Dr. Emily A. Heaton
Assistant Professor, Biomass Crop Production
Dept. of Agronomy
Iowa State University
www.agron.iastate.edu/faculty/heaton
Curriculum Vitae

CANDIDATE INFORMATION

Education

- Ph.D., University of Illinois at Urbana-Champaign, Crop Sciences, 2006
- BS, University of Illinois at Urbana-Champaign, Crop Sciences, 2001

Professional Experience

Appointment	Year
Assistant Professor, 70% Research / 30% Extension, Department of Agronomy, Iowa State University, Ames, IA	2008-present
Manager, Research Agronomy, Ceres, Inc., Thousand Oaks, CA	2007-2008
Manager, Energy Crop Production, Ceres, Inc., Thousand Oaks, CA	2006-2007
Coordinator, Strategic Research Initiative on Biomass Energy, University of Illinois at Urbana-Champaign, Urbana, IL	2004-2006
Graduate Research Assistant, University of Illinois at Urbana-Champaign, Urbana, IL	2001-2006
Graduate Teaching Assistant, University of Illinois at Urbana-Champaign, Urbana, IL	2003-2005

Areas of Specialization

- Research program in the areas of biomass crop production, management and ecophysiology
- Extension program in the area of biomass crop adoption, production and management

Iowa State University Faculty Memberships

Program	Year
Undergraduate Honors Program	2008-2010
Dept. of Agronomy, Crop Production and Physiology Graduate Program	2008-present
Interdepartmental Plant Biology Program	2009-present
Graduate Program in Sustainable Agriculture	2012-present

RESEARCH

Honors and Awards (10)

Award	Year
Outstanding Young Alumni Award, College of Agricultural, Consumer and Environmental Sciences, University of Illinois	2013
Raymond and Mary Baker Agronomic Excellence Award, Iowa State University, Dept. of Agronomy	2013
Early Achievement in Extension and Outreach Award, Iowa State University, College of Agriculture and Life Sciences	2013
Extension Team Achievement Award (for the Crop Advantage Series), Iowa State University	2011

Baker Agronomic Excellence Travel Fund Award, Iowa State University, Dept. of Agronomy	2009
Brockson Graduate Fellowship, University of Illinois	2005
Alumni Award for Graduate Student Travel, University of Illinois	2005
University of Illinois Fellow	2002, 2003
Honorary inductee, Gamma Sigma Delta, Agricultural Honor Society	2002
Special Undergraduate Research Experience Award, University of Illinois	2001, 2002

Peer-reviewed journal articles since joining Iowa State University (23, 9 from Heaton group)

*****BS, MS or Ph.D. student, [§]post-doctoral researcher or scientist supervised by Heaton

1. Salas Fernandez M.G.., Strand K., Hamblin M., Westgate M., **Heaton E.A.** & Kresovich S. (*accepted*) Genetic analysis and phenotypic characterization of leaf photosynthetic capacity in sorghum. *Genetic Resources and Crop Evolution*.

   Role: Role: Heaton was on Katie Strand's MS graduate committee and assisted with concept of the project and slight editing of the manuscript.

   Effort: 5% concept, 0% analysis, 0% writing, 5% editing

   Significance: One of the first efforts to use photosynthetic capacity as a trait to breed for stress tolerance in sorghum.

2. Hong C.O., Owens V.N., Bransby D., Farris R., Fike J., **Heaton E.A.**, Kim S., Mayton H., Mitchell R., & Viands D. (*in press*) Switchgrass response to nitrogen fertilizer across diverse environments in the USA: a regional feedstock partnership report. *Bioenergy Research.* DOI: 10.1007/s12155-014-9484-y

   Role: Heaton led the Iowa portion of this research including experimental design and data collection, then edited the manuscript multiple times.
   Effort: 0% concept, 2% analysis, 10% writing, 25% editing

   Significance: This is the second paper from the US Sun Grant Initiative Regional Feedstock Partnership project on switchgrass, a transcontinental experiment informing switchgrass growth and

production at a commercially relevant scale across diverse environments (http://www.sungrant.org/Feedstock+Partnerships/).

3. Boersma N.N.* & **Heaton E.A**. (2014) Propagation method affects *Miscanthus × giganteus* developmental morphology. *Industrial Crops and Products.* **57**, 59-68.

   Role: Heaton supervised Boersma's Ph.D., and was closely involved in the genesis and development of this manuscript.
   Effort: 20% concept, 0% analysis, 15% writing, 95% editing

   Significance: This is the first study to document the impact of two commercial propagation techniques on subsequent M. × giganteus development and appearance. We found stem and rhizome propagation produce similar plants, in contrast to European work on tissue-cultured M. × giganteus.

4. Boersma N.N.* & **Heaton E.A**. (2014) Does propagation method affect yield and survival? The potential of *Miscanthus* × *giganteus* in Iowa, USA. *Industrial Crops and Products.* **57**, 43-51.

   Role: Heaton supervised Boersma's Ph.D., and was closely involved in the genesis and development of this manuscript.
   Effort: 20% concept, 0% analysis, 15% writing, 95% editing

   Significance: This is the first study to document the impact of two commercial propagation techniques on subsequent M. × giganteus survival and yield. We found stem and rhizome propagation survived and yielded similarly, in contrast to poor survival from European tissue-cultured plants. Our findings mean that farmers can confidently purchase whichever propagule works best for their operation.

5. Bonin C.L.[§], **Heaton E.A.** & Barb J. (2014) *Miscanthus sacchariflorus*: biofuel parent or new weed? *Global Change Biology Bioenergy*. Article first published online: 31 JAN 2014
   DOI: 10.1111/gcbb.12098.

   Role: Heaton conceived this manuscript and supervised post-doctoral scientist Bonin.
   Effort: 95% concept, 0% analysis, 5% writing, 90% editing

   Significance: Considerable attention has been given to the potential impacts of M. × giganteus and its parent M. sinensis as biofuels or invasive species, while the other parent, M. sacchariflorus, has been largely ignored. This review highlights concerns and knowledge gaps with new information from Heaton's program.

6. Wilson D.M.*, **Heaton E.A.**, Schulte L.A., Gunther T.P., Shea M.E., Hall R.B., Headlee W.L., Moore K.J., Boersma N.N.* (2014) Establishment and short-term productivity of annual and perennial bioenergy crops across a landscape gradient. *BioEnergy Research*. 1-14.

   Role: Heaton supervised Wilson in writing this manuscript and was intimately involved in all aspects of its development.
   Effort: 25% concept, 2% analysis, 20% writing, 75% editing

Significance: This manuscript provides full site and yield details from the first four years of the Landscape Biomass Project, a long-term, transdisciplinary project evaluating tradeoffs associated with bioenergy crops grown over a topographic gradient on marginal land. Importantly, this paper highlights the potential of planting switchgrass under a corn nurse crop, and the stability of diverse cropping systems under weather extremes (drought and flood).

7. Arundale R., Dohleman F., **Heaton E.A.**, McGrath J. Voigt, T. & Long S.P. (2014) Yields of *Miscanthus* x *giganteus* and *Panicum virgatum* decline with stand age in the Midwestern USA. *Global Change Biology Bioenergy*. **6**, 1-13.

   Role: Heaton designed the original experiment and established the plots used in this research, then contributed to the structure and editing of this publication.
   Effort: 50% concept, 0% analysis, 0% writing, 10% editing

   Significance: This is the first report of longer-term yields of Miscanthus in the US. It shows a decline after 8 years that may prove significant for models of biomass availability in the nation.

8. Owens V.N., Viands D.R., Mayton H.S., Fike J.H., Farris R., **Heaton E.A.**, Bransby D.I., Hong C.O. (2013) Nitrogen use in switchgrass grown for bioenergy across the USA. *Biomass and Bioenergy*. **58**, 286-293.

   Role: Heaton assisted with the scope and tailoring of this article.
   Effort: 1% concept, 0% analysis, 1% writing, 10% editing

   Significance: This is the first paper to come out of the Sun Grant Initiative's Regional Feedstock Partnership, a unified network of bioenergy trials across the US. This paper showed patterns of switchgrass N use from field-scale trials that are appropriate for economic modeling and biorefinery planning.

9. **Heaton E.A.,** Schulte L.A, Berti M., Langeveld H., Zegada-Lizarazu W., Parrish D. & Monti, A. (2013) Integrating food and fuel: How to manage a 2G crop portfolio. *BioFPR*. **7**, 702-714; **invited submission**.

   Role: Heaton led this invited submission from US and EU scientists. Heaton was responsible for manuscript development, editing and submission.

   Effort: 80% concept, n/a% analysis, 50% writing, 60% editing

   Significance: This review is part of a special issue on building an EU-US bridge in second generation energy crop development. It highlights strategies to achieve food, fuel and environmental goals with case studies from the EU and US, including Heaton's research at the Landscape Biomass Project.

10. Coulman B., Dalai A., **Heaton E.A.**, Lefsrud M., Levin D., Lemaux P.G., Neale D., Shoemaker S. P., Singh J., Smith D.L. & Whalen J.K. (2013) Lignocellulosic biofuel feedstocks. *BioFPR.* **7**, 582-601; **invited submission**.

    Role: Heaton contributed a section on Miscanthus and other perennial grasses to this review.
    Effort: 0% concept, 0% analysis, 10% writing, 5% editing

Significance: This paper provides a holistic view of woody and herbaceous feedstocks in North America.

11. Waramit N., Moore K.J. & **Heaton E.A.** (2013) Nitrogen and harvest date affect developmental morphology and biomass yield of warm-season grasses. *Global Change Biology Bioenergy*. Article first published online: 29 AUG 2013, DOI: 10.1111/gcbb.12086.

    Role: Heaton was on the graduate committee of Dr. Waramit and assisted with shaping and editing the manuscript.
    Effort: 0% concept, 0% analysis, 0% writing, 10% editing

    Significance: This study demonstrated that warm-season grasses develop differently depending on management, with implications for modelled projections of biomass production and resource use.

12. Manatt R.K., Hallam A., Schulte L.A., Gunther T., Hall R.B., **Heaton E.A.** & Moore K. (2013) Farm-scale costs and returns for 2G cropping systems in the U.S. Corn Belt. *Environmental Research Letters.* **8** 035037; **invited submission**.

    Role: This manuscript is one of the first generated by the Landscape Biomass Project, which Heaton joined in 2010. Heaton assisted in shaping and editing the manuscript.
    Effort: 10% concept, 0% analysis, 0% writing, 5% editing

    Significance: This study details profitability of four second-generation (2G) cropping systems compared to corn, based on data collected from the Landscape Biomass Project. 2G crops will not be profitable without changes to policy or valuation of ecosystem services in the US Corn Belt.

13. Cole D. P., Smith E.A., Dalluge D., Wilson D.M.*, **Heaton E.A.**, Brown R.C. & Young J.L. (2013) Molecular characterization of nitrogen-containing species in switchgrass bio-oils at various harvest times. *Fuel*. **111**, 718-726.

    Role: This study used bio-oil generated by Danielle Wilson during her MS degree on a project initiated by Heaton. Heaton contributed to the direction of the analysis and interpretation of results.
    Effort: 3% concept, 0% analysis, 0% writing, 10% editing

    Significance: This study used multiple analytical chemistry techniques to characterize bio-oil, showing that the interpretation of bio-oil composition depends on the type of method used and the type of N species present.

14. Wilson D.M.*, **Heaton E.A.**, Liebman M. & Moore K.J. (2013) Intra-seasonal changes in switchgrass nitrogen distribution compared to corn. *Agronomy Journal*. **105,** 285-294.

    Role: Heaton conceived this project and advised the lead author in implementing the research as well as publishing the article.
    Effort: 90% concept, 0% analysis, 40% writing, 70% editing

Significance: Considerable evidence suggests switchgrass cycles N from above-ground tissues, but there are few papers tracking the movement of N to below-ground tissues. This paper provides a comprehensive inventory of both above- and below-ground inventories of N in switchgrass, allowing farmers to better assess plant nutrient demands and management strategies.

15. Wilson D.M.*, Dalluge D.L., Rover M., **Heaton E.A.**, & Brown R.C. (2013) Crop management impacts biofuel quality: influence of switchgrass harvest time on yield, nitrogen, and ash of fast pyrolysis products. *Bioenergy Research*. **6,** 103-113.

    Role: Heaton conceived the idea for this project and advised the lead author in implementing the research and publishing the article as part Wilson's MS degree.
    Effort: 70% concept, 0% analysis, 15% writing, 90% editing

    Significance: Nitrogen (N) is a contaminant in the process of upgrading bio-oil to useful fuel. This paper was the first to determine a predictive relationship between feedstock nitrogen concentration and that of resultant pyrolysis products. Not only did we find a robust relationship, thus providing the industry with a rapid and cost-effective means of assessing feedstock quality for pyrolysis, but we also found that bio-oil quality can improved simply by managing the harvest time of switchgrass feedstock.

16. Boersma N.N.* & **Heaton E.A**. (2012) Effects of temperature, illumination and node position on stem propagation of *Miscanthus × giganteus*. *Global Change Biology Bioenergy*. **4**, 680-687.

    Role: Heaton shared in the conception of this project and advised the lead author in implementing the research and publishing the article.
    Effort: 50% concept, 10% analysis, 40% writing, 90% editing

    Significance: A major limitation to farmer adoption of Miscanthus is the cost of planting material. Here we identified optimum conditions for a novel propagation system using M. × giganteus stem cuttings that was as effective as traditional rhizome propagation, but that has potential to be at least 15 fold faster and cheaper.

17. Dohleman F.G., **Heaton E.A.**, Arundale R.A. & Long, S.P. (2012) Seasonal dynamics of above- and below-ground biomass and nitrogen partitioning in *Miscanthus* x *giganteus* and *Panicum virgatum* across three growing seasons. *Global Change Biology Bioenergy*. **4**, 534-544.

    Role: Heaton designed the original experiment and established the plots used in this research, then contributed to the structure and editing of this publication.
    Effort: 20% concept, 0% analysis, 0% writing, 20% editing

    Significance: This paper demonstrates seasonal cycling of N and biomass between above- and below-ground structures of Miscanthus and switchgrass over multiple years and locations. The robust data set is useful to modelers and other researchers in estimating the C and N budgets that can be expected from these crops in the central US.

18. Rogovska N., Laird D., Cruse R.M., Trabue S. & **Heaton E.A.** (2012) Germination tests for assessing biochar quality. *Journal of Environmental Quality*. **41**, 1014-1022.

Role: Heaton advised in the design of these experiments and in the interpretation of results.
Effort: 10% concept, 0% analysis, 0% writing, 10% editing

Significance: Biochar has received considerable attention as a panacea for soil improvement and crop health, but conflicting data indicated can either help or harm plant growth. This paper provides methods for determining if a given biochar is likely to be useful as a soil amendment, thus shaping the future of biochar research.

19. Prasifka J., Buhay J.E., Sappinton T.W., **Heaton E.A.**, Bradshaw J.D., & Gray, M.E. (2011) Stem-boring caterpillars of switchgrass in the Midwestern United States. *Annals of the Entomological Society of America.* **104**, 507-514.

    Role: Heaton assisted with data collection, interpretation and editing.
    Effort: 0% concept, 5% analysis, 0% writing, 5% editing

    Significance: Switchgrass could be planted on millions of acres in the US as energy crop productions increases, but very little is known about its pests. This paper is the first to identify new stem boring caterpillars found in field trials across the Midwest.

