



Dr. Olga S. Walsh is a Soil Fertility and Precision Nutrient Management Specialist. She joined Montana State University's Agricultural Experiment Station and the Department of the Research Centers in 2010 as an Assistant Professor of Soil Nutrient Management.

She received her BS degree in Soil Science, specializing in Soil Chemistry, in 1997 at St. Petersburg State University, St. Petersburg, Russia. She obtained her MS (2007) and PhD degrees in Soil Science (2009) from Oklahoma State University, specializing in Soil Fertility and Nutrient Management.

Dr. Walsh is located at Western Triangle Agricultural Research Center, near Conrad, MT. She is developing an applied, nationally-recognized, field-oriented research program that focuses on nutrient management strategies that optimize economic and environmental sustainability of agricultural cropping systems with an emphasis on small grain production. Dr. Walsh's research is focused on precision agriculture methodologies that encompass a wide variety of approaches and methodologies focused on improvements in the efficiency of all the aspects of agricultural production systems. Her research aims to develop comprehensive management system where the quantity and quality of agricultural production is increased, while the negative impact of agricultural practices on the environmental quality is minimized. Dr. Walsh utilizes remote sensing tools that provide efficient, accurate, and timely information - basis for a practical site-specific management of crops for increased nutrient use efficiency.

# OLGA S. WALSH

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## **PROFESSIONAL EXPERIENCE**

**Assistant Professor, Soil Nutrient Management** – Montana State University  
Montana Agricultural Experiment Station, Western Triangle Agricultural Research Center, Conrad, MT Nov 2010 - present

**Affiliate Assistant Professor, Soil Nutrient Management** – Montana State University, Department of Land Resources and Environmental Sciences Jan 2013 - present

(80% Research/10% Teaching/10% Service)

## **EDUCATION**

**Oklahoma State University, Ph.D. Soil Science, 2009**

Research focus: Soil Fertility and Nutrient Management

*Dissertation:* **I.** Use of Real-Time Soil Moisture Data for Refined Greenseeker™ Sensor Based Nitrogen Recommendations in Winter Wheat. **II.** Effect of Foliar Phosphorus Fertilization on Corn Grain Yields and Phosphorus Use Efficiency. **III.** Identifying Soil Moisture Indices for Refined Yield Potential Prediction in Winter Wheat.

**IV.** Effect of Nitrogen Fertilizer Rate and Application Time on Nitrogen Mineralization in a Continuous Winter Wheat Production.

**Oklahoma State University, M.S. Soil Science, 2007**

Research focus: Soil Fertility and Nutrient Management

*Thesis:* Effect of Delayed Nitrogen Fertilization on Corn Grain Yields.

**St. Petersburg State University, Russia, B.S. Soil Science, 1997**

Research focus: Soil Chemistry

*Thesis:* Structure and Composition of the Organic Matter in the Underlying Alphehumus Soils of Karelian Peninsula.

## **HIGHLIGHTS**

**PUBLICATIONS** Peer-reviewed **9** Proceedings **12** Editor-reviewed **6** Abstracts **18**

## **EXTRAMURAL FUNDING**

Competitive grant awards(PI and Co-PI) **\$ 604,022**

Competitive grant awards (PI) **\$ 410,153**

Total non-competitive grant awards(PI) **\$ 54,752**

**Grand Total Awarded** **\$ 658,774**

Competitive grants pending funding **\$ 432,685**

## **RESEARCH AND CREATIVE ACTIVITIES**

### **PUBLICATIONS**

1. **O. S. Walsh**, J.B. Solie, and W.R. Raun. Can Oklahoma Mesonet Cumulative Evapotranspiration Data Be Accurately Predicted Using Three Interpolation Methods? 2013. *Comm. Soil Sci. and Plant Anal.* 44(5): 892-899.
2. **Walsh, O.**, A.R. Klatt, J.B. Solie, C.B. Godsey, and W.R. Raun. Use of Soil Moisture Data for Refined Greenseeker Sensor Based Nitrogen Recommendations in Winter Wheat (*Triticum aestivum* L.) . 2012. *J. Prec. Ag.* 14: 343-356.
3. **Walsh, O.**, A.R. Klatt, J.B. Solie, and W.R. Raun. Effect of delayed N fertilization on corn grain yields. 2012. *J. Plant. Nutr.* 35(4):538-555.
4. Tubaña, B.S., D.B. Arnall, **O. Walsh**, B. Chung, J.B. Solie, K. Girma, and W. R. Raun. 2008. Adjusting midseason nitrogen rate using a sensor-based optimization algorithm to increase use efficiency in corn (*Zea mays* L.). *J. Plant Nutr.* 31:1975-1998.
5. Freeman, K.W., A.R. Klatt, W.R. Raun, K. Girma, D.B. Arnall, B. Tubaña, S.L. Holtz, K.D. Lawles, **O. Walsh**, B. Chung, and K.D. Sayre. 2007. Bed and flat planted dryland winter wheat as influenced by row configuration. *Archives of Agron. and Soil Sci.* 53:293-304.
6. Martin, K., K. Girma, K.W. Freeman, R.K. Teal, B. Tubaña, D.B. Arnall, B. Chung, **O. Walsh**, J.B. Solie, M.L. Stone, and W. R. Raun. 2007. Expression of variability in corn as influence by growth stage using optical sensor measurements. *Agron. J.* 99:384-389.
7. Moges, S.M., K. Girma, R. Teal, K. Freeman, H. Zhang, D.B. Arnall, S.L. Holtz, B. Tubaña, **O. Walsh**, B. Chung, and W.R. Raun. 2007. In-season estimation of grain sorghum yield potential using a hand-held optical sensor. *Archives of Agron. and Soil Science* 53:617-628.
8. Teal, R., B. Tubaña, K. Girma, K. Freeman, B. Arnall, **O. Walsh** and W.R. Raun. 2006. In-season prediction of corn grain yield potential using normalized difference vegetation index. *Agron. J.* 98:1488-1494.
9. Girma, K., S.L. Holtz, D.B. Arnall, L.M. Fultz, T.L. Hanks, K.D. Lawles, C.J. Mack, K.W. Owen, S.D. Reed, J. Santilliano, **O. Walsh**, M. J. White, and W.R. Raun. 2007. Weather, Fertilizer, Previous Year Yield, and Fertilizer Levels Affect Ensuing Year Fertilizer Response of Wheat. *Agron. J.*99:1607-1614.

### **TRADE JOURNAL/EDITOR-REVIEWED JOURNAL**

1. **Olga S. Walsh**. Evaluation of Sensors for Improved Nitrogen Recommendations in Spring Wheat Production. 2012. *Western Nutrient Digest*, 4(1):1-5.
2. **Walsh, O. S.**, D.E. Edmonds, Y. Kanke, and W. R. Raun. Improving Mid-Season N Rate Recommendations for Winter Wheat Using Soil Moisture Data. 2009. *Better Crops*, 93(1): 26-27.
3. **Olga S. Walsh**. 2013. Productive Journey to Successful Retention. *CSA News*. May, 2013.

### **POPULAR PRESS**

1. **Olga S. Walsh**. 2012. *Traders Dispatch*. Soil Fertility Studies at WTARC.
2. **Olga S. Walsh**. 2013. *Traders Dispatch*. Soil Nutrient Management is expanding at WTARC.
3. Reddy V.P. Gadi and **Olga S. Walsh**. 2013. *Independent Observer*. Western Triangle Ag Research Center Acquires Modern Crop Harvest Combine.

