

**Joel R. Coats, Ph.D.**

Charles F. Curtiss Distinguished Professor of Entomology & Toxicology  
Department of Entomology  
Iowa State University, Ames, Iowa 50011  
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Email <jcoats@iastate.edu>

**AREAS OF SPECIALIZATION:**

Insecticide Toxicology  
Environmental Toxicology and Chemistry

**EDUCATION:**

Ph.D.-Entomology (Insecticide Toxicology), Minor in Chemistry, University of Illinois, Urbana-Champaign, IL (1974)

M.S.-Entomology, University of Illinois, Urbana-Champaign, IL (1972)

B.S.-Zoology (with distinction), Minor in Chemistry, Arizona State Univ., Tempe, AZ (1970)

**EXPERIENCE:**

**Department of Entomology-Iowa State University, Ames, Iowa**

Distinguished Professor: 2011 - present

Department Chair: 1999-2004

Interim Chair: 2007–2008, 2011

Professor: 1986 - 2011

Associate Professor: 1981-1986

Assistant Professor: 1978-1981

**Teaching:**

“Insecticide Toxicology” (ENT 675)

“Pesticides in the Environment” (ENT 550)

“Principles of Toxicology” (TOX 501) (coordinator, team taught)

“Toxicology Methods” (TOX 502) (team taught)

“Special Topics in Insect Toxicology” (ENT 590I)

**Research:**

A. Modes of action of natural products as insecticides and repellents, metabolism, quantitative structure-activity relationships, synthesis

B. Fate and effects of agrochemicals in soil, water, and organisms:  
insecticides, herbicides, fungicides, transgenic proteins in GMO's, veterinary  
antibiotics: mobility, dissipation, degradation, residue analysis

**Institute for the Chemistry and Dynamics of the Geosphere, Federal**

**Research Center at Jülich, Germany** (on Faculty Improvement  
Leave from Iowa State University)

Guest Scientist: September 1997 - February 1998

**Department of Environmental Biology, University of Guelph, Guelph,  
Ontario, Canada**

Visiting Professor: 1976-1978

**Teaching:**

“Pesticides in the Environment”

“Biological Activity of Pesticides”

**Research:**

Environmental Toxicology and Chemistry - Pesticides

Insecticide Toxicology

**Department of Entomology, Univ. Illinois, Urbana-Champaign, Illinois**

Postdoctoral Research Associate: 1974-1976

FDA Project on Environmental Fate & Effects of Six Veterinary Drugs  
and Feed Additives

**SCIENTIFIC ORGANIZATIONS**

American Association for the Advancement of Science

American Chemical Society

Entomological Society of America

Pesticide Science Society of Japan

Society of Environmental Toxicology and Chemistry

**HONORS**

Alumni Achievement Award, College of Liberal Arts and Sciences, University  
of Illinois, Urbana-Champaign, IL (2013)

Charles F. Curtiss Distinguished Professor (2011)

International Award for Research in Agrochemicals, American Chemical  
Society – Agrochemicals Division (2006)

Outstanding Toxicology Faculty Mentor Award (2011)  
Fellow, Entomological Society of America (2007)  
Fellow, American Association for the Advancement of Science (1987)  
Fellow, Agrochemicals Division of American Chemical Society (1992)  
Research Award of Merit, Gamma Sigma Delta Honor Society of Agriculture,  
Iowa State University (2005)  
Excellence in Applied Research Award, Iowa State University College of  
Agriculture (1989)  
Mid-career Award for Research Achievement, Iowa State University  
Foundation (1992)  
Entomology Recognition Award, North Central Branch, Entomological  
Society America (1996)  
Guest Scientist Fellowship, Federal Research Center – Jülich, in Jülich,  
Germany (9/97- 2/98)  
Newsmaker Award, American Chemical Society, Washington, DC (8/2000)  
Faculty Appreciation Award – ISU Entomology Graduate Student  
Organization (2000)  
Best Ecological Risk Assessment Paper (co-author) – 2001, *J. Human &  
Ecological Risk Assessment*  
Distinguished Alumni Seminar, Dept Entomology, Univ. Illinois, Urbana-  
Champaign (2002)  
Beta Beta Beta Biology Honorary  
Sigma Xi Research Honorary Society (Executive Committee at ISU)  
Phi Kappa Phi Honor Society (Past President of ISU Chapter)  
Gamma Sigma Delta Agriculture Honorary

#### **PROFESSIONAL SERVICE**

Program Chair, 4<sup>th</sup> Pan-Pacific Conference on Pesticide Science (2008)  
Program Chair, 2<sup>nd</sup> Pan-Pacific Conference on Pesticide Science (1999)  
American Chemical Society, Agrochemicals Division:  
Finance Committee Chairman (2010-2013)  
Councilor (2002-2008)  
Chairman (1992)  
Program Chairman/Chairman-Elect (1991)

Vice Chairman (1990)  
Executive Committee (1987-1993, 2002-2008)  
Nominating Committee Chairman (1993)  
Awards Committee Chairman (1994-2003)  
Strategic Planning Committee (1993-1999)  
Alternate Councilor (1998-2001)

American Chemical Society

Committee on Environmental Improvement (2003-2009)

Society of Environmental Toxicology and Chemistry,

Ozark-Prairie Chapter:

President (2004), Vice President (2003)

Board of Directors (1986-1990; 1996-99; 2002-05; 2009-13)

Nominating Committee (1990-1993)

Society of Toxicology, Central States Chapter:

President (1989)

Program Chair (1988)

Executive Committee (1986-90)

*Pest Management Science* – Associate Editor (2008-2014)

*Pesticide Biochemistry and Physiology*-Editorial Board (1992-2004)

*Bulletin of Environmental Contamination and Toxicology*-Editorial Board  
(1992-2014)

Iowa State University-Toxicology Supervisory Committee

Member (1985-2013)

Chair (1985-87, 91-93)

Environmental Protection Agency

Board of Scientific Councilors (BOSC) – Safe Pesticides & Safe  
Products Subcommittee (2007-2008)

Scientific Advisory Panel – Atrazine & Amphibians (2003)

Scientific Advisory Panel - Pesticide Fate Studies (1998)

Scientific Review Panel - Environmental Biology (1986-99)

Review Panel: evaluation of the Mid-Continent Ecology Lab-Duluth,  
MN (2007)

National Institutes of Health

Toxicology Review Panels (1986-1987, 1996-1997, 2004, 2010)

Entomological Society of America

Early Career Innovation Award Committee (2009)

Council of Entomology Dept. Administrators (1999-2004, 2007-2008)

Fellow Selection Committee (2010-2013)

Innovation Award Committee (2012-2013)

Bussart Award Committee

Section B-Physiol., Biochem. Toxicol.

