant animal feeds (with exceptions for blood, milk and gelatin). To enforce this ban, the FDA has suggested the use of quick test kits or microscopy at all facilities that manufacture ruminant feed. The purpose of this assay is to provide quick, reliable screening of ruminant feeds for the presence of ruminant proteins prior to sale or export. While microscopy has been the standard method for the detection of ruminant content in feeds, it is costly, time-consuming, non-species specific, and requires extensive analyst training. Similar issues make NIRM, NIRS and PCR undesirable as screening assays. The MELISA-Tek Ruminant Assay is an ELISA method that detects troponin-I, a heat-stable, muscle-specific protein. Thus it detects the major banned ruminant protein (muscle) after high-temperature processing, without detecting exempted materials. We have developed a concentration protocol that makes the MELISA-Tek Ruminant assay a sensitive screening tool. Slaughtering processes typically remove the majority of muscle tissue from carcasses, leaving little muscle tissue when rendered. Nonetheless, as originally developed, the MELISA-Tek Ruminant assay had a LOD of 0.005% for ruminant muscle tissue and 0.5-1% for ruminant MBM, in feed. The high-sensitivity protocol improves the LOD to 0.1% (w/w) for commercial beef and sheep MBM in feeds without increasing its response to feed matrices or non-ruminant tissues. This protocol should increase the utility of ELISA assays in screening ruminant feeds for sale or export, and help guarantee the safety of the ruminant feed supply.

AGRO 48

Monitoring *Bt* proteins in soil using biomimetic extraction technology

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Since the debut of genetically enhanced crops in the field in the mid-1990s, their potential risk to ecosystems has been of concern to some government agencies and others. Risk assessment of *Bt* proteins in soil has been hindered by lack of efficient quantitative detection methods due to the low extractability of *Bt* proteins from soil. Recently, we adopted a novel approach using a synthetic invertebrate gut fluid as an extraction buffer, which can effectively extract *Bt* proteins from soil. Coupled with an immunoassay, this system provides a powerful tool to quantitatively assess the *Bt* protein in soil. We validated the Cry1F and Cry1Ac quantitative ELISA methods using synthetic gut fluid as an extraction system for soil over the range of 18 to 180 ng/g dry weight. Both assays demonstrated good accuracy and precision with a detection limit of 4.5 ng/g. These methods were then applied to determine Cry1F and Cry1Ac levels in soil samples collected from fields where transgenic Herculex I corn and WideStrike cotton had been grown for 3 consecutive years. Confirmatory bioassays were also conducted. The negligible levels of *Bt* protein in soil after cultivation of *Bt* crops will be discussed.

AGRO 49

A sensitive immunoassay for the detection of spinosyns in industrial water

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The spinosyns belong to a new family of insect control agents that are derived from a naturally occurring soil bacterium Saccharopolyspora spinosa. Spinosad, which comprises spinosyns A and D, is widely used on a variety of crops to control several orders of insects. Spinetoram, which contains derivatives of both spinosyns J and L, is being developed at Dow AgroSciences and is expected to be introduced to the market soon. A rapid and sensitive immunoassay for detecting all active ingredients of spinosad and spinetoram was developed. Rabbits were immunized with 5,6-dihydro spinosyn A, 3'-O-glutarate-thyroglobulin conjugate. All sera were screened against numerous HRP conjugated antigens. The assay with the least interference and the best sensitivity was optimized and characterized. The average I50 for spinosyn A was 0.09 ppb with a detection limit of 0.02 ppb. The resulting assay equally detects all four active ingredients of both spinosyn and spinetoram. No or minimal cross reactivity was found to other spinosyn metabolites. The assay was validated for industrial waste water monitoring. Results of validation and application in waste water matrix will be discussed.

AGRO 50

Detection of hen's egg white lysozyme in food: Comparison between a sensitive HPLC and a commercial ELISA method

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Hen's egg white lysozyme shows lytic activity on the cell wall of several bacteria and is as such an effective preservative in foods. Thus, this natural antimicrobial enzyme is used as an alternative to nitrates, to prevent late blowing of semi-hard and hard cheeses by inhibiting growth of Clostridium tyrobutyricum. In the last decade more and more case-studies revealed severe allergic reactions to lysozyme containing foods in egg allergic persons. Because of this and because of recently changed EC legislation, the use of lysozyme as an additive has to be declared on the ingredient label. In order to control the use of lysozyme there is an urgent need for good detection and quantification methods. In this study an enzyme-linked immunosorbent assay (ELISA) was compared with a chromatographic method for the quantification of HEW lysozyme in cheese and cooked meals. Preliminary results show that ELISA is an appropriate screening technique in cheese. For the analysis of more complex samples and for more reliable quantified data, the instrumental method is however recommended.

AGRO 51

Explosives detection by HPLC-based immunoextraction coupled with LC-MS and CE

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The detection of explosives such as TNT and RDX has become an area of national priority due to the increased use of such substances in criminal activities and the rise in decontamination or remediation projects for closed military bases. The nature of these explosives and analyses requires measurement methods that can provide reliable identification of the explosives in complex sample matrices. Immunoextraction has long been recognized as a high selective approach for environmental samples. This research focuses on the development of HPLC-based immunoextraction columns for TNT and RDX that can be employed along with the methods of LC-MS or capillary electrophoresis. The immunoextraction columns contained anti-TNT or anti-RDX antibodies for the isolation of TNT, RDX, and their degradation products. Frontal analysis was used to characterize the binding properties of these columns. LC-MS analysis of these extracts was performed using an APCI ion trap. Analysis by capillary electrophoresis was performed using micellar electrokinetic chromatography (MEKC) using a mixture of sodium dodecyl sulfate and crowns as the pseudo-stationary phase.

AGRO 52

Selection and expression of recombinant single domain antibodies (V_HHs) against a low molecular weight hapten

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Few recombinant single domain antibodies V_HH against low molecular weight haptens have been developed. Therefore, a V_HH phage displayed library was constructed by isolating the V_HH-coding genes from the lymphocytes collected from a *Llama glama* immunized with the strobilurin fungicide, azoxystrobin (403 MW), conjugated to bovine serum albumin (BSA). Six rounds of panning were performed against azoxystrobin conjugated to rabbit serum albumin (RSA) to enrich clones containing V_HH specific to the hapten. After screening 95 clones, five V_HH antibodies with different amino acid sequences were identified, expressed in soluble format in *Escherichia coli* HB2151, and purified using nickel-immobilized metal affinity chromatography. Competition enzyme-linked immunosorbent assay (ELISA), using free azoxystrobin, azoxystrobin-RSA and RSA, showed all five V_HHs were azoxystrobin binders. The IC_{50} of these V_HHs were ca. 10 µM.

AGRO 53

Quantitative ELISA validation for GE crop expression

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Enzyme linked immunosorbent assay (ELISA) has become a very widely accepted analytical technique used in the quantitative detection of proteins of interest in genetically enhanced (GE) crops. The use of ELISA is very appealing due to the ease of use, quick turn around time, low cost per sample analysis and compatibility with high throughput automation. To ensure the integrity of the data, a validation of an ELISA is needed and defines important parameters including precision (repeatability/reproducibility), accuracy (recovery and false negative/positive rates), ruggedness, matrix effects and interfering substances. In addition to these, sensitivity, including limit of detection and quantitation and specificity of the assay are also determined. We have validated multiple ELISAs for the determination of Bt proteins such as Cry1F and Cry1Ac in various plant tissues. The validation results will be discussed. A comprehensive validation process including acceptance criteria will be discussed as well.

AGRO 54

Use of laboratory automation in GE crop regulatory expression trials

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There is an increasing demand for quantitative analyses using enzyme linked immunosorbent assay (ELISA) as the analytical technique to support genetically enhanced (GE) crop expression regulatory trials. The consequence of this increased demand is a need for high throughput analyses. Automation is the obvious choice because it helps to minimize analyst error and ergonomic issues in addition to

increasing productivity. We have validated the Tecan Genesis™ workstation on ninety-six well microtiter plate ELISA format to detect multiple GE proteins including Cry1F, Cry1Ac, PAT etc. An emphasis on maintaining high quality data has been a requirement for the success of the project. Accuracy, precision and reproducibility of the automated system will be discussed.

AGRO 55

Development of a single chiral HPLC method for the separation of brodifacoum enantiomers

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Brodifacoum(3-[3-(4'-Bromo[1,1'-biphenyl]-4-yl)1,2,3,4-tetrahydro-1-naphthalenyl]-4-hydroxy-2H-1-benzo-pyran-2-one), a 2nd generation anti coagulant rodenticide, has two chiral centers, and thus four enantiomers. It is common practice to isolate the enantiomer pairs from each chiral center and then optimize their individual separation using a second chromatography method. We evaluated the effect of varying mobile phase composition on the separation of the four enantiomers in a single chromatography method on Chiracel OD-H, Chiralpak AD-H, Chiracel OJ-H and Chiralpak AS-H, 250 x 4.6 mm columns. The mobile phase combinations and solvent volume percent ranges we evaluated were: 1. hexane (60-95%)/isopropyl alcohol (5-40%). 2. hexane (80-95%)/ethanol (5-20%). 3.hexane (60-95%)/methanol:ethanol (1:1) (5-40%). The hexane/isopropyl alcohol mobile phase provided baseline resolution between the enantiomer pairs associated with each chiral center on the Chiralpak AD-H column under the conditions investigated. This approach will be used for the isolation of brodifacoum enantiomers to permit improved risk characterization for wildlife which feed on brodifacoum poisoned target species.

AGRO 56

Enantiomerization of pyrethroid insecticides in solvents

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All pyrethroids are chiral compounds and isomerization has been frequently observed from exposure to heat, sunlight or certain solvents. However, so far isomerization of pyrethroids has not been characterized at the enantiomer level. In this study, we evaluated the occurrence of enantiomerization of permethrin and cypermethrin in various organic solvents and solvent-water systems. The four stereoisomers of permethrin were stable under all test conditions. Rapid enantiomerization of cypermethrin was observed in isopropanol and methanol. After 4 d at room temperature, 18-39% conversions occurred for the different cypermethrin stereoisomers in isopropanol and methanol, and the enantiomerization invariably took place at the α carbon position. The enantiomerization was temperature dependent, and was also influenced by water as a co-solvent. Results from this study suggest that exposure to certain solvents and water may cause artifacts in chiral analysis and that for enantiomer-enriched pyrethroid products, such abiotic enantiomerization may render the products less effective.

AGRO 57

Enantioselective endocrine disruption effects of synthetic pyrethroids

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Recent studies reported enantioselective degradation of synthetic pyrethroid in both laboratory and field samples. The significance of such observations would be of limited importance if the enantiomers of the given chiral compound have comparable toxicity to non-target organism. Enantioselectivity in the chronic toxicity and biotransformation of pyrethroids is essentially unknown in aquatic organisms. Certain pyrethroids and their metabolites have been shown to bind to estrogen receptors in the yeast estrogen screen (YES) bioassay. In this study we investigated possible enantioselectivity in the endocrine disruption effects of synthetic pyrethroids. Preliminary evaluation of vitellogenin induction in juvenile (4 – 5 weeks old) Japanese medaka indicated mild vitellogenin induction following 7 days exposure to selected pyrethroids. Similarly, in vitro evaluation using primary rainbow trout hepatocytes indicated stereoselective induction vitellogenin-mRNA at levels significantly higher from that of controls. Enantioselectivity in all these processes could result in ecotoxicological effects that may be important considerations in future risk assessment and regulatory decisions.

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Separation and aquatic toxicity of enantiomers of the pyrethroid insecticide lambda-cyhalcothrin

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Chiral pollutants are receiving growing environmental concern due to differential biological activities of their enantiomers. In this study, enantiomeric separation of the pyrethroid insecticide lambda-cyhalothrin (LCT) was investigated by high-performance liquid chromatography (HPLC) using the columns of Chiralpak AD, Chiralpak AS, Chiralcel OD and Chiralcel OJ with different chiral stationary phases. The differential toxicities of the enantiomers in aquatic systems were evaluated using the acute zebrafish (Danio rerio) toxicity test and the zebrafish embryo test. The enantiomers of LCT were completely separated on all the columns tested and detected by circular dichroism at 236 nm. Better separations were achieved at lower temperatures (e.g., 20°C) and lower levels of polar modifiers (5%) in mobile phase. Ethanol was found to be a good modifier of the mobile phase for all the columns, although isopropanol acted better for the Chiralcel OD column. The (-)-enantiomer was >162 times more toxic than its antipode to zebrafish in the acute test. The embryo test indicated that the exposure to LCT enantioselectively induced crooked body, yolk sac edema and pericardial edema and that the (-)-enantiomer was 7.2 times stronger than the (+)-enantiomer in 96-h mortality. The malformations were induced by the racemate and its (-)-enantiomer at lower concentrations tested (e.g., 50 µg/L), whereas the (+)-enantiomer induced malformations at relatively higher concentrations (>100 µg/L). These results suggest that the toxicological effects of chiral pesticides must be evaluated using their individual enantiomers.

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Chiral and isomer-specific chlordane signatures for stormwater runoff representing various land use categories

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Although studies have quantified contaminant loading in urban stormwater, little is known about specific land use contributions to wet weather loads. To determine if chiral signatures can be used to identify/apportion sources, we measured the enantiomer fraction (EF) and simple concentration ratios of trans- and cis-chlordane (TC/CC) in stormwater particulate material from the Newport Bay (CA) watershed. Differences in TC/CC among sites representing residential, industrial/commercial and agricultural land use were observed, with TC being preferentially depleted. For all land use categories, the (+) TC and (-) CC enantiomers were enriched relative to their antipodes. Moreover, the EF and TC/CC signatures for sites that integrate watershed runoff were consistent with a simple weighted average of those representing the major land use categories. These results suggest that chlordane signatures maybe useful in distinguishing among land use specific contributions to wet weather loads.

AGRO 60

The antioxidants in natural plants affecting formation of alpha synuclein nanobioparticles

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Oxidation of alpha synuclein was found to be influential to the protein aggregation which is the hallmark of Parkinson's disease. Methionine and tyrosine are the two possible candidates causing the oxidation in the sequence of alpha synuclein. Binding of oxygen or nitrogen will change the hydrophobicity of alpha synuclein, affecting the fibrillation process. Antioxidants in diets and Chinese medicines, especially the compounds in natural plants, are playing role in decreasing the reactive oxidation species in neural system. By employing cyclic voltammetry in a physiological medium, authors have observed the electrochemical process of alpha synuclein oxidation at an electrode surface. Four antioxidant compounds rich in natural plant extracts are tested in interacting with the alpha synuclein molecules. Formation of nanoscale oligomers are tracked by a time lapse manner. An Oxidation following coordination mechanism was proposed for the interaction of alpha synuclein with antioxidants and participating metals and the formation of the nano-bioparticles.

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AGRO 61

Overcoming mutations in fp25k baculovirus gene on the way to continuous biopesticide production in insect cell culture

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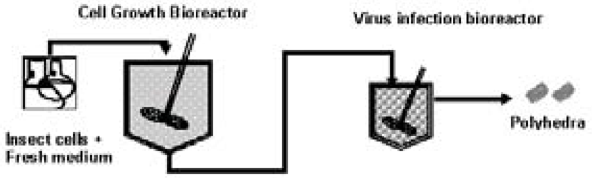
Bio-pesticides are useful in overcoming the significant disadvantages of chemical pesticides, such as detrimental effects on non-target organisms, higher animals and soil fertility. However, the current production cost of a potential bio-pesticide, such as the baculovirus (which kills only targeted insects and is environmentally benign), is significantly higher than that of chemical pesticides. In particular, a potentially low-cost plant-scale production through continuous insect cell culture is hindered by undesirable mutations. In this context, our primary goal is to overcome few polyhedra (FP) mutation, resulting, generally, from the insertion of host cell DNA sequence, known as transposons, into the baculovirus fp25k gene. In addition, we shall examine whether FP mutants are a necessary precursor of another type of deletion mutants, namely, defective interfering particle (DIP) mutants.



