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Curriculum Vitae

(last updated July 18, 2019)

CANDIDATE INFORMATION	2
<i>Education</i>	2
<i>Professional experience</i>	2
<i>Areas of specialization</i>	2
<i>Iowa State University faculty memberships</i>	2
RESEARCH	3
<i>Honors and awards (10)</i>	3
<i>Peer-reviewed journal articles since last promotion (26)</i>	3
<i>Peer-reviewed journal articles prior to last promotion (29)</i>	9
<i>Peer-reviewed journal articles under review (2)</i>	16
<i>Peer-reviewed book chapters since last promotion (1)</i>	16
<i>Invited presentations (99)</i>	18
<i>Other conference presentations (53)</i>	25
<i>Funding related to disciplinary research (\$14 million, \$3 million to Heaton since last promotion)</i>	32
<i>Graduate student advising</i>	39
EXTENSION AND OUTREACH	42
<i>Extension and outreach products (118; 39 since last promotion)</i>	42
<i>Extension and outreach presentations (130)</i>	51
Teaching	57
<i>Courses taught (1)</i>	57
<i>Guest lectures</i>	57
<i>Other teaching activities</i>	58
SERVICE	59
<i>Professional outreach</i>	59
<i>Professional affiliations</i>	61
<i>Professional society service</i>	62
<i>Editorial responsibilities</i>	62
<i>Referee responsibilities</i>	62
<i>Professional development</i>	65
<i>Service</i>	66

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
Associate Professor, 65% Research /25% Extension/10% Teaching, Department of Agronomy, Iowa State University, Ames, IA	2017-present
Associate Professor, 70% Research / 30% Extension, Department of Agronomy, Iowa State University, Ames, IA	2015-2017
Assistant Professor, 70% Research / 30% Extension, Department of Agronomy, Iowa State University, Ames, IA	2008-2015
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

- Ecophysiology of perennial grasses in temperate climates
- Precision conservation and spatial integration of perennials in cropland
- Biomass crop production, management, and extension

Iowa State University faculty memberships

Program	Year
Interdepartmental Environmental Science Graduate Program	2019-present
Interdepartmental Biorenewable Resources and Technology Graduate Program	2014-present
Interdepartmental Sustainable Agriculture Graduate Program	2012-present
Interdepartmental Plant Biology Graduate Program	2009-present
Undergraduate Honors Program	2008-2010
Dept. of Agronomy, Crop Production and Physiology Graduate Program	2008-present

RESEARCH

Honors and awards (10)

Award	Year
Recognition of Service from US Interagency Biomass Research and Development Technical Advisory Committee, led by Dept. of Energy	2019
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 last promotion (26)

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

Summary: Google scholar h-index = 24; i10-index=39; 4,233 total citations; 2,360 citations since last promotion

- J.55 Tejera M.*, Boersma N.N. §, VanLoocke A., Archontoulis S.V., Dixon P., Miguez F.E. & **Heaton E.A.** (2019) Multi-year and -site establishment of the perennial biomass crop *Miscanthus × giganteus* using a staggered-start design to elucidate N response. *Bioenergy Research*. doi:10.1007/s12155-019-09985-6

Role: Heaton was lead PI on two grants that funded this work. She supervised PhD student Tejera, helped conceive experiment, and contributed to all aspects of manuscript development. Significance: This is the first paper from the LAMPS project, which provided the preliminary data needed to garner CABBI and C-CHANGE awards. It showed that M. × giganteus stands perform differently depending on planting conditions, and that N fertilizer increases yield only in about 1 in 5 years.

- J. 54 Aurangzaib M., K. Moore, Lenssen A., Archontoulis S.V., **Heaton E.A.** & Fei S. (2018) Developmental morphology and biomass yield of upland and lowland switchgrass ecotypes grown in Iowa. *Agronomy Journal*. **8**(5): p. 61-72. doi:10.3390/agronomy8050061

Role: Heaton contributed to the editing of this manuscript.

Significance: This paper presented a relationship between biomass yield and phenology in bioenergy switchgrass cultivars that is useful for prediction switchgrass performance and crop improvement.

- J.53 Farrar K., **Heaton E.A.** & L.M. Trindade (2018) Editorial: Optimizing miscanthus for the sustainable bioeconomy: From genes to products. *Frontiers in Plant Science*. **9**(878). 10.3389/fpls.2018.00878

Role: Heaton contributed to the conception, writing, and editing of this paper.

Significance: This paper introduced and highlighted a special research topic by the same title in the journal, which was co-edited by Heaton, Farrar, and Trindade.

- J.52 Puntel L.A., Sawyer J.E., Barker D.W., Thorburn P.J., Castellano M.J., Moore K.J., VanLoocke A., **Heaton E.A.**, & Archontoulis, S.V. (2018) A systems modeling approach to forecast corn economic optimum nitrogen rate. *Frontiers in Plant Science*. **9**(436).doi:10.3389/fpls.2018.00436

Role: Heaton served on Puntel's PhD committee, provided input on results interpretation, and helped to edit the manuscript. Significance: This paper tested the use of the APSIM crop model as an in-season forecast tool to improve fertilizer application decision-making. It showed that using the model could improve year-to-year predictability of corn yields and optimum N rates, and provided a path for future method improvement.

- J.51 Brandes E.[§], Plastina A. & **Heaton E.A.** (2018) Where can switchgrass production be more profitable than corn and soybean? An integrated subfield assessment in Iowa, USA. *Global Change Biology Bioenergy* **10**, 473-488. doi:10.1111/gcbb.12516

Role: Heaton was lead PI on an internal award that funded this work. She supervised postdoctoral scientist Brandes, helped conceive concept, and contributed to analysis, writing, and editing.

Significance: This paper built upon the novel spatially-explicit analytical framework of Brandes et al. 2016 and is foundational to current CABBI and C-CHANGE-funded research. We found that switchgrass would be more profitable than corn/soy on ~5% of Iowa cropland, on average, and would increase county-level farm income by millions of dollars in some counties.

- J.50 Bonin C.L.[§], Fidel R.B., Banik C., Laird D.A, Mitchell R., & **Heaton E.A.** (2018) Perennial biomass crop establishment, community characteristics, and productivity in the upper US Midwest: Effects of cropping systems seed mixtures and biochar applications. *European Journal of Agronomy* **101**, 121-128 doi:10.1016/j.eja.2018.08.009

Role: Heaton was a collaborator on CenUSA, the NIFA CAP that funded this work. She supervised postdoctoral scientist Bonin, helped conceive and conduct the experiment, and edited the manuscript.

Significance: This work showed low-diversity perennial grass stands outperformed high-diversity blends in the first three years after establishment, and that biochar makes very little difference to plant performance on rich arable soils.

- J.49 Chang H., Snow A., Mariti M., Evans M., & **Heaton E.A.** (2018) Extent of pollen-mediated gene flow and seed longevity in switchgrass (*Panicum virgatum* L.): implications for biosafety procedures *Biomass and Bioenergy* 109, 114-124. doi: 10.1016/j.biombioe.2017.12.016

Role: Heaton was co-PI on Snow's NIFA grant that funded this work, and provided information and interpretation of results relating to bioenergy switchgrass production.

Significance: This paper highlights important knowledge gaps in our understanding of switchgrass pollen movement and associated gene flow. While gene flow is not as likely in switchgrass as in some species, it poses real risk with wide-spread production of improved switchgrass.

- J.48 Lee D. K., Aberle E., Anderson E. K., Anderson W., Baldwin B. S., Baltensperger D., Barrett M., Blumenthal J., Bonos S., Bouton J., Bransby D. I., Brummer C., Burks P. S., Chen C., Daly C., Egenolf J., Farris R. L., Fike J. H., Gaussoin R., Gill J. R., Gravois K., Halbleib M. D., Hale A., Hanna W., Harmoney K., **Heaton E. A.**, Heiniger R. W., Hoffman L., Hong C. O., Kakani G., Kallenbach R., Macoon B., Medley J. C., Missaoui A., Mitchell R., Moore K. J., Morrison J. I., Odvody G. N., Richwine J. D., Ogoshi R., Parrish J. R., Quinn L., Richard E., Rooney W. L., Rushing J. B., Schnell R., Sousek M., Staggenborg S. A., Tew T., Uehara G., Viands D. R., Voigt T., Williams D., Williams L., Wilson L. T., Wycislo A., Yang Y. & Owens V. (2018) Biomass production of herbaceous energy crops in the United States: field trial results and yield potential maps from the multiyear regional feedstock partnership. *Global Change Biology Bioenergy*. doi:10.1111/gcbb.12493

Role: Heaton was a participating collaborator in the federally funded Regional Feedstock Partnership and provided data for this synthesis paper.

Significance: The Regional Feedstock Partnership was the first and largest network of energy crop research trials in the US to date. This paper provides seminal summary information from rigorous field trials that have since been used to guide research, funding, and policy by providing the foundation for Dept. of Energy Billion Ton Assessments.

- J.47 Brandes E.[§], McNunn G. S., Schulte L. A., Muth D. J., Jr., Vanloocke A. & **Heaton Emily A.** (2017) Targeted subfield switchgrass integration could improve the farm economy, water quality, and bioenergy feedstock production. *Global Change Biology Bioenergy*. DOI 10.1111/gcbb/12481

Role: Heaton supervised postdoctoral scientist Brandes, helped conceive idea, and contributed to all aspects of the manuscript.

Significance: This novel analysis coupled publically-available, spatially-explicit land use and profitability information (developed in Brandes et al., 2016) with a mechanistic biogeochemical model (DNDC) to show that planting switchgrass only on parts of cropland that were unprofitable 2012-2015 could reduce N loss from those fields by 38%, getting Iowa near its Nutrient Reduction Strategy goals while simultaneously improving the farm economy.

- J.46 Tejera M.* & **Heaton E.A.** (2017) Description and codification of *Miscanthus × giganteus* morphological development for phenological assessment *Frontiers in Plant Science* 8 DOI 10.3389/fpls.2017.01726

Role: Heaton supervised PhD student Tejera and assisted with all aspects of the work, from inception to publication.

*Significance: This paper describes the first phenological scale for *M. × giganteus*, providing a tool that practitioners and academics alike can use to describe and manage *M. × giganteus* according to growth stage rather than arbitrary calendar or weather dates, as had been done previously.*

- J.45 Miriti M., Ibrahim T., Palik D., Bonin C.L.⁵, **Heaton E.A.**, Mutegi E. & Snow A. (2017) Growth and fecundity of fertile *Miscanthus × giganteus* ('PowerCane') compared to feral and ornamental *Miscanthus sinensis* in a common garden experiment: implications for invasion *Ecology and Evolution* **7** DOI 10.1002/ece3.3134

Role: Heaton was a PI on Snow's NIFA grant that funded this work and supervised postdoc Bonin who conducted field research used for this analysis.

Significance: This paper was the first to compare improved fertile miscanthus with both feral and ornamental lines in multiple locations. We found the improved variety "PowerCane" has growth and survival characteristics that make it reasonably likely to be invasive if widely cultivated under current management practices.

- J.44 Fike J., Pease J., Owens V., Farris R., Hansen J., **Heaton E.A.**, Hong C., Mayton H., Mitchell R., & Viands, D. Switchgrass Nitrogen Response and Cost of Production on Diverse Sites (2017) *Global Change Biology Bioenergy* 10.1111/gcbb.12444

Role: Heaton was a participating collaborator in the federally funded Regional Feedstock Partnership and provided data for this synthesis paper.

Significance: The Regional Feedstock Partnership was the first and largest network of energy crop research trials in the US to date. This paper provides seminal summary information from rigorous field trials that have since been used to guide research, funding, and policy by providing the foundation for Dept. of Energy Billion Ton Assessments.

- J.43 Burke R.H.* , Moore K.J., Shipitalo M.J., Miguez F.E. & **Heaton E.A.** (2017) All washed out? Foliar nutrient resorption and leaching in senescing switchgrass *Bioenergy Research* DOI 10.1007/s12155-017-9819-6

Role: Heaton co-advised MS student Burke with Fernando Miguez on this project leveraging Heaton's Regional Feedstock Partnership switchgrass trials. Heaton conceived the project and contributed to all aspects of the manuscript.

Significance: Many of the differences reported in the agronomic literature are likely artifacts of differences in methodology. Here we determined that only small amounts of nutrients actually leach out of senesced switchgrass (as frequently reported) but that instead nutrient-rich leaves drop over the winter, giving the appearance of leaching from standing biomass.

- J.42 Roby M., Salas-Fernandez M., **Heaton E.A.**, Miguez F.E. & VanLoocke A. (2017) Biomass sorghum and maize have similar water-use-efficiency under non-drought conditions in the rain-fed Midwest U.S. *Agricultural and Forest Meteorology* DOI 10.1016/j.agrformet.2017.08.019

Role: Heaton advised on agronomy of biomass sorghum and helped edit manuscript.

Significance: This paper presents some of the only biomass sorghum yield and evapotranspiration data for the temperate US and helped garner CABBI funding for current biomass sorghum research.

- J.41 Yost M., Kitchen N., Myers R. & **Heaton E.A.** (2017) Yield Potential and Nitrogen Requirements of *Miscanthus × giganteus* on Eroded Soils *Agronomy Journal* DOI:10.2134/agronj2016.10.0582

Role: Heaton was co-PI on the grant that funded this research, provided insight on *M. × giganteus* agronomy to conduct the experiment, and helped edit the manuscript.

Significance: This paper showed that *M. × giganteus* can have high yield potential even on severely degraded (2 inches topsoil) soils.

- J. 40 Bonin C.L.[§], Mutegi E., Snow A., Miriti M., Chang H., & **Heaton E.A.** (2016) Improved feedstock option or invasive risk? Comparing establishment and yields of fertile *Miscanthus × giganteus* with *Miscanthus sinensis* biotypes *Bioenergy Research* 1-12.10.1007/s12155-016-9808-1

Role: Heaton supervised postdoc Bonin and the Iowa research location of this project stemming from a co-PI NIFA grant with Snow and Miriti.

Significance: This is the first study comparing fertile bioenergy, ornamental and feral genotypes of *M. × giganteus*, finding that fertile bioenergy genotypes have greater potential to be invasive than ornamental or feral genotypes in the Midwest. Findings are being used to shape best practice recommendations.

- J. 39 Huang S., Hu G., Chennault C., Su L., Brandes E., **Heaton E.A.**, Schulte L.A., Wang L. & Tyndall J. (2016) An agent-based simulation model of farmer decision making on bioenergy crop adoption. *Energy* 115, 1188-1201 DOI 10.1016/j.energy.2016.09.084

Role: Heaton led the research collaboration that led to this paper, Iowa's Sustainable bioEnergy Pathway (ISEP), and helped shape the paper's focus and development.

