

Alabama:

OUTPUTS: Related Publications and Presentations

Peer Reviewed: 1. Carter C.L., Abdoulmoumine, N., Kulkarni, A., Adhikari, S. and Fasina, O. 2013. Physicochemical properties of thermally treated biomass and energy requirement for torrefaction. *Trans. ASABE* 56: 1093-1100. 2. Wadkins, J., Shrestha, A., Fasina, O., Adhikari, S. and Taylor, S. 2013. Frictional properties of ground loblolly pine chips. *Auburn University Journal of Undergraduate Research (AUJUS)*, 2: 26-31. 3. Atta-Obeng, E., Via, B.K., Fasina, O., Auad, M.L. and Jiang, W. 2013. Cellulose reinforcement of phenol formaldehyde: characterization and chemometric elucidation. *International Journal of Composite Materials* 3(3): 61-68. 4. Ravindran, H.; Adhikari, S., Gopakumar, S., Fasina, O., Taylor, S. and Tu, M. 2013. Co-processing of woody biomass and poultry litter for bio-oil production with high pH. *Trans. ASABE* 56(1): 1-6. 5. Fasina, O. and Littlefield, B. 2012. TG-FTIR analysis of pecan shells thermal decomposition. *Fuel Processing Technology* 102: 61-66. 6. Brian Via, Sushil Adhikari, and Steven Taylor. 2013. Modeling for proximate analysis and heating value of torrefied biomass with vibration spectroscopy. *Bioresource Technology*. Vol. 133, pp. 1-8. 7. Vaishnavi Srinivasan, Sushil Adhikari, Shyamsundar Ayalur Chattanathan and Sunkyu Park. 2012. Catalytic pyrolysis of torrefied biomass for hydrocarbons production. *Energy & Fuels* Vol. 26 (12), pp 7347–7353

Thesis and Dissertation: 1. Gurdeep Herar: M.S. Biosystems Engineering. Physicochemical and Ignition Properties of Dust from Loblolly Pine. Auburn University, Auburn, AL. 2. Qun Wang: M.S. Biosystems Engineering. Rapid Characterization of Biomass. Auburn University, Auburn, AL. 3. Vaishnavi Srinivasan: M.S. Biosystems Engineering. Catalytic Pyrolysis of Thermally Pre-Treated Biomass for Aromatic Production. Auburn University, Auburn, AL. 4. Simerjeet Virk: M.S. Biosystems Engineering. Development of moisture sensor technology to enhance conveyance and field distribution of broiler litter. Auburn University, Auburn, AL.

Presentations: 1. Olatunde, G., Fasina, O., McDonald, T. and Adhikari, S. Effect of size on physical and aerodynamic properties of loblolly pine wood. ASABE Annual Presentation, Kansas City, MO July 21-24. 2. Fasina, O., Wadkins, J. and Shrestha, A. 2013. Friction Properties of Ground Loblolly Pine Chips. ASABE Annual Presentation, Kansas City, MO July 21-24. 3. Herar, G., Fasina, O., Adhikari, S., and Fulton, J. 2013. Heating and Ignition Risks of Bioamss Dusts – Particle Size Effects. ASABE Annual Presentation, Kansas City, MO July 21-24. 4. Thaper, R., Fulton, J., McDonald, T., Fasina, O., Wood, W. and Virk, S. 2013. Potential segregation issues when applying blended fertilizers with spinner-disc spreaders. ASABE Annual Presentation, Kansas City, MO July 21-24. 5. Thaper, R., Fulton, J., McDonald, T., Fasina, O., Wood, W. and Virk, S. 2013. Impact of vane design on particle behavior and distribution for spinner-disc spreaders. ASABE Annual Presentation, Kansas City, MO July 21-24. 6. Virk, S., Fulton, J.P., Fasina, O., McDonald, T. 2013. Real-time moisture measurement of broiler litter using capacitance and near-infrared techniques. ASABE Annual Presentation, Kansas City, MO July 21-24.

Alaska: Dickerson, T.B. and Soria J.A. (2013). Catalytic Fast Pyrolysis: A Review. *Energies*, 6, 514-538

Thesis and Dissertation: Theodore Dickerson M.S. Title: Catalytic Fast Pyrolysis Using Multiple Catalysts Simultaneously in a Micro-Scale Reactor.

Arkansas: 1. Bunnell K, Rich A, Luckett C, Wang Y, Martin E and Carrier DJ. (2013). “Plant maturity effects on the physiochemical properties and dilute acid hydrolysis of switchgrass hemicellulose.” *Sustainable Chemistry and Engineering* 1:649–654. 2. Clausen E, Lay J, Gidden J and Carrier DJ. (2013). “Separation of xylose oligomers using centrifugal partition chromatography with a butanol-methanol-water system.” *Journal of Industrial Microbiology* 40:51-62. 3. Arora A, Martin E, Pelkki M and Carrier DJ. (2013). “The effect of formic acid and

furfural on the enzymatic hydrolysis of cellulose powder and dilute acid-pretreated poplar hydrolysates.” Sustainable Chemistry and Engineering 1: 23-28. 4. Frederick N, Zhang N, Djiroleu A, Ge X, Xu J and Carrier DJ. (2013). “The effect of washing dilute acid pretreated poplar biomass on ethanol yields.” In Sustainable Degradation of Lignocellulosic Biomass - Techniques, Applications and Commercialization. Anuj K.Chandel and Silvio Silv rio da Silva Editors. InTech Publishers, Janeza Trdine 9, 51000 Rijeka, Croatia. Pp. 105-118.

Thesis and Dissertation:Kris Bunnell, PhD thesis 05/31/2013 “Characterization and Quantification of Monomers, Oligomers, and By-products from Switchgrass Hemicelluloses during Biomass Pretreatment. “Presentations: Kris Bunnell, Jackson O. Lay Jr., and Danielle Julie Carrier. Pretreatment of switchgrass (*Panicum virgatum*, L.) hemicellulose. 35th Symposium on Biotechnology for Fuels and Chemicals. Portland, OR. April 30 to May 3, 2013. (Poster).Angele Djiroleu, Elizabeth Martin, Matthew Pelkki, and Danielle Julie Carrier. Xylose and glucose yields from dilute acid pretreatment and enzymatic hydrolysis of mixed hardwood. 35th Symposium on Biotechnology for Fuels and Chemicals. Portland, OR. April 30 to May 3, 2013. (Poster).Danielle Julie Carrier. Solvent-free extraction and centrifugal partition chromatography separation. Natural Health Product Research Society of Canada. 10th NHP Research Conference. Windsor, Ontario, Canada. May 15th, 2013 (Plenary Lecture).

Danielle Julie Carrier. Separation of phytochemicals and xylose oligomers using centrifugal partition chromatography (CPC). 8th International Starch Conference, University of Illinois Urbana Champaign, IL. June 2, 2013. (Lecture).Philip G. Crandall, Dinesh Babu, Danielle Julie Carrier, Matthew Pelkki and Elizabeth Martin. Sweetgum bark: Production of extract and evaluation of its antimicrobial properties. Institute for Food Technology. Chicago, IL. July 2013. (Poster).Nathan Holeman and Thomas A. Costello. Bioremediation of swine wastewater using attached algae production. The National Agricultural and Biotechnology Council Conference. Fayetteville, AR. June 11-13, 2012. (Poster).Nathan Holeman, Wen Zhang, Marty Matlock, D. Julie Carrier and Thomas A. Costello. Design of a swine wastewater treatment facility to produce periphytic algae as a biomass energy feedstock. The Institute of Biological Engineering Annual Conference. Raleigh, NC. March 7-9, 2003.Target audience includes scientific peers, undergraduate and graduate students, grass root groups interested in renewable energy, and elected officials. Project results will be disseminated through formal peer-reviewed publications, classroom teaching, on-line teaching, internships with undergraduate students, and extension to state officials and interested participants.

California: Liu, G., R. Zhang, H. El-Mashad, R. Dong and X. Liu.2012. Biogas production from green and food wastes using anaerobic phased solids digester system. Applied Biochemistry and Biotechnology. 168:78-90. DOI 10.1007/s12010-011-9322-z. Kim. H. S. Moon, A. Abug, S. Choi, R. Zhang, Y. Oh. 2012. Effect of fermentation conditions on biohydrogen production from lipid-rich food material. International Journal of Hydrogen Energy. 37:15062-15069.Zhang, R.H., S. Zicari, C. Chang, N. Aramrueang. 2012. Ethanol Production from Sugar Beets, Research report submitted to California Energy Commission. Zheng Y, Lee C, Yu C, Cheng Y-S, Zhang R, Jenkins BM, VanderGheynst JS. 2013. Dilute acid pretreatment and fermentation of sugar beet pulp to ethanol. Applied Energy 105(0):1-7.Cheng Y-S, Zheng Y, Labavitch JM, VanderGheynst JS. 2013. Virus infection of *Chlorella variabilis* and enzymatic saccharification of algal biomass for bioethanol production. Bioresource Technology 137:326-331.Zheng Y, Lee C, Yu C, Cheng Y-S, Simmons CW, Zhang R, Jenkins BM, VanderGheynst JS. 2012. Ensilage and Bioconversion of Grape Pomace into Fuel Ethanol. Journal of Agricultural and Food Chemistry 60(44):11128-11134.Thy, P., C.W. Yu, B.M. Jenkins and Leshner, C.E.. 2013. Inorganic composition and

environmental impact of biomass feedstock. *Energy & Fuels* 27:3969-3987. Thy, P., C.W. Yu, S.L. Blunk and B.M. Jenkins. 2013. Inorganic composition of saline irrigated biomass. *Water, Air, and Soil Pollution* 224(7):1617 (pp 1-17). Hildebrand, A., Schlacta, T., Warmack, R., Kasuga, T., and Fan, Z. (2013) Engineering *Escherichia coli* for improved ethanol yield from gluconate, *Journal of Biotechnology*, In press. Wu, W., Hildebrand, A., Kasuga, T., Xiong, X., and Fan, Z. (2013) Direct cellobiose production from cellulose using sextuple beta-glucosidase gene deletion *Neurospora crassa* mutants, *Enzyme and Microbial Technology*, 52, 184-189.

Recent Presentations: Jenkins, B.M. 2013. Systems Analysis in Bioenergy Development and Optimization. Brigham Young University, February. Jenkins, B.M. 2013. Energy and Sustainability. International Symposium on Biorefinery, Beijing University of Chemical Technology, Beijing, China. Jenkins, B.M. 2013. Biofuel supply estimation and geospatial modeling for large-scale biorefinery optimization. International Symposium on Biorefinery, Beijing University of Chemical Technology, Beijing, China. Zicari, S., R. Zhang, N. Aramurueang, A. Kendall, S. Kaffka, J. Tischer and J. Manternach: 2013. Sugar beets for advanced bioethanol and biogas production in California, Poster. Li, J. S. Zicari and R. Zhang. 2013. Effects of moisture content and storage time on the methanogenic activities of anaerobic sludge. Paper presented at ASABE 2013 Annual International Meeting. July 20-23, Kansas City, KS. Hildebrand, A., Schlacta, T., Warmack, R., Kasuga, T., and Fan, Z. (2013) Engineering *Escherichia coli* for improved ethanol yield from gluconate, Presented at 35th Symposium on Biotechnology for Fuels and Chemicals, Portland, OR. Aramurueang, N. S. Zicari, J. Li, S. Kaffka, J. Tischer and R. Zhang. 2012. Characterization and compositional analysis of herbaceous crops for biofuel production, Presentation at ASABE Annual International Meeting. July 29-August 1. Dallas, Texas. Aramurueang, N. S. Zicari, K. Williams and R. Zhang. 2012. Enzymatic hydrolysis of sugar beet leaves for biofuel production, . Presentation at ASABE Annual International Meeting. July 29-August 1. Dallas, Texas.

Hawaii: OUTPUTS (Related Publications and Presentations) Peer Reviewed: 1. K.C., S., Hashimoto, A.G., and Khanal, S. K. Biogas as a sustainable energy source for the developing countries: Opportunities and challenges. *Renewable and Sustainable Energy Reviews* (in-press). 2. K.C., S., Takara, D. Jasinski, J. and Khanal, S. K. (2013). Household anaerobic digester for bioenergy production in developing countries: opportunities and challenges. *Environmental Technology* (in-press). 3. Ilukpitiya, P., Yanagida, J.F., Ogoshi, R., and Uehara, G. (2013). Sugar-ethanol-electricity co-generation in Hawaii: An application of Linear Programming (L.P.) for optimizing strategies. *Journal of Biomass and Bioenergy* 48: 203-212. 4. Devappa, R.K., Bingham, J-P., and Khanal, S.K. (2013). High performance liquid chromatography method for rapid quantification of phorbol esters in *Jatropha curcas* seed. : *Industrial Crops & Products*. 49: 211-219. 5. Nitayavardhana, S., Kerati, I, Pavasant, P., and Khanal, S. K. 2013. Production of protein-rich fungal biomass in an airlift bioreactor using vinasse as substrate. *Bioresource Technology*. 133:301–306. 6. Zhen, H., Lee, J. W., Chandran, K., Kim, S., Sharma, K., and Khanal, S. K. 2013. Nitrous oxide emission from intensive aquaculture system. *Bioresource Technology*. 130: 314-320. 7. Lee, K.H., Park, K.Y., Khanal, S.K. Lee, J.W. 2013. Effects of Household Detergent on Anaerobic Fermentation of Kitchen Wastewater from Food Waste Disposer. *Hazardous Materials*. 244: 39-45. 8. Takara, D., Nitayavardhana, S., Munasinghe, P.C, K.C., S., and Khanal, S. K. 2012. Sustainable Bioenergy from Biofuel-Derived Residues. *Water Environment Research*. 84: 1568-1585. Thesis and Dissertation: 1. Takara, D., Green Processing of Napier Grass for Generation of Biofuel and Biobased Products. PhD dissertation, University of Hawaii at Manoa. Ann Arbor: ProQuest UMI. 2012. 2. Nitayavardhana, S., Protein-rich Fungal Biomass Production on