## **MEDIA PUBLICATIONS**

- **Olga S. Walsh.** 2013. Soil Nutrient Management blog – “Precision Agriculture, MSU” - <http://precision-ag-montana.blogspot.com/>. Weekly posts on nutrient management research.

## **PUBLICATIONS IN PROGRESS/IN REVIEW**

1. **Olga S. Walsh**, Robin J. Christiaens, and Arjun Pandey. 2013. Foliar-Applied Nitrogen Fertilizers in Spring Wheat Production. *Crops and Soils* \_\_\_\_ - \_\_\_\_ (in review)
2. **Olga S. Walsh**, Robin J. Christiaens, and Arjun Pandey. 2013. Foliar-Applied Nitrogen Fertilizers in Spring Wheat Production. *West. Nutr. Dig.* \_\_\_\_ - \_\_\_\_ (in review)
3. S. M. Samborski, E.S.Dobers, **Olga S. Walsh**, D. Gozdowski, M. Stępień, and J. Szatyłowicz. 2013. *Incorporation of map-based information into sensor-based algorithm to improve nitrogen variable application in winter wheat.* *Prec. Ag.* \_\_\_\_ - \_\_\_\_ (in review).
4. Pishchik V.N., Vorobyov N.I., Surin V.G., Khomyakov Y.V., and **O.S. Walsh**. 2013. *Estimation of synergistic effect of humic fertilizer and Bacillus Subtilis on lettuce plants by reflectance measurements.* *Agron. J.* \_\_\_\_ - \_\_\_\_ (in review)
5. **O.S. Walsh**, B. Tubana, K. Girma, and B. Chung. *Efficacy of Foliar Phosphorus Fertilizers in Crop Production.* *Agron. J.* \_\_\_\_ - \_\_\_\_ (in preparation)
6. **O. S. Walsh**, R.J. Christiaens, and A. Pandey. *Effect of Nitrogen Sources, Rates, and Application Time on Spring Wheat Yield and Grain Protein.* *J. Plant. Nutr.* \_\_\_\_ - \_\_\_\_ (in preparation)
7. **O. S. Walsh**, M. P, Westcott, R.J. Christiaens, and A. Pandey. *Sensor-Based Technologies and Nitrogen Sources for Improved Recommendations for Dryland and Irrigated Spring Wheat Production.* *Agron. J.* \_\_\_\_ - \_\_\_\_ (in preparation)
8. **O. S. Walsh**, M. P, Westcott, R.J. Christiaens, and A. Pandey. *The Efficacy of Foliar Applied Nitrogen Fertilizers for Increased Yield and Improved Quality of Spring Wheat.* *J. Plant. Nutr.* \_\_\_\_ - \_\_\_\_ (in preparation)
9. **O.S. Walsh**, M. P, Westcott, R.J. Christiaens, and A. Pandey. *Benefits of Utilizing Environmentally Smart Nitrogen (ESN) for Improved Spring Wheat Production.* *Agr. J.* \_\_\_\_ - \_\_\_\_ (in preparation)
10. **O.S. Walsh**, M.P. Westcott, C. Chen, and D. Boss, R.J. Christiaens, and A. Pandey. *Improving Nitrogen Use Efficiency in Spring and Winter Wheat Using Sensor-Based Technologies and Split Nitrogen Application.* *J. Plant. Nutr.* \_\_\_\_ - \_\_\_\_ (in preparation)

## **PROCEEDINGS**

1. **Olga S. Walsh**, Robin Christiaens, and Martha Knox. 2013. Foliar Applied Nitrogen Fertilizers in Spring Wheat. Western Crop Science Society Conference, Pendleton, OR. June 10-13, 2013.
2. **Olga S. Walsh**, Robin Christiaens, and Martha Knox. 2013. Evaluation of Sensor-Based Technologies and Nitrogen Sources for Improved Recommendations for Dryland and Irrigated Spring Wheat Production. Western Crop Science Society Conference, Pendleton, OR. June 10-13, 2013.
3. **Olga S. Walsh** and Robin Christiaens. 2013. Effect of Nitrogen Sources, Rates, and Application Time on Spring Wheat Yield and Grain Protein. Western Crop Science Society Conference, Pendleton, OR. June 10-13, 2013.
4. **Olga S. Walsh**, Robin Christiaens, and Martha Knox. 2013. Comparison of Nitrogen Sources for Spring Wheat Production. Western Crop Science Society Conference, Pendleton, OR. June 10-13, 2013.
5. **Olga S. Walsh**. 2012. Effect of Nitrogen Sources, Rates, and Application Time on Spring Wheat Yield. Western Crop Science Society Conference, Pullman, WA. July 11-13, 2012.

### **PROCEEDINGS(continued)**

6. **Olga S. Walsh**, Mal P. Westcott, 2012. Evaluation of Sensor-Based Technologies and Nitrogen Sources for Improved Spring Wheat Production in Montana. Western Crop Science Society Conference,
7. **Olga S. Walsh**, Mal P. Westcott, 2012. Sensor-based nutrient management in Montana's Golden Triangle. Great Plains Soil Fertility Conference, Denver, CO. March 6-7, 2012.
8. Weaver, D., P. Lamb, J. Miller, **O. Walsh**, K. Delaney, and C. Jones. Impact of nutrient limitations on wheat stem sawfly injury. 2012. Great Plains Soil Fertility Conference, Denver, CO. March 6-7, 2012.
9. Dotson, C., D.B. Arnall, S. Holtz, B. Tubaña, **O. Walsh**, B. Chung, P. Turner, K. Girma, and W.R. Raun. 2007. Precision sidedress UAN application for corn production. Proc 2007 Fluid Fertilizer Foundation Forum. Az., Feb 2007.
10. Arnall, D.B., B. Tubaña, W.R. Raun, **O. Walsh** and S. Holtz. 2006. Three alternative nitrogen management strategies for cereal grain production. 2006. *In Proc. Southern Plant Nutrient Management Conference and Southern CSREES Water Quality/Nutrient Management Meeting.* Olive Branch, Mississippi. Oct. 3-5, 2006.
11. Tubaña, B., R. Teal, K. Girma, K. Freeman, B. Arnall, **O. Walsh**, K. Martin and W. Raun. 2006. Corn yield potential prediction based on in-season spectral measurements. *In Proc. 8<sup>th</sup> International Conference on Precision Agriculture.* Minneapolis, MN. July 23-26, 2006.
12. Arnall, D.B., W.R. Raun, B. Tubaña and **O. Walsh**. 2006. Three alternative nitrogen management strategies for cereal grain production. Pgs. 77-78. *In R.C. Schwartz, R.L. Baumhardt and J.M. Bell (eds) Proc. 28<sup>th</sup> Southern Conservation Systems Conf., Amarillo, Texas. June 26-28, 2006, USDA-ARS Conservation and Production Research Laboratory Report Np. 06-1, Bushland, TX.*

