

USDA-ARS

Land Management and Water Conservation Research Unit

Greetings!

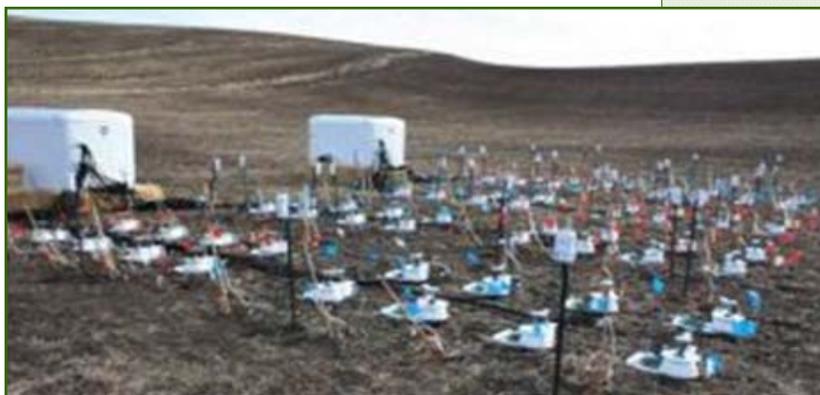
The Land Management and Water Conservation Research Unit (LMWCRU) conducts research for advancing agricultural practices and technologies that will improve the efficiencies and performance of cropping systems and quality of our natural resources. In this issue of the LMWCRU update, we highlight the activities of the LMWCRU during the past six months as well as spotlight our role in long-term agricultural research. Long-term agricultural research is necessary for developing sustainable systems that are able to cope with oft-times unexpected and extreme changes in markets, policies, technologies, and weather. A commitment to long-term agricultural research will ensure an ample supply of food, feed, fiber and fuel and pristine natural resources for future generations. We hope you enjoy this issue of the LMWCRU update.

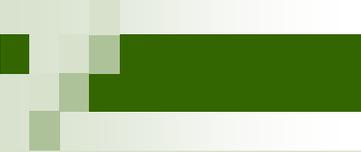


Spotlight on Research

The USDA Agricultural Research Service (ARS) established a Long-Term Agroecosystem Research network in 2012. This network, comprised of 10 sites, has the objective of assessing the sustainability of United States agricultural systems. This assessment will require a long term commitment to improving our understanding of the complexities of agroecosystems and their influence on neighboring ecosystems at multiple scales. The LMWCRU will coordinate efforts at one of the sites, the Washington State University R. J. Cook Agronomy Farm, which was established by a team of ARS and Washington State University scientists involved in direct-seed cropping systems research. The Long-Term Agroecosystem Research network will work closely with the National Science Foundation's Long-Term Ecological Research Network and National Ecological Observatory Network and support the President's Council of Advisors on Science and Technology Quadrennial Ecosystems Services Trends Assessment program.

The R.J. Cook Agronomy Farm is ideally suited to examine the sustainability of agricultural systems due to the complexity of the landscape, proximity to other ecosystems, and assemblage of trans-disciplinary research projects involving partnerships among several universities and agencies. **David Huggins** and **Jeff Smith** contribute to one such project which examines carbon and nitrogen cycling after application of different rates and types of fertilizer. In the image to the left, these scientists are using portable chambers to continuously monitor greenhouse gases after applying fertilizers.





LMWCRU News

Invited Presentations

September 2012

David Huggins is invited to give a presentation on long-term agricultural research in the Pacific Northwest to the Long-Term Ecological Research Network in Estes Park, Colorado.

November 2012

Ann Kennedy is invited to present papers on soil quality and soil microbe weed control at the winter weed meetings in Converse County, Wyoming.

Frank Young is invited to give a presentation on “Chemical and crop rotation to prevent herbicide resistance” at the Washington State Future Energy Day, Seattle, Washington.

December 2012

Frank Young is invited to organize a session and give a presentation on canola seeding and weed control to the Far West Agribusiness Association, Richland, Washington.

January 2012

Ann Kennedy is invited to speak on ‘Cheating the Cheatgrass and Medusahead’ at the Washington Association of Professional Crop Consultants Annual meeting in Moses Lake and on ‘Soil Microbes and Weed Suppression’ at the Idaho Weed Meetings in Boise, Idaho.

Collaborations

Ann Kennedy is cooperating with the Tunisia Centre de Recherché et Technologie des Eaux, Laboratoire de Traitement des Eaux Usées, Technopark of Borj-Cedria, Soliman, Tunisia in determining the quality and microbial characteristics of treated sewage.

Grants

Ann Kennedy, in collaboration with Washington State University scientists, received grants from the Bureau of Land Reclamation, U. S. Fish and Wildlife Service, and Washington Grain Alliance to study suppression of weeds using a soil bacterium.

Ann Kennedy, in collaboration with Washington State University scientists, received a Sustainable Agriculture Research & Education grant to assess soil quality of long-term direct seed production systems.

Ann Kennedy, in collaboration with the Spokane Conservation District and Washington State University scientists, received a Verle Kaiser Conservation Endowment grant for integrating the ‘Dig-It’ curricula into hands-on soil science activities for K-12 students of Eastern Washington.

Program Planning

Brenton Sharratt and **Frank Young** participated in a national workshop in March 2012 designed to acquire stakeholder input on research needs for creating more competitive and sustainable crop and livestock systems. This information will be used for developing a new five year research plan aligned with ARS National Program 216 - Agricultural System Competitiveness and Sustainability.

Visiting Scientists

Ann Kennedy hosted Mike Gregg and Jason Pyron, US Fish and Wildlife Service, to outline collaborative research on soils, microbiology and weed management.