Significance: This paper uses a novel modeling technique to assess socioeconomic drivers and impacts of bioenergy in Iowa from a farmer's perspective.

- J. 38 Mutegi E., Bonin C.L.[§], **Heaton E.A.**, Chang C., Gernes C., Palik D., Miriti M. & Snow A. (2016) Population genetics and seed set in feral, ornamental *Miscanthus sacchariflorus* *Invasive Plant Science and Management* DOI 10.1614/IPSM-D-16-00030.

Role: Heaton helped design and implement this experiment, and supervised Dr. Bonin.

Significance: This paper is the first to examine the genetics and fecundity of feral *M. sacchariflorus*, a parent species of *M. × giganteus* that is found throughout the upper Midwest and could become invasive. We found that seed set is currently pollen-limited, but could change as populations expand.

- J. 37 Palik D., Snow A.A., Stottlemeyer A.L., Miriti M.N. & **Heaton E.A.** (2016) Relative performance of non-local cultivars and local, wild populations of switchgrass (*Panicum virgatum*) in competition experiments. *PLOS1* DOI 10.1371/journal.pone.0154444

Role: Heaton help to frame this experiment and ensure it was designed to test relevant questions for the bioenergy and invasive ecology communities.

Significance: This paper is one of the few investigating the comparative invasive potential of improved and wild switchgrass, finding that there is some cause for concern that agronomically improved switchgrass is also more invasive than wildtype.

- J. 36 Brandes E.[§], McNunn G., Schulte L.A., Muth D., Sharma B., Babcock B. & **Heaton E.A.** (2016) Subfield profitability analysis reveals an economic case for cropland diversification. *Environmental Research Letters* DOI 10.1088/1748-9326/11/1/014009
- Role: Heaton helped conceive the idea, oversaw the analysis and manuscript development, and supervised Dr. Brandes.*
- Significance: This paper developed a novel spatial analysis framework that predicts corn/soy profitability at a sub-field scale, and demonstrated the value position of strategic incorporation of perennials into annual crop land.*
- J. 35 Zaib M.A., Moore K.J., Archontoulis S.V., **Heaton E.A.**, Lenssen A.W. & Fei S. (2016) Compositional differences among upland and lowland switchgrass ecotypes grown as a bioenergy feedstock crop. *Biomass & Bioenergy* DOI 10.1016/j.biombioe.2016.02.017
- Role: Heaton initially designed the field experiment used for this paper then assisted with editing of the manuscript.*
- Significance: This paper is a solid contribution to understanding of compositional differences between upland and lowland switchgrass ecotypes.*
- J. 34 Yost M., Randall B.K., Kitchen N.R., **Heaton E.A.**, Stelzer H.E. & Thompson A.L. (2016) Impact of rhizome quality on *Miscanthus* establishment in claypan soil landscapes. *Industrial Crops and Products* DOI: 10.1016/j.indcrop.2015.12.040
- Role: Heaton helped develop the methods and implementation for *Miscanthus* establishment and data collection.*
- Significance: This paper demonstrated that *Miscanthus* can effectively establish under soil conditions that severely limit maize production, even within a range of rhizome quality.*
- J. 33 Wilson D.M.*, Gunther T.P., Schulte L.A., Moore K.J. & **Heaton E.A.** (2016) Landscape position influences switchgrass feedstock composition and quality. *Crop Science*. DOI10.2135/cropsci2015.07.0437.
- Role: Working closely with Wilson, Heaton supervised this manuscript throughout to ensure its publication after research project management transitioned from Moore to Heaton.*
- Significance: This is one of the few papers to tie landscape position to biofuel quality, and the first to show that plant mineral composition is most affected by spatial factors, while plant structural composition is most affected by temporal factors, thus enabling precision management for improved biofuel quality and ecosystem function.*
- J. 32 Sharma B., Brandes E.[§], Khanchi A., Birrell S., **Heaton E.A.** & Miguez F.E. (2015) Evaluation of microalgae biofuel production potential and cultivation sites using Geographic Information Systems: A review. *Bioenergy Research*. DOI 10.1007/s12155-015-9623-0
- Role: Heaton assisted with manuscript development and supervised Dr. Brandes.*
- 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.*

- J. 31 Boersma N.N.*, Dohleman F.G., Miguez F.E. & **Heaton E.A.** (2015) Autumnal leaf senescence in *Miscanthus × giganteus* and leaf [N] differ by stand age. *Journal of Experimental Botany*. DOI 10.1093/jxb/erv129.

Role: Heaton shared in the conception of this project and advised Boersma in implementing the research and publishing the article as part of his PhD.

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. Findings lead to development of the LAMPS project investigating the interactive effects of stand age and N fertility in M. × giganteus, and ultimately, to CABBI funding.

- J. 30 Bonin C.L.[§], **Heaton E.A.**, Cogdill T.J. & Moore K. (2015) Management of sweet sorghum for biomass production. *Sugar Tech*. DOI 10.1007/s12355-015-0377-y

Role: Heaton took over management of this data from Moore who supervised MS student Cogdill. Heaton enlisted her postdoc Bonin to get the work published, and worked with her to reanalyze, present and publish the data.

Significance: Little management data exists sweet sorghum in the US Midwest. This paper provided important, practical data on row spacing and planting date for this highly promising biomass crop.

Peer-reviewed journal articles prior to last promotion (29)

- J. 29 Salas Fernandez M.G., Strand K., Hamblin M., Westgate M., **Heaton E.A.** & Kresovich S. (2014) Genetic analysis and phenotypic characterization of leaf photosynthetic capacity in sorghum. *Genetic Resources and Crop Evolution*. DOI 10.1007/s10722-014-0202-6.

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

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

- J. 28 Hong C.O., Owens V.N., Bransby D., Farris R., Fike J., **Heaton E.A.**, Kim S., Mayton H., Mitchell R., & Viands D. (2014) Switchgrass response to nitrogen fertilizer across diverse environments in the USA: a regional feedstock partnership report. *Bioenergy Research*. **7**, 777-788. DOI: 10.1007/s12155-016-9734-2

Role: Heaton led the Iowa portion of this research including experimental design and data collection, then edited the manuscript multiple times.

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/>).

- J. 27 Boersma N.N.* & **Heaton E.A.** (2014) Propagation method affects *Miscanthus × giganteus* developmental morphology. *Industrial Crops and Products*. **57**, 59-68. DOI: 10.1016/j.indcrop.2014.01.059

Role: Heaton supervised Boersma's Ph.D., and was closely involved in the genesis and development of this manuscript.

*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*.*

- J. 26 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. DOI: 10.1016/j.indcrop.2014.01.058

Role: Heaton supervised Boersma's Ph.D., and was closely involved in the genesis and development of this manuscript.

*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.*

- J. 25 Bonin C.L.[§], Barb J. & **Heaton E.A.** (2014) *Miscanthus sacchariflorus*: biofuel parent or new weed? *Global Change Biology Bioenergy*. **6**, 629-636. DOI: 10.1111/gcbb.12098

Role: Heaton conceived this manuscript and supervised post-doctoral scientist Bonin.

*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.*

- J. 24 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*. **7**, 885-898. DOI:10.1007/s1255-014-9409-9

Role: Heaton supervised Wilson in writing this manuscript and was intimately involved in all aspects of its development.

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).

- J. 23 Arundale R., Dohleman F., **Heaton E.A.**, McGrath J. Voigt, T. & Long S.P. (2014) Yields of *Miscanthus × giganteus* and *Panicum virgatum* decline with stand age in the Midwestern USA. *Global Change Biology Bioenergy*. **6**, 1-13. DOI: 10.1111/gcbb.12077

Role: Heaton designed the original experiment and established the plots used in this research, then contributed to the structure and editing of this publication.

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.

- J. 22 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. DOI: 10.1016/j.biombioe.2013.07.016

Role: Heaton assisted with the scope and editing of this article.

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.

- J. 21 **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**. DOI: 10.1002/bbb1429

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

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.

- J. 20 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**. DOI: 10.1002/bbb.1418

Role: Heaton contributed a section on Miscanthus and other perennial grasses to this review.

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

- J. 19 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.

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

- J. 18 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**. DOI: 10.1088/1748-9326/8/3/035037

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.

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.

- J. 17 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. DOI: 10.1016/j.fuel.2013.04.064

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.

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.

- J. 16 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. DOI: 10.2134/agronj2012.0233

Role: Heaton conceived this project and advised the lead author in implementing the research as well as publishing the article.

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.

- J. 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. DOI: 10.1007/s12155-012-9240-0

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.

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.

- J. 14 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. DOI: 10.1111/j.1757-1707.2011.01148.x

Role: Heaton shared in the conception of this project and advised the lead author in implementing the research and publishing the article.

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.

- J. 13 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. DOI: 10.1111/j.1757-1707.2011.01153.x

Role: Heaton designed the original experiment and established the plots used in this research, then contributed to the structure and editing of this publication.

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.

- J. 12 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. DOI: 10.2134/jeq2011.0103

Role: Heaton advised in the design of these experiments and in the interpretation of results.

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.

- J. 11 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. DOI: 10.1603/AN10183

Role: Heaton assisted with data collection, interpretation and 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.

- J. 10 **Heaton E.A.**, Dohleman F.G., Miguez F.E., Juvik J.A., Lozovaya V., Widholm J. , Zobotina O.A., Mclsaac 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. DOI: 10.1016/s0065-2296(10)56003-8

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

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.

- J. 9 Goff B.M., Moore K.J., Fales S.L., & **Heaton E.A.** (2010) Double-cropping sorghum for biomass. *Agronomy Journal*. **102**, 1586-1592. DOI: 10.2134/agronj2010.0209

Role: Heaton was an active member of Goff's PhD committee and advised on results interpretation.

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.

- J. 8 **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. DOI: 10.1111/j.1757-1707.2009.01022.x

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.

*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.***

- J. 7 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. DOI: 10.1111/j.1365-3040.2009.02017.x.

Role: Heaton assisted with concept development, data collection and interpretation

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.

- J. 6 **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. DOI: 10.1016/j.copbio.2008.05.001.

Role: Heaton was invited to submit this article and was responsible for its conception and development.

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.

- J. 5 **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. DOI: 10.1111/j.1365-2486.2008.01662.x

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.

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 8.88 and is ranked by ISI ScienceWatch as the most cited journal in Climate Change Research behind Science and Nature.

- J. 4 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. DOI: 10.1111/j.1365-3040.2004.01163.x

Role: Heaton performed data collection and contributed to conceptual discussion. This paper was a result of some of Heaton's undergraduate research.

Significance: Carbohydrate dynamics determine the magnitude of photosynthetic response to elevated CO₂ 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.

- J. 3 **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. DOI: 10.1023/B:MITI.0000038848.94134. be

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.

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.

- J. 2 **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. DOI: 10.1016/j.biombioe.2003.10.005

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.

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.

- J. 1 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. DOI: 10.1046/j.1365-2486.2002.00498.x

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

Significance: A plethora of studies had investigated the effects of elevated CO₂ 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)

- J. Tejera M.* and Heaton & **Heaton E.A.** The early plant gets the sun: age-related changes in phenology of *Miscanthus × giganteus*. *American Journal of Botany*.

Role: Heaton supervised Ph.D student Tejera and contributed to all aspects of this work, from inception to completion.

*Significance: This paper quantified the impact of plant age and N fertility on phenology using *M. × giganteus* as a model perennial grass, finding that *M. × giganteus* behaves differently than model tree species, with implications for how woody and herbaceous biomass crops are modeled.*

- J. McNunn G., **Heaton E.A.**, Archontoulis S., Licht M. & VanLoocke A. A crop modeling approach for precision cost-benefit analysis of variable seeding and nitrogen application rates. *Frontiers in Sustainable Food Systems*.

Role: Heaton served on McNunn's PhD committee and advised on subfield modeling and crop performance

Significance: This paper provides ground-testing of our sub-field economic and environmental assessment framework, and shows variable-rate practices that most improved economic return on investment typically also improved environmental outcomes.

Peer-reviewed book chapters since last promotion (1)

- B. 6 Moore K.J. & **Heaton E.A.** (2018) Forage crops for bioenergy and industrial products. In: *Forages, Volume I An introduction to grassland agriculture* 7th edition (eds Collins M., Nelson C.J., Moore K.J. & Barnes R.F.) pp 408 Hoboken NJ, USA, John Wiley & Sons, Inc.

Peer-reviewed book chapters prior to last promotion (5)

- B. 5 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.

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.

- B. 4 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.

*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.*

- B. 3 Casler M.D., **Heaton E.A.**, Shinnors 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.

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.

- B. 2 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.

*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.*

- B. 1 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 [O₃] 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.

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 CO₂ and O₃ will lead to lower than anticipated soybean yields under future climate conditions, with major implications for global food supply.

Peer-reviewed conference proceedings (2)

2. 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.

1. 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 (99)

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

Invited presentations since last promotion (34)

2019

- IP 99 **Heaton E.A.** (2019) Does size matter more than experience? Age and nutrient dilution dynamics in *Miscanthus × giganteus*. American Society of Plant Biologists annual meeting, San Jose, CA (session chair).
- IP98 **Heaton E.A.** (2019; declined) Sourcing, sustainability, and supply. Biomass to Power North America, Raleigh, NC.
- IP 97 **Heaton E.A.** (2019) Perennial plants and a Midwest Low Carbon Fuel Standard. Great Plains Institute Meeting, Minneapolis, MN

2018

- IP 96 **Heaton E.A.** (2018; declined) Barriers and opportunities to establishing multifunctional buffers. Pennsylvania State University, Harrisburg, PA.
- IP 95 **Heaton E.A.** (2018) Ecology with a purpose: overview of the CABBI Sustainability theme. Center for Advanced Bioenergy and Bioproducts Innovation Annual Retreat, Champaign, IL
- IP 94 **Heaton E.A.**, Brandes E, McNunn G, Schulte L, Muth D, VanLoocke A, Studt J, Tejera M, & McDaniel M.(2018) Targeted subfield switchgrass integration could improve the farm economy, water quality, and bioenergy feedstock production. Danforth Plant Science Center Fall Symposium, St. Louis, MO
- IP 93 **Heaton E.A.**, Brandes E, McNunn G, Schulte L, Muth D, VanLoocke A, Studt J, Tejera M, & McDaniel M.(2018) Targeted subfield switchgrass integration could improve the farm economy, water quality, and bioenergy feedstock production. Bayer, Chesterfield, MO
- IP 92 **Heaton E.A.** (2018) **Heaton E.A.**, Brandes E, McNunn G, Schulte L, Muth D, VanLoocke A, Studt J, Tejera M, & McDaniel M.(2018) Targeted subfield switchgrass integration could improve the farm economy, water quality, and bioenergy feedstock production. American Society of Plant Biologists annual meeting, Montreal CA
- IP 91 **Heaton E.A.**, Brandes E. [§], McNunn, G., Tejera M.* , VanLoocke A., & Schulte L.A. (2018) Perennial solutions to annual problems. ISU Faculty Ladies Annual Meeting, Ames, IA.
- IP 90 **Heaton E.A.**, Brandes E. [§], McNunn, G., Muth D., VanLoocke A., & Schulte L.A. (2018) Where can switchgrass provide both clean water and profit in Iowa? Interdepartmental Plant Biology Seminar, Ames, IA.

