

R. Troy Peters, P.E., Ph.D.

Professor and Extension Irrigation Engineer (80% Extension, 20% Research)
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Education

Ph.D. Irrigation Engineering. Utah State University. May 2003. CGPA: 3.93/4.00.
51 total graded course semester credits.

B.S. Manufacturing Engineering. Brigham Young University. April 1997. CGPA: 3.72/4.00.
International Emphasis, and Korean Language Minor. 179 total graded semester credits.

Licenses/Certifications

Licensed Professional Agricultural Engineer (PE). Washington State Certification # 44143

Certified Agricultural Irrigation Specialist (CAIS). Administered through the Irrigation Association (IA).

Experience Highlights

Professor/Extension Irrigation Specialist. Mar. 2006 – Present
Washington State University, Irrigated Agriculture Research and Extension Center, Prosser, WA

Agricultural Engineer/Post-doctoral Research Scientist. July 2003 – Feb. 2006
USDA – ARS, Conservation and Production Research Laboratory, Bushland, TX

Research Assistant. Aug. 2000 – June 2003
Utah State University, Logan, UT

Manufacturing Systems Engineer. May 1997 – June 2000
Motorola, Semiconductor Products Sector, MOS13, Austin, TX

Teaching Assistant. Nov 1996 – Apr 1997
Brigham Young University, Provo, UT

Design Engineer. Provo, Utah (Sep 1996 – Apr 1997)

Shop Mathematics Teacher, Springville, Utah (Nov 1996 – Apr 1997)

Korean Language Teacher. Aug 1994 – Apr 1996
Brigham Young University, Provo, UT

Honors and Awards

- Elected as a Washington State University Faculty Senator
- 2021 ASABE Standards Development Award for “Field Test Procedure for Determining Irrigation Water Distribution Uniformity of Center Pivot and Lateral Move Systems”
- ASCE EWRI Journal of Irrigation and Drainage Engineering 2017 Honorable mention Paper Award for “Estimating Actual Transpiration of Apple Trees Based on Infrared Thermometry”.
- My student (Hossein Sadeghi) was awarded the Soil Science Society of America Graduate Student Award.
- Winner of the 2012 ASABE Mobile App Challenge
- 2009 Mentor of the Year Nominee
- Tau Beta Phi National Engineering Honors Society
- Phi Kappa Phi National Honors Society. Invited at both BYU and USU.
- Golden Key National Honors Society Nominee
- College of Engineering Dean’s list at Utah State University
- President (and organizer) of the Biological and Irrigation Engineering Graduate Student Club
- Biological and Irrigation Engineering Department Graduate Student Senator at Utah State University
- Licensed Ham Radio Operator
- Eagle Scout; the highest obtainable rank of the Boy Scouts of America
- High school student body presidency, president of the Technology Club, and National Honors Society
- Wyoming state old-time fiddle champion, junior division (1984)

Current Professional Societies/Memberships

- American Society of Agricultural and Biological Engineers (ASABE). 2002 to Present
- United States Committee on Irrigation and Drainage (USCID). Apr. 2006 to Present.
- Past Societies/Memberships: Environmental and Water Resources Institute of the American Society of Civil Engineers

Languages

English – native language
Korean – speak and write effectively
Limited Spanish

Computer Languages

Visual Basic, VBA, C, C++, PHP, SQL, MySQL, SCILAB, Javascript, HTML, Java, Arduino programming, PLC Ladder-Logic, CR-Basic, and Campbell Scientific table-based programming.

Publications

*Publications with an asterisk are either authored by me, or were completed by a student under my direct supervision.

Peer Reviewed Journal Publications Published or Accepted for Publication

1. *Molaei, B., **R.T. Peters**, L.R. Khot, and C.O. Stockle. 2022. Assessing Suitability of Auto-Selection of hot and Cold Anchor Pixels of the UAS-METRIC Model for Developing Crop Water Use Maps. *Remote Sensing*. 2022, 14, 4454. <https://doi.org/10.3390/rs14184454>
2. *Saedi, S. I., & **Peters, R.T.** (2022). Prediction of wind drift and evaporation losses in sprinkler irrigation systems using artificial neural networks. *Iranian Journal of Irrigation & Drainage*, 16(3), 537-549. <https://dorl.net/dor/20.1001.1.20087942.1401.16.3.6.7>
3. *Sadeghi, H., and **R.T. Peters**. 2022. An Explicit Equation to the Maximum Water Application Depth in Center Pivot Irrigation. *Journal of Irrigation and Drainage Engineering*. Vol 148, Issue 11 (Nov. 2022) 06022007(1-5). [https://doi.org/10.1061/\(ASCE\)IR.1943-4774.0001718](https://doi.org/10.1061/(ASCE)IR.1943-4774.0001718)
4. *Sadeghi, S.H., S.I. Saedi, **R.T. Peters**, C. Stockle. 2022. Towards Improving the Global Water Application Uniformity of Center Pivots through Lateral Speed Adjustment. *Biosystems Engineering*. Mar. 2022. (215),215-227. <https://doi.org/10.1016/j.biosystemseng.2022.01.012>
5. Krishnan, A., C. Kogan., **R.T. Peters**, E.L. Thomas, and F.J. Critzer. 2021. Microbial and physicochemical assessment of irrigation water-treatment methods. *Journal of Applied Microbiology*. Sep;131(3):1555-1562. <https://doi.org/10.1111/jam.15043>
6. Lamm, F., P.D. Colaizzi, R.B. Sorenson, J.P. Bordovsky, M. Dougherty, K. Balcom, D. Zaccaria, K. Bali, D.R. Rudnick, and **R.T. Peters**. 2021. A 2020 Visions of Subsurface Drip Irrigation in the USA. *Transactions of ASABE*. 64(4): 1319-1343. <https://doi.org/10.13031/trans.14555>
7. *Mohamed, A.Z., **R.T. Peters**, A. Sarwar, B. Molaei, and D. McMoran. 2021. Impact of intermittency movement of center pivots on irrigation uniformity. *Water*. 13(9), 1167; <https://doi.org/10.3390/w13091167>
8. *Molaei, B., A. Chandel, **R.T. Peters**, L.R. Khot, and J.Q. Vargas. 2021. Investigating Lodging in Spearmint with Overhead Sprinklers Compared to Drag Hoses Using the Texture Feature from Low Altitude RGB Imagery. *Information Processing in Agriculture*. 9(2):335-341. <https://doi.org/10.1016/j.inpa.2021.02.003>
9. *Chandel, A.K., L.R. Khot, B. Molaei, **R.T. Peters**, C.O. Stockle, and P. Jacoby. 2021. High-resolution spatiotemporal water use mapping of surface and direct-root-zone drip irrigated grapevines using UAS-based thermal and multispectral remote sensing. *Remote Sensing*. 2021, 13(5), 954. <https://doi.org/10.3390/rs13050954>

10. ***Peters, R.T.** and B. King. 2021. Field Test Procedure for Determining Irrigation Water Distribution Uniformity of Center Pivot and Lateral Move Systems. Adopted as an ASABE and ANSI standard. S436.2 JUN2020. Also approved as an American National Standard.
11. *Molaei, B., **R.T. Peters**, A.Z. Mohamed, and A. Sarwar. 2021. Large Scale Evaluation of a LEPA/LESA system compared with MESA on Spearmint and Peppermint. *Industrial Crops and Products*. Vol 159:113048. <https://doi.org/10.1016/j.indcrop.2020.113048>
12. Mohamed, A.Z., Y. Osroosh, **R.T. Peters**, T. Bates, C.S. Campbell, and F. Ferrer-Alegre. 2021. Monitoring crop water status in applies trees using a sensitive morning crop water stress index. *Irrigation and Drainage* 70:27-41. <https://doi.org/10.1002/ird.2528>.
13. *Yang, F.H., D.R. Bryla, and **R.T. Peters**. 2020. An Energy Balance Model for Predicting Berry Temperature and Scheduling Sprinklers for Cooling in Northern Highbush Blueberry. *Hort Science*. 56(4):447-453. <https://doi.org/10.21273/HORTSCI15459-20>
14. *Chandel, A.K., B. Molaei, L.R. Khot, **R.T. Peters**, and C.O. Stockle. 2020. High Resolution Geospatial Evapotranspiration Mapping of Irrigated Field Crops Using Multispectral and Thermal Infrared Imagery with METRIC Energy Balance Model. *Drones*. 4(52):1-19. <https://doi.org/10.3390/drones4030052>
15. Al-Oqaili, F.M., S.P. Good, **R.T. Peters**, C.E. Finkenbiner, and A. Sarwar. 2020. Using stable water isotopes to assess the influence of irrigation structural configurations on evaporation losses in semiarid agricultural systems. *Agricultural and Forest Meteorology*. 291:108083 (2020) 108083. <https://doi.org/10.1016/j.agrformet/2020.108083>
16. Ranjan, R., L. Khot, **R.T. Peters**, M.R. Salazar-Gutierrez, G. Shi. 2020. In-field crop physiology sensing aided real-time apple fruit surface temperature monitoring for sunburn protection. *Computers and Electronics in Agriculture* 175(2020) 10558 p1-11. <https://doi.org/10.1016/j.compag.2020.10558>
17. Wang, B., R. Ranjan, L.R. Khot, **R.T. Peters**. 2020. Smartphone Application enabled Apple Fruit Surface Temperature Monitoring Tool for In-field and Real-time Sunburn Susceptibility Prediction. *Sensors* 20(3):608. <https://doi.org/10.3390/s20030608>
18. *Sarwar, A., **R.T. Peters**, and A.Z. Mohamed. 2020. Linear mixed modeling and artificial neural network techniques for predicting wind drift and evaporation losses under moving sprinkler irrigation systems. *Irrigation Science*. 38(2):177-188 <https://doi.org/10.1007/s00271-019-00659-x>
19. Vargas, J.Q., L.R. Khot, **R.T. Peters**, A.K. Chandel, and B. Molaei. 2020. Low Orbiting Satellite and Small UAS based High Resolution Imagery Data to Quantify Crop Lodging: A Case Study in Irrigated Spearmint. *Geoscience and Remote Sensing*. 17(5):755-759. <https://doi.org/10.1109/LGRS.2019.2935830>
20. *Sarwar, A., **R.T. Peters**, H. Mahanna, M.Z. Amini, and A. Z. Mohamed. 2019. A Comprehensive Evaluation of Moving Sprinkler Irrigation Systems (MESA and LESAs) Under Dynamic Variations of Weather Conditions. *Ag. Water Management* 221:84-91. <https://doi.org/10.1016/j.agwat.2019.04.028>

21. Xin, P. H. Zhang, J. Hu, Z. Shao, and **R.T. Peters**. 2019. CO2 control system design based on an optimized regulation model. *Applied Engineering in Agriculture*. 35(3): 377-388. <https://doi.org/10.13031/aea.13091>
22. Chakraborty, M., L. Khot, and **R.T. Peters**. 2019. Assessing suitability of modified center pivot irrigation systems in corn production using low altitude aerial imaging techniques. *Information Processing in Agriculture*. In Press. <https://doi.org/10.1016/j.inpa.2019.06.001>
23. Osroosh, Y., L. Khot, and **R.T. Peters**. 2019. Detecting Fruit Surface Wetness using a Custom-built Low-resolution Thermal RGB imager. *Computers and Electronics in Agriculture*. 157:509-517. <https://doi.org/10.1016/j.compag.2019.01.023>
24. *Mohamed, A.Z., **R.T. Peters**, X. Zhu, and A. Sarwar. 2019. Adjusting Irrigation Uniformity Coefficients for Unimportant Variability on a Small Scale. *Ag. Water Management*. 213 (2019):1078-1083. <https://doi.org/10.1016/j.agwat.2018.07.017>
25. Osroosh, Y., L. Khot, and **R.T. Peters**. 2018. Economic Thermal-RGB Imaging Systems for Agricultural Crops. *Computers and Electronics in Agriculture*. Apr;147:34-42. <https://doi.org/10.1016/j.compag.2018.02.018>
26. Chandel, A., L. R. Khot, Y. Osroosh and **R. T. Peters**. 2018. Thermal-RGB imager derived in-field apple surface temperature estimates for sunburn management. *Ag. and Forest Meteorology* 253-254:132-140. <https://doi.org/10.1016/j.agrformet.2018.02.013>
27. Malek, K., J. Adam, C. Stockle, and **R.T. Peters**. 2017. Climate change reduces water availability for agriculture by decreasing non-evaporative irrigation losses. *Journal of Hydrology*. 561:444-460. <https://doi.org/10.1016/j.jhydrol.2017.11.046>
28. *McMoran, D., and **R.T. Peters**. 2017. An Extension Educator's Guide to Increasing Utilization of Irrigation Scheduler Mobile. *Journal of the NACAA (National Association of County Agricultural Agents)*. ISSN 2158-9429. Vol 10: Issue 1 – June 2017.
29. Stout, J.E., J.R. Davenport, and **R.T. Peters**. 2017. Deficit Irrigation in *Vitis labruscana* Bailey 'Concord' in Central Washington. *Hort Science*. 52(3):450-456. <https://doi.org/10.17660/ActaHortic.2017.1150.60>
30. *Nakawuka, P., **R.T. Peters**, and D. Walsh. 2017. Effect of deficit irrigation on yield quantity and quality, water use efficiency and economic returns of four cultivars of hops in the Yakima Valley, Washington State. *Industrial Crops and Products*. 98(2017) 82-92. <https://doi.org/10.1016/j.indcrop.2017.01.037>
31. *Sadeghi, S.H., **R.T. Peters**, B. Shafii, M.Z. Amini, and C. Stockle. 2017. Continuous Variation of Wind Drift and Evaporation Losses under a Linear Move Irrigation System. *Ag. Water Management* 182(39-54). <https://doi.org/10.1016/j.agwat.2016.12.009>
32. Zhou, J., L.R. Khot, H.Y. Bahlol, G.K. Kafle, **R.T. Peters**, M.D. Whiting, Q. Zhang, D.M. Granatstein, and T. Coffey. 2016. In-field sensing for crop loss management: Efficacy of air-blast sprayer generated crosswind in rainwater removal from cherry canopies. *Crop Protection*, 91:27-33. <https://doi.org/10.1016/j.cropro.2016.09.010>

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33. *Osroosh, Y., **R.T. Peters**, C.S. Campbell, and Q. Zhang. 2016. Comparison of Irrigation Automation Algorithms for Drip-Irrigated Apple Trees. *Computers and Electronics in Agriculture*. Oct;128:87-99. <https://doi.org/10.1016/j.compag.2016.08.013>
34. *Zhu, Xingye, **R.T. Peters**, and W.H. Neibling. 2016. Hydraulic Performance Assessment of LESA at Low Pressure. *Irrig. and Drain*. 65: 530-536. <https://doi.org/10.1002/ird.1982>
35. Zhou, J., L. Khot, **R.T. Peters**, M.D. Whiting, Q. Zhang, and D. Granatstein. 2016. Efficacy of Unmanned Helicopter in Rainwater Removal from Cherry Canopies. *Computers and Electronics in Agriculture*. 124:161-167. <https://doi.org/10.1016/j.compag.2016.04.006>
36. *Sadeghi, S.H., **R.T. Peters**, F. Lamm. 2016. Closure to "Design of Zero Slope Microirrigation Laterals: Effect of the Friction Factor Variation". *Journal of Irrigation and Drainage Engineering*. 142(8): 07016006. [https://doi.org/10.1061/\(ASCE\)IR.1943-4774.0001060](https://doi.org/10.1061/(ASCE)IR.1943-4774.0001060)
37. *Osroosh, Y., **R.T. Peters**, and C.S. Campbell. 2016. Daylight Crop Water Stress Index for Continuous Monitoring of Water Status in Apple Trees. *Irrigation Science*. May;34(3):209-219. <https://doi.org/10.1007/s00271-016-0499-3>.
38. *Sadeghi, S.H., **R.T. Peters**, and V. Shelia. 2016. Energy Grade Line Assessment for Tapered Micro-irrigation Laterals. *ASCE's Journal of Irrigation and Drainage Engineering*. 142(7): 04016020. [https://doi.org/10.1061/\(ASCE\)IR.1943-4774.0001020](https://doi.org/10.1061/(ASCE)IR.1943-4774.0001020)
39. *Osroosh, Y., **R.T. Peters**, C.S. Campbell, and Q. Zhang. 2015. Automatic Irrigation Scheduling of Apple Trees Using Theoretical Crop Water Stress Index with an Innovative Dynamic Threshold. *Computers and Electronics in Agriculture* 118(2015):193-203. <https://doi.org/10.1016/j.compag.2015.09.006>
40. *Sadeghi, S.H., **R.T. Peters**, M.Z. Amini, and H. Loescher. 2015. Novel Approach to Evaluate the Dynamic Variation of Wind Drift and Evaporation Losses under Moving Irrigation Systems. *Biosystems Engineering*. (35) 44-53. <https://doi.org/10.1016/j.biosystemseng.2015.04.011>
41. *Sadeghi, S.H., **R.T. Peters**, F. Lamm. 2015. Design of Zero Slope Microirrigation Laterals: Effect of the Friction Factor Variation. *Journal of Irrigation and Drainage Engineering*. 141(10):04015012. [https://doi.org/10.1061/\(ASCE\)IR.1943-4774.0000905](https://doi.org/10.1061/(ASCE)IR.1943-4774.0000905)
42. *Osroosh, Y., **R.T. Peters**, and C.S. Campbell. 2015. Estimating Potential Transpiration of Apple Trees Using Theoretical Non-Water-Stressed Baselines. *Journal of Irrigation and Drainage Engineering*. 141(9): 04015009, [https://doi.org/10.1061/\(ASCE\)IR.1943-4774.0000877](https://doi.org/10.1061/(ASCE)IR.1943-4774.0000877).
43. *Osroosh, Y., **R.T. Peters**, and C.S. Campbell. 2015. Estimating Actual Transpiration of Apple Trees Based on Infrared Thermometry. *Journal of Irrigation and Drainage Engineering*. 141(8): 04014084, [https://doi.org/10.1061/\(ASCE\)IR.1943-4774.0000860](https://doi.org/10.1061/(ASCE)IR.1943-4774.0000860).
44. *Li, L., **R.T. Peters**, Q. Zhang, J. Zhang, and D. Huang. 2014. Modeling Apple Surface Temperature Dynamics Based on Weather Data. *Sensors*. 14:20217-20234. <https://doi.org/10.3390/s141120217>