20. **Heaton E.A.,** Dohleman F.G., Miguez F., Juvik J.A., Lozovaya V., Widholm J. , Zabotina O.A., McIsaac G.F., David M.B., Voigt T.B., Boersma N.N.#, & Long S.P. (2010) Miscanthus: a promising biomass crop. In: *Advances in Botanical Research* (ed. Jean-Claude K. & Michel D.). **56,** 75-137. Academic Press.

    Role: Heaton and Dohleman were invited to submit this review and equally developed the content outline. Heaton was responsible for manuscript development, editing and submission
    Effort: 50% concept, 10% analysis, 30% writing, 90% editing

    Significance: Miscanthus is currently the subject of much active research, but synthesis of new information is lacking. This review is the most recent and comprehensive review of Miscanthus in the peer-reviewed literature today.

21. Goff B.M., Moore K.J., Fales S.L., & **Heaton E.A.** (2010) Double-cropping sorghum for biomass. *Agronomy Journal.* **102**, 1586-1592.

    Role: Heaton was an active member of Goff's PhD committee and advised on results interpretation.
    Effort: 0% concept, 0% analysis, 0% writing, 25% editing

    Significance: Sorghum is a traditional arable crop with great potential as a bioenergy feedstock, but very little data exists on its productivity in this capacity. This paper is one of few presenting biomass and energy production potential from sorghum grown in the Midwestern US.

22. **Heaton E.A.**, Dohleman F.G. & Long S.P. (2009) The impact of harvest time on nitrogen dynamics in Miscanthus and switchgrass. *Global Change Biology Bioenergy*. **1**, 297-307.

    Role: Heaton performed the data collection and analysis for this paper as part of her PhD research. The data analysis was refined and the manuscript prepared while at ISU.
    Effort: 75% concept, 90% analysis, 90% writing, 95% editing

Significance: This paper was the first to present nitrogen cycling information for Miscanthus *x* giganteus *in the US, indicating the crop can produce high biomass yields with little external nitrogen application if managed properly, thus reducing excess nitrogen in the agro-ecosystem and improving crop sustainability.* ***Of the 190 articles the journal, which has an impact factor of 4.7, had published since inception in January 2011 to December 2013, this paper was one of the 15 most-cited according to Web of Science®, placing it among the top 10% of articles in 2013.***

23. Dohleman F.G., **Heaton E.A**., Leakey A.D.B. & Long S.P. (2009) Does greater leaf-level photosynthesis contribute to greater solar energy conversion efficiency in Miscanthus when compared to switchgrass? *Plant Cell and Environment.* **32**, 1525-1537.

    Role: Heaton assisted with concept development, data collection and interpretation
    Effort: 20% concept, 10% analysis, 10% writing, 25% editing

    Significance: Understanding what limits biomass production of terrestrial plants will be important to meeting human energy demands in a bioenergy economy. In this paper we show mechanisms that enable Miscanthus to produce more than the "model" bioenergy crop, switchgrass.

Peer-reviewed journal articles prior to joining Iowa State University (6)

24. **Heaton E.A.**, Flavell R.B., Mascia P.N., Thomas S.R., Dohleman F.G. & Long S.P. (2008) Herbaceous energy crop development: recent progress and future prospects. *Current Opinion in Biotechnology*. **19**, 202-209.

    Role: Heaton was invited to submit this article and was responsible for its conception and development.
    Effort: 95% concept, 90% analysis, 50% writing, 90% editing

    Significance: Energy crop development is a nascent and rapidly changing area of science. This article framed key, recent advances in research and policy related to energy crops in a context targeted to those in biotechnology.

25. **Heaton E.A.**, Dohleman F.G. & Long S.P. (2008) Meeting US biofuel goals with less land: the potential of Miscanthus. *Global Change Biology*. **14**, 2000-2014.

    Role: Heaton collected the data for this study, performed the analysis and wrote the article. This article was a result of Heaton's Ph.D. research.
    Effort: 80% concept, 100% analysis, 90% writing, 50% editing

    Significance: This article was the first to present biomass yields of Miscanthus *x* giganteus *in the US, showing it could produce enough renewable feedstock to meet US biofuel mandates on only the land currently used for corn ethanol production, thus helping launch US interest in Miscanthus.* ***The article is in the top 3% of those cited from the journal, which has an Impact Factor of 6.91 and is ranked by ISI ScienceWatch as the most cited journal in Climate Change Research behind Science and Nature.***

26. Rogers A., Allen D.J., Davey P.A., Morgan P.B., Ainsworth E.A., Bernacchi C.J., Cornic G., Dermody O., Dohleman F.G., **Heaton E.A.**, Mahoney J., Zhu X.G., Delucia E.H., Ort D.R. & Long S.P. (2004) Leaf photosynthesis and carbohydrate dynamics of soybeans grown throughout their life-cycle under Free-Air Carbon dioxide Enrichment. *Plant Cell and Environment*. **27**, 449-458.

    Role: Heaton performed data collection and contributed to conceptual discussion. This paper was a result of some of Heaton's undergraduate research.
    Effort: 5% concept, 0% analysis, 0% writing, 5% editing

    Significance: Carbohydrate dynamics determine the magnitude of photosynthetic response to elevated CO_2 concentrations in soybean. This paper demonstrated that the photosynthetic increase of plants grown in the field is significantly less than previously demonstrated by growth chamber studies and contributed to revision of global estimates of plant productivity under projected climate change.

27. **Heaton E.A.**, Clifton-Brown J., Voigt T.B., Jones M.B. & Long S.P. (2004) Miscanthus for renewable energy generation: European Union experience and projections for Illinois. *Mitigation and Adaption Strategies for Global Change*. **9**, 433-451.

    Role: Heaton collected and analyzed the data for this paper and did most of the writing. This paper is a result of Heaton's undergraduate and Ph.D. research.
    Effort: 70% concept, 95% analysis, 90% writing, 40% editing.

    Significance: Miscanthus had never been grown in the US for biomass, despite a long history in the EU. Here we presented the case for Miscanthus, along with modeled predictions of biomass yield, which indicated Miscanthus could produce twice as much biomass as switchgrass, the leading biomass crop in the US at the time.

28. **Heaton E.A.**, Voigt T. & Long S.P. (2004) A quantitative review comparing the yields of two candidate C-4 perennial biomass crops in relation to nitrogen, temperature and water. *Biomass & Bioenergy*. **27**, 21-30.

    Role: Heaton collected and analyzed the data for this paper and did most of the writing. This paper is a result of Heaton's Ph.D. research.
    Effort: 60% concept, 100% analysis, 95% writing, 50% editing

    Significance: Miscanthus and switchgrass are leading energy crops in the EU and US respectively, but had not been compared on the same continent. This quantitative review compared published yields and concluded Miscanthus should produce about twice as much biomass than switchgrass per unit of water, heat or nitrogen fertilizer.

29. Ainsworth E.A., Davey P.A., Bernacchi C.J., Dermody O.C., **Heaton E.A.**, Moore D.J., Morgan P.B., Naidu S.L., Ra H.S.Y., Zhu X.G., Curtis P.S. & Long S.P. (2002) A meta-analysis of elevated [CO2] effects on soybean (*Glycine max*) physiology, growth and yield. *Global Change Biology*. **8**, 695-709.

    Role: Heaton collected data and contributed to editing of the manuscript. This paper was a result of some of Heaton's undergraduate research.

Effort: 0% concept, 10% analysis, 0% writing, 5% editing

Significance: A plethora of studies had investigated the effects of elevated CO_2 concentrations on soybeans, with no clear consensus of results. This meta-analysis revealed statistically significant treatment effects as well as artifacts of measurement conditions, thus leading to changes in accepted research methodology.

Peer-reviewed journal articles under review (2, 1 from Heaton group)

30. Boersma N.N.*, Dohleman F.G., Miguez F. & **Heaton E.A.** (*in review*) *Miscanthus* x *giganteus* autumnal leaf senescence is affected by stand age. *New Phytologist*.

    Role: Heaton shared in the conception of this project and advised Nic Boersma in implementing the research and publishing the article as part of his PhD.
    Effort: 60% concept, 5% analysis, 30% writing, 75% editing

    Significance: This paper is the first showing differential senescence in perennial grasses with plant age, i.e., plants 'learn' how to senesce with age, with basic and applied science implications.

31. Stottlemeyer A.L., Snow A.A., Sweeney P.M., Miriti M.N. & **Heaton E.A.** Hybridization potential and fitness of cultivated and wild switchgrass (*Panicum virgatum*) in Ohio: implications for biofuel crops. *Ecological Applications.*

    Role: Heaton collaborates with Allison Snow on two NIFA grants related to invasion potential of bioenergy crops. For this study Heaton provided input on the initial direction and implementation, then on interpretation and editing of the results.
    Effort: 5% concept, 0% analysis, 2% writing, 10% editing

    Significance: Few studies have focused on whether non-local switchgrass cultivars could hybridize with native genotypes and possibly outcompete them. Using a paired common garden approach in Iowa and Ohio, we found that pollen- and seed-mediated gene flow between cultivars and wild relatives can occur. As improved varieties of switchgrass become more widely planted, there is real potential for naturalized populations to develop and persist in natural and semi-natural areas, and, in some cases, become more common than native biotypes.

Peer-reviewed book chapters (5)

1. Dohleman F.G., **Heaton E.A.** & S. Long. (2010) Perennial grasses as second-generation sustainable feedstocks without conflict with food production. In: *Handbook of Bioenergy Economics and Policy*. (eds Khanna M., Scheffran J. and Zilberman D.) pp 27-38. New York, NY, Springer Publishing.

    Role: Heaton contributed data for this chapter, along with assisting with its conception and development.
    Effort: 30% concept, 30% analysis, 30% writing, 50% editing

    Significance: This chapter synthesizes current knowledge of perennial energy crop production, including information not easily found in the peer-reviewed literature. It contributes to a collection of biomass crop information tailored to non-specialist scientists.

2. Pyter R., **Heaton E.A.**, Dohleman F.G., Voigt T.B. & Long S.P. (2009) Agronomic Experiences with *Miscanthus* x *giganteus* in Illinois. In: *Biofuels Methods and Protocols* (ed J.R. Mielenz) pp 41-52. New York, NY, Humana Press.

   Role: Heaton contributed data for this chapter, along with assisting with its conception and development.
   Effort: 30% concept, 30% analysis, 30% writing, 50% editing

   Significance: Written for both scientists and non-scientists, this chapter was the first to give practical descriptions of Miscanthus production with a focus on methodology and results in Midwestern experiments.

3. Casler M.D., **Heaton E.A.**, Shinners K.J., Jung H.G., Weimer P.J., Liebig M.A., Mitchell R.B. & Digman M.F. (2008) Grasses and Legumes for Cellulosic Bioenergy. In: *Grass: The 2008 Yearbook of Agriculture* (eds Wedin W. & Fales S.) pp 157-172. Madison, WI, American Society of Agronomy.

   Role: Heaton contributed data for this chapter, along with assisting with its conception and development.
   Effort: 5% concept, 5% analysis, 20% writing, 10% editing

   Significance: This chapter updated the 1948 Yearbook of Agriculture publication on grasses providing a unique perspective to contemporary discussions of grasses and legumes for bioenergy production. It contains a synthesis of information not easily available from primary literature.

4. Pyter R., Voigt T.B., **Heaton E.A.**, Dohleman F.G. & Long S.P. (2007) Giant Miscanthus: Biomass Crop for Illinois. In: *Issues in New Crops and New Uses* (eds Janick J. & Whipkey A.) pp 39-42. Alexandria, VA, ASHS Press.

   Role: Heaton contributed data for this chapter, along with assisting with its conception and development.
   Effort: 30% concept, 30% analysis, 30% writing, 50% editing

   Significance: Written for a broad audience, this chapter describes the challenges and triumphs of early Miscanthus investigations in Illinois, paving the way for the wealth of experimentation in progress today.

5. Ort D.R., Ainsworth E.A., Aldea M., Allen D.J., Bernacchi C.J., Berenbaum M.R., Bollero G.A., Cornic G., Davey P.A., Dermody O., Dohleman F.G., Hamilton J.G., **Heaton E.A.**, Leakey A.D.B., Mahoney J., Mies T.A., Morgan P.B., Nelson R.L., O 'Neil B., Rogers A., Zangerl A.R., Zhu X.G., Delucia E.H. & Long S.P. (2006) SoyFACE: the effects and interactions of elevated [CO2] and[O-3] on soybean. In: *Managed Ecosystems and Co2: Case Studies Processes and Perspectives* (eds Nosberger J., Long S., Norby R., Stitt M., Hendrey G., & Blum H.) pp 71-86. Berlin, Springer-Verlag.

   Role: Heaton assisted with data contribution for this review chapter as part of her undergraduate research.
   Effort: 0% concept, 2% analysis, 0% writing, 0% editing.

Significance: Free Air gas Concentration Enrichment (FACE) allows assessment of crop response to elevated greenhouse gas concentrations in an undisturbed field setting. SoyFACE is the only such system on soybean and found the interaction of CO_2 and O_3 will lead to lower than anticipated soybean yields under future climate conditions, with major implications for global food supply.

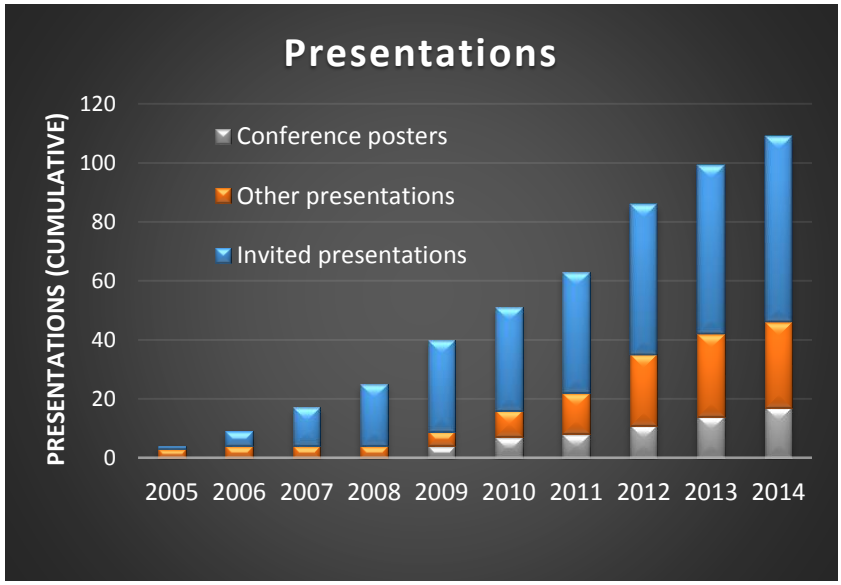
Peer-reviewed conference proceedings (2)

1. Moore K.J., Fales S.L. & **Heaton E.A.** (2008) Biorenewable Energy: New Opportunities for Grassland Agriculture. In: *Multifunctional Grasslands in a Changing World, Volume II: XI International Grassland Congress and VIII International Rangeland Congress, Hohhot, China, 29 June-5 July 2008* pp 1023- 1030. Hohhot, China, Guangdong Peoples Publishing House.

2. Moore K.J., **Heaton E. A**. & Fales S. L. 2009. Use of grasses for biofuel. In: *Simpósio Internacional de Melhoramento de Forrageiras II* (eds Liana J., Chiari L., Resende R.M.S.) CD-ROM. Campo Grande, Brazil, Embrapa Gado de Corte.

Invited presentations since joining Iowa State University (48, 42 as lead presenter/first author)

*BS, MS or Ph.D. student, [§]post-doctoral researcher or scientist supervised by Heaton



1. **Heaton E.A.,** Schulte L.A, Brandes E., Muth D., Snow A., Miriti M., Bonin C. [§] & Milster F. (2014 *upcoming).* What to put where? Ecophysiology informs strategic integration of Miscanthus and switchgrass into Cornbelt landscapes. ASA-CSSA-SSSA International Annual Meetings, Long Beach, CA.