2017

- IP 89. **Heaton E.A.**, Brandes E. [§], McNunn, G., Tejera M. ^{*}, VanLoocke A., & Schulte L.A. (2017) Perennial solutions to annual problems. Argonne National Laboratory, Lemont, IL
- IP 88. **Heaton E.A.**, Brandes E. [§], McNunn, G., Tejera M. ^{*}, VanLoocke A., & Schulte L.A. (2017) Perennial solutions to annual problems. American Institute of Chemical Engineers Annual meeting (plenary session), Minneapolis, MN
- IP 87. **Heaton E.A.**, Brandes E. [§], McNunn, G., Tejera M. ^{*}, VanLoocke A., & Schulte L.A. (2017) Perennial solutions to annual problems. Association for the Advancement of Industrial Crops, Ames, IA
- IP 86. **Heaton E.A.** (2017) Renewable energy successes at Iowa State University. Presentation to the Iowa Energy Plan Biomass Implementation Committee, Des Moines, IA
- IP 85. **Heaton E.A.**, Hazen E., Brandes, E., Gronstal Anderson I., & Schulte L.A. (2017) Perennial Power! Golden K Kiwanis, Ames, IA
- IP 84. **Heaton E.A.** Schulte L.A., Gronstal Anderson I., Muth D. & Richards T. (2017) Market-based solutions to advance the bioeconomy in Iowa and beyond. Presentation to US Dept. of Agriculture funding agency representatives, Washington DC
- IP 83. **Heaton E.A.** (2017) Miscanthus as a biofuel crop. Iowa Weed Commissioners Annual Meeting, Ames, IA
- IP 82. **Heaton E.A.** (2017) Perennial power! Iowa State University Osborne Club, Ames, IA
- IP 81. **Heaton E.A.** (2017) Perennial power! Des Moines Botanical Garden, Des Moines, IA
- IP 80. **Heaton E.A.** (2017) Perennial power! Ames Golden K Kiwanis Club, Ames, IA
- IP 79. **Heaton E.A.** (2017) Perennials in landscape design. Biomass 2017, annual meeting of the Dept. of Energy Bioenergy Technology Office, Washington DC
- IP 78. **Heaton E.A.** (2017) Why do early adopters adopt? Lessons from the Iowa Biomass Fuel Project. Emerging Feedstocks Forum, International Biomass Expo, Minneapolis MN

2016

- IP 77. **Heaton E.A.**, Schulte L., Moore K., Salas M. & Brandes E. (2016) Iowa State University Feedstock Production Research. Presentation to Fraunhofer Institute representative, Ames, IA.
- IP 76. **Heaton E.A.** and Gronstal Anderson I. (2016) Biomass and Bioenergy. US Electricity Generation and Transmission Resource Planning Association Annual Conference, Des Moines, IA.
- IP 75. **Heaton E.A.** and Gronstal Anderson I. (2016) Strategic integration of perennials and the Food-Energy-Water nexus. Iowa Flood Center, University of Iowa, Iowa City, IA.
- IP 74. **Heaton E.A.** (2016) Bottom up: using subfield profitability to achieve sustainability goals. Dept. of Plant Pathology, Iowa State University, Ames, IA
- IP 73. **Heaton, E.A.** Schomberg S., Gronstal Anderson I. (2016) The Iowa Biomass Fuel Project: Why did early adopters adopt? Biomass@Illinois seminar, University of Illinois, Urbana-Champaign, IL.

- IP 72. Martin J., DeLonge M., **Heaton E.A.** and Gronstal Anderson I. (2016) Perennial biomass as a driver for water quality and emissions reductions, special webinar presentation to RE-AMP with the Center for Rural Affairs, <https://cc.readytalk.com/cc/s/meetingArchive?eventId=sr4gk88rtudg>
- IP 71. **Heaton E.A.** (2016) Bottom up: using subfield profitability to achieve sustainability goals. Plenary presentation, Great Lakes Bioenergy Center annual meeting, Kellogg Biological Station, Hickory Corners, MI.
- IP 70. **Heaton E.A.** (2016) Perennials and their environment. NewBio (NIFA Coordinated Agricultural Project) annual meeting, State College, PA

2015

- IP 69. **Heaton E.A.**, Brandes E.[§], McNunn G., Schulte L.A., Bonner I., Muth D., Babcock B., Sharma B., Liebman M. & Gronstal Anderson I., Boersma N.N.* , Bonin C.L.[§] & Tejera M.* (2015) Can profit push perennials in Iowa? And an update on Miscanthus... Soil and Crop Sciences Seminar, Colorado State University, Fort Collins, CO.
- IP 68. **Heaton E.A.**, Brandes E.[§], McNunn G., Schulte L.A., Bonner I., Muth D., Babcock B., Sharma B., Liebman M. & Gronstal Anderson I. (2015) Can profit push perennials in Iowa? Green Lands Blue Waters Annual Meeting, Minneapolis, MN.

2014

- IP 67. **Heaton E.A.**, Schulte L.A, Brandes E., Muth D., Snow A., Miriti M., Bonin C.[§] & Milster F. (2014). What to put where? Ecophysiology informs strategic integration of Miscanthus and switchgrass into Cornbelt landscapes. ASA-CSSA-SSSA International Annual Meetings, Long Beach, CA.
- IP 66. **Heaton E.A.**, Schulte L.A, Brandes E., Muth D., Cafferty K. & Milster F. (2014). Dedicated energy crops in Iowa: Is it over after stover? 2014 CAFO (Concentrated Animal Feeding Operations) Roundtable, Des Moines, IA.

Invited presentations prior to last promotion

- IP 65. **Heaton E.A.**, Schulte L.A, Brandes E., Muth D., Snow A., Miriti M., Bonin C.[§] & Milster F. (2014). Dedicated energy crops in Iowa: Is it over after stover? Energy Biosciences Institute Symposium, University of Illinois, Urbana, IL.
- IP 64. **Heaton E.A.** (2014) Impact of IowaEPSCoR on my research and career. NSF Iowa EPSCoR Annual All-Hands Meeting, Ames, IA.
- IP 63. **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.
- IP 62. Bonin C.[§], VanLoocke A., Mitchell R. & **Heaton E.A.** (2014) A coupled field and modeling approach for quantifying the environmental impacts of genetic improvements in switchgrass. Agro-IBIS Workshop, Ames, IA.

- IP 61. **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.
- IP 60. **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.
- IP 59. **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.

2013

- IP 58. **Heaton E.A.** (2013) Energy Crops in Iowa. Graduate Program in Sustainable Agriculture Colloquium, Iowa State University, Ames, IA.
- IP 57. 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.
- IP 56. **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.
- IP 55. **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.
- IP 54. **Heaton E.A.**, Bonin C.L.[§], Singer J., Cruse R.M. & Davenport D. (2013) Under cover: do nurse crops make *Miscanthus x giganteus* establishment more sustainable? 2013 North Central Sun Grant Annual Meeting, Chicago, IL.
- IP 53. **Heaton E.A.** (2013) Dedicated energy crops. Community College Teacher Continuing Education Webinar, Ames, IA. www.agenenergy.ia.org.

2012

- IP 52. **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.
- IP 51. **Heaton E.A.** & Schulte L.A. (2012) Iowa EPSCoR energy crop research. University of Northern Iowa, Waterloo, IA.
- IP 50. **Heaton E.A.** & Williams C. (2012) Perennial living cover for bioenergy. Green Lands Blue Water Partnership Conference, Iowa State University, Ames, Iowa.
- IP 49. **Heaton E.A.** & Jackson S. (2012) Energy crop production. USDA SARE Carbon, Energy and Climate Conference, Kellogg Biological Station, Hickory Corners, MI.
- IP 48. **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.
- IP 47. **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.

- IP 46. **Heaton E.A.** (2012) Introduction to Miscanthus. Iowa Biomass Power Partnership meeting, Ames, IA.
- IP 45. **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.
- IP 44. **Heaton E.A.** (2012) Big steel for biofuels. 27th Annual Agricultural Machinery Conference, Waterloo, IA.
- IP 43. **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**).

2011

- IP 42. **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.
- IP 41. **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.
- IP 40. **Heaton E.A.** (2011) Miscanthus production practices: A new Missouri bioenergy crop. University of Missouri Research Farms, Special Workshop, Columbia, MO.
- IP 39. **Heaton E.A.** (2011) Switchgrass and Miscanthus as dedicated energy crops in Iowa. Pioneer and DuPont Cellulosic Ethanol special seminar, Johnston, IA.
- IP 38. **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.
- IP 39. **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.

2010

- IP 36. Schulte Moore, L.A., Gunther T., Hall R., Hallam A., Hargreaves S., Headlee W., **Heaton E.A.**, Helmers M., Hofmockel K., Isenhardt 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.
- IP 35. Boersma N.N.* & **Heaton E.A.** (2010) *Miscanthus x giganteus* stem propagation. Iowa State University Horticulture Departmental Seminar, Ames, IA.
- IP 34. **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.
- IP 33. **Heaton E.A.** (2010) Growing giant grass: Why bigger is better for energy crops. Brookhaven National Laboratory, Upton, NY.

IP 32. **Heaton E.A.** (2010) Managing perennial grass monocultures for ecosystem services. Wisconsin Grasslands Bioenergy Symposium, Madison, WI.

2009

IP 31. **Heaton E.A.**, Wilson D.M.* & Boersma N.N.* (2009) Miscanthus – separating hope from hype? Iowa State University Agronomy 600 Seminar, Ames, IA.

IP 30. **Heaton E.A.** (2009) Biomass crops for Iowa. 2009 BIGMAP Symposium, Food and Fuel Crops: Issues Policies and Regulation, Ames, IA.

IP 29. **Heaton E.A.** (2009) Environmental impacts of new bio-fuel crops. Heartland Regional Water Conference, Overland Park, KS.

IP 28. **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.

IP 27. **Heaton E.A.** (2009) Mechanical challenges of dedicated energy crops. 2009 Agricultural Machinery Conference, Cedar Rapids, IA.

IP 26. **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.

IP 25. **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.

IP 24. **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.

IP 23. **Heaton E.A.** (2009) Biofuel Feedstock – Where will it come from? Penn State University Biofuel Short Course, San Francisco, CA.

IP 22. **Heaton E.A.** (2009) Developing bioenergy crops. Online seminar series of the Canadian Green Crop Network, McGill University, Montreal, Canada.

2008

IP 21. **Heaton E.A.** (2008) New and emerging feedstocks. Workshop on Measuring and Modeling the Lifecycle GHG Impacts of Transportation Fuels, Berkeley, CA.

IP 20. **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**).

IP 19. **Heaton E.A.** (2008) Biofuel feedstock – Where will it come from? Penn State University Biofuel Short Course, Philadelphia, PA.

IP 18. **Heaton E.A.** (2008) Designing energy crops. Plant Breeding and Genetics Symposium, Lansing, MI.

IP 17. Dohleman F.G., **Heaton E.A.**, and Long S.P. (2008) Miscanthus. Center for Advanced BioEnergy Research (CABER) Seminar Series. Urbana, IL.

IP 16. **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)

2008

IP 15. 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.

IP 14. Dohleman F.G., **Heaton E.A.**, and Long S.P. (2008) Miscanthus and switchgrass trials in Illinois. Southwest Agricultural Conference, Ridgetown, ON, Canada.

2007

IP 13. **Heaton E.A.**, Dohleman F.G., and Long S.P. (2007) High yielding bioenergy crops. ASA/CSSA/SSA Annual Meeting, New Orleans, LA.

IP 12. **Heaton E.A.**, Dohleman F.G., and Long S.P. (2007) Giant Miscanthus – Frequently asked questions. SouthEast Bioenergy Conference, Tifton, GA.

IP 11. **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.

IP 10. 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.

IP 9. 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.

IP 8. 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.

IP 7. **Heaton E.A.**, Dohleman F.G., and Long S.P. (2007) Practical experience with Miscanthus and switchgrass in Illinois. Bioenergy Symposium, Urbana, IL.

IP 6. **Heaton E.A.** (2007) Energy + agriculture: Rethinking the Green Revolution. Iowa State University, Ames, IA.

2006

IP 5. **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.

IP 4. **Heaton E.A.** (2006) The promise of dedicated energy crops. AAIC Annual Meeting, San Diego, CA.

IP 3. Dohleman F.G., **Heaton E.A.** and Long, S.P. (2006) Miscanthus: Findings and Challenges with a New Crop. Peoria Farm Show, Peoria, IL.

IP 2. **Heaton E.A.** (2006) Feedstock for fuel. Growing the Bioeconomy Conference, Iowa State University, Ames, IA.

2005

- IP 1. **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 presentations (53)

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

Other conference presentations since last promotion (19)

2019

- OP 53 Nowatzke M.* , Moore L., VanLoocke A., Niemi J., Gutierrez L., **Heaton E.A.** (2019) The Agricultural Economic Performance Engine. Soil and Water Conservation Society Annual Meeting, Pittsburg, PA.
- OP 52 Steiner A.* , VanLoocke A., **Heaton E.A.** (2019) Does miscanthus perform better than corn in farmed ephemeral wetlands (potholes)? Switchgrass V conference, Urbana, IL.
- OP 51 Wilson D. § Eric Foreman, **Heaton E.A.** (2019) Progress with the Iowa Biomass Fuel Project. Switchgrass V conference, Urbana, IL.
- OP 50 Tejera, M.* (2019) Elucidating the role of age in miscanthus responses to N fertilizer. Center for Advanced Bioenergy and Bioproducts Innovation Retreat, Urbana, IL.
- OP 49 Donovan T.* , Studt J.* , Tejera M.* , **Heaton E.A.** (2019) Are yield increases in fertilized biomass crops worth reductions in water quality? Symposium on Undergraduate Research and Creative Expression, Iowa State University, Ames, IA.
- OP 48 Studt J.E.* , McDaniel M.D., **Heaton E.A.** (2019) Does *Miscanthus × giganteus* always improve soil health and water quality compared to *Zea mays*? Soil Science Society of America Annual Meeting, San Diego, CA.