45. Bass R., M. Garcia-Perez, D. Horneck, M. Lewis, B. Pane, **R.T. Peters**, R. Stevens, and D. Wysocki. 2014. Carbon Implications of Converting a Coal-Fired Power Plant to Combustion of Torrefied Arundo Donax. *Applied Bioenergy*. 1:30-43. <https://doi.org/10.2478/apbi-2014-0002>
46. *Nakawuka, P., Okwany, R., **Peters, R.T.**, Desta, K., & Sadeghi, H. 2014. Efficacy of Boom Systems in Controlling Runoff under Center Pivots and Linear Move Irrigation Systems. *Applied Engineering in Agriculture*. 30(5): 797-801. <http://dx.doi.org/10.13031/aea.30.10540>
47. *Sadeghi, S.H., and **R.T. Peters**. 2014. Closure to 'Analytical determination of distribution uniformity for tapered microirrigation laterals laid on uphill and horizontal slopes'. *J. Irrigation and Drainage Engr.*, 140(12):07014031. [https://doi.org/10.1061/\(ASCE\)IR.1943-4774.0000765](https://doi.org/10.1061/(ASCE)IR.1943-4774.0000765)
48. *Sadeghi, S.H., **R.T. Peters**. 2014. Closure to "Modified G and GAVG Correction Factors for Laterals with Multiple Outlets and Outflow" by Sayed-Hossein Sadeghi and Troy Peters. *J. Irrigation and Drainage Engr.* 140(5):07014015. [https://doi.org/10.1061/\(ASCE\)IR.1943-4774.0000734](https://doi.org/10.1061/(ASCE)IR.1943-4774.0000734)
49. *Nakawuka, P., **R.T. Peters**, K.R. Gallardo, D. T Gonzalez, R.O. Okwany, and D.B. Walsh. 2014. Effect of deficit irrigation on yield, quality and costs of production of native spearmint. *J. Irrig. Drain Eng.* 140(5):05014002. May 2014. [https://doi.org/10.1061/\(ASCE\)IR.1943-4774.0000719](https://doi.org/10.1061/(ASCE)IR.1943-4774.0000719)
50. *Sadeghi, S.H., and **R.T. Peters**. 2013. Analytical Determination of Distribution Uniformity for Microirrigation Tapered Laterals Laid on Uphill and Horizontal Slopes. *J. Irrig. Drain Eng.* 139(6):483-489. [https://doi.org/10.1061/\(ASCE\)IR.1943-4774.0000568](https://doi.org/10.1061/(ASCE)IR.1943-4774.0000568)
51. *Okwany, R.O., S.C. Fransen, **R.T. Peters**, M. Ottman, D. Hunsakwe, and P.A. Aanchez. 2013. Irrigation of warm season grasses for bioenergy feedstock: Water use and water use efficiency. *BioEnergy Research*.
52. *Sadeghi, S.H., **R.T. Peters**, D.R. Cobos, H.W. Loescher and C.S. Campbell. 2013. Direct Calculation of Thermodynamic Wet Bulb Temperature as a Function of Pressure and Elevation. *J. Atmos. Oceanic Technol.*, 30:1757–1765. <https://doi.org/10.1175/JTECH-D-12-00191.1>
53. Boman, B., B. Sanden, **R.T. Peters**, and L. Parsons. 2012. Current Status of Microsprinkler Irrigation in the United States. *Applied Engineering in Agriculture*. 28(3): 359-366. ISSN : 0883-8542
54. Kranz, W.L., R.G. Evans, F.R. Lamm, S.A. O'Shaughnessy, and **R.T. Peters**. 2012. A Review of Center Pivot Sprinkler Irrigation Control and Automation Technologies. *Applied Engineering in Agriculture*. 28(3): 389-397. <https://doi.org/10.13031/2013.35832>
55. Lamm, F. R., J. P. Bordovsky, L. J. Schwankl, G. L. Grabow, J. Enciso- Medina, **R. T. Peters**, P. D. Colaizzi, T. P. Trooien, and D. O. Porter. 2012. Subsurface drip irrigation: Status of the technology in 2010. *Trans. ASABE* 55(2): 483-491. <https://doi.org/10.13031/2013.41387>

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56. *Mobbs, T.L., **R.T. Peters**, J.R. Davenport, M.A. Evans, and J.Q. Wu. 2012. Effects of Four Soil Surfactants on Four Soil-Water Properties in Sand and Silt Loam. *J. Soil and Water Cons.* July/August 2012. 67(4):275-283. <https://doi.org/10.2489/jswc.67.4.275>
57. *Sadeghi, SH, and **R.T. Peters**. 2011. Adjusted Friction Correction Factors for Center-Pivots with an End Gun. *Irrigation Science*. 31:351-358. <https://doi.org/10.1007/s00271-011-0307-z>
58. *Okwany, R.O., and **R.T. Peters**. K. Ringer, D. Walsh, and M. Rubio. 2011. Impact of Sustained Deficit Irrigation on Spearmint (*Mentha spicata* L.) Water Usage and Yield. *Irrigation Science*. 30(3):213-219. <https://doi.org/10.1007/s00271-011-0282-4>
59. *Sadeghi, S.H., and **R.T. Peters**. 2011. Modified G and Gavg Correction Factors for Laterals with Multiple Outlets and Outflow. *J. of Irrig. Drain. Eng.* 137:697-704 [https://doi.org/10.1061/\(ASCE\)IR.1943-4774.0000332](https://doi.org/10.1061/(ASCE)IR.1943-4774.0000332)
60. *Malek, K., and **R.T. Peters**. 2010. Wetting Pattern Models for Drip Irrigation: A New Empirical Model. *Irrigation and Drainage Engineering*. 137(8):530-536. [https://doi.org/10.1061/\(ASCE\)IR.1943-4774.0000320](https://doi.org/10.1061/(ASCE)IR.1943-4774.0000320)
61. Balota, M., W.A. Payne, S.R. Evett, & **R.T. Peters**. 2008. Morphological and physiological characteristics associated with canopy temperature depression in three closely-related wheat lines. *Crop Science*. 48:1897-1910. <https://doi.org/10.2135/cropsci2007.06.0317>
62. ***Peters, R.T.**, and S.R. Evett. 2008. Automation of a Center Pivot Using the Temperature-Time-Threshold Method of Irrigation Scheduling. *Journal of Irrigation and Drainage Engineering*. 133(3), 286-291. [https://doi.org/10.1061/\(ASCE\)0733-9437\(2008\)134:3\(286\)](https://doi.org/10.1061/(ASCE)0733-9437(2008)134:3(286))
63. ***Peters, R.T.**, and S.R. Evett. 2007. Spatial and temporal analysis of crop stress using multiple canopy temperature maps created with an array of center-pivot-mounted infrared thermometers. *Trans. ASABE* 50(3):919-927 <https://doi.org/10.13031/2013.23156>
64. ***Peters, R.T.**, and S.R. Evett. 2005. Using low-cost GPS receivers for determining field position of mechanized irrigation systems. *Applied Engineering in Agriculture*. 21(5): 841-845. <http://dx.doi.org/10.13031/2013.19711>
65. ***Peters, R.T.**, and S.R. Evett. 2004. Modeling diurnal canopy temperature dynamics using one time-of-day measurements and a reference temperature curve. *Agronomy Journal*. 96:1553-1561. <https://doi.org/10.2134/agronj2004.1553>

Peer Reviewed Extension Publications Published or Accepted for Publication

1. Dupont, T., and R.T. Peters. 2022. Using Soil Moisture Sensors in Pears. Peer reviewed WSU Extension Fact Sheet #FS377E
2. McMoran, D., A. Mohamed, S. Thorstenson, K. Seymour, and R.T. Peters. 2021. Irrigated Agriculture in Skagit County, WA. Accepted for publication as a peer reviewed WSU Extension Fact Sheet

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3. McMoran, D., A. Mohamed, S. Thorstenson, K. Seymour, and **R.T. Peters**. 2021. Irrigated Agriculture in Ferry County, WA. Peer reviewed WSU Extension Fact Sheet #TB78E
4. McMoran, D., A. Mohamed, S. Thorstenson, K. Seymour, and **R.T. Peters**. 2021. Irrigated Agriculture in Lewis County, WA. Peer reviewed WSU Extension Fact Sheet #TB79E
5. *Sarwar, A., and **R.T. Peters**. 2021. The More you Expose, The More You Lose: Limiting Center Pivot Irrigation Water Losses. Accepted for publication as a WSU Extension Fact Sheet
6. ***Peters, R.T.**, M.I. Zamoara-Re, and B. Molaei. 2021. Irrigation Management Strategies for Drought. Accepted for publication as a peer reviewed WSU Extension Fact Sheet
7. ***Peters, R.T.**, C. Hillyer, and M. Flury. 2021. Variable Rate Irrigation. What is it? Should I Invest? Accepted for publication as a peer reviewed WSU Extension Fact Sheet
8. *Molaei, B., **R.T. Peters**, and I. Kisekka. 2021. Mobile Drip Irrigation (MDI) on Center Pivots in the Pacific Northwest: Issues and Opportunities. Accepted for publication as a peer reviewed WSU Extension Fact Sheet
9. ***Peters, R.T.**, H. Neibling, and R. Stroh. 2021. Low Energy Precision Application (LEPA) and Low Elevation Spray Application (LESA) Trials in the Pacific Northwest. Accepted for publication as a peer reviewed WSU Extension Technical Bulletin
10. ***Peters, R.T.** 2021. Watering Lawns in Washington to Save Water, Save Money, and have a Healthy, Green Lawn. WSU Extension Pub# FS362E
11. ***Peters, R.T.** and R. Okwany. 2021. Using the Atmometer for Irrigation Scheduling in Washington. WSU Extension Pub# FS361E
12. *Mohamed, A.Z., **R.T. Peters**, and D. McMoran. 2020. Management of Traveler Gun Irrigation Systems in the Pacific Northwest. WSU Extension Publication. Pub# FS348E
13. Yorgey, G., K. Borrelli, K. Painter, E. Brooks, H. Davis, and **R.T. Peters**. 2018. Deficit Irrigation of a Diverse Irrigated Rotation: Jake Madison. WSU Extension Publication. PNW705.
14. ***Peters, R.T.** 2016. Irrigation Tools and Scheduling in Vine to Wine: Successfully Establishing a Vineyard and Winery. Moyer, M.M. and G.A. Hoheisel (eds). WSU Extension Pub# OM41. Washington State University. Available online at: <http://pubs.wpdev.cahnrs.wsu.edu/pubs/om41/>
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21. Bodah, B., H.R. Connolly, J.L. Ullman, N. Stabbdard, **R.T. Peters**, V.A. McCarcken, and W. Pan. 2016. Forage Productivity of Vegetative Filter Strips Established on Rill-Irrigated Row Crop Fields. WSU Extension Pub# TB03.
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34. ***Peters, R.T.** 2010. Drip Irrigation for the Yard and Garden. 2010. WSU Peer Reviewed Extension Publication. Accepted and In Press. Publication # FS030E.
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37. ***Peters, R.T.**, 2009. T. Mobbs, and J. Davenport. 2009. Does Wetter Water Make Fatter Wallets. The use of Soil Wetting Agents. WSU Extension Publication. Publication # FS004E
38. ***Peters, R.T.** 2009. Washington Water Rights for Agricultural Producers. WSU Extension Publication. Publication # FSRW001

Peer Reviewed Journal Publications under Review

1. Chandel, A.K., L.R. Khot, C.O. Stöckle, D.J. Brown, S. Mantle, A.P. Rathnayake, and R.T. Peters. 2022. High spatiotemporal crop and weather data driven canopy transpiration mapping in a high-density apple orchard. Submitted to Remote Sensing.
2. ***Molaei, B., R.T. Peters, A. Chandel, C.O. Stockle, L.R. Khot, C. Campbell.** 2021. Measuring Evapotranspiration Suppression from the Wind Drift and Spray Water Losses from LESA and MESA Sprinklers in a Center Pivot System. Submitted to Agricultural Water Management. (Molaei is my PhD student and this research was my idea and funded project and performed under my supervision). Submitted 11/18/21
3. ***Molaei, B., A. Chandel, R.T. Peters, L.R. Khot, A. Khan, F. Maureira, C.O. Stockle.** 2020. Investigating artificial hot and cold reference surfaces for estimating water use with thermal images. Submitted to Journal of Agricultural and Forest Meteorology. (Molaei is my PhD student and this research was my idea and performed under my supervision).
4. ***Saedi, S.I., F. Rezaei, R.T. Peters, and B. Molaei.** 2020. Runoff of Various Configurations of Low Elevation Spray Application (LESA) Compared with Traditional Mid Elevation Spray Application (MESA). Submitted to Irrigation Science. (Iman was a visiting scientist. This research was my idea and performed under my supervision).
5. ***Amini, M.Z., R.T. Peters.** 2020. Effect of Collector's Opening Diameter and Weather Conditions on the Measurements of Application Efficiency and Uniformity of Center Pivots and Linear-Move Irrigation Systems. Submitted to *Irrigation and Drainage Engineering*. (Amini was my Ph.D. student and this research was done under my direction and supervision.)
6. ***Amini, M.Z., R.T. Peters, and S.H. Sadeghi.** 2020. Efficacy of Offset Booms on Center Pivots and Linear Move Irrigation Systems in Reducing Runoff from Bare Soil and Wheat Under Different Initial Soil Water Contents. Submitted to *Irrigation Science*. (Amini was my Ph.D. student and this research was done under my direction and supervision.)

7. *Okwany, R., **Peters, R.T.**, Stevens, R.G., Fuerst, E.P., Hang, A.N., & Burke, I. 2020. Influence of sustained deficit irrigation on seed and oil concentration of two winter canola cultivars in the Columbia Basin, USA. *Crop Science*. (Okwany was my Ph.D. student).

Peer Reviewed Extension Publications under Review

1. McMoran, D., A.Z. Mohamed, K. Seymour, S. Thorston, P.J. Munts, and **R.T. Peters**. 2021. Overview of Irrigated Agriculture in Spokane County, WA. Under Review.
2. ***Peters, R.T.** 2021. Irrigation Scheduler Mobile. Documentation and User's Manual. 35-page manual. Under Review.
3. *C. Hillyer, **R.T. Peters**, X. Qiao, D. Heeren, J. LaRue, C. Prestwich, S. Bhatti. 2021. Center Pivot Field Check Lists. Under Review

Manuscripts under preparation for Submission for Peer Review

*Amini, M.Z., **R.T. Peters**. 2020. LESA vs MESA (Amini was my Ph.D. student and this research was done under my direction and supervision.)

*Amini, M.Z., **R.T. Peters**. 2020. Irrigation Frequency. (Amini was my Ph.D. student and this research was done under my direction and supervision.)

Websites

The following websites and web-based tools represent a huge time investment in their creation and development but have been extremely successful at reaching a large number of people at a very low cost.

Peters, R.T., S.E. Hill, and G. Hoogenboom. (2013) <http://weather.wsu.edu/ism>. Irrigation Scheduler Mobile: A user-friendly online irrigation scheduling tool that is optimized for use on a smart phone, but works well on any desktop web browser. It is integrated with an agricultural weather network for quick population of crop water use estimates, and default crop coefficients for simplified irrigation scheduling.

***Peters, R.T.** (2007). Washington Irrigation Extension Education. <http://irrigation.wsu.edu>.

Extensive website with many pages, calculators, publications, and tools. This site contains 58 different calculators, and hundreds of pages of information as well as many links and fact sheets for download. It has a mobile phone version of the most popular calculators so that it is more accessible for mobile farmers. It uses thousands of lines of html, javascript, and PHP code. It interacts with databases using MySQL and makes extensive use of cascading style sheets (CSS). It receives an average of about 35-40,000 page views per year with about 14,000 of these from unique visitors. This website is having a large impact.

Educational Videos

R. Troy Peters, P.E., Ph.D.

Peters, R.T., and K.D. Patten. 2016. Properly utilizing soil tensiometers for cranberries.
<http://youtu.be/Bb8iWPHxyrw>

Whitefield, L., and R.T. Peters. 2016. Water Efficient Irrigation Practice: Featuring Low Elevation Spray Application (LESA). <https://www.youtube.com/watch?v=qXS4i5oSwFI&t=5s>

R.T. Peters. 2016. Vine to Wine: Irrigation Tools and Scheduling.
<https://www.youtube.com/watch?v=V3FOSYvhVCK>

Neibling, H., and R.T. Peters. 2015. Irrigation Scheduler Mobile Application Part 1.
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L. R. Khot, Y. Osroosh, and R.T. Peters. 2017. IOT-enabled imagery system for crop management. WSU-OC-1842

Books and Book Chapters

Boman, B.J., and **R.T. Peters**, and E.O. Ontermma. 2022. Chapter 15: Maintenance. In the book: Microirrigation for Crop Production: Design, Operation, and Management. J. Ayers, D. Zaccaria, and K. Bali editors.

