

NCERA 59

Annual Meeting: July 17 & 18, 2014

Period: 10/2013 – 9/2014

Participants: Will Horwath, UC-Davis (Chair); Matt Ruark, UW-Madison (Secretary); Mike Castellano, Iowa State; Rhae Drijber, Univ. Nebraska; Larry Cihachek, NDSU; Ann-Marie Fortuna, NDSU (via phone); and Ron Turco, Purdue Univ. (Advisor)

Location: University of California-Davis, Davis, CA

### **Meeting agenda/notes**

#### **Thursday, July 17th**

8:30-10:15: Opening comments & state reports

- Horwath – Review of Brazilian research on organic C increases through restoration with iron biosolids.
- General discussion on manure management to discuss GHG emissions.
- Castellano – C and N building or loss with long term N rates.
- Ruark – POM and aggregate fractions across cropping systems.
- Larry – reviewing concepts of SOC sequestration and soil C change

10:30-12:00: Business meeting & Administrators's report

- Elections: Matt Ruark was elected incoming chair
- Discussion on finding new members for the committee
- Future meetings: Ames, IA in 2015; Madison, WI in 2016

1:00-5:00: Field trips

Lodi winery – presentation from Matt X, on Lodi Rules and whatever it is that Will Horwath chairs

Field visit – Vineyard GHG study

Field visit – Delta wetlands agriculture and water reclamation project – chemical treatment of water before returning to

Field visit – Carbon and N cycling in rice and natural wetlands and soil subsidence

Field visit – Drip vs. flood irrigation and GHG losses in California agriculture

#### **Friday, July 18<sup>th</sup>**

9:00-12:00: Discussion of methods book

- Reviewed current outline and status of authors
- Deadline of January 1<sup>st</sup> for first drafts

### **Accomplishments**

*Publications (NCERA 59 members in bold)*

He, Z., Zhang Hailin, **Olk, D.C.**, Shankle, M., Way, T.R., Tewolde, H. Protein and fiber profiles of cottonseed from upland cotton with different fertilizations. 2014. Modern Applied Science 8: 97-105.

Lamar, R.T., **Olk, D.C.**, Mayhew, L., Bloom, P.R. 2014. Determination of humic and fulvic acids in commercial solid and liquid humic products by alkaline extraction and gravimetric determination. Journal of AOAC International. 97: 721-730.

Zhigao Zhou, Xiaoyan Cao, K. Schmidt-Rohr, **D.C. Olk**, Shun Yao Zhuang, Jing Zhou, Zhihong Cao, and Jingdong Mao. 2014. Similarities in chemical composition of soil organic matter across a