2018

- OP 47 Tejera M.* , Boersma N.N. § , Vanloocke A., Archontoulis S., Dixon P., Miguez F.E. & **Heaton E.A.** (2018) Not Another *Miscanthus × giganteus* Nitrogen Trial. It is a REPLAY. ASPB Midwest annual meeting, Ames, IA
- OP 46 **Heaton E.A.**, Brandes E. § , McNunn, G., Muth D., VanLoocke A., & Schulte L.A. (2018) Integrating plant, biochemistry, and economic models reveals hot spots for profit and water quality improvement in Iowa cropland. American Society of Plant Biology Midwest Annual Meeting, Ames, IA
- OP 45 Tejera M.* , Boersma N.N. § , VanLoocke A., Archontoulis S., Dixon P., Miguez F.E. & **Heaton E.A.** (2018) Is reduced photosynthesis as stands age age-related, or simply dilution? ASA, CSSA, SSSA Annual Meeting, Baltimore, MD

2017

- OP 44 Tejera, M., and **Heaton E.A.** (2017) Nitrogen fertilization makes *Miscanthus × giganteus* grow faster but not bigger: A closer look at phenology. ASA, CSSA, SSSA Annual Meeting, Tampa, FL

OP 43 Puntel L., Archontoulis S., Sawyer J., Castellano M., Moore K.J., **Heaton E.A.** & Thorburn P. (2017) A systems modeling approach to forecast corn economic optimum nitrogen rate. ASA, CSSA, SSSA Annual Meeting, Tampa, FL

OP 42 Tejera, M., and **Heaton E. A.** (2017) *Miscanthus x giganteus* light efficiencies under Nitrogen fertilization: the fate of a photon. Graduate & Professional Student Research Symposium, Ames, IA

OP 41 Tejera, M., Boersma, N., VanLoocke, A., and **Heaton E.A.** (2017) *Miscanthus x giganteus* photosynthesis and senescence: Nitrogen fertilization and stand age effects. Interdepartmental Plant Biology Seminar, Ames, IA

2016

OP 40. Wilson D., Walker V., Hoover A.N., Emerson R.M, Cortez M., Kinoshita R., & **Heaton E.A.** (2016) Bioenergy feedstock data – how do we learn from it? ASA, CSSA, SSSA Annual Meeting, Phoenix, AZ

OP 39. Tejera, M., Boersma, N., Archontoulis, S., VanLoocke, A., & **Heaton E.A.** (2016) *Miscanthus x giganteus* response to Nitrogen fertilization across 3 sites in Iowa. ASA, CSSA, SSSA Annual Meeting, Phoenix, AZ

OP 38. Brandes E. [§], McNunn G., Schulte L.A., Muth D., Tyndall J., Sharma B. & **Heaton E.A.** (2016) Can profit push perennials? Subfield analysis reveals an economic case to increase biodiversity. European Biomass Conference and Exhibition, Vienna, Austria

OP 37. Brandes E. [§], McNunn G., Schulte L.A., Muth D., Tyndall J., Sharma B. & **Heaton E.A.** (2016). Can profit push perennials? Subfield analysis reveals an economic case to increase biodiversity. Annual Meeting of the US Regional Association of the International Association for Landscape Ecology, Asheville, NC.

2015

OP 36. Burke R.*, Moore K.J., Shipitalo M.J., Miguez F.E. & **Heaton E.A.** (2015) Simulated rainfall events induce real, but minimal, foliar nutrient leaching in senescing switchgrass biomass. ASA, CSSA, SSSA Annual Meeting, Minneapolis, MN.

OP 35. Brandes E.[§], McNunn G., Muth D., Schulte L.A., Bonner I., Cafferty K. & **Heaton E.A.** (2015) Beyond corn and beans – Iowa’s fields of opportunities. ASA, CSSA, SSSA Annual Meeting, Minneapolis, MN.

OP 34. Brandes E.[§], McNunn G., Muth D., Schulte L.A., Bonner I., Cafferty K. & **Heaton E.A.** (2015) Beyond corn and beans – Iowa’s fields of opportunities. 2015 Iowa Prairie Conference, University of Northern Iowa, Cedar Falls, IA.

Other conference presentations prior to last promotion (33)

2014

OP 33. Bonin C.L.[§] & **Heaton E.A.** (2014) *Miscanthus sacchariflorus* - biofuel parent or new weed? 74th Midwest Fish and Wildlife Conference, Kansas City, MO.

OP 32. Bonin C.L.[§], **Heaton E.A.**, Miriti M. & Snow A. (2014) Gene flow networks and potential invasiveness of perennial biofuel grasses (*Miscanthus*). Biotechnology Risk Assessment Grant Annual Project Director’s Meeting. Riverdale, MD.

- OP 31. Wilson D.M., **Heaton E.A.**, Schulte L.A., Gunther T.P & Moore K.J. (2014) Switchgrass composition and quality across a landscape gradient. ASA 2014 ASA-CSSA-SSSA International Annual Meetings, Long Beach, CA.
- OP 30. Boersma N.N.[§], Miguez F.E., Dohleman F.G. & **Heaton E.A.** (2014) *Miscanthus x giganteus* senescence is affected by stand age. ASA 2014 ASA-CSSA-SSSA International Annual Meetings, Long Beach, CA.

2013

- OP 29. 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.
- OP 28. **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.
- OP 27. **Heaton E.A.** & Boersma N.N.* (2013) The effect of propagation method on the morphology of *Miscanthus x giganteus*. ASA-CSSA-SSSA International Annual Meetings, Tampa, FL.
- OP 26. Bonin C.L.[§], **Heaton E.A.**, & Barb J. (2013) *Miscanthus sacchariflorus* - biofuel parent or new weed? ASA-CSSA-SSSA International Annual Meeting, Tampa, FL.
- OP 25. 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.

2012

- OP 24. 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.
- OP 23. Stottlemeyer 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.
- OP 22. Stottlemeyer 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.
- OP 21. 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.
- OP 20. 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.

- OP 19. Chang H., Snow A. A., Palik D. J., Stottlemeyer 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.
- OP 18. 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.
- OP 17. 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.
- OP 16. **Heaton E.A.**, Singer J., Cruse R.M. & Davenport D. (2012) Under cover: Secrets to using companion crops in establishment of *Miscanthus x giganteus*. Dept. of Energy North Central Sungrant Annual Meeting, Indianapolis, IN.
- OP 15. 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.

2011

- OP 14. Zaib M.A.* & **Heaton E.A.** (2011) Cold Acclimation in *Miscanthus*. ASA-CSSA-SSSA International Annual Meetings, San Antonio, TX.
- OP 13. 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.
- OP 12. 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.
- OP 11. **Heaton E.A.**, Singer J., Cruse R.M. & Davenport D. (2011) Under cover: Secrets to using companion crops in establishment of *Miscanthus x giganteus*. Biomass & Energy Crops IV, Champaign, IL.
- OP 10. 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.

2010

- OP 9. 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.
- OP 8. 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.

OP 7. **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.

OP 6. Westgate M., Hatfield J., **Heaton E.A.**, & Miguez F.E. (2010) Climate change and crop productivity.

2009

OP 5. **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.

2006

OP 4. **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.

2005

OP 3. **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.

OP 2. **Heaton E.A.**, Long S.P. (2005) *Miscanthus*: findings and challenges with a new crop. Plant Physiology/Genetic Engineering Seminar, Urbana, IL.

2004

OP 1. **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

2019

P 34 Lee J., Choi J., Liu J., Ma L., Gunturu S., Ouyang Y., Cole J., Tiemann L., VanLoocke A., **Heaton E.A.** & Howe A. (2019) High-throughput quantification of nitrogen cycling genes in bioenergy crop soils. Center for Advanced Bioenergy and Bioproducts Innovation annual retreat.

P 33 Bendorf J.*, VanLoocke A. & **Heaton E.A.** (2019) Development of a model representation of biomass sorghum in Agro-IBIS. Center for Advanced Bioenergy and Bioproducts Innovation annual retreat.

P 32 Donovan T.*, Studt J.*, Tejera M.* & **Heaton E.A.** (2019) Are yield increases in fertilized biomass crops worth reductions in water quality? National Conference on Undergraduate Research, Kennesaw State University, Kennesaw, GA.

P 31 Nowatzke M.*, McNunn G. & **Heaton E.A.**, VanLoocke A., Schulte-Moore L., Niemi J., Damiano L. (2019) Targeting marginal land for economic and environmental benefit with the Agricultural Economic Performance Engine. Soil Health Conference, Ames, IA.

2018

P 30 Donovan T.*, Studt J.*, Tejera M.* & **Heaton E.A.** (2018) Is the yield benefit from nitrogen worth the water quality penalty? Science with Practice poster symposium, Ames, IA

2017

- P 29. Lee, M.S., **Heaton E.A.**, D.K. Lee, and Rob Mitchell. (2017) Warm-season grass monocultures and mixtures for sustainable bioenergy feedstock production in the Midwest, USA. Switchgrass IV, Lincoln, NE.

2016

- P 28. Brandes E.*, McNunn G., Muth D., VanLoocke A., Schulte L., Plastina A. **Heaton E.A.** (2016) Subfield profitability analysis reveals an economic case for a perennial biomass crop. *24th European Biomass Conference and Exhibition*, Selected Poster. Amsterdam, The Netherlands. Jun 6-9, 2016.

2015

- P 27. Tejera M.*, Boersma N.N.*, Bonin C.L.* & **Heaton E.A.** (2015) Long-term Assessment of *Miscanthus* Productivity and Sustainability (LAMPS). ISU Extension and Outreach Field Agronomist InService Training, Boone, IA.
- P 26. Roby M., **Heaton E.A.**, Salas-Fernandez M.G., Miguez F.E.E. & VanLoocke, A. (2015) Comparing the water-use-efficiency of maize and biomass sorghum grown in the rain-fed, Midwestern US. American Geophysical Union Annual Meeting, San Francisco, CA.
- P 25. Burke R. & **Heaton E.A.** (2015) Do simulated rainfall events induce foliar nutrient leaching in senescing switchgrass? ASA/CSSA/SSA Annual Meeting, Minneapolis MN.
- P 24. Brandes E.[§], McNunn G., Muth D., Schulte L.A., Bonner I., Cafferty K. & **Heaton E.A.** (2015) Beyond corn and beans – Identifying sub-field profit variability and economic opportunity for alternative land management. American Society of Plant Biologists Annual Meeting, Minneapolis, MN.
- P 23. Snow A.A. **Heaton E.A.**, Miriti M.N., Bonin C.L. & Mutegi E. (2015) Gene flow networks and potential invasiveness of seed-producing *Miscanthus* species for biofuel crops. NIFA Biotechnology Risk Assessment Grants Program Annual Project Director's Meeting, Riverdale, MD.

2014

- P 22. 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.
- P 21. 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.
- P 20. Brandes E.[§], Bonner I.J., Cafferty K.G., Muth D.J., Schulte L.A. & **Heaton E.A.** (2014) Targeted integration of perennials into Iowa farm fields: a win-win strategy for farm profit and ecosystem services. Ecological Society of America Annual Meeting, Sacramento, CA
- P 19. Ibrahim T., Miriti M.N, Snow A.A., **Heaton E.A.**, Palik D.J., Bonin C.L.[§], Mutegi E., & Chang H. (2014) Relative competitive abilities among feral and commercial strains of *Miscanthus spp.*: implications for new biofuel cultivars. American Botanical Society Annual Meeting, Boise, ID.
- P 18. 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.

- P 17. 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.

2013

- P 16. 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.
- P 15. 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 Institute of Food and Agriculture, Biotechnology Risk Assessment Grants Program: Annual Project Director's Meeting. Riverdale, MD.
- P 14. 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.

2012

- P 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. New Technology Expo. BioCentury Research Farm, Iowa State University, Ames, IA.
- P 12. 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. Agronomy Department Research Symposium and Poster Session, Iowa State University, Ames, IA.
- P 11. 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., Isenhardt 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.
- P 10. 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., Isenhardt 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.

2011

- P 9. 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.

2010

- P 8. 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.
- P 7. 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.
- P 6. Zaib M.A.* & **Heaton E.A.** (2010) Cold acclimation in *Miscanthus*. Agronomy Dept. Research Symposium and Poster Session, Iowa State University, Ames, IA.
- P 5. Schulte Moore, L.A., Gunther T., Hall R., Hallam A., Hargreaves S., Headlee W., **Heaton E.A.**, Helmers M., Hofmockel K., Isenhardt 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.

2009

- P 4. 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.
- P 3. 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.
- P 2. 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
- P 1. 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.

Funding related to disciplinary research (\$14 million, \$3 million to Heaton since last promotion)

Summary: 14 competitively funded projects were awarded since last promotion, totaling \$14.3 million of which \$3.3 million went to the Heaton lab.

Competitive External Funding Since Last Promotion						
#	Project Title	Name of Grantor	Participants	Role	Period	Grant Amount (to Heaton lab)
37	Developing monitored, controlled drainage capacity to measure nutrient and	US Dept. of Energy through Center for Advanced Bioenergy and	Heaton EA , VanLoocke A, Howe A	PI	2019-2020	243,148 (243,148)

	water cycling in improved energy crop systems.	Bioproduct Innovation				
<i>Role: Developing infrastructure for measurements of plant performance, drainage water monitoring, and nutrient cycling, and connecting findings to ongoing Center research.</i>						
36	Long-term Assessment of Miscanthus Productivity and Sustainability (LAMPS)	US Dept. of Energy through Center for Advanced Bioenergy and Bioproduct Innovation	Heaton EA , VanLoocke A, Howe A	PI	2018-2019	28,000 (28,000)
<i>Role: Manage all aspects of experiment and field site maintenance.</i>						
35	Next-generation feedstocks for the emerging bioeconomy	US Dept. of Energy	Lee DK, Mitchell R, Heaton EA , Boe A, Owens V, Archer D, Negri C, LaGory K, Cacho J, Hoover A, Comer K	Co-PI	2018-2023	\$5,000,000 (411,259)
<i>Role: Manage the Iowa field site evaluating performance of new energy grasses.</i>						
34	Perennializing farmed potholes to improve ecosystem services.	USDA-NIFA	VanLoocke A, Hall SA, Heaton EA , Kaleita A, Soupier M, Schulte LA	Co-PI	01/01/18-12/31/20	\$475,000 (45,000)
<i>Role: Manage miscanthus activities and determine profitability compared to corn/soy.</i>						
33	Center for Advanced Bioenergy and Bioproduct Innovation (CABBI)	US DOE	DeLucia E, and many others; ISU subcontract	Co-PI	2017-2022	\$6,750,789 (2,250,263)
<i>Role: Conduct a suite of collaborative research activities to inform ecosystem models of energy crop environmental and economic impacts.</i>						
32	A model-based assessment of socioeconomic, policy and environmental implications for sustainable bioenergy	USDA-NIFA	Wang Y, Wright M, Heaton EA	Co-PI	2017-2020	\$487,943 (15,634)

Role: Guide co-PI's to relevant existing data for model development and calibration.