Sugarcane Vinasse for Animal Feed Applications with Concomitant Water Reclamation. PhD dissertation, University of Hawaii at Manoa. Ann Arbor: ProQuest UMI. 2012.3.Munasinghe, P., Mass Transfer Evaluation and Analytical Modeling Using Composite Hollow Fiber (CHF) Membrane for Syngas Fermentation to Biofuels. PhD dissertation, University of Hawaii at Manoa. Ann Arbor: ProQuest UMI. 2012.4.LeRoy, M. , Ultrastructural Changes Associated with Different Pretreatments on Napier grass. M.S. thesis, University of Hawaii at Manoa. Ann Arbor: ProQuest UMI. 2012.5.Wong M., Mass Transfer Evaluation of Fungal Fermentation. M.S. thesis, University of Hawaii at Manoa. 2013.6.Robertson, N., Life Cycle Analysis of Napier Grass for Biofuel Production. M.S. thesis, University of Hawaii at Manoa. 2013.Conference Proceedings and Presentations:1.Khanal, S.K. Key Note Speaker, Research Internships in Science and Engineering Scholar (RISE) Meeting (Jul 4, 2013), International education and research experience Organized by DAAD Germany at Heidelberg University, Heidelberg, Germany. 2.Hashimoto, A. Conversion High-Yield Tropical Biomass into Sustainable Biofuels. Green Initiative for Fuels Transition Pacific (GIFTPAC, working group for the U.S. Department of Defense Joint Forces Command) meeting, Honolulu, HI June 21, 2013.3.Khanal, S.K. State Institute of Agricultural Engineering and Bioenergy, Hohenheim University, Stuttgart, Germany (Jun 4, 2013). Bioenergy/biobased products and environmental biotechnology research. 4.Hashimoto, A. University of Hawaii BRDI Project. S-1041-The Science and Engineering for a Biobased Industry and Economy Annual Meeting. Kahului, Maui. June 17, 2013. 5.Ogoshi, R., A. Youkhana, L. Jakeway, M. Nakahta, and P. Shingaki. Feedstock Crop Trials for Hawaii and the Tropics. S- 1041-The Science and Engineering for a Biobased Industry and Economy Annual Meeting, Kahului, Maui, HI, June 17-18, 2013.6.Khanal, S.K and Takara D. Biorefining tropical feedstocks for biofuel and biobased products. In conference proceedings of 1st International Congress on Bioenergy, Portalegre, Portugal, May 23-25, 2013.7.Hashimoto, A. High-Yield Feedstock and Biomass Conversion Technology for Renewable Energy and Economic Development. U.S. Department of Energy Bioenergy Technologies Office Project Peer Review, Alexandria, VA, May 20, 2013.8.Mochizuki, Junko, John F. Yanagida, Richard Ogoshi, Tomoaki Miura, and PingSun Leung. "GIS analysis of an optimal plant location—the case of Banagrass-based bioethanol production in Hawaii." Paper presentation, College of Tropical Agriculture and Human Resources, Student Research Symposium, University of Hawaii, April 12-13, 2013.9.Mochizuki, Junko, John F. Yanagida, Devin Takara, Deepak Kumar, and Ganti S. Murthy. "Life cycle assessment of ethanol production from tropical Banagrass (*Pennisetum purpureum*) using green and non-green processing technology in Hawaii." Poster presentation, College of Tropical Agriculture and Human Resources, Student Research Symposium, University of Hawaii, April 12-13, 2013. 10.K.C., S., and Khanal, S.K. Ensilage strategy to pretreat green grass for enhanced biomethane production (Oral presentation). 27th Annual Biocycle West Coast Conference 2013, San Diego, CA, Apr. 9-11, 2013. 11.Khanal, S.K. Center for Energy and Environment Policy, Imperial College London (Oct 26, 2012). Current status of bioenergy research in the United States.12.Takara, D., Hashimoto, A.G, and Khanal, S.K. Green processing: a biorefinery perspective. In conference proceedings of Sun Grant National Conference: Science for Biomass Feedstock Production and Utilization, New Orleans, LA, Oct. 2-5, 2012. (http://sungrant.tennessee.edu/NR/rdonlyres/DDF120E1-C312-4065-B095_6EC87BD11DA8/3650/317Khanal_Samir.pdf).13.Hashimoto, A., Arnold, J., Ayars, J., Crow, S., Eggeman, T., Jakeway, L., Karkee, M., Khanal, S., Kiniry, J., Matsunaga, J., Meki, N., Murthy, G., Nakahata, M., Ogoshi, R., Turano, B., Turn, S., Yanagida, J., and Zhang, Q. High-Yield Tropical Biomass for Advanced Biofuels. Sun Grant National Conference, New

Orleans, LA, October 3-5, 2012 (http://sungrant.tennessee.edu/NR/rdonlyres/3880A277-C502-4EC9-9DEBC385186A5C85/3706/214Hashimoto_Andy.pdf).14.Pawlowski, M., Crow, S.E., Deenik, J.L., Evensen, C. Linking soil and water conservation practices to greenhouse gas flux and fine root dynamics: A comparison of sugarcane and Napier grass grown for bioenergy production. ASA, CSSA, and SSSA International Annual Meetings, Cincinnati, OH, October 2012.15.Hashimoto, A.G. Farming and Energy: Sustainability in America. National Association of State Energy Officials. Minneapolis, MN, September 10-12, 2012.16.Sumiyoshi, Y., Crow, S.E., Litton, C.M., Deenik, J.L., Turano, B., and Taylor, A. Belowground carbon cycle of Napier and Guinea grasses grown for biofuel feedstock production. ASA, CSSA, and SSSA International Annual Meetings, Cincinnati, OH, October 2012.17.Takara, D., Hashimoto, A.G., and Khanal, S.K. Green processing of dedicated energy crops for biofuel and biobased products. International Conference on Challenges in Environmental Science and Engineering (CESE) 2012, Melbourne, Australia, September 9-13, 2012.18.Munasinghe, P.C. and Khanal, S.K. Evaluation and analytical modeling of carbon monoxide and hydrogen mass transfer using a composite hollow fiber (CHF) membrane bioreactor in syngas fermentation. International conference on Challenges in Environmental Science and Engineering (CESE) 2012, Melbourne, Australia, September 9-13, 2012.19.Nitayavardhana, S., Issarapayup, K., Pavasant, P. and Khanal, S.K. Biofuel residues conversion into aquatic feed via fungal fermentation. International Conference on Challenges in Environmental Science and Engineering (CESE) 2012, Melbourne, Australia September 9-13, 2012. Target audience included: presentations to fellow bioenergy researchers (Multi-state Project S-1041 "The Science and Engineering for a Biobased Industry and Economy," Sun Grant Association, USDOE Bioenergy Technologies Office), presentations at national and international meetings (Crop Sciences Society of America, Agronomy Society of America, Soil Science Society of America, National Association of State Energy Officials, International Conference on Challenges in Environmental Science and Engineering), student symposia (College of Tropical Agriculture and Human Resources Student Research Symposium), and community and elementary students (experiment station field days and elementary school outreach).

Illinois: OUTPUTS: Publications (Sept 2012 – July 2013 not previously reported)Refereed PublicationsKhullar, E., Dien, B.S., Rausch, K.D., Tumbleson, M.E. and Singh, V. 2013. Effect of particle size on enzymatic hydrolysis of pretreated Miscanthus. *Ind. Crops Prod.* 44:11-17.Khullar, E., Kent, A.D., Leathers, T.D., Bischoff, K.M., Rausch, K.D., Tumbleson, M.E. and Singh, V. 2013. Contamination issues in a continuous ethanol production corn wet milling facility. *World J Microbio. Biotechnol.* 29:891-898. Chen, M.-H., Kaur, P., Dien, B.S., Below, F., Vincent, M.L. and Singh, V. 2013. Use of tropical maize for bioethanol production. *World J Microbio. Biotechnol.* (online version) ISSN 0959-3993. DOI 10.1007/s11274-013-1317-1. AbstractsChalla, R.K., Johnston, D.B., Singh, V., Tumbleson, M.E., Engeseth, N.J. and Rausch, K.D. 2012. Fouling rates of synthetic thin stillage. Abstract 602ah. Proceedings: American Institute of Chemical Engineers Annual Meeting, Pittsburg, PA.Challa, R.K., Zheng, Y., Johnston, D.B., Tumbleson, M.E., Singh, V. and Rausch, K.D. 2012. Accelerated fouling rates of synthetic thin stillage. Abstract. In: Proc. AACC International annual meeting. AACC International. St. Paul, MN.Chen, M.-H., Dien, B.S., Rausch, K.D., Tumbleson, M.E. and Singh, V. 2012. Production of xylooligosaccharide (XOS) coproducts from *Miscanthus x giganteus*. Abstract. In: Proc. AACC International annual meeting. AACC International. St. Paul, MN.Khullar, E., Dien, B.S. Rausch, K.D., Tumbleson, M.E. and Singh, V. 2012. Effect of particle size on enzymatic hydrolysis of pretreated miscanthus. Abstract 602an. American Institute of Chemical Engineers Annual Meeting,

Pittsburg, PA. Zheng, Y., Challa, R.K., Johnston, D.B., Singh, V., Tumbleson, M.E. and Rausch, K.D. 2012. Effects of insoluble solids content on evaporator fouling during thin stillage concentration. Abstract. In: Proc. AACC International annual meeting. AACC International. St. Paul, MN. Proceedings Plumier, B.M., Danao, M.C., Singh, V. and Rausch, K.D. 2013. Analysis and prediction of unreacted starch content in corn using FT-NIR spectroscopy. ASABE Paper No. 1596314. American Society of Agricultural and Biological Engineers, St. Joseph, MI. PARTICIPANTS: A. Principal Investigators: SY Kent Rausch ABE 0.1 Vijay Singh ABE 0.1 Mike Tumbleson ABE 0.1 B. Co-Investigators Bruce Dien NCAUR, ARS David Johnston ERRC, ARS C. Graduate Students Ravi Challa ABEMing-Hsu Chen ABE Song Li ABE Divya Ramachandran ABE Yingying Zheng ABE University of Illinois – Department of Agricultural and Biological Engineering (ABE), College of Agricultural, Consumer and Environmental Sciences. Eastern Regional Research Center (ERRC) – ARS, USDA, Wyndmoor, PA. National Center for Agricultural Utilization Research (NCAUR) – ARS, USDA, Peoria, IL. **Indiana** Castro, J., Li, W., Pour-Ghaz, M., Tao, B., Sun, H., Weiss, W. J. Durability of Saw-Cut Joints in Plain Cement Concrete Pavements. Publication FHWA/IN/JTRP-2011/22. Joint Transportation Research Program, Indiana Department of Transportation and Purdue University, West Lafayette, Indiana, 2012 Coates, K, Tao, B. and J. Weiss, Can Soy Methyl Esters Improve Concrete Pavement Joint Durability: J. Transport. Research Board, Paper 12-1656, 2013 U.S. Patent Application Serial No. 13/344,140 Thesis and Dissertation: Kahn, J. L., Exploring Alternative Bioconjugation Methods for Covalent Linkage of DNA and Peptides, MS Thesis, Purdue University 2012 **Iowa**: 1. Kim, T.H., Yoo, C.G., and Lamsal, B. P. 2013. Front-end recovery of protein from wet biomass and its effects on chemical pretreatment and enzymatic hydrolysis of partially deproteinized fiber; Bioprocess and Biosystems Engineering, 36: 687-694. 2. Kadam, D.M., Thunga, M., Wang, S., Kessler, M.R., Grewell, D. Lamsal, B. P., Yu, C. 2013. Preparation and characterization of whey protein isolate films reinforced with porous silica coated titania nanoparticles, In press, Journal of Food Engineering, 117: 133–140. 3. Gerde JA, Wang T, Yao L, Jung S, Johnson LA, Lamsal B. Optimizing protein isolation from defatted and non-defatted nanochloropsis microalgae biomass, Algal Research, 2: 145-153, 2013 4. de Moura Bell, J.M.L.N, Maurer D., Yao L., Wang T., Jung S., Johnson L.A. Characteristics of oil and skim in enzyme-assisted aqueous extraction of soybeans, Journal of American Oil Chemists Society, 90: 1079-1088, 2013 5. Karki B., Maurer D., Kim H., Jung S., Ethanol production from soybean fiber, a co-product of soybean oil extraction, using aqueous ammonia soaking, Journal of American Oil Chemists Society, 89: 1345-1353, 2012 6. Ayadi, F., K. A. Rosentrater, and K. Muthukumarappan. 2012. A review of alternative protein sources in aquaculture feeds. Journal of Aquaculture Feed Science and Nutrition 4(1): 1-26. 7. Barnes, M. E., M. L. Brown, K. A. Rosentrater, and J. R. Sewell. 2012. An initial investigation replacing fish meal with a commercial fermented soybean meal product in the diets of juvenile rainbow trout. Open Journal of Animal Sciences 2(4): 234-243. 8. Barnes, M. E., M. L. Brown, and K. A. Rosentrater. 2012. Initial observations on the inclusion of high protein distillers dried grain into rainbow trout diets. Open Fish Science Journal 5: 21-29. 9. Barnes, M. E., M. L. Brown, and K. A. Rosentrater. 2012. Juvenile rainbow trout responses to diets containing distillers dried grain with solubles, phytase, and amino acid supplements. Open Journal of Animal Sciences 2(2): 69-77. 10. Bhadra, R., K. A. Rosentrater, and K. Muthukumarappan. 2012. Effects of CDS and drying temperature levels on the flowability behavior of DDGS. Drying Technology 30: 542-558. 11. Bhadra, R., K. A. Rosentrater, and K. Muthukumarappan. 2012. Effects of varying condensed distillers solubles, drying and cooling