2. **Heaton E.A.** (2014) Impact of IowaEPSCoR on my research and career. NSF Iowa EPSCoR Annual All-Hands Meeting, Ames, IA.

3. **Heaton E.A.,** Schulte L.A, Brandes E., Muth D., Snow A., Miriti M., Bonin C. [§] & Milster F. (2014) Miscanthus and switchgrass cropping systems - ecophysiology to landscape. American Society of Plant Biology 4th Pan-American Congress on Plants and Bioenergy, Guelph, Canada.

4. Bonin C. [§], VanLoocke A., Mitchell R. & **Heaton E.A.** (2014) A coupled field and modeling approach for quanitfying the environmental impacts of genetic improvements in switchgrass. Agro-IBIS Workshop, Ames, IA.

5. **Heaton E.A.**, Singer J., Cruse R., Lok J., Davenport D. & Depoy M. (2014) Under cover: do nurse crops make *Miscanthus* x *giganteus* establishment more sustainable? Sun Grant North Central Regional Meeting, Bloomington, MN.

6. **Heaton E.A.,** Schulte L.A, Brandes E., Darr M., Hu G., Wang L. & Milster F. (2014) Putting the Pieces Together. Mosaic Seminar Series, University of Minnesota, St. Paul, MN.

7. **Heaton E.A.** (2014) Biomass for energy? Pros and cons in the big picture. Graduate Program in Sustainable Agriculture Colloquium, Iowa State University, Ames, IA.

8. **Heaton E.A.** (2013) Energy Crops in Iowa. Graduate Program in Sustainable Agriculture Colloquium, Iowa State University, Ames, IA.

9. Milster F. & **Heaton E.A.** (2013) Introduction to dedicated energy crops with a focus on Miscanthus. Grower Interest Meeting, University of Iowa, Iowa City, IA.

10. **Heaton E.A.**, Schulte L.A. & Milster F. (2013) Integrating food and fuel production in the Corn Belt. Kohn Lecture Series, University of Iowa, Iowa City, IA.

11. **Heaton E.A.,** Schulte L.A. & Wilson D.M.* (2013) Integrating food and fuel: how to manage a 2G crop portfolio. BioFuelNet Canada Annual Meeting, Montreal, CA.

12. **Heaton E.A**., Bonin C.L.[§], Singer J., Cruse R.M. & Davenport D. (2013) Under cover: do nurse crops make *Miscanthus* × *giganteus* establishment more sustainable*?* 2013 North Central Sun Grant Annual Meeting, Chicago, IL.

13. **Heaton E.A.** (2013) Dedicated energy crops. Community College Teacher Continuing Education Webinar, Ames, IA. www.agenergy.ia.org.

14. **Heaton E.A.**, Snow A., Mariti M. & Bonin C.L.[§] (2012) Miscanthus: biofuels, invaders or both? North Central Weed Science Society Annual Meeting, St. Louis, MO.

15. **Heaton E.A.** & Schulte L.A. **(**2012) Iowa EPSCoR energy crop research. University of Northern Iowa, Waterloo, IA.

16. **Heaton E.A.** & Williams C. (2012) Perennial living cover for bioenergy. Green Lands Blue Water Partnership Conference, Iowa State University, Ames, Iowa.

17. **Heaton E.A.** & Jackson S. (2012) Energy crop production. USDA SARE Carbon, Energy and Climate Conference, Kellogg Biological Station, Hickory Corners, MI.

18. **Heaton E.A.**, Caveny J.D. & Pennington D. (2012)Energy crop identification and planting methods. USDA SARE Carbon, Energy and Climate Conference, Kellogg Biological Station, Hickory Corners, MI.

19. **Heaton E.A.**, Wilson D.M.*, Dalluge D.L., Rover M. & Schulte L.A. (2012) Management matters: what engineers should learn about agronomy. Agronomy departmental seminar, Purdue University, W. Lafayette, IN.

20. **Heaton E.A.** (2012) Introduction to Miscanthus. Iowa Biomass Power Partnership meeting, Ames, IA.

21. **Heaton E. A.**, Wilson D.M.*, Dalluge D., Rover M. & Schulte L.A. (2012) Management matters: what engineers should learn about agronomy. Energy Biosciences Institute seminar series, University of Illinois at Urbana-Champaign, Urbana, IL.

22. **Heaton E.A.** (2012) Big steel for biofuels. 27th Annual Agricultural Machinery Conference, Waterloo, IA.

23. **Heaton E.A.**, Wilson, D.M.*, Dalluge D.L., Rover M. & Schulte L.A. (2012) Switchgrass and pyrolysis (and more!). 3rd PanAmerican Congress on Plants and Bioenergy, Urbana-Champaign, IL (**plenary**).

24. **Heaton E.A.** & Boersma N.N.* (2011) The big cover-up: Using perennial grasses to save soil and so much more. Iowa State University Plant Biology Departmental Seminar, Ames, IA.

25. **Heaton E.A.,** Singer J., Cruse R.M., Boersma N.N* & Davenport D. (2011) Agronomic issues for Giant Miscanthus. University of Missouri, Special seminar, Columbia, MO.

26. **Heaton E.A.** (2011) Miscanthus production practices: A new Missouri bioenergy crop. University of Missouri Research Farms, Special Workshop, Columbia, MO.

27. **Heaton E.A.** (2011) Switchgrass and Miscanthus as dedicated energy crops in Iowa. Pioneer and DuPont Cellulosic Ethanol special seminar, Johnston, IA.

28. **Heaton E.A.,** Boersma N.N.*, Lok J., Cruse R. & Singer J. (2011) Greener grass? Addressing problems in Miscanthus cultivation. CABER seminar series, University of Illinois at Urbana-Champaign, Urbana, IL.

29. **Heaton E.A.,** Singer J., Cruse R.M. & Davenport D. (2011) Undercover: Secrets to using companion crops in establishment of *Miscanthus × giganteus.* Conservation Districts of Iowa Annual Meeting, Des Moines, IA.

30. Schulte Moore, L.A., Gunther T., Hall R., Hallam A., Hargreaves S., Headlee W., **Heaton E.A.**, Helmers M., Hofmockel K., Isenhart T., Kolka R., Moore K., and Ontl T. (2010) Agronomic, environmental, and economic performance of alternative biomass cropping systems. 25th Annual Symposium of the U.S. Regional International Association for Landscape Ecology Annual Symposium, Athens, GA.

31. Boersma N.N.* & **Heaton E.A.** (2010) *Miscanthus* x *giganteus* stem propagation. Iowa State University Horticulture Departmental Seminar, Ames, IA.

32. **Heaton E.A.**, Singer J., Dohleman F. & Long S.P. (2010) Managing perennial monocultures for ecosystem services. Ecological Society of America Annual Meeting, Pittsburgh, PA.

33. **Heaton E.A.** (2010) Growing giant grass: Why bigger is better for energy crops. Brookhaven National Laboratory, Upton, NY**.**

34. **Heaton E.A.** (2010) Managing perennial grass monocultures for ecosystem services. Wisconsin Grasslands Bioenergy Symposium, Madison, WI. Podcast at http://dnrmedia.wi.gov/main/Catalog/pages/catalog.aspx?catalogId=27fa5ed4-817b-41a5-bf92-fd6f8039d53d **.**

35. **Heaton E.A.,** Wilson D.M.* & Boersma N.N.* (2009) Miscanthus – separating hope from hype? Iowa State University Agronomy 600 Seminar, Ames, IA.

36. **Heaton E.A**. (2009) Biomass crops for Iowa. 2009 BIGMAP Symposium, Food and Fuel Crops: Issues Policies and Regulation, Ames, IA.

37. **Heaton E.A.** (2009) Environmental impacts of new bio-fuel crops. Heartland Regional Water Conference, Overland Park, KS.

38. **Heaton E.A.** (2009) Plant disease in Miscanthus and other cellulosic biomass crops. North Central Division Meeting of the American Phytopathological Society, Meeting the Challenges of Global Food and Energy Production, Ames, IA.

39. **Heaton E.A.** (2009) Mechanical challenges of dedicated energy crops. 2009 Agricultural Machinery Conference, Cedar Rapids, IA.

40. **Heaton E.A**. (2009) When to harvest? The impact of harvest time on nitrogen dynamics in Miscanthus and switchgrass. 6th Annual Bioenergy Feedstocks Symposium, Urbana, IL.

41. **Heaton E.A.**, Boersma N.N.*, Caveny J.D., Dohleman F.D. & Voigt T.B. (2009) Emerging Crops – Miscanthus. International Energy Agency Bioenergy Task 30 Workshop, Taupo, New Zealand.

42. **Heaton E.A.**, Moore K.J. & Fales S. L. (2009) Dedicated energy crop feedstocks. Proceedings of the 2009 Louisiana Natural Resources Symposium, Louisiana State University, Baton Rouge, LA.

43. **Heaton E.A**. (2009) Biofuel Feedstock – Where will it come from? Penn State University Biofuel Short Course, San Francisco, CA.

44. **Heaton E.A**. (2009) Developing bioenergy crops. Online seminar series of the Canadian Green Crop Network, McGill University, Montreal, Canada.

45. **Heaton E.A**. (2008) New and emerging feedstocks. Workshop on Measuring and Modeling the Lifecycle GHG Impacts of Transportation Fuels, Berkeley, CA.

46. **Heaton E.A**. (2008) Practical considerations of designing an energy crop, American Society of Plant Biology 1st Pan-American Congress on Plants and Bioenergy, Merida, Mexico (**plenary**).

47. **Heaton E.A**. (2008) Biofuel feedstock – Where will it come from? Penn State University Biofuel Short Course, Philadelphia, PA.

48. **Heaton E.A**. (2008) Designing energy crops. Plant Breeding and Genetics Symposium, Lansing, MI.

49. Dohleman F.G., **Heaton E.A.**, and Long S.P. (2008) Miscanthus. Center for Advanced BioEnergy Research (CABER) Seminar Series. Urbana, IL.

50. **Heaton E.A**. & Heggenstaller A. (2008) Grass feedstocks. Growing the Bioeconomy Conference, Iowa State University, Ames, IA.

Invited presentation prior to joining Iowa State University (15, 9 as lead presenter)

51. Dohleman F.G. & **Heaton E.A.** (2008) Growing the margins. Energy, Bioproducts and Byproducts from Farm and Food Sectors Conference and Exhibition, London, ON, Canada.

52. Dohleman F.G., **Heaton E.A.**, and Long S.P. (2008) Miscanthus and switchgrass trials in Illinois. Southwest Agricultural Conference, Ridgetown, ON, Canada.

53. **Heaton E.A.**, Dohleman F.G., and Long S.P. (2007) High yielding bioenergy crops. ASA/CSSA/SSA Annual Meeting, New Orleans, LA.

54. **Heaton E.A.**, Dohleman F.G., and Long S.P. (2007) Giant Miscanthus – Frequently asked questions. SouthEast Bioenergy Conference, Tifton, GA.

55. **Heaton E.A.**, Dohleman F.G., and Long S.P. (2007) The promise (and nagging details) of dedicated energy crops. Online seminar, Canadian Green Crop Network, McGill University, Montreal, Canada.

56. Dohleman F.G., **Heaton E.A.**, T.B. Voigt and Long S.P. (2007) Miscanthus and switchgrass trials in Illinois. Ontario Agri-Food Forum. Ottawa, ON, Canada. October.

57. Dohleman F.G., **Heaton E.A.** and Long S.P. (2007) Miscanthus: findings and challenges with a new crop. Champaign County Democrats Monthly Meeting, Champaign, IL.

58. Dohleman F.G., **Heaton E.A.** and Long S.P. (2007) Nutrient recycling and sustainability in Miscanthus. Fueling Change with Renewable Energy Conference, Urbana, IL.

59. **Heaton E.A.**, Dohleman F.G., and Long S.P. (2007) Practical experience with Miscanthus and switchgrass in Illinois. Bioenergy Symposium, Urbana, IL.

60. **Heaton E.A.** (2007) Energy + agriculture: Rethinking the Green Revolution. Iowa State University, Ames, IA.

61. **Heaton E.A.** (2006) The promise (and nagging details) of dedicated energy crops. The Science and Engineering Challenges to the Development of Sustainable Biobased Industries Seminar Series, Cornell University, Ithaca, NY.

62. **Heaton E.A.** (2006) The promise of dedicated energy crops. AAIC Annual Meeting, San Diego, CA.

63. Dohleman F.G., **Heaton E.A.** and Long, S.P. (2006) Miscanthus: Findings and Challenges with a New Crop. Peoria Farm Show, Peoria, IL.

64. **Heaton E.A**. (2006) Feedstock for fuel. Growing the Bioeconomy Conference, Iowa State University, Ames, IA.

65. **Heaton E.A**. & Long S.P. (2005) Miscanthus: climate change mitigation potential of a high yielding energy crop in Illinois. Greenhouse Gas Symposium, United States Dept. of Agriculture, Baltimore, MD.

Other Conference and Professional Society Conference Presentations (32 total, 10 as lead presenter)

*****BS, MS or Ph.D. student; § post-doctoral researcher supervised by Heaton

1. Bonin C.L.§ and **Heaton E.A.** (2014) *Miscanthus sacchariflorus* - biofuel parent or new weed? 74th Midwest Fish and Wildlife Conference, Kansas City, MO.

2. Wilson D. M.*, **Heaton E. A.**, Schulte L.A., Gunther T.P., Hall R.B., Headlee W.L., Moore K.J., Maier M.E. & Boersma N.N.* (2013) Influence of landscape position on biomass feedstock productivity. ASA-CSSA-SSSA International Annual Meetings, Tampa, FL.

3. **Heaton E.A.,** Schulte L.A, Berti M., Langeveld H., Zegada-Lizarazu W., Parrish D., Monti, A. & Milster F. (2013) Integrating food and fuel: How to manage a 2G crop portfolio. ASA-CSSA-SSSA International Annual Meetings, Tampa, FL.

4. **Heaton E.A.** & Boersma N.N.* (2013) The effect of propagation method on the morphology of *Miscanthus × giganteus.* ASA-CSSA-SSSA International Annual Meetings, Tampa, FL.

5. Bonin C.L.§, **Heaton E.A.**., & Barb J. (2013) Miscanthus sacchariflorus - biofuel parent or new weed? ASA-CSSA-SSSA International Annual Meeting, Tampa, FL.

6. Volenec J.J., Mitchell R. B., Laird D., Lee D.K., Rosen C., Brouder S.M., Turco R.F., **Heaton E.A.**, Moore K.J., Chaubey I., Lamb J., and Casler M. (2013) Evaluating perennial grasses for biomass production in diverse cropping systems in the central United States (CenUSA). Joint meeting of the Association for Advancement of Industrial Crops and NIFA CAP projects, Washington, DC.

7. Owens V., Bransby D., Farris R., Fike J., **Heaton E.A.**, Hong C.O., Hopkins C., Mayton H., Mitchell R., and D. Viands. (2012) Switchgrass response to N fertilizer across diverse environments in the US. 2012 National Sun Grant Conference, New Orleans, LA.

8. Stottlemyer A. L., Snow A. A., Sweeney P. M., Miriti M. N., and **Heaton E. A.** (2012) Flowering phenology, ploidy, and fitness differences between cultivated and native switchgrass (*Panicum virgatum* L.): implications for future biofuel crops. Botanical Society of America Annual Meeting, Columbus, OH.