Nominating Committee

Program Chairman, North Central Branch (1995)

C.V. Riley Award Chairman, North Central Branch (2004-05)

### **ACADEMIC SERVICE**

Chair and Director of Graduate Education, Toxicology Interdepartmental

Program, Iowa State University (1985-1987 & 1989-1991)

Director of Graduate Education – Department of Entomology (2004-2013)

Supervisory Committee – Toxicology Interdepartmental Program

(1985-2013)

College of Agriculture Research Grants Review Panel, Iowa State University

(1988-1993)

College of Agriculture and Life Sciences Distinguished Professor Award

Committee (2012)

Mentoring Undergraduate Research Students & Interns

Honors Program Research Projects – 11

George Washington Carver, Women in Science & Engineering,

Howard Hughes Research Interns, Undergraduate Research Assistants -

17

Mentoring Visiting International Scholars and Trainees: (1-6 months) – 15

Adjunct Professor – The Institute for Environmental and Human Health, Texas

Tech University, Lubbock, TX (2000-2013)

### **PATENTS - 9**

U.S. Patent No. 7,939,091; 2011. Biorational Repellents Obtained from

Terpenoids for Use against Arthropods - B2

U.S. Patent No. 7,524,888; 2009. Biorational Repellents Obtained from Terpenoids for Use against Arthropods

U.S. Patent No. 6,545,043; 2003. Compounds Related to Natural Sources and Their Use as Biopesticides

U.S. Patent No. 6,524,605; 2003. Biorational Repellents Obtained from Terpenoids for Use against Arthropods

U.S. Patent No. 6,207,705; 2001. Novel Biopesticides Related to Natural Sources

U.S. Patent No. 6,099,850; 2000. Termite and Boring Insect Barrier for Protection of Wooden Structures

U.S. Patent No. 4,594,360; 1986. Chloronitroalkane Insecticides

U.S. Patent No. 4,118,424; 1978. Biodegradable Insecticides

U.S. Patent No. 4,003,950; 1977. Diphenylmethyl Biodegradable Insecticides

#### **SCIENTIFIC PUBLICATIONS (Total 193)**

**BOOKS (10)**

**REVIEW ARTICLES (7)**

**BOOK CHAPTERS (40)**

**REFEREED JOURNAL ARTICLES (139)**

#### **SUMMARY OF PUBLICATIONS**

1. Environmental toxicology and chemistry of pesticides (105 total)
  - a. Pesticides in soil (58)
  - b. Pesticides in aquatic systems (19)
  - c. Other (residue analysis, methodology) (17)
2. Insect toxicology (85 total)
  - a. Mode of action, structure-activity (36)
  - b. Metabolism, selectivity, natural products, repellents, methods (49)

#### **EXTRAMURAL FUNDING**

Total during 35 years at Iowa State University: \$7 million; sources: USDA, EPA, DOD, numerous other sources

#### **INVITED PRESENTATIONS**

**International – 30**

**National – 70**

**Regional and State – 32**

## **CONTRIBUTED PAPERS**

Approximately 60 presented

Co-author of approx. 230 papers presented by students at scientific meetings

Symposia Organized at National and International Meetings (ACS, SETAC,  
ESA) - 14

## **GRADUATE STUDENTS ADVISED**

### **Major Professor for:**

25 Ph.D. degrees conferred

25 M.S. degrees conferred

3 Ph.D. students currently

## **Graduate Students Mentored by Joel Coats**

### **Academia**

Rodolfo Rubio Moran, University of Aguascalientes, Mexico

Chu-Ying Hsin, National Pingtung University, Taichung, Taiwan

Michael Gray, University of Illinois, Urbana-Champaign, IL

Thomas Heppner, University of Vermont, Burlington, VT

Hafeez Baluch, University of Balochistan, Quetta, Pakistan

David Featherstone, University of Illinois – Chicago, Chicago, IL

Jason Belden, Oklahoma State University, Stillwater, OK

Bryan W. Clark, Duke University, Durham, NC

Dingfei Hu, Smithers Viscient, Boston, MA

Fan Tong, University of Florida, Gainesville, FL

Ashley Jessick, Transgenomic Inc., Omaha, NE

Aaron Gross, Iowa State University (Ph.D. program)

Vurtice Albright III, Iowa State University (Ph.D. program)

### **Industry**

Nasser A. Assaf, Valent BioScience Corp., Libertyville, IL

Scott Dyer, Procter & Gamble Co., Cincinnati, OH

Kenneth Racke, Dow AgroSciences, Indianapolis, IN

Laura Karr, Dow AgroSciences, Indianapolis, IN (ret.)

L. Somasundaram, DuPont Agricultural Products, Avondale, PA

Patricia Rice, BASF Corporation, Research Triangle Park, NC

James Cink, BASF Corporation, St. Louis, MO

Jianbo Liu, Agela Technologies, China

James Zahn, Coskata, Inc., Warrenville, IL

Ellen Kruger Arthur, Bayer CropScience, Research Triangle Park, NC

Sangkyun Lee, Sumagen, Ltd., Seoul, Korea

Hirofumi Kosaki, Mitsui Chemicals, Inc., Tokyo, Japan

Keri Henderson Carstens, DuPont-Pioneer HiBred, Johnston, IA

Gretchen Paluch, Iowa Dept. Agriculture & Land Stewardship, Des Moines, IA

Lindsey Gereszek, DuPont-Pioneer HiBred, Ankeny, IA

Nick Behrens, DuPont-Pioneer HiBred, Dallas Center, IA

Ian Murphy, DuPont-Pioneer HiBred, Ankeny, IA  
Rachel Binning, DuPont-Pioneer HiBred, Johnston, IA

## Government

Richard Bennett, U.S. EPA, Duluth, MN  
Steven Bradbury, U.S. EPA, Arlington, VA  
Daniel Symonik, Minnesota Dept. of Health, Minneapolis, MN  
Larry Rice, USDA-ARS, Ames, IA (ret.)  
Kevin Cole, USDA-ARS, Ames, IA  
Pamela Rice, USDA-ARS, St. Paul, MN  
Tracy Ellis, San Diego County Extension, San Diego, CA  
Shaohan Zhao, Medical Examiner's Office, Houston, TX  
Christopher Peterson, U.S. Forest Service, USDA, Starkville, MS  
Justin Grodnitzky, State Crime Lab, Dept. Public Safety, Ankeny, IA  
Dong-Sik Park, Federal Food & Drug Administration, Republic of Korea  
Kelsey Prihoda, Lake Superior Research Institute, Superior, WI

## **POSTDOCTORAL RESEARCH ASSOCIATES TRAINED – 13**

### **LIST OF SCIENTIFIC PUBLICATIONS (Total 190)**

#### **BOOKS (10)**

Beck, J.J., J.R. Coats, S.O. Duke, and M.E. Koivunen, Editors. 2013. *Pest Management with Natural Products*. American Chemical Society, Washington, D.C., 247 pp.

Paluch, G.E. and J.R. Coats, Editors. 2011. *Recent Developments in Invertebrate Repellents*. American Chemical Society, Washington, DC. 186 pp. DOI: 10.1021/bk-2011-1090

Henderson, K.L., and J.R. Coats, Editors. 2009. *Veterinary Pharmaceuticals in the Environment*. American Chemical Society, Wash. D.C. 247 pp.

Coats, J.R. and H. Yamamoto, Editors. 2003. *Environmental Fate and Effects of Pesticides*. American Chemical Society, Washington, D.C., 300 pp.

Kruger, E.L., T.A. Anderson, and J.R. Coats, Editors. 1997. *Phytoremediation of Soil and Water Contaminants*. American Chemical Society, Washington, D.C. 318 pp.

Anderson, T.A., and J.R. Coats. Editors. 1994. *Bioremediation through Rhizosphere Technology*. American Chemical Society, Washington, D.C. 249 pp.



Somasundaram, L., and J.R. Coats, Editors. 1991. *Pesticide Transformation Products: Fate and Significance in the Environment*. American Chemical Society, Washington, D.C., 305 pp.

Racke, K.D., and J.R. Coats, Editors. 1990. *Enhanced Biodegradation of Pesticides in the Environment*. American Chemical Society, Washington, D.C., 302 pp.

Solomon, K.R., K.M. Lloyd, J.R. Roberts, M.H. Akhtar, J.R. Coats, P.D. Kingsbury, H.W. Leung, H.T.J. Mount, and L.O. Ruzo. 1986. *Pyrethroids: Their Effects on Aquatic and Terrestrial Ecosystems*. National Research Council of Canada, Ottawa, Canada, 295 pp.

Coats, J.R. Editor. 1982. *Insecticide Mode of Action*. Academic Press, New York, NY, 488 pp.

### **REVIEW ARTICLES (7)**

Paluch, G.E., L.C. Bartholomay, and J.R. Coats. 2010. Mosquito repellents: a review of chemical structure diversity and olfaction. *Pest Manag. Sci.* 66: 925-935.