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*Peters and Mohamed. 2019. Chapter on center pivots.

***Peters, R.T.**, 2018. Variable Rate Irrigation. Automation in Tree Fruit, Principles and Practice.

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Q. Zhang Editor. Published by CABI International. Oxfordshire, OX, UK. ISBN-13: 978 1 78064 850 7

Authored Professional Magazine Articles

1. ***Peters, R.T.**, and B. Molaei. 2019. Center Pivot Modifications for Improved Efficiency and Mint Oil Yields. *Oregon Mint Update*. Spring 2019.
2. ***Peters, R.T.**, and B. Molaei. 2018. A New Low in Irrigation: Low Elevation Spray Application for Growing Potatoes. *Potato Country*. July/August 2018 Issue.
3. Khot, L.R., and **R.T. Peters**. 2018. USA-based Imagery: How can advances in this technology apply to irrigated agriculture? *Irrigation Today*. Vol 2, Issue 4. April 2018.
4. ***Peters, R.T.**, 2016. Lower Sprinkler Drops Save Water and Energy. *Hay and Forage Grower Magazine*. February 2017.
5. ***R.T. Peters**. 2014. Irrigation in Vineyards with Different Soil Types. *Viticulture and Enology Extension News*. Spring 2014. Pg. 11-13.
6. ***R.T. Peters**. 2012. Good to Know: Irrigation Scheduling. *Good Fruit Grower*. May 15th, 2012 issue. pg. 12-15.
7. ***Peters, R.T.** 2011. Managing Irrigation Water in Fields with Very Different Soils. *Fruit Grower News*. June 2011 Issue.
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11. ***Peters, R.T.** 2007. Irrigation Management for Improved Profitability. *Potato Country*. Feb. 2007 Issue.
12. ***Peters, R.T.** and Steven R. Evett. 2006. Center Pivot Automation. Using Crop Canopy Temperature to Eliminate Irrigation Guesswork. *Resource*. Published by ASABE. Mar. 2006.

Theses

- *Peters, R.T.** 2003. Simulation of grass-legume pasture yield as influenced by soil water, temperature, and nitrogen. Ph.D. dissertation. Utah State University, Logan, Utah.

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*R.W. Hill, E.B. Godfrey, **R.T. Peters**, and C.I. Kimber. 2002. *Irrigation Pumping Cost Estimator*. Available at <http://utahreach.org/IrrEstimator/>

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2. Sallato, B., H. Hussein, **R.T. Peters**, 2022. Soil acidifying treatments do not improve 'Honeycrisp' apple fruit quality. International Symposium on Plant Nutrition, Fertilization, and Soil Management. Aug. 14-20., 2022. Angers, France.
3. Molaei, B., **R.T. Peters**, A.K. Chandel, L.R. Khot, C.O. Stockle, and C. Campbell. 2021. Comparing Downwind Evapotranspiration Suppression in LESA and MESA Irrigation Systems. Dec 6-8, 2021. IA-ASABE Symposium. San Diego, CA
4. **Peters, R.T.**, A.Z. Mohamed, and D. McMoran. 2021. Center pivot control panels should vary cycle time instead of run time to set a percent setting. Dec. 6-9, 2021. Irrigation Association-American Society of Agricultural and Biological Engineers 6th Decennial National Irrigation Symposium.
5. Amogi, B., L.R. Khot, **R.T. Peters**, C.O. Stockle, and A. Chandel. 2021. Cloud Compute Enabled High Resolution ET Mapping for Grapevine Irrigation Management. July 12-16, 2021 ASABE online Annual International Meeting.
6. Kang, C., M. Karkee, Q. Zhang, M. Keller, **R.T. Peters**, R.G. Diverres Naranjo, and S. Thapa. 2021. Decision-Support System for Precision Irrigation in Vineyards. July 12-16, 2021 ASABE online Annual International Meeting.
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9. **R.T. Peters**, M. Barber, and B. Molaei. 2021. Cost per Drop: Cost Comparison Estimates for Various Irrigation Water Conservation Technologies. July 12-16, 2021 ASABE online Annual International Meeting.

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14. ***Peters, R.T.**, and B. Molaei. 2019. The 10 Commandments of Irrigation for Dairymen. 2019 Western Dairy Conference. Reno, NV. Feb. 26-28, 2019.
15. Osroosh, Y., T. Bates, **R.T. Peters**, C.S. Campbell, F. Ferrer-Alegre, and A.Z. Mohamed. 2019. Theoretical Crop Water Stress Index with Dynamic Threshold for Irrigation Scheduling in Commercial Apple Orchards. 2019 ASABE Meetings, Boston, MA. (Osroosh was my PhD student and this work was done under my supervision)
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17. Osroosh, Y., **R.T. Peters**, C. Campbell, and L. Khot. 2018. Thermal Imaging-Based Sensors for Agricultural Applications. ASA Annual Meetings. Baltimore, MD. Nov. 5, 2018. (Some of the content of this presentation was done under my supervision).
18. Chakraborty, M., L. Khot, and **R.T. Peters**. 2018. Assessment of Crop Growth under Modified Center Pivot Irrigation Systems Using Small Unmanned Aerial Systems based Spectral Imaging Techniques. June 24-27, 2018. Montreal, Quebec, Canada. 14th International Conference on Precision Agriculture.
19. ***Peters, R.T.**, and M. Flury. 2017. Variable Rate Irrigation on Center Pivots. What Is It? Should I Invest? Proceedings of the 2017 Western Alfalfa and Forage Symposium, Reno, NV, Nov. 28-30, 2017
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24. ***Peters, R.T.**, 2016. Hay and Oil Yield Differences from Low Energy Precision Application (LEPA) vs. Mid Elevation Spray Application (MESA) on Center Pivots. Proceedings of the 2016 WA State Mint Convention. Kennewick, WA. Dec. 6, 2016
25. ***Sadeghi, H., R.T. Peters**, and Saffii. 2016. Continuous monitoring of sprinkler discharge efficiency under a linear move irrigation system. ASABE 2016 Annual International Meeting. July 17-20, 2016. Orlando, FL.
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27. Jacoby, P.W., **R.T. Peters**, S. Sankaran, and L.R. Khot. 2015. Advancing Water Use Efficiency in Vineyards with Sub-surface Micro-irrigation Techniques. Presented at the joint ASABE/IA Irrigation Symposium. Nov. 10-12, 2015 in Long Beach, CA.
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36. M.E. Barber, J.C. Adam, M. Brady, K. Chinnayakanahalli, S. Dinesh, C. Kruger, **R.T. Peters**, K. Rajagopalan, C. Stockle, J. Yoder, and G. Yorgey. 2012. Climate Change Impacts on 2030 Water Supply and Demand in the Columbia River Basin. 3rd Annual Pacific Northwest Climate Science Conference, Boise, ID. October 2012.
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Poster Presentations

1. Critzer, F., J. Buchanan, B. Chamberlin, M. Danyluk, L. Dunn, C. Gunter, A. Hamilton, M. Krug, P. Martinez, **R.T. Peters**, C. Rock, L. Strawn, and A. Wszelaki. 2021. Agricultural water treatment food safety curriculum: Re-tooling outreach during the pandemic. ASHS Annual Meeting, August 6-9. Denver, CO. HortScience 56(9):S143
2. Hess, N., K. Hofmockel, T. Northen, J. Sethian, S. Tringe, C. Masiello, J. Silberg, L. Khot, S. Norberg, and **R.T. Peters**. 2021. Twin Ecosystem laboratory and field reserqch using integrated sensor technologies. PNNL iPoster Session. Available online at: <https://emsl2021-pnnl.ipostersessions.com/Default.aspx?s=71-B5-46-D1-D2-1F-33-3D-70-C2-5B-4A-DE-93-A8-F6&pdfprint=true&guestview=true>
3. Molaei, B., **R.T. Peters**, A.K. Chandel, L.R. Khot, A. Sarwar, and A.M. Mohamed. 2019. The effect of Low Energy Precision Application on the Oil Yield & Lodging of the Peppermint & Spearmint. Poster presented at: AgTech day; Aug 22, 2019, Center for Precision and Automated Agricultural Systems, Prosser, WA, USA.
4. Molaei, B., and **R.T. Peters**. 2017. Irrigation in Potatoes. 2017 ASABE Annual International Meeting, Spokane, WA, 17-19 July 2017.

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5. Wine, E., D. Walsh, and **R.T. Peters**. 2017. Determining Alkali Bee Nesting Requirements. 2017 Pacific Branch Meeting of the Entomological Society of America. Portland, OR. April 2-5, 2017.
6. **Peters, R.T.** S.E. Hill, and G. Hoogenboom. 2016. Simplified Irrigation Scheduling for Improved Profits. Updates and Improvements to the Irrigation Scheduler Mobile App. Dairy Conference. Nov. 7-8, 2016. Ellensburg, WA
7. **Peters, R.T.**, H. Neibling, and D. Stroh. 2016. Low Energy Precision Application (LEPA) and Low Elevation Spray Application (LESA) on Center Pivots in the PNW. Dairy Conference. Nov. 7-8, 2016. Ellensburg, WA
8. Zhou, J., L.R. Khot, **R.T. Peters**, M.D. Whiting, Q. Zhang, and D.M. Granastein. 2016. Assessment of efficacy of an orchard sprayer and an unmanned helicopter in rainwater removal from cherry canopies based on an in-field sensing system. 2016 Precision Farming Expo. Kennewick, WA. Jan 7-8, 2016
9. Jacoby, P.W., S. Sankaran, A.J. McElrone, **R.T. Peters**, M. Keller, and L.R. Khot. 2016. Precision Sub-Surface Irrigation to Regulate Wine Grape Physiology. Northwest Center for Small Fruit Research Annual Meeting. Kennewick, WA Dec. 8, 2016
10. Wine, A., D. Walsh, and **R.T. Peters**. 2016. Cultivating Alkali Bees for Alfalfa Seed Production.
11. Presented in Hawaii.
12. **Peters, R.T.**, H. Neibling, and D. Stroh. 2016. Low Energy Precision Application (LEPA) and Low Elevation Spray Application (LESA) on Center Pivots in the PNW. WSU Academic Showcase. Mar. 25, 2016. Pullman, WA.
13. **Peters, R.T.**, H. Neibling, and D. Stroh. 2015. Low Energy Precision Application (LEPA) and Low Elevation Spray Application (LESA) on Center Pivots in the PNW. Jun. 23, 2015. Valmont NW Grower Appreciation Lunch. Sunnyside, WA.
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15. **Peters, R.T.**, H. Neibling, and D. Stroh. 2015. Low Energy Precision Application (LEPA) and Low Elevation Spray Application (LESA) on Center Pivots in the PNW. Sep. 24, 2015. LEPA/LESA field days. Pasco, WA.
16. **Peters, R.T.** S.E. Hill, and G. Hoogenboom. 2015. Simplified Irrigation Scheduling for Improved Profits. Updates and Improvements to the Irrigation Scheduler Mobile App. Sep. 24, 2015. LEPA/LESA field days. Pasco, WA.
17. **Peters, R.T.**, H. Neibling, and D. Stroh. 2015. Low Energy Precision Application (LEPA) and Low Elevation Spray Application (LESA) on Center Pivots in the PNW. Sep. 25, 2015. LEPA/LESA field days. Mabton, WA.

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18. **Peters, R.T.** S.E. Hill, and G. Hoogenboom. 2015. Simplified Irrigation Scheduling for Improved Profits. Updates and Improvements to the Irrigation Scheduler Mobile App. Sep. 25, 2015. LEPA/LESA field days. Mabton, WA.
19. **Peters, R.T.**, and H. Neibling. Water Management Options for Drought. Northwest Hort Expo. Dec. 7-9, 2015. Yakima Convention Center, Yakima, WA.
20. Zhou, J., L. Khot, **R.T. Peters**, M. Whiting, Q. Zhang, and D. Granastein, Feasibility Study on Mid-sized Unmanned Helicopter Downwash Based Rainwater Removal from Sweet Cherry Canopies. Northwest Hort. Expo. Dec. 7-9, 2015. Yakima Convention Center, Yakima, WA.
21. **Peters, R.T.** S.E. Hill, and G. Hoogenboom. 2015. Simplified Irrigation Scheduling for Improved Profits. Updates and Improvements to the Irrigation Scheduler Mobile App. CPAAS Open House Poster Session. Sep. 17, 2015. Prosser, WA.
22. York Z.B., P.W.Jacoby, **R.T.Peters**, S.Sankaran, L.R.Khot, J.R.Thompson. 2015. Deep subsurface irrigation in Concord vineyards. CPAAS Technology Day. Prosser, WA. Sep. 17, 2015.
23. Jacoby P.W., **R.T.Peters**, S.Sankaran, L.R.Khot, J.R.Thompson, Z.B.York. 2015. Deep subsurface irrigation to advance precision vineyard management. CPAAS Technology Conference. Prosser, WA. Sep. 17, 2015.
24. York Z.B., P.W.Jacoby, **R.T.Peters**, S.Sankaran, L.R.Khot, J.R.Thompson. 2015. Deep subsurface irrigation in Concord vineyards. Annual Meeting, WA Grape Society. Grandview, WA. Nov. 12-13, 2015
25. Jacoby, P.W., A.J. McElrone, S. Sankaran, L.R. Khot, M. Keller, and **R.T. Peters**. 2015. Precision Sub-Surface Irrigation to Regulate Wine Grape Physiology. Annual Meeting, NW Center for Small Fruit Research, Portland, OR. Dec. 1, 2015
26. *Lei, Li, **R.T. Peters**, and Q. Zhang. 2014. Modelling Apple Surface Temperature Dynamics Using Thermal Imaging. Hort. Convention. Kennewick, WA. Nov. 30 -Dec. 2, 2014
27. ***Peters, R.T.**, H. Neibling, and D. Stroh. 2014. Low Energy Precision Application (LEPA) and Low Energy Spray Application (LESA) on Center Pivots in the PNW. BioAg Symposium Poster Presentation. Pullman, WA. Oct. 28, 2014
28. ***Peters, R.T.**, S.E. Hill, and G. Hoogenboom. 2014. Simplified Irrigation Scheduling for Improved Profits: Updates and Improvements to the Irrigation Scheduler Mobile App. BioAg Symposium Poster Presentation. Pullman, WA. Oct. 28, 2014
29. ***Peters, R.T.**, H. Neibling, and D. Stroh. 2014. Low Energy Precision Application (LEPA) and Low Energy Spray Application (LESA) on Center Pivots in the PNW. CSANR Symposium with Poster Session. Pullman, WA. Oct. 7, 2014
30. ***Peters, R.T.**, S.E. Hill, and G. Hoogenboom. 2014. Simplified Irrigation Scheduling for Improved Profits: Updates and Improvements to the Irrigation Scheduler Mobile App. CSANR Symposium with Poster Session. Pullman, WA. Oct. 7, 2014

31. *Osroosh, Y., and **R.T. Peters**. 2014. Automatic Algorithms for Precision Irrigation of Fuji Apple Trees in the Pacific Northwest. WSU Academic Showcase. Pullman, WA. Mar. 28, 2014. (Osroosh was my Ph.D. student.)
32. Solgi, R., S.F. Mousavi, M. Rahimi, S.H. Sadeghi, **R.T. Peters**. 2014. Estimation of reference crop evapotranspiration by FAO- Penman– Monteith method and sensitivity analysis of the climatic variables. Case study: Synoptic stations of Semnan. ASABE. Evapotranspiration Conference. Raleigh, NC. Apr. 7-10, 2014.
33. *L. Li, and **R.T. Peters**. 2014. Modelling Apple Surface Temperature Dynamics Using Thermal Imaging. WSU Academic Showcase. Pullman, WA. Mar. 28, 2014. (Lei Li is a visiting scholar that I supervised.)
34. *H. Sadeghi, **R.T. Peters**, and M.Z. Amini. 2014. Center Pivot Lateral Speed Adjustment Based on Climatic Variables. WSU Academic Showcase. Pullman, WA. Mar. 28, 2014. (H. Sadeghi was my Ph.D. student.)
35. ***Peters, R.T.**, S.E. Hill, G. Hoogenboom. 2014. Simplified Irrigation Scheduling for Improved Profits: Updates and Improvements to the Irrigation Scheduler Mobile App. *Washington Association of Wine Grape Growers Annual Meeting , Convention & Trade Show*. Kennewick, WA. Feb. 4-6, 2014.
36. ***Peters, R.T.**, S.E. Hill, G. Hoogenboom. 2013. Simplified Irrigation Scheduling for Improved Profits: Updates and Improvements to the Irrigation Scheduler Mobile App. *Washington State Horticultural Association Annual Meeting*. Wenatchee, WA. Dec. 2-3, 2013.
37. *Oshroosh, **R.T. Peters**. 2013. Automatic algorithms for precision irrigation of Fuji apple trees in the Pacific Northwest. *Washington State Horticultural Association Annual Meeting*. Wenatchee, WA. Dec. 2-3, 2013.
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39. ***Peters, R.T.** 2013. Save Water, Save Money, Save Time, Save Energy. Irrigation Scheduling on your phone or web browser. WSU Academic Showcase. Mar. 29, 2013. Pullman, WA
40. ***Peters, R.T.** 2013. Irrigation Scheduling Made Easy for Improvement of Grape Production. Presented at the Washington Association of Wine Grape Growers. Feb. 7, 2013. Kennewick, WA
41. *Osroosh, C.Y., and **R.T. Peters**. 2012. Automatic Irrigation Control Algorithms for Apple Trees Using Inexpensive Hardware. Washington State Horticultural Association. Dec. 3, 2012. Yakima, WA
42. Desta, K. R.O. Okwany, S. Fransen, **R.T. Peters**, W. Pan. M. Ottman, H. Collins, and J. Davenport. 2012. Soil Profile Nitrogen Under Different Biofuel Feedstock Grasses and Irrigation Regimes in the Irrigated Arid Pacific Northwest. ASA, CSSA, and SSSA International Annual Meetings. Oct. 21-24, 2012. Cincinnati, Ohio.