9. Stottlemyer A. L., Snow A. A., Sweeney P. M., Miriti M. N., and **Heaton E. A.** (2012) Fitness-related traits of cultivated *vs.* wild switchgrass (*Panicum virgatum*): implications for widespread planting of biofuel cultivars. 4th International EcoSummit, Columbus, Ohio, USA.

10. Palik D. J., Snow A. A., Sweeney P. M., Miriti M. N., and **Heaton E. A.** (2012) Relative competitive abilities of cultivated vs. wild switchgrass (*Panicum virgatum* L.): implications for new biofuel cultivars. Botanical Society of America Annual Meeting, Columbus, OH.

11. Palik D. J., Snow A. A., Sweeney P. M., Miriti M. N., and **Heaton E. A.** (2012) Relative competitive abilities of cultivated vs. wild switchgrass (*Panicum virgatum* L.): implications for new biofuel cultivars. 4th International EcoSummit Conference, Columbus, OH.

12. Chang H., Snow A. A., Palik D. J., Stottlemyer A. L., **Heaton E. A.**, and Miriti M. N. (2012) Fitness comparisons between cultivated and native switchgrass (*Panicum virgatum* L.): Implications for Future Biofuel Crops. 12th International Symposium on Biosafety of Genetically Modified Organisms, St. Louis, MO.

13. Wilson D.M.*, Dalluge D.L., Rover M., **Heaton E.A.**, & Brown R.C. (2012) Crop management impacts biofuel quality: Impact of switchgrass harvest time on yield, nitrogen and ash of fast pyrolysis products. ASA-CSSA-SSSA International Annual Meetings, Cincinnati, OH.

14. Owens V., Bransby D., Farris R., Fike J., **Heaton E.A.**, Hong C., Hopkins C., Mayton H., Mitchell R. & Viands D. (2012) Switchgrass response to N fertilizer across diverse environments in the USA: A regional feedstock partnership report. USDA DOE Sun Grant Initiative National Conference, New Orleans, LA.

15. **Heaton E.A.,** Singer J., Cruse R.M. & Davenport D. (2012) Under cover: Secrets to using companion crops in establishment of *Miscanthus × giganteus.* Dept. of Energy North Central Sungrant Annual Meeting, Indianapolis, IN.

16. Salas M, Strand K. & **Heaton E.A.** (2012) Association mapping of carotenoid candidate genes with photosynthesis and photoprotection in sorghum. Plant and Animal Genome XX Conference, San Diego, CA.

17. Zaib M.A.* & **Heaton E.A.** (2011) Cold Acclimation in *Miscanthus.* ASA-CSSA-SSSA International Annual Meetings, San Antonio, TX.

18. Boersma N. N.* & **Heaton E.A.** (2011) *Miscanthus* x *giganteus* propagated from plugs and rhizomes exhibits similar yields with different morphology. ASA-CSSA-SSSA International Annual Meetings, San Antonio, TX.

19. Wilson D.M.*, **Heaton E.A.** & Liebman M. (2011) Impacts of internal nitrogen cycling within switchgrass on biomass feedstock sustainability. ASA-CSSA-SSSA International Annual Meetings, San Antonio, TX.

20. **Heaton E.A.,** Singer J., Cruse R.M. & Davenport D. (2011) Under cover: Secrets to using companion crops in establishment of *Miscanthus × giganteus.* Biomass & Energy Crops IV, Champaign, IL.

21. Wilson D.M.*, **Heaton E.A.** & Liebman M. (2011) Impacts of internal nitrogen translocation within switchgrass on biomass feedstock sustainability. Biomass & Energy Crops IV, Champaign, IL.

22. Wilson D. M**.*, Heaton E.A.** & Liebman M. (2010) Quantifying the timing and impact of internal N movement with switchgrass on crop sustainability. ASA-CSSA-SSSA International Annual Meetings.

23. Wilson D.M.*, **Heaton E.A**. & Liebman M. (2010) Quantifying the timing and impact of internal N movement within switchgrass on crop sustainability. Agronomy Department Research Symposium and Poster Session. Agronomy Hall, Iowa State University.

24. **Heaton E.A.***,* Singer J., Cruse R., Davenport D. (2010) Under cover: Secrets to using companion crops in establishment of *M.* x *giganteus.* In *Abstracts of the 2010 International Meetings* [CD-ROM] ASA-CSSA-SSSA, Madison, WI. ASA/CSSA/SSSA Annual Meeting, Long Beach, CA.

25. Westgate M., Hatfield J., **Heaton E.A.,** & Miguez F. (2010) Climate change and crop productivity.

26. **Heaton E.A.** (2009) The sustainability of *Miscanthus* x *giganteus* cropping systems. In *Abstracts of the 2009 International Meetings* [CD-ROM] ASA-CSSA-SSSA, Madison, WI. ASA/CSSA/SSSA Annual Meeting, Pittsburgh, PA.

27. **Heaton E.A.**, Dohleman F.G., and Long S.P. (2006) Miscanthus, what it is and why we care. World Congress on Industrial Biotechnology and Bioprocessing, Toronto, Canada.

28. **Heaton E.A.**, Long, S.P. (2005) Miscanthus and switchgrass: A comparison of two high yielding energy crops in the Midwestern US. 90th Annual Meeting of the Ecological Society of America, Montreal, Canada.

29. **Heaton E.A**., Long S.P. (2005) Miscanthus: findings and challenges with a new crop. Plant Physiology/Genetic Engineering Seminar, Urbana, IL.

30. **Heaton E.A**., Voigt T.B., and Long S.P. (2004) Miscanthus and switchgrass: A comparison of high yielding energy crops. ASA/CSSA/SSSA Annual Meeting, Seattle, WA.

Conference Posters (23 total)

1. McCoy G., Coon C., Bonin C[§]. & **Heaton E.A.** 2014. Effects of biochar and diversity on native perennial grasslands. NIFA CAP CenUSA Annual Meeting, Chanhassen, MN.

2. McCoy G., Coon C., Bonin C[§]. & **Heaton E.A.** 2014. Effects of biochar and diversity on native perennial grasslands. Iowa EPSCoR Annual All-Hands Meeting, Ames, IA.

3. Brandes E. [§], Bonner I.J., Cafferty K.G., Muth D.J., Schulte L.A. & **Heaton E.A.** 2014 *upcoming.* Targeted integration of perennials into Iowa farm fields: a win-win strategy for farm profit and ecosystem services. Ecological Society of America Annual Meeting, Sacrament, CA

4. Ibrahim T., Miriti M., Snow A., **Heaton E.A.**, Mutegi E., Bonin C.L.[§], Palik D. & Chang H. 2014 *upcoming.* Relative competitive abilities among feral and commercial strains of *Miscanthus spp.*: implications for new biofuel cultivars. American Botanical Society Annual Meeting, Boise, ID.

5. Brandes E. [§], Muth D.J., Cafferty K.G., Bonner I.J., Schulte L.A. & **Heaton E.A.** 2014. Integrating switchgrass into farm fields could improve soil and increase farm profit in Iowa. Midwest Postdoctoral Symposium, Iowa City, IA.

6. Brandes E. [§], Darr M., Hu G., Schulte L.A., Wang L. & **Heaton E.A.** 2014. Integrated Sustainable bioEnergy Pathways (ISEP). Iowa State University Graduate Program in Sustainable Agriculture Spring Symposium, Ames, IA.

7. Snow A.A., **Heaton E.A.**, Miriti M.N., Bonin, C.L.[§], Mutegi E. 2013. Gene flow networks and potential invasiveness of seed-producing *Miscanthus* species for biofuel crops. National Institute of Food and Agriculture, Biotechnology Risk Assessment Grants Program: Annual Project Director's Meeting. Riverdale, MD.

8. Chang H., Snow A.A., Mutegi E., Lewis E.M., Miriti M.N. & **Heaton E.A.** 2013. Pollen-mediated gene flow up to 130m in small, experimental arrays of cultivated and wild switchgrass (*Panicum virgatum*): Implication for transgenic field trials. National Instute of Food and Agriculture, Biotechnology Risk Assessment Grants Program: Annual Project Director's Meeting. Riverdale, MD.

9. Chang H., Snow A., Mutegi E., Lewis E., Miriti M. & **Heaton E.A.** 2013. Hybridization between Cultivated and Wild Switchgrass (*Panicum virgatum*) as a function of distance from cultivar field trials: implication for biosafety procedures. American Botanical Society Annual Meeting, New Orleans, LA.

10. Wilson D.M.*, Dalluge D.L., Rover M., **Heaton E.A.**, & Brown R.C. September 12, 2012. Crop management impacts biofuel quality: Impact of switchgrass harvest time on yield, nitrogen and ash of fast pyrolysis products. New Technology Expo. BioCentury Research Farm, Iowa State University, Ames, IA.

11. Wilson D.M.*, Dalluge D.L., Rover M., **Heaton E.A.**, & Brown R.C. November 1, 2012. Crop management impacts biofuel quality: Impact of switchgrass harvest time on yield, nitrogen and ash of fast pyrolysis products. Agronomy Department Research Symposium and Poster Session, Iowa State University, Ames, IA.

12. Schulte, L.A., Cambardella C.A., Gunther T., Hall R.B., Hallam A., Hargreaves S.K., Headlee W., **Heaton E.A.**, Helmers M.J., Hofmockel K.S., Isenhart T.M., Kolka R.K., Manatt R., Moore K., Ontl T.A., Welsh W. & Williams R.J. 2012. The Landscape Biomass Project: field tests of ecological and economic tradeoffs associated with five biomass cropping systems. New Technology Expo at the BioCentury Research Farm, Ames, IA.

13. Schulte, L.A., Cambardella C.A., Gunther T., Hall R.B., Hallam A., Hargreaves S.K., Headlee W., **Heaton E.A.**, Helmers M.J., Hofmockel K.S., Isenhart T.M., Kolka R.K., Manatt R., Moore K., Ontl T.A., Welsh W. & Williams R.J. 2012. The Landscape Biomass Project: field tests of ecological and economic tradeoffs associated with five biomass cropping systems 97th annual meeting of the Ecological Society of America, Portland, OR.

14. Wilson D.M.*, **Heaton E.A.** & Liebman M. 2011. Quantifying the timing and impact of internal N movement within switchgrass on crop sustainability. Agronomy Dept. Research Symposium and Poster Session, Iowa State University, Ames, IA.

15. Wilson D.M.*, **Heaton E.A.** & Liebman M. 2010. Quantifying the timing and impact of internal N movement within switchgrass on crop sustainability. Agronomy Dept. Research Symposium and Poster Session, Iowa State University, Ames, IA.

16. Boersma N.N.* & **Heaton E.A.** 2010. Can Miscanthus stems be used for propagation and establishment? Agronomy Dept. Research Symposium and Poster Session, Iowa State University, Ames, IA.

17. Zaib M.A.* & **Heaton E.A.** 2010. Cold acclimation in *Miscanthus.* Agronomy Dept. Research Symposium and Poster Session, Iowa State University, Ames, IA.

18. Schulte Moore, L.A., Gunther T., Hall R., Hallam A., Hargreaves S., Headlee W., **Heaton E.A.**, Helmers M., Hofmockel K., Isenhart T., Kolka R., Moore K., and Ontl T. 2010. Agronomic, environmental, and economic performance of alternative biomass cropping systems. ISU 2nd Annual Symposium on Enhancing Sustainability, Ames, IA.

19. Boersma N.N.* & **Heaton E.A.** 2009. Can Miscanthus stems be used for propagation and establishment? Interdepartmental Plant Biology Retreat, Iowa State University, Ames, IA.

20. Wilson D.M.*, **Heaton E.A.** & Liebman M., Darr M. 2009. Quantifying the timing and impact of internal N cycling on switchgrass sustainability and feedstock storage. Agronomy Dept. Research Symposium and Poster Session, Iowa State University, Ames, IA.

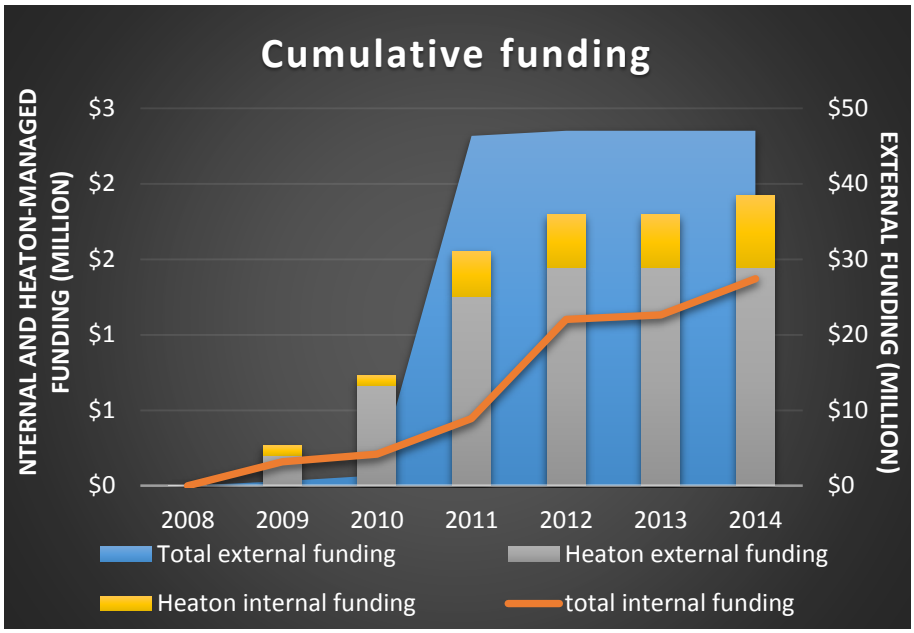
21. Wilson D.M.*, **Heaton E.A.**, Liebman M. & Darr M. 2009. Quantifying the timing and impact of internal N cycling on switchgrass sustainability and feedstock storage. Live Green Presidential Lecture Series, Iowa State University, Ames, IA

22. Wilson D.M.*, **Heaton E.A.**, Liebman M. & Darr M. 2009. Quantifying the timing and impact of internal N cycling on switchgrass sustainability and feedstock storage. BioCentury Research Farm Dedication, Iowa State University, Ames, IA.

Grants and Contracts Related to Disciplinary Research ($48,392,619 total, $1,924,441 to Heaton)

Received External ($47,020,342 total, $1,445,561 to Heaton)

1. 2012 Snow A., **Heaton E.A**. & M. Miriti. Gene flow networks and potential invasiveness of perennial biofuel grasses (Miscanthus). USDA NIFA Biotechnology Risk Assessment Program. $500,000.
   Role: Co-PI
   Effort: 15% concept, 30% writing, 30 % editing



2. 2012 Kitchen N., Massey R., Kremer R., Thompson A., Sudduth K., Meyers B., **Heaton E.A.** & J. Kiniry. Miscanthus and Switchgrass Bioenergy Production and Soil Remediation on Marginal and Vulnerable Landscapes. US DOE South Central Sun Grant Initiative. $160,000.
   Role: Co-PI
   Effort: 10% concept, 15% writing, 10% editing

3. 2011 Brown R.C. and many others. Harnessing Energy Flows in the Biosphere to Build Sustainable Energy Systems. NSF EPSCoR RII NSF. $20,000,000.
   Role: Collaborator. Heaton leading agronomic research at Iowa State University within Biorenewable Platform. Approximately $313,641 to Heaton.
   Effort: 1% concept, 1% writing, 1% editing

4. 2011 Moore K.J. and many others. Sustainable Production and Distribution of Bioenergy for the Central USA. USDA NIFA Coordinated Agriculture Project. $25,000,000.