### **PUBLISHED ABSTRACTS**

1. **Olga S. Walsh**. 2012. Effect of Nitrogen Sources, Rates, and Application Time on Spring Wheat Yield and Grain Protein. *In Agronomy Abstracts.* ASA, Madison, WI.
2. **Olga S. Walsh**, Mal P. Westcott. 2012. Evaluation of Sensor-Based Technologies and Nitrogen Sources for Improved Recommendations for Dryland and Irrigated Spring Wheat Production in Montana. *In Agronomy Abstracts.* ASA, Madison, WI.
3. **Olga S. Walsh**, Mal P. Westcott. 2012. Foliar Applied Nitrogen Fertilizers In Spring Wheat. *In Agronomy Abstracts.* ASA, Madison, WI.
4. **Olga S. Walsh**. 2011. Effect of Nitrogen Sources, Rates, and Application Time on Spring Wheat Yield and Grain Protein. *In Agronomy Abstracts.* ASA, Madison, WI.
5. **Olga S. Walsh**, Mal P. Westcott. 2011. Evaluation of Sensor-Based Technologies and Nitrogen Sources for Improved Recommendations for Dryland and Irrigated Spring Wheat Production in Montana. *In Agronomy Abstracts.* ASA, Madison, WI.
6. **Walsh, O.S.**, W.R. Raun, J.B. Solie, A.Klatt, C. Godsey, B. Arnall, D. Edmonds, B. England, C. Daft, and Y. Kanke. 2008. Use of Soil Moisture Data to Refine GreenSeeker Sensor Based N Recommendations in Winter Wheat. *In Agronomy Abstracts.* ASA, Madison, WI.
7. **Walsh, O.S.**, W.R. Raun, J.B. Solie, R. Elliot, A. Sutherland, K. Girma, and D.B. Arnall. 2007. Real-time use of Mesonet weather data for refined Greenseeker sensor based N recommendations in winter wheat. *In Agronomy Abstracts.* ASA, Madison, WI.
8. Chung, B.K., D.B. Arnall, B.S. Tubaña, K. Girma, S.L. Holtz, P.L. Turner, **O.S. Walsh**, C.R. Dotson, J.B. Solie and W.R. Raun. 2007. Changes in response indices as a function of time in winter wheat. *In Agronomy Abstracts.* ASA, Madison, WI.

### **PUBLISHED ABSTRACTS continued**

9. Edmonds, D.E., D.B. Arnall, B. Chung, M.C. Daft, K.Girma, Dotson, B.B. England, S.L. Holtz, C.J. Mack, W.R. Raun, J.B. Solie, R.K. Taylor, B.S. Tubaña, P.L. Turner, **O.S. Walsh**, and D.L. Zavodny. 2007. Extension and analysis of the Ramp Calibration Strip fertilization strategy. *In Agronomy Abstracts*. ASA, Madison, WI.
10. Girma, K., D.B. Arnall, S.L. Holtz, W.R. Raun, B. Chung, B.S. Tubaña, **O. Walsh**, P.L. Turner, C.R. Dotson, B.B. England, D.E. Edmonds, M.C. Daft and D. Zavodny. 2007. Weather, fertilizer, previous year grain yield and fertilizer response levels affect ensuing year grain yield and fertilizer response of winter wheat. *In Agronomy Abstracts*. ASA, Madison, WI.
11. Holtz, S.L., B.S. Tubaña, D.B. Arnall, K.W. Freeman, R.K. Teal, B. Chung, **O. Walsh**, P.L. Turner, K.D. Lawles, C.J. Mack, D.E. Edmonds, K. Girma and W.R. Raun. 2007. Response of corn (*Zea mays* L.) grain yields to variable row nitrogen fertilization. *In Agronomy Abstracts*. ASA, Madison, WI.
12. Tubaña, B.S., D.B. Arnall, K.W. Freeman, R.K. Teal, B. Chung, **O. Walsh**, D.E. Edmonds, S. Holtz, P. Turner, C.R. Dotson, B. England, M.C. Daft, C.J. Mack, K. Lawles, K. Girma and W.R. Raun. 2007. Corn (*Zea mays* L.) grain yield response to by-plant nitrogen fertilization. *In Agronomy Abstracts*. ASA, Madison, WI.
13. Chung, B., B.S. Tubaña, B. Arnall, S. Holtz, **O. Walsh**, K. Martin, K. Desta and W. Raun. 2006. Optimum spatial scale and management resolution for corn (*Zea mays* L.). *In Agronomy Abstracts*, ASA Madison, WI.
14. Holtz, S., K. Desta, B. Arnall, B. Tubaña, R. Teal, K. Lawles, C. Mack, B. Chung, **O. Walsh** and W. Raun. 2006. Aboveground nitrogen accumulation as a function of time in corn and winter wheat. *In Agronomy Abstracts*, ASA, Madison, WI.
15. Lawles, K., K. Freeman, R. Teal, B. Arnall, B. Tubaña, **O. Walsh**, B. Chung, S. Holtz and W. Raun. 2006. Effect of delayed emergence on corn (*Zea mays* L.) grain yields. *In Agronomy Abstracts*, ASA, Madison, WI.
16. Tubaña, B., R.K. Teal, B. Arnall, K. Freeman, B. Chung, **O. Walsh**, K. Lawles, C. Mack and W. Raun. 2006. Adjusting mid-season nitrogen using a sensor-based optimization algorithm to increase use efficiency in corn (*Zea mays* L.). *In Agronomy Abstracts*, ASA, Madison, WI.
17. Arnall, D.B., K.W. Freeman, K.L. Martin, K. Girma, R.K. Teal, C.J. Mack, W.R. Raun, B. Tubaña, **O. Walsh**, and B. Chung. 2005. Refining response index in winter wheat with the use of CV's. *In Agronomy Abstracts*, ASA, Madison, WI.
18. Girma, K., K.W. Freeman, K.L. Martin, R.K. Teal, D.B. Arnall, C.J. Mack, J. Mosali, B. Tubaña, B. Chung, **O. Walsh**, W.R. Raun, H. Zhang, and S. Moges. 2005. Long-term municipal biosolids and ammonium nitrate fertilizer effects on grain yield and nitrogen uptake, and concentration of selected metals in dry land winter wheat (*Triticum aestivum* L.) *In Agronomy Abstracts*. ASA, Madison, WI.

### **SCIENTIFIC CONFERENCES ORAL/POSTER PRESENTATIONS**

1. **Olga S. Walsh**. 2013. Precision Sensing – Potential and Challenges. InfoAg Conference. Springfield, IL. July 16-18, 2013.
2. **Olga S. Walsh**, Robin Christiaens, and Martha Knox. 2013. Foliar Applied Nitrogen Fertilizers in Spring Wheat. Western Crop Science Society Conference, Pendleton, OR. June 10-13, 2013.
3. **Olga S. Walsh**, Robin Christiaens, and Martha Knox. 2013. Evaluation of Sensor-Based Technologies and Nitrogen Sources for Improved Recommendations for Dryland and Irrigated Spring Wheat Production. Western Crop Science Society Conference, Pendleton, OR. June 10-13, 2013.