temperatures on glass transition temperature of distillers dried grains. *Canadian Biosystems Engineering* 53: 3.9-3.18.12.Brudecki, G., I. Cybulska, K. A. Rosentrater, and J. L. Julson. 2012. Optimization of clean fractionation processing as a pre-treatment technology for prairie cordgrass. *Bioresource Technology* 107: 494-504.13.Cybulska, I., G. Brudecki, K. A. Rosentrater, H. Lei, and J. L. Julson. 2012. Catalyzed modified clean fractionation of prairie cord grass integrated with hydrothermal post-treatment. *Bioresource Technology* 46 (November): 389–401.14.Cybulska, I., G. Brudecki, K. A. Rosentrater, J. L. Julson, and H. Lei. 2012. Comparative study of organosolv lignin extracted from prairie cordgrass, switchgrass and corn stover. *Bioresource Technology* 118: 30-36.15.Fallahi, P., K. Muthukumarappan, K. A. Rosentrater, and M. L. Brown. 2012. Twin-screw extrusion processing of vegetable-based protein feeds for yellow perch (*Perca flavescens*) containing distillers dried grains, soy protein concentrate, and fermented high protein soybean meal. *Journal of Food Research* 1(3): 230-246. 16.Lehman, R. M. and K. A. Rosentrater. 2012. Aerobic stability of distillers wet grains as influenced by temperature. *Journal of the Science of Food and Agriculture* 3 AUG 2012, DOI: 10.1002/jsfa.5803.17.Mjoun, K., K. A. Rosentrater, and M. L. Brown. 2012. Culture performance and tissue fatty acid compositions of yellow perch (*Perca flavescens*) fed different dietary lipids. *Aquaculture* 360-361: 17-24. 18.Morgan, D. K. J., C. J. R. Verbeek, K. A. Rosentrater, and B. J. Hicks. 2012. The palatability of flavoured novel floating pellets made with brewer's spent grain to captive carp. *New Zealand Journal of Zoology* 24 Sep 2012, DOI: 10.1080/03014223.2012.719912. 19.Rosentrater, K. A. and E. Kongar. 2012. Biofuel coproduct densification: techno-economic assessment. *Encyclopedia of Energy Engineering and Technology* DOI: 10.1081/E-EEE-120047375: Feb: 1-9.20.Schaeffer, T. W., M. J. Hennen, M. L. Brown, and K. A. Rosentrater. 2012. Nutritional composition and use of common carp muscle in yellow perch diets. *North American Journal of Aquaculture* 74: 297-305. 21.Schaeffer, T., M. L. Brown, and K. A. Rosentrater. 2012. Growth and stress resistance of advanced size Nile tilapia fed diets containing fuel-based DDGS and yeast. *Journal of Applied Aquaculture* 24: 1-11.Antunez, P. D., M. B. Omary, K. A. Rosentrater, M. Pascall, and L. Winstone. 2012. Effect of an oxygen scavenger on the stability of preservative free flour tortillas. *Journal of Food Science* 77(1): S1-S9. DOI: 10.1111/j.1750-3841.2011.02470.x. Published online 02 Dec. 2011.**Kansas:** Peer Reviewed:X. Wu, A. Maier, T. Wu, N. Li, J. Pedersen, and D. Wang. 2013. Evaluation of Nebraska Waxy Sorghum Hybrids for Ethanol Production. *Cereal Chemistry* 90(3): 198-203.F. Xu, Y-C. Shi, and D. Wang. 2013. Towards understanding structural changes of photoperiod-sensitive sorghum biomass during sulfuric acid pretreatment. *Bioresource Technology* 135 (2013):704-709.Q. Zhang, P.F. Zhang, Z.J. Pei, and D. Wang. 2013, "Ultrasonic vibration-assisted pelleting for cellulosic biofuel manufacturing: investigation on power consumption. *Renewable Energy*. 55:175-781.F. Xu, Y-C Shi, and D. Wang. 2013. X-ray diffraction studies of lignocellulosic biomass: a review. *Carbohydrates Polymers* 94(2013) 904-917.Guragain Y, Wilson J, Staggenborg S, McKinney L, Wang D, Vadlani PV (2013) Evaluation of pelleting as a pre-processing step for effective biomass deconstruction and fermentation. *Biochemical Engineering Journal* DOI 10.1016/j.bej.2013.05.014Zhang Y, Kumar A, Vadlani PV*, Narayanan S (2012) Production of nitrogen-based platform chemical: cyanophycin biosynthesis using recombinant *Escherichia coli* and low-cost media substitutes. *Journal Chem Tech Biotechnol* DOI 10.1002/jctb.3978 Rigdon AR, Jumpponen A, Vadlani PV, Maier DE (2013) Impact of various storage conditions on enzymatic activity, biomass components and conversion to ethanol yields from sorghum biomass used as a bioenergy crop. *Bioresource Technology* 132 (2013) 269–275

N. Li, G. Qi, X.S. Sun, and D. Wang. 2012. Effects of Sodium Bisulfite on the Physicochemical and Adhesion Properties of Canola Protein Fractions. *J. Polymers and Environment* (2012) 20:905-915. PhD Dissertation: Li, N. 2013. Isolation, characterization and adhesion performance of sorghum, canola and camelina proteins. PhD Dissertation submitted to Kansas State University. M.S. Thesis: Linnerbur, K.H. 2013. Analysis of torrefaction of big bluestem biomass and biomass from the conservation reserve program. MS Thesis submitted to Kansas State University. Hale, K. 2013. The potential of canola protein for bio-based wood adhesives. MS Thesis submitted to Kansas State University. Presentations: D. Wang, L. Liu, A. Maier, N. Klocke, S. Yan, D. Rogers, and T. Tesso. 2013. Impact of deficit irrigation on sorghum physical and chemical properties and ethanol yield. ASABE Annual Meeting, 7/21 to 7/24, 2013, Kansas City, MO. Paper No. 131591633. K. Zhang, L. Johnson, R. Nelson, W. Yuan, Z.J. Pei, and D. Wang. 2013. Thermal properties of big bluestem as affected by ecotype and planting location along the precipitation gradient of the Great Plains. ASABE Annual Meeting, 7/21 to 7/24, 2013, Kansas City, MO. Paper No. 131591985. G. Qi, N. Li, D. Wang, X.S. Sun. 2013. Adhesion and physicochemical properties of soy protein adhesives modified by sodium bisulfate. ASABE Annual Meeting, 7/21 to 7/24, 2013, Kansas City, MO. Paper No. 131618387. N. Li, D. Wang, X.S. Sun, and G. Qi. 2013. Isolation and characterization of camelina proteins from camelina meal. ASABE Annual Meeting, 7/21 to 7/24, 2013, Kansas City, MO. Paper No. 131591989. D. Wang, L. Liu, N. Klocke, D. Rogers, F. Lamm, and A. Schlegel. 2013. Impact of deficit irrigation on crop physical and chemical properties and ethanol yield. The Proceedings of The Eight International Starch Technology Conference, pp62-79, K. Rausch, V. Singh, and M. Tumbleson eds., University of Illinois,ampaign, IL. D. Wang. 2013. Biofuel from cellulosic biomass. The 245th ACS National Meeting & Exposition. 4/7-11, 2013, New Orleans, Louisiana (Invited). D. Wang. 2013. Improving the efficiency of biomass conversion to fuels and chemicals. Kansas State University Bioenergy Symposium. 4/11, 2013, Manhattan, KS. E. Kennedy, P. Zhang, Q. Zhang, Z.J. Pei, and D. Wang. 2013. Effects of ultrasonic vibration-assisted pelleting of biomass on sugar yield in biofuel manufacturing with different pretreatment methods. ASME 2013 Manufacturing Science and Engineering Conference, 6/10-14, 2013, Madison, WI. Q. Zhang, P. Zhang, S.I. Chang, Z.J. Pei, and D. Wang. 2013. Application of multiple response methodology for optimization of cellulose ethanol manufacturing by ultrasonic vibration-assisted pelleting. ASME 2013 Manufacturing Science and Engineering Conference, 6/10-14, 2013, Madison, WI. D. Wang, L. Liu, N. Klocke, D. Rogers, F. Lamm, and A. Schlegel. 2013. Impact of deficit irrigation on grain physical and chemical properties and ethanol yield. Ogallala Aquifer Program Workshop. 3/5-7, 2013, Amarillo, TX. X.S. Sun and D. Wang. 2013. Biobased adhesives and coatings from plant based polymers. European Coatings Conference on Biobased Adhesives. 2/21-22, 2013, Düsseldorf, Germany. **Kentucky:** Modenbach, A.A., Nokes, S.E. Reaction mechanism and biomass structural changes associated with sodium hydroxide pretreatment. Transactions of the ASABE. (Accepted). Modenbach, A.A., Nokes, S.E. 2012. The use of high-solids loadings in biomass pretreatment – A review. *Biotechnology and Bioengineering*. 109(6): 1430-1442. W. Yao, S. Nokes. 2012. Perspective: The use of co-culturing in solid substrate cultivation. *Biofuels, Bioproducts & Biorefining*. In press. Modenbach, A.A., Nokes, S.E. 2013. Enzymatic hydrolysis of biomass at high-solids loadings – A review. *Biomass and Bioenergy*. 56: 526-544. W. Yao, S. Nokes. 2012. Phanerochaete chrysosporium pretreatment of biomass to enhance solvent production using solid-substrate Cultivation. *Biomass and Bioenergy*. In review process. Petti, C., Shearer, A., Tateno, M., Ruwaya, M., Nokes, S., Brutnell, T., & Debolt, S. Comparative feedstock analysis in *Setaria*

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Louisiana:[1] A. Silaban, R. Bai, M. T. Gutierrez-Wing, Ioan Negulescu and K. A. Rusch. Effect of organic carbon, C:N ratio and light on the growth and lipid productivity of microalgae /cyanobacteria co-culture. *Eng. Life Sci.* 2013, DOI: 10.1002/elsc.201200219.[2] R. Bai, A. G. Silaban, M. T. Gutierrez-Wing, M. G. Benton, Ioan I. Negulescu, and K. A. Rusch. Silver nanofiber assisted lipid extraction from biomass of a Louisiana *Chlorella vulgaris/ Leptolyngbya* sp. co-culture. *Chem. Eng. J.* 2013, <http://dx.doi.org/10.1016/j.cej.2013.03.075>[3] C. Rosu, W. H. Daly, Ioan I. Negulescu, P. S. Russo and R. Laine. (2013). Polyamides from Ethyl Bis-Ketal Galactarates. *J. Macromol. Sci. Pure Appl. Chem.* A50 (9), in print[4] Negulescu, I. and Uglea, C.V. 2013. Polymeric Micelles, Chapter 7 In M. Popa and C.V. Uglea (eds), *Polymeric Nanomedicines*. Bentham Science Publishers, Sharjah, UAE, p. 251-292.[5] Negulescu, I. Uglea, C.V. and Popa, M. 2013. Polymeric Nanomedicines: Between Tradition and Innovation, *Polymeric Nanomedicines*, Chapter 21 In M. Popa and C.V. Uglea (eds), *Polymeric Nanomedicines*. Bentham Science Publishers, Sharjah, UAE, p. 783-790.

Minnesota: Peer reviewed papers 1. Zhenyi Du, Xiaochen Ma, Yun Li, Paul Chen, Yuhuan Liu, Xiangyang Lin, Hanwu Lei, Roger Ruan. 2013. Production of aromatic hydrocarbons by catalytic pyrolysis of microalgae with zeolites: Catalyst screening in a pyroprobe. *Bioresource Technology* 10.1016/j.biortech.2013.04.0532. Wenguang Zhou, Min Min, Bing Hu, Xiaochen Ma, Yuhuan Liu, Qin Wang, Jian Shi, Paul Chen, Roger Ruan. 2013. Filamentous fungi assisted bio-flocculation: A novel alternative technique for harvesting heterotrophic and autotrophic microalgal cells. *Separation and Purification Technology* 107 (2013) 158–165. 3. Bing Hu, Wenguang Zhou, Min Min, Zhenyi Du, Paul Chen, Xiaochen Ma, Yuhuan Liu, Hanwu Lei, Jian Shi, Roger Ruan. 2013. Development of an effective acidogenically digested swine manure-based algal system for improved wastewater treatment and biofuel and feed production. *Applied Energy* 107(2013):255-263. 4. Zhenyi Du, Bing Hu, Xiaochen Ma, Yanling Cheng, Yuhuan Liu, Xiangyang Lin, Yiqin Wan, Hanwu Lei, Paul Chen, and Roger Ruan. 2013. Catalytic pyrolysis of microalgae and their three major components: carbohydrates, proteins, and lipids. *Bioresource Technology* 130(2013):777-782. 5. Wang, B., Y. Cheng, Y. Liu, P. Chen, D. Li, R. Ruan. 2012. Properties of rigid polyurethane foams prepared from recycled aircraft deicing agent with hexamethylene diisocyanate. *J. APPL. POLYM. SCI.* 2012, DOI: 10.1002/APP.37525. 6. Ma, W., Y. Liu, R. Ruan, X. Jiang, Y. Wang, Y. Wan, X. Wu, Y. Li. 2013. *Sapium sebiferum* (Chinese Tallow) – a promising energy plant for diesel (hydrocarbon fuel). *Advanced Materials Research* 608-609(2013):453-457. 7. Shi, A., Z. Du, X. Ma, Y. Cheng. M. Min, S. Deng, P. Chen. D. Li, R. Ruan. 2013. Production and evaluation of biodiesel and bioethanol from high oil corn using three processing routes. *Bioresource Technology* 128:100-106. 8. Du, Z., B. Hu, A. Shi, X. Ma, Y. Cheng, P. Chen, Y. Liu, X. Lin, and R. Ruan. 2012. Cultivation of a microalga *Chlorella vulgaris* using recycled aqueous phase nutrients from hydrothermal carbonization process. *Bioresource Technology* 126(2012):354-357. 9. Luo, Q., Peng, H., Zhou, M., Lin, D., Ruan, R., Wan, Y., Zhang, J., and Liu, Y. 2012. Alkali extraction and physicochemical characterization of hemicelluloses from young bamboo (*Phyllostachys pubescens* Mazel). *BioResources* 7(4), 5817-5828. 10. Peng, H., J. Zhang, Y. Liu, D. Liu, Z. Yu, Y. Wan, and R. Ruan. 2012. Structural

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Mississippi:Peer Reviewed Publications1.Zhang, Y., C., Wan, Q. Li, P.H. Steele, and F. Yu.