   Role: Collaborator. Heaton leading agronomic research at Iowa State University within Feedstock Production Objective. Approximately $182,414 to Heaton.
   Effort: 1% concept, 1% writing, 1% editing

5. 2010 Snow A., **Heaton E.A**. & M. Miriti. Gene Flow and Fitness studies of Switchgrass: Implications for New Biofuel Crops. USDA NIFA Biotechnology Risk Assessment Program. $398,619.
   Role: Co-PI
   Effort: 10% concept, 10% writing, 30% editing

6. 2010 **Heaton E.A.,** Singer J., Cruse R., Loynachan T., O'Neal M., Davenport D. & R. Depoy. Do Companion Crops Make Miscanthus Establishment More Sustainable? US DOE North Central Sun Grant. $180,815.
   Role: PI
   Effort: 90% concept, 75% writing, 30% editing

7. 2010 **Heaton E.A.** Field Evaluation of Cold Tolerant Miscanthus. Mendel Biotechnology. $153,344
   Role: PI
   Effort: 90% concept, 100% writing, 100% editing

8. 2009 Isenhart T., Schulte L., Hall R., Hallam A., **Heaton E.A.,** Helmers M., Hofmockel K., Moore K. & R. Kolka. Influence of Alternative Biomass Cropping Systems on Short-term Ecosystem Processes. USDA AFRI Managed Ecosystems Program. $499,250.
   Role: Co-PI
   Effort: 50% concept, 10% writing, 10% editing

9. 2009 **Heaton E.A.** P and K Fertilizer Response in *Miscanthus x giganteus*. Mosaic Fertilizer LLC. $8,331.
   Role: Co-PI
   Effort: 90% concept, 100% writing, 100% editing

10. 2009 **Heaton E.A.** Regional Biomass Feedstock Partnership – Herbaceous Bioenergy Crop Field Trials; switchgrass. US DOE North Central Sungrant. $90,000.
    Role: PI. Heaton leads the ISU portion of this partnership, but came in after the umbrella grant was funded. The overall project is lead by V. Owens of South Dakota State University.
    Effort: 0% concept, 0 % writing, 0% editing

11. 2009 Jarchow M., Liebman M. & **E.A. Heaton**. Incorporating Native Prairies into Working Farm Landscapes. NCR-SARE. GCN09-107. $9,965
    Role: Co-PI
    Effort: 0% concept, 1% writing, 5% editing

12. 2008 **E.A. Heaton.** Miscanthus Variety Evaluation. Mendel Biotechnology. $5,597
    Role: PI
    Effort: 90% concept, 100% writing, 100% editing

Received Internal ($1,101,351 total, $348,624 to Heaton)

13. 2014 **Heaton E.A.**, Darr M., Hu G., Schulte L.A., & L. Wang. Integrated Sustainable bioEnergy Pathways project (ISEP). Iowa State University Dept. of Agronomy. $240,926.
    Role: PI
    Effort: 30% concept, 30 % writing, 30% editing

14. 2013 Christiansen L., Gronstal Anderson I., Milster F., **Heaton E.A.**, Schulte-Moore L.A., Hall R., Tyndall J., Ward A., Tate E. & T. Priest. The University of Iowa Biomass Energy Sustainability Index: A Decision-Making Tool for the University of Iowa Biomass Partnership Project. Leopold Center for Sustainable Agriculture. $30,000.

Role: Co-PI
Effort: 1% concept, 1% writing, 3% editing

15. 2012 Schulte L., Tyndall J., Arbuckle J., Franz K., **Heaton E.A.**, Helmers M., Isenhart T.,& M. Liebman. Integrating Project Knowledge and Models: the Next Step in Developing a Payment for Ecosystem Services Scheme for the Big Creek watershed. The Leopold Center for Sustainable Agriculture. $35,000.
Role: Co-PI
Effort: 1% concept, 1% writing, 3% editing
16. 2012 **Heaton E.A.**, Darr M., Hu G., Schulte L. & L. Wang. Iowa's Sustainable Energy Pathway (ISEP): Building a Team to Address the Complete Biofuels Supply Chain. Iowa State University Plant Sciences Institute. $50,000.
Role: PI
Effort: 90% concept, 90% writing, 20% editing

17. 2012 Mueller, D., Staker, J., Jesse, L., Sisson, A., Saalau Rojas, E., **Heaton, E.A**., Leshen, A., Rouse, M., McCorkle, D., Bryden, M., Bryden, K., VanDerZanden, A.M., Paulsen, T., McGrath, C., Arndorfer, B., & D. Johnson. Developing and Structuring Pre-Collegiate STEM Education and Outreach: Pest Management (IPM) Education, Civil Engineering, and Biorenewable Energy as Models. ISU Extension and Outreach Initiatives. $571,444.
Role: Co-PI
Effort: 1% concept, 1% writing, 3% editing

18. 2011 **Heaton E.A.** & M. Liebman. Where's the Nitrogen? Quantifying the Timing and Impact of N Translocation Feedstock Storage and Crop Sustainability of Switchgrass for Bioenergy. ConocoPhillips. $234,979.
Role: PI
Effort: 90% concept, 90% writing, 50% editing

19. 2010 Miranowski J., **Heaton E.A.** & A. Rosburg. Biofuel and Greenhouse Gases: Yields, Yield Growth and Land Use Effects. Biobased Industry Center, $50,000.
Role: Co-PI
Effort: 10% concept, 10% writing, 15% editing

20. 2010 Schluttner J. & **E.A. Heaton**. Biomass Crop Production and Physiology. Iowa State University First-Year Honors Mentor Program Grant. $250.
Role: PI
Effort: 90% concept, 50% writing, 50% editing

21. 2009 **Heaton E.A.** & M. Liebman. Where's the Nitrogen? Quantifying the Timing and Impact of N Translocation Feedstock Storage and Crop Sustainability of Switchgrass for Bioenergy. ConocoPhillips. $63,145.
Role: PI
Effort: 90% concept, 50% writing, 50% editing

22. 2009 Cruse R., **Heaton E.A.**, Laird D. & N. Rogovska. Development of a Germination Screening Test for Biochar Quality. Iowa State University Bioeconomy Institute. $19,760.

Role: Co-PI
Effort: 5% concept, 5% writing, 5 % editing

23. 2009 Miranowski J. & **E.A. Heaton**. Biofuel and Greenhouse Gases: Yields, Yield Growth, and Land Use Effects. Biobased Industry Center, $76, 523.
Role: Co-PI
Effort: 10% concept, 10% writing, 15% editing

24. 2009 Pfeiffer B. & **E.A. Heaton**. Miscanthus Stem Propagation. First-Year Honors Mentor Program Grant, Iowa State University. $250.
Role: PI
Effort: 90% concept, 50% writing, 5% editing

Projects Pending (0)

Projects Not Funded (24 total, 4 as Primary Investigator)

1. 2014 **Heaton E.A.,** VanLoocke A., Bonin C.L.[§] & R.B. Mitchell. A Coupled Field and Modeling Approach for Quantifying the Environmental Impacts of Genetic Improvements in Switchgrass. USDA NIFA Biotechnology Risk Assessment Program. $499,951.

2. 2014 Wolt J.D., Peterson R.K.D, Miguez F.E., **Heaton E.A.** & L. Abendroth. A Framework for Non-target Ecological Risk Assessment at Landscape-scale: A Trophic Function Approach. USDA NIFA Biotechnology Risk Assessment Program. $999,845.

1. 2013 **Heaton E.A.**, Darr M., Hu G., Schulte L.A. & L. Wang. Integrated sustainable bioenergy pathways project (ISEP). Iowa State University Plant Sciences Institute. $994,253.

2. 2013 Darr M., Birrell S., **Heaton E.A.** & Miranowski J. Integration and demonstration of targeted machinery and logistical improvements to reduce cost and increase feedstock quality within an industrial biomass supply chain. US DOE. $5,700,000.

3. 2013 Brouder S., Volenec J., Turco R., Casteel S., Gibson K., Chaubey I., Mosier N., Tyner W., Mansfield C., Hill J., **Heaton E.A.**, Salas-Fernandez M., Mitchell R., Jin V., Wildcat D., Baxter C., Thom M., Marek L. & Lenssen A. Ecological Landscape Intensification for Energy. USDA NIFA Coordinated Agriculture Project. $10,000,000.

4. 2013 Milster F. & **E.A. Heaton**. Learning how to grow a perennial energy crop, *Miscanthus* × *giganteus*, in southeast Iowa with accompanying economic, environmental, and social benefits. Iowa Department of Agriculture and Land Stewardship Research and Demonstration Grant. $52,000.

5. 2012 Brown, R. and many others. Supercritical Hydrolysis of Sustainable, Non-food Biomasses for Production of Cost Competitive Ethanol and Lactic Acid. USDA/DOE BRDI. $8,694,984.

6. 2012 Laird, D. and many others. Advanced Systems for Sustainable Grain and Cellulosic Biofuel Production. USDA/DOE BRDI. $5,789,073.

7. 2012 Hofmockel K., Bai X., Hall R., **Heaton E.A.** & L. Schulte. Sustainable Landscape and Seasonal Integration of Biomass Production, Harvesting, Storage and Conversion. NSF Sustainable Energy Pathways. $1,999,683.

8. 2011 Twine, T., Hill, J. Schulte-Moore, L., Tyndall, J. & **E.A. Heaton**. Application of a life cycle assessment framework for climate change adaptation and mitigation in Midwestern agricultural landscapes. USDA AFRI. $349,294.

9. 2011 Laird, D. and many others. Advanced Systems for Sustainable Grain and Cellulosic Biofuel Production. USDA/DOE BRDI. $7,802,618.

10. 2011 Rover M., **Heaton E.A**., Lee Y. & R.C. Brown. Role of Nitrogen in Bio-Oil Instability. ConocoPhillips. $57,850.

11. 2011 **Heaton E.A.,** DePoy M., Frazer D., Davenport D., Sprague R., Singer J., Cruse R. & J. Lundvall. Strengthening a Network of Diverse Stakeholders Evaluating Miscanthus on Marginal Land in Southern Iowa. The Leopold Center for Sustainable Agriculture. $55,961.

12. 2010 Arritt R.W. & **E.A. Heaton**. Interactions of Alternative Energy Sources with Regional Climate. NOAA Earth Systems Science. $384,753.

13. 2010 Owens V. and 57 others (**Heaton leader, Objective 2)**. An Integrated and Sustainable Supply Chain for Bioenergy and Bioproducts in the Great Plains and Midwest Region of the US. USDA NIFA CAP, $45,000,000.

14. 2010 Long S. and many others. Achieving high-production Sustainable Bioenergy Systems through Perennial Grasses for the Central, S. Central and Southeast Regions. USDA NIFA CAP. $45,000,000.

15. 2009 **Heaton E.A.,** Cruse R.C., Euken J. & J. Tyndall. Developing the Iowa Biomass Stakeholder Network (IBSN) – A Planning Grant for Coordinated Research, Communication and Commercialization Activities. The Leopold Center for Sustainable Agriculture (E2010-14). $39,436.

16. 2009 Thompson M., Liebman M., Cruse R., Horton R., **Heaton E.A.,** Helmers M., Hofmockel K. & R. Anex. Comparison of Biofuel Systems: Productivity and Environmental Impacts. USDOE Sun Grant. $699,864.

17. 2009 Snow A.A., **Heaton E.A.** & M.N. Miriti. New Switchgrass Cultivars for Bioenergy Crops – Could They Become Unintentional Weeds? CSREES AFRI Biology of Weedy and Invasive Species in Agroecosystems Program (94240). $495,498.

18. 2009 Cruse R., Iutzi F., Williams C., **Heaton E.A.,** David M., Sauer T. & S. Secchi. On-farm Research for Evaluation of Ecological and Economic Tradeoffs between Switchgrass and Conventional Maize Production for Bioenergy in the U.S. Corn Belt.. USDA/AFRI Program of Managed Ecosystems (Program Code – 94340). *Preproposal.*

19. 2009 Thompson M., Anex R., Cruse R., Helmers M., Horton R., **Heaton E.A.** & K. Hofmockel. Comparison of Biofuel Systems: Productivity and Environmental Impacts. M. Liebman, USDA/DOE project, Funding Opportunity Number: DE-PS36-09GO99016. *Preproposal*.

20. 2009 Miranowski J., Birrell S., Karlen D. & **E.A. Heaton**. Risks and Uncertainties Influencing Biomass Feedstock Production. Biobased Industry Center. $49,903

21. 2009 Sacks, E. Allen, D. Goggi, S. **Heaton, E.A.** & D. Engler. Developing Seed Production Methods for Miscanthus. DOE-ARPA-E. Funding Opportunity Number DE-FOA-0000065. $8,000,000. *Preproposal*.

22. 2009 Lubberstedt T., **Heaton E.A.,** Tabatabai A. & R. Brown. Efficient Bio-oil Production by Pyrolysis from Corn Stover and Bioenergy Grasses. USDA/DOE project, Funding Opportunity Number: DE-PS36-09GO99016. $2,500,000. *Preproposal.*

23. 2009 Lubberstedt T., Zabotina O., Nikolau B., Hong M., Pruski M., McCleland J., **Heaton E.A.**, Lee Y., Blanco M., Gardner C., Vaknin D., Rajan K., Hillier A., Jernigan R., Sivasankar S., Lee M., Wurtele E. & R. Brown. Biomass Sample Resource for Integrated Chemical and Physical Characterization of Plant Cell Walls. USDA/DOE project, Funding Opportunity Number: DE-PS36-09GO99016. $2,400,000. *Preproposal.*

24. 2008 **Heaton E.A.** Under Cover: Identifying Nurse Crops for Increased Land Cover and Diversity in Establishment of *Miscanthus* x *giganteus.* Leopold Center for Sustainable Agriculture. $93,437.