43. ***Peters, R.T.** 2012. Simplified Irrigation Scheduling on a Smart Phone or Computer. Washington Horticultural Society Annual Meetings. Dec. 4, 2012. Yakima, WA
44. *Nakawuka, P., and **R.T. Peters**. 2012. Response to water availability challenges in irrigated agriculture: a case study on the response of native spearmint to deficit irrigation. ASA, CSSA, and SSSA International Annual Meetings. Oct. 24. 2012. Cincinnati, OH
45. *Osroosh, C.Y., and **R.T. Peters**. 2012. Precision Irrigation. Center for Precision Agricultural and Automation Systems Technology Expo. Oct. 2, 2012. Wenatchee, WA
46. *Osroosh, C.Y., and **R.T. Peters**. 2012. Automatic Irrigation Control Algorithms for Apple Trees Using Inexpensive Hardware. Washington State Grape Society Annual Meeting & Trade Show. Nov. 15, 2012. Grandview, WA
47. ***R.T. Peters**. 2012. Simplified Irrigation Scheduling on a Smart Phone or Computer. Washington State Grape Society Annual Meeting & Trade Show. Nov. 15, 2012. Grandview, WA
48. *Sadeghi, S. H., and **R.T. Peters** 2012. Maximum allowable depth of water for center pivots laid on field with no surface storage. ASABE Annual meeting, 29 Jul-1 Aug 2012, Dallas, TX.
49. *Nakawuka, P., and **R.T. Peters**. 2012. Effect of applying different stress levels at different timings on drip irrigated native spearmint in the Pacific Northwest. USCID Water Management Conference. Apr. 5, 2012. Austin, TX
50. *Nakawuka, P., and **R.T. Peters**. 2012. Response of drip irrigated native spearmint to different water stress levels applied at different times. WSU Academic Showcase. Washington State University. Mar. 30, 2012. Pullman, WA.
51. ***Peters, R.T.** 2010. Water and Irrigation in Washington. Presented at the CEREO Water Forum. Spokane, WA
52. McMoran, D.W., and **R.T. Peters**. 2010. Comparison of Boom-Type Carts with Big-Gun Irrigation Systems in Skagit and Whatcom Counties.
53. *Mobbs, T.L. and **R.T. Peters**. 2009. Does Wetter Water Make Fatter Wallets? Washington State Horticultural Association.
54. *Mobbs, T.L., **R.T. Peters**, M. Flury, and J.R. Davenport. 2009. Will "Wetter Water" Solve Irrigation Problems? Evaluation Soil Surfactants. Washington Association of Wine Grape Growers Annual Meeting. Kennewick, WA
55. *Okwany, R.O., and **R.T. Peters**. 2009. Canola Yield and Quality Response to Deficit Irrigation and Different Nitrogen Levels.
56. ***Peters, R.T.** and M.D. Whiting. 2008. Irrigation Scheduling for Tree Fruit Using Canopy (Leaf) Temperature. Washington State Horticultural Association Annual Meeting. Yakima, WA.

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57. *Okwany, R.O., **R.T. Peters**, and D. Walsh. 2008. Yield Impact of Sustained Deficit Irrigation of Alfalfa and Mint.
58. *Okwany, R.O., **R.T. Peters**, and D. Walsh. 2008. Mint and Alfalfa Yield and Water Use Efficiency Under Sustained Deficit Irrigation.
59. *Okwany, R.O., and **R.T. Peters**. 2007. Hay and Oil Productivity of Peppermint under Varied Water Sufficiency Levels.
60. *Okwany, R.O., **R.T. Peters**, R. Stevens, J. Davenport, and P. Fuerst. 2007. Canola Seed and Oil Yield Responses to Deficit Irrigation and Different Nitrogen Levels.
61. ***Peters, R.T.** 2007. Irrigation in Washington. PNW Water Quality Conference: Moving Science and Policy into Action. November 6-7, 2007. Stevenson, WA

Abstracts

1. Wszelaki, A., J. Buchanan, B. Chamberlin, F. Critzer, M. Danyluk, L. Dunn, C. Gunter, A. Hamilton, M. Krug, P. Martinez, **R.T. Peters**, C. Rock, and L. Strawn. 2021. Agricultural Water Treatment Food Safety Curriculum: Re-tooling Outreach During the Pandemic. Presented at the American Society for Horticultural Science. Aug. 509, 2021. Denver, CO.
2. *Molaei, B., A. Chandel, **R.T. Peters**, L.R. Khot, and J.Q. Vargas. 2020. Crop Lodging Assessment in Irrigated Spearmint Using Low Altitude High Resolution Imagery. ASABE Annual International Meeting. Virtual Meeting Due to Pandemic.
3. *Chandel, A.K., B. Molaei, L.R. Khot, **R.T. Peters**, and C.O. Stöckle. 2019. High Resolution Geospatial Mapping of Actual Evapotranspiration Using Small UAS Based Imagery for Site Specific Irrigation Management. WaterSmart Innovations Conference and Exposition 2019, Las Vegas, NV, USA.
4. *Molaei, B., **R.T. Peters**, A.K. Chandel, L.R. Khot, A. Sarwar, A.M. Mohammed. 2019. The effect of Low Energy Precision Application on the Oil Yield & Lodging of the Peppermint & Spearmint. Poster presented at: AgTech day; Aug 22, 2019, Center for Precision and Automated Agricultural Systems, Prosser, WA, USA.
5. ***Peters, R.T.**, B. Molaei, A. Sarwar and A. Mohamed. 2019. Large Scale Evaluation of a Low Energy Precision Application (LEPA) system compared to Mid Elevation Spray Application (MESA) on Spearmint and Peppermint. ASABE Annual International Meeting. Boston, MA, July 7–10, 2019.
6. Chandel, A.K., F. Maureira, A. Khan, B. Molaei, L.R. Khot, **R.T. Peters**, and C. Stockle. 2019. Determination of albedo with a multispectral camera mounted near surface. ASABE Annual International Meeting. Boston, MA, July 7–10, 2019.
7. *Molaei, B., **R.T. Peters**, A.K. Chandel, L.R. Khot, A. Khan, F. Maureira, and C. Stockle. 2019. Investigating artificial hot and cold reference surfaces for estimating water use with thermal images. ASABE Annual International Meeting. Boston, MA, July 7–10, 2019.

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8. *Chandel, A.K., B. Molaei, L.R. Khot, **R.T. Peters**, and C. Stockle. 2019. Low altitude high resolution remote sensing-based evapotranspiration mapping for potato crop. ASABE Annual International Meeting. Boston, MA. July 7–10, 2019.
9. Maureira, F., A. Chandel, B. Molaei, L.R. Khot, **R.T. Peters**, and C. Stockle. 2019. Proximal sensing of crop surface albedo with multispectral imaging sensors on board ground-based platform. Paper No. 1901685, ASABE 2019 Annual International Meeting, Boston, MA, July 7- 11, 2019.
10. ***Peters, R.T.**, and B. Molaei. 2019. The 10 Commandments of Irrigation for Dairymen. 2019 Western Dairy Conference. Reno, NV. Feb. 26–28, 2019.
11. *Molaei, B., **R.T. Peters**. 2018. Scientific irrigation scheduling baseline research study in Columbia River basin. ASABE Annual International Meeting. Detroit, MI, July 29–Aug. 1st, 2018

Additional Research Reports

NEEA Project Report

Peters, R.T., 2016. Hay and Oil Yield Differences from Low Energy Precision Application (LEPA) vs. Mid Elevation Spray Application (MESA) on Center Pivots. Report to the Washington Mint Commission.

Peters, R.T., 2015. Hay and Oil Yield Differences from Low Energy Precision Application (LEPA) vs. Mid Elevation Spray Application (MESA) on Center Pivots. Report to the Washington Mint Commission. June 2, 2015.

***Peters, R.T.**, P. Nakawuka, and D.B. Walsh. 2011. Water Stress for Improved Profits in Spearmint. Progress Report to the Mint Commission.

***Peters, R.T.**, R.O. Okwany, D.B. Walsh, and R.A. Boydston. 2010. Response of Mint Oil and Hay Yields to Deficit Irrigation. Progress Report to the Mint Commission.

***Peters, R.T.**, and R.O. Okwany. 2010. Sustained Deficit Irrigation as a Feasible Management Strategy for Growing Mint. Mint Field Day Written Report.

***Peters, R.T.**, T. Mobbs, and J. Davenport. 2009. Does Wetter Water Make Fatter Wallets? Using Soil Wetting Agents. 2009 WSU Onion Cultivar Demonstration and Field Day. Aug. 27, 2009. Quincy, WA.

***Peters, R.T.**, D.B. Walsh, and R.A. Boydston. 2009. Mint Oil Yields, Weeds and Pests Under Deficit Irrigation. Progress Report to the Mint Commission.

***Peters, R.T.**, D.B. Walsh, and R.A. Boydson. 2009. Mint Oil Yields, Weeds and Pests Under Deficit Irrigation. Mint Field Day Written Report.

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- *Peters, R.T.**, D.B. Walsh, and R.A. Boydston. 2007. Mint Oil Yields, Weeds and Pests Under Deficit Irrigation. Progress Report to the Mint Commission.
- *Peters, R.T.**, and M.D. Whiting. 2007. Irrigation Automation Using Infrared Temperature Sensors. 2007. To the Washington Tree Fruit Research Commission. Final Report.
- *Peters, R.T.**, and M.D. Whiting. 2007. Irrigation Automation Using Infrared Temperature Sensors. 2007. To the Washington Tree Fruit Research Commission. Q3 Continuing Report.
- *Peters, R.T.**, and M.D. Whiting. 2007. Irrigation Automation Using Infrared Temperature Sensors. 2007. To the Washington Tree Fruit Research Commission. Q1 Continuing Report.
- *Peters, R.T.**, and M.D. Whiting. 2006. Irrigation Automation Using Infrared Temperature Sensors. To the Washington Tree Fruit Research Commission. Q4 Continuing Report.
- *Peters, R.T.**, and M.D. Whiting. 2006. Irrigation Automation Using Infrared Temperature Sensors. To the Washington Tree Fruit Research Commission. Q3 Continuing Report.
- *Peters, R.T.**, and S.R. Evett. 2004. Automating a Center Pivot Using Leaf Temperatures. 2004 Bushland Ag. Day. Summer Crops Field Day.. Aug. 31, 2004.

Authored Popular Press Articles

1. Pickering, N., A. Chandel, L. Khot, M. Liu, **R.T. Peters**, S. Kadam, B. Molaei, J. Yoder, K. Rajagopalan, C. Stockle, G. Yorgey, D. Haller, M. Barber, and R. Khanal. 2021. Evapotranspiration Estimation: Comparison of Evapotranspiration Methods Used in Washington State. The Water Report. Water Rights, Water Quality, & Water Solutions in the West. 208:10-19. <http://www.thewaterreport.com/Issues%20205%20to%20208.html>
2. ***Peters, R.T.**, and B. Molaei. 2020. Low Elevation Spray Application (LESA) for Growing Potatoes. Potato Progress Vol. XXX, #7. Mar. 2020.
3. ***Peters, R.T.**, and B. Molaei. 2019. Center Pivot Modifications for Improved Efficiency and Mint Oil Yields. Oregon Mint Update. Spring 2019.
4. ***Peters, R.T.**, and B. Molaei. 2018. A New Low in Irrigation: Low-Elevation Spray Application for Growing Potatoes. Potato Country magazine. July/August 2018 Issue.
5. ***Peters, R.T.**, 2016. Drip Irrigation System Maintenance. Viticulture and Enology Newsletter. WSU Extension.
6. ***R.T. Peters**, 2012. Irrigation Scheduling Made Easy with New App. Grandview Herald. July 18, 2012 issue. Also available online here: <http://www.thegrandviewherald.com/Farm%20Tab%202012.pdf>
7. ***R.T. Peters**. Spring 2012. Irrigation Scheduling for (Wireless) Washington. Viticulture and Enology Extension News

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8. ***R.T. Peters**. 2012. Good to Know: Irrigation Scheduling. Good Fruit Grower. May 15th, 2012 issue. pg. 12-15. Available here: <http://www.goodfruit.com/Good-Fruit-Grower/May-15th-2012/Good-to-Know-Irrigation-scheduling/>
9. ***R.T. Peters**. 2012. Irrigation Scheduling Made Easy. Summer 2012. Mint Drops.
10. ***R.T. Peters**. 2012. Irrigation Scheduling Made Easy. WSU Irrigated Agriculture Email List Serve. Available online here: <http://wsuirrigatedag.blogspot.com/2012/04/irrigation-scheduling-made-easy.html>
11. ***Peters, R.T.** 2011. Practical Use of Soil Moisture Sensors for Irrigation Scheduling. WA Mint Drops Newsletter. Spring 2011 Issue.
12. ***Peters, R.T.** 2011. Practical Use of Soil Moisture Sensors. Viticulture and Enology Newsletter. WSU Extension.
13. Hoffmann, T., **R.T. Peters**, and L. Nelson. 2010. CD of presentations and reference materials used by the cranberry industry. This was widely disseminated in Western Washington and Oregon. It was also picked up by the British Columbia Cranberry Growers Association (BCCGA) who copied it and disseminated it to their growers as well.
14. ***Peters, R.T.** 2009. Water Stress Study on Mint Going into Second Year. Mint Drops Newsletter.
15. ***Peters, R.T.**, and J.R. Davenport. 2009. Does Wetter Water Make Fatter Wallets? Pacific Northwest Vegetable Growers Association Newsletter.
16. ***Peters, R.T.**, and J.R. Davenport. 2009. Does Wetter Water Make Fatter Wallets? Columbia Basin Crop Consultants Association Newsletter.
17. ***Peters, R.T.**, & Davenport, J.R. 2009. Does Wetter Water Make Fatter Wallets?. Columbia Basin Crop Consultant's Association Newsletter

In the News

Good Fruit Growers. Pros and Cons: WSU irrigation specialist provides growers with a rundown on five soil sensors. By Ross Courtney. 2022. Good Fruit Grower April 2022 issue. Vol. 73, No. 8

Western Fruit Grower. Article about my irrigation scheduling app. Knowing When to Irrigate Is at Your Fingertips. 2019. Available online at: <https://www.growingproduce.com/fruits/known-when-to-irrigate-is-at-your-fingertips/>

Western Innovators: Innovations in Irrigation. Article about my recent innovations in irrigation. Sept. 8, 2018. Available Online at: <http://www.capitalpress.com/Research/20180908/western-innovator-innovations-in-irrigation>

Washington State Professor Finds Sky-high Opportunities for Drones in Agriculture. American Farm Bureau Federation. Feb 28, 2017. Available online at:

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<http://www.cattlenetwork.com/news/industry/washington-state-professor-finds-sky-high-opportunities-drones-agriculture>

Southern Idaho grower raising hay with buried drip. Capital Press. April 15, 2016. References our work. Also available online at: <http://www.capitalpress.com/Idaho/20160415/southern-idaho-grower-raising-hay-with-buried-drip>

H. Neibling. Article about our demonstration projects. LESA produces forage crops with less water. Hay and Forage Grower Magazine. May 18, 2016. Also available online at: <http://hayandforage.com/article-714-lesa-produces-forage-crops-with-less-water.html>

Another article was published in the Capital Press titled, "Low energy spray demonstrations planned in Washington, Oregon." (Fri. Dec. 21, 2016). I was quoted many times throughout the article.

A front-page feature article on our work with Low Elevation Spray Application (LESA) was in the Capital Press (Friday Oct. 14, 2016). "A Better Way to Irrigate". I was quoted several times in the article.

An online interview on irrigation management was published online at: <http://www.theruminant.ca/blog/2015/9/24/e05-irrigation-tips-from-troy-peters>

I was quoted extensively in the cover-page article of Potato Grower Magazine, "To the Rescue. Eliminating Start-Stop Pivot Action." July 2016, Smart Irrigation Month issue.

Article about our LESA demonstration project was featured in the Capital Press. April 5, 2016. By John O'Connel. New irrigation method catching on in West.

Article featuring our work on Low Elevation Spray Application was published in the Western Farmer-Stockman; Feb 2016. Vol. 139 Issue 2, PIE1. LESA systems expand to Pacific Northwest.