Competitive External Funding Prior to Last Promotion

31	Competitive renewal of: Miscanthus and Switchgrass Bioenergy Production and Soil Remediation on Marginal and Vulnerable Landscapes	US DOE South Central Sun Grant Initiative	Kitchen N., Massey R., Kremer R., Thompson A., Sudduth K., Meyers B., Heaton E.A. & J. Kiniry	Co-PI	2014-2016	\$5000 (1,000)
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Role: Advised on M. × giganteus agronomy, experimental management, and results interpretation.

30	Gene flow networks and potential invasiveness of perennial biofuel grasses (Miscanthus)	USDA NIFA Biotechnology Risk Assessment Program	Snow A., Heaton E.A. & M. Miriti	Co-PI	2012-2016	\$500,000 (189,980)
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Role: Sampled feral M. sacchariflorus populations and grew multiple Miscanthus species in monitored common gardens experiments that were replicated in Ohio.

29	Miscanthus and Switchgrass Bioenergy Production and Soil Remediation on Marginal and Vulnerable Landscapes	US DOE South Central Sun Grant Initiative	Kitchen N., Massey R., Kremer R., Thompson A., Sudduth K., Meyers B., Heaton E.A. & J. Kiniry	Co-PI	2012-2014	\$270,000 (5,000)
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Role: Advised on M. × giganteus agronomy, experimental management, and results interpretation.

28	Harnessing Energy Flows in the Biosphere to Build Sustainable Energy Systems	NSF EPSCoR RII NSF	Brown R.C. and many others.	Collaborator	2011	\$20,000,000 (Approximately \$313,641 to Heaton)
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Role: Contributed biomass crop expertise and infrastructure to large renewable energy team

27	Sustainable Production and Distribution of Bioenergy for the Central USA.	USDA NIFA Coordinated Agriculture Project	Moore K.J. and many others	Collaborator	2011	25,000,000 (Approximately \$182,414 to Heaton)
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Role: Assessed the impact of diversity and biochar on perennial crop performance.

26	Gene Flow and Fitness studies of Switchgrass: Implications for New Biofuel Crops	USDA NIFA Biotechnology Risk Assessment Program	Snow A., Heaton E.A. & M. Miriti	Co-PI	2010	\$398,619 (137,177)
<i>Role: Conducted common garden experiments assessing switchgrass invasive potential; replicated in OH.</i>						
25	Do Companion Crops Make Miscanthus Establishment More Sustainable?	US DOE North Central Sun Grant	Heaton E.A. , Singer J., Cruse R., Loynachan T., O'Neal M., Davenport D. & R	PI	2010	\$180,815 (180,815)
<i>Role: Conducted field trials assessing M. × giganteus performance with 10 different cover crops.</i>						
24	Field Evaluation of Cold Tolerant Miscanthus	Mendel Biotechnology	Heaton E.A.	PI	2010	\$147,747 (\$147,747)
<i>Role: Conducted field trials of cold-tolerant Miscanthus genotypes.</i>						
23	Influence of Alternative Biomass Cropping Systems on Short-term Ecosystem Processes	USDA AFRI Managed Ecosystems Program	Isenhardt T., Schulte L., Hall R., Hallam A., Heaton E.A. , Helmers M., Hofmockel K., Moore K. & R. Kolka	Co-PI	2009	\$499,250 (\$77,840)
<i>Role: Managed agronomic aspects of this large field experiment; took over from Moore.</i>						
22	P and K Fertilizer Response in <i>Miscanthus x giganteus</i>	Mosaic Fertilizer LLC	Heaton E.A.	Co-PI	2009	\$8,331 (\$8,331)
<i>Role: Assessed M. × giganteus fertilizer response in greenhouse trials.</i>						
21	Regional Biomass Feedstock Partnership – Herbaceous Bioenergy Crop Field Trials; switchgrass	US DOE North Central Sungrant	Heaton E.A.	PI <i>(Heaton led the ISU portion of this partnership, but came in after the umbrella grant was funded. The overall project is led by V. Owens of South</i>	2009	\$190,000 (\$190,000)

				Dakota State University.)		
<i>Role: Conducted field research on switchgrass; experiment was replicated at sites around the country.</i>						
20	Incorporating Native Prairies into Working Farm Landscapes	NCR-SARE, GCN09-107	Jarchow M., Liebman M. & E.A. Heaton	Co-PI	2009	\$9,965 (\$0)
<i>Role: Advised on switchgrass management.</i>						
19	Miscanthus Variety Evaluation	Mendel Biotechnology	E.A. Heaton	Co-PI	2008	\$5,597 (\$5,597)
<i>Role: Managed field trial.</i>						

Competitive Internal Funding Since Last Promotion						
#	Project Title	Name of Grantor	Participants	Role	Period	Grant Amount
18	Initiative for Cultivating Human and Naturally regenerative Enterprises (I-CHANGE)	Iowa State University Presidential Research Initiatives	Schulte L, Arbuckle J, Brown R, Heaton EA, Helmers M, Janke A, Kimle K, Liebman M, McDaniel M, Niemi J, Wald D	Co-PI	2018-2021	741,480
<i>Role: Lead subfield profitability modeling and development of ISU leadership capacity</i>						
17	Does Increasing landscape diversity if farmed closed depressions (potholes) increase profitability and ecosystem services?	Leopold Center for Sustainable Agriculture	Kaleita A., VanLoocke A., Soupir M. and Heaton E.A.	Co-PI	2016-2018	\$121,140 (\$0)
<i>Role: Contributed biomass crop and subfield modeling expertise.</i>						
16	Reducing nutrient losses while increasing farm profit through precision conservation	Iowa Nutrient Research Center	VanLoocke A., Heaton E.A. , Muth D., Schulte L.A., Archontoulis S. and Gronstal Anderson I.	Co-PI	2015-2018	\$67,641 (\$1,000)
<i>Role: Contributed biomass crop and subfield modeling expertise.</i>						
	The impact of climate variability and land	Iowa Nutrient Research Center	VanLoocke, A., Ward, A. Franz K.,	Co-PI	2017-2018	\$65,044 (\$0)

	management practices on water quality in Iowa at the watershed scale		Heaton EA, Muth D, Schulte Moore L., Archontoulis S.			
<i>Role: Contribute biomass crop and subfield modeling expertise.</i>						
15	Long-term Assessment of Miscanthus Productivity and Sustainability (LAMPS)	Leopold Center for Sustainable Agriculture	Heaton E.A. , Boersma N. N.	PI	2015-2018	\$119,555 (\$119,555)
<i>Role: Led disciplinary team to develop LAMPS field trials; foundation of CABBI funding.</i>						
14	Long-term Assessment of Miscanthus Productivity and Sustainability (LAMPS)	Iowa Energy Center Opportunity Grant	Heaton E.A. , Boersma N. N.	PI	2015-2017	\$99,954 (\$99,954)
<i>Role: Led disciplinary team to develop LAMPS field trials; foundation of CABBI funding.</i>						
Competitive Internal Funding Prior to Last Promotion						
13	From Data to Knowledge: Using Cyber Infrastructure to Enhance Understanding of Bioenergy Systems	Iowa EPSCoR	Bonin C.L. [§] , Elgersma K., Mupasiri D., Rajan K. & E.A. Heaton	Co-PI	2014	\$19,999 (\$19,999)
<i>Role: Supervised postdoctoral researcher Catherine Bonin.</i>						
12	Integrated Sustainable bioEnergy Pathways project (ISEP)	Iowa State University Dept. of Agronomy	Heaton E.A. , Darr M., Hu G., Schulte L.A., & L. Wang	PI	2014	\$240,926 (\$130,256)
<i>Role: Lead interdisciplinary team developing sub-field and agent-based evaluations of bioenergy production. Foundation of C-CHANGE funding and multiple publications.</i>						
11	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	Christiansen L., Gronstal Anderson I., Milster F., Heaton E.A. , Schulte-Moore L.A., Hall R., Tyndall J., Ward A., Tate E. & T. Priest	Co-PI	2013	\$30,000 (\$0)

<i>Role: Advised on biomass crops.</i>						
9	Iowa's Sustainable Energy Pathway (ISEP): Building a Team to Address the Complete Biofuels Supply Chain	Iowa State University Plant Sciences Institute	Heaton E.A. , Darr M., Hu G., Schulte L. & L. Wang	Pi	2012	\$50,000 (\$50,000)
<i>Role: Lead this team-building grant to develop new paradigm for bioenergy research.</i>						
8	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	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	Co-PI	2012	\$571,444 (\$0)
<i>Role: Advised on biomass crops.</i>						
7	Where's the Nitrogen? Quantifying the Timing and Impact of N Translocation Feedstock Storage and Crop Sustainability of Switchgrass for Bioenergy	ConocoPhillips	Heaton E.A. & M. Liebman	PI	2011	\$234,979 (\$234,979)
<i>Role: Lead competitively renewed project evaluating nutrient use of field-grown switchgrass.</i>						
6	Biofuel and Greenhouse Gases: Yields, Yield Growth and Land Use Effects	Biobased Industry Center	Miranowski J., Heaton E.A. & A. Rosburg	Co-PI	2010	\$50,000 (\$0)
<i>Role: Advised on biomass crops.</i>						
5	Biomass Crop Production and Physiology	Iowa State University First-Year Honors Mentor Program Grant	Schluttner J. & E.A. Heaton	PI	2010	\$250 (\$250)
<i>Role: Applied for funding, advised and supervised Jason Schluttner.</i>						

4	Where's the Nitrogen? Quantifying the Timing and Impact of N Translocation Feedstock Storage and Crop Sustainability of Switchgrass for Bioenergy	ConocoPhillips	Heaton E.A. & M. Liebman	PI	2009	\$63,145 (\$63,145)
<i>Role: Lead competitively renewed project evaluating nutrient use of field-grown switchgrass.</i>						
3	Development of a Germination Screening Test for Biochar Quality	Iowa State University Bioeconomy Institute	Cruse R., Heaton E.A. , Laird D. & N. Rogovska	Co-PI	2009	\$19,760 (\$0)
<i>Role: Advised on plant responses to biochar.</i>						
2	Biofuel and Greenhouse Gases: Yields, Yield Growth, and Land Use Effects.	Biobased Industry Center	Miranowski J. & E.A. Heaton	Co-PI	2009	\$76, 523 (\$0)
<i>Role: Advised on biomass crops.</i>						
1	Miscanthus Stem Propagation	First-Year Honors Mentor Program Grant, Iowa State University	Pfeiffer B. & E.A. Heaton	PI	2009	\$250 (\$250)
<i>Role: Applied for funding, advised and supervised Brian Pfeiffer.</i>						

Projects pending

Project Title	Name of Grantor	Participants	Role	Period	Grant Amount
Forever Green	MacArthur Foundation	Joan Gabel, Windy Wintersteen and many others	Collaborator	2020-2025	\$100,000,000

Graduate student advising

Served as major or co-major professor (7)

Name	Degree	Graduate Program	Conferred	Current Employer

Matt Nowatzke (with Andy VanLoocke)	PhD	Environmental Science, NSF DataFEW sion scholar	<i>In progress</i>	
Josh Bendorf (with Andy VanLoocke)	MS	Agronomy	<i>In progress</i>	
Alex Steiner	PhD	Plant Biology	<i>In progress</i>	
Jacob Studt (with Marshall McDaniel)	MS	Agronomy	2019	Assistant Scientist, ISU
Mauricio Tejera	PhD	Agronomy	2019	Michigan State University
Willard Mott	MS*	Agronomy	2017	Illinois Valley Community College
Ruth Burke (with Fernando Miguez)	MS	Agronomy	2016	Blue River Organic Seed
Matthew Heims	MS*	Seed Science	2016	Pioneer
Nicholas Boersma	Ph.D.	Plant Biology	2013	Program Coordinator, ISU
Brittany Follon	MS*	Agronomy	2013	Poet
Danielle Wilson	MS	Agronomy	2012	Assistant Scientist, ISU
Muhammad Aurang Zaib	MS	Agronomy	2012	Professor, Pakistan
Chris McKone	MS*	Agronomy	<i>Withdrew</i>	Land of Lakes

*Off-campus distance program

Served on Graduate Program of Study Committee (21)

Name	Degree	Department	Conferred
Annabelle Laurent	Ph.D.	Agronomy	<i>In progress</i>
Kelsie Ferin	Ph.D.	Agronomy	<i>In progress</i>
Laila Puntel	Ph.D.	Agronomy	2018

Gabe McNunn	Ph.D.	Agronomy	2018
Hamze Dokoohaki	Ph.D.	Agronomy	2018
Bernardo del Campo	Ph.D.	Biorenewable Resources and Technology	2018
Muhammad AurangZaib	Ph.D.	Agronomy	2016
Alicia McQuilkin	MS*	Agronomy	2016
Liu Su	MS	Industrial and Manufacturing Systems Engineering	2015
Bryan Randall	MS	Plant Sciences, University of Missouri	2015
Monday Ahonsi	MS*	Plant Pathology	2014
Ranae Dietzel	Ph.D.	Agronomy	2014
Joyce Lok	MS	Agronomy	<i>withdrew</i>
Erik Christian	Ph.D.	Agronomy	2012
Greg Pfeiffer	Ph.D.	Agronomy	2011
Tyler Barton	Ph.D.	Agronomy	2013
Katie Strand	MS	Agronomy	2012
Theo Gunther	MS	Agronomy	2011
Naroon Waramit	Ph.D.	Agronomy	2010
Ben Goff	MS	Agronomy	2010
Suh-Yeon Choi	Ph.D.	Genetics, Development and Cell Biology	2009

*Off-campus distance program

Post-doctoral Researchers Supervised at Iowa State University

Name	Duration	Current Employer
Guler Alsan Sungur (with Andy VanLoocke)	1/2019 - present	ISU
Elke Brandes	11/2013 -6/2017	Scientist, Thuenen Institute, Germany
Catherine L. Bonin	12/2012 – 06/2016	Ohio State University

Visiting Scholars Hosted/Advised at Iowa State University

Name	Duration	Institution
Pablo Gonzalez	6/10-12/10	Facultad de Agronomia, Uruguay

Interns Supervised at Iowa State University

Name	Year	Program
Tyler Donovan	2019	ISU Agronomy Dept. Internship
Dayana Carrera Saenz	2016	George Washington Carver Summer Research Internship
Valeria Cano Camacho	2015	George Washington Carver Summer Research Internship
Calvin Culp	2012	ISU Agronomy Dept. Internship

EXTENSION AND OUTREACH

Extension and outreach products (118; 39 since last promotion)

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

Peer-reviewed extension publications

2. **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.