2013. Studies of Biochars Generated from Pilot-scale Downdraft Gasification. *Transactions of the ASABE*. 56(3): 995-1001. 2.Yan, Q., C. Wan, J. Liu, J. Gao, F. Yu, J. Zhang, and Z. Cai.

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15:1631-1640.3.Gu, M., Q. Li, P.H. Steele, G. Niu, and F. Yu. 2013. Growth of 'Fireworks' gomphrena grown in substrates amended with biochar. *Journal of Food, Agriculture & Environment*. 11(1):819-821. 4.Li, Q., P.H. Steele, F. Yu, B. Mitchell, and E.M. Hassan. 2013.

Pyrolytic spray increases levoglucosan production during fast pyrolysis. *Journal of Analytical and Applied Pyrolysis*. 100: 33-40 5.Li, Q., P.H. Steele, B. Mitchell, L. Ingram, and F. Yu. 2013.

The Addition of Water to Extract Maximum Levoglucosan from the Bio-oil Produced via Fast Pyrolysis of Pretreated Loblolly Pinewood. *Bioresources*. 8(2): 1868-1880 6.Yan, Q., F. Yu, Z. Cai, and J. Zhang. 2012. Catalytic upgrading nitrogen-riched wood syngas to liquid hydrocarbon mixture over a Fe-Pd/ZSM-5 catalyst. *Biomass and Bioenergy*. 47: 469-473 7.Yan, Q., F. Yu, J. Liu, J. Street, J. Gao, Z. Cai, and J. Zhang. 2012. Catalytic Conversion Wood Syngas to Synthetic Aviation Turbine Fuels over A Multifunctional Catalyst. *Bioresource Technology*.127:281-290 8.Wang, H., D. Livingston, R. Srinivasan, Q. Li, P. Steele, and F. Yu.

2012. Detoxification and fermentation of pyrolytic sugar for ethanol production. *Applied Biochemistry and Biotechnology*. 168:1568-1583 Presentations1.Yu, F. 2013. Process Development of Biomass to Wide-Cut Diesel via Gasification, Syngas Conditioning and Catalytic Conversion. BIT's 4th Annual Global Congress of Catalysis-2013. Dalian, China, June 29-July 1. Oral.2.Lu, Y., F. Yu, J. Hu, and P. Zhou. 2013. Higher alcohols synthesis from syngas over three-dimensionally ordered macroporous Cu-Fe bimetallic catalyst. 23rd North American Catalysis Society Meeting. Louisville, KY. June 2-7. Poster. 3.Yan, Q., and F. Yu. 2013.

Catalytic Conversion Wood Syngas to 'Wide Cut' Diesel over A Multifunctional Catalyst. 23rd North American Catalysis Society Meeting. Louisville, KY. June 2-7. Poster. 4.Street, J., F. Yu, E. Columbus, J. Wooten, and Q. Yan. 2013. Scale up of Gasoline-Range Hydrocarbon Production from Gasified Woody Biomass using a Bi-Functional Catalyst. 2013 Southeastern Conference (SEC) Symposium. Atlanta, GA, February 10-12. Poster.5.Lu, Y., F. Yu, J. Hu, and P. Zhou. 2013. Syngas to Higher Alcohols via Three-dimensionally Ordered Macroporous Cu-Fe Bimetallic Catalyst. 2013 Southeastern Conference (SEC) Symposium. Atlanta, GA, February 10-12. Poster.6.Yu, F. and E. Columbus. 2012. Biomass to Liquid Hydrocarbon Process via Catalytic Conversion on Carbon Encapsulated Iron Nanoparticles. S1041 (The Science and Engineering for a Biobased Industry and Economy) Symposium. Washington DC, August 6-7. Poster.

Missouri: Brune, D. E., C. Tucker, M. Massingill, and J. Chappell, 2012, Partitioned Aquaculture Systems, pp 308-342 in J.H. Tidwell, editor, *Aquaculture Production Systems*, Wiley-Blackwell, Oxford, UK, 2012. Presentations Brune, D. E., High-Rate Algal Ponds: Partitioned Aquaculture Systems & Split-Ponds, Catfish Farmers of America Annual Meeting, Little Rock Ark., Feb., 2012.Brune, D. E., Aquacultural Bioprocessing of Algal Biomass: A Bridge to Sustainable Seafood & Biofuel Co-Production, Aquaculture - 2013, Nashville, TN, Feb., 2013.Brune, D. E., Aquacultural Bioprocessing of Algal Biomass: Sustainable Seafood,

Feed & Biofuel Co-Production, Missouri Organic Association Meeting, Springfield, MO., Feb., 2013. **Montana** 2013 S-1041 Project Contributions Peer Reviewed: Lee, D.K., E. Aberle, C. Chen, J. Egenolf, K. Harmony, G. Kakani, R. Kallenbach, J.C. Castro. 2013. Nitrogen and harvest management of conservation reserve program (CRP) grassland for sustainable biomass feedstock production. *GCB Bioenergy* 5:6-15. M.S. Thesis: Porter, T.F. 2013. Comparison of three remote sensing methods to predict biomass on CRP pastureland. A M.S. Thesis submitted to Montana State University. Presentations: Chen, C. 2013. Potential of camelina sativa fitting into the pulse-cereal rotation systems in Montana. Western Society of Crop Science 2013 Annual Meeting, June 11-12, Pendleton, OR. Mohammed, Y.A., C. Chen, J. Hesser, and D.K. Lee. 2013. Biomass production and energy content of grass and alfalfa mixture in CRP land affected by nitrogen and harvest time in central Montana. Western Society of Crop Science 2013 Annual Meeting, June 11-12, Pendleton, OR. **Nebraska**: Peer Reviewed Wu, Hanjing, Milford A. Hanna, and David D. Jones. Optimization of energy efficiency for the gasification of feedlot manure using response surface methodology. *Journal of Industrial & Engineering Chemistry Research* (in press). Wu, Hanjing, Milford A. Hanna, and David D. Jones. Feedlot manure-derived biochar effects on nitrogen and phosphorus leaching. *Journal of Energy & Fuels* (in press). Wu, Hanjing, Milford A. Hanna, and David D. Jones. Life cycle assessment of greenhouse gas emissions of feedlot manure management practices: Land application and gasification. *Journal of Industrial & Engineering Chemistry Research* (in press). Wu, Hanjing, Milford A. Hanna, and David D. Jones. Feedlot Manure-Derived Biochar Effects on Nitrogen and Phosphorous Leaching. *Energy & Fuels* (submitted 12/3/12). Xu, Y.X., Sismour, E.N., Parry, J., Hanna, M.A., Li, H.W. 2012. Nutritional composition and antioxidant activity in hazelnut shells from US-grown cultivars. *International Journal of Food Science and technology*. 47(5): 940-946. Yang, Fangxia, Milford A. Hanna, and Runcang Sun. 2012. Value-added uses for crude glycerol—a byproduct of biodiesel production. *Biotechnology for biofuels*. 5:13 Yang, Fangxia, Milford A. Hanna, David B. Marx, and Runcang Sun. 2012. Optimization of hydrogen production from supercritical water gasification of crude glycerol—byproduct of biodiesel production. *International Journal of Energy Research*. Zhang, S.J., Xu, Y.X., and Hanna, M.A. 2012. Pretreatment of corn stover with twin-screw extrusion followed by enzymatic saccharification. *Applied Biochemistry and Biotechnology*. 166 (2): 458-469. Zhang, S.J., Keshwani, D.R., Xu, Y.X. and Hanna, M.A. 2012. Alkali combined extrusion pretreatment of corn stover to enhance enzyme saccharification. *Industrial Crops and Products*. 37 (1): 352-357. Chang, Fei, Milford A. Hanna, De-Jing Zhanga, Hu Li, Quan Zhou, Bao-An Song, Song Yang. Production and fuel properties of biodiesel from non-edible herbaceous vegetable oil: *Xanthium sibiricum* Patr. Submitted 2013. **Bioresource Technology** **New York – Cornell**: Peer Reviewed Publications 1. Cherney, J.H., and V.K. Verma. (2013). Grass pellet quality index: A tool to evaluate suitability of grass pellets for small scale combustion systems. *Applied Energy* 103:679-684. 2. Lu, F., Lipka, R.E. Elshire, J. Glaubitz, J.H. Cherney, M. Casler, E. Buckler, and D.E. Costich. (2013). Switchgrass genomic diversity, ploidy and evolution: novel insights from a network-based SNP discovery protocol. *PLoS Genet* 9(1): e1003215. doi:10.1371/journal.pgen.1003215. 3. Jung, H.I., Gayomba, S.R., Rutzke, M.A., Craft, E., Kochian, L.V., Vatamaniuk, O.K. (2012) COPT6 is a Plasma Membrane Transporter that Functions in Copper Homeostasis in Arabidopsis and is a Novel Target of SQUAMOSA Promoter Binding Protein-Like 7. *J. Biol. Chem.* 287 (40):33252-67. 4. Gayomba, S.R., Jung, H., Yan, J., Danku, J., Rutzke M., Bernal, M., Kraemer, U., Kochian, L.V., Salt, D.E., Vatamaniuk, O.K. (2013) The CTR/COPT-dependent copper uptake and SPL7-dependent copper deficiency responses are required for basal cadmium tolerance in *A. thaliana*. *Metallomics*, Accepted

manuscript, DOI:10.1039/C3MT00111C.Presentations1-Cherney, J.H. 2012. Herbaceous biomass for heat. Carbon, Energy, and Climate Conference. Sept. 26-28, 2012, Kellogg Biological Station, North Central SARE.2-Cherney, J.H. 2012. Non-traditional roles for forage crops. Agronomy Abstracts. ASA, CSSA, SSSA Annual Meeting. October 21-24, 2012, Cincinnati, OH.3-Cherney, J.H., Q. Ketterings, M. Davis, D.J.R. Cherney, K. Paddock. (2012). Grass Biomass Management for Bioheat. Agronomy Abstracts, ASA, CSSA, SSSA Annual Meeting. October 21-24, 2012, Cincinnati, OH.4-Stoof, C.R., B. Richards, P. Woodbury, H. Mayton, and J.H. Cherney. (2012). Untapped Potential: Sustainable Bioenergy Production from Marginal Lands in the Northeast US. Agronomy Abstracts, ASA, CSSA, SSSA Annual Meeting. October 21-24, 2012, Cincinnati, OH.5-Anderson, C. L. (2012) Revisiting the SABBIC Vision: How do we Begin to Optimize Sustainable Biobased Industries. Invited Presentation, The Science and Engineering Challenges to the Development of Sustainable Biobased Industries Seminar Series. October 2012. 6-Anderson, C.L. (2013) "The Systems Perspective: Applications to Renewable Energy" The Northeast Bioenergy and BioProducts Education Program. Cornell University, Ithaca, NY. June.7-Gayomba, S., Jung, H., Yan, J., Danku, J., Bernal, M., Rutzke, M., Krämer, U., Kochian, L.V., Salt, D.E., Vatamaniuk, O.K. (2013) Cross-talk Between Cadmium and Copper Homeostasis in Arabidopsis: A Central Regulator of Copper Homeostasis, SPL7, is Essential for Cadmium Resistance. Annual Meeting of American Society of Plant Biologists, Providence, RI, USA, July 21-23. 8-Yan, J., Jung, H., Gayomba, S., Vatamaniuk, O.K. (2013) A Putative Transcription Factor, CCIT1, is a Novel Regulator of Copper Homeostasis, is Essential for Cadmium Resistance and is a Downstream Target of SPL7. Annual Meeting of American Society of Plant Biologists, Providence, RI, USA, July 21-23.

North Carolina:Papers in Conference Proceedings:1. Wei, T., You, Z., Liu, Z., Gontupil, J., Cheng, J.J. (2012) Characteristics of cellulose-degrading microbes in anaerobic co-digestion of swine manure with corn stover for biogas production. Proceeding of the 4th International Conference on Pulping, Papermaking and Biotechnology, November 7-9, 2012, Nanjing Forestry University, Nanjing, China. 2. Liu, Z., Darwin, M., Gontupil, J., Cheng, J.J. (2013) Mesophilic anaerobic co-digestion of swine manure with switchgrass and wheat straw for methane production. Presented at the 2013 IBE (Institute of Biological Engineering) Annual Conference, March 7-9, 2013, Raleigh, North Carolina, USA.3. Darwin, M., Liu, Z., Gontupil, J., Cheng, J.J. (2013) Potential of methane production from anaerobic co-digestion of swine manure with rice straw and cocoa husk. Presented at the 2013 IBE (Institute of Biological Engineering) Annual Conference, March 7-9, 2013, Raleigh, North Carolina, USA.4. Gontupil, J., Liu, Z., Darwin, M., Cheng, J.J. (2013) Anaerobic co-digestion of swine manure and corn stover with additional enzymes for enhancing biogas production. Presented at the 2013 IBE (Institute of Biological Engineering) Annual Conference, March 7-9, 2013, Raleigh, North Carolina, USA.24. North Dakota 2013 S-1041 Project Contributions Submitted by Scott Pryor (S-1041 ND rep)

North Dakota:The insight developed in this project is disseminated to the community via conferences, as well as publications in peer-reviewed journals, conference proceedings, and book chapters. •16 NDSU agriculture students learned about national and international implementation of bioenergy conversion processes. •The economical machine vision method of PSD determination of particulate biomass is being actively considered as an alternative method for accurate measurement. A new ASABE standard (Project# X631) development lead by NDSU (ASABE Committee FPE-709 and PM-23/7/2) on application of machine vision applied to forage and biomass. •Cost effective (document scanner + laptop computer + free software ImageJ) wool grading system using image processing will be an alternative to the existing expensive laser-

based system. •The infield biomass bales aggregation IBALS model with economic analysis serves as an excellent decision-making and extension tool to inform producers/farmers of the state and the nation on bales aggregation – an essential operation in crop production sequence.