Arthur, E.L., P.J. Rice, P.J. Rice, T.A. Anderson, S.M. Baladi, K.L.D. Henderson, and J.R. Coats. 2005. Phytoremediation – An overview. *Crit. Rev. Plant Sci.* 24:109-122.

Clark, B.W., T.A. Phillips, and J.R. Coats. 2005. Environmental fate and effects of *Bacillus thuringiensis* (Bt) proteins from transgenic crops: a review. *J. Agric. Food Chem.* 53(12): 4643-4653.

Solomon, K.R., J.P. Giesy, R.J. Kendall, L.B. Best, J.R. Coats, K.R. Dixon, M.J. Hooper, E.E. Kenaga, and S.T. McMurray. 2001. Chlorpyrifos: Ecotoxicological risk assessment for birds and mammals in corn agroecosystems. *J. Human Ecol. Risk Assess.* 7:497-632.

Giesy, J.P., K.R. Solomon, J.R. Coats, K.R. Dixon, J.M. Giddings, and E.E. Kenaga. 1999. Chlorpyrifos: Ecological risk assessment in North American aquatic environments. *Rev. Environ. Contam. Toxicol.* 160:1-129.

Coats, J.R. 1994. Risks from natural versus synthetic insecticides, *Ann. Rev. Entomol.* 39:489-515.

Bradbury, S.P., and J.R. Coats. 1989. Comparative toxicology of the pyrethroid insecticides. *Rev. Environ. Contam. Toxicol.* 18:134-177.

### **BOOK CHAPTERS (40)**

Gross, Aaron D., Michael J. Kimber, Tim A. Day, Paula Ribeiro, and Joel R. Coats. 2013. Quantitative structure-activity relationships (QSARs) of monoterpenoids at an expressed American cockroach octopamine receptor,

Chapter 7 in *Pest Management with Natural Products*, J.J. Beck, J.R. Coats, S.O. Duke and M.E. Koivunen, Editors, American Chemical Society, Washington, D.C. 247 pp. DOI: 10.102/bk-2013-1141.ch007.

Jessick, Ashely, Tom Moorman, and Joel Coats. 2013. Fate of erythromycin in sediment-containing surface water microcosms: How does aging of erythromycin in sediment influence its bioavailability? Chapter 7 in *Evaluating Veterinary Pharmaceutical Behavior in the Environment*, G.P. Cobb and P.N. Smith, Eds, American Chemical Society, Washington, DC., 188 pp.

Peterson, Christopher J., and Coats, Joel R. 2011. Catnip essential oil and its nepetalactone isomers as repellents for mosquitoes, Chapter 4 in *Recent Developments in Invertebrate Repellents*, Paluch, Gretchen E. and Coats, Joel R., American Chemical Society Books, Washington, DC. pp 59-65.

Henderson, Keri and Coats, Joel. 2009. Preface, Chapter 1 in *Veterinary Pharmaceuticals in the Environment*, Henderson, Keri L.D. and Coats, Joel R., American Chemical Society Books, Washington, DC. pp 1-2.

Henderson, Keri L.D. and Coats, Joel R. 2009. Veterinary Pharmaceuticals in the Environment: An Introduction, Chapter 2 in *Veterinary Pharmaceuticals in the Environment*, Henderson, Keri L.D. and Coats, Joel R., American Chemical Society Books, Washington, DC. pp 3-7.

Hu, Dingfei, Henderson, Keri L.D., and Coats, Joel R. 2009. Environmental fate and chemistry of a veterinary antibiotic - tylosin, Chapter 7 in *Veterinary Pharmaceuticals in the Environment*, Henderson, Keri L.D. and Coats, Joel R., American Chemical Society Books, Washington, DC. pp 93-104.

Henderson, Keri L.D., Moorman, Thomas B. and Coats, Joel R. 2009. Fate and bioavailability of sulfamethazine in freshwater ecosystems, Chapter 9 in *Veterinary Pharmaceuticals in the Environment*, Henderson, Keri L.D. and Coats, Joel R., American Chemical Society Books, Washington, DC. pp 121-131.

Paluch, Gretchen E., Junwei Zhu, Lyric C. Bartholomay, and Joel R. Coats. 2009. Amyris and Siam-wood essential oils: Insect activity of sesquiterpenes, in *Pesticides in Household, Structural and Residential Pest Management*, C.J. Peterson, and D.M. Stout II, eds., ACS Books, Washington, DC. pp 5-18.

Hu, Dingfei, Keri Henderson, and Joel Coats. 2009. Fate of transformation products of synthetic chemicals. Chapter in *The Handbook of Environmental Chemistry*, vol. 2, Part P. Alistair Boxall, editor, Springer-Verlag, Berlin, Germany. pp. 103-120.

Schultz, G., C. Peterson, and J.R. Coats. 2006. Natural insect repellents: Activity against mosquitoes and cockroaches. Chapter 13 in *Natural Products for Pest*

*Management*, A.M. Rimando & S.O. Duke, eds. American Chemical Society, Washington D.C. pp. 168-181.

Belden, J.B., B.W. Clark, T.A. Phillips, K.L. Henderson, E.L. Arthur, and J.R. Coats. 2004. Detoxification of pesticide residues in soil using phytoremediation. Chapter 12 in *Pesticide Decontamination and Detoxification*, J.J. Gan, P.C. Zhu, S.D. Aust, and A.T. Lemley, eds. pp. 155-167. American Chemical Society, Washington, D.C.

Zhao, S., E.L. Arthur, and J.R. Coats. 2003. The use of native prairie grasses to degrade atrazine and metolachlor in soil. Chapter 9 in *Environmental Fate and Effects of Pesticides*, J.R. Coats and H. Yamamoto, eds. pp. 157-166. American Chemical Society, Washington, D.C.

Belden, J.B., T.A. Phillips, K.D. Henderson, B.W. Clark, M.J. Lydy, and J.R. Coats. 2003. Persistence, mobility, and bioavailability of pendimethalin and trifluralin in soil. Chapter 10 in *Environmental Fate and Effects of Pesticides*, J.R. Coats and H. Yamamoto, eds. pp. 167-177. American Chemical Society, Washington, D.C.

Grodnitzky, J.A., and J.R. Coats. 2001. Using classic and quantum parameters to determine monoterpenoids' insecticidal quantitative structure-activity relationships. Chapter 23 in *Synthesis and Chemistry of Agrochemicals*, vol. VI, D.R. Baker, J.G. Fenyves, G.P. Lahm, T.P. Selby, & T.M. Stevenson, eds. American Chemical Society, Washington, DC.

LeBlanc, G.A., P.M. Campbell, P. den Besten, R.P. Brown, E.S. Chang, J.R. Coats, P.L. deFur, T. Dhadialla, J. Edwards, L.M. Riddiford, M.G. Simpson, T.W. Snell, M. Thorndyke, F. Matsumura. 1999. The endocrinology of invertebrates, Chapter 2 in *Endocrine Disruption in Invertebrates: Endocrinology, Testing, and Assessment*. P.L. deFur, M. Crane, C.G. Ingersoll, L.J. Tattersfield, eds., pp. 23-106. Society of Environmental Toxicology and Chemistry (SETAC) Press, Pensacola, FL.

Arthur, E.L., and J.R. Coats. 1998. Phytoremediation, Chapter 11 in *Pesticide Remediation in Soils and Water*. P. Kearney and T. Roberts, eds., pp. 251-283. John Wiley & Sons Ltd., Chichester, U.K.

Arthur, E.L., P.J. Rice, P.J. Rice, T.A. Anderson, and J.R. Coats. 1998. Mobility and degradation of pesticides and their degradates in intact soil columns, in *Environmental Behavior of Pesticides: The Lysimeter Concept*. F. Führ, J. Plimmer, R. Hance, and J. Nelson, eds. American Chemical Society, Washington, D.C.