AGRO 62

Bioactive materials for organophosphorus pesticides decontamination and protection

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Organophosphorus hydrolysis enzyme with cellulose binding domain fusion (CBD-OPH) has been immobilized to wipe paper and cotton cloths as bioactive materials for organophosphorus pesticides decontamination spills and protecting. Enzyme purification and immobilization was achieved in one single step. The optimum conditions for the CBD-OPH bioactive system were tested and showed increasing in system immobilization and activity respectively. These bioactive materials degrade 10 µmoles of either paraoxon or methyl parathion completely from dried contaminated zones. The resulting bioactive materials are highly active and stable for paraoxon and methyl-parathion degradation from wet and dry contaminated zones. Moreover, these bioactive materials could be used as protecting cloths for the workers dealing with pesticides.

AGRO 63

Abraham descriptors relating to agrochemical transport processes

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There is a growing consensus that transport properties can be described via a small number of molecular descriptors. Whilst there are differences in the individual descriptors identified by independent research led by Klampt and Abraham for example, they appear to encode similar chemical information re: dispersion interactions, dipolar/polarisability interactions, hydrogen bond acid and hydrogen bond base interactions and solute size. Considerable progress has been made by Abraham and co-workers over the past 15 years defining transport processes in terms of linear solvation energy relationships (LSER) utilising up to 6 descriptors. We predicted Abraham descriptors (ADME Boxes v 3.5 Absolv module) for a set of ~ 50 agrochemicals for which descriptors have been independently determined. In addition we have predicted descriptors for the ~600 agrochemicals in the Pesticide Manual which have measured log P octanol values and compared these with predicted Absolv log P octanol values.

AGRO 64

Agrochemicals and log P octanol: Evaluation of structure based predictions

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The organic:aqueous partition coefficient between octanol and water is widely used as a measure of lipophilicity in the assessment of the environmental fate of agrochemicals. We have applied six structure based methods for the prediction of log P octanol to ~600 agrochemical products taken from the Pesticide Manual (12th Edition) and ~ 5000 compounds from Syngenta research projects. The prediction methods used were ClogP (Daylight v.4.73), AlogP, (Accelrys Diamond Descriptors v1.5), ACD logP (Phys Chem Batch v.6.16), Kowwin (EPI Suite v3.12), Absolv log P and PHA log P (both via Pharma Algorithms ADME Boxes v.3.5). Predictions obtained for each method were compared to measured values in terms of r-squared, intercept and slope and mean absolute errors calculated from plots normalised to give a slope of 1 and intercept of 0. In addition percentage average error values within 0.2, 0.5, 1.0 and 2.0 log units were assessed for each method.

AGRO 65

Insecticide formulations for improved control of sand flies and mosquitoes in severe environments

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Leishmaniasis and malaria are widely distributed vector-borne diseases. People's health in certain areas continues to be compromised due to the population of mosquitoes and sandflies, the vector of malaria and leishmaniasis. Conventional pesticide applications repeatedly failed to suppress sandfly populations in the Middle East. The effects of intense heat, blowing sand, ultraviolet light, or a combination of them in severe environmental conditions result in a lack of adequate control against sand flies. To develop an insecticide formulation for improved control of these vectors in severe environments, we formulated an insecticide sustained release system. We combined polymeric spheres and polymeric capsules impregnated with insecticides in the formulation. These two components made the system release insecticides at a controlled rate. It exhibited a good residual property. The other additives in the system further improved the insecticide stability under UV, intense sunlight and high temperature conditions. Its insecticide efficacy WHO tube test proved its superior performance to the best commercial pesticide after 170 hrs 65oC constant treatment.

AGRO 66

Hydrolytic enzymes produced by a bioherbicidal strain of *Myrothecium verrucaria*

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The involvement of cell wall degrading enzymes in infection processes of phytopathogenic microorganisms has been well documented. Thus far attention has generally focused on hydrolytic enzymes that degrade polysaccharides, but more recently other lytic enzymes such as proteases have been implicated as virulence factors in certain host:pathogen interactions. We are developing a fungus, *Myrothecium verrucaria* (MV), as a bioherbicide for kudzu and some other invasive weeds. Spore and mycelial formulations of MV exhibit relatively rapid bioherbicidal activity when applied to the foliage of these weeds. Presently, little is known about the biochemical processes involved during infection and the development of necrosis in host weeds treated with MV propagules. Knowledge of such events and their biochemical mechanisms would be useful to regulate and/or improve bioherbicidal efficacy. We have recently discovered the presence of various hydrolytic enzymes in the mycelium of MV. Crude enzyme extracts, prepared using sonicated mycelium (obtained via fermentation), were found to contain proteolytic and polysaccharidase activities. Proteolytic activity was exhibited on two synthetic substrates (*N*-benzoyl-arginine-*p*-nitroanilide and azocoll), with optimal activity occurring between pH values of about 6.8 - 9.0 and 5.0 - 9.0, respectively. Polysaccharide hydrolytic activity was detected using *p*-nitrophenyl-ß-galactoside and *p*-nitrophenyl-ß-glucoside with optimal activity occurring at pH 6.8 - 9.0. The enzyme preparation also possessed hydrolytic activity on fluorescein diacetate, a general substrate for the assay of lipases, esterases, and proteases. Further characterization of these enzymes and their roles in the development of infectivity, necrosis, and death of target weeds will be subjects of future research.

AGRO 67

Molecular overlay as a tool to model biospecificity: A case study with mosquito repellents

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Enantiomers and diastereomers are important classes of stereoisomers. Enantiomers are isomers that are related such that the object and its mirror image are not superimposable. Diastereomers are stereoisomers that differ in 3-dimensional arrangement and do not have the mirror-image relation. Diastereomerism arises out of differences in configuration or conformation. Enantiomers have identical physical and chemical properties, while diastereomers differ in physiochemical properties. Molecular descriptors derived from adjacency and distance matrices of molecular graphs fail in differentiating enantiomers because they have identical scalar properties. The same is true in the case of diastereomers arising out of polychiral diastereomerism. In such cases, we have to come up with new strategies to differentiate the three dimensional disposition of atoms around chiral centers. Molecular overlay of optimized geometries of diastereomers was found to be one of the possible alternatives because it is a holistic approach where the entire structures are compared rather than parts or descriptors calculated by reductionistic approaches. In order to find the level of theory necessary to get reasonable predictions, we used the quantum chemical methods in a graduated manner from semiempirical AM1, to Hartree Fock (STO3G, 3-21G, 6-31G, and 6-311G) to Density Functional Theory (B3LYP/6-31G, B3LYP/6-311G). We were able to correctly order the repellency of diastereomeric insect repellents using the hierarchical molecular overlay approach.

AGRO 68

5-Thioalkyl-1,3,4-thiadiazole-2-carboxylic acid derivatives as nematicides

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5-Thioalkyl-1,3,4-thiadiazole-2-carboxylic acid derivatives have been shown to possess high nematicidal activity. To optimize the nematicidal activity and maintain the required physical properties, we were drawn to prepared different acid derivatives and replace the 1,3,4-thiadiazole ring with various other 5-membered, 6-membered heterocycles. This poster will outline the synthetic approaches we used to make the desired compounds as well as their biological activity.

AGRO 69

Performance of a new organic herbicide based on d-limonene

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In organic farming, biological control of weeds using herbicides based on natural products or phytotoxic microbial metabolites is a potential alternative for hand hoeing and flaming. The herbicidal effects of plant extracts and essential oils have been acknowledged for decades but only recently have these products become commercially available for professional growers. One of the most promising organic herbicides is d-limonene, a monoterpene extracted from orange peels. It has previously been used as an insecticide in organic farming but recent field studies have shown that d-limonene (GreenMatch O^{TM}) at 17.5 % controls most of the common broadleaved and grass weeds. The non-systemic burn-down effect is based on fast disruption of the leaf cuticle, which leads to wilting. The effect is dependent on temperature as well as the plant age and leaf structure but in most cases, one application of d-limonene controls more than 80 % of weeds for 3-4 weeks.

AGRO 70

The contents of organic carbon and problems of soil fertility

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The Study has shown that in soil of Zarafshan valley of Uzbekistan the content of organic carbon falls down and is mainly below 1%. Among natural factors the type, sorbing and different kinds of ground, above the gradient, sternness, mechanical composition, height of the location sea level among anthropogenic factors the rotation crop, predecessor, system of the processing, fertilizers, irrigation, degree and of mastering greatly influence on the content of organic carbon in soil. Experiences made with isotope S-14 have shown that the increasing of the dose of the nitric fertilizers leads to the decrease of the transition marked carbon the Lucerne in the composition of humus but low and moderate doses of hitch fertilizers increase the transition. Our studies and calculations have shown that carom 1971 to 1991 in the farm “Saidbekmurodov” the of humus falidown spare from 120 t/hà to 62 t/hà. The loss of humus was 58 t/hà that promotes the increase of the leaving the carbon dioxide in atmosphere on 123,35 t/hà. This breaks the natural balance of carbon in agrolandscapts and the fertility of soil. The Study shows that the works which promote the reinforcement of the processes of oxidation, aeration increase the content of the mineral nitrogen, reinforcement àmmonification, nitrification and de nitrification lead to escalated decomposition of humus. Besides that the reduction of the C:N in soil correlation intensifies the mineralization of humus and promotes the formation of "Extra" nitrogen. Hereby the confection of carbon as an organic material is actual for the decision of the problem of soil fertility and for the reduction of the content of dioxide in atmosphere. The content of organic carbon as humus has the great for the increased of the manure of soil.

AGRO 71

The influence compost is on agrochemical qualities of soil

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The field experiences were carried out by us within several years on the same site, composts and the mineral fertilizers also were brought in annually. It has resulted in some accumulation in ground of separate chemical elements and organic substance. It has led to some accumulation in typical serozem soil in variants without application of fertilizers in a layer of 0-30 sm. 5.3 mg/for 100 g soil of the absorbed calcium and 3.6 mg/ for 100 g. soil f magnesium, and in a layer of 30-50 sm. accordingly, 3,9 and 3,0 mg/ for 100 g. soil on soil contained. The influence compost from manure, city is firm-household waste, straw and silt of fresh waters influenced, on changes of the contents of the absorbed bases, which depends on a parity (ration) of making components and his structure. Composts which on 50 % from manure in all years of researches had steady an effect on increase quantity (amount) of the absorbed calcium in soil. In this variant in an arable layer, this parameter was above the control over 1,2 mg/ for 100 g. soil, and in scorch on 2,2 mg/ for 100 g. soil. The annual entering compost on a typical serozem soil in quantity influences of 20 t/h renders appreciably influence on the contents of organic substance in soil. In it the relation contents humus in soil raised on 0,10-0,20 % in relation to the control. In process of reduction in composts a share of manure the increase of organic substance in soil decreases. Compost and there combination to mineral fertilizers positively influence the contents humus in soil, especially in the first years of entering compost and fertilizers, in the further this parameter is stabilized.

AGRO 72

Production of beauvericin by *Fusarium sp. F-1*

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Beauvericin (BEA) is a cyclic hexadepsipeptide mycotoxin, which has been found in the secondary metabolites of *Beauveria bassiana*, *Paecilomyces fumosoroseus*, *Paecilomyces tenuipes*, *Polyporus sulphurous*, and a variety of *Fusarium* species. BEA shows antimicrobial, insecticidal, cytotoxic, and apoptotic activity, which means it can be developed and used as bioinsecticide and human medicine. However, BEA production of the microorganisms is limited and the fermentation technology is not preferable at present. The concentration of BEA obtained from the culture of Fusarium sp. is only 5 mg/g mycelia. In this study an endophytic fungus Fusarium sp. F-1, which was isolated from a seagrass Spartina alterniflora, was investigated to improve BEA yield and to shorten production time by using a dynamic fermentation with a low aeration condition instead of a usual static fermentation. Thin layer chromatography and high performance liquid chromatography were applied to analyze BEA in the cultures. The results indicated that the aeration condition might be the key.

AGRO 73

Influence of mulching by polyethylene film on the content of rolling nutrients in soil and chemical composition of plants

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Mulching the soil greatly increases the temperature of the soil that in turn intensifying microbiological processes strongly influences on the formation of rolling nutrients in soil. Our experiments carried out on irrigated typical serozems of foothill zones of the Zarafshan valley has shown that under mulching the soil by polyethylene film, particularly springtime, the content of ammonium and nitrate nitrogen, rolling phosphate, fraudulent potassium is increased in soil. Such increase of assimilating forms of the nutrients are observed in arable, and sub-arable layers of the soil. Mulching most of all has increased the content of ammonium and nitrate nitrogen in soil, but the amount of assimilating phosphate and potassium increased in less degree. It is connected that the formation of ammonium and nitrate nitrogen more depends on the temperature of soil and atmosphere and subjected to quick change. The experiments have been carried out under tobacco growing. Tobacco influences on the content of the rolling nutrients in soil too. During the escalated growing and development of the plants the content of the nutrients in soil decreases. This is particularly noticeable on the absolute control, where the fertilizer was not used. The change of the chemical composition of the soil with standpoint of the rolling nutrients, under mulching has influenced on the plants feeding that resulted in the change of the chemical composition of the plants and harvests. Under mulching the content of the gross nitrogen, phosphorus and potassium in plants in contrast with the control increases. Thereby, mulching the soil in tobacco growing in condition of foothill zones of Zarafshan valleys in Uzbekistan greatly enlarges the content of the main rolling nutrients of soil and improves the chemical composition of the tobacco plants.

AGRO 74

Bioconversion of humic substances as a promising tool for obtaining beneficial plant growth-stimulators

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Biological conversion of humic substances (HS) by microorganisms has been considered as a potential system for obtaining highly-effective microbial formulations. Low molecular weights and high water solubility are just a few positive traits of such beneficial microbial formulations. To reach this goal, consortia and pure cultures of natural microbial population from soil, biohumus and wood rot were isolated and application of different complementary techniques for the structural analysis of humic derivatives were used (^{13}CNMR/UV/vis/FTIR spectroscopy, SEC, element analysis). Data obtained indicated a decrease in particle size and a loss in aromaticity and aliphatic carbon in HS reisolated from microbial cultures. The microbial degradation of HS strongly depended on the composition of the HS, the species selection of the microorganisms, and to a lesser extent on the culture conditions. Low molecular biosolubilized HS were displayed phytohormone-like activity. Acknowledgement. This research was supported by the grant of the ISTC KR-993.2.

AGRO 75 – withdrawn

AGRO 76

A novel antifungal agent ilicicolin H produced by *Fusarium sp. F-4*

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Ilicicolin, a potent antifungal agent, was found first in *Cylindrocladium ilicicola* MFC-870 in 1971 and was classified from A to H. This study is the first to report that ilicicolin H could be separated from the metabolites of an endophytic fungus *Fusarium sp. F-4*, which was isolated from a seagrass *Spartina alterniflora*. The composition of cultural medium and the cultural conditions of *Fusarium sp. F-4* were optimized using single-factor tests and an orthogonal experiment in shake-flask cultivations to improve the yield of ilicicolin H. Several impact factors including carbon sources, nitrogen sources, precursors of ilicicolin, initial pH of medium, temperature, and rotational speed were investigated. The growth curve after optimization showed that the culture finished in 120 h.

AGRO 77

Application of optical properties of the (3-methoxypropyl)silsesquioxanes hybrid films for green house

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(3-methoxypropyl)silsesquioxanes(MS) derived from hydrolytic condensation of (3-methoxypropyl)trimethoxy silane (MPMS) and modified with tetraethoxysilane (TEOS) were prepared by sol-gel process. The Ormosil thin films based on MS and MST (f-VS and f-VST) were coated on glass by the dip-coating method. The MS structural characteristics and the morphology were characterized, by Fourier transform infrared (FTIR) and a scanning probe microscope (SPM) device. The optical behavior of the films was studied by a UV-VIS-NIR scanning spectrophotometer (SSP). The f-MS films showed the largest UVR absorbs in a range of 200-300 nm wave length. The average transmittance of the coatings within 400-700 nm band can be increased up to more than 90%. The effects of TEOS contents on the optical properties and their applications in agriculture were discussed. The hybrid film with 20% TEOS fraction had the optimum antireflectivity, and can be used as antireflective coating in the sun-beam gathering of green house.