•Front-end processing of energy beets forms a vital link in the planned twelve 20 million gallon/year biofuel industry in the state of ND. OUTPUTS (Related Publications and Presentations)Peer Reviewed:Manamperi, W.A., Chang, S.K.C., Wiesenborn, D.P. and S.W. Pryor. 2012. Impact of Meal Preparation Method and Extraction Procedure on Canola Protein Yield and Properties, *Biological Engineering Transactions*, 5(4): 191-200.Monono, E., Haagenson, D., and S. W. Pryor* 2012. Developing and evaluating NIR calibration models for multi-species herbaceous perennials, *Industrial Biotechnology*, 8(5): 285-92.Tuntiwiwattanapun, N., C. Tongcumpou, D. Haagenson, and D. Wiesenborn. 2013. Development and scale-up of aqueous surfactant-assisted extraction of canola oil for use as biodiesel feedstock, *Journal of the American Oil Chemists Society*, 90(7):1089–1099.M.S. Thesis:Rijal, B. Combined Effect of Densification and Pretreatment on Cellulosic Ethanol Production. Master of Science in Agricultural & Biosystems Engineering, North Dakota State University, Fargo, 2012.

Tuntiwiwattanapun, N. Aqueous Surfactant-assisted Extraction of Canola Oil. Master of Science in Environmental & Conservation Science, North Dakota State University, Fargo. 2012.

Vargas-Ramirez, J. Best Storage Conditions for Raw, Thick Juice from Energy Beets and Whole Energy Beets. Master of Science in Agricultural & Biosystems Engineering, North Dakota State University, Fargo, 2012.Presentations: Igathinathane, C., H. Zerom, G. Bora, K. Nichols, M. Sanderson, J. Hendrickson, and W. Hoogmoed. 2013. Fruits and Vegetables Volume Estimation by Machine Vision. Paper No: 131598833. 2013 ASABE Annual International Meeting, July 21 – July 24, 2013, Kansas City, Missouri, US. Igathinathane, C., M. Yu, J. Hendrickson, K. Nichols, D. Archer, S. Kronberg, and M. Liebig. 2013. Ground Biomass Sieveless Particle Size Distribution using Machine Vision Approach. Paper No: 131593002. 2013 ASABE Annual International Meeting, July 21 – July 24, 2013, Kansas City, Missouri, US. Igathinathane, C., R. Redden, and C. Schauer. 2013. Application of Image Processing for Development of Economical Wool Fiber Thickness Measurement for Grading. Paper No: 131600767. 2013 ASABE Annual International Meeting, July 21 – July 24, 2013, Kansas City, Missouri, US.Igathinathane, C., S. Sumadhur, D. Archer, J. Hendrickson, S. Kronberg, and M. Sanderson. 2013. Economic Consideration of Infield Biomass Bales Aggregation Strategies. Paper No: 131599046. 2013 ASABE Annual International Meeting, July 21 – July 24, 2013, Kansas City, Missouri, US.

Monono, E., J. Perleberg, D. Haagenson, and D. Wiesenborn. 2013. Determining the temperature profile and heat transfer coefficient in an epoxidation process. ASABE Annual International Meeting, Kansas City, MO, July 21-24.Nahar, N., and S.W. Pryor 2013. Effects of Pretreatment Conditions for Enzymatic Hydrolysis of Pelleted Switchgrass, Paper No. 1619709. ASABE International Meeting. Kansas City, MO Jul 22-24, 2013. Pryor, S.W., O. Kudina, A. Samaratunga, N. Nahar, S. Minko, and A. Voronov 2013. Kinetics and recovery of cellulases immobilized on pH-responsive polymer brushes grafted to nanosilica and ferromagnetic particles, Paper No. 23962. 35th Symposium on Biotechnology for Fuels and Chemicals. Portland, OR Apr 29-May 2, 2013. Samaratunga, A., N.Nahar, O. Kudina, A. Voronov, S. Minko, and S. W. Pryor 2013. Impact of enzyme loading on activity and recovery of cellulases immobilized on polymer brushes, Paper No. 1620390. ASABE International Meeting. Kansas City, MO Jul 22-24, 2013.Vargas-Ramirez, J.M., D.M. Haagenson and D.P. Wiesenborn. 2013. Evaluation of the effect of combined storage techniques on the preservation of industrial sugars from sugar beets for bioproducts, paper 1620707. ASABE Annual International Meeting, Kan

Ohio:Peer Reviewed Journal Publication:Cai, T., Ge, X. M., Park, Y. S., Li, Y. B. 2013. Comparison of *Synechocystis* sp. PCC6803 and *Nannochloropsis salina* for lipid production using artificial seawater and nutrients from anaerobic digestion effluent. *Bioresource Technology* 144:255-260.Wang, Z. J., Xu, F. Q., Li, Y. B. 2013. Effects of total ammonia nitrogen concentration on solid-state anaerobic digestion of corn stover. *Bioresource Technology* 144:281-287.Cai, T., Park S., Siam Racharaks, Li, Y. B. 2013. Cultivation of *Nannochloropsis salina* in anaerobic digestion effluent for nutrient removal and lipid production. *Applied Energy* 108:486-492.Canam, T., Dumonceaux. T. J., Record E., Li, Y. B. 2013. White Rot Fungi: The key to sustainable biofuel production? *Biofuels* 4(3):247-250.Luo, X. L., Hu, S. J., Zhang, X., Li, Y. B. 2013. Thermochemical conversion of crude glycerol to biopolyols for the production of polyurethane foams. *Bioresource Technology* 139:323-329.Shi, J., Wang Z. J., Stiverson, J. A., Yu, Z. T., Li, Y. B. Reactor performance and microbial community dynamics during solid-state anaerobic digestion of corn stover at mesophilic and thermophilic conditions. *Bioresource Technology* 136:574-581.Cai, T., Park, S., Li, Y. B. 2013 Nutrient recovery from wastewater streams by microalgae: status and prospects. *Renewable and Sustainable Energy Reviews* 19: 360-369.Cherosky P., Li, Y. B. 2013. Hydrogen sulfide removal from biogas by bio-based iron sponge. *Biosystems Engineering* 114:55-59Xu, F. Q., Shi, J., Lv, W., Yu, Z. T., Li, Y. B. 2013. Comparison of different liquid anaerobic digestion effluents as inoculum and nitrogen sources for solid-state batch anaerobic digestion of corn stover. *Waste Management* 33: 26–32. Brown, D., Li, Y. B. 2012. Solid state anaerobic co-digestion of yard waste and food waste for biogas production. *Bioresource Technology* 127:275-280.ThesisJia Zhao, M.S. 2013. Enhancement of Methane Production from Solid-state Anaerobic Digestion of Yard Trimmings by Biological Pretreatment.John Sheets, M.S. 2013. Cultivation of *Nannochloropsis Salina* in Diluted Anaerobic Digester Effluent under Simulated Seasonal Climatic Conditions and in Open Raceway Ponds.Shengjun Hu, Ph.D. 2013. Production and Characterization of Bio-based Polyols and Polyurethanes (PU) from Biodiesel-derived Crude Glycerol and Lignocellulosic Biomass. Conference Proceedings and Presentations:Zhao, J., Li, Y. B. 2013. Enhancement of methane production from solid-state anaerobic digestion (ss-ad) of yard trimmings by fungal pretreatment. 2013 ASABE Annual International Meeting. Kansas City, KS. (July 21-July 24).Sheets J., Li, Y. B. 2013. Cultivation of *nannochloropsis salina* in diluted anaerobic digester effluent under simulated seasonal climatic conditions and in open raceway ponds. 2013 ASABE Annual International Meeting. Kansas City, KS. (July 21-July 24).Li, Y. B. Hu, S. J. 2013. Crude glycerol based liquefaction of lignocellulosic biomass: effects of crude glycerol impurities on polyol properties. 2013 ASABE Annual International Meeting. Kansas City, KS. (July 21-July 24).Li, Y. B., Zhu, J. Y. 2013. Solid state anaerobic co-digestion of hay and soybean processing waste in a reactor with leachate recirculation. 2013 ASABE Annual International Meeting. Kansas City, KS. (July 21-July 24).Zhu, J., Zheng, Y., Xu, F., Li, Y.B. 2013. Co-digestion of soybean processing waste and deteriorated hay in solid-state anaerobic digestion for biogas production. 2013 OARDC Annual Meeting, Columbus, OH. (April 25, 2013) Second Place Award Post-Doc Category.Zhao, J., Zheng, Y., Li, Y.B. 2013. Enhancement of methane production in solid-state anaerobic digestion from yard trimmings by fungal pretreatment. 2013 OARDC Annual Meeting, Columbus, OH. (April 25, 2013)Hu, S., Li, Y.B. 2013. Glycerol based liquefaction of corn stover: effects of crude glycerol impurities on polyol properties. 2013 OARDC Annual Meeting, Columbus, OH. (April 25, 2013)Sheets, J.P., Li, Y.B. 2013. *Nannochloropsis salina* cultivation in diluted anaerobic digester effluent under simulated seasonal climatic conditions. 2013 OARDC Annual Meeting, Columbus, OH. (April 25, 2013)

Hu, S. J., Li, Y. B. 2012. Polyols and polyurethane foams from crude glycerol-based liquefaction of lignocellulosic biomass: effects of crude glycerol impurities on product properties. AIChE Annual Meeting. Pittsburgh, PA. (Oct 29-Nov 2).

Park, S., Li, Y. B. 2012. An integrated computational fluid dynamics model to simulate the productivity of industrial scale algae raceway ponds. AIChE Annual Meeting. Pittsburgh, PA. (Oct 29-Nov 2)

Cai, T., Li, Y. B. 2012. Cultivation of lipid-rich microalgae *Nannochloropsis salina* in anaerobic digestion effluent for biofuel production. 2012 ASABE Annual International Meeting. Dallas, TX. (July 30-Aug.1)

Wang, Z. J., Shi, J., Li, Y. B. 2012. Effect of leachate recirculation on the solid state anaerobic digestion of corn stover. 2012 ASABE Annual International Meeting. Dallas, TX. (July 30-Aug.1).

Brown, D., Li, Y. B. 2012. Evaluation of different lignocellulosic biomass feedstocks for biogas production via solid state anaerobic digestion. Joint Technical Conference and Annual General Meeting of CSBE & NABEC. July 15-18, Orillia, ON.

Oklahoma: Peer Reviewed: Orgill, J. J., H. K. Atiyeh, M. Devarapalli, J. R. Phillips, R. S. Lewis and R. L. Huhnke. 2013. A comparison of mass transfer coefficients between syngas fermentation reactors. *Bioresource Technol.* 133:340-346.

Qian, K, A. Kumar, K. Patil, D. Bellmer, D. Wang, W. Yuan, and R. Huhnke. Effects of biomass feedstocks and gasification condition on physiochemical properties of biochar. *Energies.* (in press).

Ramachandriya, K.D., D.K. Kundiyana, M.R. Wilkins, J.B, Terrill, H.K. Atiyeh, and R.L. Huhnke. 2013. Carbon dioxide conversion to fuels and chemicals using a hybrid green process. *Applied Energy.* 112:289-299.

Ramachandriya, K.D., M.R. Wilkins, K. Patil. 2013. Influence of switchgrass generated producer gas pre-adaptation on growth and product distribution of *Clostridium ragsdalei*. *Biotechnol. Bioprocess Eng.* (in press).

Ramachandriya, K.D., M.R. Wilkins, N. Dunford, S. Hiziroglu, and H.K. Atiyeh. 2013. Development of an efficient pretreatment process for enzymatic saccharification of Eastern redcedar. *Bioresource Technol.* 136:131-139.

Sharma, A. M., A. Kumar, K. N. Patil and R. L. Huhnke. 2013. Fluidization characteristics of a mixture of gasifier solid residues, switchgrass and inert material. *Powder Technol.* 235:661-668.

Youssef, N.H., M.B. Couger, C.G. Struchtemeyer, A.S. Liggenstoffer, R.A. Prade, F.Z. Najjar, H.K. Atiyeh, M.R. Wilkins, M.S. Elshahed. 2013. Genome of the anaerobic fungus *Orpinomyces* sp. C1A reveals the unique evolutionary history of a remarkable plant biomass degrader. *Appl. Env. Microbiol.* doi: 10.1128/AEM.00821-13.

PhD Dissertations: Liu, K. Ph.D. Biosystems Engineering, Oklahoma State University. Production of alcohols via syngas fermentation using *Alkalibaculum bacchi* monoculture and a mixed culture. Completed December 2013

Phillips, J.R. Ph.D. Biosystems Engineering, Oklahoma State University. Fermentation of synthesis gas to ethanol medium design, mass transfer and integrated model. Completed May 2013.

Ramachandriya, K.D. Ph.D. Biosystems Engineering, Oklahoma State University. Development and optimization of glucose and ethanol production from Eastern redcedar. Completed July 2013.

M.S. Thesis: Jie Gao, M.S. Biosystems Engineering, Oklahoma State University. Development of low cost medium for ethanol production from syngas by *Clostridium ragsdalei*. Completed December 2012.

Presentations: Atiyeh, H. K., J. Gao, J. R. Phillips, M. R. Wilkins, and R. L. Huhnke. 2013. Development of low cost defined medium for ethanol production from syngas using *Clostridium ragsdalei*. 2013 ASABE Annual International Meeting, Kansas City, Missouri, USA, July 21-24, 2013. Oral presentation.