**SCIENTIFIC CONFERENCES ORAL/POSTER PRESENTATIONS ( continued)**

4. **Olga S. Walsh** and Robin Christiaens. 2013. Effect of Nitrogen Sources, Rates, and Application Time on Spring Wheat Yield and Grain Protein. Western Crop Science Society Conference, Pendleton, OR. June 10-13, 2013.
5. **Olga S. Walsh**, Robin Christiaens, and Martha Knox. 2013. Comparison of Nitrogen Sources for Spring Wheat Production. Western Crop Science Society Conference, Pendleton, OR. June 10-13, 2013.
6. **Olga S. Walsh**. 2013. Foliar Nitrogen Fertilizers in Wheat Production. Western Nutrient Management Conference. Reno, NV. March 5-8, 2013.
7. **Olga S. Walsh**. 2013. Foliar Applied Nitrogen Fertilizers in Spring Wheat. Western Nutrient Management Conference. Reno, NV. March 5-8, 2013.
8. **Olga S. Walsh**. 2012. Effect of Nitrogen Sources, Rates, and Application Time on Spring Wheat Yield and Grain Protein. ASA/CSSA/SSSA International Annual Conference, Cincinnati, OH, October 21-24, 2012.
9. **Olga S. Walsh**, Mal P. Westcott. 2012. Evaluation of Sensor-Based Technologies and Nitrogen Sources for Improved Recommendations for Dryland and Irrigated Spring Wheat Production in Montana. ASA/CSSA/SSSA International Annual Conference, Cincinnati, OH, October 21-24, 2012.
10. **Olga S. Walsh**, Mal P. Westcott. 2012. Foliar Applied Nitrogen Fertilizers in Spring Wheat. ASA/CSSA/SSSA International Annual Conference, Cincinnati, OH, October 21-24, 2012.
11. **Olga S. Walsh**. 2012. Crop Canopy Sensors: Potential and Challenges. Annual Nitrogen Use Efficiency Conference, North Dakota State University, Fargo, ND, August 6-8, 2012.
12. **Olga S. Walsh**. 2012. Effect of Nitrogen Sources, Rates, and Application Time on Spring Wheat Yield. Western Crop Science Society Conference, Pullman, WA. July 11-13, 2012.
13. **Olga S. Walsh**, Mal P. Westcott, 2012. Evaluation of Sensor-Based Technologies and Nitrogen Sources for Improved Spring Wheat Production in Montana. Western Crop Science Society Conference, Pullman, WA. July 11-13, 2012.
14. **Olga S. Walsh**, Mal P. Westcott, 2012. Sensor-based nutrient management in Montana's Golden Triangle. Great Plains Soil Fertility Conference, Denver, CO. March 6-7, 2012.
15. **Olga S. Walsh**, Mal P. Westcott, 2012. Sensor-based nutrient management in Montana's Golden Triangle. Great Plains Soil Fertility Conference, Denver, CO. March 6-7, 2012.
16. Weaver, D., P. Lamb, J. Miller, **O. Walsh**, K. Delaney, and C. Jones. Impact of nutrient limitations on wheat stem sawfly injury in spring wheat. 2012. Great Plains Soil Fertility Conference, Denver, CO. March 6-7, 2012.
17. **Olga S. Walsh**. Sensor-based nutrient management in Montana's Golden Triangle. 2012. Great Plains Soil Fertility Conference, Denver, CO.
18. **Olga S. Walsh**. 2011. Effect of Nitrogen Sources, Rates, and Application Time on Spring Wheat Yield and Grain Protein. ASA/CSSA/SSSA International Annual Conference, San-Antonio, TX, October 16-19, 2012.
19. **Olga S. Walsh**, Mal P. Westcott. 2011. Evaluation of Sensor-Based Technologies and Nitrogen Sources for Improved Recommendations for Dryland and Irrigated Spring Wheat Production in Montana. ASA/CSSA/SSSA International Annual Conference, San-Antonio, TX, October 16-19, 2012.
20. **Walsh, O.S.**, W.R. Raun, J.B. Solie, A.Klatt, C. Godsey, B. Arnall, D. Edmonds, B. England, C. Daft, and Y. Kanke. 2008. Use of Soil Moisture Data to Refine GreenSeeker Sensor Based N Recommendations in Winter Wheat. ASA/CSSA/SSSA International Annual Conference, San-Antonio, TX, October 5-9, 2008.

**SCIENTIFIC CONFERENCES ORAL/POSTER PRESENTATIONS ( continued)**

21. **Walsh, O.S.**, W.R. Raun, J.B. Solie, R. Elliot, A. Sutherland, K. Girma, and D.B. Arnall. 2007. Real-time use of Mesonet weather data for refined Greenseeker sensor based N recommendations in winter wheat. ASA/CSSA/SSSA International Annual Conference, New Orleans, LA, November 4-8, 2007.
22. **Walsh, O.S.**, A. Klatt, J. Solie, and W. Raun. 2006. Effect of Delayed N fertilization on Corn Grain Yields. ASA/CSSA/SSSA International Annual Conference, Indianapolis, IN, November 12-16, 2006.
23. Weaver, D., P. Lamb, J. Miller, **O. Walsh**, K. Delaney, and C. Jones. 2012. Impact of nutrient limitations on wheat stem sawfly injury. Great Plains Soil Fertility Conference, Denver, CO.
24. Chung, B.K., D.B. Arnall, B.S. Tubaña, K. Girma, S.L. Holtz, P.L. Turner, **O.S. Walsh**, C.R. Dotson, J.B. Solie and W.R. Raun. 2007. Changes in response indices as a function of time in winter wheat. ASA/CSSA/SSSA International Annual Conference, New Orleans, LA, November 4-8, 2007.
25. Edmonds, D.E., D.B. Arnall, B. Chung, M.C. Daft, K.Girma. Dotson, B.B. England, S.L. Holtz, C.J. Mack, W.R. Raun, J.B. Solie, R.K. Taylor, B.S. Tubaña, P.L. Turner, **O.S. Walsh**, and D.L. Zavodny. 2007. Extension and analysis of the Ramp Calibration Strip fertilization strategy. ASA/CSSA/SSSA International Annual Conference, New Orleans, LA, November 4-8, 2007.
26. Girma, K., D.B. Arnall, S.L. Holtz, W.R. Raun, B. Chung, B.S. Tubaña, **O. Walsh**, P.L. Turner, C.R. Dotson, B.B. England, D.E. Edmonds, M.C. Daft and D. Zavodny. 2007. Weather, fertilizer, previous year grain yield and fertilizer response levels affect ensuing year grain yield and fertilizer response of winter wheat. ASA/CSSA/SSSA International Annual Conference, New Orleans, LA, November 4-8, 2007.
27. Holtz, S.L., B.S. Tubaña, D.B. Arnall, K.W. Freeman, R.K. Teal, B. Chung, **O. Walsh**, P.L. Turner, K.D. Lawles, C.J. Mack, D.E. Edmonds, K. Girma and W.R. Raun. 2007. Response of corn (*Zea mays* L.) grain yields to variable row nitrogen fertilization. ASA/CSSA/SSSA International Annual Conference, New Orleans, LA, November 4-8, 2007.
28. Tubaña, B.S., D.B. Arnall, K.W. Freeman, R.K. Teal, B. Chung, **O. Walsh**, D.E. Edmonds, S. Holtz, P. Turner, C.R. Dotson, B. England, M.C. Daft, C.J. Mack, K. Lawles, K. Girma and W.R. Raun. 2007. Corn (*Zea mays* L.) grain yield response to by-plant nitrogen fertilization. ASA/CSSA/SSSA International Annual Conference, New Orleans, LA, November 4-8, 2007.
29. Chung, B., B.S. Tubaña, B. Arnall, S. Holtz, **O. Walsh**, K. Martin, K. Desta and W. Raun. 2006. Optimum spatial scale and management resolution for corn (*Zea mays* L.). ASA/CSSA/SSSA International Annual Conference, Indianapolis, IN, November 12-16, 2006.
30. Lawles, K., K. Freeman, R. Teal, B. Arnall, B. Tubaña, **O. Walsh**, B. Chung, S. Holtz and W. Raun. 2006. Effect of delayed emergence on corn (*Zea mays* L.) grain yields. ASA/CSSA/SSSA International Annual Conference, Indianapolis, IN, November 12-16, 2006.
31. Tubaña, B., R.K. Teal, B. Arnall, K. Freeman, B. Chung, **O. Walsh**, K. Lawles, C. Mack and W. Raun. 2006. Adjusting mid-season nitrogen using a sensor-based optimization algorithm to increase use efficiency in corn (*Zea mays* L.). ASA/CSSA/SSSA International Annual Conference, Indianapolis, IN, November 12-16, 2006.
32. Arnall, D.B., K.W. Freeman, K.L. Martin, K. Girma, R.K. Teal, C.J. Mack, W.R. Raun, B. Tubaña, **O. Walsh**, and B. Chung. 2005. Refining response index in winter wheat with the use of CV's. ASA/CSSA/SSSA International Annual Conference, Salt Lake City, UT, November 6-10, 2005.
33. Girma, K., K.W. Freeman, K.L. Martin, R.K. Teal, D.B. Arnall, C.J. Mack, J. Mosali, B. Tubaña, B. Chung, **O. Walsh**, W.R. Raun, H. Zhang, and S. Moges. 2005. Long-term municipal biosolids and ammonium nitrate fertilizer effects on grain yield and nitrogen uptake, and concentration of selected metals in dry land winter wheat (*Triticum aestivum* L.). ASA/CSSA/SSSA International Annual Conference, Salt Lake City, UT, November 6-10, 2005.



