**Laura S. Higgins, Ph.D.**

Operational and Scientific Excellence Lead, Integrated Field Sciences

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**Overview of Responsibilities**

In my current role, I lead eight teams responsible for delivering all aspects of enabling capabilities and services to support the Integrated Field Sciences (IFS) group. Includes, but not limited to: IFS insect research facilities, data management and statistical capabilities, global sample services, integrated pest management and resistance research, global technical education, IFS budgets, capital, resource planning and functional continuous improvement and innovation initiatives.

**Education**

**Ph.D.**, University of Nebraska, Lincoln, August 2011. Entomology. Major professors: Blair D. Siegfried and John E. Foster. Dissertation topics: Approaches for field monitoring transgenic crops for non-target organism effects.

**M.S.**, Iowa State University, May 1998. Entomology. Major professor: Jon J. Tollefson. Thesis title: Influence of Cry1Ab protein on feeding and ovipositional behavior of European corn borer, *Ostrinia nubilalis* (Hübner).

**B.S.**, The Ohio State University, March 1990. Agriculture.

**Employment**

**Lead, Integrated Field Sciences Operational and Scientific Excellence**, Corteva Agriscience™, Agriculture Division of DowDuPont™, Johnston, IA. September 1, 2017 – present.

**Research Director - Cereals Component Characterization & Integrated Product Characterization & Development Operations,** DuPont Pioneer, Johnston, IA. November 2, 2015 – August 31, 2017. Lead the Cereals Component Characterization & Integrated Product Characterization & Development (IPCD) Operations groups. Responsibilities included strategy and execution of trait and technology characterization and development research activities for cereal crops including wheat and rice in North America and India. Member of the Hybrid Wheat, Rice and Sterility Portfolio Program Leadership Teams, and collaborated closely with Hybrid Crop Product Development to ensure cohesive development plans in the hybrid crop space. Oversaw IPCD Operations, which built and maintained effective infrastructure to enable execution of research activities within the scope of IPCD, including statistical support for multiple research groups, management of the Johnston Field Research Center and IPCD Operations in India.

**Research Director – Insect Trait Development** DuPont Pioneer, Johnston, IA. March 1, 2013 – Nov. 2, 2015. Responsible for leading 7 scientists and their global research teams (approx. 68 people) in delivering trait characterization and development support to enable Pioneer’s insect trait strategy. Responsible for generating data, analyses, interpretation and input for trait advancement decisions. Led the insect resistance management team and participated broadly in product stewardship activities related to insect trait durability and sustainability. Developed internal and external collaborations, established effective networking across functions, and was responsible for personnel development.

**Program Leader** DuPont Agricultural Biotechnology Group, DuPont Pioneer, Johnston, IA. May 10, 2010 – March 1, 2013. Drove program execution and served as single point of accountability for the Optimum®AcreMax® Program, Corn Herbicide Tolerance Program, Southern Refuge Program and Insect Resistance Management Program. Collaborated broadly across Ag Biotech, Crop Genetics Research & Development, and the broader Enterprise and provided cross-functional leadership and ensured alignment on program objectives, plans and timelines.

**Research Scientist, Optimum**® **AcreMax**® **Implementation Lead** Trait Characterization & Development Group, Pioneer Hi-Bred International, Inc., Johnston, IA. March 2008 – May 10, 2010. Cross-functional coordination for execution of the Optimum® AcreMax® Insect Control strategy which included participation on all workstreams, strategy development, and technical implementation from Discovery through Regulatory and post-commercial support.

**Research Scientist, Environmental Safety Leader** Regulatory Science & Registration Group, Pioneer Hi-Bred International, Inc., Johnston, IA. June 2005 – March 2008. Primary responsibilities included: Coordination of environmental safety studies for transgenic crops; design and implementation of laboratory and field studies evaluating non-target organism effects of transgenic crops worldwide; coordination of environmental fate research; conducting environmental risk assessment for genetically modified crops. Pioneer technical representative for Agriculture Biotechnology Stewardship Technical Committee, Non-Target Organism Subcommittee.