1. **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

6. Boersma N.N., Bonin C.L.[§], Clark L.G. & **Heaton E.A.** (2015) Identifying Miscanthus in Iowa. Iowa State University Publication No. CROP 3039.
5. Wilson D.M.* & **Heaton E.A.** (2013) Giant Miscanthus establishment. Iowa State University, Publication No. 3056.
4. 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.
2. Boersma N. N.* & **Heaton E.A.** (2011) Giant Miscanthus: Rhizomes v. plugs. Iowa State University, Publication No. AG 203.
1. **Heaton E.A.** (2010) Giant Miscanthus for biomass production. Iowa State University, Publication No. AG 201.

Extension conference proceedings

3. **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.
1. **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

31. De Graaf C.*, Clark D.*, & **Heaton E.A.** (2019) Best storage methods for miscanthus in Iowa. ! Integrated Crop Management Blog Post, Iowa State University. <https://crops.extension.iastate.edu/blog/collin-de-graaf-danielle-m-clark-wilson-emily-heaton/best-storage-methods-miscanthus-iowa>
30. De Graaf C.*, Clark D.*, & **Heaton E.A.** (2019) Let's plant some miscanthus! Integrated Crop Management Blog Post, Iowa State University. <https://crops.extension.iastate.edu/blog/danielle-m-clark-wilson-perla-carmenate-emily-heaton/lets-plant-some-miscanthus>
29. De Graaf C.*, Clark D.*, & **Heaton E.A.** (2019) Miscanthus harvest concludes! Integrated Crop Management Blog Post, Iowa State University. <https://crops.extension.iastate.edu/blog/collin-de-graaf-danielle-m-clark-wilson-emily-heaton/miscanthus-harvest-concludes>
28. **Heaton E.A.**, De Graaf C.*, Cano Camancho V.*, Carmenate P.*, Donovan T.*, & Clark D.* (2019) Burnin' grass at the University of Iowa. Conservation Learning Group, Iowa Learning Group. <https://iowalearningfarms.wordpress.com/2019/04/19/burnin-grass-at-the-university-of-iowa/>
27. Cano Camacho V.*, Clark D.*, & **Emily E.A.** (2019) Ethnobotany of miscanthus & current uses. Integrated Crop Management Blog Post, Iowa State University. <https://crops.extension.iastate.edu/blog/danielle-m-clark-wilson-valeria-cano-camacho-emily-heaton/ethnobotany-miscanthus-current-uses>
26. **Heaton E.A.** (2019) ISU Biomass blog series introduction. Integrated Crop Management Blog Post, Iowa State University. <https://crops.extension.iastate.edu/blog/emily-heaton/isu-biomass-blog-series-introduction>
25. **Heaton E.A.** (2018) Could perennializing potholes? Conservation Learning Group, Iowa Learning Farms. <https://iowalearningfarms.wordpress.com/2018/10/15/could-perennializing-potholes-reduce-nitrate-losses/>
24. Boersma B.*, Tejera M.* & **Heaton E.A.** (2017) Long-term Assessment of Miscanthus Productivity and Sustainability. Iowa State University Farms Progress Reports. <http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1314&context=farmprogressreports>
23. Brandes E[§], **Heaton E.A.** (2016) New ISU research may help farmers make more informed decisions about land use. Integrated Crop Management News, Iowa State University <http://crops.extension.iastate.edu/cropnews/2016/01/new-isu-research-may-help-farmers-make-more-informed-decisions-about-land-use>
22. **Heaton E.A.**, Schulte L.A., Brandes E. [§], Boersma N.N.*, Muth D., Bonner I., Cafferty K. & Gronstal Anderson I. (2015) Is it over after stover? OR the 15% solution? BBI International Webinar. <http://biomassmagazine.com/pages/webinar/>

21. **Heaton E.A.** & Teske, T. (2014) Miscanthus: Propagating rhizomes. Iowa State University Frequently Asked Questions. 831 views as of Feb. 23, 2016. <http://www.youtube.com/user/ISUAgronomy>
20. **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>
19. **Heaton E.A.** (2013) Webinar: Dedicated Energy Crops: What, Why and Where? Iowa EPSCoR FLARE Webinar Series, www.iowaepscor.org.
18. **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.
17. **Heaton E.A.** (2012) Dedicated biomass crops for Iowa. ISU Extension and Outreach Timely Topics in Agriculture noon seminar series.
16. **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>
15. **Heaton E.A.** (2011) Giant Miscanthus and Other Perennial Energy Crops. Iowa Learning Farms Webinar Series, July, 2011. <http://www.extension.iastate.edu/ilf/>
14. 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>
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9. **Heaton E.A.** & Teske, T. (2008) Miscanthus: What is it? Iowa State University Frequently Asked Questions. 12,418 views as of Feb. 23, 2016. <http://www.youtube.com/user/ISUAgronomy>
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82. From pigs to prairie grass: Missouri company seeks new biogas feedstock. (2018) **Energy News Network** <https://energynews.us/2018/09/07/midwest/from-pigs-to-prairie-grass-missouri-company-seeks-new-biogas-feedstock/>
81. Iowa taps ‘abundant’ biomass resources. (2018) **Cedar Rapids Gazette**. <http://cedarrapidsgazette.ia.newsmemory.com/?publink=0cd0da80e>
80. Iowa State University scientists examine perennial grass as an option for flood-prone land. (2018) **ISU news service**. <https://www.news.iastate.edu/news/2018/07/31/miscanthuspothole>
79. Water quality goes south. (2018) Harry Smith, On Point, **National Public Radio** <https://www.wbur.org/onpoint/2018/07/16/iowa-water-pollution>
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75. University of Iowa Looks to Fields for Energy. (2016) Mark Carlson. **KCRG television**: <http://www.kcrg.com/content/news/University-of-Iowa-Looks-to-Fields-for-Energy--370191761.html>
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73. New ISU research studies Iowa farmland that loses money. (2016) Fred Love **Iowa State University press release** <http://www.news.iastate.edu/news/2016/01/21/unprofitableacres>

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71. New eastern Iowa airport Miscanthus crop will fuel University of Iowa power plant. (2016) George C. Ford. **Cedar Rapids Gazette** <http://www.thegazette.com/subject/news/new-eastern-iowa-airport-miscanthus-crop-will-fuel-university-of-iowa-power-plant-20150515>
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67. Iowa scientists help drive energy transformation. (2016) Donnelle Eller **Des Moines Register** <http://www.desmoinesregister.com/story/tech/science/environment/2016/01/10/iowa-scientists-help-drive-energy-transformation/77669248/>
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65. Perennials have potential in low-productive land. (2015) Kacey Birchmier. **Successful Farming** <http://www.agriculture.com/crops/renewable-energy/biomass/perennials-have-potential-in-195-ar51385>
64. Much has changed for women in ag research and leadership. (2015) Caitlin Ellingson. **IowaFarmer Today** http://www.iowafarmertoday.com/news/much-has-changed-for-women-in-ag-research-and-leadership/article_6a917530-6215-11e5-b502-e7bc92b51df1.html
63. UI Using More Sustainable Energy. (2015) Mellaney V. Moore. **KGAN, CBS 2** <http://www.cbs2iowa.com/news/features/top-stories/stories/UI-Using-More-Sustainable-Energy-190549.shtml>
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61. UI Shows Off Its Biomass. (2015) Nicholas Boose. **The Daily Iowan** <http://daily-iowan.com/2015/08/26/ui-shows-off-its-biomass/>
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59. Miscanthus providing fuel for energy and other environmental benefits. (2015) Jean Caspers-Simmet. **AgriNews** http://www.agrinews.com/news/iowa_news/miscanthus-providing-fuel-for-energy-and-other-environmental-benefits/article_5b7985ff-2032-5e75-af61-361837ecbb7f.html?TNNomobile
58. Greening airports – Iowa airport to plant prairie grasses to improve water quality. (2015) Pamela Porter. **BLADES newsletter**. http://blades-newsletter.blogspot.com/2015/06/greening-airports-iowa-airport-to-plant.html?utm_source=June+2015+Issue+-+BLADES&utm_campaign=June+CenUSA+Bioenergy+Newsletter&utm_medium=email
57. Change Agent. (2015) Fred Love. **Iowa State University press release**. <http://www.news.iastate.edu/news/2015/02/17/caheaton>
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Popular press coverage prior to last promotion (55)

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54. Government officials take biofuels tour. (2014) Sara Parks. **Iowa EPSCoR press release**. <http://iowaepscor.org/news/2014/govtour>
53. 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/>
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50. Miscanthus would yield more biomass than originally thought. (2014) Staff. **Iowa Farmer Today**. August 2, 2014.
49. 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>
48. 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>
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45. Miscanthus: crop of the future? (2014) Rick Fredericksen. **Iowa Public Radio**.
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42. Project seeks crop systems to profit farmers, clean air. (2014) Staff. **Iowa Farmer Today**.
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41. 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**.
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<http://www.greentechmedia.com/articles/read/next-generation-biofuels-on-the-verge>
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<http://www.myfarmlife.com/asides/growing-miscanthus/>.
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22. Biomass workshop showcases crops for energy production. (2011) J. Wilson. **Adams County Free Press**.
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12. Miscanthus Grass (2009) Brandon Smith, KBIA Radio, Columbia MO.
11. Biomass Focus of Research. (2009) Gene Lucht. **Iowa Farmer Today**.
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9. Miscanthus Creates Ethanol Buzz. (2009) Gene Lucht. **Iowa Farmer Today**.
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8. 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>
7. The Big Show. (2008) Bob Quinn. **WHO Radio**.
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Extension and outreach products prior to joining Iowa State University

2. Bioenergy crops compared: Miscanthus more productive than switchgrass (2007) Staff. ScienceDaily.
<http://www.sciencedaily.com/releases/2007/07/070710064827.htm>
1. 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 (130)

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

Extension and outreach presentations since last promotion (39)

2019

130. **Heaton E.A.**, VanLoocke A., Boersma N.N.[§], Aslan-Sungur G.[§], Bendorf J.* ,
129. Studt J.* & **Heaton E.A.** (2019) Miscanthus soil and water quality. Kirkwood Community College field day, South East Research Farm, Crawfordsville, IA.
128. Studt J.* & **Heaton E.A.** (2019) Miscanthus soil and water quality. South East Research Farm field day, Crawfordsville, IA.
127. Comito J., Schulte L., & **Heaton E.A.** (2019) Native plant workshop, Iowa Learning Farms, Spirit Lake, IA.
126. Comito J., Schulte L., & **Heaton E.A.** (2019) Native plant workshop, Iowa Learning Farms, Coon Rapids, IA.
125. Comito J., Schulte L., & **Heaton E.A.** (2019) Native plant workshop, Iowa Learning Farms, Otho, IA.
124. **Heaton E.A.**, Studt J.* , Steiner A.* , Bendorf J.* , Carmenate P.* , DeGraaf C.* , Donovan T.* & Krischel J.* (2019) Where do biomass crops fit in Iowa agriculture? Iowa Emersion Class, Furman University students, Boone, IA, 15 participants.
123. **Heaton E.A.** (2019) Biomass crops in Iowa. Agronomy in the Field webinar, 12 participants.
122. **Heaton E.A.** (2019) Biomass research activities in central Iowa. Presentation to Verbio, 8 participants.

2018

121. **Heaton E.A.** (2018) Ask the Expert. Farm Progress Show, Boone, IA, 200 participants.
120. **Heaton E.A.** (2018) Long-term Assessment of Miscanthus Productivity and Sustainability (LAMPS) update to ISU Field Agronomist and Ag Engineers, Boone, IA, 23 participants.
119. **Heaton E.A.** (2018) Update on Miscanthus work in Iowa, Miscanthus Producer Workshop (organizer). Iowa City, IA, 50 participants.
118. Tejera M.* , Boersma N.[§] , & **Heaton E.A.** (2018). Nitrogen application and planting year effect on M. × giganteus. Miscanthus Producer Workshop, Iowa City, IA 50 participants.
117. Studt J.* , McDaniel M. & **Heaton E.A.** (2018). Soil and water quality under fertilized corn and Miscanthus. Miscanthus Producer Workshop, Iowa City, IA 50 participants.
116. Boersma N.* , Tejera M., Meade J. & **Heaton E.A.** (2018). Soil temperature and winter survival in establishing Miscanthus stands. Miscanthus Producer Workshop, Iowa City, IA 50 participants.

2017

115. **Heaton E.A.** (2017) The Iowa Biomass Fuel Project, ISU Baseload Showcase, Boone, IA, 150 participants.
114. **Heaton E.A.** (2017) Where can biomass crops pay? Midwest Governor's Association regional bioenergy discussion, Iowa City, IA, 50 participants.
113. **Heaton E.A.** (2017) First results from the Long-term Assessment of Miscanthus Productivity and Sustainability (LAMPS) project, LAMPS Advisory Board meeting, Boone, IA, 20 participants.
112. Tom Richard, Jeremy Martin, Andrea Basche & **Heaton E.A.** (2017) Subfield profitability and ecosystem function with perennials. Meetings with Representative Elijah Cummings (D-Maryland), Washington DC, 8 participants.

111. **Heaton E.A.** (2017) Subfield profitability and ecosystem function with perennials. Presentation to USDA FSA, Washington DC, 30 participants.
110. **Heaton E.A.** (2017) Subfield profitability and ecosystem function with perennials. Presentation to Mark Brodziski, Dept. Administrator Energy Programs, Rural Business and Cooperative Service, USDA, Ames, IA, 15 participants.
109. **Heaton E.A.** (2017) Subfield profitability and ecosystem function with perennials. Presentation to Gov. Kim Reynolds, Iowa City, IA, 30 participants.
108. Tejera, M.* , Boersma, N., and **Heaton E.A.** (2017). Nitrogen application and planting year effect on *M. × giganteus*. Miscanthus Producer Workshop, Cedar Rapids, IA

2016

107. **Heaton E.A.** (2016) Miscanthus research update to ISU Field Agronomist and Ag Engineers, Boone, IA, 35 participants.
106. **Heaton E.A.**, Schulte L., Gronstal Anderson I, Anderson B. (2016) Eastern Iowa Airport field day Joint field day with airport, Prairie Strips project and Iowa Biomass Fuel Project. 70 participants.
105. Tejera M.* & Miguez F.E. (2016) Argentinian farmer and co-op employee field tour, Boone, IA, 25 participants.
104. Cano Camacho V.* (2016) George Washington Carver and Dept. of Agronomy 'I'm an Agronomist' feature, Boone, IA, 5 participants.
104. Boersma N.N.* & VanLoocke A. (2016) Congressional aide field tour. Boone, IA, 40 participants.
103. Tejera M.* , (2016) MS in Agronomy Distance Program field tour, Boone, IA, 35 participants.
102. **Heaton E.A.**, Tejera M.* , Cano Camacho V.* , Carrera Saenz D.* (2016) Costa Rican visiting student field trip, Boone, IA, 25 participants.
101. **Heaton E.A.**, Tejera M.* , Cano Camacho V.* , Carrera Saenz D.* (2016) George Washington Carver internship leadership tour, Boone, IA, 7 participants.
100. Tejera M.* , Cano Camacho V.* , & Boerma N.N.[§] (2016) Long-term assessment of Miscanthus Productivity and Sustainability (LAMPS) research update. ISU Southeast Research Farm Field Day, Crawfordsville, IA, 70 participants.
99. Bonin C.L.[§] & Boersma N.N.[§] (2016) What's up with bioenergy in Iowa? Late Season Crop Clinic, Boone, IA, 50 participants.