## **EXTRAMURAL FUNDING**

**GRANT PROPOSALS – TOTAL FUNDED: \$658,774**

**COMPETITIVE GRANTS – Total funded: \$604,022**

1. **Olga S. Walsh.** 2013. Reference Strips and Precision Sensors for Increased Nitrogen Use Efficiency in Wheat Production. Professional + Producer Grant. Submitted to Western SARE. **Funded: \$49,907.**
2. **Olga S. Walsh.** 2013. Comparison of Foliar Applied Nitrogen Fertilizers in Spring Wheat. Submitted to Montana Fertilizer Tax Advisory Committee. **Funded: \$32,238.**
3. **Olga S. Walsh.** 2013. Evaluation of Sensor-Based Technologies and Nitrogen Sources for Improved Recommendations for Dryland and Irrigated Spring Wheat Production in Montana. Submitted to Montana Fertilizer Tax Advisory Committee. **Funded: \$30,823.**
4. **Olga S. Walsh.** 2013. Effect of Nitrogen Sources, Rates, and Application Time on Spring Wheat Yield and Grain Protein. Submitted to Montana Fertilizer Tax Advisory Committee. **Funded: \$23,268.**
5. **Olga S. Walsh.** 2013. A Comparison of Nitrogen Sources for Spring Wheat Production. Submitted to Montana Fertilizer Tax Advisory Committee. **Funded: \$28,438.**
6. Jasper Teboh and **Olga S. Walsh.** 2013. Evaluation of wheat yield response to nitrogen-based enhanced efficiency fertilizers (EEFs) in North Dakota and Montana. Submitted to Koch Agronomic Services, LLC. **Funded: \$14,970.**
7. **Olga S. Walsh.** 2012. Nutrient Management Strategies for Improved Small Grain Production. Submitted to United States Department of Agriculture's National Food and Agriculture Institute. **Funded: \$32,195.**
8. **Olga S. Walsh.** 2012. Sensor-Based Nitrogen Fertilization Algorithm for Winter Wheat Varieties. Submitted to Montana Wheat and Barley Committee. **Funded: \$28,500.**
9. **Olga S. Walsh,** Mal Westcott, Chengci Chen. 2012. Improving Nitrogen Use Efficiency in Winter Wheat Using Sensor-Based Technologies and Split Nitrogen Application. Submitted to Montana Fertilizer Tax Advisory Committee. **Funded: \$20,944.**
10. **Olga S. Walsh,** Mal Westcott. 2012. Comparison of Foliar Applied Nitrogen Fertilizers in Spring Wheat. Submitted to Montana Fertilizer Tax Advisory Committee. **Funded: \$27,838.**
11. **Olga S. Walsh,** Mal Westcott. 2012. Evaluation of Sensor-Based Technologies and Nitrogen Sources for Improved Recommendations for Dryland and Irrigated Spring Wheat Production in Montana. Submitted to Montana Fertilizer Tax Advisory Committee. **Funded: \$19,623.**
12. **Olga S. Walsh.** 2012. Effect of Nitrogen Sources, Rates, and Application Time on Spring Wheat Yield and Grain Protein. Submitted to Montana Fertilizer Tax Advisory Committee. **Funded: \$13,268.**
13. **Olga S. Walsh,** Mal Westcott. 2012. A Comparison of Nitrogen Sources for Spring Wheat Production. Submitted to Montana Fertilizer Tax Advisory Committee. **Funded: \$14,838.**
14. David Weaver, **Olga S. Walsh,** Peggy Lamb, Gregg Carlson, Clain Jones. 2012. An Examination of Hard Red Spring Wheat Response to Wheat Stem Sawfly Herbivory Under Phosphorus and Nitrogen Supplemented Conditions. Submitted to Montana Fertilizer Tax Advisory Committee. **Funded: \$24,342.**
15. Bruce Maxwell, Clain Jones, **Olga S. Walsh,** Chuck Merja, Judit Barroso, Patrick Lawrence. 2012. Spatial Optimization of Nitrogen Application for Dryland Wheat Yield and Protein. Submitted to Montana Fertilizer Tax Advisory Committee. **Funded: \$23,940.**
16. **Olga S. Walsh.** 2011. Sensor-Based Nitrogen Fertilization Algorithm for Winter Wheat Varieties. Submitted to Montana Wheat and Barley Committee. **Funded: \$17,600.**