AGRO 78

Field investigation of stimulating effect for bamboo vinegar as potential plant growth regulator

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The field experiments were carried out to test the stimulating effect of original and neutralized bamboo vinegar on apple , orange , loquat , strawberry , waxberry ,pakchoi , mulberry and rice in China .The results showed that (1) Original bamboo vinegar and neutralized bamboo vinegar could add yield greatly. (2) They could also improve leaf quality, prolong its natural life , increased the fruit hardness to improve its storage quality, make the fruit had better intrinsic quality and appearance.(3) Original bamboo vinegar and neutralized bamboo vinegar could regulate maturing time of fruit and reduce rust spot, leaf falling, fruit dropping, disease Key words: bamboo vinegar; plant growth regulator; stimulating effect; field investigation

AGRO 79

Bioactivity laboratory screening of bamboo vinegar as potential plant growth regulator

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The laboratory test were carried out to screen the bioactivity of original and neutralized bamboo vinegar on radish seedling , cucumber seedling , wheat seedling , radish cotyledon , cucumber cotyledon, and algae. The results showed that (1) Original and neutralized bamboo vinegar as plant growth regulator stimulated growth at low concentration (< 500 mg/ L) and inhibit growth at high concentration (2000 - 5000 mg/ L) similar to 2 ,4-D herbicides , hormones herbicides , gibberellic acid (GA3) and 6-benzylaminop-urine (6-BA). (2) The bioactivity of neutralized bamboo vinegar was higher than that of original bamboo vinegar. (3) The sensitivity of tested plants for screen bioactivity from high to low was *Microcystis aeruginosa* > *Scenedesmus quadricauda* > radish (cucumber) cotyledon > cucumber seedling > radish seedling > wheat seedling. The sensitivity of root growth was higher than that of stem.
Key words: bamboo vinegar; plant growth regulator; bioactivity; laboratory screening

AGRO 80

Selection of an effective fungicide against *Rhizoctonia solani*, *Sphaerotheca fuliginea*, and *Pseudoperonospora cubensis*

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Camptothecin, which is isolated from *Camptotheca acuminate*, has received FDA approval for the treatment of ovarian and lung cancers and for colorectal cancer. Effectiveness of a naturally derived fungicide against *Rhizoctonia solani*, *Sphaerotheca fuliginea*, and *Pseudoperonospora cubensis* was studied under laboratory greenhouse conditions. The product exhibited strong antifungal activity and at doses about 20-40 mg/L caused >50% inhibition ratio and 250-750 mg/L caused >90% against *R. solani*, *S. fuliginea*, and *P. cubensis*, the LD_{50} and LD_{90} values were 42.0 mg/L ,40.5mg/L, 27.5 mg/L, and 756 mg/L, 247 mg/L, 342 mg/L, respectively. The results showed that camptothecin is highly inhibition effective on above three agricultural fungi.

AGRO 81

Insecticidal activity of camptothecin isolated from *Camptotheca acuminate* against aphids on cabbage, *Chilo suppressalis*, and planthopper on rice

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Chilo suppressalis and planthopper (*Nilaparvata lugens*, *Sogatella furcifera*, and *Laodelphax striatellus*) are major pests of arable crops throughout the world. In this work, the effects of camptothecin (isolated from *Camptotheca acuminate*) against aphids on cabbage, *Chilo suppressalis* and planthopper on rice was carried out under laboratory conditions and field experiments. Laboratory bioassay showed that on aphids and planthopper possessed the powerful contact toxicity with an LC_{50} of 0.371 mg/L and 0.130 mg/L, respectively, with an LC_{90} of 1.55 mg/L and 0.432 mg/L, respectively. Field experiments showed that, on aphids, planthopper and *Chilo suppressalis*, camptothecin was strongly bioactive with an LC_{50} of 1.11 mg/L, 1.93 mg/L, and 0.543 mg/L, respectively, with an LC_{90} of 3.44 mg/L 12.4, mg/L, and 5.002 mg/L, respectively. The results showed that camptothecin has strong insecticidal activity on above three agricultural pests.

AGRO 82

Discovery and optimization of novel 2-aryl-5-thienyloxadiazoles as nematicides

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Root knot nematodes (RKN) are ubiquitous and harmful pests of global agriculture. A safe and effective nematicide is desired to replace methyl bromide, which is phasing out because it is an ozone depleting substance. We have discovered novel 2-aryl-5-thienyloxadiazoles as part of an insecticide/nematicide program. This poster will show our scouting efforts around 2-aryl-5-thienyl-heteropentalenes, discovering and optimizing 2-aryl-5-thienyloxadiazoles with good nematicidal activity.

AGRO 83

Development of pesticide volatile organic compound (VOC) emission adjustment factors

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Each year, the Department of Pesticide Regulation (DPR) calculates a May-October pesticide VOC emission inventory for specified areas and compares emissions on a relative basis to a base year. Fumigants are among the highest VOC contributors. DPR currently assumes 100% of applied fumigants volatilize to the air. However, field monitoring shows fumigant emissions typically less than 100%, varying with application method. DPR has developed application method- and fumigant-specific emission adjustment factors, expressed as proportion of mass applied emitted to the air, for methyl bromide, metam sodium and metam potassium, 1,3-D, chloropicrin, dazomet, and sodium tetrathiocarbonate. Drip application methods for all fumigants show small adjustment factors, between 9 and 15%. The bed/tarp application method for methyl bromide shows the largest adjustment factor at 100%. Other methods with large adjustment factor values include shallow soil injection methods or no tarp methods.

AGRO 84

Estimating fumigant emissions from agricultural soils

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Fumigants have been extensively used to improve crop production by controlling plant pests. Atmospheric emissions are a major problem and have been shown to increase the risk of stratospheric ozone depletion, bystander exposure, and may also contribute to the formation of near-surface ozone. This has become a serious concern with the implementation of a new federal 8-hour ozone standard. The adverse impacts from soil fumigation can be reduced using one of several management practices; including deep injection, improved surface barriers and soil amendments. Although many methods are available to reduce emissions, no simple and cost-effective methodology is available to provide information and guidance to the regulatory community. This has led to a requirement that large-scale, time-consuming, costly, and complex experiments be conducted to provide emissions estimates for new emission-reduction methodology. The experiments, which are conducted at specific sites and times, are heavily influenced by the particular cultural practices and the prevailing soil and environmental conditions. This introduces large uncertainties when the experimental information is used as a surrogate for other locations. Described in this presentation is an investigation of lower-cost approaches to estimate fumigant emissions and to determine their usefulness in providing regulatory guidance. Through laboratory experimentation and simulation modeling, comparisons will be made to emission estimates obtained from field experiments. This allows quantification of the effectiveness of lower-cost approaches in characterizing large-scale field behavior. Through similar comparison studies, it is expected that new cost-effective approaches will be shown to be valuable in assisting the regulatory community obtain needed emissions information.

AGRO 85

Research strategy for achieving emissions reduction in a regulatory framework

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Soil fumigants are high volume pesticides critical for crop production. Air quality laws have renewed their evaluation because of inherit volatility and potential VOC emissions. Regulatory authorities need to evaluate results from best available science to make protective decisions. A strategy to evaluate existing research and identify gaps in knowledge is provided. The objective value and limitations of each soil fumigant study type is identified. Research tools ranging from laboratory degradation to field-scale emissions studies are placed in a framework for decision-making. Uncertainty is minimized by cross-validation of theory, modeling and field observations. A case is made for enhancing regulatory decision-making through targeted lab, modeling, and small plot research. This approach will provide the best mitigation practice candidates to test at full field scale, which would be necessary only if uncertainty of the lower tier studies exceeds a threshold value in comparison to the ability to conduct these complex studies.

AGRO 86

Overview of methods to estimate emissions from agricultural fumigants

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There has been a great deal of technical advancements that have been developed over the past several years in terms of evaluating exposures from agricultural fumigants. This paper summarizes the evolution of methods to estimate emission rates from fumigation applications, including the use of on-field and ambient methods. Normalized data are provided to compare and contrast optional methods based on recent field studies. In addition, the most recent advancements in the modeling of exposures will be described, including the use of the state-of-the-art CALPUFF 6 modeling system, which can be used as a basis to estimate emission rates as a function of time. Comparisons also are provided of the enhancement of the modeled concentrations when using CALPUF 6 as the basis to estimate emission of VOCs as compared to the ISCST3 model in terms of replicating measured concentration fields, and, thereby, promoting more realistic emission estimates for agricultural fumigants.

AGRO 87

Alternative methods for evaluation of VOCs

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There are several standard methods for evaluating volatile organic compounds (VOCs) in the atmosphere. Single point source evaluations as well as aggregate multiple source evaluations can be made. In the past, many evaluations have been based upon simple fugacity models. Some alternative methods, that have been employed in the evaluation of FLUX for fumigants, will be discussed for their application to VOCs in general. These include the the horizontal FLUX method and the off-site perimeter FLUX methods. A comparison of a horizontal flux method with off-site perimeter methods will be discussed. Specific trapping methods and collection techniques also will be discussed. A critical factor in the evaluation of VOCs is the atmospheric conditions at the time of data collection, and the correlation of limited source collection data to other atmospheric and topographical conditions. Some new and more sensitive techniques in the measurement of atmospheric conditions (and how they may be used)will be discussed.

AGRO 88

2006 methyl isothiocyanate near-field air assessments: Implications for air quality in south Franklin County, Washington

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An ambient air monitoring program conducted in central Washington State in the fall of 2005 established that gaseous methyl isothiocyanate (MITC) emissions approached or exceeded California EPA Reference Exposure Level and/or EPA Office of Pesticide Protection (OPP) criteria for acute and sub-chronic residential inhalation exposure. To minimize residential exposure, a near-field air monitoring program was conducted in this region in the fall of 2006 that examined off-target MITC movement from center pivot chemigation and soil-incorporated shank injection with compaction. A low pressure center pivot system was used to apply Sectagon 42® (42% metam sodium) to a 33 acre circle in October. An adjacent 119 acre crop circle with near-identical soil characteristics was treated with a similar application rate of Sectagon 42® by shank injection ca. 3 weeks later in early November. Near-field MITC emissions were monitored at eight air sampling stations surrounding each circle before, during, and up to 4 days after fumigation. A maximum field averaged concentration of 224 µg/m3 was observed during the chemigation event; whereas, a 10 fold reduction field averaged concentration of 22.5 µg/m3 was observed by shank injection during the same field fumigation period. For the center pivot application, a maximum downwind MITC concentration of 987 µg/m3 was observed in comparison to a maximum downwind shank injection concentration of 141 µg/m3. This study lends support for the use of shank injection for minimizing off-target fumigant emissions on fields in close proximity to residential communities in central Washington State.

AGRO 89

Use of CHAIN_2D to model the effect of fumigant application mitigation strategies on volatilization from soil

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Emissions of soil applied fumigants to the atmosphere are being scrutinized by regulatory bodies for their contribution to atmospheric VOC's. A soil physics computer model, CHAIN_2D, is used to simulate the emissions of soil fumigants under typical agronomic conditions and practices. A sensitivity analysis for CHAIN_2D is performed, and the model is validated against several diverse field datasets where emission flux was determined using the aerodynamic method. The effects of soil incorporation, plastic mulch, and soil water content on emission reduction are provided for several common soil fumigants. Simulation results indicate careful management of soil water content prior to fumigation, increased depth of injection, and the use of plastic mulch can reduce fumigant emissions. The validated model can be used to generate transient emissions losses from soil and provides the necessary source input for air dispersion models to predict off-site movement and bystander exposure.

AGRO 90

Evaluation of a thermogravimetric analysis (TGA) method for assessing volatile organic compound (VOC) emissions potential for crop protection products

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This presentation examines the thermogravimetric analysis (TGA) test employed by California Department of Pesticide Regulation (DPR) and Air Resources Board (ARB) to quantitate its volatile organic carbon (VOC) emissions inventory for crop protection products. Although the TGA test meets many practical needs for both industry and state regulators, its utility as a stand-alone regulatory test to mandate liquid product reformulations is of concern. Product reformulations are costly endeavors for registrants, and in some cases, mandated product reformulations would not deliver the intended ozone reductions, but only increase grower costs. VOC reduction plans for crop protection products are driven by state and federal mandates to reduce ozone levels in the San Joaquin Valley (SJV) air shed. Ozone is known to form via the photochemical reaction between atmospherically available VOC molecules with NOx molecules. The SJV is a farming intensive region in central California where growers value the benefits derived from crop protection products. TGA data for several key solvents is compared against their flashpoints and vapor pressures. TGA test conditions will be contrasted with agricultural use conditions. Several examples of how product use practices can impact the atmospheric availability of a VOC will also be provided. Also, the assumption that NOx levels (from motor vehicle emissions) are present in sufficient amounts to allow ozone formation in the SJV will be discussed.

AGRO 91

Pesticidal VOCs and the formation of ozone: An academic perspective

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Efforts to reduce VOCs from all sources have been underway for many years and for diverse air quality goals. Though also a pre-cursor to secondary organic aerosol (another important research area), our focus is on the formation of ozone - a vexing air quality challenge in many areas of the nation, and particularly in the agriculturally productive San Joaquin Valley region of California. Regulations require exempting some VOCs which have low photochemical reactivity and then treating all other VOCs equally. In past urban-oriented studies, actual reactivities among common compounds vary by a factor of 20 or more - and we see at least as great a range under rural-relevant conditions. We are assessing actual ozone formation from whole samples under field conditions.

AGRO 92

Photochemical ozone formation potential of pesticide solvent

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The solvents in pesticide formulations, known as inert ingredient, are volatile organic compounds (VOCs) potentially contributing to ozone formation. This study aims to improve the current understanding of photochemical ozone formation potential of pesticide solvent from agricultural applications. A Mobile Ozone Chamber Assay (MOChA) was developed to assess the ozone produced from the whole VOC emission under various NO_x scenarios in the field. This facility comprises a 1 m^3 Teflon bag as the photochemical reactor and a bank of black lights to simulate sun-light. Laboratory experiments for popularly-used EC (Emulsifiable Concentrate) solvents showed that these VOC mixtures have high ozone forming reactivity. The isopleth indicated that the ozone formation potential is NO_x-limited. Field experiments are currently underway to determine the actual ozone formation resulting from field pesticide applications. Further evaluation of the ozone formation potential of pesticide solvent will be discussed and strategies to reduce ozone levels in the San Joaquin Valley will then be identified accordingly.

AGRO 93

Relationship between the evaporation rate and vapor pressure of moderately and highly volatile chemicals

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Volatilization of chemicals can be an important form of dissipation in the natural environment. A regression of evaporation rate and vapor pressure from 3 independent datasets containing 82 pesticidal active ingredients and co-formulants, ranging in vapor pressure from 0.0001 to >30,000 Pa was developed. Rates of evaporative losses from plant and soil surfaces are useful for estimating the potential for food related dietary residues and operator and bystander exposure, and can be used as source functions for screening models that predict off-site movement of volatile materials. Higher tiered assessments would require that measurements of evaporation rates should be made under actual use conditions, and the effect of degradation and sorption processes should be included.

AGRO 94

VOC testing of agricultural EC formulations

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Currently the TGA is the standard VOC test for liquid formulations in California. While this test is valuable, we need a more complete picture. California has agreed that we may work on a solvent by solvent basis. We are developing additional tests that better relate to real field conditions. A blank EC will be tested diluted in water as a normal application. The diluted product will be applied to simulated soil substrates, organic and inorganic, as well as plant foliage. For the soil part, 72 Hours at 40°C will be used. The substrate is analyzed over a 72 hour period for the solvent. These test parameters have been accepted by California's DPR and will be in round robin testing through ASTM E35.22 this year. The foliage testing will follow the soil round robin testing and will involve head space analysis of air above easily wetted plants and difficult to wet plants that have been treated with water diluted blank EC's. Our goal is to put together a model with inputs from the tests above as well as many other factors involving atmospheric availability of VOC's like soil decomposition and foliage intercept data. Atmospheric reaction kinetics will also play a important role. We welcome ideas and input that will help us develop a robust model that is built on good science.