2015

98. **Heaton E.A.** (2015) Eastern Iowa Miscanthus Field tour. 12 participants.
97. **Heaton E.A.** (2015) Integrated land management and Miscanthus. Iowa Soybean Association team meeting, Ankeny, IA, 7 participants.
96. **Heaton E.A.** (2015) Biomass Fuel Project Field Day. Iowa City, IA, 250 participants.
95. **Heaton E.A.** (2015) Congressional aide field tour. Boone, IA, 35 participants.
94. **Heaton E.A.** (2015) Agron 594 Master in Agronomy field tour. Boone, IA, 50 participants.
93. **Heaton E.A.** (2015) George Washington Carver intern field tour. Boone, IA, 5 participants.
92. **Heaton E.A.** (2015) Managing dedicated bioenergy crops. Iowa State Extension and Outreach Crop School, Boone, IA, 200 participants.

Extension and outreach presentations prior to last promotion (75)

91. **Heaton E.A.** (2015) Bioenergy crop stop. Iowa State Extension and Outreach Field Day, Kanawha, IA, 150 participants.

90. **Heaton E.A.** & Gronstal Anderson I. (2015) Update and details on the Biomass Fuel Project. Biomass Crops Workshop, Iowa City, IA, 25 participants.
89. **Heaton E.A.**, Schulte L.A., Brandes E., Boersma N.N., Muth D., Bonner I., Cafferty K. & Gronstal Anderson I. (2015) Is it over after stover? OR the 15% solution? Ag Education Day, Emmetsburg, IA, 200 participants.
88. **Heaton E.A.**, Schulte L.A., Brandes E., Boersma N.N., Muth D., Bonner I., Cafferty K. & Gronstal Anderson I. (2015) Is it over after stover? OR the 15% solution? Southeast Iowa Agronomic Research Association, Iowa City, IA, 45 participants.

2014

87. Bonin C.L.[§] & **Heaton E.A.** (2014) The 15% solution. Missouri Crop Management Conference, Columbia, MO, 250 participants.
86. **Heaton E.A.** (2014) Integrating perennial energy crops in Iowa. Dept. of Energy Bioenergy Technology staff tour. Boone, IA, 60 participants.
85. Boersma N.N.[§] & Bonin C.[§] (2014) SARE Extension Energy and Environment Summit field tour. Boone, IA, 75 participants.
84. **Heaton E.A.** (2014) ISU Miscanthus update. University of Iowa Miscanthus Pilot field tour. Iowa City, IA, 70 participants.
83. **Heaton E.A.**, Boersma N. N.[§], Coon C.* , Burke R.* , Bonin C.[§], Brandes E.[§] & Wilson D. (2014) Ask the expert: biomass crops. 2014 Farm Progress Show, Boone, IA, est. 150,000 visitors.
82. **Heaton E.A.** (2014) Bioenergy crop research. Congressional Aide field tour. Boone, IA, 48 participants.
81. **Heaton E.A.**, Schulte-Moore L.A., Brandes E.[§], Muth D., Bonner I., Cafferty K. & Milster F. (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.
80. **Heaton E.A.** & Milster F. (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.
79. **Heaton E.A.** & Milster F. (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.
78. **Heaton E.A.** & Milster F. (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.

2013

77. **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? 25th Annual Integrated Crop Management Conference. Iowa State University, Ames, IA; 182 participants.
76. **Heaton E.A.** (2013) Bioenergy crop research. Congressional Aide field tour. Boone, IA, 53 participants.
75. **Heaton E.A.** (2013) Bioeconomy media tour. Boone, IA, 18 participants.
74. Helmers M. & **Heaton E.A.** (2013) ISU Bioeconomy education tour with Iowa community college leader delegation. Boone, IA, 15 participants.
73. Wilson D.M.* (2013) World Food Prize Institute student experience tour, Boone, IA. 30 participants.

72. **Heaton E.A.**, Boersma N.N.* Schulte L.A. & Wilson D.* (2013) Perennial energy crops in Iowa. 3rd Annual Biomass Workshop. Iowa City, IA. 30 participants.
71. **Heaton E.A.**, Schulte L.A. & Wilson D.* (2013) Managing for bioenergy – integrating food and fuel production. Ag Education Day, Emmetsburg, IA, 130 participants.
70. **Heaton E.A.** (2013) Perennial bioenergy crops benefit soil and water. University of Illinois Soil and Water Workshop, Taylorville, IL, 75 participants.
69. **Heaton E.A.** (2013) Perennials to the rescue! The Dirt on Dirt Soil Health Workshop, Lenox, IA, 78 participants.
68. Bonin C.L.[§] and **Heaton E.A.** (2013) Perennials to the rescue! The Dirt on Dirt Soil Health Workshop, Lenox, IA, 78 participants.

2012

67. **Heaton E.A.**, Wilson D.M.* (2012) Iowa's Sustainable Energy Pathway field tour, Boone, IA, 6 participants.
66. **Heaton E.A.** (2012) Ask the expert: biomass crops. 2012 Farm Progress Show, Boone, IA, est. 200,000 visitors.
65. **Heaton E.A.** (2012) Biomass research at ISU. Biofuels Science and Sustainability Tour. Boone, IA, 75 participants.
64. **Heaton E.A.** & Schulte L.A. (2012) Integrating food and fuel, Landscape Biomass Project Field Day. Boone, IA, 50 participants.
63. **Heaton E.A.** & Schulte L.A. (2012) Overview of the Landscape Biomass Project, Masters in Agronomy Field Tour. Boone, IA, 75 participants.
62. Boersma N. N.* & **Heaton E.A.** (2012) Giant Miscanthus performance in Iowa, Northwest Iowa Research Farm Field Day, Sutherland, IA, 150 participants.
61. **Heaton E.A.**, Berns B.* & Culp, C.* (2012) Biomass crops for Iowa overview, Hay and Forage Expo, Boone, IA, 1000 visitors.
60. **Heaton E.A.** (2012) Iowa State University Early Outreach Program Intensive Program, Hinds Farm, Ames, IA, 60 participants.
59. **Heaton E.A.** (2012) Ag Energy Workshop, BioCentury Farm, Ames, IA, 75 participants.
58. **Heaton E.A.** (2012) Miscanthus propagation demonstration. In cooperation with Northwest Missouri State University, Hinds Farm, Ames, IA, 25 participants.
57. **Heaton E.A.** (2012) 2nd Annual Biomass Workshop, Creston, IA, 48 participants.
56. Boersma N. N.* & **Heaton E.A.** (2012) *Miscanthus* propagation, planting and management. Northwest Missouri Certified Crop Advisors Workshop. St Joseph, MO, 100 participants.
55. Boersma N. N.* & **Heaton E.A.** (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.

2011

54. **Heaton E.A.** (2011) Introduction to biomass work at ISU. Agronomy Freshman Field Tour, Boone, IA, 30 participants.
54. **Heaton E.A.** (2011) Bioenergy crop research. Congressional Aide field tour. Boone, IA, 75 participants.
53. **Heaton E.A.** (2011) Developing energy crop portfolios. Landscape Biomass project field day. Boone, IA, 42 participants.

52. **Heaton E.A.** (2011) Using companion crops to establish Miscanthus. Neely-Kinyon Farm field day. Greenfield, IA, 100 participants.
51. **Heaton E.A.** (2011) Miscanthus as a bioenergy crop in Iowa. Iowa Learning Farm Webinar. Ames, IA. Unknown number of participants.
50. **Heaton E.A.** (2011) Biofuels cropping systems: Agronomic and environmental issues. High school science teacher workshop field day. Boone, IA, 50 participants.
49. **Heaton E.A.** (2011) Miscanthus in Iowa. Presentation to the Carver Foundation. Ames, IA, 15 participants.
48. **Heaton E.A.** (2011) Biomass crops for Iowa. All-Iowa Horticulture Expo, Ottumwa, IA, 50 participants.
47. **Heaton E.A.** (2011) Choosing an energy crop. 1st Annual Biomass Workshop. Creston, IA, 75 participants.
46. Boersma N. N.* & **Heaton E.A.** (2011) *Miscanthus x giganteus* agronomy. ISU Southwest Iowa Research Farms Annual Update Meeting. Greenfield, IA, 50 participants.

2010

45. **Heaton E.A.** (2010) Developing energy crop portfolios. Landscape Biomass project field day. Boone, IA, 36 participants.
44. Wilson D.M.*, **Heaton E.A.** & Liebman M. (2010) Where and when? Quantifying the movement of nitrogen in switchgrass. 2010 Bio-char Initiative Conference field day. Boone, IA, 75 participants.
43. Wilson D.M.*, **Heaton E.A.** & Liebman M. (2010) Switchgrass plot field day. Where and when? Quantifying the movement of nitrogen in switchgrass. Boone, IA, 75 participants.
42. **Heaton E.A.** & DePoy R. (2010) Miscanthus opportunities in southern Iowa. Neely-Kinyon Field Day, Greenfield, IA, 75 participants.
41. **Heaton E.A.** What is this crop? (2010) Biomass crops in Iowa. CSI Crops 2010, 4H Annual Conference, Ames, IA, 75 participants.
40. Wilson D.M.* & **Heaton E.A.** (2010) Nitrogen cycling in switchgrass. 2010 Biochar Conference Field Tour, Ames, IA, 100 participants.
39. **Heaton E.A.** (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.
38. **Heaton E.A.** (2010) Miscanthus for southern Iowa. South East Iowa Research and Demonstration Farm Spring Field Day, Crawfordsville, IA, 40 participants.
37. Boersma, N.N.* & **Heaton E.A.** (2010) Miscanthus for southern Iowa. Armstrong Farm Annual Field Day, Lewis, IA, 50 participants.
36. **Heaton E.A.** (2010) Giant grass and how to grow it. Presentation to Southern Iowa farmers and investors, Creston, IA, 40 participants.
35. **Heaton E.A.** (2010) Giant grass and how to grow it. Presentation to Southern Iowa Soil and Water Conservation Commissioners, Bedford IA, 6 participants.
34. Liebman M., Sauer T., Thompson M., Helmers M. & **Heaton E.A.** (2010) Iowa Corn Growers' Bioenergy Tour, Ames, IA 63 participants.

2009

33. **Heaton E.A.** & Moore K. J. (2009) Agronomy 594 (off-campus MS) Bioenergy Field Tour, 26 participants.

32. **Heaton E.A.** & Moore K. J. (2009) Biomass Crop Tour, USDA NC7 Plant Introduction Annual Meeting. Ames, IA. 14 participants.
31. **Heaton E.A.** (2009) Biomass Crops in the Future of Iowa Agriculture. CSI Crops 4H Annual Conference. Ames, IA. 75 participants.
30. **Heaton E.A.** (2009) Perennial Energy Crops for the Midwest. University of Nebraska Extension Webinar. <http://bioenergy.unl.edu>. 38 participants.
29. **Heaton E.A.** (2009) Growing Giant Grass for a Living. Iowa State University Agronomy Club. Ames, IA. 16 participants.
28. **Heaton E.A.** (2009) Practical Considerations in Developing Bioenergy. Hamilton County Series of Ag Reports, Webster City, IA. 8 participants.
27. **Heaton E. A.** (2009) Future of Cellulosic Crops. Iowa State University Extension. Global Agriculture Conference, Spencer, IA. 30 participants.
26. **Heaton E. A.** (2009) Dedicated Biomass Crops in Iowa. Annual meeting of the Iowa Crop Improvement Association, Ames, IA. 75 participants.
25. **Heaton E. A.** (2009) Practical Considerations in Developing Dedicated Energy Crops. Iowa Learning Farm Winter Workshop, Ames, IA. 75 participants.
24. **Heaton E. A.** (2009) Practical Considerations in Dedicated Energy Crops. Iowa State University Crop Advantage Series Meeting, Carroll, IA. 150 participants.
40. **Heaton E. A.** (2009) Practical Considerations in Dedicated Energy Crops. Iowa State University Crop Advantage Series Meeting, Ames, IA. 100 participants.
22. **Heaton E. A.** (2009) Practical Considerations in Dedicated Energy Crops. Iowa State University Crop Advantage Series Meeting, Mason City, IA. 75 participants.

2008

21. **Heaton E. A.** (2008) Miscanthus Agronomy. Bioenergy 101. University of Missouri, Warrensburg, MO. 56 participants.
37. **Heaton E. A.,** Goff, B. (2008) Sweet Sorghum and Next Generation Energy Crops. Sugar Beet Field Day, Fruitland, IA. 110 participants.
19. **Heaton E. A.** (2008) Perennial Energy Crops – Miscanthus. Biobased Industry Outlook Conference Field Tour, Ames, IA. 50 participants.
18. **Heaton E. A.** (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

2006

17. Dohleman F.G., **Heaton E.A.** and Long S.P. (2006) Miscanthus: Findings and Challenges with a New Crop. Peoria Farm Show, Peoria, IL. 50 participants.

2005

16. **Heaton E. A.** (2005) Illinois Council on Food and Agriculture C-FAR Day. 50 participants.
15. **Heaton E. A.** (2005) Chicago Farmers Annual Meeting, Chicago IL. 100 participants.

14. **Heaton E. A.** (2005) Argentine Agronomic Producers Farm Tour. Urbana, IL.
13. **Heaton E. A.** (2005) Agricultural Educators Farm Tour. Urbana, IL.
12. **Heaton E. A.** (2005) Students for Environmental Concerns Energy Conference. Urbana, IL.
11. **Heaton E. A.** (2005) Land Grant Universities Science and Education Exhibit. Washington D.C.
10. **Heaton E. A.** (2005) Class presentation to General Engineering 161. Urbana, IL..
9. **Heaton E. A.** (2005) Miscanthus information presentation to John Deere. Moline, IL..
8. **Heaton E. A.** (2005) Miscanthus information presentation to Lt. Governor Pat Quinn. Springfield, IL.
7. **Heaton E. A.** (2005) Biomass Energy Crops. Dudley Smith Days, Pana, IL.
6. **Heaton E. A.** (2005) Biomass Energy Crops. Agronomy Day, Urbana, IL.