An article in which I was quoted extensively was published in The Spokesman-Review. Saturday, May 21, 2016. Save water by paying attention to soil, plant needs. Also available online at: <http://www.spokesman.com/stories/2016/may/21/save-water-by-paying-attention-to-soil-plant-needs/>

"What I learned about irrigation management." Jan. 7, 2016. Blog by Alex Shih about a presentation I made at the Tilth Producers Conference in Spokane, WA.

"When Irrigation Meets Science". Ruralite (a magazine that goes out to all customers of 48 consumer-owned electric utilities in OR, WA, AK, ID, NV, and CA). June 2015 issue. A 2 page article about our irrigation scheduling app. http://www.ruralite-digital.com/ruralite/201506_CEC/?pg=29&pm=2&u1=friend#pg29

Research offers irrigation options for farmers. Capital Press. Published Oct. 2, 2015. Also available online at: <http://www.capitalpress.com/Research/20151002/researcher-offers-irrigation-options-for-farmers>

"Study shows benefit of hose boom system." Farm Progress Magazine. January 2015. Also available online at: <http://magissues.farmprogress.com/wfs/WS01Jan15/wfs052.pdf>

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"A Weather Eye Open. WSU weather network helps farmers make decisions." July, 2014.
Front page Mt. Vernon newspaper article about about irrigation scheduler mobile.

Irrigation recommendations via online program. July 23, 2014. Article in a special edition of the Grandview Herald and Prosser Record Bulletin "Valley Farm Life." About irrigation scheduler mobile.

"Study shows boombucks reduce run-off by 24%." AgWeekly. October 2014. Also available online at http://www.theprairiestar.com/agweekly/news/irrigation/study-shows-boombucks-reduce-run-off-by/article_03c822d8-5300-11e4-8db6-5364d317582b.html

"Here Comes the Boom" February 2013. Potato Grower Magazine. Discusses our work on boombucks. Also available online at <http://www.potatogrower.com/2013/02/here-comes-the-boom>

On-The-Go Irrigation Scheduling. Onion World. Nov. 2012 issue. Troy and Sean were quoted several times. Also available online here: <http://digital.turn-page.com/i/92839/13>

Water Data with a Click. Ruralite: July, 2012 issue. 2 page article.

Free Irrigation Tool Aims to Provide Efficient Water Use. AgWeb. Oct. 24, 2012. Available online here: <http://www.agweb.com/news/news.aspx?ArticleId=325651>

Free Irrigation Tool Aims to Provide Efficient Water Use. AgDay. Oct. 24, 2012. Available online here: <http://www.agweb.com/agday/news/news.aspx?ArticleId=325799>

Online Irrigation Tool & National Water Quality Initiative. By Lacy Gray. AgInfo.net. Published May 9, 2012. Available online here: <http://www.aginfo.net/index.cfm/event/report/id/21983>

Irrigation Specialist Offers Advice on Soil Moisture Sensors. Grandview Herald. July 18, 2012 issue. Also available online here:
<http://www.thegrandviewherald.com/Farm%20Tab%202012.pdf>

Online Irrigation Tool Goes Live. By Bob Hoffman. May 23, 2012. CAHNRS News. Available online here: <http://news.cahnrs.wsu.edu/2012/05/24/ufos-export-assistance-irrigation-online-wsus-on-solid-ground-for-may-23-2012/>

Hort Headlines. WSU Irrigation Scheduler Mobile. April 27, 2012.

WSU tool helps figure irrigation needs. Western Farmer-Stockman. Sept. 2012. Issue.

Washington State U Offers Precision Irrigation Advice On Line. Western Farmer-Stockman. May 16th, 2012 issue (included a picture of "Troy Peters" that wasn't me ☐). Also available online here: <http://farmprogress.com/story-washington-state-u-offers-precision-irrigation-advice-line-0-59784>

Article about Irrigation Scheduler Mobile came out in WSU News. "Precise irrigation recommendations provided online." About our new irrigation scheduler. Available online at: <https://news.wsu.edu/pages/publications.asp?Action=Detail&PublicationID=31645&TypeID=1>

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Article published in the Western Farm Press titled, "Irrigation made simpler with online scheduling tool." Available here: <http://westernfarmpress.com/irrigation/irrigation-made-simpler-online-scheduling-tool>

Online Irrigation recommendations. In the Fruit Grower Report, By Greg Martin. AgInfo.net. May 9, 2012. Available online here: <http://www.aginfo.net/index.cfm/event/report/id/21984>

WSU's Irrigation Scheduler Mobile. Optimizing Irrigation in Washington State. Potato Grower Magazine. July 2012 issue. P. 33 Available online here: <http://read.uberflip.com/i/71916>

Mobile website helps schedule irrigation. The Grower. May, 9, 2012. Available online here: <http://www.thegrower.com/news/Mobile-website-helps-schedule-irrigations-150794885.html>

Was also referenced in the Palouse Water Conservation Network. Article titled "Precise irrigation recommendations offered online." Available here: <http://www.pwcn.org/index.cfm?fa=contentNews.newsDetails&newsID=3367004&from=list>

Was also referenced in SiloBreaker. Article titled, "Mobile website helps schedule irrigation." Available online here: http://www.silobreaker.com/mobile-website-helps-schedule-irrigation-5_2265683496259289122

An article was written on a presentation that I gave at the Potato Conference in Pasco. Distribution Uniformity: What it is and its Horrendous Costs. *Potato Country*. (2010)

An article was written about our work comparing big guns to boom-carts and was published in the CAHNRS news. "Integration in Action: Second in a Series". April 23, 2010 issue.

An article was written by Robert Mahler on my work on the regional irrigation management website. "Regional Web Site: Irrigation Management in the Pacific Northwest." *Pacific Northwest Regional Water Program Newsletter*. Fall 2009. PNWWATER 166

An article was written by Hope Tinney about the \$3.1M grant we obtained to further our research on mint and hops. "Industry delighted with study on mint, hops." *WSU Today*. Oct. 27, 2009.

An article was written by T.J. Burnham on our deficit irrigation studies on mint and published in the *Western Farmer-Stockman* magazine. "Water cuts no loss for mint oil." June 2009 issue.

An article was written by Ingrid Stegemoeller which cited our presentation at the mint field day. "Mint crop gains steam in Mid-Columbia." *Mid Columbian Magazine*. and the Tri-City Herald. June. 15, 2009.

An article was written about my work on an irrigation website by the Pacific Northwest Regional Water Program. It was published in a newsletter and online at http://www.pnwwaterweb.com/WQFlyers_PNW134.pdf.

An article titled "The Ogallala, Gauging, Protecting the Aquifer's Health" was written on work that I initiated. April 2008 Issue of *Agricultural Research*

An article was written about accomplishments using infrared for irrigation management titled "Hot New Irrigation Ideas." *The Furrow*. Dec. 2008 Issue

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An article was written about our work in WSU Today titled: Irrigation study shows ways to save water, energy and money. Friday, Nov. 14, 2008 By Camille Villanueva, WSU Today Intern

Front Page featured article came out on our research “Mint Smelling Good to Growers: Mint Growth Picks up in Mid-Columbia.” In the *Tri-City Herald*.

Feature article on the irrigation website development titled “One-Stop Water Shop.” Published in the June 2007 issue of *Ruralite*.

An article titled “Irrigators give plants the last word” was written by Don Comis on work that I initiated. *Resource Magazine*. Oct. 2006 Issue.

An article was written about one of my presentations at the Pacific Northwest Vegetable Growers Association and was published in *Onion World*.

Article written on myself and program direction in the *Good Fruit Grower* magazine. June, 2006.

Organized Educational Workshops and Meetings.

LEPA/LESA Workshops and Field Days. Held in Mabton and North of Pasco. Two separate field days.

Irrigation System Uniformity and Efficiency. In conjunction with WSDA and NRCS. **Eight different** workshops all around the state.

Irrigation Management Training Seminar for Vegetable Producers. Half day training presented as the education piece of the Pacific Northwest Vegetable Growers Association Annual Meeting.

Irrigated Agriculture Research and Extension Update Meetings; Organized and hosted in Prosser. This meeting was supported by the Dean and is now an annual meeting.

Bio-fuel and Forage Field Day. Independently advertised and put on with the help of Steve Fransen, and Hal Collins.

Biofuel feedstock research and development tour. Included as a part of the Pacific Northwest Section of the American Society of Agricultural and Biological Engineers Meeting.

Received (Funded) Grants

The **bolded** amount in parentheses is the amount spendable by Dr. Peters.

1. Peters, R.T., 2023. Best Management Practices for the Distillation of High Quality Mint Oil. Mint Industry Research Council. **(\$22,318)**.
2. NASA Roses.

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3. WSDA Soil Health Project
4. PNW Small Fruit Grant
5. Keller, M., L. Khot, **R.T. Peters**, and A. Kalyanaraman. 2022. Combining Sensors and Artificial Intelligence to Automate Deficit Irrigation. Washington Wine Commission. 30,000
6. Walsh, D., and **R.T. Peters**. 2021. Nitrogen and Water Management of Spearmint. Mint Industry Research Council. \$32,936
7. Walsh, D., and **R.T. Peters**. 2021. Nitrogen and Water Management of Spearmint. Washington Mint Commission. \$7,936
8. Khot, L. B. Sallato-Carmona, C. Torres, and **R.T. Peters**. 2021. Efficient heat stress management for improved apple fruit quality. Washington Tree Fruit Research Commission. \$68,717.
9. Kalyanaraman, A., Q. Zhang, M. Karkee, C. Stockle, K. Rajagopalan, D. Brown, M. Brady, L. Khot, G. Yorgey, V. Doppa, J. Yu, Y. Yan, S. Sankaran, M. Whiting, A. Dhingra, M. Keller, **R.T. Peters**, L. Kalcits, B. Sallato, C. Kruger, J. Bolivar-Medina, and N. Deringer. 2021. AI Institute: Agricultural AI for Transforming Workforce and Decision Support (AgAID). USDA-NIFA. \$20,000,000 (**\$282,424**)
10. Water Technology for Trade.
11. Walsh, D., R.T. Peters, B. Molaei, and R. Baker. 2022. Nitrogen and Water Management on Spearmint. (\$48,178)
12. Critzer, F., **R.T. Peters**, et al. Bridging the Gap: Expanding a HACCP-based curriculum to help produce growers treat agricultural water. 2020. 546,966. (**\$20,000**)
13. **Peters, R.T.**, and B. Molaei Large Scale Evaluation of a LEPA/LESA system compared to MESA on Spearmint and Peppermint. Idaho Industry Research Council. 2019. (**\$5,000**)
14. **Peters, R.T.**, and B. Molaei. 2019. Large Scale Evaluation of a LEPA/LESA system compared to MESA on Spearmint and Peppermint. Oregon Industry Research Council. 2019. (**\$5,000**)
15. **Peters, R.T.**, and B. Molaei. 2019. Large Scale Evaluation of a LEPA/LESA system compared to MESA on Spearmint and Peppermint. Mint Industry Research Council. (**\$5,165**)
16. **Peters, R.T.**, and B. Molaei. Large Scale Evaluation of a LEPA/LESA system compared to MESA on Spearmint and Peppermint. Washington Mint Commission. 2019. (**\$14,202**)
17. **Peters, R.T.**, B. Molaei, and L. Lommers. 2019. Mars Wrigley's Confectionary Sustainable Agricultural Funding for North America Mint Farmers. Mars-Wrigley's Confectionary. \$25,000 (**\$15,000**)

18. **Peters, R.T.**, Precision Agricultural and Sensor Development. METER Group. 2018. **(\$93,895)**
19. Critzer, F. and **R.T. Peters**. 2018. Evaluation of Agricultural Water Disinfection Treatments. Washington State Department of Agriculture Specialty Crop Block Grant Program. \$136,696. **(\$17,565)**
20. **Peters, R.T.** Large Scale Evaluation of a LEPA/LESA system compared to MESA on Spearmint and Peppermint. Mint Industry Research Council. 2018. **(\$50,533)**
21. **Peters, R.T.** Large Scale Evaluation of a LEPA/LESA system compared to MESA on Spearmint and Peppermint. Washington Mint Commission. 2018. **(\$14,202)**
22. Yoder, J., M.P. Brady, J.C. Adam, C.O. Stockle, **R.T. Peters**, K. Rajagopalan, C.E. Kruger, G.C. Yorgey, J.C. Padowski, N.B. Pickering, M. Liu, L.R. Khot. 2018. Technology for trade: Improving water use and allocation efficiency in agriculture and beyond. USDA NIFA AFRI Competitive Grant Program. \$4,966,223 **(\$68,172)**
23. Taugher, C.M. and **R.T. Peters**. 2018. Egypt Water Management Borlaug Program - CGIAR (Swelam) Egypt at WSU. USDA-FAS. Borlaug Fellowship. \$49,478 **(\$49,478)**
24. **Peters, R.T.**, and P.N. Miklas. 2017. Non-Assistance Cooperative Agreement. USDA-ARS. \$37,000. **(\$0)**.
25. **Peters, R.T.**, and C. Campbell. 2017. Tools for Nutrient Management Planning. METER Group. \$93,895. **(\$93,895)**. 10/16/2017 – 10/15/2018.
26. **Peters, R.T.**, C. Stockle, and L. Khot. 2017. Adapting Satellite-Based methods for Estimating Water Use and Crop-Water Stress to High Resolution Images from Small Unmanned Aerial Vehicles. Washington State University Emerging Research Issues Grant. \$79,105. **(\$79,105)** June 2017-May 2019.
27. **Peters, R.T.**, 2016. LEPA/LESA in the Pacific Northwest: 2016. Bonneville Power Administration Energy Program. \$665,667. **(\$119,549)**. 10/1/2016 – 10/31/2017.
28. McMoran, D., and **R.T. Peters**. 2016. Water Irrigation Systems Efficiency. USDA, NRCS, CIG Grant. \$455,915. **(\$199,833)** 10/1/2016 - 9/30/2019.
29. Khot, L, and **R.T. Peters**. 2016. Unmanned Aerial System based Rapid Evaluation for Crop and Site Specific System Adaptation in the Pacific Northwest. WSU Water Research Center. Emerging Research Issues. \$39,701. **(\$39,701)** 3/1/2016-2/28/2017. 2015.
30. Harrison, J., E. Whitefield, C. Kruger, G. Yorgey, and **R.T. Peters**. 2015. Implication of Water Impacts from Climate Change: Preparing Agricultural Educators & Advisors in the Pacific Northwest. \$75,000 **(\$2,086)**. Western SARE.
31. **R.T. Peters**. 2015. Hay and Oil Yield Differences from Low Energy Precision Application (LEPA) vs. Mid Elevation Spray Application (MESA) on Center Pivots. Washington Mint Commission. **(\$17,584)**. 2015-2016

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32. **R.T. Peters**, and H. Neibling. 2015. A Multi-State LEPA Demonstration Project. Department of Energy, Bonneville Power Administration. \$108,990 (**\$108,990**), 2015-2016
33. **R.T. Peters**, and G. Hoogenboom. 2015. iPhone and Android App for doing Simplified Irrigation Scheduling for Improved Grower Profits, Environmental Preservation, and Water and Energy Conservation. (**\$36,013**). 2015.
34. Walsh, D., Lavine, L., T. Marsh, **R.T. Peters**, S. O'Neal, and J. Sherman. 2014. "Reducing the Impact of Industry-Critical Insect and Disease Problems in Hop through Development of Preventive and Predictive Strategies." USDA NIFA SCRI. \$1,196,739. 2014-2018 (**\$0**)
35. Jacoby, P., S. Sankaran, L. Khot, A. McElrone, **R.T. Peters**, and M. Keller. 2014. "Precision sub-surface irrigation to regulate wine grape physiology." USDA-ARS NW Center for Small Fruits Research. \$34,876. 2014-2015 (**\$0**)
36. Jacoby, P., **R.T. Peters**, and M. Keller. 2014. "Deep Irrigation to conserve water and advance vineyard management". WSU - CAHNRS – ARC. \$47,061. 2014-2014 (**\$0**)
37. Hamel, J., and **R.T. Peters**. 2014. "Irrigation Scheduling on a Mobile Platform." U.S. Bureau of Reclamation. \$30,000. 2014-2015. (**\$30,000**)
38. Khot, L., Q. Zhang, **R.T. Peters**, and D. Granatstein. 2014. "In-field sensing and decision support system to prevent cherry fruit cracking due to rainwater." WSU CAHNRS ERI. \$74,223 (**\$0**). 2014-2015
39. **R.T. Peters**, and H. Neibling. 2014. A Multi-State LEPA Demonstration Project. Department of Energy, Bonneville Power Administration. \$175,000 (**\$95,000**), 2014-2015
40. **R.T. Peters**. 2014. Precision Flat-Rate Irrigation and Irrigation System Commissioning. Northwest Energy Efficiency Alliance. (**108,000**) 2014-2015.
41. **Peters, R.T.** 2014. CAHNRS Undergraduate Internship. \$6,500.
42. Peters, R.T., P. Nakawuka, and R. Okwany. 2013. Efficacy of Boombucks on Center Pivots. Irrigation Accessories Company. \$12,000 (**\$12,000**). 2013-2014.
43. Keller, M., and R.T. Peters. 2013. "Effectiveness of ET-, soil-, and plant-based tools to determine vineyard water requirement and optimal irrigation strategies for white wine grape production." WA Ag. \$181,818. (**\$0**) 2013-2016
44. Brady, M. **R.T. Peters**, and K. Desta. 2012. The potential for data-based irrigation management adoption to improve the sustainability of water and nitrogen resources. CSANR-BIOAG. \$20,000. (**\$0**) 2011-2013.
45. **Peters, R.T.** 2013. CAHNRS Undergraduate Internship. \$6,500. No potential interns applied for this position. Money reverted to CAHNRS.
46. McPhail, M., K. Patten, **R.T. Peters**, M Burns, L. Nelson, and K. Talbot. 2011. Technology Transfer for Sustainable Cranberry Production. Washington State USDA Specialty Crop Block Gran Program. 201,674 (**\$4,500**), 2011-2014.