AGRO 95

Bollgard® Cotton: A decade of success and a glimpse of the future of cotton

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Bollgard® cotton is a great success story for agricultural biotechnology. This product was created by inserting an insect control protein gene based on a gene sequence from *Bacillus thuringiensis (Bt)* into a cotton plant via *agrobacterium*-mediated transformation. The selected *Bt* transformed plant was used to backcross the inserted gene into elite cotton varieties. As a commercial product, Bollgard broke new ground introducing novel marketing schemes such as grower licenses. It required creative and extensive regulatory studies. Bollgard enabled growers to re-think insecticide use and integrated pest management. Most importantly, it prepared cotton growers for the future mediated by new technology and investment into the cotton industry. The challenges of introducing Bollgard cotton will be discussed with a consideration for the future possibilities of genetically improved cotton in the next decade.

AGRO 96

Protein discovery, design, and mechanistic analysis of Cry3Bb1

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Monsanto's rootworm-controlled corn products provide effective plant protection against principal components of the rootworm pest complex with additional crop performance resulting from the protection of root structure. The creation of the biotechnology products expressing the protein Cry3Bb1 required enormous and specialized understanding at each and every step along the way making it difficult to thoroughly discuss the entire product development history. Instead the focus of this presentation is on the history of the original protein discovery, the rationale for the protein design, and the mechanistic analysis used to create this novel biologically-active protein. More recent advances to uncover the structural requirements for insecticidal activity will also be discussed.

AGRO 97

Peptidergic regulation of an innate behavioral sequence

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At the end of each molt, release of ecdysis triggering hormones (ETHs) into the hemolymph initiates the ecdysis behavioral sequence and shedding of the old cuticle. ETH-induced motor patterns corresponding to each step of the behavioral sequence can be recorded from the isolated CNS, indicating they are centrally patterned. We found that ETH receptors (ETHRs) are expressed in diverse ensembles of central peptidergic neurons. In *Manduca sexta*, ETHRs occur in neurosecretory L3-4 cells of the abdominal ganglia, which co-express kinins and diuretic hormones. Exposure of the isolated CNS to these peptides results in fictive pre-ecdysis behavior. ETHRs also occur in interneurons IN704 of the abdominal ganglia, which co-express CCAP and MIPs. Bath application of a CCAP/MIP cocktail elicits fictive ecdysis behavior. These results suggest ETH activates peptidergic ensembles, which in turn recruit central pattern generators underlying each successive step of the ecdysis sequence. Do these peptidergic ensembles become active at appropriate times during the ecdysis behavioral sequence? In *Drosophila*, real time imaging of calcium dynamics were used to monitor activities of ETHR ensembles during fictive behaviors. FMRFamide neurons are activated during pre-ecdysis, EH, CCAP and CCAP/MIP neurons are active prior to and during ecdysis, and activity of CCAP/MIP/bursicon neurons coincides with post-ecdysis. Mechanism(s) through which ETH recruits peptidergic ensembles with appropriate delays is currently under investigation. Our findings indicate that innate, centrally-patterned behaviors are programmed via peptidergic signaling in the CNS.

AGRO 98

Insect resistance management in GM crops: Past, present, and future

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By the early 1990s, a number of tactics had been proposed for insect resistance management in insecticidal GM crops, including using low or high expression, tissue and temporal specific expression, seed mixes of susceptible and transgenic plants, and mosaics, rotations, and pyramids of multiple toxins. The development of higher expression of *Bt* toxins, to which Fred Perlak directly contributed, solved the problem of dose. Tissue or temporal specific expression and seed mixes conceivably might still be useful, but only under unique circumstances. Mosaics are the worst way to deploy different toxins, but pyramids of different toxins with refuges are currently the most robust resistance management strategy. Perlak contributed not only in creating pyramided plants, but also in raising questions about how they would work. The future of resistance management should include better expression of transgenes and a closer marriage of GM and marker-assisted breeding of naturally-occurring insecticidal traits.

AGRO 99

Chemical and biological control: 100 Years of research and adoption in the US

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Chemical and biological controls for insects have coexisted in the US for the past one hundred years. For many key insect pests, effective biological controls have not been established and their control is completely dependent on insecticide use. Some biological control organisms can not be used effectively because insecticides used to control key pests reduce their populations as well. On the other hand, the development of some selective insecticides has facilitated the expanded use of biological control organisms in some crops. The decision to use biological controls, chemical controls or their integrated use is economic with the farmer choosing to use the most cost-effective technique. In some cases, farmers have relied on partially-effective biological controls until more effective insecticides have been introduced. In other cases, farmers have come to rely on a biological control and reduced their insecticide use.

AGRO 100
Endangered species and their implications to IPM programs

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Integrated Pest Management (IPM) is an approach to managing organisms which cause economic, environmental or animal or human health problems. IPM seeks to mitigate secondary effects on humans and our environment through a systems approach in managing weeds, diseases, vertebrates, arthropods or nematodes. Management is conducted through the integration of biological, chemical and cultural methods that uses knowledge of the pest and crop and rational decision-making based on population estimates and potential loss. IPM requires intervention in the natural and agricultural systems to seek equilibrium between damaging and non-damaging population densities. Within these systems are organisms that might be listed as threatened or endangered. The presence of such organism must be incorporated into the whole system being utilized to develop and deliver an IPM system. Examples will be provided to illustrate specific issues regarding endangered species and the introduction of exotic natural enemies. Implications of pesticide use in designated endanger species habitat will discussed.

AGRO 101
Preparing the next generation for IPM roles in industry

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Students need to be well prepared for IPM careers in industry. The University of Florida has two academic programs designed especially to prepare students for IPM employment: the 6-year-old Doctor of Plant Medicine degree and the Urban Pest Management Bachelors, Masters, and Ph.D. degrees that can include distance education for place-bound students. The programs' approaches, goals, and methods have been refined over the years to help the students succeed. To establish a proper work ethic, the students are required to sign a written agreement that enumerates the faculty's expectations. Both programs utilize internships to provide students real life on-the-job experience, and the urban pest management curriculum integrates business courses with the science, so students can succeed in a business environment. Virtually all of the students cite the importance of faculty being committed and establishing high academic standards for their educational programs.

AGRO 102
The IPM-PIPE: What does it do to enhance IPM

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The Integrated Pest Management - Pest Information Platform for Extension and Education (IPM-PIPE) was first conceptualized during early outbreaks of soybean aphid in the North Central U.S. during 2000-02, but was implemented in early 2005 for the purpose of monitoring soybean rust in North America. Currently, the IPM-PIPE involves monitoring and reporting soybean rust and soybean aphid in 35 states and three Canadian provinces. In 2007, a pilot Legume component was also established. Although information technology support for the IPM-PIPE is advanced, the concept follows a standard IPM template: 1) collect information, 2) analyze information, 3) make recommendations, 4) keep records, and 5) build historical data base. Advances of the IPM-PIPE over the existing IPM template include easy stakeholder access to national pest incidence and distribution data, disease forecasting, and state-specific control recommendations, through a public website, on a near-real time basis. The IPM-PIPE has greatly enhanced communication among scientists.

AGRO 103
Transgenic crops and IPM: Reassessing our icon

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The development of transgenic agricultural crops has revolutionized pest management practices, as well as our perception of integrated pest management (IPM). As more and more acres are planted annually with transgenic crops and as continuing developments in the technology provide a rapidly expanding array of products, the relevance of some IPM principles is being questioned. Do insect resistance management (IRM) principles supplant IPM principles in our focus on crop protection, or are the two sets of principles compatible? Are economic thresholds useful any more? How can we cope with widespread reliance on one tactic of crop protection? What has happened to the word “integrated” in IPM? The current and potential future roles of transgenic crops in agriculture and their impact on IPM will be discussed.

AGRO 104
DNA screening to monitor pink bollworm resistance to *Bt* cotton

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Transgenic crops producing toxins from *Bacillus thuringiensis* (*Bt*) kill insect pests and can reduce reliance on chemical insecticides. Evolution of resistance by target pests is considered the primary threat to the success of *Bt* crops. Monitoring the early phases of pest resistance to *Bt* crops is crucial, but has been extremely difficult because bioassays cannot detect heterozygotes harboring a single recessive allele for resistance. Pink bollworm (*Pectinophora gossypiella*) is a major lepidopteran pest of cotton that has experienced selection for resistance to Cry1Ac, the toxin in *Bt* cotton, in Arizona since 1996. In laboratory-selected strains, resistance to Cry1Ac and survival on *Bt* cotton are linked with three recessive mutations in the gene encoding a cadherin protein that binds Cry1Ac. Each of the three resistant alleles has a deletion upstream of the toxin-binding region of the cadherin protein. We developed a PCR-based method for detecting each of the three alleles to monitor resistance to *Bt* cotton in field-collected pink bollworm. Screening of DNA from >6,600 insects from 79 cotton fields during 2001 to 2006 detected no resistance alleles. Bioassays and field efficacy tests confirm that resistance to Cry1Ac remains rare in pink bollworm in the southwestern US. These results contradict predictions of rapid pest resistance to *Bt* crops and are consistent with the exceptional field performance of *Bt* cotton against pink bollworm despite a decade of exposure to *Bt*.

AGRO 105
Phytochemicals for pest control

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Phytochemicals have been the source of or inspiration for many pharmaceuticals and some important pesticide classes, such as the pyrethroid insecticides and triketone herbicides. This paper summarizes several examples of pesticide discoveries from plants made in our laboratory. The first is a 9,10-anthraquinone derivative for use in aquaculture to selectively control blue-green algae that impart undesirable flavors to fish. Two norclerodanes from american beautyberry (*Callicarpa americana*) were discovered to be potent insect repellents. Natural triketones from oil of manuka (*Leptospermum scoparium*) were found to be good inhibitors of *p*-hydroxyphenylpyruvate dioxygenase and potential herbicides for organic farmers. Sampangine from the bark of the *Cleistopholis patens* tree was sufficiently fungitoxic to be patented as an agricultural fungicide. Examples of termiticidal compounds from plant sources will be discussed. Our experience has been that plants are rich sources of novel compounds that could be the bases for new pesticides.

AGRO 106
Evolution of safety assessment and regulatory approval processes for insect protected crops

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Insect-protected crops were among the first plant biotechnology-derived products that were developed and commercialized. These products included insect-protected cotton, corn, and potato which were approved and commercialized over a decade ago. The data requirements have evolved significantly over the past decade and so has the number of regulatory approvals that are required globally. Many additional traits, including other insect-protected trait products, have been developed and introduced commercially. Today, growers demand that new traits are introduced in combination with traits that they already plant, such that essentially all new insect-protected products will be introduced along with the key previously-approved, biotechnology-derived traits. Growers also demand these traits in the best germplasm available. The advantages of the insect-protected crops has been established around the world, and many new countries, especially developing countries, are establishing regulatory systems so that these products can be approved and introduced locally.

AGRO 107
Environmental fate and effects of *Bt* proteins in the environment

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It is important to evaluate the environmental fate and effects of any new technology, including *Bt* insecticidal protein toxins that are expressed in crops. Risk assessments require that both exposure data and hazard data be developed. Extraction and quantification of *Bt* proteins from environmental matrices is challenging, but analytical methodology is improving, specifically for soil, water, sediment, and decaying plant tissue. Dissipation, bioavailability, and movement of the protein residues are important components of the study of their fate. Potential effects on non-target organisms need to be addressed for the hazard side of the risk assessment equation. Development of sub-chronic bioassays for terrestrial non-target invertebrates has included earthworm, springtail, and pillbug laboratory evaluations of growth rates (earthworm, pillbug) and reproduction (springtail). When adequate data are available on exposure and hazard, the environmental significance of these proteins can be determined.

AGRO 108
Unusual challenges, unusual rewards: Introduction of Bollgard II® in Burkina Faso, West Africa

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Since 2003, Monsanto has been working with the government of Burkina Faso to assess the potential value of Bollgard II® insect control technology in cotton, the country's leading export crop (>60% of export dollars), and its leading industry in terms of employment (3 million of the country's 14 million are involved in cotton production). Four years of confined field trials have determined that the technology can raise grower profits substantially, largely by increasing yields and saving caterpillar insecticide input costs. The road to commercial release of Bollgard II has been challenging, due mainly to the lack of enabling regulatory structures to assess, approve, and market biotechnology products. This presentation will describe the many partnerships forged and their efforts to build a robust regulatory framework to ensure grower access to the benefits of Bollgard II and to future safe, effective biotech products.

AGRO 109
Yield effects of genetically-modified crops in developing countries

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Biotechnology allows introducing traits that reduce pest damage and can enhance yield. The yield effect varies depending on weather, pest infestation, and the availability and effectiveness of alternative pest controls. The gains from *Bt* varieties vary by location and depend significantly on the varieties to which the *Bt* trait is inserted. Studies found that *Bt* cotton tends to increase yield substantially, but the yield effect varies from low and negative impacts to high rates of 80%. On average, yield effects above 40% are common in India and South Africa, while in the United States and China the average yield effects are around 15%. *Bt* cotton also reduces chemical use and improves workers' health conditions. *Bt* varieties tend to increase yield and reduce pest chemical use in other crops. They also improve storability of grains. The gains are distributed between farmers, consumers, and manufacturers.

AGRO 110

Adoption, challenges, and future prospects for insect protected crops in India

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Bollgard® insect-resistant cotton was approved in India in 2002. Adoption by Indian cotton farmers was rapid, and in 2006, the estimated acreage was approximately 9 million acres of a total of 22 million acres of cotton grown in India. An independent study estimated that Bollgard technology added approximately $1.5 billion value to farmers in India. Most cotton farms in India range from 2 - 5 acres which demonstrates that this technology can be successfully adopted by small farmers in developing countries. The Indian Regulatory environment has been supportive of Bollgard® technology; however, testing of insect protection corn and other technologies has been suspended by the Supreme Court in response to challenges from Public Interest Litigation. Other challenges include saved seed and other forms of illegal seeds in the marketplace. The future continues to look positive and we expect more farmers will plant *Bt* cotton and next generation technologies.

AGRO 111

Nanotechnology opportunities in agriculture and food systems

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Examples of potential applications of nanotechnology include disease diagnosis and treatment delivery systems, new tools for molecular and cellular breeding, identity preservation of animal history from birth to a consumer's table, the security of food products, major impact on animal and human nutrition ranging from the diet to nutrient uptake and utilization, development and modification of new food products, modification of animal waste as expelled from the animal, pathogen detection, and many more. Existing research has demonstrated the feasibility of introducing nanoparticles into animals to seek and destroy targeted cells. Thus, building blocks do exist and are expected to be integrated into systems over the next couple of decades on a commercial basis. While it is reasonable to presume that nanobiotechnology industries and unique developments will have major implications on agriculture and food systems, this optimistic view must be informed and balanced with uncertainties to reach its potentially exciting future.

AGRO 112

Plant power: electrochemical energy conversion using photosystem I

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Photosystem I (PSI) as one of nature's photodiodes is a perfect candidate for agro-nanotechnology studies leading towards biologically-inspired molecular electronics. In order to integrate it into devices, we have selectively orientated its electron transfer vector on patterned substrates. Scanning Electrochemical Microscopy (SECM) imaged the directed adsorption of PSI at patterned surfaces containing discreet regions of CH_3- and HO-terminated SAMs. SECM is an *in situ* scanning probe microscopy that rasters an ultramicroelectrode tip across the surface, measuring the electrochemical gradients generated at a surface. The electrochemical surface image provides information about the uniformity of adsorption as well as the biolayer thickness. Direct protein voltammetry on photosystem I has identified the electron donor, P700, and the electron acceptor sites, F_{AB}, and the observed potential values (E_{P700} = 0.5 V vs. NHE (Normal Hydrogen Electrode); EF_{AB} = -0.5 V vs. NHE) correlate with the literature. Photoelectrochemical experiments demonstrate the ability of these PSI electrodes to convert light into photocurrents.