**Research Scientist** Insect Control–Herbicide Resistance Group, Pioneer Hi-Bred International, Inc., Johnston, IA. June 2001 – June 2005. Primary responsibilities included: Managed the Insect Control – Herbicide Resistance Plant Entomology group, which focused on insect production (insectary) and early generation field evaluation of transgenic corn (greenhouse and field). Principle investigator for laboratory and field based non-target organism studies including GLP studies for regulatory support. Member of the Event Management Team which was responsible for integration of new technology into the product development pipeline. Pioneer technical representative for Agriculture Biotechnology Stewardship Technical Committee, Non-Target Organism Subcommittee.

**Senior Research Associate** Plant Resistance to Insects Group, Pioneer Hi-Bred International, Inc., Johnston, IA. December 1996 – June 2001. Primary responsibilities included: research supporting the regulatory approval process, non-target organism studies and insect resistance management research; screening transgenic plant material for insect resistance in the greenhouse, field and laboratory; evaluating events in product development pipeline.

**Research Associate** Entomology Group, Pioneer Hi-Bred International, Inc., Johnston, IA. May 1994 – December 1996. Primary responsibilities included: field evaluation of germplasm for resistance to European corn borer and western corn rootworm; greenhouse screening of transgenic material for insect resistance.

**Part-time Research Assistant** Pioneer Hi-Bred International, Inc., Johnston, IA. November 1992 - May 1994. Assisted with several Pioneer research projects including soybean (manager: Leon Streit); herbicide resistance (manager: Lynn Heetland); and entomology (manager: John Campbell).

**Beef Merchandiser/Tagger** IBP, Inc., Dakota City, NE. June 1990 – October 1992. Selected carcass beef for IBP box beef production and Certified Angus Beef Program. Responsible for outside sales of carcass beef not utilized in IBP boxed beef program. Worked closely with USDA meat graders and have comprehensive knowledge of the USDA carcass beef yield and quality grading system. Supervised carcass beef load-out crew.

**Professional Associations/Certifications/Organizations/Awards**

* Entomological Society of America – 1994 to present.
* Board Certified Entomologist (Plant-Insect Ecosystems), Entomological Society of America – 2000 to present.
* Certified Entomologists of Mid-America (Secretary/Treasurer 2012-2016) – 2010 to present.
* Entomological Society of America Certification Board (Director, 2015) – 2014-2016.
* Certified Commercial Pesticide Applicator – State of Iowa (Core & Ag Insect) – March 2017-Dec 2019.
* Girl Scouts of Greater Iowa Board of Directors, Des Moines, Iowa – 2018-2021.
* Science Center of Iowa Board of Directors (Internal Affairs Chair, 2018), Des Moines, Iowa – 2014-2018.
* Grand View University Biology Advisory Committee, Des Moines, Iowa – 2013-2018.
* Executive Youth Committee, Plymouth Church, Des Moines, Iowa (Chair, 2015-16) – 2014-2017.
* Alexis de Tocqueville Society, United Way of Central Iowa – 2016-2018.
* Lead for Pioneer’s Homeless Assistance Team, Dec. 2014-present. Past lead for Pioneer’s Meals on Wheels delivery program, 2006-2015.
* Recipient of the Excellence in Core Values Award for leadership of Pioneer’s Homeless Assistance Team, July 14, 2017, DuPont Pioneer Core Values Advancement Team, Johnston, Iowa.
* Recipient of the 2017 Honor Award for significant contributions to the Girl Scout Leadership experience. April 22, 2017, Girl Scouts of Greater Iowa Circle of Excellence, Ames, Iowa.
* Recipient of the 2014 Girls in Science “Scientist of the Year” Award. May 14, 2014. Presented by the Science Center of Iowa – Des Moines, Iowa.
* Recipient of the 2012 Pioneer Northeast Business Unit “Business Directors Award” for outstanding leadership and achievement in regulatory affairs. June 21, 2012 – DuPont Pioneer.
* Recipient of the 2011 DuPont Bolton/Carothers Innovative Science Award recognizing a creative scientific invention or discovery that results in a recently commercialized new product – Optimum®AcreMax® insect protection products. January 17, 2012 – DuPont.
* Recipient of the 2011 DuPont Marketing & Sales Excellence Awards - Optimum® AcreMax® 1 Launch Team. January 17, 2012 – DuPont.
* Recipient of the 2011 Henry A. Wallace Agricultural Revolution Impact Award for the achievements of the Optimum® AcreMax® Team resulting in a major impact on the Pioneer business and the greater science community. July 13, 2011 – Pioneer Hi-Bred International, Inc.
* Finalist for the 2010 Iowa Women of Innovation Award presented by the Technology Association of Iowa. Large Company Innovation and Leadership (Science) award category – October 13, 2010.
* Recipient of the 2010 DuPont Agriculture Biotechnology Achievement Awards “Outstanding Team Collaboration Award” recognizing the best cross-functional collaboration that leads to the development of a competitive technology or product. July 14, 2010 – Pioneer Hi-Bred International, Inc.
* Recognized by the DuPont Crop Genetics Research and Development Contribution Award Program for contributions to the Optimum® AcreMax®1 regulatory submission. March 11, 2008 – Pioneer Hi-Bred International, Inc.
* Recipient of the 2007 Bolton/Carothers Innovative Science Award recognizing a creative scientific invention or discovery that results in a recently commercialized new product – Herculex® RW - DuPont.
* Recipient of the 2006 Rick McConnell Leadership Award recognizing contributions to Regulatory Science for commercialization of Herculex® RW – Pioneer Hi-Bred International, Inc.
* Lifetime member of Girl Scouts USA. Girl Scout troop leader, Troop 661 & 1117 (STEM-focused troop), Walnut Creek Service Unit Manager (2011-2014), Des Moines, Iowa. 2006-present.