Graduate Student Advising at Iowa State University

Served as major professor (7)

No.	Name	Degree	Department	Conferred	Current Employer
1	Nicholas Boersma	Ph.D.	Agronomy	2013	Scientist, ISU
2	Danielle Wilson	MS	Agronomy	2012	Lab Manager, ISU
3	Muhammad Aurang Zaib	MS	Agronomy	2012	Ph.D., ISU
4	Chris McKone	MS*	Agronomy	*In progress*	Almaco
5	Brittany Follon	MS*	Agronomy	2013	Poet
6	Ruth Burke	MS	Agronomy	*In progress*	
7	Mauricio Tejera	PhD	Agronomy	*In progress*	

*Off-campus distance program

Served on Graduate Program of Study Committee (16)

No.	Name	Degree	Department	Conferred	Current Employer
1	Suh-Yeon Choi	Ph.D.	Genetics, Development and Cell Biology	2009	N/A
2	Ben Goff	MS	Agronomy	2010	Faculty, U. of Kentucky
3	Naroon Waramit	Ph.D.	Agronomy	2010	Faculty, Thailand
4	Theo Gunther	MS	Agronomy	2011	IA Soybean Association
5	Katie Strand	MS	Agronomy	2012	N/A
6	Tyler Barton	Ph.D.	Agronomy	2013	Monsanto Co.
9	Greg Peiffer	Ph.D.	Agronomy	2011	N/A
10	Erik Christian	Ph.D.	Agronomy	2012	Lecturer, ISU
7	Joyce Lok	MS	Agronomy	*In progress*	
8	Ranae Dietzle	Ph.D.	Agronomy	*In progress*	
11	Javier do Canto	Ph.D.	Agronomy	*In progress*	

12	Monday Ahonsi	MS*	Plant Pathology	*In progress*
13	Bryan Randall	MS	Plant Sciences, University of Missouri	*In progress*
14	Cynthia Bartel	Ph.D.	Agronomy	*In progress*
15	Maeraj Sheikh	Ph.D.	Natural Resource Ecology and Management	*In progress*
16	Liu Su	MS	Industrial and Manufacturing Systems Engineering	*In progress*

*Off-campus distance program

Post-doctoral Researchers Supervised at Iowa State University

No.	Name	Duration	Current Employer
1	Catherine L. Bonin	12/5/2013 -	
2	Elke Brandes	11/12/2013 -	

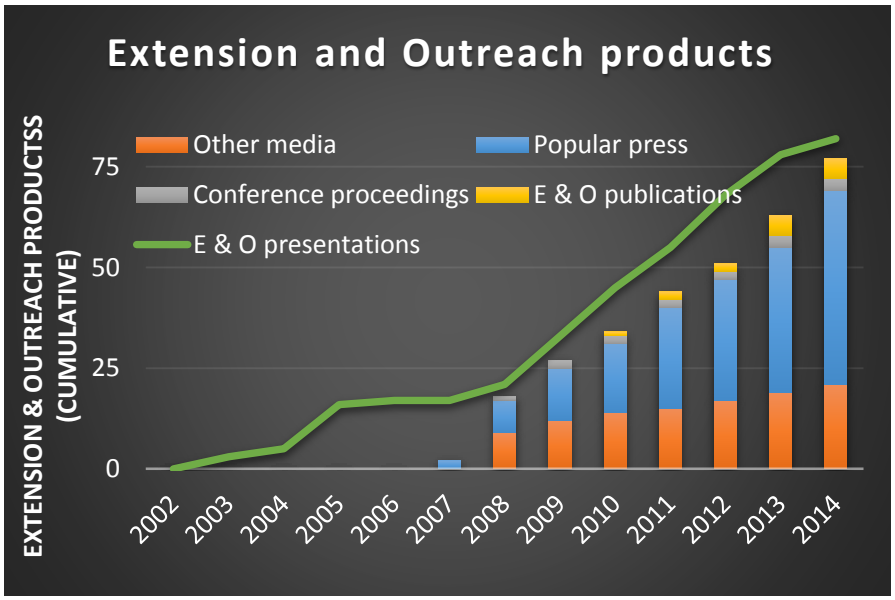
Visiting Scholars Hosted/Advised at Iowa State University

No.	Name	Duration	Institution
1	Pablo Gonzalez	6/10-12/10	Facultad de Agronomia, Uruguay

EXTENSION AND OUTREACH

Extension and Outreach Products since joining Iowa State University (76)

*BS, MS or Ph.D. student, §post-doctoral researcher or scientist supervised by Heaton



Peer-Reviewed Extension Publications (2)

1. **Heaton E.A.** & Harlow S. (2013) Delaying harvest of perennial grass can improve biofuel quality. eXtension Bioenergy Feedstock Community of Practice.

http://create.extension.org/node/94603 *Role: Heaton's group published information on switchgrass management for biofuel quality (Wilson et al., 2012, 2013). Harlow worked with Heaton to summarize this for eXtension.*
Effort: 75% concept, n/a analysis, 30% writing, 90% editing

Significance: This publication summarized technical agronomic and engineering information on how to manage bioenergy crops for improved fuel quality in a format and style accessible to extension educators and the general public.

2. **Heaton E.A.,** Boersma N.*, Caveny J.D., Voigt T.B. & Dohleman F.G. (2010) Miscanthus for Biofuel Production. eXtension Bioenergy Feedstock Community of Practice. http://cop.extension.org/pages/Miscanthus_for_Biofuel_Production

   Role: Heaton conceived the idea for this publication and lead its development and submission.
   Effort: 90% concept, 90% analysis, 80% writing, 50% editing

   Significance: Very little practical information exists for agricultural stakeholders wishing to learn more about Miscanthus production and use. This paper address this information gap in a format tailored for non-scientists as part of a bioenergy portfolio in eXtension.

Iowa State University Extension Publications (5)

1. Wilson D.M.* & **Heaton E.A.** (2013) Giant Miscanthus establishment. Iowa State University, Publication No. 3056.
2. Wilson D.M.* & **Heaton E.A.** (2013) Giant Miscanthus weed control. Iowa State University, Publication No. 3055.
3. Wilson D.M.* & **Heaton E.A.** (2013) Giant Miscanthus eradication. Iowa State University, Publication No. 3054.
4. Boersma N. N.* & **Heaton E.A.** (2011) Giant Miscanthus: Rhizomes v. plugs. Iowa State University, Publication No. AG 203.
5. **Heaton E.A.** (2010) Giant Miscanthus for biomass production. Iowa State University, Publication No. AG 201.

Extension Conference Proceedings (3)

1. **Heaton E.A**., Schulte-Moore L.A., Helmers M., Liebman M. & Milster F. (2013) Producing food, feed and energy: How can agriculture do it all? Proceedings of the 25th Annual Integrated Crop Management Conference, pp. 33-47. Iowa State University, Ames, IA.

2. **Heaton E.A**. (2009) Practical Considerations in Developing Bioenergy. In Proceedings 2009 Crop Advantage Series, Iowa State University, Ames, IA.

3. **Heaton E.A.,** Moore K.J., & Fales S.L. (2008) Practical Considerations in Energy Crops. In Proc. 2008 Integrated Crop Management Conference, p. 55. Iowa State University, Ames, IA.

Other Extension Contributions to Media (21)

1. **Heaton E.A.** & Teske, T. (2014) Miscanthus: Propagating rhizomes. Iowa State University Frequently Asked Questions. 78 views as of May 29, 2014. http://www.youtube.com/user/ISUAgronomy

2. **Heaton E.A.** (2014) University of Iowa planting Miscanthus. Integrated Crop Management News, Iowa State University. http://www.extension.iastate.edu/CropNews/2014/0502heaton.htm

3. **Heaton E.A.** (2013) Webinar: Dedicated Energy Crops: What, Why and Where? Iowa EPSCoR FLARE Webinar Series, www.iowaepscor.org.

4. **Heaton E.A.** (2013) Video: Using perennials to protect soil and water. Iowa Commercial Pesticide Applicator Training, 2013-2014 program year. 15,000-16,000 anticipated views.

5. **Heaton E.A.** (2012) Dedicated biomass crops for Iowa. ISU Extension and Outreach Timely Topics in Agriculture noon seminar series.

6. **Heaton E.A.** & Boersma N.N.* (2012) Is it too late to dig Miscanthus for spring planting? Integrated Crop Management News, Iowa State University. http://www.extension.iastate.edu/CropNews/2012/0411heaton.htm

7. **Heaton E.A.** (2011) Giant Miscanthus and Other Perennial Energy Crops. Iowa Learning Farms Webinar Series, July, 2011. http://www.extension.iastate.edu/ilf/

8. Tylka G. & **Heaton E.A.** (2010) Nematodes Discovered on Biofuel Crops. Integrated Crop Management News, Iowa State University. http://www.extension.iastate.edu/CropNews/2010/0323tylkaheaton.htm

9. **Heaton E.A.** (2010) Iowa State Receives $200,000 Grant to Develop Biomass Crops in Southern Iowa. *Integrated Crop Management News*, Iowa State University. http://www.extension.iastate.edu/CropNews/2010/0507heaton.htm

10. **Heaton E.A.** (2009) Biofuel Crops for Iowa. University of Nebraska Biofuel Forum. http://connect.extension.iastate.edu/p20736034/

11. **Heaton E.A.** & Ciha, A.J. (2009) Miscanthus. Crop Advisor Institute. Iowa State University. CD-ROM module. http://www.cai.iastate.edu/

12. **Heaton E.A.** & Teske, T. (2009) Biomass Production Research, Iowa State University. 1,317 views as of May 29, 2014. http://www.youtube.com/user/ISUAgronomy

13. **Heaton E.A.** & Teske, T. (2008) Miscanthus: What is it? Iowa State University Frequently Asked Questions. 11,010 views as of May 29, 2014. http://www.youtube.com/user/ISUAgronomy

14. **Heaton E.A.** & Teske, T. (2008) Miscanthus: Ethanol Yield. Iowa State University Frequently Asked Questions. 4,366 views as of May 29, 2014. http://www.youtube.com/user/ISUAgronomy

15. **Heaton E.A.** & Teske, T. (2008) Miscanthus: When Do I Harvest? Iowa State University Frequently Asked Questions. 3,848 views as of May 29, 2014. http://www.youtube.com/user/ISUAgronomy

16. **Heaton E.A.** & Teske, T. (2008) Miscanthus: Who Needs Nitrogen? Iowa State University Frequently Asked Questions. 2,553 views as of May 29, 2014. http://www.youtube.com/user/ISUAgronomy

17. **Heaton E.A.** & Teske, T. (2008) Miscanthus: Where Does It Grow? Iowa State University Frequently Asked Questions. 2,830 views as of May 29, 2014. http://www.youtube.com/user/ISUAgronomy

18. **Heaton E.A.** & Teske, T. (2008) Miscanthus: Can I Plant Some? Iowa State University Frequently Asked Questions. 5,818 views as of May 29, 2014. http://www.youtube.com/user/ISUAgronomy

19. **Heaton E.A.** & Teske, T. (2008) Miscanthus: CO2 Sponge. Iowa State University Frequently Asked Questions. 2,257 views as of May 29, 2014. http://www.youtube.com/user/ISUAgronomy

20. **Heaton E.A.** (2008) World Book Encyclopedia Online. Frequently Asked Questions In Agriculture: Energy Crops. http://www.worldbookonline.com/wbdiscover/explains (subscription required).

21. **Heaton E.A.** (2008) World Book Encyclopedia Online. Frequently Asked Questions In Agriculture: Ethanol (subscription required). http://www.worldbookonline.com/wbdiscover/explains

Popular Press Coverage (48)

1. Study shows better yield potential for miscanthus in Iowa (2014) Meghan Sapp. Biofuels Digest. http://www.biofuelsdigest.com/bdigest/2014/07/28/study-shows-better-yield-potential-for-miscanthus-in-iowa/

2. Miscanthus to play a major role in Iowa agriculture (2014) Staff. The Daily Fusion. http://dailyfusion.net/2014/07/miscanthus-iowa-agriculture-30804/

3. Miscanthus to play a major role in Iowa ag (2014) Staff. Morning Ag Clips. https://www.morningagclips.com/miscanthus-to-play-a-major-role-in-iowa-ag/?utm_content=articles&utm_campaign=NLCampaign&utm_source=Newsletter&utm_term=newsletteredition&utm_medium=email

4. Iowa State University agronomist says Miscanthus would yield more biomass than originally thought in Iowa soil (2014) Fred Love. Iowa State University press release. http://www.news.iastate.edu/news/2014/07/23/miscanthus2014

5. Cropping biofuels: Iowa State research looks at growing bioenergy crops (2014) Jerry Perkins. Biofuels Journal. http://edition.pagesuite-professional.co.uk//launch.aspx?pbid=4d63415d-a95c-43f0-937d-3d7fe7e4fc52

6. Miscanthus an option for bioenergy (2014) Matt Kelley. RadioIowa. http://www.radioiowa.com/2014/06/02/miscanthus-an-option-for-bioenergy/

7. Miscanthus: crop of the future? (2014) Rick Fredericksen. Iowa Public Radio. http://iowapublicradio.org/post/miscanthus-crop-future

8. University of Iowa grows Miscanthus grass for renewable energy goals (2014) Sara Agnew. Iowa City Press Citizen. http://www.press-citizen.com/story/news/education/university-of-iowa/2014/05/07/ui-grows-miscanthus-grass-renewable-energy-goals/8831579/

9. Biomass upstarts (2014) Becky Mills. My Farm Life. http://www.myfarmlife.com/crops/biomass-upstarts/3/

10. Project seeks crop systems to profit farmers, clean air (2014) Staff. Iowa Farmer Today. http://www.iowafarmertoday.com/news/crop/project-seeks-crop-systems-to-profit-farmers-clean-air/article_a2536fb6-9a37-11e3-85bc-001a4bcf887a.html

11. Project seeks cropping systems that profit farmers, provide food and fuel and scrub carbon out of the air (2014) Lynn Laws & Ed Adcock. Iowa State University press release. http://www.ag.iastate.edu/news/.

12. A garden of marvels (2014) Ruth Kassinger. 416 pp. William Morrow, publisher. http://www.amazon.com/Garden-Marvels-Discovered-Flowers-Secrets/dp/0062048996
    - *Heaton advised the author on ecophysiological limits to plant productivity.*

13. Masterminding Miscanthus (2014) Anna Simet. Biomass Magazine. http://www.biomassmagazine.com/articles/9937/masterminding-miscanthus.

14. From recipe to scientific formula (2014) Chris Hanson. Biomass Magazine. http://www.biomassmagazine.com/articles/9933/from-recipe-to-scientific-formula.

15. Biomass appeal – SWCC students gain advantage by studying energy crops (2013) Stephanie Finley. Southwest Iowa AgMag, Shaw Media. Fall 2013, pp 42-46.

16. Biofuels on the verge (2013) Herman Trabish. Greentech Media.

17. Alternative crops for alternative fuels (2013) Becky Mills. BALE magazine.

18. Miscanthus (2013) Richard Banks. Farm Life, a Massey Ferguson publication. Includes 20-minute video interview at http://www.myfarmlife.com/asides/growing-miscanthus/.

19. Farming meeting future needs (2013) Mindy Baker. p. A3, Algona Upper Des Moines newspaper.

20. What's new with energy crops? (2013) **Heaton, E.A.** In: Getting Into Soil and Water, Samuel Bernard (ed.), p. 26-27, Iowa Water Center, Ames, IA.

21. "Why Women Can't Have It All" challenges career-child balance (2012) Elizabeth Polsdofer. Iowa State Daily. http://www.iowastatedaily.com/news/article_d997b62a-cad7-11e1-abc9-001a4bcf887a.html

22. Emily Heaton: cultivating sustainable energy (2012) Sara Parks. Iowa NSF EPSCoR press release. http://iowaepscor.org/news/profiles/eheaton.

23. Tips on planting Miscanthus (2012) Staff compilation. Wallaces Farmer. http://farmprogress.com/wallaces-farmer-story-nl13_3nl-tips-planting-miscanthus-spring-9-58944

24. Navy plan benefits biomass (2012) Dan Piller. Des Moines Register.

25. Food, fuel & the future of the world (2012) Jodi O'Donnell. Forward Magazine http://www.foundation.iastate.edu/site/PageServer?pagename=forwardmag_issues.