AGRO 113

Storage and delivery of aquatic microorganisms in emulsions stabilized by surface-modified silica nanoparticles

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Augmentation of microorganisms in aquatic ecosystems is a common approach for the control of insects and weeds and for production of bioenergy. Hydrophobicly-treated silica nanoparticles were investigated for stabilizing microorganisms in water-in-oil (invert) emulsions and for delivery to aqueous environments. Microorganisms studied included the biolarvacide *Lagenidium giganteum* and a *Chlorella sp*. Surface treatment of silica nanoparticles had a significant effect on cell death rate; as the hydrophobicity of the silica increased, the rate of death increased. Varying the content of moderately-hydrophobic silica had no effect on cell density measured in the emulsion at time zero, however, increasing the concentration of silica significantly reduced cell death rate, particularly in formulations with a high initial cell density. Microorganisms formulated in emulsions containing silica nanoparticles were less likely to settle when applied to water compared to cells formulated in aqueous suspensions. This suggests that controlled cell distribution and release could be achieved when modified nanoparticles are a component of the emulsion.

AGRO 114

DNA with zip codes: Addressable DNA molecules and their applications in agriculture and biotechnology

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Multivalent and anisotropic molecules (addressable molecules) are of great importance since they provide unparalleled control over the placement of different functional moieties within one single molecule. This molecular addressability allows the precise design and synthesis of multifunctional hybrid materials that are not attainable with most of the current natural and synthetic polymers. We developed a general synthesizing approach to create addressable molecules using dendrimer-like DNA, a new type of DNA nanomaterial previously reported from our group. We have designed and synthesized two classes of such multifunctional hybrid molecules: 1) DNA-organic dye hybrid molecules and 2) DNA-gold nanoparticle-quantum dot hybrid molecules. In the first case, we conjugated, with very high precision, individual organic dye molecules (OD) onto single, branched DNA molecules. In the second, we addressed each DNA branch with individual gold nanoparticles (AuNP) and individual quantum dots (QD). We achieved in both cases almost monodisperse materials and at bulk scale. A few examples of DNA nanomaterials will be discussed in this talk with the focus on addressable DNA and their applications in agriculture and biotechnology. These examples include DNA-based nanobarcode systems, DNA hydrogels for drug delivery, and in particular, multiplexed *in situ* detections of single copy genes from pathogens (e.g., *Salmonella* and *E. coli O157*.) without PCR.

AGRO 115
Societal dimensions of agrifood nanotechnology: Project overview

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The Institute for Food and Agricultural Standards (IFAS) at Michigan State University has received funding from the National Science Foundation to conduct a four-year study of the social and ethical dimensions of agrifood nanotechnology. The project, now in its third year, has completed a number of activities designed to anticipate potential social and ethical issues of nanotechnologies applied to food and agriculture to inform the development of socially responsive policies and governance in these areas. This presentation provides an overview of key project activities and outcomes deriving from public conferences and workshops addressing: (1) lessons learned from social experience with agricultural biotechnologies; (2) an ‘issues landscape' for the development of standards for nanotechnology; (3) agrifood nanotechnology applications, participation, and governance; and (4) the development of an integrated approach to public engagement in agrifood nanotechnology. Attendees will be encouraged to share their views to inform our future project-related activities.

AGRO 116
Recognition of conformational changes in β-lactoglobulin by molecularly-imprinted thin films

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Pathogenesis in protein conformational diseases is initiated by changes in protein secondary structure. This molecular restructuring presents an opportunity for novel shape-based detection approaches, as protein molecular weight and chemistry are otherwise unaltered. Here we apply molecular imprinting to discriminate between distinct conformations of the model protein β-lactoglobulin (BLG). Thermal and fluoro-alcohol induced BLG isoforms were imprinted in thin films of 3-aminophenylboronic acid on quartz crystal microbalance chips. Enhanced rebinding of the template isoform was observed in all cases when compared to the binding of non-template isoforms over the concentration range 1-100 μg/ml. Furthermore, it was observed that the greater the changes in the secondary structure of the template protein the lower the binding of native BLG challenges to the imprint, suggesting a strong steric influence in the recognition system. This feasibility study is a first demonstration of molecular imprints for recognition of distinct conformations of the same protein.

AGRO 117
Carbon nanotubes as near-infrared agents for photothermal nanotherapy of bacterial infections

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Carbon nanotubes (CNTs) would provide new avenues for overcoming challenges to realize non-invasive antimicrobial treatment of bacterial infections. In this study, *Escherichia coli* was used as a model bacterium to evaluate the CNTs' potential for photothermal (PT) nanotherapy of bacterial infections. Results demonstrate great potentials of CNTs for non-invasive PT antimicrobial nanotherapy to cause irreparable damage to disease-causing pathogens. High temperatures accompanied by bubble-formation phenomena around the clustered CNTs at the cell surfaces were considered to be responsible for the effective cell damages after multi-pulse near-infrared (NIR) irradiation at a wavelength of 1064 nm. The key characteristics that made CNTs enabling PT agents were their capability to self-assemble as clusters at the cell surface and their inherent NIR responsiveness. This technology, uniquely combining laser and nanotechnology, can be useful for other applications that require bacterial removal, such as drinking water treatment and food processing.

AGRO 118
Single molecule analysis of bacterial 16s rdna pcr products in submicrometer fluidic channels

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The manipulation, detection and analysis of nucleic acids have become essential tasks in many biological applications ranging from genomic sequencing to microbial ecology. The analytical demands of these applications have stimulated the development of Lab-on-a-Chip (LoaC) and Micro-Total-Analysis-System (μTAS) technology with integrated nanostructures to increase sensitivity and throughput. Laser induced fluorescence in submicrometer fluidic channels was used to analyze Polymerase Chain Reaction (PCR) products from the 16S rDNA of *Thermobifida fusca* (325 bp). Oligonucleotide universal bacterial primers and PCR amplicons were detected at all phases of the reaction without post-amplification purification or size screening. Primers were fluorescently labeled with single Alexa Fluor 488 or Alexa Fluor 594 fluorophores, resulting in double labeled amplicons. Photon burst analysis was used to detect and identify individual primers and amplicons, and fluorescence correlation and cross correlation spectroscopy were used to account for analyte flow speed.

AGRO 119
Enantioselectivity in pyrethroid insecticides

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Pyrethroid insecticides are widely used in both agricultural and urban areas. Pyrethroids usually display high aquatic toxicities and ecotoxicological effects from pyrethroid contamination in surface aquatic systems are an important concern. Each compound in the pyrethroid family is chiral, consisting of two to eight stereoisomers. Over the last few years, our group has evaluated the occurrence of enantioselectivity of pyrethroids in their biodegradation, exposure to polar solvents and heat, acute toxicity to aquatic invertebrates, and chronic toxicity (i.e., endocrine disruption) to fish. Our studies so far have shown that enantioselectivity commonly occurs with many of these processes. The observed chiral selectivity is important for improving the environmental risk assessment of pyrethroids, especially effects to non-target organisms, as well as for understanding the environmental benefits of using isomer-enriched pyrethroid products. This presentation will provide an overview of our up-to-date findings on this topic.

AGRO 120

Estrogenicity of enantiomers of the synthetic pyrethroid insecticide (Z)-cis-bifenthrin

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Despite the fact that the biological processes of chiral compounds are enantioselective, the endocrine disruption activity of chiral contaminants with respect to enantioselectivity has so far received limited research. In this study, the estrogenic potential of enantiomers of the synthetic pyrethroid insecticide (*Z*)-*cis*-bifenthrin (BF) were investigated. Significant differences in estrogenic potential were observed between the two enantiomers in the in vitro human breast carcinoma MCF-7 cell proliferation assay and the in vivo aquatic vertebrate vitellogenin enzyme-linked immunosorbent assay (ELISA). In the E-SCREEN assay, the relative proliferative effect ratios of 1S-*cis*-BF and 1R-*cis*-BF were 85.3% and 38.1%, respectively, and the relative proliferative potency ratios were 100% and 10%, respectively. The cell proliferation induced by the two BF enantiomers may be through the classical estrogen response pathway via the estrogen receptor (ER) as the proliferation induced by the enantiomers could be completely blocked when combined with 10^{-6} mol/L antiestrogen ICI 182,780. Measurement of vitellogenin induction in Japanese medaka (*Oryzias latipes*) showed that the estrogenic potency of 1S-*cis*-BF was about 123 times stronger than that of 1R-*cis*-BF. These results suggest that assessment of the environmental safety of chiral insecticides should take enantioselectivity in acute and chronic ecotoxicities (e.g., endocrine disruption) into consideration.

AGRO 121

Utilizing in silico techniques to elucidate the stereoselective behavior of pyrethroids within carboxylesterase

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In the absence of reliable experimental data, the development of *a priori* methods is essential to predict chemical-specific parameters to describe absorption, distribution, metabolism and elimination (ADME) processes within physiologically-based pharmacokinetic (PBPK) models. Elucidating the molecular mode of toxicity of pesticides is important in furthering the validity of PBPK models and mechanistic interpretations derived as they apply to human risk assessment studies. In the case of pyrethroid pesticides, the primary initial biotransformation of the parent compound occurs via an oxidative or hydrolytic pathway, whereby hepatic carboxylesterase is responsible for hydrolysis by cleaving the central ester bond of pyrethroids through a catalytic triad consisting of serine, histidine and glutamic acid residues. Recent studies of Huang *et al.* (2005) experimentally demonstrated that pyrethroid-like compounds exhibit a "consistent pattern of stereoselective hydrolysis" whereby *trans*-isomers of cypermethrin analogues were generally hydrolyzed faster than *cis*-isomers. We have recently undertaken a consensus docking study to elucidate the stereoselective nature of the hepatic carboxylesterase binding with respect to several pyrethroid-like compounds. The evaluation and effectiveness of AutoDock, MOE-Dock, Glide and eHits packages will be discussed with respect to the theoretical validation of the experimental results for the cypermethrin analogue. We have also undertaken studies to address the treatment of enantiomers as chemical mixtures in our PBPK modeling efforts. Preliminary results and their implications for the use of *in silico* approaches will be discussed as they relate to the pyrethroids. Although this work was reviewed by EPA and approved for publication, it may not necessarily reflect official Agency policy.

AGRO 122

Comparison of aquatic toxicity of pyrethroid isomers and isomer mixtures

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Most synthetic pyrethroids occur as mixtures of stereoisomers that differ in insecticidal activity and toxicity to some non-target species. Refined isomeric mixtures of some pyrethroids have been developed to enhance efficacy and reduce the mass of pesticide needed for pest control. Theoretically, isomer mixtures enriched in the active isomers should be more toxic to aquatic species than unrefined mixtures containing a higher proportion of less active isomers. Data from standard aquatic toxicity studies with synthetic pyrethroids – refined and unrefined mixtures – were reviewed to determine the magnitude of the differences. The theoretical difference in toxicity is on the order of two-fold, which is within the normal range of test-to-test variability in aquatic toxicity results. For this reason, aquatic toxicity data rarely confirm the expected differences between isomer mixtures of synthetic pyrethroids. Differences in aquatic toxicity among pyrethroid products with differing isomeric composition are therefore of minor importance in ecological risk assessment.

AGRO 123

Enantioselective degradation of fungicides in soils: Chiral preference changes with soil pH

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Many pesticides are chiral and consist of two or more enantiomers/stereoisomers, which may differ in desired biological activity, toxicity, effects on nontarget organisms, and environmental fate. The last years have seen the substitution of several racemic by enantiopure compounds. The enantioselective degradation in soils is an important part of a benefit-risk evaluation. However, studies are typically carried out only with a few soils, in many cases only with a single soil, so that it is not possible to extrapolate the findings on chiral preference to other soils. In this study, the enantio-/stereoselective degradation of selected modern fungicides was investigated in various soils, selected to cover a wide range of soil properties. The fungicides were incubated under laboratory conditions and the degradation and chiral stability of the enantiomers/stereoisomers were followed over time using enantio-/stereoselective HR-GC-MS with cyclodextrin derivatives as chiral selectors. Racemic compounds were incubated to determine the enantioselectivity of degradation. Enantiopure compounds were used to study the chiral stability, i.e., enantiomerization (R/S) or isomerization (such as Z/E). For a number of fungicides, the enantioselectivity of degradation, expressed as ES = (kR - kS)/(kR + kS), showed a reasonably linear correlation with soil pH.

AGRO 124

Enantioselective formation of the triazole fungicide triadimenol from triadimefon in mammal and fish hepatic microsomes

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Triazole containing compounds are used extensively in both agriculture and medicine for the control of fungal infections. Recently emphasis has been placed on the potential adverse effects of these compounds within mammalian systems. Triadimefon is a common agricultural fungicide. It contains one chiral center, and forms a second chiral center when metabolized to triadimenol, another commercially used fungicide. We have studied the enantioselective metabolism of the individual enantiomers and racemate of triadimefon to triadimenol in microsomes from various male and female mammals, fish and invertebrates. In all species and genders, (+) triadimefon was metabolized more quickly than (-) with the enantiomeric fractions of the resulting four triadimenol enantiomers being species specific. Inhibitor and pure enzyme studies indicate that triadimefon is metabolized by a short-chain dehydrogenase/reductase and may disrupt steroid pathways. These finding will be put in context of species differences, potential impacts on steroidogenesis and tumorgenesis, and risk assessment. Although this work was reviewed by EPA and approved for publication, it may not necessarily reflect official Agency policy. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

AGRO 125

Enantioselective carcinogenesis of agrochemicals and other xenobiotics

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Generally, one of the enantiomers of racemic agrochemicals is carcinogenic/toxic than its antipode. Therefore, the data available on the carcinogenesis of the racemic mixtures of the chiral pollutants is not reliable and need modification in terms of the enantioselective carcinogenesis. It is essential to explore the enantioselective carcinogenesis due to different toxicities of the chiral pollutants. The knowledge of the stereoselective metabolisms of the chiral pollutants may be useful for cancer treatment. The enantioselective carcinogens/toxicities due to chiral pesticides, polynuclear aromatic hydrocarbons and other xenobiotics have been discussed.

AGRO 126

Novel magnetic nanobars for diagnosis and sampling in food safety and security

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Nanoparticles, amorphous Fe-B nanobars, are introduced as a novel type of magnetic particles for concentrating and separating target bio-species from the raw food samples. These nanoparticles inherit all the advantages provided by the magnetic beads, but provide some unique advantages. For examples, it is active so that the separation and concentration can be more effective and rapid. More importantly, these nanoparticles serve, at the same time, as sensor platform, which has the potential to detect the presence of a single target organism. Therefore, the novel magnetic nanobars are a novel type of magnetic nanoparticles for diagnosis and sampling which may be used in food process or inspection to enhance the food safety and security. In this presentation, the principle, fabrication, and characterization of the nanoparticles will be presented. The integration of the nanoparticles with microfluidic devices for detecting small number of target species in liquid samples is discussed.

AGRO 127

Nanoencapsulation of triclosan through ethanol mediated dissociation of the casein micelle: Implications in antimicrobial and drug delivery systems

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The ability of the bovine casein micelle to act as a nano-carrier system for a widely used low molecular weight hydrophobic compound, triclosan (TCS), is investigated in this study. Two methods for micellar disruption and subsequent encapsulation of TCS at 22.9 mg/L were employed: 1) continuous high shear processing (CHSP) in the presence of ethanol (1:1, v/v) and 2) ethanol mediated dissociation through acidification and re-association via alkaline treatment (EMDAA). Ethanol was evaporated from processed samples and HPLC analysis was carried out on micelle pellets or supernatant post ultracentrifugation. Micelle pellet, subjected to CHSP at 300 MPa, contained 19.55(±0.3) mg/L TCS as compared to 11.1 mg/L in controls. EMDAA showed a reduction in TCS supernatant by 88% (±7) indicating apparent micelle encapsulation of TCS above its reported aqueous solubility of 10 mg/L. Micellar effectiveness as a potential nano-carrier will be determined by post-encapsulation stability and the maximum solubility enhancing capacity of a stable colloidal system.