Kruger, E.L., J.C. Anhalt, D.L. Sorenson, B.A. Nelson, A.L. Chouhy, T.A. Anderson, and J.R. Coats. 1997. Atrazine degradation in pesticide-contaminated soils: phytoremediation potential, Chapter 4 in *Phytoremediation of Soil and Water Contaminants*. E.L. Kruger, T.A.

Anderson, and J.R. Coats, eds., pp. 54-64. American Chemical Society, Washington, D.C.

Rice, P.J., T.A. Anderson, and J.R. Coats. 1997. Phytoremediation of herbicide-contaminated surface water with aquatic plants, Chapter 10 in *Phytoremediation of Soil and Water*. Kruger, E.L., T.A. Anderson, and J.R. Coats, eds., pp. 133-151. American Chemical Society, Washington, D.C.

Rice, P.J., T.A. Anderson, and J.R. Coats. 1997. Evaluation of the use of vegetation for reducing the environmental impact of deicers, Chapter 12 in *Phytoremediation of Soil and Water Contaminants*. Kruger, E.L., T.A. Anderson, and J.R. Coats, eds., pp. 162-176. American Chemical Society, Washington, D.C.

Anderson, T.A., P.J. Rice, J.H. Cink and J.R. Coats. 1997. Fate of methyl bromide in fumigated soils, Chapter 5 in *Fumigants: Environmental Fate, Exposure, and Analysis*. J.N. Seiber, J.A. Knuteson, J.E. Woodrow, N.L. Wolfe, M.V. Yates, and S.R. Yates, eds., pp. 42-52. American Chemical Society, Washington, D.C.

Kruger, E.L., and J.R. Coats. 1996. Fate of atrazine and atrazine degradates in soils of Iowa. Chapter 12 in *Herbicide Metabolites in Surface Water and Groundwater*, M.T. Meyer and E.M. Thurman, eds., pp. 140-150. American Chemical Society, Washington, D.C.

Coats, J.R. 1995. Environmental fate of organophosphorus insecticides, Chapter 3 in *Progress and Prospects of Organophosphorus Agrochemicals*, M. Eto and J.E. Casida, eds., pp. 43-56. Kyushu Univ. Press, Fukuoka, Japan.

Anderson, T.A., and J.R. Coats. 1995. An overview of microbial degradation in the rhizosphere and its implications for bioremediation, Chapter 8 in *Bioremediation: Science and Applications*, H.D. Skipper and R.F. Turco eds., pp. 135-143. Soil Science Society of America, Madison, WI.

Tsao, R., S. Lee, P.J. Rice, C. Jensen, and J.R. Coats. 1995. Monoterpenoids and their synthetic derivatives as leads for new insect-control agents. Chapter 28, in *Synthesis and Chemistry of Agrochemicals - IV*, D.R. Baker, J.G. Fenyves, and G.S. Basarab, eds., pp. 312-324. American Chemical Society, Washington, D.C.

Rice, P.J., and J.R. Coats. 1994. Structural requirements for monoterpene activity against insects. Chapter 8, in *Bioregulators for Crop Protection and Pest Control*, P.A. Hedin, ed., pp. 92-108. American Chemical Society, Washington, D.C.

Anderson, T.A., E.L. Kruger, and J.R. Coats. 1994. Biological degradation of pesticide wastes in the root zone of soils collected at an agrochemical

dealership. Chapter 16, in *Bioremediation through Rhizosphere Technology*, T.A. Anderson and J.R. Coats, eds., pp. 199-209. American Chemical Society, Washington, D.C.

Cink, J.H., and J.R. Coats. 1993. The effect of concentration, temperature, and soil moisture on the degradation of chlorpyrifos in an urban Iowa soil, Chapter 7 in *Fate and Significance of Pesticides in the Urban Environment*, K.D. Racke and A.R. Leslie, eds., pp. 62-69, American Chem.Society, Wash. D.C.

Coats, J.R., and L. Somasundaram. 1991. Pesticide-microbial interactions in soil, Chapter 3 in *Pesticides and the Future: Toxicological Studies of Risks and Benefits*, E. Hodgson, N. Motoyama, and R.M. Roe, eds., pp. 23-30. North Carolina State University, Raleigh, NC.

Somasundaram, L., and J.R. Coats. 1991. Pesticide transformation products in the environment. Chapter 1 in *Pesticide Transformation Products: Fate and Significance in the Environment*. L. Somasundaram and J.R. Coats, eds. Pp. 2-9. American Chemical Society, Washington, D.C.

Somasundaram, L., and J.R. Coats. 1991. Interaction between pesticides and their major degradation products. Chapter 12, in *Pesticide Transformation Products: Fate and Significance in the Environment*, L. Somasundaram and J.R. Coats, eds., pp. 162-171. American Chemical Society, Washington, D.C.

Coats, J.R. 1991. Pesticide degradation mechanisms and environmental activation. Chapter 2, in *Pesticide Transformation Products: Fate and Significance in the Environment*, L. Somasundaram and J.R. Coats, eds, pp. 10-30. American Chemical Society, Washington, D.C.

Somasundaram, L., and J.R. Coats. 1991. Pesticide transformation products research: A future perspective. Chapter 20, in *Pesticide Transformation Products: Fate and Significance in the Environment*, L. Somasundaram and J.R. Coats, eds., pp. 285-288. American Chemical Society, Washington, D.C.

Coats, J.R., L.L. Karr, and C.D. Drewes. 1991. Toxicity and neurotoxic effects of monoterpenoids in insects and an earthworm. Chapter 20, in *Naturally Occurring Pest Bioregulators*, P.A. Hedin, ed., pp. 305-316. American Chemical Society, Washington, D.C.

Racke, K.D. and J.R. Coats. 1990. Enhanced biodegradation of insecticides in Midwestern corn soils. Chapter 6, in *Enhanced Biodegradation of Pesticides in the Environment*, K.D. Racke and J.R. Coats, eds., pp. 68-81. American Chemical Society, Washington, D.C.

Somasundaram, L. and J.R. Coats. 1990. Influence of pesticide metabolites on the development of enhanced biodegradation. Chapter 10, in *Enhanced*

*Biodegradation of Pesticides in the Environment*. K.D. Racke and J.R. Coats, eds., pp. 128-140. American Chemical Society, Washington, D.C.

Coats, R.R., L.L. Karr, R.L. Fryer, and H.S. Beard. 1987. Diphenylchloronitroethane insecticides, Chapter 20, in *Synthesis and Chemistry of Agrochemicals*. D.R. Baker, J.G. Fenyes, W.K. Moberg, and B. Cross, eds., pp. 217-225. American Chemical Society, Washington, D.C.

Coats, J.R. 1987. Toxicology of pesticide residues in foods, Chapter 10, in *Nutritional Toxicology, Vol. II*. J.N. Hathcock, ed. pp. 249-279. Academic Press, NY.

Coats, J.R. 1986. Toxicological methods and laboratory testing of insecticides, Chapter 11, in *Methods for the Study of Pest Diabrotica*, J.L. Krysan and T.A. Miller, eds., pp. 205-226. Springer-Verlag, NY.

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### **JOURNAL ARTICLES – Non-refereed (12)**

Zhao, S., Belden, J., Cink, J., Coats, J. 2010. Mobility of five termiticides in soil columns, *Proceedings of the 2010 NCUE* (Portland, OR, 169-174, 2010).

Coats, J., Prihoda, K., and H. Kosaki. 2006. Environmental fate: detection and degradation of gene products, *The 9<sup>th</sup> International Symposium on the Biosafety of Genetically Modified Organisms* (Jeju Island, Korea, 24-29 September, 2006) *Biosafety research and environmental risk assessment*: 147-151.