Atiyeh, H.K., J. J. Orgill, M. Devarapalli, J. R. Phillips, R. S. Lewis and R. L. Huhnke. 2012. Comparison of syngas fermentation reactors for ethanol production. 2012 AIChE Annual Meeting, Pittsburgh, Pennsylvania, USA, October 28-November 2, 2012. Oral presentation.

Atiyeh, H. K., K. Liu, B. S. Stevenson, R. S. Tanner, M. R. Wilkins, and R. L. Huhnke. 2013. C4 and C6 alcohols production using mixed culture syngas

fermentation. US Department of Energy Biomass 2013 Conference: How the Advanced Bioindustry is Reshaping American Energy, Washington, DC, USA, July 31-August 1, 2013. Poster. Atiyeh, H. K., M. Devarapalli, J. R. Phillips, J. J. Orgill, R. S. Lewis, and R. L. Huhnke. 2013. Comparison of syngas fermentation in trickle bed, continuously stirred tank and hollow fiber membrane reactors using *Clostridium ragsdalei*. 2013 ASABE Annual International Meeting, Kansas City, Missouri, USA, July 21-24, 2013. Oral presentation. Bhoi, P., K. N. Patil, and R. L. Huhnke. 2013. Downdraft gasification performance of forage sorghum. 2013 ASABE Annual International Meeting, Kansas City, Missouri, USA, July 21-24, 2013. Oral presentation. Buser, M. D., B. Biggerstaff, E. Miller, and R. L. Huhnke. 2013. Moisture probe comparison for moisture determination in high density biomass bales. 2013 ASABE Annual International Meeting, Kansas City, Missouri, USA, July 21-24, 2013. Poster. Buser, M. D., E. Miller, and R. L. Huhnke. 2013. Field-scale switchgrass and energy sorghum harvesting: OSU BRDI project update. 2013 ASABE Annual International Meeting, Kansas City, Missouri, USA, July 21-24, 2013. Oral presentation. Buser, M. D., E. A. Miller, and R. L. Huhnke, and K. L. Kenney. 2013. Performance of large bale switchgrass and energy sorghum storage stacks: Oklahoma State University BRDI project overview. 2013 ASABE Annual International Meeting, Kansas City, Missouri, USA, July 21-24, 2013. Oral presentation. Devarapalli, M., H. K. Atiyeh, J. R. Phillips, J. J. Orgill, R. S. Lewis, and R. L. Huhnke. 2012. Comparison of syngas fermentation reactors for biological alcohol production. 2012 National Sun Grant Conference, New Orleans, Louisiana, USA, October 3-5, 2012. Poster. Devarapalli, M., H. K. Atiyeh, R. S. Lewis, and R. L. Huhnke. 2013. Syngas fermentation in a trickle bed reactor using *Clostridium ragsdalei*. 2013 Oklahoma EPSCoR Annual State Conference 2013, Stillwater, Oklahoma, April 23, 2013. Poster. Devarapalli, M., H. K. Atiyeh, R. S. Lewis, and R. L. Huhnke. 2013. Syngas fermentation in a trickle-bed reactor using *Clostridium ragsdalei*. S-1041-The Science and Engineering for a Biobased Industry Annual Meeting and Symposium, Kahului, Maui, Hawaii, June 17-18, 2013. Poster. Gao J., J. R. Phillips, H. K. Atiyeh, M. R. Wilkins, and R. L. Huhnke. 2012. Medium design for ethanol production through syngas fermentation. 2012 AIChE Annual Meeting, Pittsburgh, Pennsylvania, USA, October 28- November 2, 2012. Poster. Kumar, A., Sarkar, M., Tumuluru, J. S., Patil, K. N., Bellmer, D., Huhnke, R. Effects of torrefaction and densification on quality of syngas generated from fluidized-bed gasification of switchgrass. 2013 ASABE Annual International Meeting, Kansas City, Missouri, USA, July 21-24, 2013. Poster. Kumar, A., P. Bhandari, and R. L. Huhnke. 2013. Biochar-based and mixed-metal oxide catalysts for simultaneous removal of toluene (model tar), NH₃, and H₂S, from biomass-generated producer gas. 2013 ASABE Annual International Meeting, Kansas City, Missouri, USA, July 21-24, 2013. Oral presentation. Liggenstoffer, A. S., C. S. Struchtemeyer, H. K. Atiyeh, M. Wilkins, and M. S. Elshahed. 2013. The anaerobic fungal isolate *Orpinomyces* sp. strain C1A is an efficient plant biomass degrader under anaerobic conditions. 2013 Oklahoma EPSCoR Conference, Stillwater, Oklahoma, USA, April 23, 2013. Poster. Liu, K., H. K. Atiyeh, B. S. Stevenson, R. S. Tanner, M. R. Wilkins, and R. L. Huhnke. 2013. Production of drop-in biofuels by mixed culture syngas fermentation. 2013 ASABE Annual International Meeting, Kansas City, Missouri, USA, July 21-24, 2013. Oral presentation. Liu, K., H. K. Atiyeh, B. S. Stevenson, R. S. Tanner, M. R. Wilkins, and R. L. Huhnke. 2013. Drop-in biofuels production by a mixed culture fermentation of syngas. 2013 Oklahoma EPSCoR Conference, Stillwater, Oklahoma, USA, April 23, 2013. Poster. Miller, E., M. D. Buser, R. L. Huhnke, and R. K. Taylor. 2013. Machine power and drying Rate relationships for high energy forage sorghum. 2013 ASABE Annual International Meeting, Kansas City, Missouri, USA, July 21-24, 2013. Oral presentation. Miller, E., M. D. Buser, R. L.

Huhnke, and V. Schielack. 2013. Initial moisture variability in high density biomass bales. 2013 ASABE Annual International Meeting, Kansas City, Missouri, USA, July 21-24, 2013. Poster.

Patil, K. N., P. R. Bhoi, and R. L. Huhnke. 2012. Biomass-based model syngas co-firing with natural gas in a laboratory air-swirled burner: Effects of co-firing rates, combustion air-to-fuel ratios and burner port area on flame and exhaust characteristics. 2012 National Sun Grant Conference, New Orleans, Louisiana, USA, October 3-5, 2012. Poster.

Patil, K. N., D. Iyer, P. Bhoi, and R. L. Huhnke. 2013. Simulation of natural gas co-firing with producer gas mixtures using Aspen Plus. 2013 ASABE Annual International Meeting, Kansas City, Missouri, USA, July 21-24, 2013. Oral presentation.

Qian, K., A. Kumar, and R. L. Huhnke. 2013. Structural characterization of biochar by spectroscopy techniques. 2013 ASABE Annual International Meeting, July 21-24, 2013, Kansas City, Missouri, USA. Oral Presentation.

Ramachandriya, K. D. M. R. Wilkins, S. Hiziroglu, N. T. Dunford, and H. K. Atiyeh. 2013. Effect of high solid loading on enzymatic hydrolysis of pretreated Eastern red cedar. 2013 Oklahoma EPSCoR Conference, Stillwater, Oklahoma, USA, April 23, 2013. Poster.

Ramachandriya, K.D., Wilkins, M.R., C. Goad, N.T. Dunford, H.K. Atiyeh, S. Hiziroglu. 2013. Sodium bisulfite pretreatment of Eastern redcedar for fermentable sugar production optimization using response surface methodology. FAPC Research Symposium, Stillwater, Oklahoma, USA, February 19, 2013. Oral presentation.

Schielack III, V. P., M. D. Buser, E. A. Miller, and R. L. Huhnke. 2013. Moisture content sampling variance with large square hay bales: evaluation of sampling protocols. 2013 ASABE Oklahoma Section Meeting. Stillwater, Oklahoma, USA, February 18, 2013. Poster.

Sharma, A. M., A. Kumar, and R. L. Huhnke. 2013. CFD-based gasification model incorporating fluidization hydrodynamics and reaction kinetics. 2013 ASABE Annual International Meeting, July 21-24, 2013, Kansas City, Missouri, USA. Oral presentation.

Sharma, A. M., A. Kumar, and R. L. Huhnke. Reaction kinetics-based gasification model using a continuous stirred-tank reactor (CSTR). 24th Annual OSU Research Symposium and Research Scholar Conference, Stillwater, Oklahoma, USA, Feb 20-22, 2013. Oral presentation.

Wilkins, M. R., K. Ramachandriya, S. Hiziroglu, N. Dunford, H. Atiyeh. 2012. Development of an acid sulfite process to pretreat Eastern red cedar for cellulose hydrolysis. 2012 National Sun Grant Conference, New Orleans, Louisiana, USA, October 3-5, 2012. Poster.

Wilkins, M. R., K. Ramachandriya, C. Goad, N. T. Dunford, H. K. Atiyeh, S. Hiziroglu. 2013. Optimization of acid bisulfite pretreatment of Eastern redcedar using response surface methodology. 2013 ASABE Annual International Meeting, Kansas City, Missouri, USA, July 21-24, 2013. Oral Presentation.

Wilkins, M. R., X. Zhu, H. K. Atiyeh, R. S. Lewis, R. L. Huhnke. 2013. Conversion of CO₂ and H₂ to alcohols by *Clostridium carboxidivorans* at various pH using a hollow fiber membrane for gas transfer. US Department of Energy Biomass 2013 Conference: How the Advanced Bioindustry is Reshaping American Energy, Washington, DC, USA, July 31-August 1, 2013. Poster.

Wilkins, M.R., X. Zhu, H. K. Atiyeh, R. S. Lewis, R. L. Huhnke. 2013. Effect of pH on CO₂ and H₂ fermentation using *Clostridium carboxidivorans*. 2013 ASABE Annual International Meeting, July 21-24, 2013, Kansas City, Missouri, USA. Poster.

Yang, Z., A. Kumar, M. Buser, and R. L. Huhnke. 2013. Influence of operation conditions on fast pyrolysis of eastern red cedar. 2013 ASABE Annual International Meeting, July 21-24, 2013, Kansas City, Missouri, USA. Oral Presentation.

Numerous videos on biomass logistics and storage were created and are available through the OSU Bioenergy YouTube Channel: <http://bioenergycenter.okstate.edu/videos/BRDI/logistics>

Oregon: Peer Reviewed: •Ding, J., Bierma, J., Smith, M.R., Poliner, E., Wolfe, C., Hadduck, A.N., Zara, S., Jirikovic, M., van Zee, K., Penner, M.H., Patton-Vogt, J. & Bakalinsky, A.T. (2013) "Acetic acid inhibits nutrient uptake in *Saccharomyces cerevisiae*: auxotrophy confounds

the use of yeast deletion libraries for strain improvement” *Appl. Microbiol. Biotechnol.* 97:7405–7416

•Juneja, A., Ceballos, R.M., and Murthy, G.S. 2013. Effect of environmental factors and nutrients on biochemical composition of algae for biofuels production: A review. *Energies*. (Accepted).

•Kumar, D. and Murthy, G.S. 2013. Stochastic molecular model of enzymatic hydrolysis of cellulose for ethanol production. *Biotechnol. Biofuels*.6:63.

•Juneja, A., Kumar, D. and Murthy, G.S. 2013. Economic feasibility and environmental life cycle assessment of ethanol production from lignocellulosic feedstocks in Pacific Northwest U.S. *J. Ren. Sust. Energy*. 5:023142.

•Bozorgirad, M.A., Zhang, H., Haapala, K.R. and Murthy, G.S. 2013. Environmental impact and cost assessment of incineration and ethanol production as municipal solid waste management strategies. *Intl. J. LCA*. DOI 10.1007/s11367-013-0587-z.

•Kumar, D., Juneja, A., Hohenshuh, W., Williams, J.D. and Murthy, G.S. 2012. Study of chemical composition of lignocellulosic feedstocks from different sites of conservation reserve program lands. *J. Ren. Sust. Energy*. 4:063114. doi: 10.1063/1.4766889.

•Hohenshuh, W., Ma, C., Dalton, D.A., and Murthy, G.S. 2012. Development of protocols for determination of PHB in plant tissues. *J. Bioproc. Eng. Biorefinery*. 1:120-126.

•Kumar, D. and Murthy, G.S. 2012. Life cycle assessment of ethanol production from grass straws using various pretreatment processes. *Intl. J. LCA*. 17:388-401.

•Murthy, G.S., Rausch, K.D., Johnston, D.B., Tumbleson, M.E., and Singh, V. 2012. A simultaneous saccharification and fermentation model for dynamic growth environments. *Bioprocess Biosys. Eng.* 35:519-534.

•Murthy, G.S., Rausch, K.D., Johnston, D.B., Tumbleson, M.E., and Singh, V. 2012. Design and evaluation of an optimal controller for simultaneous saccharification and fermentation process. *Appl. Biotechnol. Biochem.* 166:87-111.

Thesis and Dissertation: Sophonputtanaphoca, S. (2012) “Science and Efficacy of Mile Sodium-Hydroxide Treatments in Enzyme-Based Wheat Straw-to-Glucose Processing” Ph. D. dissertation, Oregon State University

Presentations: • Ding, J., Bierma, J., Smith, M.R., Hadduck, A.H., Zara, S., Poliner, E., Wolfe, C., van Zee, K., Jirikovic, M., Patton-Vogt, J., Penner, M.H. and Bakalinsky, A.T. (April 29 – May 2, 2013) “Acetic acid inhibits nutrient uptake in *Saccharomyces cerevisiae*” (Poster 8-09) 35th Symposium on Biotechnology for Fuels and Chemicals, Portland, Oregon

•Junyusen, T., Goddik, L.M. and Penner, M.H. (April 29 – May 2, 2013) “Parameter effects on straw lignin recovery from alkali liquors” (Poster 13-08) 35th Symposium on Biotechnology for Fuels and Chemicals, Portland, Oregon

•Sophonputtanaphoca, S., Junyusen, T., Smith, D.E., Kelly, C.J. and Penner, M.H. (April 29 – May 2, 2013) “On the nature of hydroxide ion uptake during alkali processing of wheat straw” (Poster 13-21) 35th Symposium on Biotechnology for Fuels and Chemicals, Portland, Oregon

•Hohenschuh, W., Hector, R., and Murthy, G.S. 2013. Quantifying xylulose uptake kinetics and enzymatic utilization bottlenecks. ASABE, St. Joseph, MI.