**COMPETITIVE GRANTS (continued) – Total funded: \$658,774**

17. **Olga S. Walsh**. 2011. Effect of Nitrogen Sources, Rates, and Application Time on Spring Wheat Yield and Grain Protein. Submitted to Montana Fertilizer Tax Advisory Committee. **Funded: \$15,268.**
18. **Olga S. Walsh**, Mal Westcott. 2011. Evaluation of Sensor-Based Technologies and Nitrogen Sources for Improved Recommendations for Dryland and Irrigated Spring Wheat Production in Montana. Submitted to Montana Fertilizer Tax Advisory Committee. **Funded: \$19,623.**
19. **Olga S. Walsh**, Jeff Whitmus, Mal Westcott, Chengci Chen. 2011. Improving Nitrogen Use Efficiency in Winter Wheat Using Sensor-Based Technologies and Split Nitrogen Application. Submitted to Montana Fertilizer Tax Advisory Committee. **Funded: \$20,944.**
20. Mason, H., **Walsh, O.**, and Wichman, D. 2011. Nitrogen fertilizer comparisons in Montana's winter wheat cropping systems: The effect of rate and timing of broadcast ESN and urea on winter wheat yield and protein. Submitted to Agrium Advanced Technologies, USA. **Funded: \$20,913.**
21. Heather Mason, **Olga S. Walsh**, Mal Westcott. 2011. A Comparison of Nitrogen Sources for Spring Wheat Production. Submitted to Montana Fertilizer Tax Advisory Committee. **Funded: \$14,838.**
22. David Weaver, **Olga S. Walsh**, Peggy Lamb, Gregg Carlson, Clain Jones. 2011. An Examination of Hard Red Spring Wheat Response to Wheat Stem Sawfly Herbivory Under Phosphorus and Nitrogen Supplemented Conditions. Submitted to Montana Fertilizer Tax Advisory Committee. **Funded: \$24,342.**
23. Bruce Maxwell, Clain Jones, **Olga S. Walsh**, Chuck Merja, Judit Barroso, Patrick Lawrence. 2011. Spatial Optimization of Nitrogen Application for Dryland Wheat Yield and Protein. Submitted to Montana Fertilizer Tax Advisory Committee. **Funded: \$23,940.**
24. Raun W.R., A. Sutherland, R. Elliott, J. Solie, J. Stiegler, D.B. Arnall, G. Brown, K. Girma, S. Holtz, R. Taylor, **O. Walsh**, and H. Zhang. 2007. Real-time use of the Mesonet weather data for refined GreenSeeker sensor based N recommendations in winter wheat. Submitted to OAES and OCES TIP. **Funded: \$61,422.**

**COMPETITIVE GRANTS PENDING FUNDING- Total requested: \$432,685**

1. **Olga S. Walsh** and A. Pandey. 2013. Potassium Management for Improved Dryland Spring Wheat Grain Yield and Quality. Potassium Fellowship. Submitted to International Plant Nutrition Institute. **\$260,285. Pending.**
2. **Olga S. Walsh**, D. Wichman, K. McVay, P. Lamb, and M. Knox. 2013. Sensor-Based Nitrogen Fertilization Algorithm for Spring Wheat Varieties. Submitted to Montana Wheat and Barley Committee. **\$67,600. Pending.**
3. **Olga S. Walsh**, D. Wichman, K. McVay, P. Lamb, J. Eckhoff and M. Knox. 2013. Sensor-Based Nitrogen Fertilization Algorithm for Winter Wheat Varieties. Submitted to Montana Wheat and Barley Committee. **\$76,500. Pending.**
4. P. Jha and **Olga S. Walsh**. Light-Activated Sensor Controlled (LASC) Sprayer Technology for Reduced Herbicide Use in No-Till Fallow Systems. Submitted to Montana Wheat and Barley Committee. **\$28,300. Pending.**

### **NON-COMPETITIVE GRANTS - Total funded: \$54,752**

1. **Olga S. Walsh.** 2013. Develop guidelines for utilization of Environmentally Smart Nitrogen (ESN) for increased efficiency of wheat production. Funding institution: Agrium Advanced Technologies. **Funded: \$7,876.**
2. **Olga S. Walsh.** 2013. Evaluation of microbial amendments for increased efficiency of N, P, and K fertilizers in winter wheat. Funding institution: Pathway Biologic. **Funded: \$6,000.**
3. **Olga S. Walsh.** 2013. Evaluation of MicroEssentials®SZ™ for enhanced N, P, and K uptake in spring wheat. Funding institution: The Mosaic Company. **Funded: \$6,000.**
4. **Olga S. Walsh.** 2013. Assessing the efficacy of Micro Carbon Technology® – based foliar P fertilizer for improved grain yield and quality of spring wheat. Funding institution: Bio Humanetics. **Funded: \$6,000.**
5. **Olga S. Walsh.** 2013. Developing grower recommendations for utilization of NZone N stabilizer for improved efficiency of spring wheat production. Funding institution: AgExplore. **Funded: \$6,000.**
6. **Olga S. Walsh.** 2013. Comparison various liquid and granular fertilizers efficacy for improved spring wheat production. Agro-Culture Liquid Fertilizers. **Funded: \$4,000.**
7. **Olga S. Walsh.** 2012. Evaluation of fungal-based amendments for improved P availability and uptake in winter wheat. Funding institution: Funding institution: BrettYoung. **Funded: \$5,000.**
8. **Olga S. Walsh.** 2012. Evaluation of MicroEssentials®SZ™ for enhanced N, P, and K uptake in winter wheat. Funding institution: The Mosaic Company. **Funded: \$6,000.**
9. **Olga S. Walsh.** 2012. Develop guidelines for utilization of Environmentally Smart Nitrogen (ESN) for increased efficiency of wheat production. Funding institution: Agrium Advanced Technologies. **Funded: \$7,876.**

### **SUBMITTED AND NOT-FUNDED GRANTS:**

- **Olga S. Walsh.** *Professional Development* Training in Sustainable Agriculture. Western SARE Mini-grant program. **Requested: \$2,300.**

## **TEACHING/OUTREACH ACTIVITIES**

### **FORMAL CLASSROOM TEACHING**

- Guest lecture: April 5, 2012. Precision sensing technologies in agriculture. GPHY 429/LRES 525- Applied Remote Sensing. Rick L. Lawrence, course instructor.

### **TEACHING/OUTREACH PRESENTATIONS**

1. *Application of GreenSeeker sensors for improved nitrogen recommendations in small grains.* Central Agricultural Research Center, Moccasin, MT, June 22, 2011. Invited Speaker. Attendees – over 25.
2. *Sensor-Based Technologies for Improved Fertilizer Recommendations in Small Grains.* Choteau County Crop Tour, Knees, MT, July 13, 2011. Invited Speaker. Attendees – 19.
3. *Evaluation of Sensor-Based Technologies and Nitrogen Sources for Improved Recommendations for Dryland and Irrigated Spring Wheat Production in Montana.* MSU Ag. Appreciation Fair, Bozeman, MT. October 28, 2011. Attendees – approximately 200.

### **TEACHING/OUTREACH PRESENTATIONS (continued)**

4. *Improved Nutrient Management: Products and Technologies*. Golden Triangle Cropping Seminar, MSU Extension. Fort Benton, Denton, Shelby, Chester, Cut Bank, Conrad, Choteau, and Great Falls, MT. January 16-19, 2012. Invited speaker. Attendees – over 255.
5. *Precision Sensing Technologies in Soil Nutrient Management Research at MSU*. Montana Agricultural Business Association Convention. Great Falls, MT, January 27, 2012. Invited speaker. Official attendees – 512.
6. *Sensor-Based Technology Research at MSU*. Nutrient Management Conference. Chester, MT. February 14, 2012. Attendees – 75.
  