Recent Publications

Our Recent Publications are scholarly professional publications that convey information from original research. Below each citation is a brief description of the major research finding. When available, links are provided to the articles.

- Neila, S., K. Kotfi, K. Soulwene, B.Y. Amira, F. Murano, and **A.C. Kennedy**. 2011. Characteristics and biological treatment of leachates from a domestic landfill. *Hydrology Current Research* S3:001. doi: 10.4172/2157-7587.
We found a significant reduction in organic matter after treatments with a high microbial diversity, which provides a method to improve waste water treatment and improve the environmental quality of waste disposal.
- Saunders, O., A. Fortuna, J. Harrison, E. Whitefield, C. Cogger, **A.C. Kennedy**, and A.I. Bary. 2012. Comparison of raw dairy manure slurry and anaerobically digested slurry as N sources for grass forage production. *International Journal of Agronomy* doi:10.1155/2012/101074.
Anaerobically digested dairy slurry provided adequate soil fertility and N availability for crop uptake and forage production.
- Halvorson, J.J., H.T. Gollany, **A.C. Kennedy**, A.E. Hagerman, J.M. Gonzalez, and S.B. Wuest. 2012. [Sorption of tannin and related phenolic compounds and effects on extraction of soluble-N in soil amended with several carbon sources](#). *Agriculture* 2:52-72.
Tannins may influence soil organic matter and nutrient cycling; however, their impact is directed by the type of soil organic matter already present.
- Stubbs, T. L. and **A.C. Kennedy**. 2012. Microbial weed control and microbial herbicides. In: R. Alvarez-Fernandez (ed.). *Herbicides - Environmental Impact Studies and Management Approaches*. InTech-Open Access Publisher, Rijeka, Croatia.
The latest information on the state of research in the use of microbes in weed management illustrated the advances that continue to improve our understanding of the wealth of genetic diversity and potential to use plant-microbe interactions to benefit agriculture. <http://www.intechopen.com/articles/show/title/microbial-weed-control-and-microbial-herbicides>.
- **Sharratt, B.S.**, L. Wendling, and G. Feng. 2012. Surface characteristics of a windblown soil altered by tillage intensity during summer fallow. *Aeolian Research* 5:1-7.
Windblown PM10 emissions were proportional to tillage intensity during summer fallow, primarily due to the impact of tillage on residue cover. Maintaining residue on the soil surface during summer fallow is critical to controlling erosion.
- Singh, P., **B. Sharratt**, and W. Schillinger. 2012. Wind erosion and PM10 emission affected by tillage systems in the world's driest rainfed wheat region. *Soil & Tillage Research* 124:219-225.
PM10 loss was reduced by half as a result of using undercutter tillage rather than disk tillage during the summer fallow phase of a wheat-fallow rotation. Undercutter tillage is a viable strategy for reducing PM10 emissions.

Recent Publications Cont'd

- **Sharratt, B.S.** and V. Vaddella. 2012. Threshold friction velocity of soils within the Columbia Plateau. *Aeolian Research* 6:13-20.
The loessial soils of the Inland Pacific Northwest begin to erode at a lower wind velocity than soils found in other regions of the United States. This information will enable models to more accurately predict wind erosion and PM10 loss from agricultural lands in the Northwest.
- Bailey, V.L., C.L. Bilskis, S.J. Fansler, L. McCue, **J.L. Smith**, and A. Konopka. 2012. Measurements of microbial community activities in individual soil macroaggregates. *Soil Biology and Biochemistry* 48:192–195.
We found that the smallest aggregates had the greatest enzyme activity, thus are most important in nutrient cycling.
- Abi-Ghanem, R., L. Carpenter-Boggs, **J.L. Smith**, and G.J. Vandemark. 2012. Nitrogen fixation by U.S. and Middle Eastern chickpeas with commercial and wild Middle Eastern inocula. *International Scholarly Research Network Soil Science* doi:10.5402/2012/981842.
We found that chickpeas vary widely in their capacity to fix nitrogen, thus suggesting a great potential to improve nitrogen fixation in chickpea.
- Long, D.S., J.D. McCallum, **F.L. Young**, and A. Lenssen. 2012 In-stream measurement of canola (*Brassica napus L.*) seed oil concentration using in-line near infrared reflectance spectroscopy. *J. Near Infrared Spectroscopy*. 20:387-395.
The spectrometer accurately predicted seed oil concentration in a grain stream. This creates opportunities for monitoring the oil content of seed entering the expeller at crushing plants and to adjust the expeller for maximum efficiency.
- **Young, F.L.**, D.S. Long, and J.R. Alldredge. 2012. Effect of planting methods on spring canola (*Brassica napus L.*) establishment and yield in the low-rainfall region of the Pacific Northwest. *Crop Management* doi:10.1094/CM-2012-0321-01-RS.
Spring canola planted with no-till openers yielded higher than broadcast seed. The adoption of spring canola in the wheat/fallow region of the PNW would improve pest management strategies, diversify markets, and increase sustainability.
- Walters, C.G., **F.L. Young**, and D.L. Young. 2012. Economics of alternative management practices for jointed goatgrass in winter wheat in the Pacific Northwest. *Crop Management* doi:10.1094/CM-2012-0227-01-RV.
A spring wheat/fallow/winter wheat/fallow rotation improved crop yield, quality, and profitability and reduced jointed goatgrass populations and dockage compared to other weed management systems. Adopting this production system will increase profitability and sustainability and decrease herbicide resistance in jointed goatgrass.

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Ann Kennedy, Soil Quality

Jeff Smith, Greenhouse Gas Emissions

Frank Young, Cropping Systems