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47. **Peters, R.T.** and H. Neibling. 2012. Multi State LEPA Irrigation Demonstration Project. Bonneville Power Administration. \$337,179 (**\$202,025**), 2012-2014.
48. **Peters, R.T.** 2011. Creation of a Regional Irrigation Education Web Site. 2011. Funded by the PNW Regional Water Quality Program. \$15,000 (**\$15,000**), 2011.
49. **Peters, R.T.**, D.B. Walsh, and R.A. Boydston. 2011. "Response of Mint Oil Yields, Weeds and Pests to Deficit Irrigation" WA Mint Commission. \$14,250 (**\$14,250**), 2011.
50. McMoran, D.W., **R.T. Peters**, B. Mittlestadt, D. Inglis, M. Pavek, and K. Kadlec. 2010. Drip Irrigation Costs and Efficacy on Potatoes in Western Washington. Washington State Potato Commission. \$22,904 (**\$1,200**), 2011-2012.
51. Pierce, F., **R.T. Peters**, et al. 2010. Precision Management of Specialty Crops Through Sensor-Based Decision Making. USDA – Specialty Crop Research Initiative. \$2,590,885 (**\$155,332**), Sept. 2010 – Oct. 2014.
52. **Peters, R.T.** 2010. Creation of a Regional Irrigation Education Website. PNW Regional Water Quality Program, CSREES, USDA. \$15,000 (**\$15,000**), 2010.
53. **Peters, R.T.**, D.B. Walsh, and R.A. Boydston. 2010. "Response of Mint Oil Yields, Weeds and Pests to Deficit Irrigation" WA Mint Commission. \$20,000 (**\$20,000**), 2010.
54. **Peters, R.T.** 2010. Revised Crop Coefficients for Washington. Washington State Department of Ecology. \$54,382 (**\$54,382**), 2010.
55. **Peters, R.T.**, Creation of a Regional Irrigation Education Website. 2009. Funded by the PNW Regional Water Quality Program. \$10,000 (**\$10,000**), 2009.
56. McMoran, D.W., D. Inglis, **R.T. Peters**, S.R. Schaffer, B. Mittlestadt. 2009. Drip Irrigation Costs and Efficacy on Potatoes in Western Washington. Agricultural Extension Mini-Grants. WSU. \$4,070 (**\$600**), 2009.
57. **Peters, R.T.**, D.B. Walsh, and R.A. Boydston. 2009. "Response of Mint Oil Yields, Weeds and Pests to Deficit Irrigation" WA Mint Commission. \$20,000 (**\$20,000**), 2009.
58. Adam, J., M. Barber, M. Brady, D. Granatstein, C. Kruger, T. Marsh, **R.T. Peters**, C. Stockle, and J. Yoder. 2009. Columbia River Basin Water Supply Investment Plan: A Strategy to develop water supply to meet water demand needs through 2030. Washington State Department of Ecology. \$748,372 (**\$18,983**), 2009.
59. Walsh, D.B., **R.T. Peters**, et al. 2009. Agronomic, Biochemical, Social, and Economic Impacts of Biotic and Abiotic Stress on Pacific Northwest Flavor Crops. USDA - Specialty Crop Research Initiative. \$3,142,400 (**\$145,667**), 2009-2013.
60. **Peters, R.T.**, D.B. Walsh, and R.A. Boydston. 2008. "Response of Mint Oil Yields, Weeds and Pests to Deficit Irrigation" WA Mint Commission. \$20,000 (**\$20,000**), 2008.
61. **Peters, R.T.** 2008. Creation of a Regional Irrigation Education Web Site. 2008. USDA CSREES National Water Quality Program. \$10,000 (**\$10,000**), 2008.

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62. **Peters, R.T.**, L. Nelson, and R. Allen. 2008. Evapotranspiration and Consumptive Irrigation Requirements for Washington. Washington State Department of Ecology. \$94,000 **(\$94,000)**, 2008-2010.
63. Mann, K., A. Bary, J. Busboom, L. Carpenter-Boggs, C. Cogger, R. Dougherty, J. Harrison, J. Rentz, C. Miles, P. Ndegwa, M. Ostrom, J. Ullman, T. Waters, Z. Edwards, and **R.T. Peters**. 2008. A farm-to-table approach to reduce the risk of foodborne pathogens integrating outreach and applied research. \$50,000 **(\$0)**, 2008-2009.
64. **Peters, R.T.**, T. Smith, T. Walters, C. Stockle, R. Stevens, M. Zuroske, T. Hoffmann, and L. Nelson. 2007. Improving Water Use Efficiencies for Agricultural Production. \$3,000 **(\$3,000)**.
65. Walsh, D., **R.T. Peters**, and R. Boydston. 2007. Preparing Washington State Forage Producers for Pest Management and Agronomic Impacts of long-term drought and climate change. WSU ARC Emerging Issues for Washington Agriculture Grants. \$122,403 **(\$70,000)**, 2007-2008.
66. **Peters, R.T.**, D.B. Walsh and R.A. Boydston. 2007. Mint Oil Yields, Weeds and Pests Under Deficit Irrigation. Washington Mint Commission. \$9,500 **(\$9,500)**.
67. English, M., **R.T. Peters**, R. Snyder, and R. Allen. 2007. A Regional Evaluation of a Web-based Irrigation Advisory Service. USDA NRCS, Conservation Innovator's Grant. \$347,900 **(\$62,534)**.
68. Fransen, S., **R.T. Peters**. 2007. Water Requirements and Economics for Growing Perennial Warm-Season Grasses for Ethanol Under Irrigation in the Arid-West. USDA-CSREES, Integrated Research, Education, and Extension Competitive Grants Program – National Integrated Water Quality Program. \$395,000 **(\$18,730)**, 2007-2011.
69. Miles, C., **R.T. Peters**, K. Baril, and J. Thomas. 2007. Supplemental R&E Funding form Innovative SARE Coordinator Programs Washington State University. \$24,842 **(\$6,000)**, 2007-2008.
70. Beutel, M., R. Watts, and **R.T. Peters**. 2007. Quantifying and Enhancing Nitrogen Removal in Constructed Wetlands. WSU Water Research Counsel. \$24,000 **(\$0)**, 2007 – 2008.
71. **Peters, R.T.** and M.D. Whiting. 2006. Irrigation Automation Using Infrared Temperature Sensors. Washington Tree Fruit Research Commission. \$40,000 **(\$40,000)**, 2006 – 2007.

Invited Presentations

| <u>Date</u> | <u>Title, Duration, Sponsor, Contacts, and Location.</u> |
|--------------------|---|
| 12/6/2022 | Irrigation and Nitrogen Trial Results on Spearmint. 20 min. 83 participants. Washington Mint Convention. Kennewick, WA |
| 12/1/2022 | The Effects of Irrigation and Nitrogen Levels on Spearmint Hay and Oil Yields. 30 min. 42 participants. Hermiston Farm Fair Seminars. Hermiston, OR |
| 11/17/2022 | LEPA/LESA and MDI on Center Pivots. 20 min. 9 participants. Irrigation designers meeting. Pasco, WA |
| 11/14/2022 | Principles of Scheduling Irrigation & Soil Moisture Monitoring. 40 min. 115 participants. Alfalfa Conference. San Diego, CA |
| 10/28/2022 | US History and Cultural Influences. 20 min. LAWREE Monthly Social. Zoom |
| 10/7/2022 | Evapotranspiration (ET) Estimation Methods and their Limitations. 1 hr. 59 participants. Washington State Department of Ecology Bioannual Meeting. Wenatchee, WA. |
| 9/15/2022 | Evapotranspiration (ET) Estimation Methods and their Limitations. 1 hr. 27 participants. Eastern OR OpenET Workshop. Hermiston, OR. |
| 9/14/2022 | Evapotranspiration (ET) Estimation Methods and their Limitations. 1 hr. 27 participants. OR Dept of water resources, NRCS, and OSU personnel. Aurora, OR. |
| 9/11/2022 | Irrigation of grapes. 2 hours. 38 participants. V&E Certificate program field day. Prosser, WA |
| 7/28/2022 | Chemigation of Cranberries. 1.25 hours. 37 participants. Washington Cranberry Field Day. Aberdeen, WA. |
| 7/26/2022 | Irrigation Research at the Irrigated Agriculture Research and Extension Center. 30 min. 48 participants. Eisenhower High School. Prosser, WA. |
| 7/21/2022 | Soil Moisture Monitoring and Record Keeping. 1 hr. 19 participants. Irrigation Water Management Workshop. Madras, OR. |
| 6/24/2022 | Irrigation Technologies and Research at WSU. 30 minutes. 11 participants. CBC Students. Prosser, WA |
| 6/22/2022 | Irrigation Education Opportunities for AgTech Teachers. 30 minutes. 4 participants. High School Ag Teacher Education Event. Prosser, WA. |
| 6/7/2022 | LEPA/LESA on Mint. 10 minutes. 29 participants. WA Mint Field Day. Prosser, WA. |
| 6/1/2022 | Dairy Irrigation Water Management. 30 minutes. 23 participants. NW Washington dairy producers. Lynden, WA |
| 4/13/2022 | Upcoming irrigation technologies. 1 hr. 20 participants. Presentation to High School Students. IAREC, Prosser, WA. |
| 3/12/2022 | Irrigating Your Home Landscape. 1 hr. 36 participants. Spokane co. Virtual Gardening Symposium. Gardening Zoom |
| 3/8/2022 | Irrigating Your Home Landscape. 2 hours. 27 participants. Benton-Franklin Master Gardener Volunteer Training. |
| 3/6/2022 | Irrigation for Small Farm Operators. 2 hours. Deer Park, WA. |
| 3/4/2022 | Common Irrigation Problems Found in Orchards. Wilbur Ellis Agribusiness Irrigation Training Meeting. 14 participants. 15 minutes. Zoom |
| 2/17/2022 | Irrigation of Tree Fruit. 12 participants. 1 hr. Hort 433. Zoom |
| 2/9/2022 | Irrigation for Fruit Quality and Efficiency. 30 min. 32 participants. Omak, WA. Okanogan Horticultural Association Annual Meeting. |
| 2/4/2022 | Soil Moisture Sensors for Weather Networks. 20 min. 29 Participants. Zoom. |

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| | Washington Weather School. |
| 1/28/2022 | Sensors and Tools for Irrigation Water Management. 1 hour. 32 participants. Stevenson, WA. Pratum Coop Crop Advisor Training |
| 1/28/2022 | Water Available for Food Production in Whitman, Co. 5 min. 125 participants. Zoom. Palouse-Clearwater Food Summit. |
| 1/20/2022 | Water Management for Dairy Producers. 30 min. 26 participants. Lynden, WA. Dairy Nutrient Management Training. |
| 1/13/2022 | Determining Optimal Irrigation and Fertility Programs in Mint. 30 min. 137 participants. Lincoln City, OR. Oregon Mint Meetings |
| 12/7/2021 | Center pivots control panels should vary cycle time instead of run time to control pivot speed. 20 min. 62 participants. San Diego, CA. ASABE Meeting |
| 11/30/2021 | Irrigation set times and soil moisture sensors. 20 min. 23 participants. Cashmere, WA. Pear Irrigation Session. |
| 10/22/2021 | Deficit Irrigation. 1 hr. 19 participants. Zoom. Artificial Intelligence in Agriculture Seminar. |
| 10/20/2021 | Irrigation: Getting your money's worth. 1 hr. 28 participants. Garfield County Master Gardener Training. |
| 10/2/2021 | Irrigation. What Questions do you Get in Clinic? Answers to Commonly Asked Irrigation Questions. 1.5 hrs. 32 participants. Master Gardener Advanced Education Conference. |
| 9/24/2021 | Whole System On-Off: A New Paradigm in Irrigation Scheduling. 0.5 hrs. 12 participants. WERA-1022 Meeting. |
| 9/12/2021 | Irrigation filters, vineyard setups, soil moisture sensors, and hardware. 3.5 hrs. 35 participants. Grape Camp. |
| 7/15/2021 | Cost per Drop: Cost Comparison Estimates for Various Irrigation Water Conservation Technologies. 15 min. 25 participants. Virtual ASABE Mtg. |
| 6/24/2021 | Amongst chaos, finding truth. Or, at least, best. CBC Science and Agriculture Workshop. Prosser, WA. 30 min. 7 participants. Prosser, WA. |
| 6/8/2021 | Irrigation Management. Master Gardener Training Online. 2 hours. 18 participants. (Zoom) |
| 6/8/2021 | A Very Simple Irrigation Scheduling Tool for an Average Year. Mint Field Day. 8 min. 32 participants. Prosser, WA |
| 3/17/2021 | Nozzle Calculator: Sprinkler Design 101. Annual Irrigators Summit via Virtual WebEx. 15 min. 21 participants |
| 3/17/2021 | Irrigation Scheduling on your Phone or Web Browser. Annual Irrigators Summit via Virtual WebEx. 10 min. 21 participants |
| 3/8/2021 | Methods of Irrigation Management. Guest Lecture for AgTM 405. 1.5 hrs. 13 Participants. (Zoom) |
| 3/3/2021 | Bridging the Gaps: Approaches for treating Preharvest Agricultural Water On-Farm Training the Trainer Course. 8 hrs over 2 days (3/2-3/3). 45 participants. Northwestern States. (Zoom) |
| 2/25/2021 | Water Losses in Irrigation Systems. Crook County SWCD Ditch Rider Workshop. 1 hr. 19 Participants. (Zoom) |
| 2/24/2021 | Irrigating Montana Fruit Crops for Efficiency, Fruit Quality, and Conservation. Western Agricultural Research Center Seminar. 1.5 hrs. 28 participants. (Zoom) |
| 1/28/2021 | Irrigation for Wine Grapes. Guest Lecture for V&E 433. 1.5 hrs. 18 participants. Richland, WA. (Zoom) |
| 1/13/2021 | Bridging the Gaps: Approaches for treating Preharvest Agricultural Water On-Farm Training the Trainer Course. 8 hrs over 2 days (1/13-1/14). 45 participants. Southern Region. (Zoom) |

- 12/3/2020** Using Greatly Simplified On/Off Accounting with the Irrigation Scheduler Mobile App. Hermiston Agricultural Research and Extension Center Field Day. 30 minutes. 164 participants. (Zoom).
- 11/19/2020** Greatly Simplified Irrigation Scheduling on you Phone or Web Browser. Pacific Northwest Vegetable-Growers Association (PNVA). 30 minutes. 212 participants. (Zoom).
- 11/19/2020** Water Conservation Technologies: Getting the Biggest Bang for your Buck. Pacific Northwest Vegetable-Growers Association (PNVA). 30 minutes. 212 participants. (Zoom).
- 10/13/2020** Bridging the Gaps: Approaches for treating Preharvest Agricultural Water On-Farm Training the Trainer Course. 8 hrs over 2 days (10/13-10/14). 45 participants. Northwestern States. (Zoom)
- 8/29/2020** Comparing the Costs and Benefits of Various Irrigation Technologies to Save Water. Which is the Biggest Bang for the Buck? MPKV India International Talk. 1 hour. 812 participants! (Zoom).
- 8/29/2020** Irrigation Water Management Progress in Washington. WERA 1022 Meeting Talk. 20 minutes. 16 participants. (Zoom).
- 7/28/2020** Irrigation Systems and Technologies: The Big Picture. WSU Water Technology for Trade. 30 minutes. 12 participants. Pullman, WA (Zoom).
- 6/17/2020** Comparison on different irrigation technologies. Conservation potential and biggest bang for the buck. Washington Association of District Employees (WADE). 30 minutes. 14 participants. Leavenworth, WA (Zoom)
- 6/9/2020** Irrigation Strategies for Drought. Southern Oregon Conservation District. 8 contacts. 1 hr. Klamath Falls, OR (Zoom)
- 5/27/2020** Irrigation of Pears for maximum yield and quality. WSU Extension Pear Field Day. 15 minutes. 13 contacts. Cashmere, WA.
- 5/15/2020** Irrigation Technologies and Practices Applicable to Utah. Utah Department of Water Resources. 20 minutes. 8 contacts. Salt Lake City, UT (Zoom)
- 5/6/2020** Automated Irrigation: The Basics of Drip Irrigation and its Application to Vegetable and Fruit Crops. PennState University. 30 minutes. 26 participants. State College, PA (Zoom)
- 3/13/2020** Irrigation of Small Fruits. Western Washington Small Fruits Conference. 30 min. 64 participants. Mt. Vernon, WA
- 3/4/2020** Beyond Probes and Bombs: Using Technologies to Manage Vineyard Irrigation. Washington Association of Wine Grape Growers Annual Conference. 30 minutes. 132 participants. Kennewick, WA
- 2/25/2020** Water and Irrigation Management for Fruit Crops. Guest lecture for Hort 521. 1.5 hrs. 23 participants. Prosser, WA
- 2/21/2020** On-Off Improvements to Irrigation Scheduler Mobile. Western Washington Potato Workshop. 20 minutes. 85 participants. Mt. Vernon, WA
- 2/13/2020** AppSense1.0: A Smartphone Application for Real-time Apple Fruit Surface Temperature Monitoring. Next Generation Network workshop. 20 minutes, 40 participants. Wenatchee, WA,
- 2/7/2020** Irrigation for landscape trees. Inland Tree and Landscape Conference. 1 hr. 48 participants. Spokane, WA
- 1/30/2020** Irrigation for Wine Grapes. Guest Lecture for V&E 433. 1.5 hrs. 18 participants. Richland, WA
- 1/21/2020** Large Scale Evaluation of LEPA/LESA compared with MESA on spearmint and peppermint. 45 minutes. 73 participants. Scottsdale, AZ
- 1/9/2020** Advancing Water Efficacies with Innovative Irrigation Approaches. 30 minutes. 62 participants. Glenenden Beach, OR