7. *Precision Nutrient Management Research in Montana*. Western Agricultural Research Center's Field Day. MSU, WARC, June 28, 2012. Attendees – 223.
8. *Detecting Crop Stress and Estimating Yield Potential Using Sensor-Based Technologies*. Glacier County Conservation District tour, Cut Bank. Attendees – 25.
9. *Soil nutrient management research workshop*. Prairie View Elementary School, 4<sup>th</sup> grade students' field day, Conrad, MT. March 15, 2013. Attendees – over 60.
10. *Agricultural Research/Teaching/Outreach panel*. Dutton High School, Dutton, MT, April 25, 2013. Attendees – over 25.
11. *Soil fertility and precision nutrient management research progress*. Western Agricultural Research Center's Advisory Committee Meeting, Corvallis, MT. Invited Speaker. May 20, 2013. Attendees – over 25.
12. *Advances in Developing Sensor-Based Nitrogen Optimization Algorithm for Spring and Winter Wheat Varieties in Montana*. Choteau County Crop Tour, Knees, MT, June 19, 2013. Invited Speaker. Attendees – 19.
13. *Overview of Soil Fertility and Nutrient Management Projects*. MSU, Western Triangle Research Center, Field Day, Conrad, MT. 2011, 2012, 2013. Host/Speaker. Attendees – approximately 45 individuals annually.
14. *Soil Fertility and Precision Nutrient Management Research Results*. Annual WTARC Advisory Committee Meetings, WTARC, Conrad, MT, 2010, 2011, 2013. Host/Speaker. Attendees – 9, 15, and 19, respectively.

### **TEACHING/OUTREACH THROUGH MEDIA**

1. Two radio segments on nutrient management program at WTARC. MSU Extension Minute with Pondera County Agent Dan Picard, on K96FM, Shelby, MT, April 21, 2011 and February 27, 2013. Invited Speaker. Reached over 30,000 listeners within Glacier, Pondera, Toole, Liberty & Teton Montana counties.
2. Western Triangle Agricultural Center web-site (<http://ag.montana.edu/wtarc/>) – annual contribution.
3. Western Triangle Agricultural Center Facebook page (WTARC, Conrad, MT) – Development, maintenance, and weekly contribution.
4. Precision Nutrient Management blog – “Precision Agriculture, MSU” (<http://precision-ag-montana.blogspot.com/>) – Development, design, maintenance, regular weekly contribution.

## **SERVICE ACTIVITIES**

### **JOURNAL ARTICLE REVIEWING/PUBLISHING**

- Associate Editor, Agronomy Journal (since 2012)
- Guest Editor, Western Nutrient Digest (2013)
- Reviewer, Agronomy Journal (since 2009)
- Reviewer, Soil Science (since 2011)
- Reviewer, Journal of the Science of Food and Agriculture (since 2011)
- Reviewer, Western Nutrient Digest (since 2011)
- Reviewer, Journal of Biomass and Energy (since 2011)
- Reviewer, Journal of Soil Science and Plant Nutrition (since 2011)
- Reviewer, Journal of Soil Science Society of America (since 2011)

### **MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS**

- Member, American Society of Agronomy, 2005 to date
- Member, Crop Science Society of America, 2005 to date
- Member, Soil Science Society of America, 2005 to date
- Member, Western Crop Science Society of America, 2012 to date
- Member, International Society of Precision Agriculture, 2012 to date

### **PROFESSIONAL COMMITTEES**

- WERA103 (Western Education/Extension Regional Activities Nutrient Management) : Nutrient Management and Water Quality Multi-State Project. Committee Member/Representative for Montana, Since 2013
- Division C-03 (Crop Ecology, Management & Quality) Graduate Student Poster Contest. Judge. 2012 ASA-CSSA-SSSA Annual Meeting in Cincinnati, Ohio.
- MSU, MAES Departmental faculty search – Associate Professor of Horticulture and Extension Specialist, Superintendent, Western Agricultural Research Center, Corvallis, MT. Committee Member, 2013
- MSU, MAES Departmental faculty search – Associate Professor of Entomology and Ecology, Superintendent, Western Triangle Agricultural Research Center, Conrad, MT. Committee Member, 2012 .
- MSU, MAES Departmental faculty search – Assistant Professor of Cropping Systems, Northern Agricultural Research Center, Havre, MT. Committee Member, 2012
- MSU, MAES Departmental staff search – Research Associate, Western Triangle Agricultural Research Center, Conrad, MT. Committee Chair, 2012
- MSU, MAES Departmental staff search – Research Assistant III, Western Triangle Agricultural Research Center, Conrad, MT. Committee Member, 2012
- MSU, MAES Project Review - Rick Engel, Department of Land Resources and Environmental Sciences, MSU. Committee Member. December 2012.

## **PROFESSIONAL PANELS**

- *Montana State University Research Panel.* Montana Grain Growers Association (MGGA) Convention, Great Falls, MT, November 30, 2011. Invited Speaker. Attendees – over 800.
- *Nutrient Management Scientific Panel.* Golden Triangle Cropping Seminar, MSU Extension. Conrad, MT. January 16, 2013. Attendees – 60.

## **PUBLICATIONS**

- **Olga S. Walsh.** 2013. Productive Journey to Successful Retention. CSA News. May, 2013.

## **CONSULTING PROVIDED TO PRODUCERS, RESEARCHERS, AND INDUSTRY**

- Enhanced efficiency fertilizers in wheat production. Jasper Teboh. March 1, 2013.
- Estimation of synergistic effect of humic fertilizer and *Bacillus subtilis* on lettuce plants by reflectance measurements. Veronika Pishchik. January-March 2013.
- Incorporation of map-based information into sensor-based algorithm to improve variable nitrogen application in winter wheat. Stanislaw Samborski. January-March, 2013.
- Utilization of GreenSeeker sensors for variable rate nitrogen fertilization in wheat. Jones Agricultural Consulting. February 28, 2013.
- Soil nutrient management for organic wheat and barley production in Montana. Bruce Peterson. February 26, 2013.
- Radio-controlled platforms for precision sensing in agricultural production. Tait Sougstad, Magpie Aerial Perspectives. February 25, 2013.
- Precision agriculture tools for sustainable crop production. Jamie Puchinger. February 19, 2013.
- Sensor-based fertilizer recommendations. Chuck Merja. February 15, 2013.
- Manganese and other micronutrient application in wheat. Phil Hodgson. January 29-30, 2013.
- Efficacy of sulfur application for decreased ammonia volatilization from surface applied urea. Bill McLean. January 25, 2013.
- Increased phosphorus uptake by wheat. Steve Savage, Biology Fortified. December 10, 2012.
- Sensor-based technology research at MSU. Patrick Hensleigh. State Agronomist, NRCS, Bozeman, MT, November 29, 2012.
- Efficacy of liquid nitrogen fertilizers in crop production. Jerry Wilhm, Senior Research Manager, Agro-Culture Liquid Fertilizers, November 21, 2012.
- Novel micronutrient product efficiency in wheat. Pawel Wiatrak, Product Development Management, Cytozyme. November 1, 2012.
- Incorporation of map-based information into sensor-based algorithm to improve nitrogen variable application in winter wheat. Stanislaw Samborski. October 18, 2012.
- Soil moisture measurements using 229-L matric potential sensors. Al Sutherland, Oklahoma State University. OK Mesonet Agricultural Coordinator. October 15, 2012.
- Improved nitrogen use efficiency in wheat. Kyle Freeman, Mosaic. September 17, 2012.
- Precision sensors for improved nutrient use efficiency. Daniel Rodriguez, Trimble. September 13, 2012.
- Precision weed management using sensor-based technologies. DeImna Heiken, Triangle Ag Services, Fort Benton, MT. August 12, 2012.
- Improved phosphorus fertilization management. Matt Clover, Agrium. August 2, 2012.