- millennia-old paddy soil chronosequence as revealed by advanced solid-state NMR spectroscopy. *Biology and Fertility of Soils* 50: 571-581.
- Rivas, F.A., M.A. Tabatabai, **D.C. Oik**, and M.L. Thompson. 2014. Kinetics of short-term carbon mineralization in roots of biofuel crops in soils. *Biology and Fertility of Soils* 50: 527-535.
- Mitchell DC\*, Helmers MJ, Parkin TB, Zhou X, **Castellano MJ**. 2014. Soil nitrogen retention in perennial grass filter strips buffering annual croplands. *Journal of Environmental Quality*, doi:10.2134/jeq2014.05.0201.
- Toosi ER, Schmidt JP, **Castellano MJ**. 2014. Land use and flowpath interact to affect dissolved organic carbon and inorganic nitrogen transport to subsoils. *Biogeochemistry*, doi: 10.1007/s10533-014-9983-0.
- Lewis DB, **Castellano MJ**, Kaye JP. 2014. Forest succession, soil carbon accumulation, and rapid nitrogen storage in poorly-remineralized soil organic matter. *Ecology*, doi: 10.1890/13-2196.1.
- Toosi ER, Schmidt J, **Castellano MJ**. 2014a. Soil temperature is positively associated with dissolved organic carbon supply and negatively associated with soil solution nitrate. *European Journal of Soil Biology*, doi: 10.1016/j.ejsobi.2014.01.003.
- Brown KH, Bach E, Drijber RA, Hofmockel K, Jeske EA, Sawyer JE, **Castellano MJ**. 2014. A long-term nitrogen fertilizer gradient has little effect on soil organic matter. *Global Change Biology* doi: 10.1111/gcb.12519
- Pérez-Suárez M, **Castellano MJ**, Kolka R, Asbjornsen H, Helmers MJ. 2014. Nitrogen and carbon dynamics in prairie vegetation strips across topographical gradients in mixed Central Iowa agroecosystems. *Agriculture Ecosystems and Environment* doi:10.1016/j.agee.2014.01.023.
- Geatz, G.W., B.A. Needleman, **R.R. Weil** and J.P. Megonigal 2013. Nutrient Availability and Soil Organic Matter Decomposition Response to Prescribed Burns in Mid-Atlantic Brackish Marshes. *Soil Science Society of America Journal*.  
<https://dl.sciencesocieties.org/publications/sssaj/pdfs/0/0/sssaj2012.0272>
- Chen, G., **R.R. Weil** and R. Hill. 2014. Effects of Compaction and Cover Crops on Soil Least Limiting Water Range and Air Permeability. *Soil & Tillage Research* 136:61-69.
- Tulley, K. **R.R. Weil**, C. Palm. 2014. Ion selective electrode offers accurate, inexpensive method for analyzing soil solution nitrate in remote regions. *Communications in Soil Science and Plant Analysis*. 45: 1974-1980.
- Wang, F., Y.A. Tong, P. Gao, J. Zhang, **R.R. Weil**, and J.N. Coffie. 2014. Organic amendments to a wheat crop alter soil aggregation and labile carbon on the loess plateau, China. *Soil Science* 179:166-173.
- Higo, M., K. Isobe, K. Kondo, M. Yamaguchi, S. Takeyama, **R.A. Drijber**, Y. Torigoe. 2014. Temporal variation of the molecular diversity of arbuscular mycorrhizal communities in three different winter cover crop rotational systems. *Biology and Fertility of Soils*. Published on-line 30-July 2014.
- Higo, M., K. Isobe, **R.A. Drijber**, T. Kondo, M. Yamaguchi, S. Takeyama, Y. Suzuki, D. Nijjima, Y. Matsuda, R. Ishii, Y. Torigoe. 2014. Impact of a 5-year winter cover crop rotational system on the molecular diversity of arbuscular mycorrhizal fungi colonizing roots of subsequent soybean. *Biology and Fertility of Soils* 50:913-926.
- Snell, L.K., J.A. Guretzky, V.L. Jin, **R.A. Drijber**, M. Mamo. 2014. Nitrous oxide emissions and herbage accumulation in smooth bromegrass pastures with nitrogen fertilizer and ruminant urine application. *Nutrient Cycling Agroecosystems* 98:223-234.

- Tian, H., J. Fu, **R.A. Drijber**, Y. Gao. Expression patterns of five genes involved in nitrogen metabolism in two winter wheat (*Triticum aestivum* L.) genotypes with high and low nitrogen utilization efficiencies. Accepted by Journal of Cereal Science on 9-24-2014.
- Kwon, H-Y., **Wander, M.M.**, Mueller, S. and J.B. Dunn. 2013. Modeling state-level soil carbon emissions factors under various scenarios for direct land use change associated with United States biofuel feedstock production. Biomass and Bioenergy. <http://dx.doi.org/10.1016/j.biombioe.2013.02.021>.
- Ugarte, M. C., Zaborski, E. R., and **M.M. Wander**. 2013. Nematodes as integrative measures of soil condition in organic cropping systems. Soil Biology and Biochemistry. 64:103-113.
- Francis, C., Miller, M., Anderson, M., Creamer, N., Wander, M., Park, J., Green, T., and B. McCown. 2013. Food webs and food sovereignty: Research agenda for sustainability. Journal of Agriculture, Food Systems, and Community Development. Advance online publication. <http://dx.doi.org/10.5304/jafscd.2013.034.010>.
- Yang, X., Drury, C.F., and **M.M. Wander**. 2013. [A wide view of no-tillage practices and soil organic carbon sequestration](#). ACTA AGRICULTURAE SCANDINAVICA. 63: 523-530.
- Marzano, SY, **M.M. Wander**, M. Villamil, C.M. Ugarte, E. R. Zaborski, and D. Eastburn. 2014. Transitional cropping systems and organic amendment effects on crop disease. Agronomy Journal. Vol. 106 No. 2, p. 519-527.
- Ugarte, M.C., Kwon, H-Y., Andrews, S.A. and **M.M. Wander**. 2014. A Meta-analysis of soil organic matter response to soil management practices in the continental United States. Journal of Soil and Water Conservation. 69:422-430.
- Chen, X., Wang X., Liebman, M., Cavigelli M., and **M. Wander**. 2014. Influence of soil quality on carbon mineralization response to residue and nitrogen fertilizer additions. PLoS ONE 9(7): e103720. doi:10.1371/journal.pone.0103720.
- Zhangcai, Q. Dunn, J., Kwon, H-Y, Mueller, S. and **M. Wander**. Soil carbon sequestration and land use change associated with biofuel production: Empirical evidence. Global Change Biology. In press.
- Cogger, C.G., A.I. Bary, A.C. Kennedy, and **A.-M. Fortuna**. 2013. Long-term crop and soil response to biosolids applications in dryland wheat. J. Environ. Qual. 42:1872–1880. doi:10.2134/jeq2013.05.0109.
- Gollany, H.T., **A. Fortuna**, M. K. Samuel, F. L. Young, W.L. Pan, and M. Pecharko. 2013. Soil organic carbon accretion vs. sequestration using physicochemical fractionation and CQESTR simulation. Soil Sci. Soc. Am. J., doi:10.2136/sssaj2012.0303.
- Cogger, C.G., A.I. Bary, E. A. Myhre, and **A. Fortuna**. 2013. Biosolids applications to tall fescue have long-term influence on soil nitrogen, carbon, and phosphorus. J. Environ. Qual.42:516-522., doi:10.2134/jeq2012.0269
- Beyhaut, E., D.L. Larson, **D.L. Allan**, and P.H. Graham. 2014. Legumes in prairie restoration: evidence for wide cross-nodulation and improved inoculant delivery. Plant Soil. 377:245-258.
- Griffing, E.M., R.L. Schauer, and **C.W. Rice**. 2014. Life cycle assessment of fertilization of corn and corn-soybean rotations with swine manure and synthetic fertilizer in Iowa. J. Environ. Qual. 43:709-722.
- Robertson, G.P., K.L. Gross, S.K. Hamilton, D.A. Landis, T.M. Schmidt, **S.S. Snap**, and S.M. Swinton. 2014. Farming for ecosystem services: an ecological approach to production agriculture. BioScience 64:404-415.