- 12/20/2019** Opportunities for Water Conservation in Utah. 10 minutes. 14 participants. Salt Lake City, UT.
- 12/3/2019** Large Scale Evaluation of LEPA/LESA System Compared to MESA on Spearmint and Peppermint. WA Mint Annual Convention. 15 minutes. 94 participants. Kennewick, WA.
- 11/20/2019** Mobile Drip Irrigation & Variable Rate Irrigation: A Review of Existing Research. Pacific Northwest Vegetable Growers Association Annual Conference and Trade Show. 30 minutes. 78 participants. Kennewick, WA
- 11/19/2019** LEPA, LESA and Mobile Drip Irrigation. Western Alfalfa Forage Symposium. 15 minutes. 185 participants. Reno, NV.
- 11/19/2019** Irrigation Scheduling: When and How Much? Western Alfalfa Forage Symposium. 15 minutes. 185 participants. Reno, NV.
- 10/24/2019** Soil Moisture Sensors, and Automatic Weather Stations for Irrigation Management. Guest lecture for Instrumentation and Measurements. 20 students. 1 hour. Prosser, WA
- 10/9/2019** Opportunities for Water Conservation: Those with and without potential. Invited Seminar at Oregon State University. 28 participants (students). 1 hr. Corvallis, OR.
- 10/5/2019** Chemigation, Irrigation Basics, and LEPA/LESA. IAREC Centennial Celebration community event. 80 participants over 4 hours. Prosser, WA
- 9/19/2019** Irrigated Agriculture in Washington. IPM Coordinator Tour. 21 participants. 30 minutes. Prosser, WA
- 9/15/2019** Irrigation Management and Design. Grape Camp. 35 participants. 2 hrs. Prosser, WA.
- 8/14/2019** Irrigation Management Training. South Yakima Conservation District. 30 minutes. 14 participants. Yakima, WA.
- 8/13/2019** Irrigation Management Training. Okanogan Conservation District. 2 hours. 12 participants. Okanogan, WA
- 7/23/2019** How to utilize Irrigation Scheduler Mobile for Irrigation Management. Cherry field day. 39 participants. 15 minutes. Prosser, WA.
- 7/8/2019** Large Scale Evaluation of a Low Energy Precision Application (LEPA) system compared to Mid Elevation Spray Application (MESA) on Spearmint and Peppermint. ASABE Annual Meetings. 34 participants. 15 minutes. Boston, MA.
- 6/4/2019** Low Energy Precision Application for Mint. WA Mint field day. 52 participants. 15 minutes. Prosser, WA.
- 5/16/2019** Chemigation and Drift. PIRT Tour (NRCS and WA Dept of Ag Regulators). 45 Participants. 30 minutes. Prosser, WA
- 5/14/2019** Emerging Technology for Energy Conservation in Irrigation: Variable Rate Irrigation and LEPA/LESA. 42 participants. 15 minutes. Coeur D'Alene, ID
- 5/8/2019** Irrigation system calibration, maintenance, and evaluation. H2O and SO2 Wine grape water management field day. 120 participants. 30 minutes. Benton City, WA
- 4/23/2019** Do's and Don't for Attending the ASABE Annual Meeting. Invited presentation by the BSE ASABE student club. 32 participants. 1 hr. Prosser, WA.
- 3/19/2019** Improving Irrigation practices with Using soil moisture monitoring. Irrigation Workshop. 25 minutes. 53 participants. Prineville, OR
- 3/18/2019** Chemigation. Irrigation Workshop. 30 minutes. 53 participants. Prineville, OR
- 3/18/2019** Drip Irrigation Systems: Maintenance and Management. Irrigation Workshop. 30 minutes. 53 participants. Prineville, OR
- 3/18/2019** Variable Rate Irrigation. When does it make sense? Irrigation Workshop. 15

- minutes. 53 participants. Prineville, OR
- 3/18/2019** Irrigation Efficiency and Uniformity. Should growers do irrigation system design? Irrigation Workshop. 15 minutes. 53 participants. Prineville, OR
- 3/18/2019** ET-based and soil moisture based irrigation scheduling and Irrigation Scheduler Mobile. Irrigation Workshop. 30 minutes. 53 participants. Prineville, OR
- 3/18/2019** Soil water relationships. Irrigation Workshop. 20 minutes. 53 participants. Prineville, OR
- 3/7/2019** Irrigation Hardware Workshop for Energy Conservation. Bonneville Power Administration Regional Technical Forum. 10 minutes. 22 participants. Portland, OR
- 3/2/2019** Irrigation basics for grape production. Grape Camp. 34 participants. 3 hours. Prosser, WA
- 2/27/2019** The 10 Commandments of Irrigation for Dairymen. Western Dairy Conference. 132 participants. 30 minutes. Reno, NV.
- 2/12/2019** Drip Irrigation System Maintenance. WA Wine Grape Growers Convention and Trade Show. 129 participants. 1 hour. Kennewick, WA
- 2/7/2019** Low Energy Precision Application (LEPA) and Low Elevation Spray Application (LESA) for Central Oregon. Irrigation Training Class. 83 participants. 1 hr. Madras, OR
- 1/29/2019** Irrigation of Grapevines: When and How Much? WSU Viticulture and Enology guest lecture. 16 participants. 1.25 hours. Richland, WA
- 1/24/2019** Evaluating Precision Irrigation Systems. Mint Industry Research Council Annual Meeting. 115 participants. 30 minutes. San Antonio, TX
- 1/16/2019** Towards Good Size Fruit and Less Cork -Evaluating your Irrigation System. North Central Washington Pear Day. 190 participants. 30 Minutes. Wenatchee, WA
- 1/11/2019** Advanced Water Efficiencies with Innovative Irrigation Approaches. Oregon Mint Convention. 123 participants. 30 minutes. Salishan, OR.
- 12/11/2018** Water and Energy Conservation Opportunities with Variable Rate Irrigation, Low Elevation Spray Application Sprinklers, and Irrigation Scheduling. FWAA Conference. 89 participants. 30 minutes. Kennewick, WA
- 12/5/2018** Low Energy Precision Application on Spearmint and Peppermint. ID Mint Meetings. 76 participants. 20 minutes. Burley, ID
- 12/4/2018** Center Pivot Irrigation Efficiency as a Function of Weather and Sprinkler Height. Irrigation Association Conference. 67 participants. 15 minutes. Long Beach, CA.
- 12/3/2018** Low Energy Precision Application on Spearmint and Peppermint. WA Mint Convention. 116 participants. 20 minutes. Kennewick, WA
- 11/27/2018** Irrigation and Water Rights. Advanced Cropping Systems WSU Course Guest Lecture. 1 hr. 23 participants. Pullman, WA
- 11/15/2018** Practical Advice for Irrigation Water Management. Utah Fruit School. 43 participants. 1 hr. Spanish Fork, UT.
- 11/14/2018** Practical Soil Moisture Monitoring. Pacific Northwest Vegetable Growers Association. 120 participants. 30 minutes. Kennewick, WA.
- 11/6/2018** Low elevation precision application (LEPA) effects on peppermint and spearmint. 23 participants. 15 min. Prosser, WA
- 10/24/2018** Tips and Tricks for Getting Through Graduate School. CPAAS Invited presentation. 32 participants. 1 hr. Prosser, WA
- 10/15/2018** AgWeatherNet: Opportunities for the Future. Invited presentation to IAREC faculty. 53 participants. 1 hr. Prosser, WA
- 10/1/2018** Consumptive Use and Irrigation Water Requirements for Washington: WA State

- Dept. of Ecology. 23 participants. 30 min. Yakima, WA
- 8/10/2018** Viticulture Field Day: Chemigation for Viticulture. 120 participants. 3 different presentations 30 min each. Sunnyside, WA
- 8/1/2018** Low Elevation Spray Application (LESA) compared with Mid Elevation Spray Application (MESA) on Center Pivots in the Pacific Northwest: Quantifying Efficiency Differences. 67 participants. 20 min. Detroit, MI
- 7/11/2018** Low Elevation Spray application and Variable Rate Irrigation. 53 participants. 45 min. Walla Walla, WA.
- 6/14/2018** LEPA/LESA Trials, Variable Rate Irrigation, and ET-based Irrigation Scheduling. 31 participants. 1 hour. Elberta, UT.
- 3/19/2018** Agricultural Water Management: When you Don't have Enough. Irrigation BMPs for Westside Farmers. 28 participants. 40 minutes. Carnation, WA.
- 3/14/2018** Practical Opportunities for Water and Energy Conservation with Irrigation Technologies. Santiago, Chile.
- 3/3/2018** Drip Irrigation and Soil Moisture Monitors for the Home Gardener. WSU Spring Garden Day. 40 minutes. Richland, WA.
- 2/20/2018** Hort 521 guest lecture. 1 hour. Prosser, WA.
- 2/15/2018** Irrigation Management in the Vineyard. Viticulture Guest Lecture. 1 hour. Richland, WA
- 1/31/2018** Irrigation Research in the Pacific Northwestern United States. Egyptian. 1.5 hrs. 12 participants. Cairo, Egypt
- 1/23/2018** Innovative Technologies to Improve Irrigation Efficiency. Mint Industry Research Council Annual Convention. 30 minutes. 94 participants. New Orleans, LA.
- 1/17/2018** Innovations with Center Pivot Irrigation in Hay Crops. Northwest Hay Expo. 30 minutes. 115 participants. Kennewick, WA.
- 1/12/2018** Water and Power Savings from Low Energy Precision Application (LEPA) and Low Elevation Spray Application (LESA) in the Pacific Northwest. 45 minutes. 8 participants. Walla Walla, WA.
- 1/5/2018** Deficit Irrigation Effects on Yield and Quality of Four Cultivars of Hops. Hop Growers Convention. 15 minutes. 163 participants. Yakima, WA
- 12/13/2017** Irrigation Scheduling and the Practical Use of Soil Moisture Sensors for Irrigation Management. Allan Bros Growers. 45 minutes. 27 participants. Naches, WA
- 12/5/2017** Tree Fruit Surface Temperature Model for use with Automatic Cooling Sprinkler Control. Washington Tree Fruit Association. 5 minutes. 230 participants. Kennewick, WA
- 11/29/2017** Innovations with Center Pivot Irrigation with Hay Crops. 20 minutes. Western Alfalfa Symposium. 208 participants. Reno, NV
- 11/7/2017** LEPA/LESA on Mint. 20 minutes. WA Mint Commission. 20 participants. Prosser, WA
- 10/27/2017** Irrigation Issues and Advances in the Pacific Northwest. 60 minutes. 75 participants. Hebei University, China.
- 10/24/2017** Irrigation Issues and Advances in the Pacific Northwest. 60 minutes. 75 participants. Xian, China
- 9/14/2017** Irrigation Management for Improved Profitability in Mint. 30 minutes. Mint Industry Technical Research Review. 34 Participants. Portland, OR
- 9/6/2017** AgweatherNet Use For Irrigation Scheduling. 5 minutes. Ag Forestry Leadership Tour. 26 participants. Prosser, WA
- 8/17/2017** Practical Irrigation Scheduling. 1.5 hrs. Mercer Ranches. 10 Participants. Paterson, WA
- 8/9/2017** Irrigation Management for Improved Profitability. Latino Small Farms Conference. 35 minutes. Yakima, WA

- 8/2/2017** Tools for Practical Irrigation Scheduling. 30 minutes. Dairy Nutrient Management Tools Workshop. 23 Participants. Enumclaw, WA
- 8/1/2017** Tools for Practical Irrigation Scheduling. 30 minutes. Dairy Nutrient Management Tools Workshop. 12 Participants. Lynden, WA
- 7/31/2017** Precision Irrigation. 1 hour. CPAAS Open House Invited Presentation. 136 participants. Prosser, WA
- 7/19/2017** Variable Rate Irrigation: The Potential for Profitability. 20 minutes. ASABE Presentation. 31 participants. Spokane, WA
- 7/18/2017** Washington Agriculture 101. 1 hour. ASABE Young Professionals Community Invited Presentation. 28 participants. Spokane, WA
- 6/28/2017** Irrigation Management for Vegetables. 2.5 hours. Evergreen College Invited Lecture. 31 participants. Olympia, WA
- 6/27/2017** Irrigation for Hops. 60 minutes. Hops Growers Luncheon. 52 participants. Toppenish, WA
- 6/7/2017** Irrigation Management. 15 minutes. Dairy Nutrient Management Tools Workshop. 42 participants. Sunnyside, WA
- 6/6/2017** LEPA/LESA trials in Mint. 10 minutes. WA Mint Field Day. 30 participants. Prosser, WA
- 5/25/2017** LEPA/LESA in the Pacific Northwest. 25 participants. 3 separate presentations at different field-stop locations. 15 min each. Wasco County Crop Tour. Madras, Terrabonne, and Lone Pine, OR.
- 5/16/2017** LEPA/LESA Field Day. 28 participants. 20 minute Dufur, OR
- 5/9/2017** LEPA/LESA trials in the Pacific Northwest. 8 participants. 1.5 hours. Northern California NRCS and Conservation District employees.
- 4/25/2017** Irrigation in Fruit and Nut Crops. 18 participants. 1.5 hours. Milton Freewater, OR
- 4/7/2017** Irrigation Scheduling on your Phone or Web Browser. Irrigation Training Meeting. 25 participants. 1 hr. Eureka, NV
- 3/18/2017** Low Flow Irrigation Class. Island County. 38 participants. 3 hours. Coupeville, WA
- 3/15/2017** Irrigation Scheduling, LEPA/LESA, and Soil Moisture Sensors. Science at IAREC Day. 2 hours. 32 students. Prosser, WA
- 3/4/2017** Irrigation Management, Soil Moisture Sensors, and Drip Irrigation. Grape Camp. 2 hours. 38 people. Prosser, WA.
- 2/24/2017** WSU WISE. Western Washington Potato Conference. 95 people. Mt. Vernon, WA.
- 2/17/2017** Simplified Irrigation Scheduling on Your Computer or Mobile Device and LESA for Pivots... A significant water savings opportunity? 34 people. 45 min. Yreka, CA
- 2/7/2017** Simplified Irrigation Scheduling on Your Computer or Mobile Device. Lake County Irrigation Seminar. 56 participants. 40 min. Christmas Valley, OR
- 2/7/2017** Irrigation Scheduling and the Practical Use of Soil Moisture Sensors for Irrigation Management. 56 participants. 25 min. Lake County Irrigation Seminar. Christmas Valley, OR
- 2/6/2017** Simplified Irrigation Scheduling on Your Computer or Mobile Device. 72 participants. 40 min. Harney County Irrigation Seminar. Burns, OR.
- 2/6/2017** Irrigation Scheduling and the Practical Use of Soil Moisture Sensors for Irrigation Management. Harney County Irrigation Seminar. 72 participants. 30 min. Burns, OR.
- 2/2/2017** Low Elevation Spray Application and ISM. Bureau of Indian Affairs Conference. 6 participants. 1.5 hrs. Toppenish, WA.