AGRO 128

Food pathogen detection using Au/Si nanorods

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Among several potentials of nanotechnology applications in agriculture and food systems such as improving food safety, quality, product traceability, better nutrient delivery system, nonmaterial to enhance packaging performance, and improving food processing for food industry, development of nanoscale biosensors for food safety and biosecurity are emerging. A novel bio-functional nanosensor for Salmonella detection was developed using Au/Si nanorods. The Si nanorods were fabricated by glancing angle deposition (GLAD) method and the Au was sputtered onto the Si nanorods. Alexa 488-succinimide dye was immobilized onto the annealed Si nanorods via the attachment between the dye ester and the primary amine supplied by the 3-Aminopropyltriethoxysilane (APTES). The anti-Salmonella was conjugated to Au via Dithiobis[succinimidylpropionate] (DSP) self-assembly monolayer (SAM). Due to the high aspect ratio nature of the Si nanorods, hundreds or thousands of dye molecules attached to the Si nanorods produced enhanced fluorescence signal. In addition to fabrication protocol for bio-functional nanorods, the results of surface plasmon resonance (SPR) will be discussed based on the principle of attenuated total-internal reflection (ATR). These biologically functionalized nanorods also can be used to detect Salmonella with fluorescent microscopic imaging. This new nanoscale biosensor will be of great significance in agricultural and food systems application.

AGRO 129

Fabrication of functional food nanocomposites utilizing microdispensing technology and engineered edible films

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Functional foods are food products that aid specific bodily functions in addition to being nutritious. We propose to develop of new nanotechnology-enabled functional food product based on nutraceuticals and microelements nano-composites. Our approach is based on ink-jet deposition of active compounds onto edible substrate. The basic technical concept of the presented study is to use a modified ink-jet printing system as a dosage system where nutraceuticals, excipients, and release modifiers are contained in "cartridges" and are deposited on an edible substrate (edible film) forming food nano-composite. Technological aspect of the processing, pattern formation of functional deposits and interaction of multiphase nano-scale deposits (emulsions, suspensions) are discussed.

AGRO 130

Nanostructured bacteriophage reporter system for the detection of bacterial pathogens

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Bacteriophage (or phage for short) are viruses that infect bacteria, with oftentimes exquisite specificity. Exploiting this level of specificity allows for the unique detection of target bacterial populations. We have recently developed a phage-based detection system for the foodborne pathogen *Escherichia coli* O157:H7 that combines phage-host infection events with bioluminescent signaling, thereby permitting the presence of *E. coli* O157:H7 to be easily visualized by light emissions. Detection down to 10 cfu/ml within five hours has been demonstrated in pure culture in a high-throughput format using 96-well microtiter plates. To move towards field portability and on-the-spot production line monitoring, we are currently adapting the phage assay to a microluminometer integrated circuit format dubbed the BBIC (bioluminescent bioreporter integrated circuit) to create wireless handheld probes for pathogen detection. As part of this process, nanofiber 'forests' and 'cages' are being created on-chip to provide phage attachment sites and bioreporter holding cells for future standalone single chip multiplex pathogen detection.

AGRO 131

Electronic nanosemiconductor biomolecular pathogen detector

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An electronic pathogen detector based on nano scale transistors is described utilizing nano scale semiconductor, molecular biology, organic and surface chemistry and deep submicron electronics expertise. The goal of this active USDA project is to produce a functional electronic-biomolecular subsystem capable of detecting pathogens in a food safety program. The system incorporates a nano scale transistor as the detection mechanism; in this case a 20 nm to 50 nm Field Effect Transistor (FET), manufactured at the Cornell Nanoscale Facility. A molecular signal transduction process was developed. Signal molecules, reporting the presence of target pathogens through an organic interface structure, change electronic properties of a nano-FET and produce detectable electronic signals. Digital signals are generated with embedded deep submicron electronics which provides the backend structure to produce an effective real time subsystem. The deep submicron electronics is designed in 250 nm CMOS scheduled for fabrication at TSMC.

AGRO 132

Biocompatible nanoparticles trigger rapid bacteria clustering

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The goal of this research is to develop a method for separating bacterial pathogens from liquids using non-toxic biopolymer nanoparticles at low concentrations. The rapid formation of large bacteria clusters facilitates separation. Chitosan and chitosan-coated alginate nanoparticles are produced by ionic gelation methods under mild, room-temperature conditions. Chitosan and alginate are edible, biocompatible polymers, and are frequently used in food applications. Chitosan and chitosan-coated alginate nanoparticles with different surface charges were mixed with dilute Escherichia coli PBS solutions and the bacteria-nanoparticle interactions were observed by phase contrast and fluorescence microscopy. We study how the interactions depend on particle zeta potential (range from -32 to 50 mV), particle concentration and bacterial concentration. We observe rapid aggregation and restricted microbial motion when bacteria interact with nanoparticles that have a highly positive zeta potential, contrasting with the negative bacterial surface charge. Results will be presented on the cluster size and formation process.

AGRO 133

Luminescent and magnetic nanoparticles in assays for toxins and DNA

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Many types of fluorescent nanoparticles have been investigated as alternatives to conventional organic dyes in biochemistry; magnetic beads also have a long history of biological applications. In this work we apply flame spray pyrolysis in order to engineer a novel type of nanoparticle that has both luminescent and magnetic properties. The particles have magnetic cores of iron oxide doped with cobalt and neodymium and luminescent shells of europium-doped gadolinium oxide ($\mathrm{Eu:Gd_2O_3}$). Luminescence spectroscopy showed spectra typical of the Eu ion in a $\mathrm{Gd_2O_3}$ host – a narrow emission peak centered near 615 nm. Our synthesis method offers low-cost, high-rate synthesis route that enables a wide range of biological applications of magnetic/luminescent core/shell particles. Using these particles we demonstrate a novel immunoassay format with internal luminescent calibration for more precise measurements. The technique has been applied to the detection of ricin (a toxin) in foods, and also to DNA.

AGRO 134

Enantiomeric separation of new substituted N-(2-benzolthiazol)- 1-(fluorophenyl)- O,O-dialkyl-α-aminophosphonates by normal HPLC on polysaccharide-based chiral stationary phases

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α-Aminophosphonate derivatives have attracted much attention in pesticide and medicinal chemistry due to their bioactivities. Some recemates of *N*-(substituent-benzothiazole-2-yl)-1-(substient-fluorophenyl)-*O,O*-dialkyl-α-aminophosphonate were found to possess good antiviral activity against TMV. In order to study the optical properties and bioactivity of single stereoisomer, a simple and rapid liquid chromatographic method for enantioselective separation and determination of enantiomers of six α-aminophosphonate using photo diode array (PDA) was developed. Chiralpak AD-H, Chiralpak IA packed with amylose tris-(3,5-dimethylphenyl carbamate), Chiralcel OD-H with cellulose tris-(3,5-dimethylphenyl carbamate) in isocratic modes have been performed. The result shows that Chiralpak IA is suitable to resolve all racemates in different mobile phases with good baseline separation. The concentration of polaric modifiers and temperature are studied for optimum resolution. Furthermore, probable mechanistic aspects on chiral recognition are also discussed. The proposed method was found to be suitable and accurate for rapid determination of enantiomeric purity of this series of α-aminophosphonate derivatives.

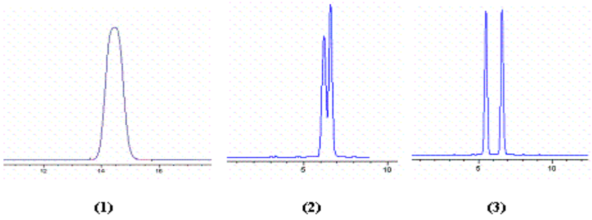

Fig. 1. Chromatogram of racemate 2 on Chiralcel OD-H (1), Chiralpak AD-H (2) and Chiralpak IA (3) in the same chromatography condition.

AGRO 135

Chiral analysis of S-metolachlor in surface water samples collected from four Ohio watersheds

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Metolachlor is a chloroacetanilide herbicide used primarily for the control of annual grasses and broadleaf weeds in corn and soybeans. It was introduced into the marketplace in 1976 as a racemic mixture of two pairs of diastereomers, 1'*S* (a*S*,1'*S* / a*R*,1'*S*) and 1'*R* (a*R*,1'*R* / a*S*,1'*R*). *S*-metolachlor, consisting of approximately 88:12 ratio of 1'*S*:1'*R* isomers was registered in 1997 as a Reduced Risk pesticide to replace racemic metolachlor. *S*-metolachlor provides comparable weed control at 35% lower application rates than the racemate. In the Lake Erie Basin in 1998, *S*-metolachlor comprised only ~1% of the combined total racemic and *S*-metolachlor used. The percent *S*-metolachlor fraction increased to 96-100% by 2002. Due to this “chiral switch”, changes to both the concentrations and isomeric composition of metolachlor residues in environmental samples would be expected. The main objective of this study was to test the isomer composition change hypothesis. This was accomplished by analyzing samples collected by the National Center for Water Quality Research at Heidelberg College, Tiffin, OH, as part of the Ohio Tributary Monitoring Program. Raw water samples from four watersheds in the Lake Erie Basin of northern Ohio were collected weekly from May to September, 2005. The water samples were analyzed using both ELISA and LC/MS/MS stereoselective methods. The results indicate that the 1'*S*/1'*R* isomer ratio in the water samples was indeed similar to the ratio in the *S*-metolachlor formulations, throughout the season in all four watersheds.

AGRO 136

Quality assurance issues related to environmental monitoring of stereoselective degradation of metolachlor

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Significant contributions of this study include evaluation of stereoselectivity based on mathematically derived fractions, rather than ratios, and statistical evaluation of precision establishing the variability resulting from chromatographic processes versus metabolic processes. Following the pioneering work of Ulrich et al. [Chemosphere 53: 531-538 (2003)], de Geus et al. [*Chemosphere* 41: 725-727 (2000)], and Harner et al. [*Environ. Sci. Technol.* 34: 218-220 (2000)], the use of enantiomeric and diastereomeric fractions as opposed to ratios for the examination of field samples for evidence of stereoselective degradation of metolachlor will be presented. Metolachlor consists of four stereoisomers due to axial and/or C-chirality. Metolachlor was analyzed using normal-phase high-performance liquid chromatography with a chiral stationary phase in agricultural runoff water applied to a subsurface flow constructed wetland. The research demonstrated that stereoselectively enriched metolachlor did not dominate in the aqueous phase.

AGRO 137

Stereoselective behavior of chiral pesticides in environment

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The stereoselective behavior of chiral pesticide enantiomers in environment was investigated. The results showed that selected chiral pesticides were enantioselectively degraded in soil, plants and animals. These studies will make important contributions on the biological behavior of chiral pesticides. The enantioselective pharmacokinetics and degradation of some chiral pesticides such as theta-cypermethrin (TCYM), metalaxyl (MX), hexaconazole, tebuconazole, ethofumesate, benalaxyl (BX) and so on, in rabbits and rats were studied by intravenous injection. The two enantiomers of the studied chiral pesticide often showed different behaviors in animals. For example, the (+)-TCYM was apparently degraded more rapidly than (-)-TCYM in rats and rabbits, and the degradation of metalaxyl enantiomers was stereoselective with the (+)-(*S*)-enantiomer eliminating faster than the (–)-(*R*)-enantiomer in rabbit plasma, liver and kidney after dosing. Similarly the enantioselectivity of chiral pesticide enantiomers in plants such as turfgrass, cabbage, cucumber plant, tomato plant and so on was usually found.

AGRO 138

Environmental fate of chiral pesticides used in Canada

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Approximately 25% of modern pesticides are chiral molecules consisting two or more enantiomers. Knowledge of the toxicology and environmental fate of the individual enantiomers is important for several reasons. It is quite common that one enantiomer of a pesticide is effective while the other one is not. Enantiomers are degraded at different rates and sometimes can be interconverted in the environment. The objectives of this study were to: 1. Determine which chiral currently used pesticides (CUPs) in Canada are amenable to separation of enantiomers by GC-MS and HPLC-MS methods, 2. Determine selected chiral CUPs in water, precipitation and soil. Method development for separating enantiomers of 10 CUPs by GC-MS and one CUP by LC-MS has so far been achieved successfully. Results for 19 water samples showed that (+) mecoprop was preferentially depleted in 21% of the samples, (–) mecoprop in 63% and racemic mecoprop occurred in 16% whereas enantiomer profiles favored depletion of the (+) enantiomer in all samples for dichlorprop. Metolachlor stereoisomers were detected in 81 surface water samples. The isomer distribution patterns of metolachlor in all surface water samples were similar; enrichment of C*S,aR and C*S,aS diastereomers which are the components of enantioenriched *S*-metolachlor. However, at this point, we do not know whether the observed isomer profiles are due solely to *S*-metolachlor, or if some selective degradation has taken place.

AGRO 139

Importance of enantioselectivity in fate and effects to ecological hazard assessment of chiral contaminants

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While enantiospecific differences in fate and effects of chiral contaminants have recently been increasingly recognized, these differences are often largely ignored in the fate and effect studies leading to assessments of ecological risk for chiral compounds. The neglect of enantiospecific differences between enantiomers introduces unnecessary uncertainty into environmental risk assessments for chiral contaminants. We will review reported enantiospecific differences in fate and effects for aquatic contaminants, including our own work on chronic sublethal enantiospecific effects. We will also present our recommendations for incorporating enantiospecific differences into the ecological risk assessment process and a proposed method for quantifying relative risk between enantiomers of a chiral compound, the enantiomer hazard ratio (EHR).

AGRO 140

Ecology and evolution of the British super rat

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Abstract not available.

AGRO 141

Recent finding in the development of noninvasive method to monitor wildlife exposure to bromadiolone

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Poisoning of non target vertebrates with rodenticide is commonly reported, the environmental risk of the molecule depending on both its toxicity and on the exposure of non target animals. The aim of this work was to assess the feasibility of monitoring the exposure of foxes (*Vulpes vulpes*) to bromadiolone by analysis of residues in faeces following a field treatment. This study was carried out in two parts: First, 4 captive foxes were fed with bromadiolone-contaminated voles for 2 or 5 days. Then, faeces and blood were collected for bromadiolone titration and blood clotting tests were performed during 30 days. A new LC-MS method was developed for analysis. Bromadiolone residues in faeces and blood exhibited similar patterns over time: a dramatic increase during the intoxication period and then a gradual decrease after the last intoxication. Bromadiolone was detected in faeces 15 hours after the first intoxication and for at least 24 days after the last intoxication (end of the experiment). Two of the foxes presented very severe external haemorrhages 6 days after the first intoxication. Their prothrombin time (PT) was multiplied by 6 compared to the day before intoxication and vitamin-K was administered. In a second time, we aimed at determining if the proportion of faeces with bromadiolone residues is related to the proportion of foxes with liver residues in field surveys. Sixty foxes will be trapped in areas treated for vole control and their liver will be collected for bromadiolone titration. At the same time, faeces sampling will be carried out in the same areas. Field experiments are currently in progress and the results will be presented during the symposium. These findings could be the basis of programs for understanding and monitoring the exposure of wild fox populations to bromadiolone using standard sampling and analysis of faeces, a non-invasive method.

AGRO 142

Irrigation incorporation and tillage impacts on runoff, erosion and preemergence herbicide loss

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Post application herbicide incorporation by irrigation has the potential to reduce runoff risks while improving weed control. Although the practice is specified on many product labels environmental benefits are uncertain. To address questions regarding potential impacts in the Coastal Plain region of Georgia (USA), we conducted a series of rainfall simulations and quantified runoff, sediment loss and loss of two herbicides, metolachlor and pendimethalin, as a function of tillage, strip (ST) versus conventional (CT), with and without post-application herbicide incorporation by irrigation. Irrigation contributed to greater runoff volumes and increased erosion but loss of both herbicides was reduced in both tillage systems. The impact was greatest for metolachlor on CT plots where a 2-fold reduction was observed. Generally the study demonstrated that irrigation incorporation can reduce preemergence herbicide losses. Adoption and implementation of the practice throughout the region is recommended.

