February 2012

USDA-ARS

Land Management and Water Conservation Research Unit

Greetings!

The Land Management and Water Conservation Research Unit (LMWCRU) conducts research for advancing practices and technologies that will improve the efficiency of cropping systems and quality of our natural resources. In this issue of the LMWCRU update, we highlight activities of the LMWCRU during the past six months as well as spotlight research on crop and nitrogen management by one of our scientists. This research is the foundation for improving the profitability of farming systems, mitigating climate change, and preserving the quality of our air, soil and water resources. We hope you enjoy this issue of the LMWCRU update.

Spotlight on Research

David Huggins, soil scientist, is a proponent of sustainable farming systems. He has a passion for developing precision technologies that will improve the way we manage crops and fertilizer across the landscape. Among his many field studies now underway, Dave is examining precision management of wheat seed and nitrogen across the rolling Palouse Hills to improve water and N fertilizer use efficiency. His findings, in collaboration with scientists from the University of Idaho, Washington State University, and industry, suggest that grain yield and nitrogen use efficiency can be improved in dry years by using variable rate technology compared to conventional technology that uniformly applies seed and N across the landscape. Dave believes that successful development of science-based decision aids for precision seed and N management will increase N and water use efficiency as well as wheat yield. Indeed, greater use efficiency of purchased N fertilizer will reduce grower costs and benefit the environment by reducing nitrous oxide (a potent greenhouse gas) emissions and N losses to surface and ground water.

Dave Huggins applying a stable N isotope to wheat for assessing N use efficiency.

Dig-It!

Ann Kennedy served on a committee that brought the “Dig-It! The Secrets of Soil” Smithsonian Exhibit to Spokane, Washington. The exhibit provides learning opportunities for all ages on the importance of soil in sustaining life on earth. The exhibit is on display at the Museum of Arts and Culture until September 22, 2012. Find out more at: http://forces.si.edu/soils/video/tour.html

LMWCRU News

Invitations

- **Frank Young** was invited to speak on "Camelina: Is it a fit in the PNW?" at the Washington Crop Consultants meeting on January 19, 2012 in Moses Lake, WA.
- **Frank Young** was invited to speak on "Canola Production in the PNW" and on "Crop and Chemical Rotations with Canola" at the Washington State Biofuel workshop on January 24, 2012 in Odessa, WA.
- **Frank Young** was invited to speak on "Glyphosate: Disease/Micronutrient Interactions—Fact or Fiction?" at the PNW Direct Seed Association on February 9, 2012 in Spokane, WA
- **Frank Young** was invited to speak on "Canola Production in the PNW" at the Douglas County Oilseed Workshop on February 27, 2012 in Waterville, WA.
- **Jeff Smith** has been invited to serve on the USDA-AFRI Sustainable Bioenergy Programs "Environmental implications of direct and indirect land use change" peer review panel. This program is to enhance understanding of the impact of biofuel feedstocks on the environment.

Farewell

- **Derek Appel** resigned as farm manager at the Palouse Conservation Field Station. We wish Derek well in his new venture.

Activities

- **February 2012**

  Brenton Sharratt and **Frank Young** participated in a regional ARS workshop in Spokane, WA. The workshop assessed stakeholder research needs concerning competitive and sustainable agricultural systems.

  Frank Young participated in the PNW Direct Seed Association meeting in Spokane, WA and in the Douglas County Oilseed workshop.

  David Huggins and **Frank Young** will participate in the Regional Approaches to Climate Change in Pacific Northwest Agriculture (REACCH) annual meeting in Pendleton, OR.

- **March 2012**

  Frank Young will present a paper at the Western Society of Weed Science in Reno, NV.

- **April 2012**

  Frank Young will collaborate with Washington State University Ferry County Extension to conduct a spring canola planting workshop for The Confederated Tribes of the Colville Reservation.

- **May 2012**

  Frank Young will conduct a North Central Washington canola field day.

- **August 2012**

  Jeff Smith will present a paper at the 14th International Symposium on Microbial Ecology in Copenhagen, Denmark.

Recent Publications

Our Recent Publications are professional publications that convey information about original research. Below each citation is a brief description of the major finding from this research. Follow the web link for more technical information about this research.

McClellen, R.C., **McCool, D.K**., Rickman, R.W. 2012. Grain yield and biomass relationship for crops in the Inland Pacific Northwest United States. Journal of Soil and Water Conservation. 67(1):42-50.

Estimating crop residue biomass is important for balancing the need for retaining residue for soil quality and for removing residue for bioenergy. We developed new relationships for estimating residue biomass based upon grain yield for dominant crops of the Pacific Northwest. These relationships can be used by conservation agencies and the bioenergy industry in estimating biofuel resources.
http://www.ars.usda.gov/research/publications/publications.htm?seq_no_115=259582

Feng, G., **Sharratt, B.** and Wendling, L. 2011. Fine particle emission potential and rate from loam soils in a semi-arid region. Soil Science Society of America Journal 75:2262-2270.

Variability among erosion prone soils to emit PM10 (air pollutant) is poorly understood in the Pacific Northwest. We found that sandy loam soils had the greatest potential to emit PM10 even though these soils were composed of a smaller percentage of PM10 as compared with silt loam soils. These findings are important to state and federal agencies for estimating PM10 emissions from soils and thereby predicting air quality across the region.
http://www.ars.usda.gov/research/publications/publications.htm?seq_no_115=265591

TerAvest, D., **Smith, J.L.,** Carpenter-Boggs, L.A., Granatstein, D.M., Hoagland, L.A., Reganold, J.P. 2011. Soil carbon pools, nitrogen supply, and tree performance under several groundcovers and compost rates in a newly planted apple orchard. Horticultural Science. 46(12):1687–1694.

Improving N-use efficiency is critical to increasing cost efficiency in organic fruit production. We found that wood chip mulch improved tree performance and soil quality compared to Brassica seed meal and legume cover crops. This information is important to producers who seek alternative amendments to bolster fruit production.
http://www.ars.usda.gov/research/publications/publications.htm?seq_no_115=272216

Zhang, S., Chen, D., Sun, D., Wang, X., **Smith, J.L**., Du, G. 2011. Impacts of altitude and position on the rates of soil nitrogen mineralization and nitrification in alpine meadows on the eastern Qinghai-Tibetan Plateau, China. Biology and Fertility of Soils.

Global warming could have a negative impact on the soil nitrogen cycle. We tested this hypothesis and found that more nitrogen was released to the environment (as a contaminant) as soil temperatures increased in alpine meadows. Managing inputs and grazing of grasslands in the future will be important to minimizing the effects of climate change.
http://www.ars.usda.gov/research/publications/publications.htm?seq_no_115=270853

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LMWCRU Scientists:

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David Huggins, Nutrient Cycling

Ann Kennedy, Soil Quality

Jeff Smith, Greenhouse Gas Emissions

Frank Young, Cropping Systems