**Verburg, P.S.J.**, S.E. Kapitzke, B.A. Stevenson, and M. Bisiaux. 2014. Carbon allocation in Larrea tridentate plant-soil systems as affected by elevated soil moisture and N availability. Plant Soil. 378:227-238.

#### *Grants Managed*

Field evaluation of a humic product for corn-based rotations in the Mid-Latitudes. 2014-2019 mid-years (5 years) with Ag Logic Distributors. Do you need dollar amount? PI **Dan Olk**.

**M. Castellano**, co-PIs **D. Olk**, J. Sawyer, J. Six. 2014-2016. United States Department of Agriculture, Agriculture and Food Research Initiative, Microbial Communities in Soil Foundational Program. "Integrating soil carbon stabilization concepts and the nitrogen cycle" \$499,000.

K. Hofmocker, co-PIs L. Halverson, **M. Castellano**. 2013-2015. United States Department of Agriculture, Agriculture and Food Research Initiative, Microbial Communities in Soil Foundational Program. "Improved N retention through plant-microbe interactions" \$499,000.

**R. Weil**. USDA/SARE. Deep Soil Nitrogen: A Resource for Sustainability. \$249,000. National competition. 09/01/2014-10/30/2017

**Drijber, R.** (PI), Project ID 29247, "Soil Microbial Community Structure and Function in High Production Corn-Soybean Systems", Dept of Agriculture-ARS, Federal, Research, Awarded. 08/01/2014-07-31/2019. \$100,000.

**Drijber, R.** (PI), Lindquist, J., Blanco-Canqui, H. Project ID 29381. "Cover Crop Strategies to Build Soil Organic Matter, Thereby Enhancing Soil Biology, Water Retention and Weed Control in Organic Cropping Systems of the Western Corn Belt", Ceres Trust, Associations/Foundations, Research, Awarded. \$180,000.

Drewnoski, M. (PI), **R. Drijber**, G. Lesoing, T. Shaver. Project ID 28812: A producer driven approach to demonstrating soil health and economic benefits of cover crop adoption and livestock integration in Nebraska cropping systems. CIG Grant, Dept. of Agriculture-NRCS. Awarded. 09/01/2014 - 05/31/2016. \$74,958.