Ellis, T., G. Bradfish, J. Coats. 2004. Bt bacteria might form basis for future biological insecticide, *Turfgrass Trends* August 1, 2004.

Ali, M.A., M.D. Ellis, J.R. Coats, and J.A. Grodnitzky. 2002. Laboratory evaluation of 17 monoterpenoids and field evaluation of two monoterpenoids and two registered acaricides for the control of *Varroa destructor* Anderson & Trueman (Acari: Varroidae), *Amer. Bee J.* 141:50-53.

Peterson, C.J., and J. R. Coats. 2001. Insect Repellents – Past, present and future. *Pesticide Outlook* 12(4):154-158.

Anhalt, J.C., E.L. Arthur, A. Chouhy, T.A. Anderson, and J.R. Coats. 1997. Pesticide-contaminated soil studies: Part I. Effects of aging herbicide mixtures on herbicide degradation, soil respiration and plant survival. Part II. Phytoremediation study with native prairie grasses. *Proc. 12<sup>th</sup> Ann. Conf. Hazardous Waste Research*. Pp. 542-555.

Tsao, R., and J.R. Coats. 1995. Starting from nature to make better insecticides. *Chemtech* 25: 23-28.

Coats, J.R. 1993. What happens to degradable pesticides? *Chemtech* 23: 25-29.

Coats, J.R., and P.A. Dahm. 1980. Detoxification of captan-treated seed corn. pp. 94-100 in *Proc. Sixth Ann. Res. Symp. Treat, Hazardous Waste*, D. Schultz, ed., Chicago, IL, March 1980. U.S. EPA, Cincinnati, OH.

Coats, J.R. 1980. A stream microcosm for environmental assessment of pesticides. in *Microcosms in Ecological Research*. J.P. Giesy, ed., pp. 715-723. U.S. Dept. of Energy, Washington, D.C.

Coats, J.R. 1980. Detreating Corn, in *Proc. Third Annual Seed Technology Conference*. J.S. Burris, ed. Seed Science Center, Iowa State University, Ames, Iowa.

Metcalf, R.L., K.A. Reinbold, J.R. Sanborn, W.F. Childers, W.N. Bruce, and J.R. Coats. 1974. *Comparative Biochemistry, Biodegradability, and Toxicity of DDT and Carbofuran Analogues*. University of Illinois Water Resources Center, Research Report No. 95, Illinois Natural History Survey, University of Illinois at Urbana-Champaign, Illinois.

## **INVITED PRESENTATIONS**

### **International (32)**

6th International Conference on Biopesticides, Chiang Mai, Thailand, December 11-16, 2011, "Green chemistry for use as insect repellents."

6<sup>th</sup> International Conference on Biopesticides, Chiang Mai, Thailand, December 11-16, 2011, "Insecticidal mechanism of action for monoterpenes."

2nd International Forum for Surveillance and Control of Mosquitoes and Mosquito-Borne Diseases, Beijing, China, May 22-26, 2012, "Green chemistry for insect repellents."

OECD Workshop on the use of QSAR with the Estrogen Receptor Model, Paris, France, February 16-18, 2009. "A (Q)SAR Approach for Estimating Estrogen Receptor Binding Affinity"

5<sup>th</sup> Society of Environmental Toxicology and Chemistry World Congress, Sydney, Australia, August 3-7, 2008. "Bioavailability of veterinary antibiotics in sediments."

27<sup>th</sup> Annual Society of Environmental Toxicology and Chemistry North America Meeting, Montreal, Canada, November 5-9, 2006. "Environmental chemistry of gene products from GMO crops: aquatic systems."

9<sup>th</sup> International Symposium on the Biosafety of Genetically Modified Organisms, Jeju Island, Republic of Korea, September 24-29, 2006. "Environmental fate: detection and degradation of gene products."

4<sup>th</sup> International Conference on Biopesticides, Chiang Mai, Thailand, February 13-18, 2005. "Natural insecticides for control of stored product pests."

4<sup>th</sup> Society of Environmental Toxicology and Chemistry World Congress, Portland, Oregon, November 14-18, 2004. "Mobility and transformation of atrazine degradates in soil."

- OECD Phytoremediation Symposium and Workshop, Budapest, Hungary, September 10-12, 2004, "Phytoremediation of pesticides in soil."
- 3<sup>rd</sup> Pan-Pacific Conference on Pesticide Science, Honolulu, HI, June 1-4, 2003. "Natural insect repellents"
- International Conference on Agricultural Science and Technology, Beijing, China. November 6-9, 2001, "Pesticides in sustainable agriculture."
- China Agricultural University, College of Veterinary Medicine, National Drug Safety Center, Beijing, China. November 7, 2001, "Environmental fate of veterinary drugs and feed supplements."
- International Symposium on Development of Natural Pesticides from Forest Resources, Seoul, Korea, October 8-11, 2001, "Monoterpenoids as natural insect control agents."
- China Agricultural University, College of Veterinary Medicine, National Drug Safety Center, Beijing, China, September 10, 2001, "Environmental toxicology and chemistry of pesticides."
- Zhejiang University, Department of Veterinary Medicine, Hangzhou, Zhejiang Province, China. September 17, 2001, "Environmental toxicology and chemistry of pesticides."
- Jiaotong University, College of Agriculture, Shanghai, China. September 18, 2001, "Environmental toxicology and chemistry of pesticides."
- 2<sup>nd</sup> International Conference on Africanized Honeybees and Bee Mites, Tucson, Arizona, April 10-12, 2000, "Monoterpenoids for control of varroa and tracheal mites."
- 2<sup>nd</sup> Pan-Pacific Conference on Pesticide Science, Honolulu, Hawaii, October 24-27, 1999, Program Chair and Organizer. "Welcome and Opening Comments".
- SETAC/OECD/EU, Amsterdam, Netherlands, December 11-16, 1998, Participant on a workshop panel, "Endocrine Disrupting Chemicals in Invertebrates."
- 9<sup>th</sup> International Congress of Pesticide Chemistry, London England, August 2-8, 1998, "Risks of natural and synthetic pesticides."
- Forschungszentrum-Jülich, Deutschland, 26 Februar 1998, "Vorstellung meiner Forschungsergebnisse" (presented in German)
- Forschungszentrum-Jülich, Germany, January 1998, "Enhanced microbial degradation of pesticides in soil."

Forschungszentrum-Jülich, Germany, January 1998, “The fate of herbicide metabolites in soil and water.”

Forschungszentrum-Jülich, Germany, January 1998, “Risks of natural and synthetic pesticides.”

Institute of Radioagronomy, Research Symposium, Technology Center, Jülich, NRW, Germany, December 16, 1997, “Effects of plant-derived amendments on biodegradation of methbenzthiazuron herbicide in soil.”

Bayer Corp. Agricultural Research Center, Monheim, NRW, Germany, December 12, 1997, “Enhanced microbial degradation of pesticides.”

Phytoremediation Workshop of the German EPA, Schmalleburg, NRW, Germany, December 1, 1997, “Phytoremediation of organic contaminants: the American perspective.”

Swiss Institute of Technology, Zurich, Switzerland, November 5, 1997, “Monoterpenoids as natural insecticides.”

International Association of Environmental Analytical Chemistry, Sixth Symposium on the Fate and Chemistry of Modern Pesticides, Amsterdam, Netherlands, June 5, 1997. “Fate of atrazine degradates in soil.”

Institute of Radioagronomy, Research Center- Jülich, Germany, June 2, 1997. “Phytoremediation of pesticide residues in soil.”

National Meeting of the Canadian Federation of Biological Sciences, Guelph, Ontario, June 1986, “Terrestrial ecotoxicology in the agroecosystem.”