26. International student looks back at education (2011) Kaleb Warnock. Iowa State Daily. http://www.iowastatedaily.com/news/article_40bce374-0f04-11e1-b507-001cc4c03286.html

27. Growing biomass across the landscape. (2011) Flori Kohn. Hay and Forage Grower.

28. Friday at 5, Landscape Biomass story (2011) Elizabeth Klinge. WHO-TV 13.

29. Bigger grasses, bigger goal (2011) Rick Malaspina. Bioenergy Connection www.energybiosciencesinstitute.org/bioenergyconnection.
30. Biomass workshop showcases crops for energy production (2011) J. Wilson. Adams County Free Press.
31. Long road to success (2011) Kaleb Warnock. Iowa State Daily.
32. Workshop on biomass crop production successful (2011) Darren Jarboe. Center for Crops Utilization Research Bulletin.
33. The Big Show (2011) Bob Quinn. WHO Radio.
34. Study: Miscanthus guzzles more water than corn but soaks up more nitrates too (2010) Lisa Song, SolveClimate http://solveclimate.com/blog/20101004/study-miscanthus-guzzles-more-water-corn-soaks-more-nitrates-too.
35. Biomass project takes root at SWCC (2010) Tyler Ellyson. Creston News Advertiser.
36. Students Line Fields, Plant Miscanthus Crop by Hand (2010) Dan Piller. Des Moines Register. http://www.desmoinesregister.com/article/20100508/BUSINESS/5080318/-1/BUSINESS04/Students-line-fields-plant-miscanthus-crop-by-hand
37. What is Miscanthus? (2010) Dean Atkins. KMA Radio 960 AM, 99.1 FM. http://sites.google.com/site/heatonlabgroup/Home/in-the-news
38. Iowa State University researches a portfolio of energy crops (2009) Tyler Teske. Ames Tribune.
39. BFJ.com Podcast, When to Harvest Miscanthus and Switchgrass (2009) Biofuels Journal. http://www.grainnet.com/article.php?ID=69305
40. Miscanthus Grass (2009) Brandon Smith, KBIA Radio, Columbia MO. Biomass Focus of Research (2009) Gene Lucht. Iowa Farmer Today. http://www.iowafarmertoday.com/articles/2009/08/20/top_stories/biomass.txt
41. Farm Energy Biomass (2009) Larry Devine, Carroll Daily Times Herald. Miscanthus Creates Ethanol Buzz (2009) Gene Lucht. Iowa Farmer Today. http://www.iowafarmer.com/articles/2009/04/29/top_stories/miscanthus.txt
42. When to Harvest Miscanthus and Switchgrass? (2009) Myke Feinman. AM 540 Power Lunch and Biofuels Journal. http://www.grainnet.com/info/article.php?ID=69305
43. The Big Show (2008) Bob Quinn. WHO Radio.
44. Sugar beets: the future of Iowa agriculture? (2008) Chet Hollingshead. Iowa State Daily. (http://www.iowastatedaily.com/articles/2008/10/05/opinion/doc48e96a4dc040f797034226.txt
45. And The Beet Goes On (2008) Jennifer Meyer. Muscatine Journal.
46. Plant could bring new energy potential to Iowa (2008) Whitney Sager. Iowa State Daily. http://www.iowastatedaily.com/articles/2008/09/25/news/local_news/doc48dc5dc8ccfdd936695763.txt

47. ISU ag researchers see tall biomass potential (2008) Dan Pillar. Des Moines Register.

48. Giant grass Miscanthus can meet US biofuels goal using less land than corn or switchgrass (2008) Staff. ScienceDaily. http://www.sciencedaily.com/releases/2008/07/080730155344.htm

Extension and Outreach Products prior to joining Iowa State University (2)

1. Bioenergy crops compared: Miscanthus more productive than switchgrass (2007) Staff. ScienceDaily. http://www.sciencedaily.com/releases/2007/07/070710064827.htm

2. A fuel for small farms. (2007) Eli Kintisch. *Science* vol. 315 no. 5813 p.788 (http://www.sciencemag.org/cgi/content/summary/315/5813/788a

Extension and Outreach Presentations since joining Iowa State University (65)

*****BS, MS or Ph.D. student supervised by Heaton; [§]post-doctoral researcher supervised by Heaton

1. **Heaton E.A.**, Schulte-Moore L.A., Brandes E. [§], Muth D., Bonner I., Cafferty K. & Milster F. (July 24, 2014) Is it over after stover? Dedicated energy crops in Iowa. Union of Concerned Scientists and Great Plains Institute Joint Summit on Cellulosic Biofuels, Ames, IA, 120 participants.

2. **Heaton E.A.** & Milster F. (January 29, 2014) The biomass power partnership: replacing coal with dedicated energy crops at the University of Iowa. 2014 Iowa State University Crop Advantage Series Workshops, Iowa City, IA, 17 participants.

3. **Heaton E.A.** & Milster F. (January 23, 2014) The biomass power partnership: replacing coal with dedicated energy crops at the University of Iowa. 2014 Iowa State University Crop Advantage Series Workshops, Waterloo, IA, 26 participants.

4. **Heaton E.A.** & Milster F. (January 10, 2014) The biomass power partnership: replacing coal with dedicated energy crops at the University of Iowa. 2014 Iowa State University Crop Advantage Series Workshops, Burlington, IA, 12 participants.

5. **Heaton E.A**., Schulte-Moore L.A., Helmers M., Liebman M. & Milster F. (December 6, 2013) Producing food, feed and energy: How can agriculture do it all? 25th Annual Integrated Crop Management Conference. Iowa State University, Ames, IA; 182 participants.

6. **Heaton E.A. (**August 14, 2013) Bioenergy crop research. Congressional Aide field tour. Boone, IA, 53 participants.

7. **Heaton E.A. (**August 8, 2013) Bioeconomy media tour. Boone, IA, 18 participants.

8. Helmers M. & **Heaton E.A.** (May 21, 2013) ISU Bioeconomy education tour with Iowa community college leader delegation. Boone, IA, 15 participants.

9. Wilson D.M.* (April 29, 2013) World Food Prize Institute student experience tour, Boone, IA. 30 participants.

10. **Heaton E.A.**, Boersma N.N.* Schulte L.A. & Wilson D.* (March 19, 2013) Perennial energy crops in Iowa. 3rd Annual Biomass Workshop. Iowa City, IA. 30 participants.

11. **Heaton E.A.**, Schulte L.A. & Wilson D.* (March 12, 3013) Managing for bioenergy – integrating food and fuel production. Ag Education Day, Emmetsburg, IA, 130 participants.
12. **Heaton E.A.** (February 28, 2013) Perennial bioenergy crops benefit soil and water. University of Illinois Soil and Water Workshop, Taylorville, IL, 75 participants.
13. **Heaton E.A.** (February 20, 2013) Perennials to the rescue! The Dirt on Dirt Soil Health Workshop, Lenox, IA, 78 participants.
14. Bonin C.L.[§] and **Heaton E.A.** (February 20, 2013) Perennials to the rescue! The Dirt on Dirt Soil Health Workshop, Lenox, IA, 78 participants.
15. **Heaton E.A.,** Wilson D.M.* (October 18, 2012) Iowa's Sustainable Energy Pathway field tour, Boone, IA, 6 participants.
16. **Heaton E.A.** (August 29, 2012) Ask the expert: biomass crops. 2012 Farm Progress Show, Boone, IA, est. 200,000 visitors.
17. **Heaton E.A. (**August 14, 2012) Biomass research at ISU. Biofuels Science and Sustainability Tour. Boone, IA, 75 participants.
18. **Heaton E.A.** & Schulte L.A. **(**July 30, 2012) Integrating food and fuel, Landscape Biomass Project Field Day. Boone, IA, 50 participants.
19. **Heaton E.A.** & Schulte L.A. (July 12, 2012) Overview of the Landscape Biomass Project, Masters in Agronomy Field Tour. Boone, IA, 75 participants.
20. Boersma N. N.* & **Heaton E.A.** (June 27, 2012) Giant Miscanthus performance in Iowa, Northwest Iowa Research Farm Field Day, Sutherland, IA, 150 participants.
21. **Heaton E.A.**, Berns B.* & Culp, C.* (June 20, 2012) Biomass crops for Iowa overview, Hay and Forage Expo, Boone, IA, 1000 visitors.
22. **Heaton E.A.** (June 18, 2012) Iowa State University Early Outreach Program Intensive Program, Hinds Farm, Ames, IA, 60 participants.
23. **Heaton E.A.** (June 13, 2012) Ag Energy Workshop, BioCentury Farm, Ames, IA, 75 participants.
24. **Heaton E.A.** (April 5, 2012) Miscanthus propagation demonstration. In cooperation with Northwest Missouri State University, Hinds Farm, Ames, IA, 25 participants.
25. **Heaton E.A.** (March 8, 2012) 2nd Annual Biomass Workshop, Creston, IA, 48 participants.
26. Boersma N. N.* & **Heaton E.A.** (Jan. 17, 2012) *Miscanthus* propagation, planting and management. Northwest Missouri Certified Crop Advisors Workshop. St Joseph, MO, 100 participants.
27. Boersma N. N.* & **Heaton E.A.** (Jan. 17, 2012) The role of *Miscanthus x giganteus* as a biomass crop in the U.S. Northwest Missouri Certified Crop Advisors Workshop. St Joseph, MO, 100 participants.
28. **Heaton E.A. (**August 20, 2011) Introduction to biomass work at ISU. Agronomy Freshman Field Tour, Boone, IA, 30 participants.

29. **Heaton E.A. (**August 17, 2011) Bioenergy crop research. Congressional Aide field tour. Boone, IA, 75 participants.
30. **Heaton E.A. (**August 5, 2011) Developing energy crop portfolios. Landscape Biomass project field day. Boone, IA, 42 participants.
31. **Heaton E.A.** (July 27, 2011) Using companion crops to establish Miscanthus. Neely-Kinyon Farm field day. Greenfield, IA, 100 participants.
32. **Heaton E.A. (**July 19, 2011) Miscanthus as a bioenergy crop in Iowa. Iowa Learning Farm Webinar. Ames, IA. Unknown number of participants.
33. **Heaton E.A. (**June 22, 2011) Biofuels cropping systems: Agronomic and environmental issues. High school science teacher workshop field day. Boone, IA, 50 participants.
34. **Heaton E.A. (**May 31, 2011) Miscanthus in Iowa. Presentation to the Carver Foundation. Ames, IA, 15 participants.
35. **Heaton E.A. (**March 25, 2011) Biomass crops for Iowa. All-Iowa Horticulture Expo, Ottumwa, IA, 50 participants.
36. **Heaton E.A. (**March 11, 2011) Choosing an energy crop. 1st Annual Biomass Workshop. Creston, IA, 75 participants.
37. Boersma N. N.* & **Heaton E.A.** (Feb. 24, 2011) *Miscanthus* x *giganteus* agronomy. ISU Southwest Iowa Research Farms Annual Update Meeting. Greenfield, IA, 50 participants.
38. **Heaton E.A. (**August 5, 2010) Developing energy crop portfolios. Landscape Biomass project field day. Boone, IA, 36 participants.
39. Wilson D.M.***, Heaton E.A.** & Liebman M. (June 29, 2010) Where and when? Quantifying the movement of nitrogen in switchgrass. 2010 Bio-char Initiative Conference field day. Boone, IA, 75 participants.
40. Wilson D.M.*, **Heaton E.A.** & Liebman M. **(**June 24, 2010) Switchgrass plot field day. Where and when? Quantifying the movement of nitrogen in switchgrass. Boone, IA, 75 participants.
41. **Heaton E.A.** & DePoy R. (Aug. 25, 2010) Miscanthus opportunities in southern Iowa. Neely-Kinyon Field Day, Greenfield, IA, 75 participants.
42. **Heaton E.A.** What is this crop? (June 30, 2010) Biomass crops in Iowa. CSI Crops 2010, 4H Annual Conference, Ames, IA, 75 participants.
43. Wilson D.M*. & **Heaton E.A.** (June 29, 2010) Nitrogen cycling in switchgrass. 2010 Biochar Conference Field Tour, Ames, IA, 100 participants.
44. **Heaton E.A.** (June 24, 2010) Environmental impacts of energy crops. Certified Crop Advisor training session. South East Iowa Research and Demonstration Farm Spring Field Day, Crawfordsville, IA, 40 participants.

45. **Heaton E.A.** (June 24, 2010) Miscanthus for southern Iowa. South East Iowa Research and Demonstration Farm Spring Field Day, Crawfordsville, IA, 40 participants.
46. Boersma, N.N.* & **Heaton E.A.** (June 16, 2010) Miscanthus for southern Iowa. Armstrong Farm Annual Field Day, Lewis, IA, 50 participants.
47. **Heaton E.A.** (March 18, 2010) Giant grass and how to grow it. Presentation to Southern Iowa farmers and investors, Creston, IA, 40 participants.
48. **Heaton E.A.** (Feb. 2, 2010) Giant grass and how to grow it. Presentation to Southern Iowa Soil and Water Conservation Commissioners, Bedford IA, 6 participants.
49. Liebman M., Sauer T., Thompson M., Helmers M. & **Heaton E.A.** (Aug 1, 2010) Iowa Corn Growers' Bioenergy Tour, Ames, IA 63 participants.
50. **Heaton E.A.** & Moore K. J. (July 23, 2009) Agronomy 594 (off-campus MS) Bioenergy Field Tour, 26 participants.
51. **Heaton E.A.** & Moore K. J. (July 2, 2009) Biomass Crop Tour, USDA NC7 Plant Introduction Annual Meeting. Ames, IA. 14 participants.
52. **Heaton E.A.** (July 1, 2009) Biomass Crops in the Future of Iowa Agriculture. CSI Crops 4H Annual Conference. Ames, IA. 75 participants.
53. **Heaton E.A.** (April 24, 2009) Perennial Energy Crops for the Midwest. University of Nebraska Extension Webinar. http://bioenergy.unl.edu. 38 participants.
54. **Heaton E.A.** (March 31, 2009) Growing Giant Grass for a Living. Iowa State University Agronomy Club. Ames, IA. 16 participants.
55. **Heaton E.A.** (March 5, 2009) Practical Considerations in Developing Bioenergy. Hamilton County Series of Ag Reports, Webster City, IA. 8 participants.
56. **Heaton E. A**. (Feb. 26, 2009) Future of Cellulosic Crops. Iowa State University Extension. Global Agriculture Conference, Spencer, IA. 30 participants.
57. **Heaton E. A.** (Feb 11, 2009) Dedicated Biomass Crops in Iowa. Annual meeting of the Iowa Crop Improvement Association, Ames, IA. 75 participants.
58. **Heaton E. A.** (Feb. 4, 2009) Practical Considerations in Developing Dedicated Energy Crops. Iowa Learning Farm Winter Workshop, Ames, IA. 75 participants.
59. **Heaton E. A.** (Jan. 27, 2009) Practical Considerations in Dedicated Energy Crops. Iowa State University Crop Advantage Series Meeting, Carroll, IA. 150 participants.
60. **Heaton E. A.** (Jan. 8, 2009) Practical Considerations in Dedicated Energy Crops. Iowa State University Crop Advantage Series Meeting, Ames, IA. 100 participants.
61. **Heaton E. A.** (Jan. 6, 2009) Practical Considerations in Dedicated Energy Crops. Iowa State University Crop Advantage Series Meeting, Mason City, IA. 75 participants.

62. **Heaton E. A.** (Nov. 24, 2008) Miscanthus Agronomy. Bioenergy 101. University of Missouri, Warrensburg, MO. 56 participants.
63. **Heaton E. A.,** Goff, B. (Sept. 25, 2008) Sweet Sorghum and Next Generation Energy Crop*s.* Sugar Beet Field Day, Fruitland, IA. 110 participants.
64. **Heaton E. A.** (Sept. 8, 2008) Perennial Energy Crops – Miscanthus. Biobased Industry Outlook Conference Field Tour, Ames, IA. 50 participants.
65. **Heaton E. A.** (August 28, 2008) Bioenergy Crops. Farm Progress Agronomy and Agricultural Engineering Farm Tour. Ames, IA.