2004

5. **Heaton E. A.** (2004) Biomass Energy Crops. Dudley Smith Days, Pana, IL.
4. **Heaton E. A.** (2004) Biomass Energy Crops. Agronomy Day, Urbana, IL.

2003

3. **Heaton E. A.** (2003) Biomass Energy Crops. Dudley Smith Days, Pana, IL.
2. **Heaton E. A.** (2003) Biomass Energy Crops. Agronomy Day, Urbana, IL.
1. **Heaton E. A.** (2003) Grasses for Food and Fuel, NCR-31 farm tour, Monticello, IL.

TEACHING

Courses taught (1)

Course	Course Title	Credit Hours	Semester	Enrollment	Avg. Instructor Ranking (1-5; 5 best) (Dept. avg.)	Avg. Course Ranking (1-5; 5 best) (Dept. avg.)
AGRON 281	Crop Physiology	3	S18	26	4.1 (4.0)	3.7 (3.9)
AGRON 281	Crop Physiology	3	S19	80	3.9 (4.1)	3.8 (4.0)

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, S15,
AGRON 280 (ISU)	Agronomy	Perennial Energy Crops	S16, S17, S18, F18, S19
AGRON/TSM 325 (ISU)	Biorenewable Systems	Developing and Implementing Agricultural Principles in the Bioeconomy (2 lectures)	F08, F09, F10, F11, F12, F13, F14, F15, F16, F17, F18, F19
AGRON 183 (ISU)	Basic Skills for Agronomists	Photosynthesis	F17, F18, F19

Other teaching activities

2018	Advisor to U. of Iowa School of Business capstone class (two teams) on precision profit and subfield crop management.
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)

2019	Josh Krischel	Using R to manage data. Science with Practice
2018	Tyler Donovan	Is increased yield in <i>Miscanthus × giganteus</i> worth the water quality penalty? Science with Practice
2016	Glyn Powell	How does variable vegetation impact erosion estimates in RUSLE2? Agron 490 Special Project

2010	Jason Schluttner	Miscanthus Storage. Freshman Honors Program
2010	Alex Maeder	Influence of Companion Crops on Growth and Development of Miscanthus. AGRON 490 Special Project.
2009	Brian Pfeiffer	Propagation Methods in Miscanthus, 2009. Freshman Honors Program

SERVICE

Professional outreach

International activities

2018	Contributed to data collection on global activities in biobased innovation by meeting with researchers sponsored by Delft University of Technology (Netherlands) and Wageningen University (Netherlands).	
2017-2018	Co-organized special research topic in <i>Frontiers in Plant Sciences</i> with colleagues from University of Aberystwyth (UK) and Wageningen University (Netherlands); recruited papers representing US <i>Miscanthus × giganteus</i> research.	
2016	Met with German public/private research team about bioeconomy work in Iowa. Ames, Iowa.	
2015	External ad hoc reviewer for the UK Biotechnology and Biological Sciences Research Council (<i>largest UK funder of non-medical research</i>)	
2012 – 2015	Research Management Committee, BioFuelNet (Canadian research consortium and funding entity). <i>Review portfolio of 70+ projects worth >\$25 million USD</i>	
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	External ad hoc reviewer for the Canadian funding agency, Mitacs https://www.mitacs.ca/en/about-mitacs	
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

2019 Met with Land O'Lakes Sustain program about subfield integration of perennials in to row-crop systems

2019 Met with Germany-based Verbio about biomass crops in Iowa appropriate for biogas conversion

2019 Provided input to consortium of public, private, and NGO groups considering a Midwest low carbon fuel standard

2018-2019 Worked with Renewable Energy Group (Ames, IA) to assess *Brassica carinata* for renewable diesel production.

2017 Member of the Biomass Advancement Committee, Green Lands Blue Waters (*multi-state non-profit organization dedicated to perennial agriculture*).

2017 Met with climate, food, bioenergy, and sustainability staff at the Union of Concerned Scientists Washington DC office to advance joint extension and outreach activities.

2017-2018 Member of Iowa Energy Plan Implementation Committee, Iowa Economic Development Authority, Des Moines, IA *Meet quarterly to advance implementation of the Iowa Energy Plan.*

2017 External letter writer for promotion and tenure, Ohio University

2016-2019 Member, federal USDA/DOE Biomass Research and Development Technical Advisory Committee. This committee advises operations and appointed officials from the Departments of Energy, Agriculture, Interior, Transportation, Defense, and the Environmental Protection Agency, the National Science Foundation, and the Office of Science and Technology Policy.

2016 Invited visit to Dept. of Energy and USDA funding agencies to present Iowa Biomass Fuel Project, LAMPS, and STRIPS research projects (with Ingrid Gronstal Anderson (UI) and Lisa Schulte (ISU).

2015 - present Idaho National Lab advisor; first external collaborator helping to develop and test biomass composition library for external (public) sample submission, database repository and query.

2015 Science and outreach advisor to University of Iowa Biomass Crop Assistance application

2015 Hosted Anthy Alexiades, California Air Resources Board engineer, for seminar and meetings about Iowa research and the Low Carbon Fuel Standard (with the ISU Bioeconomy Institute).

2015 Hosted Steve Long, Director of the Energy Biosciences Institute (U. of Illinois) for seminar and review of my research program.

- 2015 Hosted Rebecca Arundale, of NexSteppe Energy for seminar and research discussions on sorghum.
- 2015 Hosted Jeremy Martin, Biofuels Specialist with the Union of Concerned Scientists, for seminar and discussions on extension and outreach.
- 2015 Consulted with NASA Goddard Space Center Wallops Island Flight Facility to control *Phragmites australis* around launch pad.
- 2015 Consulted with Eastern Iowa Airport about strategic integration of perennials, leading to establishment of prairie STRIPS test site and 65 acres of *Miscanthus x giganteus* in 2015.
- 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.
- 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 - 2015 Member, scientific advisory board, Speedling, Inc.
- 2011 - 2015 Member, scientific advisory council, Syngest, Inc.
- 2010 Panel member, USDA biofuels roundtable, Sept. 29, Ankeny, 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.
- 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

- 2015- present American Society of Plant Biologists (National, Midwest and Ecophysiology chapters)
- 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 – 2014 Gamma Sigma Delta Agricultural Fraternity
- 2001 – 2006 Soil and Water Conservation Society

Professional society service

- 2019 Invited session chair, Plant Biology 2019, American Society of Plant Biologists annual meeting, San Jose, CA
- 2018-2019 Secretary/Treasurer of Ecology and Environmental Plant Physiology section of American Society of Plant Biologists
- 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

- 2017-2021 Served on Editorial Advisory Committee, Global Change Biology Bioenergy (IF=6.1)
- 2016-2018 Guest editor for special issue (research topic) in Frontiers in Plant Science (IF=3.9) “Optimising Miscanthus for the sustainable bioeconomy: from genes to products”. Frontiers in Plant Science is most cited open access journal in Plant Science and one of the top 3 largest journals in all of Plant Science
- 2008 – 2014 Served on inaugural Editorial Advisory Committee, Global Change Biology Bioenergy

Referee responsibilities

Journals; 29 reviews since last promotion

No.	Journal Title	Reviews
1	Agriculture Ecosystems and Environment	2

2	Agronomy Journal	3
3	Annals of Botany	7
4	Bioenergy Research	4
5	Biofuels, Bioproducts and Biorefining	6
6	Biologist, The; Journal of the British Royal Society	1
7	Biomass and Bioenergy	7
8	Bioresource Technology	3
9	Bioscience	2
10	Crop Science	3
11	Ecological Applications	1
12	Energies	1
13	Environmental Research Letters	2
14	Eos	1
15	Forage and Grazinglands	1
16	Frontiers in Plant Science	1
17	Global Change Biology	4
18	Global Change Biology Bioenergy	21
19	Industrial Crops and Products	2
20	Invasive Plant Science and Management	1
21	Journal of Experimental Botany	3
22	Journal of Plant Nutrition and Soil Science	1
23	New Phytologist	2
24	Physiologia Plantarum	2
25	Plant Cell and Environment	2
26	Plant Physiology	2
27	Proceedings of the National Academy of Sciences	1
28	The Biologist, British Royal Society Journal	1
Total		87

Grant and technical reviewing; 35 total, 12 since last promotion

2019	Biotechnology and Biological Sciences Research Council (United Kingdom federal science funding agency) external reviewer of Core Strategic Programme
2019	Future Leaders Fellowship program, UK Research and Innovation, United Kingdom
2018	US Dept. of Energy, ad hoc external reviewer of Bioenergy Technologies Office grants in Iowa.
2017	US Dept. of Agriculture panel reviewer for NIFA Biomass and Bioproduct Feedstock Genetic Development program
2017	US Dept. of Agriculture, invited panel reviewer for NIFA AFRI Bioenergy and Renewable Energy program (<i>declined for conflict</i>).

- 2017 US Dept. of Energy, panel reviewer of the Bioenergy Technologies Office, specifically reviewing the Feedstocks Supply and Logistics Program (\$16.5M in 2016) and the Feedstock-Conversion Interface Consortium (\$85.5M in 2016). Denver, CO.
- 2016 US Dept. of Energy, ad hoc external reviewer of the Bioenergy Technologies Office, specifically reviewing the Feedstocks Supply and Logistics Program (\$16.5M in 2016) and the Feedstock-Conversion Interface Consortium (\$85.5M in 2016). Week-long, in-person review, Denver CO.
- 2015 US Dept. of Energy, external reviewer, 2016 Billion Ton Study, Bioenergy Technology Office, Washington, DC.
- 2015 BioFuelNet Research Management Committee annual project review (Canadian granting organization with 70+ project portfolio valued at >\$25 million USD).
- 2015 Biotechnology and Biological Sciences Research Council (United Kingdom federal science funding agency) external reviewer
- 2015 Review panel, NIFA Predoctoral/Postdoctoral Fellowship Programs on Plants and Renewable Energy, Washington D.C. (*declined due to previous commitment*).
- 2015 Reviewer, NSF EPSCoR Research Infrastructure Improvement Program Solicitation NSF 15-517 (*declined due to previous commitment*).
- 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, Chicago, IL.
- 2014 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 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

- 2019 Achieving carbon-negative bioenergy systems from plant materials, ed. by Saffron et al. (Burleigh Dodds publishing). Reviewed chapter on Sustainable Use of Miscanthus for Biofuel by Robson et al.
- 2014 SCOPE Bioenergy & Sustainability, Chapter 2: Feedstocks.
- 2012 Bioenergy: Principles and Applications, Wiley Publishing.

Professional development

- 2019 Completed three-day APSIM crop simulation workshop, Ames, IA
- 2019 C-CHANGE Leopold Leadership retreat workshop (co-organizer), Ames, IA
- 2018 Attended webinar on “Why are food companies investing in regenerative agriculture?” by the American Society of Agronomy.
- 2018 Attended three-day Leopold Leadership Academy workshop, Minneapolis, MN
- 2016 Audited semester-long data stewardship course (Dept. of Agronomy, ISU).
- 2015 Completed week-long photosynthesis measurement course (LiCor Biosciences, Lincoln, NE).
- 2015 Completed semester-long Responsible Conduct of Research course (ISU).
- 2015 Completed (and help organize) 1st Agronomy Professional Development Series (8 sessions), Ames, IA.

- 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.
- 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.

Service

Crop production and physiology Lab

2017- present Serve as faculty supervisor for shared wet and dry labs, including financial and staff management (one professional and scientific staff, Danielle Clark).

Research assistants trained (as employees; 24)

- 23. Claire Baudler (current)
- 22. Perla Carmanente (current)
- 21. Tyler Donovan (current)
- 20. Michael Geissinger (current)
- 19. Josh Krischel (current)
- 18. Collin DeGraaf (current)
- 17. Valeria Cano Camacho (now MS student with Marshall McDaniel, ISU)
- 16. Alex Degaetano
- 15. Jennifer Hill
- 14. Glyn Powell
- 13. Collin Coon
- 12. Gabe McCoy
- 11. Brent Berns
- 10. Josh Grindeland
- 9. Brooks Campbell
- 8. Amber Goff
- 7. Nick Ohde
- 6. Nicola Forrest
- 5. Calvin Culp
- 4. Ashley Greve
- 3. Dustin Schau
- 2. Alex Maeder
- 1. Anthony Martin

Formal mentoring

2019	Mriganka De, Preparing Future Faculty program, postdoc, Agronomy, ISU
2017	Morgan Davis, Preparing Future Faculty program, PhD student, Natural Resource, Ecology and Management, ISU
2016-present	Mark Licht, Assistant Professor, Agronomy, ISU
2015-present	Bradley Miller, Assistant Professor, Agronomy, ISU
2014-present	Arti Singh, Adjunct Assistant Professor, Agronomy, ISU
2014	Sotirios Archontoulis, Associate Professor, Agronomy, ISU
2014	Renuka Mathur, Adjunct Assistant Professor, ISU

Institutional service

College and university service

2016-2017	Served on ISU Vice President for Research grand challenge research theme advisory committee
2015-2021	Served on College of Agriculture and Life Sciences Faculty Awards Committee
2015	Led Agronomy and Agriculture Engineering tour for Ames Community Preschool Center students
2015	Served on Ag and Natural Resources Extension and Outreach 'Future 2015 Task Force' to develop program and staff priorities for next decade
2015	Hosted special seminar on University of Iowa Biomass Fuel Project (Liz Christiansen and Ingrid Gronstal Anderson)
2016-2018	Served on Graduate Program in Sustainable Agriculture Admissions Committee
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
2009-2014	Assisted in planning, installation and presentation of ISU Farm Progress Show exhibits
2008	Served on ISU Plant Sciences Institute Symposia Planning group

Departmental service

2018	Served on Departmental Review committees
2017-2019	Served on Agronomy IT committee
2016	Served on Agronomy Strategic Plan committee

2016-2017	Served on Agronomy Forage Agronomist search committee (two searches; failed)
2016	Served on Communications Specialist search committee (Tracy Schlater)
2015	Spoke at Agronomy undergraduate Women and Ag luncheon (March 27, 2015)
2015	Scored Curriculum Assessment Tests (CAT)
2015	Served on committee to update departmental governance documents
2015	Worked with Professional Development committee to hold 10-session Agronomy Professional Development Series with Edge Consulting
2015	Served on Plant and Soil Relations faculty search committee (Marshal McDaniel)
2015	Helped to update Crop Production and Physiology graduate course requirements
2015	Hosted invited seminar speaker (John Caveny)
2014-present	Served on Agronomy Professional Development Committee (founding member)
2014	Served on Integrated Cropping Systems faculty search committee
2013-2016	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 -2009	Served on departmental vision committee