## **National (72)**

National Meeting of the Entomological Society of America, Knoxville, TN. November 11-14, 2012, “Green chemistry for repelling arthropod pests.”

244<sup>th</sup> National Meeting of the American Chemical Society, Philadelphia, PA. August 19-23, 2012, Multiple insecticidal modes of action of monoterpenes.”

National Meeting of the Entomological Society of America, Reno, NV. November 13-16, 2011, “Green chemistry for repelling insect pests.”

242<sup>nd</sup> National Meeting of the American Chemical Society, Denver, Colorado, August 28 – September 1, 2011, “Bioavailability of antimicrobial compounds in sediments.”

59<sup>th</sup> Annual Meeting of the Entomological Society of America, Reno, Nevada, November 13-16, 2011, “Green chemistry for repelling insect pests.”

- Department of Entomology, Univ. California – Riverside, California,  
Departmental Seminar, March 21, 2011, “Terpenes in plant essential oils:  
Multiple mechanisms of action in insects.”
- 20th Annual California Pest Management Conference, Department of  
Entomology, Univ. California - Riverside, California, March 22-23, 2011,  
“Green chemistry for urban pest management.”
- National Conference on Urban Entomology, Portland, OR, May 16-19, 2010.  
“Mobility of five termiticides in soil columns.”
- National Meeting of the Entomological Society of America, San Diego, CA,  
December 12-15, 2010. “Sesquiterpene broad-spectrum repellents for  
insects.”
- Annual Entomological Society of America Meeting, Reno, NV, November 16-19,  
2008. “Implications of a global economy in the developing world.”
- Annual Entomological Society of America Meeting, Reno, NV, November 16-19,  
2008. “Looking towards the future – transgenic protein, environmental  
fate, and the expanding world of ecotoxicology.”
- Multistate Research Project W-1045, Agrochemical Impacts on Human and  
Environmental Health: Mechanisms and Mitigation, Kona, HI, June 6-7,  
2008. “Environmental chemistry of gene products from GMO crops and  
the veterinary antibiotic tylosin.”
- 244<sup>th</sup> National Meeting and Exposition of the American Chemical Society,  
Boston, MA, August 19-23, 2007. “Environmental fate and effects of *Bt*  
proteins in the environment.”
- 232<sup>nd</sup> National Meeting and Exposition of the American Chemical Society, San  
Francisco, CA, September 10-14, 2007. “Monoterpene activity against  
insects.”
- The McKim Conference on the Use of QSARs and Aquatic Toxicology in Risk  
Assessment, U.S. EPA, Duluth, MN, June 27-29, 2006. “Mechanistic view  
of selective toxicology.”
- 231<sup>st</sup> National Meeting and Exposition of the American Chemical Society,  
Atlanta, GA, March 26-30, 2006. “Current and future challenges in  
agrochemicals research.”
- Annual Entomological Society of America Meeting, Fort Lauderdale, FL,  
December 14-18, 2005. “Natural repellents for cockroaches and  
mosquitoes.”
- Annual Entomological Society of America Meeting, Fort Lauderdale, FL,  
December 14-18, 2005. “Natural insect repellents for home and garden.”

Renewable Natural Resources Foundation Congress on Assessing and Mitigating Environmental Impacts of Emerging Contaminants, Washington, D.C., December 1-2, 2005. "Pesticides and Metabolites/Degradates – Synthetic Pyrethroids."

25<sup>th</sup> Annual Meeting of the Society of Environmental Toxicology and Chemistry, Baltimore, MD, November 14-18, 2005. "Toxicology of synthetic pyrethroids in fish."

Renewable Natural Resources Foundation: Congress on Assessing and Mitigating Environmental Impacts of Emerging Contaminants. Washington, DC, December 1-2, 2005. "Pesticides and metabolites/degradates – synthetic pyrethroids."

National Meeting of the Entomological Society of America, Ft. Lauderdale, FL, December 15-18, 2005. "Natural repellents for cockroaches and mosquitoes."

228<sup>th</sup> National Meeting of the American Chemical Society, Philadelphia, PA, August 22-27, 2004. "Environmental fate of phenylethyl propionate in soil and water."

227<sup>th</sup> National Meeting of the American Chemical Society, Anaheim, CA, March 28-April 1, 2004. "Natural Insect Repellents: Activity Against Mosquitoes and Cockroaches."

National Meeting of the American Chemical Society, New York, NY, September 7-11, 2003, "Botanical products as repellents against mosquitoes and cockroaches."

National Meeting of the A.C.S., Boston, MA, August 18-22, 2002, "Detoxification of pesticide residues in soil using phytoremediation."

National Meeting of the American Chemical Society, Orlando, FL, April 7-11, 2002, "Comparison of chemical and biological endpoints in assessment of potential environmental effects of pesticides in soil."

National Meeting of the American Chemical Society, Chicago, IL, August 26-30, 2001, "Phytoremediation of agrochemicals in the environment."

Annual Convention of the American Honey Producers, McAllen, TX, January 9-11, 2001, "Novel compounds for Varroa control."

Insect Toxicology 2000, UC-Berkeley, Berkeley, CA, July 17-19, 2000, "Monoterpenoids: Selective control of varroa mite and some QSAR studies."

FMC Corp., Agricultural Products Division, Princeton, NJ, September 4-5, 2000, "Natural products as pesticides and repellents." and "Environmental fate of pesticides in soils: methodology."

American Chemical Society National Meeting, Anaheim, CA, March 21-25, 1999, "Environmental toxicokinetics of pesticide residues."

Texas Tech University, Lubbock, Texas, March 8, 1999, "Natural insect fumigants."

University of Mississippi, National Center for the Development of Natural Products, Oxford, MS, February 17, 1999, "Natural fumigants, derivatives, and analogs."

University of Wisconsin, Stevens Point, WI, November 13, 1998, "Natural insecticides and repellents."

Rachel Carson Council's Conference on "Wildlife, Pesticides, and People, Fairfax, VA, September 25 & 26, 1998, "New insecticide modes of action."

Regional Meeting of the Society for Environmental Toxicology & Chemistry, Wichita, KS, April 20-22, 1998, "Effects of pesticides on water quality."

Dames & Moore Company, Atlanta, GA, January 14, 1997, "Phytoremediation of pesticide wastes in soils."

University of North Texas, Denton, TX, March 5, 1997, "Phytoremediation of pesticide wastes in soil and water."

National Meeting of the American Chemical Society, Orlando, FL, August 1996, "Pesticides risk and risk perception."

Kerr Environmental Research Laboratory, U.S. Environmental Protection Agency, Ada, OK, February 1995, "Strategies for bioremediation of pesticide-contaminated sites."

DowElanco, Indianapolis, IN, July 1995, "Degradation of chlorpyrifos in soil."

Air Force Office of Scientific Research-Review on Alternative Materials and Processes, Wright-Patterson Air Force Base, Dayton, OH, August 1995, "Use of vegetation to enhance the degradation of ethylene glycol and propylene glycol."

Northwestern University, Bioremediation Symposium, Evanston, IL, July 1994, "Exploiting the rhizosphere effect for bioremediation of pesticide wastes at agrochemical dealer sites."

National Meeting of the American Chemical Society, San Diego, CA, March 1994, "Environmental fate of organophosphorus insecticides."



U.S. Geological Survey, Hydrology of Toxic Substances Technical Conference, Colorado Springs, CO, September 1993, "Environmental toxicology of pesticides in surface water."

National Meeting of the American Chemical Society, Denver, CO, March 1993, "Insecticidal properties of monoterpenoids and some analogues."

S.C. Johnson, Inc., Racine, WI, June 1992, "Insecticidal action of monoterpenoids" and "Natural vs. synthetic pesticides: risks and benefits."