Extension and Outreach Presentations prior to joining Iowa State University (17)

*****BS, MS or Ph.D. student supervised by Heaton; [§] post-doctoral researcher supervised by Heaton

1. Dohleman F.G., **Heaton E.A.** and Long S.P. (Nov, 2006) Miscanthus: Findings and Challenges with a New Crop. Peoria Farm Show, Peoria, IL. 50 participants.
2. **Heaton E. A.** (Nov. 16, 2005) Illinois Council on Food and Agriculture C-FAR Day. 50 participants.
3. **Heaton E. A.** (Nov. 14, 2005) Chicago Farmers Annual Meeting, Chicago IL. 100 participants.
4. **Heaton E. A.** (Sept. 2, 2005) Argentine Agronomic Producers Farm Tour. Urbana, IL.
5. **Heaton E. A.** (June 15, 2005) Agricultural Educators Farm Tour. Urbana, IL.
6. **Heaton E. A.** (April 7, 2005) Students for Environmental Concerns Energy Conference. Urbana, IL.
7. **Heaton E. A.** (March 1, 2005) Land Grant Universities Science and Education Exhibit. Washington D.C.
8. **Heaton E. A.** (Jan. 31, 2005) Class presentation to General Engineering 161. Urbana, IL..
9. **Heaton E. A.** (Jan. 15, 2005) Miscanthus information presentation to John Deere. Moline, IL..
10. **Heaton E. A.** (Jan. 10, 2005) Miscanthus information presentation to Lt. Governor Pat Quinn. Springfield, IL.
11. **Heaton E. A.** (2005) Biomass Energy Crops. Dudley Smith Days, Pana, IL.
12. **Heaton E. A.** (2005) Biomass Energy Crops. Agronomy Day, Urbana, IL.
13. **Heaton E. A.** (2004) Biomass Energy Crops. Dudley Smith Days, Pana, IL.
14. **Heaton E. A.** (2004) Biomass Energy Crops. Agronomy Day, Urbana, IL.
15. **Heaton E. A.** (2003) Biomass Energy Crops. Dudley Smith Days, Pana, IL.
16. **Heaton E. A.** (2003) Biomass Energy Crops. Agronomy Day, Urbana, IL.
17. **Heaton E. A.** (2003)Grasses for Food and Fuel, NCR-31 farm tour, Monticello, IL.

SERVICE

Professional Outreach

International activities

2012 – present	Research Management Committee, BioFuelNet (Canadian research consortium and funding entity). *Review portfolio of 70+ projects worth >$25 million USD*
2011	External examiner, Ph.D. dissertation, McGill University
2010	Non-profit Biofuels Consulting, Nuffield Council on Bioethics, London, UK. http://www.nuffieldbioethics.org
2010 – present	Provide agronomic advising for New Zealand Miscanthus growers
2009	Invited speaker at the International Energy Agency Task 30 (Short Rotation Coppice) Workshop, Taupo, New Zealand
2009	Member, Brazil-US Higher Education Network on Biofuels, www.brazil-usa-henetwork.org
2009- 2012	Member, Canadian Green Crops Network hosted by McGill University, Montreal, Canada
2008	Plenary speaker, Biomass Conference of the Americas, Merida, Mexico
2007-2009	Instructor, Green Crops Network online seminar series, McGill University, Montreal, Canada

National and regional activities

2013- 2016	Adviser on $5,700,000 U.S. Dept. of Energy biomass harvest and logistic project (BALES); funded through the Advanced Biomass Feedstock Logistics Systems II.
2013	Met with representatives of the University Corporation for Atmospheric Research, a federally funded center that manages the National Center for Atmospheric Research, a National Science Foundation laboratory, to provide input on the role of bioenergy crops in agricultural landscapes.
2013	Provided interview data for NSF study on communicating controversial science (PI Michael Dahlstrom, Journalism, ISU).
2012	Co-organized a workshop session on biomass crops as a tool to support adoption of perennial living cover in agricultural landscapes. Done in collaboration with Dr. Carol Williams (University of Wisconsin, Madison) for the Green Lands Blue Waters Partnership Conference, Ames, IA.
2011 – present	Cooperator with the University of Iowa 2020 Initiative to source biomass crops for campus energy generation
2011 - present	Member, scientific advisory board, Speedling, Inc.

2011 - present	Member, scientific advisory council, Syngest, Inc.
2011 – present	Advise Missouri farmers, scientists and government agencies on Miscanthus cultivation
2010	Panel member, USDA biofuels roundtable, Sept. 29, Ankeny, IA
2010 – present	Advise southern Iowa producers and government agencies seeking to invest in bioenergy production.
2010	Attended Biofuel Feedstock Symposium, Jan. 11-13, Urbana, IL.
2009	Biofuels presentation to the NC7 Regional Technical Advisory Committee of the North Central Regional Plant Introduction Station. July 2, 2009, Ames, IA.
2009	Instructor, Intensive Program in Biorenewables, June 3-15, 2009, Ames, IA. 46 national and international students.
2009	Panel member, EPA Region 7 Panel on Emerging Biofuel Feedstocks. Kansas City, KS.
2007 - 2009	Instructor, Cellulosic Biofuels Short Course, 2007-2009. St. Louis, MO (2007), Philadelphia, PA (2008), San Francisco, CA (2009). Attendance 50-150 annually.
2009	Plenary presenter, Miscanthus grower workshop sponsored by Agrosil Energy LLC. Tampa, FL.
2008	Technical advisor to Marshalltown, IA middle school students preparing Miscanthus entry for the First Lego League Championship, Ames, IA.
2005	Represented the University of Illinois at the Science and Education Exhibit for Land Grant Research, Washington, D.C.

Professional Affiliations

2009 - 2012	Sigma Xi Scientific Research Society
2007 – 2009	Weed Science Society of America (WSSA)
2003 – 2009	American Society of Plant Biology (ASPB)
2003 – 2010	Ecological Society of America (ESA)
2002 – present	Crop Science Society of America (CSSA)
2002 – present	Soil Science Society of America (SSA)
2002 – present	Agronomy Society of America (ASA)
2002 – present	Gamma Sigma Delta Agricultural Fraternity
2001 – 2006	Soil and Water Conservation Society

Professional Society Service

2013 – present Legislative Action Network, ASA-CSSA-SSSA

2011 - 2013 Bioenergy Community Leader, ASA-CSSA-SSSA

2011 Bioenergy Community Co-Leader, ASA-CSSA-SSSA

2010 Chair-Elect, ASA Division A-10 (Bioenergy)

2010 Judge, Barnes Graduate Student Competition, ASA-CSSA-SSSA

2010 Symposium chair, ASA-CSSA-SSSA annual meeting A-10

2009 – 2013 Core Constituent Scientist Team member, ASA-CSSA-SSSA

2008 Golden Opportunities Scholar Mentor, CSSA

2007 Public Relations Task Force, CSSA

2007 Meetings Task Force, CSSA

Editorial Responsibilities

2008 – 2014 Editorial Advisory Committee, Global Change Biology Bioenergy

Referee Responsibilities – 21 journals

Journals

No.	Journal Title	Reviews
1	Agriculture Ecosystems and Environment	1
2	Agronomy Journal	2
3	Annals of Botany	6
4	Bioenergy Research	2
5	Biofuels, Bioproducts and Biorefining	6
6	Biomass and Bioenergy	6
7	Bioresource Technology	3
8	Bioscience	2
9	Crop Science	2
10	Energies	1
11	Environmental Research Letters	1
12	Forage and Grazinglands	1
13	Global Change Biology	4
14	Global Change Biology Bioenergy	13
15	Invasive Plant Science and Management	1
16	Journal of Experimental Botany	1
17	Journal of Plant Nutrition and Soil Science	1
18	New Phytologist	1
19	Physiologia Plantarum	2

20	Plant Cell and Environment	1
21	Proceedings of the National Academy of Sciences	1
Total		**58**

Grant and Technical Reviewing

2014 BioFuelNet Research Management Committee annual project review (Canadian granting organization with 70+ project portfolio valued at >$25 million USD).

2014 U.S. Dept. of Energy Miscanthus yield modeling and expert review panel.

2013 U.S. Dept. of Energy switchgrass yield modeling and expert review panel with Daniel Wilson*.

2013 MITACS Elevate reviewer (Canadian industry/academia funding agency; PhD excellence program).

2013 BioFuelNet Research Management Committee annual project review (Canadian granting organization with 70+ project portfolio valued at >$25 million USD).

2013 U.S. Dept. of Energy North Central Sun Grant review panel.

2012 BioFuelNet Research Management Committee annual project review (Canadian granting organization with 70+ project portfolio valued at >$25 million USD).

2012 NIFA AFRI Development and Sustainable Production of Regionally Appropriate Biomass Feedstocks program area, grant reviewer.

2011 U.S. Dept. of Energy North Central Sun Grant *ad hoc* reviewer.

2011 NCR SARE Research and Education grant reviewer.

2011 MITACS Accelerate Internship reviewer (Canadian industry/academia funding agency).

2010 NIFA AFRI Sustainable Bioenergy Program research grant panel.

2010 External reviewer, National Renewable Energy Lab, Life Cycle Analysis model development.

2010 MITACS Accelerate Internship reviewer (Canadian industry/academia partnership organization).

2010 *Ad hoc* review, USDA NIFA National Needs Fellowship program.

2010 Reviewer for U.S. Dept. of Energy's Office of Science, Office of Biological and Environmental Research (OBER), and the U.S. Dept. of Agriculture (USDA), National Institute of Food and Agriculture (NIFA) joint program focus area, Plant Feedstock Genomics for Bioenergy.

2010 *Ad hoc* reviewer, North East Sun Grant Competitive Grants.

2009 Merit review panel member, US Dept. of Energy Integrated Biorefinery Operations solicitation.

2009 Merit review panel member, US Dept. of Energy Advanced Research Projects Agency-Energy.

2009 Technical reviewer, Bioeconomy-Industrial Uses Science Grants, Ontario Ministry of Food, Agriculture and Rural Affairs.

2009-2012 Technical reviewer for USDA/ARS pre-publication manuscripts.

2009 Technical reviewer for the USDA Sustainable Agriculture Research (SARE) grant program.

Books

2014 SCOPE Bioenergy & Sustainability, Chapter 2: Feedstocks.

2012 Bioenergy: Principles and Applications, Wiley Publishing.

Professional Development

2014 Agro-IBIS (Agricultural dynamic vegetation climate model) working group workshop, Ames, IA.

2013 Iowa State University Graduate College diversity and inclusion workshop, Ames, IA.

2012 Joint NRCS, FSA, ISU and NWMS biomass pellet discussion and tour, Maryville, MO.

2012 Agro-IBIS (Agricultural dynamic vegetation climate model) working group workshop, Ames, IA.

2012-2013 NIFA CAP (CenUSA) annual collaborators meeting, Lincoln, NE, West Lafayette, IN.

2011-2013 Iowa EPSCoR collaboration meeting, Iowa City, Waterloo, IA.

2011 Long-term field research investigators workshop, Madison, WI.

2010–2013 Project Learn workshops, Ames, IA.

2009 NSF Grant writing workshop, Iowa City, IA.

2008 Agricultural Productivity Simulation (APSIM) training, Ames, IA.

2008 Grant writing workshop, Ames, IA.

2008-2014 Multiple (annual and periodic) ISU Extension and Outreach professional development workshops.

Service

Guest Lectures

Course	Course Title	Lecture Topic	Semester
AGA 114 (Southwest IA Community College)	Introduction to Agronomy	Introduction to Fuel Crops	F12
AGRON 110 (ISU)	Professional Development in Agronomy: Orientation	Biofuel Research in Agronomy	F09, F10, F12, F13
AGRON 212 (ISU)	Crop Growth, Productivity and Management	Introduction to Fuel Crops	F08, F09, F10, S12, S13, S14

AGRON/TSM 325 (ISU)	Biorenewable Systems	Developing and Implementing Agricultural Principles in the Bioeconomy (2 lectures)	F08, F09, F10, F11, F12, F13

Other Teaching Activities

2013	Bioenergy Instructor for Community College Teachers Workshop, Iowa EPSCoR.
2009-2011	ENGL 150 – Advised students on literature research methods.
2011	External PhD dissertation reviewer, Keomany Ker (Advisor Dr. Don Smith). McGill University, Canada.
2011-2013	Agronomy field tour – introduced freshman and transfer students to bioenergy field work at ISU
2012	Chemistry department bioenergy introduction – organized guided introduction to field-based bioenergy research for ISU chemistry department graduate students
2012	Agronomy Club Bioenergy Field Tour – led tour and discussion of bioenergy research for ISU Agronomy Club students
2011	Lecturer in ISU Intensive Biorenewables Program.
2011	Organized in-field training workshop on photosynthetic gas exchange with guest scientist, Dr. Frank Dohleman of Monsanto Co. Ames, IA.
2010	Organized workshop for graduate training in photosynthesis research methods with guest scientist, Dr. Frank Dohleman of Monsanto Co. Ames, IA.
2007-2008	Undergraduate online teaching on biomass crop basics through the McGill University Green Crops Network

Supervised Undergraduate Projects (for course credit)

1. Calvin Culp, Bioenergy Crops, 2012, Agronomy 311 Internship project.
2. Jason Schluttner, Miscanthus Storage, 2010. Freshman Honors Program.
3. Alex Maeder, Influence of Companion Crops on Growth and Development of Miscanthus, 2010. AGRON 490 Special Project.
4. Brian Pfeiffer, Propagation Methods in Miscanthus, 2009. Freshman Honors Program.

Research Assistants Trained (as employees)

1. Brent Berns, Syngenta
2. Josh Grindeland, ITC Holding Corp. (power grid analysis), Cedar Rapids, Iowa
3. Brooks Campbell, Iowa State University Student
4. Amber Goff, formerly at the University of Kentucky
5. Nick Ohde, Sustainable Development Coordinator, Ecuador
6. Nicola Forrest, Michigan Technical University
7. Calvin Culp, Iowa State University student

8. Ashley Greve, Quality Assurance Engineer at XL Specialized Trailers
9. Dustin Schau, Michaels Energy - Cedar Rapids, Iowa
10. Alex Maeder, Crop Production Service – Creston, Iowa
11. Anthony Martin, unknown

Institutional Service

College and University Service

2014-present	Member, Biorenewable Resources and Technology Interdepartmental Graduate Program
2014-2017	Served on Biorenewable Resources and Technology Interdepartmental Graduate Program curriculum committee
2014- present	Served on Iowa State University Farms Committee
2013	Represented department at ISU diversity and inclusion meetings
2013-2015	Served on Sustainable Agriculture Interdepartmental Graduate Program
2012-present	Member, Sustainable Agriculture Interdepartmental Graduate Program
2009-2012	Assisted in planning, installation and presentation of ISU Farm Progress Show exhibits
2009-present	Member, Plant Biology Interdepartmental Graduate Program
2008-present	Member, Bioeconomy Institute
2008	Served on ISU Plant Sciences Institute Symposia Planning group

Departmental Service

2014-present	Served on Agronomy Professional Development Committee (founding member)
2014	Served on Integrated Cropping Systems faculty search committee
2013-2015	Served on graduate awards committee
2013-2014	Served as co-leader of committee developing undergraduate immersion curriculum
2012	Hosted two special departmental seminars (J. Arbuckle, Michael Dahlstrom)
2011-present	Assist in leadership of Agronomy Crop Production and Physiology shared Lab
2011 – 2013	Served on departmental organization committee
2010 - 2012	Served on departmental strategic planning committee
2010	Served on Soybean Agronomist faculty search committee
2010-2014	Assisted with departmental Farm Progress Show planning
2008-2014	Met with Agronomy fellowship candidates

2009	Met with candidates for new Agronomy faculty positions
2008 -2009	*Ad hoc* Plant Production and Physiology seminar review committee
2008 -2009	Served on departmental vision committee
2008	Provided input on greenhouse resource needs
2008	Met with candidates for the Theoretical Production Ecology position
2008- present	Member of Agronomy Crop Production and Physiology shared Lab