**Patents**

Inventor on 5995WOPCT, Serial PCT/US16/17107: ENHANCING THE EFFECTIVENESS OF BLENDED REFUGE which discloses a seed blend designed to eliminate or greatly reduce cross-pollination and methods for deploying the refuge crop for insect resistance management.

**Publications**

Ostrem, J.E., Z. Pan, J.L. Flexner, E. Owens, R. Binning and **L.S. Higgins.** Monitoring Susceptibility of Western Bean Cutworm (Lepidoptera: Noctuidae) Field Populations to *Bacillus thuringiensis* Cry1F Protein. **Journal of Economic Entomology,** doi: 10.1093/jee/tov383. January 2016.

Pan, Z., D. Onstad, P. Crain, A. Crespo, W. Hutchison, D. Buntin, P. Porter, A. Catchot, D. Cook, C. Pilcher, J.L. Flexner; and **L.S. Higgins**. Evolution of Resistance by *Helicoverpa zea* (Lepidoptera: Noctuidae) Infesting Insecticidal Crops in the Southern United States. **Journal of Economic Entomology**, doi: 10.1093/jee/tov340. December, 2015.

Alan Raybould, **L.S. Higgins**, M.J. Horak, R.J. Layton, N.P. Storer, J.M. De La Fuente and R.A. Herman.. Assessing the ecological risks from the persistence and spread of feral populations of insect resistant transgenic maize. **Transgenic Research**, DOI 10.1007/s11248-011-9560-4. October 15, 2011.

**Laura S. Higgins**, J. Babcock, P. Neese, R.J. Layton, D.J. Moellenbeck and N. Storer. Three Year Field Monitoring of Cry1F, Event DAS-Ø15Ø7-1, Maize Hybrids for Non-Target Arthropod Effects. **Environmental Entomology**, 38: 281-292 (2009).

Jared A. Prasifka, R.L. Hellmich, G.P. Dively, **L.S. Higgins**, P.M. Dixon and J.J. Duan. Selection of Nontarget Arthropod Taxa for Field Research on Transgenic Insecticidal Crops: Using Empirical Data and Statistical Power. **Environmental Entomology,** 37(1): 1-10, February 2008.