National Meeting of the American Chemical Society, San Francisco, CA, April 1992, "Fate of chlorpyrifos termiticide in soil."

National Meeting of the Entomological Society of America, Reno, NV, December 1991, "Risks from natural vs. synthetic insecticides."

Shell Development Company, Environmental Sciences Division, Houston, TX, October, 1991, "Enhanced microbial degradation of pesticides in soil."

University of Mississippi, Pharmaceutical Research Institute, Center for Technological Development of Natural Products, Oxford, MS, June, 1991, "Insecticide activity of monoterpenoids."

National Meeting of the American Chemical Society, Washington, D.C., August 1990, "Pesticide degradation products."

National Science Foundation U.S.-Japan Seminar on: Pesticides and the Future: Toxicological Studies of Risks and Benefits, Rockville, MD, August 1990, "Pesticide-microbial interactions in soil."

International Chemical Congress of the Pacific Basin Societies, Honolulu, HI, December 1989, "Insecticidal activity of monoterpenoids."

National Meeting of the American Chemical Society, Miami Beach, FL, September 1989, "Influence of pesticide metabolites on the development of enhanced microbial degradation."

National Meeting of the American Chemical Society, Miami Beach, FL, September 1989, "Toxic effects of *d*-limonene in the earthworm *Eisenia foetida*."

Michigan State University Pesticide Research Center Annual Conference, March 1989, "Biodegradation of soil-applied pesticides."

University of California at Davis, Davis, CA, February 1989, "Enhanced microbial degradation of insecticide: a global perspective."

- U.S. EPA Workshop on Toxic Mechanisms, Duluth, MN, October 1988,  
“Structural properties for determining mechanisms of toxic action:  
organochlorines and synthetic pyrethroids.”
- National Meeting of the American Chemical Society, Denver, CO, April 1987,  
“Structure-activity for uptake and toxicity of DDT-type insecticides utilizing  
an NMR method for estimation  $\sigma^*$ .”
- National Meeting of the Society of Environmental Toxicology and chemistry,  
Alexandria, VA, November 1986, “Toxicokinetics of pyrethroid insecticides in  
fish.”
- Pesticide Chemistry and Early Warnings in Ecotoxicology Symposium,  
Champaign-Urbana, IL, November 1986, “Aquatic toxicology of synthetic  
pyrethroid insecticides.”
- CIBA Geigy Corporation, Agricultural Division, Greensboro, NC, March 1986,  
“Enhanced microbial degradation of soil insecticides-laboratory approach.”
- Dow Chemical Company, Agricultural Products Division, Midland, MI, February  
1986, “Enhanced microbial breakdown of soil-applied insecticides.”
- Stauffer Chemical Company Seminar, Scottsdale, AZ, September 1985,  
“Technical feasibility of extenders for soil insecticides.”
- Enhanced Degradation of Pesticides Workshop, St. Louis, MO, September 1984,  
“Field and laboratory studies on accelerated microbial degradation of  
isofenphos.”
- Stauffer Chemical Company Research and Development Seminar, Mountain  
View, CA, June 1984, “Bioactivity and degradation of insecticides in soils.”
- Ohio State University, Pesticide Degradation Workshop, OARDC, Wooster, OH,  
April, 1984, “Degradation of isofenphos in soil.”
- National Meeting of the American Mosquito Control Association, Orlando, FL,  
March 1983, “Mode of action of insecticides used in mosquito control.”
- Shell Development Corporation, Agricultural Chemicals, Division, Modesto, CA,  
June 1982, “Toxicology of insecticides in cutworms and rootworms.”
- National Meeting of the American Chemical Society, New York, NY, August  
1981, “Structure-activity relationships among DDT derivatives.”
- National Meeting of the Entomological Society of America, Atlanta, GA,  
December 1980, “Synthetic pyrethroids in the aquatic environment.”

U.S. Environmental Protection Agency, Sixth Annual Research Symposium, Solid and Hazardous Waste Research Division, Chicago, IL, March 1980, "Detoxification of captan-treated seed corn."

Gordon Research Conference on Toxicology and Safety Evaluation, Meridan, NH, August 1977, "Model ecosystem evaluation of toxic substances."

**Other Invited Presentations – 27**

**Contributed Presentations – 60**

**GRANTS, COOPERATIVE AGREEMENTS, CONTRACTS (as Lead P.I.)**

U.S. Department of Defense, Deployed War Fighter Protection Program. "Enhancing the efficacy of pyrethroid insecticides against mosquitoes using plant essential oils and individual terpenoids," 2012-2115, (\$539,636)

U.S. Environmental Protection Agency STAR Fellowship. 2011- 2014. (\$107,547).

BASF Corporation, St. Louis, MO, "Termiticide mobility in soil." 2012. (\$11,396).

Evonik Goldschmidt Corp., Hopewell, VA, "Evaluation of adjuvants for enhancing insecticide." 2010-2011, (\$13,600).

EcoSMART Technologies Inc. "Screening contract for insecticides," 2011-2012, (\$24,000).

Centers for Disease Control, "Mode of action of nootkatone and carvacrol in insects." 2008-2010, (\$200,647).

Valent BioSciences, "Efficacy of an insect repellent against flies" 2008-2009, (\$14,934).

EcoSMART Technologies, Inc. "Mode of action of monoterpenoids in insects" 2008-2011. (\$91,565).

Iowa Soybean Association, "Development of a soybean aphid early-warning system to predict aphid outbreaks and provide valuable information on aphid management to soybean producers." 2007-2009. (\$60,000).

U.S. Environmental Protection Agency, Region VII, Watershed Improvement Grants Program. "Field study to evaluate phytoremediation and best management practices for removal of atrazine from agricultural runoff." 2006-2009. (\$95,023).

U.S. Department of Agriculture, National Research Initiative. "Fate and significance of veterinary antibiotics in surface water." 2006-2010. (\$400,000)

Iowa State University Research Foundation. "Investigation of a novel natural insect growth regulator" 2006. (\$17,316)

USDA Biotechnology Risk Assessment Program. "Development of analytical techniques for environmental detection and quantification of the Bt toxins (Cry 1Ab & Cry 1F) from transgenic corn." 2003-2007. (\$221,000)

U.S. Environmental Protection Agency. STAR Fellowship Program. "Impact of veterinary antibiotics in terrestrial ecosystems." 2005-2008. (\$102,428)

U.S. Department of Agriculture, ARS "Biodegradation of transgenic crop residue" 2002-2007. (\$240,000)

Center for Health Effects of Environmental Contamination, University of Iowa. "Fate and significance of a veterinary antibiotic in the environment: a laboratory study" 2003. (\$19,976)

EcoSMART Technologies. "Monoterpenoid insecticides from plant essential oils" 2005-2007. (\$54,000)

Iowa State Water Resources Research Institute. "Veterinary antibiotics: transport to and degradation in surface water" 2003-2004. (\$20,586)

Tree Research & Education Endowment Fund. "Influence of elm, *Ulmaceae*, foliar leaf chemistry on Japanese beetle feeding preference and suitability" 2003-2004. (\$11,988)

Dow AgroSciences. "Development of analytical techniques for the determination of Bt Cry 1F endotoxin in soil" 2003-2004. (\$11,340)

EcoSMART Technologies. "Insecticidal monoterpenes from plant essential oils." 2002-2004. (\$24,000)

U.S. Department of Agriculture-ARS. "Chronic exposure of monarch larvae to Bt corn pollen" 2002-2003. (\$21,900)

Swiss Federal Institute of Technology/ Cimbra Foundation (Denmark), "Search for plant-based alternatives to methyl bromide" with 2 other PI's, from Switzerland and Iran. 2001-2003. (\$26,000)

Center for Health Effects of Environmental Contamination, University of Iowa. "Fate of metolachlor, atrazine, and pendimethalin during phytoremediation of prairie grasses." 2002. (\$19,947)