•Hohenschuh, W., Kumar, D., Dalton, D., Ma, C., Strauss, S. and Murthy, G.S. 2013. Environmental life cycle assessment of poly-3-hydroxybutyrate production from hybrid poplar leaves. ASABE, St. Joseph, MI.

•Kumar, D. and Murthy, G.S. 2013. Rational design of optimal enzyme mixture for deconstruction of cellulose for ethanol production. ASABE, St. Joseph, MI.

•Kumar, D. and Murthy, G.S. 2013. Synergistic action of multiple enzymes for cellulose hydrolysis: stochastic molecular modeling and experimental validation. ASABE, St. Joseph, MI.

•Juneja, A., and Murthy, G.S. 2013. Investigating the changes in biochemical composition of *Chlorella variabilis* under rapidly switched light regimes. ASABE, St. Joseph, MI.

•Murthy, G.S. 2013. Biofuels sustainability assessment using integrated systems analysis. Proceedings of 47th ISAE meeting and international symposium on Bioenergy. Hyderabad, India.

•Kumar, D. and Murthy, G.S. 2013. Stochastic molecular modeling of multi enzyme cellulose hydrolysis. Proceedings of 47th

ISAE meeting and international symposium on Bioenergy. Hyderabad, India. •Murthy, G.S. and Hashimoto, A. 2012. Sustainable energy production. S1041-The science and engineering for a biobased industry. Washington, DC. •Kumar, D., Juneja, A., William Hohenschuh, John D. Williams and Murthy, G.S. 2012. Chemical composition of lignocellulosic feedstocks from Pacific Northwest conservation buffers. S1041-The science and engineering for a biobased industry. Washington, DC. •Kumar, D. and Murthy, G.S. 2012. Technoeconomic analysis and environmental impact of ethanol production from perennial rye grass straw. S1041-The science and engineering for a biobased industry. Washington, DC. •Murthy, G.S., Rausch, K.D., Johnston, D.B., Tumbleson, M.E., and Singh, V. 2012. Effects of maize harvest moisture content and postharvest drying temperature on dry grind ethanol production. Proceedings of ISAE. Pantnagar, India. •Juneja, A., Kumar, D. and Murthy, G.S. 2012. Microwave assisted steam explosion pretreatment of wheat straw for ethanol production. ASABE, St. Joseph, MI. •Kumar, D. and Murthy, G.S. 2012. Stochastic modeling of enzymatic hydrolysis of cellulose for ethanol production. ASABE, St. Joseph, MI. •William Hohenschuh, Kumar, D., Ronald Hector and Murthy, G.S. 2012. Strategies to maximize pentose utilization in genetically modified yeast strains. ASABE, St. Joseph, MI. •Singh, V., Murthy, G.S., Tumbleson, M.E. and Rausch, K.D. 2012. Effects of maize harvest moisture content and postharvest drying temperature on the dry grind ethanol production. ISAE Annual Meeting. •Kumar, D., Juneja, A., William Hohenschuh, John D. Williams and Murthy, G.S. 2012. Study of chemical composition of lignocellulosic feedstocks from different sites of conservation reserve program lands. ASABE, St. Joseph, MI. •Juneja, A., Kumar, D., and Murthy, G.S. 2012. Microwave assisted steam explosion pretreatment of wheat straw for ethanol production. ASABE, St. Joseph, MI. •Kumar, D., Juneja, A., Hohenschuh, W., Williams, J.D., and Murthy, G.S. 2012. Study of chemical composition of lignocellulosic feedstocks from different sites of conservation reserve program lands. ASABE, St. Joseph, MI.

TARGET AUDIENCE The work performed under this project is aimed at the implementation of sustainable technologies to further the U.S. goal of developing a more biobased economy. As such, the primary target audience for this work consists of those scientists, engineers, economists, policy makers and entrepreneurs that, working together through shared knowledge and expertise, are furthering this object.

South Dakota: Peer Reviewed: Zhongyi Ma, Lin Wei, Wangda Qu, James Juson, Qingwei Zhu, Xunzhang Wang, 2013. The effect of support on the catalytic performance for bio-oil upgrading. *Advanced Materials Research*. Vols. 608-609, pp 350-355. Muthukumarappan, K., and C. Karunanithy. 2012. Extrusion process design. In: *Handbook of Food Process Design*. Eds. Mohammad Shafiur Rahman and Jasim Ahmed, Blackwell Publishing. Taylor & Francis Group. Eckard, A.D., K. Muthukumarappan, and W. Gibbons. 2012. Pretreatment of extruded corn stover with polyethylene glycol to enhance enzymatic hydrolysis: optimization, kinetics, and mechanism of action. *BioEnergy Research*. 5(2), 424-438. Eckard, A.D., K. Muthukumarappan, and W. Gibbons. 2012. Modeling of Pretreatment Condition of Extrusion Pretreated Prairie Cord grass and Corn Stover with Polyoxyethylene (20) Sorbitan monolaurate. *Applied Biochemistry and Biotechnology*. 167(2), 377-393. Karunanithy, C., V. Karuppachamy, K. Muthukumarappan, and W.R. Gibbons. 2012. Selection of enzyme combination, dose and temperature for hydrolysis of soybean white flakes. *Industrial Biotechnology* 8(5): 309-317. Karunanithy, C., and K. Muthukumarappan. 2012. A comparative study of torque requirement during extrusion pretreatment for different biomasses. *BioEnergy Research* 5: 253-267.

Presentations: L. Wei and J. Julson, 2013. Catalytic Fast Pyrolysis of Cellulosic Biomass for Drop in Fuels, the NC Sun grant annual meeting in Chicago, March 26-27, 2013. L. Wei, K. Muthukumarappan, Z.

Gu, and J. Julson. Catalyst development for biomass conversion to jet fuels. North Dakota/South Dakota Engineering Research Summit, South Dakota State University, South Dakota, April 23, 2013. X. Zhao, L. Wei, J. Julson, W. Qu, and C. Shi. Nonfood vegetable seed oil for jet fuel. North Dakota/South Dakota Engineering Research Summit, South Dakota State University, South Dakota, April 23, 2013. Muthukumarappan, K. and L. Wei. Development of Novel Continuous Oil Extraction Method from Non-Food Oil Seeds. Plenary lecture at 3rd Annual World Congress of Bioenergy 2013, April 25-27, Nanjing, China. X. Zhao, L. Wei, J. Julson, W. Qu, and C. Shi. Investigation of oil extraction from non-food sunflower seeds and meats for future jet fuel production. 2013 ASABE Annual International Meeting, Kansas City, Missouri, July 21-24, 2013. **Tennessee:** OUTPUTS (PUBLICATIONS, etc) Naimi, I., S. Sokhansanj, X. Bi, C.J. Lim, A.R. Womac, A. Lau, and S. Melin. 2013. Development of size reduction equations for calculating energy input for grinding lignocellulosic particles. Applied Engineering in Agriculture 29(1):93-100. Womac, A.R., W.E. Hart, V.B.S. Bitra, and T. Kraus. 2012. Biomass harvesting of high-yield low-moisture switchgrass: equipment performance and moisture relations. Applied Engineering in Agriculture 28(6): 775-786. Groothuis, M. and A. Womac. 2012. Bulk-format switchgrass harvest system logistics. Paper No. 121337867, ASABE, St. Joseph, MI. SYNERGISTIC ACTIVITIES (Tennessee) Womac, A.R. (P.I.), K. Tiller, S. Jackson, P. Flowers, M. Kessler, G. Braswell, K. Althoff, T. Kraus, J.R. Hess, P. Pryfogle, E.G. Wilkerson, and S. Sokhansanj. 2009. Development of a Bulk-Format System to Harvest, Handle, Store, and Deliver High-Tonnage Low-Moisture Switchgrass Feedstock. U.S. Dept. of Energy Funding Opportunity Announcement DE-FOA-0000060, Performance Period: January 1, 2010 December 31, 2012. Submitted through Genera Energy LLC (a UTRF corporation, Knoxville, TN), Federal Request \$4,999,758, Applicant \$5,000,000, Total \$9,999,758, (UT TAES: \$685,104) - \$4,999,758 was funded. PARTICIPANTS: Dr. Alvin Womac is professor of Biosystems Engineering, The University of Tennessee. Dr. Womac provides project technical leadership, engineering research methods, and the associated interpretations of results. Mr. Mitch Groothuis is a research associate of Biosystems Engineering, The University of Tennessee. Mr. Groothuis provided valuable technical assistance in setting up the bulk-format supply chain by performing capacity analysis and monitoring numerous harvesters and transport equipment with global positioning systems (GPS). Mr. Groothuis will present his second engineering technical paper, with a topic of biomass logistics, at the 2012 American Society of Agricultural and Biological Engineers annual conference. Dr. Tim Kraus, a development engineer with the Forage Equipment Division of Deere & Co. is a native of Wisconsin and is involved in various collaborative arrangements with the Investigator regarding field equipment systems. Others from Deere include John Hickman and Dean Acheson, both having biomass leadership positions in Deere. Drs. Kelly Tiller and Sam Jackson, CEO and feedstock manager, respectively for Genera Energy, oversees the feedstock supply of an increasing area of switchgrass to supply the demonstration plant in Tennessee. They provided an interface between producers and the biomass depot. Kyle Althoff oversees the interface of biomass feedstock and biorefinery for DuPont-Danisco Cellulosic Energy. He aides the Investigator with connections to basic scientists conducting conversion studies within parent organizations of DuPont (process) and Genencor (enzymes). James Robbins is Chief Engineer for Marathon Equipment. His expertise is the topic of bulk compaction and compactor design. Historically he has dealt with compaction of waste products, but this Hatch has introduced him to working with biomass materials. Tom Kice is CEO with Kice Industries that designs and manufactures conveyance equipment systems and components. This Hatch project adds field-chopped switchgrass to his long experience with

handling bulk products. Mark Kessler and Pat Warner, representative and engineer, respectively are with Laidig Systems who designs and manufactures bulk reclaimer systems that actively dig and convey bulk materials from storage. This Hatch project adds field-chopped switchgrass to their experience with handling bulk products. Drs. Shahab Sokhansanj and Richard Hess are biomass feedstock systems engineer and manager, respectively with DOE Oak Ridge National Laboratory and Idaho National Laboratory. Their collaboration helps to identify potential problems and solutions with regards to biomass supply systems. **TARGET AUDIENCES** Original Equipment Manufacturers (OEM) are targeted for the design, manufacture, and market equipment systems related to the harvest, handling, storage, transport, densification, pre-processing, and conversion of biomass to fuel and co-products. In other words, the target considers the potential new cellulosic biofuels industry for farm-to-biorefinery. Farm producers, biomass supply logistics firms, truckers, and biorefineries are targeted for the impact of supply logistics on conversion processes. Farmers are an important target for creating economically-viable biomass feedstock supplies since they make important decisions regarding the production and harvest of biomass crops to meet specifications acceptable to downstream conversion processes. Supply logistics firms can affect the quality of biomass since exposure to climatic elements affects biomass degradation and introduction of inhibitors. Truckers move biomass from farms to depots and/or biorefineries and possibly other points along the supply chain. Their understanding of moving biomass with seasonal harvest constraints and specification quality are paramount in the successful deployment of a supply chain. Biorefineries need of understand the importance of defining target biomass specifications that affect their processes, and the acceptable range of tolerances as it affects the cost of supply and conversion.

Texas A&M Univ: PhD. Degree Candidates Graduated and Dissertation Titles.

1. Capunitan, Jewel. 2013. Biofuels from Corn Stover: Pyrolytic Production and Catalytic Upgrading Studies. PhD Dissertation, Department of Agricultural and Biological Engineering, Texas A&M University, May 2013.
2. Maglinao, Amado, Jr. L. 2013. Development of a Segregated Municipal Solid Waste Gasification System for Electrical Power Generation. PhD Dissertation, Department of Agricultural and Biological Engineering, Texas A&M University, May 2013.
3. Tahmina Imam. 2012. Comparison of Biological and Thermal (Pyrolysis) Pathways for Conversion of Lignocellulose to Biofuels. PhD Dissertation, Department of Agricultural and Biological Engineering, Texas A&M University, December 2012.
4. Santos, Bjorn, S. 2013. Liquid-Phase Processing of Fast Pyrolysis Biooil Using Pt/HZSM-5 Catalysts. PhD Dissertation, Department of Agricultural and Biological Engineering, Texas A&M University, May 2013.

2013 Publications – Capareda Group

1. Placido, Jersson, Tahmina Imam and Sergio Capareda. 2013. Evaluation of Ligninolytic Enzymes, Ultrasonication and Liquid Hot Water as pretreatments for Bioethanol Production from Cotton Gin Trash. *Bioresource Technology* 139 (2013) 203-208. Elsevier Science Direct Publications. April 2013.
2. Teiseh, Eliasu A. and Sergio Capareda. 2013. Maximizing the Concentrations of Hydrogen, carbon Monoxide and Methane Produced from Pyrolysis of a MixAlco Process Derived Sludge. *Journal of Analytical and Applied Pyrolysis* 102 (2013) 76-82. Elsevier Science Direct Publications. April 2013.
3. Capunitan, Jewel A. and Sergio C. Capareda. 2013. Characterization and Separation of Corn Stover Biooil by Fractional Distillation. *Fuel* 112 (2013) 60-73. Elsevier Science Direct Publications. May 2013.