Daniel J. Moellenbeck, M.L. Peters, J.W. Bing, J.R. Rouse, **L.S**. **Higgins**, L. Sims, T. Nevshemal, L. Marshall, R.T. Ellis, P.G. Bystrak, B. Lang, J. Stewart, K. Kouba, V. Sondag, V. Gustafson, K. Nour, D. Xu, J. Swenson, J. Zhang, T. Czapla, G. Schwab, S. Jayne, B. Stockhoff, K. Narva, H. E. Schnepf, S. Stelman, C. Poutre, M. Koziel and N. Duck. Insecticidal proteins from *Bacillus thuringiensis* protect corn from corn rootworms. **Nature Biotechnology**, Vol. 19, No. 7, July 2001.

Richard L. Hellmich, **L.S. Higgins**, J.F. Witkowski, J.E. Campbell and L.C. Lewis. Oviposition by European corn borer (Lepidoptera: Crambidae) in response to various transgenic corn events. **Journal of Economic Entomology**. Vol. 92, No. 5, October 1999.

**Technical Presentations**

Optimum® AcreMax™ Insect Protection Update. Oral presentation. **Annual Meeting of the Entomological Society of America.** Nov 16, 2011. Reno, NV

Case study: Pioneer's implementation of the new paradigm with the public sector. Oral presentation. ESA symposium “Reaching out across the bag-tag: Overcoming diversity of industry, university, and government interests to embrace public-sector research on commercialized transgenic crops", **Annual Meeting of the Entomological Society of America** Tuesday, Dec 14, 2010, San Diego, CA.

Optimum® AcreMax™ Insect Protection Update. Oral presentation. **Annual Meeting of the Entomological Society of America.** Dec 14, 2010. San Diego, CA.

Multi-Gene Insect Control Products & Refuge Issues - is more *always* better? Invited speaker **Illinois Corn Breeders School.** March 1, 2010, Champaign, IL.

Optimum® AcreMax™ Insect Protection Update. Oral presentation. **Annual Meeting of the Entomological Society of America.** December 16, 2009. Indianapolis, IN.

Pioneer Trait and Technology Pipeline Update. **Farm Progress Show**, August 26, 2008. Boone, IA.

Optimum® AcreMax™ 1 Insect Protection: The Science Behind the Solution. Poster. **Annual Meeting of the Entomological Society of America.** November 19, 2008. Reno, NV.

Ladybird beetle (Coleoptera: Coccindellidae) Test Systems. Oral presentation. ESA symposium "Harmonizing Laboratory Methods to Evaluate Potential Effects of GM Crops on Non-target Arthropods" (co-organizer). **Annual Meeting of the Entomological Society of America.** December 11, 2007. San Diego, CA.

Non-target Testing Strategies for Insecticidal Crystalline Proteins: Early tier evaluation of Cry34/35Ab1 effects on the development and survival of the ladybird beetle *Coleomegilla maculate* DeGeer (Coleoptera: Coccinellidae). Poster. **North Central Branch Meeting of the Entomological Society of America.** March 21, 2005. West Lafayette, IN.

Evaluating the impact of transgenic corn hybrids developed for insect control on non-target organisms. Poster. **North Central Branch Meeting of the Entomological Society of America.** March 25, 2002. East Lansing, MI.

Transgenic rootworm resistant cultivars: development update and Pioneer perspective on resistance management. Oral presentation. **American Society of Agronomy, Crop Science Society of America and Soil Science Society of America 2000 Annual Meetings.** November 8, 2000. Minneapolis, MN.

**Scientific Community & Professional Outreach**

Invited Speaker – Symposium: Continued Challenges in Entomology from a Woman’s Perspective. **Annual Meeting of the Entomological Society of America**, Vancouver, BC, Nov 11-14, 2018.

Presenter: Perspectives on GMOs. Advanced Placement Environmental Science Class. **Des Moines Public Schools**, Roosevelt High School, 2016-2017.