**Wander, M.M.** 2014 Agroecology and Sustainable Agriculture Program – ASAP Scholars Initiative, \$50,000, Gift (100%).

**Wander, M.M.** 2013-2014. Soil Health Content for eOrganic. Organic Valley. \$33,497. (100%).

**Wander, M.M.** 2011-2015. Domestic land-use change emission factors. Argonne National Lab. \$129,389.

**Wander, M.M.** 2014-2015. Annie's Organic – Soils Content for eOrganic. \$5000.

Lin, Z., T. Maung, J. Teboh, B. Schatz, M. Ostlie and **A.-M. Fortuna**. 2013. Soil health and water quality impacts of growing energy beets for advanced biofuel production in North-Central United States. USDA-NIFA A1401 Soil, Air, and Water Processes in Agroecosystems.

Aberle, E. and **A.-M. Fortuna**. 2013. Impact of tillage system, previous fertility, and previous crop on rhizobia population, nitrogen credit, and soybean production. North Dakota Soybean Council.

SustainableDairy.org - \$10 million USDA CAP grant (2013-2018) **M. Ruark**

GreatPlainsGrazing.org - \$10 million USDA CAP grant (2013-2018) **C. Rice**

#### *Outreach and Presentations*

**Wander, M.M.** Sustainable Intensification and Food Sovereignty: Companion or competing paths to sustainability? 10/2013. Healthy Foods Healthy Lives Symposium. UMN. Minneapolis MN.

**Wander, M.M.** Growing corn for Wall-mart: Emerging sustainability standards. 10/2013. Chicago Farmers Group, Chicago IL.

**Wander, M.M.** Emerging Sustainable Agriculture Standards: Leo 4000. New Modes of Agriculture. 11/2013. INRA, Dijon, France.

**Wander, M.M.** \*Ugarte, C.M., Lazicki, P., Mendonca, E., and H. Kwon, 12/2013. Analysis for sustainable agricultural intensification at the intersection of food, water, land, energy, and the environment. \*presenter. BioSight Workshop, IFPRI, Washington DC.

**Wander, M.M.** and C. Ugarte. Illinois Soil Quality Initiative III: Stewardship on Organic, Conventional and Conservation Till Grain Farms. 1/2014. Illinois Specialty Crops, Organic and Agritourism Conference, Bloomington, IL.

**Wander, M.M.** and C. Ugarte. Soil Stewardship and Conservation Metrics: ISQI II. Illinois Chapter, Soil and Water Conservation Society. Urbana, IL.

**Wander, M.M.** and C. Ugarte. Illinois Grain Farmers' Goals and Soil Stewardship Behaviors, 7/2014. National SWCS Meeting Chicago, IL.

**Wander, M.M.**, Ugarte, C., and E. Phillips. Workshop Beg, Borrow, or Steal to Improve Soil Stewardship: Will Segmenting Midwest Row Crop Actors Improve Management? 7/2014. National SWCS Meeting, Chicago, IL. Panelists: Sarah Brown of Oregon Tilth's Organic Conservation Program (OCP) which partners with NRCS; Nick Paulson, Associate Professor of Agriculture and Consumer Economics at the University of Illinois, on farm policy and lease agreements; Dave Miller, CEO of Iroquois Valley Farms, a B Corporation generating positive returns to social, environmental and financial impacts through secure farm leases for small and mid-size family farmers, and Jeff Schahczenski, Agriculture Policy; Funding Research Director NCAT.

Revord, R., Hunter, D. Bless, B. and **M. Wander**. Panel Discussion: Reimagining curriculum and living laboratories: empower and equip young farmers to apply agro-ecological theory. 8/2014. Sustainable Agriculture Education Association, Raleigh NC.

North Dakota Soil and Water Conservation Society and Professional Soil Classifiers Association of North Dakota Annual Technical Meeting November 24-25, **2013** Fargo, ND. **Fortuna**

Master Gardener Program, October 28<sup>th</sup>, 2013. Fargo, ND. Management of Compost piles. Audience of 30 home owners, state and county agents. **Fortuna**

Saline and Sodic Soil Field Day, August 22, 2013. Bagg Bonanza Farm, Mooreton, ND. Audience of over 250 NRCS state agents and producers. **Fortuna**

Nutrient Management Day, August 13, 2013. Carrington Research and Extension Center, Carrington, ND. Audience of over 70 NRCS state agents and producers. **Fortuna**

#### Impact Statements:

1. Research was published that enhanced our understanding of carbon and nitrogen cycling and storage in soils.
2. Research grants were awarded to conduct cutting edge research into soil carbon formation and speciation.
3. Outreach was planned to educate farmers, crop consultants, government agencies, and extension staff on concepts of soil organic matter and the relationship between crop management practices and soil organic matter.