Center for Health Effects of Environmental Contamination, University of Iowa. "Comparison of biological and chemical endpoints for evaluating the success of phytoremediation of pesticide-contaminated soil," 2000. (\$19,700)

EcoSMART Technologies. "Assessment of essential oils and individual natural compounds as insecticides" 1999-2001. (\$72,000)

Iowa Biotechnology By-products Consortium. "Value-added products from agricultural crops." 2000-2001. (\$7,400)

Iowa Honey Producers Association. "Natural insecticides for the control of varroa mites." 1999-2000. (\$4,800)

Procter and Gamble Company. "Natural insecticides for control of household pests." 1999. (\$13,000)

Iowa Soybean Promotion Board. "Continued studies on development of natural nematicidal compounds for controlling soybean cyst nematode." 1998-2001. (\$92,115)

U.S. Department of Agriculture, Foreign Agriculture Service-FAO Training Program. "Use of biological endpoints to measure progress of phytoremediation of pesticide-contaminated soil." 1998. (\$15,000)

Novartis Crop Protection. "Phytoremediation and microbial inoculation for enhanced degradation of pesticide residues in contaminated soil and water." 1998-1999 (\$30,000)

University of Nebraska. "Synthetic monoterpenoids for the control of honeybee tracheal mites." 1998. (\$2,000)

Hazardous Substances Research Center (U.S. EPA) – Rocky Mountain – Great Plains Region/Kansas State University. "Use of vegetation to enhance bioremediation of surface soils contaminated with pesticide wastes." 1995-1997. (\$108,000)

U.S. Department of Agriculture – CSREES. "Iowa contribution – National Agricultural Pesticide Impact Assessment Program" 1996-1999. (\$123,128)

Iowa Soybean Promotion Board. "Natural products for management of soybean cyst nematode." 1995-1998. (\$65,000)

U.S. Air Force Office of Scientific Research. "Use of vegetation to enhance degradation of ethylene glycol and propylene glycol: prevention of runoff and movement to surface waters." 1995-1997. (\$101,000)

Mycogen Corporation. "Environmental Fate of *Bacillus thuringiensis japonensis* in turf." 1995-1996. (\$12,000)

- U.S. Environmental Protection Agency. "Development of strategies for biological remediation of pesticide-contaminated sites." 1994-1996. (\$493,000).
- S.C. Johnson Wax. "Study of the acute mode of action of monoterpenoid insecticides in insects." 1994-1995. (\$10,000)
- Ciba Plant Protection. "The use of vegetation to enhance bioremediation of surface soils contaminated with pesticide wastes." 1994-1997. (\$60,000)
- Center for Health Effects of Environmental Contamination, University of Iowa. "The use of vegetation to enhance bioremediation of soils in Iowa contaminated with pesticide wastes." 1993-1994. (\$14,931)
- U.S. Department of Agriculture, North Central Region Pesticide Impact Assessment Program. "Fate of methyl bromide in soil." 1993-1995. (\$45,000)
- Center for Health Effects of Environmental Contamination – University of Iowa. "Potential use of vegetation for bioremediation of surface soils contaminated with pesticide wastes." 1992-1993 (\$13,325)
- U.S. Department of Agriculture – CSRS. "Extraction and utilization of glucosinolates from crambe and rapeseed meal." 1992-1994. (\$45,000)
- Leopold Center for Sustainable Agriculture, Iowa State University. "Biorational insecticides for control of the corn rootworm." 1992-1995. (\$103,000)
- U.S. Air Force Office of Scientific Research. "QSAR for alicyclic chlorinated hydrocarbons." Subcontract through Mississippi State University, 1991-1994. (\$92,000)
- U.S. Department of Agriculture, North Central Region Pesticide Impact Assessment Program. "Fate and significance of major degradation products of atrazine in the soil water environment." 1991-1994. (\$75,000)
- Iowa Agriculture Experiment Station Innovative Research Grants. "Monoterpenoid insecticides – Mode of action studies." 1991. (\$9,000)
- Leopold Center for Sustainable Agriculture, Iowa State University. "Pesticides and their major degradation products as potential contaminants of groundwater." 1990-1992. (\$42,000)
- DowElanco. "Movement and degradation of chlorpyrifos and its degradation products in soils." 1990-1996. (\$127,800).
- U.S. Department of Agriculture. Management Systems Evaluation Area Grant (ARS/CSRS) "Evaluation of the impact of current and emerging farming systems on water quality: pesticide degradation products." 1990-1996. (\$192,000)

Center for Crops Utilization Research, Iowa State University. "Soil degradation of biodegradable plastics." 1989-1992. (\$82,000)

U.S. Environmental Protection Agency. "Development of a neurotoxicity assay using Japanese medaka." 1989-1993. (\$206,000)

U.S. Department of Agriculture – North Central Region Pesticide Impact Assessment Program. "Role of pesticide hydrolysis products in the development of enhanced biodegradation." 1988-1990. (\$28,000)

U.S. Department of Agriculture – North Central Region Pesticide Impact Assessment Program. "Effect of manuring on the persistence and degradation of insecticides in soil." 1986. (\$8,000)

U.S. Department of Agriculture – North Central Region Pesticide Impact Assessment Program. "Enhanced degradation of organophosphorus insecticides: scope and mechanisms." 1985. (\$16,000)

U.S. Environmental Protection Agency. "Factors modulating toxicity of a pyrethroid to fish." 1984-1987. (\$170,000)

Iowa Corn Promotion Board. "Studies on enhanced degradation of insecticides in soil." 1984-1987. (\$43,000)

Iowa High Technology Council. "Novel nitroalkane insecticides." 1984-1986. (\$25,000)

Pet Chemical Co. "Insecticidal activity of limonene." 1984-1986. (\$10,000)

U.S. Department of Agriculture-North Central Region Pesticide Impact Assessment Program. "Degradation rates and routes for isofenphos (Amaze) under conservation tillage practices." 1983-1985. (\$32,000)

U.S. Department of Agriculture. "Insecticide efficacy and fate in conservation tillage." Regional Research Grant NC-156, 1980-1989. (\$30,000)

Bio-Systems Research. "Non-target evaluation of a feeding deterrent." 1980-1981. (\$6,000)

U.S. Department of Agriculture. "Environmental toxicology of corn rootworm insecticides: uptake, toxicity, and degradation." 1980-1983. (\$72,000)

U.S. Fish and Wildlife Service, Dept. of Interior. "Conversion from chemical to non-chemical agriculture: impact on insects." 1979-1981. (\$48,000)

U.S. Fish and Wildlife Service, Dept. of Interior. "Potential effects of synthetic pyrethroid insecticides on field populations of non-target terrestrial organisms in agricultural areas," 1978-1982. (\$100,000)

Environment Protection Agency. “Alkaline hydrolysis of captan on treated corn.” 1978. (\$25,000)

Iowa State Agriculture and Home Economics Experiment Station – Hatch Research Project. “Biodegradable pest control agents – mode of action and degradation mechanisms.” 1993-1999. (\$15,000)

Iowa State Agriculture and Home Economics Experiment Station – Hatch Research Project. “Toxicology of modern insecticides, based on their physical, chemical, and biological properties.” 1978-1992. (\$56,000)

National Research Council of Canada – Cooperative Research Grant, (with 5 co-investigators). “Effects of new, broad spectrum pesticides on aquatic ecosystems.” 1978.

Ontario Ministry of the Environment – Research Grant. “Comparative degradation and bioaccumulation of four synthetic pyrethroid insecticides.” 1977.

Small grants and contracts from numerous companies, including Dow AgroSciences, Syngenta, ICI, DuPont, American Cyanamid, Mycogen, PPG, Bayer, Evonik, and numerous others. 1978-2012. (\$350,000)