### **CONSULTING PROVIDED TO PRODUCERS, RESEARCHERS, AND INDUSTRY (continued)**

- Increased phosphorus availability. Rene Mabon, BrettYoung, September 5, 2012.
- Using liquid nitrogen fertilizers in small grain production systems. Lisa Krumwide, SRES. June 27, 2012.
- Foliar phosphorus in crop production. Kefy Girma, Washington State University, Brenda Tubana, Louisiana State University. June 16, 2012.
- Predicting yield potential using Holland Scientific precision sensors. Chad Fick, AgLeader. June 9, 2012.
- MSU Ag Agents Update. Western Triangle Agricultural Research Center, Conrad, MT. May 17, 2012.
- Improved nitrogen management. Dave Linker, Linker Farms, February 24, 2012.
- Micronutrient deficiency and efficacy of micronutrient supplements for improved protein content in cereal production. Dan Picard, Pondera County Extension Agent, MSU, Conrad, MT, November 28, 2011.
- Sensor-based technologies in grain production. Patrick Hensleigh. State Agronomist, NRCS, Bozeman, MT, August 25, 2011.
- Wheat seed quality. Dan Picard, Pondera County Extension Agent, MSU, Conrad, MT, August 17, 2011.
- Rust in wheat, resistance and management. Larry, Producer, Knees, MT, August 8, 2011.
- Soil fertility projects at WTARC, Donna Griffin, Producer, WTARC Advisory Committee Member, Galata, MT, July 14, 2011.
- Post-seed application of phosphorus to spring wheat. Bill Davison. June 23, 2011.
- Soil moisture sensor installation plan for alfalfa irrigation. Gary Kruger, PAg, CCA, Provincial Irrigation Agrologist. Irrigation Development Branch. Irrigation Crop Diversification Corporation. Saskatchewan Ministry of Agriculture. December 6, 2010, and June 11, 2011.

### **STUDENT MENTORING**

#### **FORMAL STUDENT ADVISING**

- Mr. Arjun Pandey, Graduate PhD student. PhD program in Ecology and Environmental Sciences at the Montana State University's Department of Land Resources and Environmental Sciences Expected graduation - 2015.

#### **STUDENT GUIDANCE**

- Ms. Julia Udachina. Graduate MS Student. St. Petersburg State University, Russia. Precision sensing methodologies for improved yield potential prediction and nutrient management. January-March, 2013.
- Mr. Arjun Pandey. Graduate MS Student, Oklahoma State University. Precision sensing methodologies for improved yield potential prediction and nutrient management. January-March, 2013.
- Ms. Erica Garroutte. Graduate MS Student, Montana State University. Validating satellite derived NDVI data with radiometers in residential and migratory elk ranges in the paradise valley and northern part of Yellowstone National Park. February 26, 2013.
- Mr. Jacob Bushong, Graduate MS Student, Oklahoma State University. Soil moisture data for improved yield potential prediction in winter wheat. July 30, 2012.
- MS. Marilyn Dalen, Graduate MS Student, Louisiana State University. Nutrient management in crop production. June 19, 2012.

### STUDENT GUIDANCE (continued)

- Mr. Patrick Lawrence, Graduate PhD Student, MSU, Bozeman, MT. Mid-season, nitrogen adjustment for wheat. July 11 and 12, 2011.
- Mr. Neil Mauws, Graduate MS Student, Sustainable Cropping Systems, MSU Bozeman, MT. Variable rate fertilizer application. June 9, 2011.
- Ms. Natasha McNack, Graduate MS Student, Oklahoma State University, Stillwater, OK. Predicting wheat protein mid-season using sensor-based technologies. October, 17, 2011.

### AWARDS

- Dept. of Plant and Soil Sciences Outstanding Ph.D. Student Award, 2008
- Sitlington Enriched Graduate Scholarship - \$12,000 - (2007 - 2009)
- Dale Weibel Memorial Scholarship - \$1,000 - (2007 - 2008)
- H.F. "Pat" Murphy Memorial Scholarship - \$1,000 - (2007-2008)
- Jerry Grant Memorial Agriculture Scholarship - \$500 - (2006 - 2007) George Christie Memorial Graduate Scholarship - \$1,000 - (2006 - 2007)

### **PROFESSIONAL DEVELOPMENT ACTIVITIES**

- Toastmasters International. Member of **Golden Voice Club, Great Falls, MT. Since May 2013.**
- Peer Review of Grant Applications at the National Institute of Health (NIH) and Various Mechanisms for Funding. Faculty Development and Office of Sponsored Programs, MSU. Webinar. April 4, 2013.
- Opportunities for Enhancing Research Capacity: Learn What INBRE/EPSCoR/ADVANCE Can Offer You! Faculty Development and Office of Sponsored Programs, MSU. Webinar. March 26, 2013.
- Strategic Grant Writing Workshop. Institute for Strategic Funding Development. University of Montana. Missoula, Montana, October 29-30, 2012.
- Grant Writing Workshop for Early Career Members. Annual ASA-CSSA-SSSA meeting, Cincinnati, Ohio. October 24, 2012.
- Assisting Students in Distress. Faculty Development and Office of Sponsored Programs, MSU. Webinar. October 1, 2012.
- An Overview of Teaching and Learning Technology Resources at MSU. Faculty Development and Office of Sponsored Programs, MSU. Webinar. September 18, 2012.
- Annual Nitrogen Use Efficiency Conference, North Dakota State University, Fargo, ND, August 6-8, 2012.
- 11<sup>th</sup> International Conference on Precision Agriculture. Indianapolis, IN, July 15-18, 2012.
- Western Crop Science Society of America annual meeting. Washington State University, Pullman, WA, July 11-13, 2012.
- Western Agricultural Research Center's Field Day. MSU, WARC, June 28, 2012.
- Orange heat blossom midge update seminar. MSU, WTARC, March 21, 2012.
- Tips for Writing NSF Grants. Faculty Development and Office of Sponsored Programs, MSU. Webinar. March 2, 2012.
- Tips & Tools for Effective and Efficient Faculty Advising. Faculty Development and Office of Sponsored Programs, MSU. Webinar. March 20, 2012.
- How to Apply for a Growth through Agriculture (GTA) Program Workshop. Webinar. December 21, 2011.
- Professional presentation creative software tutorial. Prezi.com, October 31, 2011.



**PROFESSIONAL DEVELOPMENT (continued)**

- Annual Fall Conference, Montana Agriculture in Volatile Times. Agricultural Marketing Policy Center, MSU, Bozeman, October 28, 2011.
- Promotion and Tenure Process Seminar, Bozeman, MT, September 19, 2011.
- Discrimination and Harassment Training, MSU, July 21, 2011.
- EPA's Worker Protection Standard Pesticide Safety Training, June 23, 2011.
- MSU Agricultural Research Centers Field Days, Moccasin, Havre, Conrad, Sidney, Bozeman, MT, (June, 2011)
- Annual ASA-CSSA-SSSA Meeting (2005-2012)
- Annual Nitrogen Use Efficiency Workshops (2004, 2005, 2006, 2009, 2010, 2011)
- Western Triangle Agricultural Research Center Annual Advisory Committee Meeting, Conrad, MT (2010, 2011, 2012, 2013)
- Personal Investigator Training Seminar, Office of Sponsored Programs, MSU, Bozeman, MT, November 15, 2010.
- Montana Grain Growers Association Convention (2010-2012)
- Montana Agricultural Business Association Convention (2010-2012)