Organizer of “Incredible Women in Science” STEM Event. **Girl Scouts of Greater Iowa** and DuPont Pioneer. 2016 - present, Pioneer Carver Center, Johnston, Iowa

Panelist on women’s professional development, various venues including: **DuPont Pioneer Women’s Network** Women in Ag Panel (July 11, 2016), **Leadership Iowa University** (Aug 10, 2016), **Iowa National Guard Women's Leadership Summit** (Sept 19, 2016)

Roundtable Leader & Coach; Leader Fellowship Program. **Agriculture Future of America**, Kansas City, Missouri, 2016-present.

Mentor and Presenter, Girls in Science Meals with Mentors Program & Girls in Science Programming. **Science Center of Iowa**, Des Moines, Iowa, 2014-present.

Professional Mentor, **African Women in Agricultural Research and Development (AWARD) Program**. DuPont Pioneer and Iowa State University, 2015-2016.

Student Mentor, Science Fair Judge, Mentoring Circle Leader – **Science Bound, School of Education, Iowa State University.** Roosevelt & North High Schools, Des Moines Iowa, 2013-2018.

Technical Expert - **Iowa Youth Institute, Iowa State University & World Food Prize**. Ames, Iowa. Panelist with ISU faculty, facilitating discussion, questions and judging student presentations on food security issues. Spring 2014-present.

Invited Speaker – Monsters in the Mattress. Café Scientifique keynote speaker. January 8, 2013. **Science Center of Iowa**, Des Moines, Iowa.

Invited Presenter – Science Center of Iowa “Portal to the Public” Program. General entomology subjects 2012-2013. **Science Center of Iowa**, Des Moines, Iowa.

Invited Speaker – Data on Women in Entomology: You’ve Come a Long Way, Baby!? Symposium: Identifying the Current Status of Women in Entomology, Clarifying Initiatives for Retention, and

Speaking Out to Share Experience. **Annual Meeting of the Entomological Society of America**, Reno, Nevada, Nov 13, 2011.

Invited Speaker – Monsters in the Mattress: The remarkable story of the resurgence of the bed bug (*Cimex lectularius)*. Lunch-and-Learn series. **Pioneer Hi-Bred, a DuPont** Business, Johnston, Iowa, Feb. 14, 2011.

Invited Speaker – **Moms Night Out for STEM,** official Satellite Event of the **USA Science and Engineering Festival**, Washington DC, Oct 10-24, 2010. The Importance of Moms, Dads and Other Caregivers in Shaping Children’s Self Image and Interest in Science, Technology, Engineering and Math (STEM). Iowa Public Television Studios, Johnston, Iowa, Oct. 18, 2010.

Entomology Careers. Oral presentations. “Taking the Road Less Traveled, A Career Conference for Girls” sponsored by **Iowa State University’s Program for Women in Science and Engineering.** The conference targets sixth through twelfth grade girls for career paths within science, technology, engineering and math. More than 2,500 individuals participate in the program each year. 2007-2014. Iowa State University, Ames, Iowa.

General entomology subjects. Founder, organizer and annual presenter for the **4-H Entomology Workshop. Polk County, Iowa (Iowa State University Extension)**. Participating groups also included troops from the Boy Scouts and Girl Scouts of America. March (2001 – 2009), Pioneer Hi-Bred International, Inc. Johnston, Iowa campus, Carver Center.

Founder and organizer of the Hanawalt Elementary 4th and 5th Grade Science Fair; judging coordinator for Merrill Middle School Science Fair. **Des Moines Public Schools**. 2009-2013, Des Moines, Iowa.

Science Fair Judge, **Des Moines Public Schools** District Science Fair, DMPS Weeks and Merrill Middle Schools, **Iowa State University**’s “Science Bound” Nothing Less Than Success Science Fair. 2009-present, Des Moines, Iowa.

Overview of entomology as an introduction to general science. **Preschool, primary and secondary schools in central Iowa**. Presented on general entomological subjects to classes in the following districts: Des Moines Public Schools, West Des Moines Public Schools, Johnston Public Schools, Urbandale Public Schools, West Des Moines Dowling High School, West Des Moines Christian Church preschool. 2000-present