AGRO 143

Carbonate and magnesium interactive effect on phosphorus recovery from dairy manure wastewater

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Recovery of phosphorus (P) from dairy manure wastewater in an easily-dewatered form would enable farmers to manage P as a resource rather than land-apply it in excess at environmental risk. The purpose of this study was (1) to evaluate the feasibility of P recovery from flushed dairy manure wastewater; (2) to evaluate the form of recovered P precipitates; and (3) to determine effect of CO_3^{2-} and Mg^{2+} on P precipitation from flushed dairy manure wastewater using crystallization in a fluidized-bed reactor. Wastewater was pumped directly from a dairy farm reservoir and continuously fed in parallel through four bench-scale fluidized bed reactors deployed on-site. Chemical additives (NaOH and $MgSO_4$) required for recovery were injected directly into the zone of fluidization. Recovered P forms were assessed by X-ray diffraction, scanning electron microscopy, and micro-elemental analysis. Raising pH alone failed to recover P as Ca phosphate precipitates due to preemptive $CaCO_3$ formation. In conjunction with $MgSO_4$ addition, pH elevation induced crystalline hydroxylapatite (HAP: $Ca_5(PO_4)_3OH$) precipitation which was documented in coatings ultrasonically removed from quartz seed grains following fluidization. Addition of $MgSO_4$ was required to prevent $CaCO_3$ precipitation because CO_3^{2-} and Mg^{2+} would complex to form aqueous $MgCO_3$ and thereby reduce free CO_3^{2-} and Mg^{2+} activities, resulting in less $CaCO_3$ and enhanced HAP precipitation. Addition of $MgSO_4$ increased P recovery by 35% compared to its absence.

AGRO 144

Fipronil residues remaining in heavy clay soils seven years after application effect nontarget arthropods

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Fipronil's broad-spectrum neurotoxin activity selectively inhibits insect gamma aminobutyric acid receptors and results in hyper-excitation, paralysis and death. Non-insect arthropods also exhibit high sensitivity to Fipronil and its degradation products: Fipronil desulfinyl, Fipronil sulfide, Fipronil sulfone. The use of Fipronil on heavy clay soils may adversely influence crop rotation to the crustacean Procambarus clarkia (aka crawfish). A field study evaluating changes in the concentration of Fipronil and three degradates seven years after broadcast soil application for rice weevil control suggests that the published half-lives for Fipronil (75 – 213 days) underestimate the residual concentrations in the heavy clay soils characteristic of crawfish production areas. Analysis of shallow field soils for Fipronil and three degradates supports half-lives ranging from 152 to 631 days under southern Louisiana field conditions. The elimination or significant reduction of non-target arthropods in the rice/crawfish rotation collaborates the observed chemical persistence of biologically active pesticide reside.

AGRO 145

Electrochemical degradation of obsolete pesticide stocks

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Pesticides disposal can cause serious problems. Four commercial phosphorothioate pesticides (Demeton-*S*-methyl, Metamidophos, Fenthion, Diazinon), two phosphorodithioate (dimethoate, malathion) and two organophosphoric (Monocrotophos, Phosphamidon) were treated by an electrolysis system using Ti/Pt as anode and stainless steel 304 as cathode. A number of experiments were run in a laboratory scale pilot plant and the results are presented. For Fenthion the achieved reduction was over 60%, while for Demeton-*S*-methyl, Metamidophos and Diazinon was more than 50%. For dimethoate the achieved COD reduction was over 70%, while for malathion it was over 40%. For Monocrotophos the achieved reduction was over 28%, while for Phosphamidon was nearly 26%. The COD / BOD5 ratio was improved after electrolysis for all pesticides examined. As a conclusion, electrochemical oxidation could be used as a pretreatment method of the pesticides detoxification. A proposed mechanism of the electrochemical process is presented.

AGRO 146

Vitamin C protection against aluminum stress

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The deterioration effects of aluminum chloride AlCl3 medium dose (30 mg/kg body weight/day) short-term (40 days) in drinking water were studied on experimental rat brain, serum, bones and kidneys. Vitamin C as reducing agent was given orally to detect the effect of antioxidants to protect rat from suppressing caused by aluminum-stress in drinking water. Vitamin C was used as commercial chemical, pharmacological drug and aqueous balady orange peel extract in the same vitamin concentration (1.4 g/L). Comparing to negative untreated rat, Al in drinking water (positive control) significantly decreased daily body weight gain, daily feed intake and food efficiency. Causing neurotoxic effect and oxidative damage, Al increased serum cholinesterase ChE insignificantly, brain ChE significantly and lipid peroxidation LP significantly as well. Al showed significant decreased of serum vitamin C content. Serum lipid profile and kidneys profile have been studied. Neurodegenerative changes have been noticed as neurotic plaques and necrosis in the cerebellum. Comparison study between different vitamin sources; (commercial, medical and natural extracted) effects on deterioration effect of Al has been done. Comparing to positive control, vitamin C sources showed significant increase for food efficiency. Extracted vitamin insignificantly reduced serum ChE activity and improved HDL, and LDL values, insignificantly. While, medical vitamin showed significant decrease of brain ChE, improved kidney function significantly and increased serum Ca insignificantly. Apparent and normal histopathological changes have been detected especially with sections of natural vitamin extract.

AGRO 147

Studies on blends of polyvinyl alcohol and natural polyphenols: Specific interactions and properties

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In this paper, blend of tea polyphenols (TP)/polyvinyl alcohol (PVA) was prepared by solution casting relating to different ratios. By using FTIR, UV, DSC and contact angle measurement, the blend was studied relating to its intermolecular interactions, miscibility, water absorption and, surface properties and UV protection.

AGRO 148

AGRO symposia: Past and future

John J. Johnston*, Chemistry, National Wildlife Research Center/APHIS/USDA, 4101 LaPorte Ave, Ft Collins, CO 80521, Fax: 970-266-6063, john.j.johnston@aphis.usda.gov*

The AGRO division is undergoing a reinvention process. We are attempting to rejuvenate our division in part, by re-defining our areas of interest to include emerging relevant areas of science that are related to agricultural chemistry and pest management. This presentation will summarize past successful areas of technical programming as well as future possibilities. The goal of this presentation is to initiate an effort for the creation of an "umbrella statement" for AGRO; a statement which will help to define our areas of scientific interest and future membership base.

AGRO 149

Technical programming: The lifeblood of the division

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Technical programming provides the foundation of the AGRO division. AGRO's efforts to expand into new areas of relevant science will inevitably be reflected in future technical programming. This presentation will summarize future programming decisions and directions.

AGRO 150

AGRO membership trends and plans

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Concurrent with AGRO's efforts to expand into relevant areas of emerging science are plans to increase membership by attracting scientists from these newly identified disciplines. Potential means to attract new members as well as efforts to retain active members will be discussed.

AGRO 151

PICOGRAM: AGRO's communication pipeline

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The *PICOGRAM*, AGRO's newsletter, serves as the primary communication tool for our division. Pending changes to the *PICOGRAM* as well as changes in distribution methods will be presented and discussed.

AGRO 152

AGRO strategic planning: A recipe for success!

Laura L. McConnell, *USDA-ARS, Beltsville Agricultural Research Center, Beltsville, MD 20705, Fax: 301-504-5048, laura.mcconnell@ars.usda.gov*

Strategic planning is essential to the continued viability of AGRO. Past success of initial AGRO strategic planning efforts will be summarized. More importantly, future strategic planning efforts will discussed and finalized.

AUTHOR INDEX

FUEL DIVISION

FUEL 30

Biodiesel production from canola oil and waste fryer grease and conversion of glycerol to value-added liquid chemicals

Ajay K. Dalai[1], *Titipong Issariyakul*[2], *Mangesh G. Kulkarni*[2], *Kapil Pathak*[2], *Lekha C. Meher*[2], *and Narendra N. Bakhshi*[2]. *(1) Catalysis and Chemical Reaction Engineering Laboratories, Department of Chemical Engineering, University of Saskatchewan, 57 Campus Drive, Saskatoon, SK S7N 5A9, Canada, Fax: 306 966 4777, ajay.dalai@usask.ca, (2) Chemical Engineering, University of Saskatchewan, Saskatoon, SK S7N 5A9, Canada*

Fatty acid methyl and ethyl esters were produced from canola oil and waster fryer grease by means of transesterification with methanol, ethanol, and mixed methanol/ethanol. Transesterification was carried out at 25 to 70 oC with 6:1 alcohol to oil molar ratio using KOH as a catalyst. All the esters produced met ASTM standard and showed excellent property as lubricity additive when added at 1 vol.% as diesel fuel extender. Although, the formation of ethyl ester has proved to be more challenging than methyl ester, ethyl ester had better low-temperature properties when compare to methyl ester. The kinetic study of transesterification of WFG suggested that the conversion of triglyceride to diglyceride was the rate determining step (RDS). The activation energies of RDS were 36.2 kJ/mol and 16.8 kJ/mol for forward and reverse reaction, respectively. Glycerol was converted to various value-added liquid chemicals. The maximum liquid product (83g/100g feed) was obtained over catalyst B and C at 380 oC and WHSV of 8.7 hr-1.

FUEL 31

Biodiesel from soapstock

Edwin S. Olson, *Ramesh K. Sharma, and Ted R. Aulich, Energy & Environmental Research Center, University of North Dakota, 15 North 23rd Street, Grand Forks, ND 58203, Fax: 701-777-5181, eolson@undeerc.org*

An acid-catalyzed transesterification process was devised and tested for producing methyl ester biodiesel from inexpensive soapstock feedstocks, which are by-products from the vegetable oil-processing industry with high free fatty acid content. The process used solid acid catalysts, which avoided the need for neutralization. Methyl formate served as the alkylating agent, and the reaction was driven toward ester formation by pressure formed at elevated temperatures. High yields of methyl esters were obtained.

FUEL 32

Kinetics of soybean oil transesterification in a batch system

Richard S. Parnas[1], *James D. Stuart*[2], *Benjamin Wilhite*[3], *Si-Yu li*[3], *clifford weed*[3], *and Matthew Boucher*[3]. *(1) Institute of Materials Science and Department of Chemical, Materials and Biomolecular Engineering, University of Connecticut, 97 N. Eagleville Road, IMS, U-3136, Storrs, CT 06269-3136, rparnas@ims.uconn.edu, (2) Department of Chemistry, U-3060, University of Connecticut, Storrs, CT 06269-3060, (3) Department of Chemical Engineering, Univeristy of Connecticut, Storrs, CT 06269-3222*

The University of Connecticut Biofuels Consortium has investigated the kinetics of soybean oil transesterification to biodiesel, or fatty-acid methyl esters. The experimental techniques used are well known and were done on a liter bench scale batch system (1,2). The results obtained were analyzed using gas chromatography by ASTM methods (3) and were compared to other literature (1,2).

References (1) Sendzikiene, S.; Makareviciene, V. Kinetics of Free-fatty Acid Esterification 2004. (2) Darnoko, D.; Cheryan, M. Kinetics of Palm Oil Transesterification in a Batch Reactor. University of Illinois, Dept. of Food Science and Nutrition 2000. (3) ASTM. Test Method for: Determination of Free and Total Glycerin in B-100 Biodiesel Methyl Esters by Gas Chromatography 2000.

FUEL 33

Evaluation of partially hydrogenated soybean oil methyl esters as biodiesel

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Specifications mandating biodiesel quality, most notably in the EU (EN 14214) and the USA (ASTM D 6751), have emerged that influence feedstock choice in the production of biodiesel fuel. For instance, EN 14214 contains a specification for iodine value (IV, 120) that eliminates soybean oil (SBO) as a potential feedstock, as it generally has an IV >120. Therefore, partially hydrogenated SBO methyl esters (PHSME, IV = 116) was evaluated as a potential biodiesel fuel by measuring a number of important fuel parameters, such as oxidation stability, low temperature performance, lubricity, kinematic viscosity, and specific gravity. Compared to soybean oil methyl esters (SME), PHSME exhibited superior oxidative stability and similar specific gravity, but inferior low temperature performance, kinematic viscosity, and lubricity. However, the kinematic viscosity and lubricity of PHSME were still within prescribed US and EU limits. There is no set value for low temperature performance in biodiesel specifications, but PHSME has superior cold flow behavior when compared to other alternative feedstock fuels, such as palm oil, tallow and grease methyl esters. The production of PHSME from refined SBO would increase biodiesel production costs by US$0.04/L (US$0.15/gal) in comparison to SME. In summary, PHSME is within both the EU and American standards for all properties measured in this study and deserves consideration as a potential biodiesel fuel.

FUEL 34

Testing biodiesel samples according to ASTM methods

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To characterize various student-made and commercial biodiesel (B-100) samples, six different ASTM methods have been implemented at UCONN's Biodiesel Laboratory located in the Department of Chemical Engineering. Those methods are the following: 1. Visual Inspection ASTM D4176 2. Acid Number (Manual) ASTM D664 3. Cloud Point (Automated) ASTM D2500 4. Flash Point ASTM D93 5. Viscosity Kinematic (Manual) ASTM D445 6. Free and Total Glycerin (ASTM D6584)

FUEL 35

Novel heterogeneous esterification and transesterification catalysts for producing low-cost biodiesel from high-FFA feedstocks

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Biodiesel costs about $3/gallon to produce—including ~$2/gallon for the primary feedstock (soybean oil). However, cheaper alternative feedstocks usually contain significant amounts of free fatty acids (FFA)—molecules that are detrimental to the function of conventional transesterification catalysts (e.g., NaOMe), and therefore, must be removed before these feedstocks can be used for biodiesel production. In this presentation, we will discuss novel catalysts and processes recently developed in our laboratory: (1) new transesterification catalysts that can tolerate water and FFA in the feedstock for the high-volume, continuous biodiesel production; (2) a second esterification catalyst to manufacture biodiesel from very cheap acidulated soapstocks—FFA wastes generated in food, detergent and conventional biodiesel industries; and (3) the combined use of our esterification and transesterification catalysts to allow high-FFA feedstocks (e.g., brown grease) to be used for biodiesel production. Both FFA and triglycerides will be converted into biodiesel via esterification and transesterification transformations, respectively.

FUEL 36

Catalytic production of biodiesel from high fatty acid-containing feedstocks

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Biodiesel is a renewable fuel that is typically made by base-catalyzed transesterification of an oil or fat to simple fatty acid esters. The cost of the feedstock (e.g., soybean oil) is the major factor in producing biodiesel. High fatty acid-containing feedstocks such as yellow and brown greases are readily available, inexpensive, and renewable resources and hence are attractive feedstocks for the production of biodiesel. The high free fatty acid (FFA) content of these feedstocks, however, makes it difficult to produce biodiesel using base-catalyzed transesterification. A promising approach is to add an acid pretreatment step in order to reduce the FFA content in the greases to <1 wt% prior to alkali transesterification. However, the need of using a large amount of base to neutralize the acid catalyst remaining in the pretreated greases in this two-step process increases the production cost of BD from greases. We have developed several approaches to immobilizing highly acidic diarylammonium catalysts onto mesoporous silica materials and crosslinked poly(divinylbenzene) matrices. These recyclable and reusable heterogeneous diarylammonium catalysts are highly effective in catalyzing the esterification of the FFA present in greases to methyl esters to reduce the FFA content from 12-40 wt% to <1 wt%. The resulting ester-glyceride mixture (pretreated grease) could then be readily converted to methyl esters by base-catalyzed transesterification. We have thus developed a highly efficient two-step process for the production of biodiesel in >99% yield from readily available, inexpensive, and renewable high FFA-containing feedstocks.

FUEL 37

Designing a biodiesel fuel with optimized fatty acid composition

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Biodiesel is an alternative to petroleum-derived diesel fuel, although it can replace only a few percent of current petrodiesel production. It is technically competitive with petrodiesel. Technical problems with biodiesel are oxidative stability, cold flow, and increased nitrogen oxides (NOx) exhaust emissions. These aspects are influenced by the fatty acid profile of the biodiesel used. Other important properties of a diesel fuel are cetane number, viscosity and lubricity. Saturated fatty esters possess poor cold flow properties to biodiesel but offer advantage in terms of oxidative stability and combustion properties. Conversely, unsaturated fatty esters, especially polyunsaturated species, possess better cold flow properties to biodiesel but less advantageous oxidative stability and combustion properties. Biodiesel fuels generally contain mixtures of these compounds with property trade-offs. This leads to the question of how to design a compositionally modified biodiesel fuel acceptable with respect to all important properties affected by fatty acid composition.