Virginia: **TARGET AUDIENCE** Agricultural industry, Non-food biomass producers, Biomass logistic companies, Non-food biomass biofuel refineries, Policy makers, Managers and personnel in the wood products industry

PARTICIPANTS: Partner organizations, collaborators, and contacts: Department of Energy, U.S.-India Joint Clean Energy

Research and Development Center (JCERDC), University of Florida, University of Missouri, Montclair State University, Texas A&M University (Objective A, Task 3; Objective B.3, Task 4; Objective D, Task 3), Objective B.1, Task 1: Dr. Kevin Edgar at Virginia Tech, Objective C, Task 1: Dr. Yong Woo Lee at Virginia Tech. Objective D, Task 1: University of Minnesota. Objective D, Task 2: University of Tennessee, University of Kentucky, Ohio State University, National Hardwood Lumber Association, Kentucky Forestry Association. Missouri Forest Products Association. Investigators Synergistic activities (including other stations and states) Opportunities for training or professional development that were provided by the project: In the future the following will be cover as training: Optimization models for biomass supply, Market development for coproducts from non-food biomass biofuels. Objective D, Task 1: Multiple instances where individual managers and personnel who initiated contact and were interested in obtaining more information. Objective D, Task 2: A short course was conducted for the industry in London, KY on October 30-31, 2012. Two training sessions were conducted in Missouri in June 2013. New award from the VA Department of Forestry to Develop a Community Energy project based on biomass. New award from the US Forest Service to study and identify energy best practices in forest products production facilities. **West Virginia:** Peer Reviewed: 1. Singh, K., S. Sokhansanj, and J. Dooley. 2013. Wood as advanced feedstock?- Scale matters. *Biofuels* 4(1): 13-16 (Invited). 2. Jin, W., K. Singh, and J. Zondlo. 2013. Pyrolysis kinetics of physical components and wood polymers of wood using Isoconversion methods. *Journal of Agriculture* 1(2): 37-44. (Invited) 3. Brar, J. S., K. Singh, J. Zondlo, and J. Wang. 2013 Co-gasification of coal and hardwood pellets: A Case Study. *American Journal of Biomass and Bioenergy*. 1: 11-26. Thesis and Dissertation: None Presentations: 1. Singh, K. and L. Sivanandan. 2013. Converting food waste for biofuels for sustainability and carbon credits. Fruit Drying Extension Workshop. Kearneyesville, WV, May 30, 2013. 2. Singh, K., and J. Zondlo. 2013. Attenuated total reflectance infrared spectroscopy (ATR-IR) to detect mild hydrothermal decay of woody biomass. American Society of Agricultural and Biological Engineers' 2013 Annual International Meeting, Kansas City, MO, July 22-July 25, 2013. 3. Singh, K., D. Dadyburjow, and E. Kugler. 2013. Pros and cons of pyrolysis vapor refining and in situ & ex situ catalytic pyrolysis. American Society of Agricultural and Biological Engineers' 2013 Annual International Meeting, Kansas City, MO, July 22-July 25, 2013. 4. Singh, K., M. Risse, J. Worley, K. C. Das, S. Thompson. 2013. Effect of fractionation and pyrolysis on fuel properties of poultry litter. From Waste to Worth: "Spreading" Science and Solutions. 2013 National Conference from the Livestock and Poultry Environmental Learning Center, Denver, CO April 1-5, 2013 5. Kumar, S., K. Singh, J. Zondlo, J. S. Brar, and W. Jin. 2012. Co-liquefaction of coal and torrefied woody biomass. National SunGrant Conference 2012, New Orleans, LA, October 02-05, 2012. 6. Brar, J. S., K. Singh, J. Zondlo, W. Jin, and S. Kumar. 2012. Co-gasification of coal and Appalachian hardwood: Syngas composition, carbon efficiency and energy efficiency. Coal-Biomass Conference, September 19, 2012, Morgantown, WV (Poster Presentation). 7. Jin, W., K. Singh, J. W. Zondlo, J. Wang, J.S. Brar, S. Kumar. 2012. Pyrolysis and torrefaction behavior of hardwood components. Coal-Biomass Conference, September 19, 2012, Morgantown, WV (Poster Presentation). 8. Kumar, S., K. Singh, J. Zondlo, J. S. Brar, and W. Jin. 2012. Co-liquefaction of coal and torrefied woody biomass. Coal-Biomass Conference, September 19, 2012, Morgantown, WV (Poster Presentation). 9. Singh, K. 2012. Coal-biomass Liquefaction and gasification. WVU-LIINC Symposium on Energy and Environmental Research Showcase, Morgantown, WV, September 6, 2012. **TARGET AUDIENCE-** Biomass Energy Students, Researchers, Industries, and Others **Wisconsin:** Peer Reviewed 1. David N Thompson,

David; Campbell, Timothy; Bals; Bryan; Runge, Troy; Teymouri; Farzaneh; Ovard, Leslie; Chemical Preconversion: Application of Low-severity Pretreatment Chemistries for Commoditization of Lignocellulosic Feedstock. *Biofuels* 4(3): 323–340(2013).

2.Digman, M.F.; Runge, T.M.; Shinnars, K.J.; Hatfield, R.D.; Wet Fractionation for Improved Utilization of Alfalfa Leaves. *Biological Engineering Transactions* 6(1): 29-42 (2013).

3.Runge, Troy; Houtman, C. Negri, A.; Heinricher, J.; Timber Bamboo Pulp. *Tappi Journal*, 12 (2): 9 -15 (2013).

4.Runge, Troy; Wipperfurth, Pamella; Zhang, Chunhu; Improving biomass combustion quality using a liquid hot water treatment, *Biofuels*, Vol. 4, No. 1, Pages 73-83 (2013).

5.Mandalika, Anurag; Runge, Troy; Enabling integrated biorefineries through high-yield conversion of fractionated pentosans into furfural, *Green Chem.*,14, 3175-318 (2012).

6.Li, Z.Q., Z.H. Jiang, B.H. Fei, X.J. Pan, Z.Y. Cai, X. Liu, and Y. Yu. Ethanosolv with NaOH pretreatment of moso bamboo for efficient enzymatic saccharification. *BioResources*, 2013, 8 (3), 4711-4721.

7.Pan, X.J. and J.N. Saddler. Effect of replacing polyol by organosolv and kraft lignin on the property and structure of rigid polyurethane foam. *Biotechnology for Biofuels*, 2013, 6, 12.

8. Zhang, D.S., Q. Yang, J.Y. Zhu, and X.J. Pan. Sulfite (SPORL) Pretreatment of Switchgrass for Enzymatic Saccharification. *Bioresource Technology*, 2013, 129, 127-134.

9.Yang, Q. and X.J. Pan. Pretreatment of Agave americana stalk for enzymatic saccharification. *Bioresource Technology*, 2012, 126, 336-340.

10.Elumalai, S., Y. Tobimatsu, J.H. Grabber, X.J. Pan, and J. Ralph. Epigallocatechin Gallate Incorporation into Lignin Enhances the Alkaline Delignification and Enzymatic Saccharification of Cell Walls. *Biotechnology for Biofuels*, 2012, 5, 59.

11.Li, Z.Q., Q. Yang, Z.H. Jiang, B.H. Fei, Z.Y. Cai, and X.J. Pan. Comparative study of sulfite (SPORL), dilute acid and NaOH pretreatments of bamboo for enzymatic saccharification. *Journal of Biobased Materials and Bioenergy*, 2012, 6, 544-551.

12.Keene, J.R., K.J. Shinnars, L.J. Hill, A.J. Stallcop, S.J. Wemhoff, H.D. Anstey, A. J. Bruns and J.K. Johnson. 2013. Single-pass baling of corn stover. *Trans. ASABE*. 56(1):33-40.

13.Williams, S.D. and K.J. Shinnars. 2012. Farm-scale anaerobic storage and aerobic stability of high dry matter sorghum as biomass feedstock. *Biomass and Bioenergy*. 46(11):309-316.

14.Shinnars, K.J., R.G. Bennett and D.S. Hoffman. 2012. Single and two-pass corn grain and stover harvesting. *Transaction of the ASABE*. 55(2): 341-350.

15. Khanal, S., R. Anex, C. Anderson, B. Gelder†. 2012. Potential impacts of “Billion Ton” biofuel feedstock production scenario on regional climate. 22nd annual International Conference on Soil, Water, Energy, and Air, March 19-22. San Diego, CA.

16.Christiansen, K. L., D. R. Raman, R. P. Anex. 2012. Predicting cost growth and performance of first-generation algal production systems. *Energy Policy* 51: 382-391.

17.Jarchow, M. E., M. Liebman, V. Rawat, R. P. Anex. 2012. Functional group and fertilization affect the composition and bioenergy yields of prairie plants. *GCB Bioenergy* 4: 671-679.

18.Khanal, S., R. P. Anex, B. K. Gelder, P. Dixon, P. Caragea. 2012. Cropping pattern choice with proximity to ethanol production and animal feeding operations. *Bioproducts & Biorefining* 6(4): 431-443.

19. Rafique, R., R. P. Anex, D. Hennessy, G. Kiely. 2012. What are the impacts of grazing and cutting events on the N₂O dynamics in humid temperate grassland? *Geoderma* 181- 182: 36-44.

20.Raman, D. R. and R. P. Anex. 2012. Conceptual and mathematical models of batch simultaneous saccharification and fermentation: dimensionless groups for predicting process dynamics. *Journal of Biological Systems* 20(2): 195 – 211.

21.Shah, A., M. J. Darr, D. Medic, R. P. Anex, D. Maski, S. Khanal. 2012. Techno-economic analysis of a production- scale torrefaction system for cellulosic biomass upgrading. *Biofuels, Bioproducts & Biorefining* 6(1): 45-57.

22.Anex, R.P. "Nutrient cycling in the bioeconomy: A life cycle perspective." In: Behrens, Malte and Abhaya Datye (eds.)

Heterogeneous Catalysis for the Conversion of Biomass and Its Derivatives. Max Planck Research Library for the History and Development of Knowledge, Proceedings 2. Berlin: Edition Open Access (ISBN 978-3-8442-4282-9).

23.X.J. Pan. Organosolv biorefining platform for producing fuels, chemicals and materials from lignocellulose. In: "The role of green chemistry in biomass processing and conversion", edited by Haibo Xie and Nick Gathergood. John Wiley & Sons, Inc., Hoboken, New Jersey. 2012, pp. 241-262.

Thesis Dissertations

- 1.Mandalika, A. 2012, Enabling the Development of Furan-based Biorefineries. MS Thesis.
- 2.Keene, J.R. 2012. Development and evaluation of single-pass grain combine and biomass baler. MS Thesis.
- 3.Julie C. Sinistore, 2012. The Life Cycle Assessment of Cellulosic Ethanol Production in the Wisconsin and Michigan Agricultural Contexts: The Influence of LCA Methods and Spatial Variability on Environmental Impact Assessment. PhD Thesis.
- 4.Brock Lundberg, 2012, Structure-function relationship of citrus fibers and modifications thereof. PhD Thesis.
- 5.Lis Nimani, 2012, Lignin depolymerization through hydrogenolysis into monomeric subunits on metal catalysts. MS Thesis.

Presentations

- 1-Khanal, S., R. Anex, C. Anderson, B. Gelder. 2012. Potential impacts of "Billion Ton" biofuel feedstock production scenario on regional climate. 22nd annual International Conference on Soil, Water, Energy, and Air, March 19-22. San Diego, CA.
- 2-Anex, R. P., et al. 2012. Integrated analysis of climate mitigation and adaptation in corn-based cropping systems. ASA, CSSA, & SSSA Annual Meeting, Cincinnati, OH, October 22.
- 3-Zhou, Shengfei, Runge, Troy; Validation of lignocellulosic biomass carbohydrates determination via acid catalyzed hydrolysis 245th ACS National Meeting and Exposition. New Orleans, Louisiana (April 10, 2013).
- 4-Runge, Troy, Houtman, Carl, Heinricher, Jackie; Timber Bamboo Pulp, TAPPI PEERS Conference, Savannah, GA (October 15, 2012).
- 5-Mandalika, AS, Runge, Troy; Improved Method for Producing Furfural from Biomass. Paper No. 121337810, 2012 ASABE Annual International Meeting, Dallas TX (July 30, 2012).

TARGET AUDIENCEThe research, education and outreach is targeted to scientists, engineers, producers and students working biological systems in the production of fuels, materials, and energy.

PARTICIPANTS:Drs. Rob Anex, Becky Larson, Xuejun Pan, Troy Runge, Doug Reinemann, and Kevin Shinnars – all from the Department of Biological Systems Engineering

Synergistic activities (including other stations and states)Drs. Anex and Reinemann are involved in multidisciplinary grants that include other stations and states. The grants and collaborators include:

- On-Farm Biomass Processing: Towards an Integrated High Solids Transporting/Storing/Processing System. Collaborators: University of Kentucky (lead institution); North Carolina State University; Oak Ridge National Laboratory; University of Wisconsin; USDA-ARS-FAPU; USDA-ARS-NSL; Cornell University; USDA-ARS-GSWRL; Case-New Holland America.
- Climate Change, Mitigation, and Adaptation in Corn Based Cropping Systems.Collaborators: Iowa State University (lead institution), Lincoln University; Michigan State University; The Ohio State University; Purdue University; University of Illinois; University of Minnesota; University of Missouri; University of Wisconsin; USDA Agricultural Research Service – Columbus, Ohio; South Dakota State University; and USDA National Institute of Food and Agriculture (USDA-NIFA).
- A Regional Program for Production of Multiple Agricultural Feedstocks and Processing to Biofuels and Biobased Chemicals. Collaborators: Louisiana State University AgCenter (lead institution), Southern University, Texas A&M University, University of Arkansas at Monticello, Danisco Inc., Virent Inc.
- Great Lakes Bio-Energy Research Center: Sustainability of Bio-Energy Systems Collaborators: UW Energy Institute, UW Forestry Department, Other GLBRC collaborators at Michigan State, Iowa State and Pacific Northwest Laboratories