FUEL 38

Study of Mg-Al hydrotalcite derived catalysts for biodiesel synthesis from poultry fat

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Study of Mg-Al Hydrotalcite Derived Catalysts for Biodiesel Synthesis from Poultry Fat
Calcined Mg-Al hydrotalcite (CHT) catalysts have been studied for the conversion of lipid feedstocks, such as poultry fat, to biodiesel. CHT catalysts showed high catalytic activity for triglyceride (TG) transesterification with methanol without signs of catalyst leaching. Catalyst activity was affected by pretreatment and operating conditions. The optimum HT calcination temperature was 550°C. Methanol had to be pre-contacted with the catalyst before reaction; otherwise, catalyst activity was hindered probably due to the strong adsorption of TG molecules on catalytic sites. Reaction parameters like temperature (60-120°C) and methanol-to-TG molar ratio (6:1-60:1) positively affected the reaction rate. Catalyst deactivation was significant during the first reaction cycle probably due to deactivation of the strongest base sites. Catalyst activity, however, remained stable during subsequent reaction cycles. Catalyst activity was completely restored by re-calcination in air. Probable chemical pathways leading to catalyst deactivation will be discussed.

FUEL 39

Synthesis and characterization of a novel solid acid catalyst for improved biodiesel production

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The interest in alternative fuels has increased dramatically in recent years due to the rising cost and environmental concerns related to fossil fuels use. The purpose of this work was to synthesize and characterize a carbon based solid acid catalysts for fatty acid methyl ester production. An amorphous carbon catalyst was synthesized using the reaction of sucrose and sulfuric acid under controlled conditions. Catalysts were then characterized using x-ray photoelectron spectroscopy (XPS) attenuated total reflectance spectroscopy (ATR), and thermal gravimetric analysis (TGA). Results showed the presence of surface sulfonic acid and carboxylic acid groups and titration techniques were used to determine the concentration of both strong acid and total acid groups. Catalytic activity was monitored using the esterification of oleic acid and reaction kinetics were monitored using ATR to determine carboxylic acid and methyl ester content respectively. Conversions in excess of 90% were seen for some pre-treatments, and catalytic activity compared favorably to commercial solid acid catalysts.

FUEL 40
Solid acid catalyst prepared from polysaccharid and glucose

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Solid acids are conventional materials that have wide applications in chemical prodution. In this work, a kind of solid acid catalyst for preparing biodiesel was produced with polysaccharid and glucose. First the natural products, such as starch or sugar, were incompletely carbonized to get a rigid carbon material composed of small polycyclic aromatic carbon sheets. Then the sulphonite groups were introdued by liquid sulphuric acid. The black powder obtained was in soluble in water, methanol and biodiesel. At last Esterification and transeterification of soybean oil and methanol on this catalyst to prepare biodiesel was studied.

FUEL 41
Study on combustion performances of a new rapeseed oil monoester as biodiesel

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Over the last two decades, the awareness of complete depletion of petroleum oil in the near future and serous atmospheric pollution caused by automobile industry has promoted much research for clean alternative fuels substituting for the fossil fuels. One of the most promising alternative energy sources is biodiesel. It contains much less sulfur and nitrogen which makes it more environmentally friendly than petroleum fuels. It is renewable and available at any part of the world presenting a bright future for practical application. However, the oxygen content in conventional biodiesel is at comparatively lower level. Consequently, the reduction in smoke emissions is not just as significant as anticipated when diesel engine burns it or its mixture with diesel fuel. In a previous research, rapeseed oil monoester of ethylene glycol monomethyl ether was proposed as a new biodiesel. Presented in the current paper are its combustion performances. The study carried out in this paper shows that rapeseed oil monoester of ethylene glycol monomethyl ether ignites 1.5ºCA earlier and thus has a shorter ignition delay than diesel fuel. When diesel engine is fueled with the new biofuel in place of diesel fuel, both engine in-cylinder pressure and its changing rate with crankshaft angle increase to some extent. The combustion of the new rapeseed oil monoester can lead to a little higher heat release rate than diesel fuel. Utilization of it can remarkably improve engine brake thermal efficiency due to certain amount of oxygen contained in the new biodiesel.

FUEL 58
Ethanol: A green raw material for the petrochemical industry

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Ethylene is an important monomeric raw material for the petrochemical industry. It is used among other things for the production of polyethylene and polyvinyl chloride (PVC) and it is obtained by pyrolysis of naphtha or other fossil based hydrocarbons. Environmental concerns and high petroleum prices have spurred a renewed interest on other sources of ethylene, including ethanol, which can be used as a new raw material for ethylene production. A number of catalytic ethanol dehydration commercial units have been built in the 1950's and 1960's in South America and Asia. These units were based on the passage of ethanol vapor over solid catalysts, such as alumina. Reactors consisted of fixed or fluidized beds. Nevertheless, due to high ethanol prices and the uncertainties related with ethanol price volatility, these dedicated units have been deactivated. However, ethanol can be successfully dehydrated in an FCC unit to produce ethylene, by co-processing with regular FCC feeds, such as Heavy Vacuum Gasoils, and catalysts. Yields are as high as those obtained commercially in dedicated units, of around 95% (stoichiometric), producing an enriched ethylene fuel gas. There are many advantages in this approach: it is not necessary additional investments in the FCC unit and ethanol feeding can be interrupted without any disturbance on FCC operation, if ethanol prices become unattractive.

FUEL 59
Alkaline hydrothermal conversion of carbohydrate biomass into formic acid at mild temperatures

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A new method for the production of formic acid from carbohydrate biomass by an alkaline hydrothermal process is proposed. Glucose, a model compound of carbohydrate biomass, was oxidized with temperature varying from 200oC and 350oC, reaction time varying from 10 to 300 s and H_2O_2 supply varying from 0 to 150%, with and without alkali using a batch reactor. In the case of no-adding of alkali, the highest yield of formic acid was 24 %, which occurred at a temperature of 250 oC for reaction time of 60 s with 120 % oxygen supply. When adding alkali, the yield of formic acid increased greatly. An excellent formic acid yield of 75 % was achieved, which occurred at 250 oC for 60 s with 120 % oxygen supply and the KOH concentration of 1 M. This result should facilitate the study on the production of hydrogen from carbohydrate biomass via formic acid.

FUEL 60

Ni-olivine catalysts prepared by direct thermal diffusion of Ni into olivine: Applications for biomass gasification

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A new method for preparing Ni-olivine catalysts is presented and discussed. In this approach, catalytically-active materials have been prepared by direct, thermal diffusion of Ni metal and Ni compounds into olivine particles that are of a proper size to be employed in fluid-bed biomass gasification (200-400 micrometer fragments) or incorporation into catalyst monoliths. In a dedicated catalyst test facility with synthesized syngas, packed beds of Ni-olivine catalysts prepared according to this approach have been evaluated for extended periods and demonstrated to be effective in decomposing naphthalene (a surrogate for the tars typically found in biomass-derived syngas) and reforming methane. These catalysts have been prepared at temperatures ranging from 1000°C to 1400°C in both inert and oxidizing atmospheres and have been found to exhibit catalytic activity with synthesized syngas containing H2, CO, CO2, CH4, H2O, N2, and naphthalene at reaction temperatures ranging from 650°C to 900°C.

FUEL 61

Conversion of gylcerol to gasoline over acidic zeolites and Pd/ZnO catalysts

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Glycerol is a byproduct in the production of biodiesel from transesterification of vegetable oil. Catalytic reactions for conversion of glycerol to fuel are of interest for utilizing a potentially abundant byproduct for production and upgrading of biofuels. The conversion of glycerol to gasoline was studied on acidic zeolites. The results show that three dimensional pore zeolites, for instance, HZSM-5, HZSM-11, and HY zeolites tend to produce aromatics. Although the pressure was high (300 psig), aromatics were still produced over 3-D zeolites. However, no aromatics were produced on HMOR or H-OMEGA, with a 1-D pore structures. The products observed from the reaction included formaldehyde, acetaldehyde, acetol, etc. Using a Pd/ZnO catalyst in the first bed, the glycerol could be deoxygenated to the C1, C2, and C3 carbonyls. These intermediates can react further on either HY or HZSM-5 in the second catalytic bed to produce fungible gasoline range molecules.

FUEL 62

Production of hydrogen from biomass: Integrated biological and thermo-chemical approach

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Hydrogen production from biomass was investigated using an integrated biological and thermo chemical process. Glucose was used as a biomass surrogate. Glucose was first converted to ethanol in a fermentation process. The fermentation experiments were carried out using Saccharomyces cerevisiae. The fermentation broth was then used in aqueous phase reforming (APR) over a platinum-based catalyst. The hydrogen obtained from APR of the fermentation broth was compared against the yield from a simulated sample containing 5% pure ethanol. While the catalyst was stable for an extended time on stream during APR of ethanol, very rapid deactivation was observed in the case of fermentation broth. The different catalyst characterization techniques were employed to investigate the causes of catalyst deactivation. The preliminary results indicate that the catalyst is being poisoned by the impurities present in the fermentation broth. These impurities are suspected to be S- and P-containing materials. The effect of S and P on the deactivation of the catalyst is being studied by doping the simulated ethanol mixture with the model compounds such as amino acids containing S and ATP.

FUEL 63

Sustainable energy and chemical sciences collaboration in biomass conversion research between the US and Brazil

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The US and Brazil are active in bio and thermo chemical research and technology applied to conversion of basic biomass building blocks to develop a wide variety of fuels, chemicals, and materials. Through a partnership with the US National Science Foundation Discovery Corps Program, the Brazilian Chemical Society, the Brazilian Agricultural Research Corporation (EMBRAPA) and the ACS FUEL, AGFD AGRO, and BIOT Divisions, this project is developing an exchange / collaboration framework and a bilateral research agenda associated with the chemistries of crop-based and naturally occurring biomass feedstocks; biorefining, storage and transportation; and by/value-added co-products. Described briefly in this session will be key project outputs including best science of biorenewable chemistry (Brazilian graduate student poster winner), a May 2007 symposium in Brazil, web/audio seminars, and coordinated site visits of research labs and product facilities in Brazil.

FUEL 67

Co-processing in FCC units: Catalytic co-cracking of hydrocarbons and oxygenated biomass compounds

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Biomass attracted recently attention as a potential energy source for the production of transportation fuels. The fast pyrolysis of biomass produces a condensate, called bio-oil, which is a complex mixture of a wide range of oxygenated compounds. This bio-oil could serve as renewable feedstock for bio-fuel production by suitable refinery co-processing when solving polymerisation issues. However, necessary adaptations of large-scale refinery units yielding automotive fuels are delicate. It should exclude a disturbance of the large-scale processing scheme and require co-processing of bio-oils to proceed at lower cost than dedicated biomass-processing units. Our study focuses on the co-feeding of hydrocarbon and oxygenated compound mixtures into a catalytic reactor simulating the FCC reaction conditions in the range of 450-530°C. Oxygenated compounds (acetone, acetic acid, i-propanol) representative for the bio-oil composition and model hydrocarbons (i-octane) are used as feed. The cracking reaction is evaluated in terms of conversion, product distribution, and catalyst stability.

FUEL 68

Millisecond catalytic conversion of nonvolatile carbohydrates for sustainable fuels

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Carbohydrates such as glycerol and D-Glucose can be directly converted to synthesis gas products near equilibrium on RhCe/Al2O3 catalysts at residence times less than 70 milliseconds. With the addition of the steam, ~80% of the hydrogen in glycerol can be converted directly to H2. Selectivity to H2 and CO from D-glucose was observed ~50% near equilibrium maintaining 2/3 of the carbohydrate fuel value. Autothermal conversion is likely to occur by coupling the endothermic decomposition process with highly exothermic catalytic partial oxidation. By directly contacting carbohydrate particles with a hot catalytic surface capable of providing high heating rates, the solid particle forms volatile organics which flow into a porous catalyst and reform with oxygen from air to form synthesis gas. Deactivation over 20 hrs of operation was not detected, possibly because the formation of char is limited by high particle heating rates.

Winner of the Brazilian poster competition on bioconversion energy.

Determination of carbonyl compounds (C1-C4) emitted by diesel engine using blends of the biodiesel:diesel,

Lilian Lefol Nani Guarieiro[1], *Danilo Cardoso Santos*[2], *Ednildo Andrade*[2], *Pedro A. de P. Pereira*[2], *Jailson B. de Andrade*[2], *(1) Instituto de Quimica – UFBA, Campus Ondina, CEP 40170-290, Salvador-BA, lilianlefol@yahoo.com.br, (2) – Escola Politécnica – UFBA, Rua Prof. Aristides Novis, 02 – Federação, CEP: 40210-730, Salvador-BA*

Biodiesel is a renewable fuel and thus becomes an alternative to traditional petroleum fuels. Considered to be the best alternative for diesel, biodiesel can be forms blends with diesel in any ratio, with many environmental, economical and social advantages. Regarding to environmental concerns, many studies have shown that pure biodiesel and blends with diesel can reduce emissions of the regulated substances. However, there is a need to study emissions of some unregulated substances, such as carbonyl compounds (CC) and polycyclic aromatic hydrocarbons (PAHs) which are, or suspected to be, harmful. The aim of the present study was to evaluate the CC profile emitted by burning of pure diesel (B0), pure soy biodiesel (B100) and blends of biodiesel and diesel (B2, B5, B10, B20, B50) in Agrale® intern combustion engine, M85 model - 10 HP mounted on a stationary dynamometer using as fuel. This study evidenced that the acrolein is the major CC emitted from the fuel burn and this emission increases whenever the biodiesel amount is also increased. Influence of thermooxidative degradation of soy and bovine tallow biodiesel in the dynamics of crystallization

FUEL 64

Promoter effects on the reactivity of Rhodium based catalysts for conversion of biomass-derived syngas to ethanol

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Temperature programmed techniques were carried out at elevated pressures to study the effects of Fe, Mn, and Li promoters on the activity of Rh-Al_2O_3 catalysts for ethanol formation. TPR studies revealed that the promoters increasingly shifts Rh reduction to higher temperature in the order RhLi-Al_2O_3 < RhMn-Al_2O_3 < RhMnLi-Al_2O_3 < RhMnLiFe-Al_2O_3 with Fe having the most effect on reduction temperature. Peak ethanol activity precedes peak methane activity by ~25°C on all the catalysts tested suggesting that certain balance of dissociated and non-dissociated surface CO species is necessary for ethanol formation. Rh-Al_2O_3 and RhMnLiFe-Al_2O_3 gave the lowest ethanol intensity because of extreme dissociation of CO on Rh-Al_2O_3 and not enough CO dissociation on RhMnLiFe-Al_2O_3. The highest ethanol intensity was observed on RhLi-Al_2O_3 which exhibits intermediate CO dissociation activity

FUEL 65

Renewable FT-Liquids using Fe and Fe-Co catalysts supported on carbon nanotubes with novel catalyst docking stations

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The economically most promising route to produce a renewable liquid energy carrier 'bio-diesel' is based on the combined use of biomass gasification followed by Fischer-Tropsch synthesis (FTS). The FT process allows for the synthesis of liquid fuels from syngas (CO + H2). Such FT-derived liquid fuels have both low aromatic and sulfur contents which will lead to improved emissions. Syngas derived from renewable biomass contains H2S, NH3, large condensable organic compounds (tar) and ultrafine particulates which can act as catalyst poisons and extensive research focuses on biogas cleaning prior to the FT-process. Robustness and long-term stability are in great demand for FT-catalyst systems to be used for liquid fuel production from biomass. Carbon nanotubes (CNTs) were shown to provide not only excellent structural support for the FT catalyst but can uniquely host the catalyst particles inside nanosized docking stations that developed as a result of the nanotube /catalyst preparation method. The shielding of the catalyst in nanosized docking stations along the nanotube walls is described for the first time. The docking stations inhibit the catalyst particle agglomeration during processing seen in conventional catalysts thus providing higher stability.

FUEL 66

Renewable hydrogen and chemicals from polyols

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There has been a growing emphasis on obtaining fuels and chemicals from renewable sources. Polysaccharides and fatty oils are available in large amounts from renewable raw materials. The development of biodiesel production by transesterification of vegetable oils has yielded large amounts of glycerol as a by-product. Finding new outlets for glycerol would improve the economy of biodiesel production. An important step toward a simple process for the production of hydrogen containing low levels of carbon monoxide is made possible by the discovery that hydrogen can be produced by catalytic reforming of glycols in liquid water at temperatures near 240oC. It is also possible to obtain valuable chemicals such as propylene glycol (1,2-propanediol) and ethylene glycol by hydrogenolysis of polyols such as glycerol and sorbitol.

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