- 1/27/2017** Low Elevation Precision Application (LEPA) and Low Elevation Spray Application (LESA) in the PNW. Presentation to Nelson Irrigation Company. 9 participants. 1 hr. Walla Walla, WA.
- 1/26/2017** Low Elevation Precision Application in the Pacific Northwest. 23 participants. 20 min. Climate Impacts to Water Conference. Stevenson, WA.
- 1/23/2017** Irrigation Scheduling and Low Elevation Spray Application (LESA). Odessa BPA meeting. 1/5 hrs. 56 participants. Odessa, WA.
- 1/18/2017** Irrigation Scheduling and the Practical Use of Soil Moisture Sensors for Irrigation Management. 1 hr. 192 participants. WSU Pear Day. Wenatchee WA.
- 1/4/2017** Precision Irrigation and Low Elevation Spray Application (LESA). 43 participants. 1 hr. Precision Ag/Irrigation Conference. Pasco, WA.
- 12/16/2016** Frost control for apple orchards: Options and benefits. 30 participants. 1.5 hrs. Haisheng grower's group. Xi'an, China.
- 12/15/2016** Drip Irrigation System Design and Maintenance. 30 participants. 1.5 hrs. Haisheng grower's group. Xi'an, China.
- 12/15/2016** Irrigation management in apple orchards. 30 participants. 1.5 hrs. Haisheng grower's group. Xi'an, China.
- 12/7/2016** Precision Orchard Irrigation and Fertigation Management Techniques. 208 participants. 30 min. Washington State Tree Fruit Association. Fruit Growers. Wenatchee, WA.
- 12/6/2016** Hay & Oil Yield Differences from Low Energy Precision Application (LEPA) vs. Mid Elevation Spray Application (MESA) on Center Pivots. 123 participants. 20 min. WA State Mint Convention. Mint Growers. Kennewick, WA.
- 12/1/2016** Using weather data and soil moisture sensors for irrigation scheduling. 12 participants. 1 hr. Municipal water suppliers and conservation program personnel. Webinar presentation.
- 11/30/2016** Irrigation of Alfalfa during water shortages. 237 contacts. 25 min. California Alfalfa Symposium. Reno, NV.
- 11/1/2016** Mint Hay and Oil Yield Differences from Low Energy Precision Application (LEPA) vs. Mid Elevation Spray Application (MESA). 15 minutes. 14 contacts. Mint Commissioners. Prosser, WA.
- 9/7/2016** Irrigation Management and Conservation and production in Washington State. 15 minutes. 23 contacts. WERA-1022 Meeting. Little Rock, AR
- 8/25/2016** Conserving water and power through the use of Low Elevation Spray Application (LESA). 10 minutes. 145 contacts. Onion Field Day. Othello, WA
- 8/17/2016** Opportunities for Conservation in the PNW. 40 minutes. 19 contacts. Congressional Staffing Tour. Prosser, WA
- 7/20/2016** Soil and Water Basics and Irrigation Water Management. 2 hrs. 23 contacts. Evergreen College Organic Farm. Olympia, WA.
- 6/7/2016** LEPA/LESA on Mint. 15 min. 48 contacts. Washington Mint Commission Field Day. Prosser, WA.
- 5/18/2016** Irrigation and Conservation Practices in Eastern Washington. 1 hr. 12 Contacts. Pakistani Delegate Educational Tour. Prosser, WA.
- 4/28/2016** Irrigation Water Management and Planning: Ways to Conserve Water. 20 minutes. 37 contacts. Pierce County Planning & Land Services Workshop. Puyallup, WA.
- 4/26/2016** Irrigation for the Lawn and Garden. 2 hrs. 131 contacts. Master Gardener Training. Richland, WA.
- 3/29/2016** Irrigation Scheduling Using Weather Data. 1 hr. 26 contacts. Irrigation Educator Meeting. Chehalis, WA.
- 3/16/2016** Simplified Irrigation Scheduling on Your Computer or Mobile Device. 30 min. 92

- 3/15/2016** contacts. Maricopa Ag. Center Annual Training and Seminars. Maricopa, AZ
Simplified Irrigation Scheduling on Your Computer or Mobile Device. 30 min. 45 contacts. Irrigation Training. Fallon, NV.
- 3/14/2016** Simplified Irrigation Scheduling on Your Computer or Mobile Device. 35 min. 60 contacts. Irrigation Training for Diamond Valley growers. Eureka, NV.
- 3/5/2016** Irrigation Management for Grape Vines. Washington State University Grape Certificate Program Grape Camp. Prosser, WA.
- 3/4/2016** Irrigation Scheduling. 30 min. 32 contacts. Skagit County Agricultural Summit. Mt. Vernon, WA.
- 2/26/2016** Irrigation During Water Shortages. 30 min. 89 contacts. 34th Annual Western Washington Potato Workshop. Mt. Vernon, WA.
- 2/18/2016** Optimizing Irrigation Practices on Alkali Bee Beds. 20 min. 30 contacts. Alfalfa See Commission Annual Meeting. Prosser, WA.
- 2/11/2016** Irrigation Scheduling: Interaction of Timing and Amount. 40 min. 120 contacts. Washington Association of Wine Grape Growers. Kennewick, WA.
- 1/27/2016** Low Energy Precision Application and Low Energy Spray Application. 30 min. 84 Contacts. Hay Growers Association Meetings. Prineville, OR.
- 1/27/2016** Irrigation Water Management. 1 hr. 120 Contacts. Oregon Processed Vegetable Meetings. Albany, OR.
- 1/21/2016** Water and Irrigation Management for Grape Vines. 1 hr. 32 Contacts. Hort 421/521 Guest Lecture. Prosser, WA.
- 1/14/2016** Drip Irrigation System Maintenance, and Soil Moisture Sensors for Irrigation Scheduling. 45 minutes. 95 Contacts. Berry Crop Growers Meeting. Canby, OR.
- 1/13/2016** Irrigation Management and Irrigation Technology for Fresh Market Vegetable Production. 1.5 hrs. 120 Contacts. Vegetable Grower Meetings. Canby, OR.
- 1/12/2016** Advances in Irrigation Technology and Tools for Irrigation Scheduling. 20 min. 105 Contacts. Blueberry Council Workshop. Ellensburg, WA.
- 1/7/2016** Precision Irrigation Panel. 1 hr. 48 Contacts. Precision Ag. Expo. Kennewick, WA
- 12/10/2015** Low Elevation Spray Application. 20 min. 26 Contacts. United Ag Precision Irrigation Grower Presentation. Pasco, WA
- 12/9/2015** Low Elevation Spray Application. 20 min. 24 Contacts. United Ag Precision Irrigation Grower Presentation. Moses Lake, WA
- 12/2/2015** Tools for Practical Irrigation Scheduling. 30 min. 234 Contacts. Irrigation Management Workshop as a part of the Western Alfalfa and Forage Conference. Reno, NV.
- 12/1/2015** The effects of LESA on Mint Oil and Hay Yields. 20 min. 92 Contacts. Washington State Mint Convention. Kennewick, WA.
- 11/19/2015** Irrigation Management for Drought and Soil Surfactants. 45 min. 20 Contacts. Drought Preparedness Workshop put on the Bureau of Indian Affairs. Toppenish, WA.
- 11/17/2015** Irrigation Management in Vegetable Crops. 45 min. 68 Contacts. Pacific Northwest Vegetable Growers Association (PNVA) Irrigation Workshop. Kennewick, WA.
- 11/15/2015** Irrigation Management for Drought. 1.5 hrs. 68 Contacts. Tilt Producers Annual Conference. Spokane, WA.
- 11/10/2015** Testing Low Energy Spray Application (LESA) in the Pacific Northwest. 30 min. 95 Contacts. American Society of Agricultural and Biological Engineers (ASABE) and the Irrigation Association (IA) joint conference. Long Beach, CA
- 11/3/2015** LEPA vs. MESA on Mint. 20 min. 10 Contacts. Mint Research Report. Prosser,

- WA.
- 11/3/2015** Irrigation Management for Berries and Vegetables in a Water Short Year. 1 hr. 52 Contacts. McMinnville, OR
 - 10/27/2015** Irrigation Efficiency Using On-Farm Technology. 20 min. 108 Contacts. Columbia Basin Development League Annual Conference. Moses Lake, WA.
 - 10/15/2015** The Water-Energy-Food Nexus. 1 hr. 21 Contacts. BSYSE Seminar. Prosser, Pullman, Puyallup, Richland, WA.
 - 10/13/2015** Irrigation Management. 1.25 hrs. 45 Contacts. Asotin County Master Gardeners. Clarkston, WA.
 - 9/25/2015** Low Energy Precision Application (LEPA) and Low Energy Spray Application (LESA) vs. Mid Elevation Spray Application (MESA) in the Pacific Northwest. 1.5 hrs. 12 Contacts. Field trial results and field day. Mabton, WA.
 - 9/24/2015** Low Energy Precision Application (LEPA) and Low Energy Spray Application (LESA) vs. Mid Elevation Spray Application (MESA) in the Pacific Northwest. 1.5 hrs. 15 Contacts. Field trial results and field day. Pasco, WA.
 - 9/17/2015** Low Energy Spray Application for Water and Power Savings. 15 min. 29 Contacts. CPAAS Open House. Prosser, WA.
 - 9/17/2015** Simplified Irrigation Scheduling on Your Phone or Web Browser. 10 min. 62 Contacts. CPAAS Field Day. Prosser, WA.
 - 9/3/2015** Simplified Irrigation Management Options in the Pacific Northwest. 20 min. 12 Contacts. WERA-1022 Annual Meeting. Fort Collins, CO.
 - 8/14/2015** Chemigation and Irrigation Setup and Management for Grape Vines. 30 min. 60 Contacts. WSU Viticulture Field Day. Prosser, WA.
 - 7/22/2015** Irrigation Management Strategies for Drought. 30 min. 28 Contacts. WSU Agriculture and Natural Resources Symposium. Spokane, WA.
 - 7/14/2015** Simplified Irrigation Scheduling for Malting Barley. 20 min. 32 Contacts. Anheuser Busch Grower Field Days. Idaho Falls, ID.
 - 6/23/2015** Low Energy Precision Application (LEPA) and Simplified Irrigation Scheduling for Center Pivots. 1 hr. 40 Contacts. Valmont NW growers lunch. Sunnyside, WA.
 - 6/18/2015** Modified Alkali Bee Beds for Improved Habitat and Water Conservation. 15 min. 23 contacts. Alfalfa Seed Grower's Annual Conference. Touchet, WA.
 - 6/16/2015** Low Energy Precision Application (LEPA) for Conserving Water and Energy. 1 hr. 10 contacts. Washington Association of District Employees Training Conference. Leavenworth, WA.
 - 6/16/2015** Water Water Everywhere and Not a Drop to Spare. 1 hr. 35 contacts. Washington Association of District Employees Training Conference. Leavenworth, WA.
 - 6/2/2015** Benefits of LEPA on Mint. Mint Field Day. 15 min. 48 Contacts. Prosser, WA.
 - 5/27/2015** Soil and Water Interactions and Irrigation Scheduling for Small Farms. 1 hr. 8 Contacts. Recorded presentation for WSU Hort. Pullman, WA.
 - 5/14/2015** Careers in Math and Science. 52 Contacts. Elementary school children and parents. 2 hrs (multiple repeat of a 30 min presentation). Prosser, WA.
 - 4/23/2015** Irrigation Automation. 1 hr. 57 Contacts. Latino Farm Sustainability Series. Yakima, WA.
 - 4/8/2015** Deciding when to Irrigate. 2 hrs. 95 Contacts. Master Gardener Training. Richland, WA.
 - 3/14/2015** Irrigation Water Management. MG Spring Garden Day. 1 hr. Richland, WA.
 - 3/7/2015** Irrigation Equipment and Demonstration for Grapes. 2 hrs. 25 Contacts. Grape Camp. Prosser, WA.
 - 2/19/2015** Irrigation Water Outlook for 2015 and Irrigation Scheduling on Your Phones. 30 min. 32 Contacts. Clearwater Supply Pre-Season Grower Meeting. Othello, WA.

- 2/11/2015** Pivot Irrigation management, Drop Spacing, Sprinkler Head & Regulator Trials. 1 hr. 76 contacts. Annual Growers Meeting for the Kern Company. Kittitas, WA.
- 2/6/2015** Irrigation Management for Improved Profitability on Small Farms. 25 min. 28 Contacts. Latino Small Farms Conference. Yakima, WA.
- 1/15/2015** Nutrient Management Training Workshop. 40 minutes. 53 contacts. Irrigation Water Management. Sunnyside, WA.
- 1/14/2015** Irrigation of Timothy – The Balance Between Inadequate Irrigation and Denitrification. 30 min. 120 Contacts. Northwest Hay Expo. Kennewick, WA
- 1/7/2015** Irrigation Management for Western Washington Growers. 30 min. 83 Contacts. Lynden, WA.
- 12/4/2014** Simplified Irrigation Scheduling on your Phone or Web Browser. 30 min. 42 contacts. Washington Small Fruits Conference and Lynden Ag Show. Lynden, WA.
- 12/2/2014** Results from Low Energy Precision Application (LEPA) trials in the Pacific Northwest. 20 min. 112 contacts. Mint Convention. Pasco, WA.
- 11/20/2014** Simplified Irrigation on your Phone or Web Browser. 20 min. 35 contacts. Irrigation Association Annual Meeting. Phoenix, AZ.
- 11/19/2014** Efficacy of Boom Systems on Limiting Runoff from Center Pivots. 20 min. 28 Contacts. Irrigation Association Annual Meeting. Phoenix, AZ
- 10/31/2014** The Efficacy of Boombucks and Alternative Tillage on Reducing Dry Potato Hill Centers. 15 min. 32 contacts. Potato Research review. Moscow, ID.
- 10/10/2014** LEPA Field Day. 1.5 hrs. 19 contacts. North of Pasco, WA.
- 10/9/2014** LEPA Field Day. 1.5 hrs. 17 Contacts. Mabton, WA.
- 10/1/2014** The Yakima River Basin Ground Water Advisory Committee, Irrigation Work Group Progress. EPA CAFO Discussion Group. 30 min. 36 contacts. Yakima, WA.
- 9/15/2014** WSU Research and Extension Projects and Progress towards WERA-1022 Goals. 20 min. 17 contacts. WERA-1022 Annual Meeting. Orlando, FL.
- 9/5/2014** MS Excel Tips and Tricks for Scientists and Engineers. 1 hr. 30 contacts. BSYSE Seminar. Prosser, WA.
- 7/18/2014** Irrigation Scheduler Mobile. 30 min. 45 contacts. Anheuser Busch Barley Growers Field Day. Idaho Falls, ID.
- 6/10/2014** Irrigation Research and Extension as It Relates to Afghanistan. 1.5 hrs. 23 Contacts. Tour of Ministers and Water Professionals from Afghanistan. Prosser, WA.
- 5/21/2014** Water Scarcity, Irrigation Water use, Water Rights, and Irrigation District Organization and Governance. 30 min. 53 contacts. WSU Soils student field tour. Grand Coulee Dam, WA.
- 4/8/2014** Deciding When to Water. 130 Contacts. 2.5 hrs. Master Gardener Training. Kennewick, WA.
- 4/2/2014** Simplified Irrigation Scheduling on your Phone or Web Browser. 9 contacts. 1 hr. NRCS Webinar for Irrigation Management Specialists. Webinar.
- 3/14/2014** Soil-Water Interactions and Irrigation Planning. 56 Contacts. 1 hr. Irrigation Workshop. Bellingham, WA.
- 3/1/2014** Soil moisture sensors and irrigation equipment demonstration and field day. 2 hrs. 30 contacts. WSU Viticulture Certificate Program Grape Camp. Prosser, WA.
- 2/21/2014** Irrigation research projects at WSU. 20 min. 8 contacts. Water Quality Conference. Sunnyside, WA.
- 2/11/2014** Irrigation basics and Irrigation Scheduling Using Irrigation Scheduler Mobile. 2 hrs. 35 contacts. Kootenai Shoshone Soil and Water Conservation District Annual Meeting. Spokane, WA.

- 1/29/2014** Irrigation Equipment Calibration and Uniformity. Center Pivots on Potatoes. 30 min. 130 Contacts. Manitoba Potato Conference. Brandon, Manitoba, Canada.
- 1/23/2014** Irrigation Management for Hort. 421. Hort 421 guest lecture. 1.5 hrs. 21 Contacts. Prosser, WA
- 1/16/2014** Irrigation Scheduling and Monitoring. 60 min. 120 Contacts. Idaho Irrigation Equipment Show. Burley, ID.
- 11/14/2013** Irrigation Scheduling. 30 min. 68 Contacts. Grandview, WA.
- 11/6/2013** Simplified Irrigation Scheduling on Your Phone or Web Browser. 20 min. 59 Contacts. Austin, TX.
- 10/19/2013** Irrigation Management for Small Farms. 1 hr. 39 Contacts. Spokane, WA.
- 7/26/2013** Improved Water Management Methods for Cranberries. 15 min. 67 Contacts. Long Beach, WA.
- 7/10/2013** Irrigation Scheduler Mobile. 1 hr. 36 Contacts. Mt. Vernon, WA.
- 7/8/2013** Irrigation 101. 1.5 hrs. 19 Contacts. Olympia, WA.
- 6/28/2013** Water Management for Dairymen. 1 hr. 22 Contacts. Lynden, WA.
- 6/25/2013** Simplified Irrigation Scheduling on your Phone or Web Browser. 20 min. 8 Contacts. Austin, TX.
- 6/22/2013** Irrigation Water Management and Design. 1 hr. 16 Contacts. Leavenworth, WA.
- 5/22/2013** Low Energy Precision Application. A New Method of Irrigation for Center Pivots. 1 hr. 58 Contacts. Webinar.
- 5/14/2013** Efficacy of Soil Surfactants. 30 min. 15 Contacts. Medford, OR.
- 5/13/2013** Simplified Irrigation Scheduling on Your Phone or Web Browser. 30 min. 10 Contacts. Corvallis, OR.
- 5/6/2013** Irrigation Scheduling using Cloud Computing. 20 min. 6 Contacts. Richland, WA.
- 4/20/2013** Vine to Wine Workshop. 30 in. 38 Contacts. Prosser, WA.
- 3/21/2013** Principles of Irrigation. 30 min. 32 Contacts. Spokane, WA.
- 3/13/2013** Irrigation Training 101. 1 hr. 21 Contacts. Grandview, WA.
- 2/22/2013** Simplified Irrigation Scheduling on Your Phone or Web Browser. 30 min. 68 Contacts. Mt. Vernon, WA.
- 1/9/2013** Irrigation Scheduling in Kitsap County. 1.5 hrs. 26 Contacts. Bremerton, WA.
- 1/7/2013** Simplified Irrigation Scheduling on Your Phone or Web Browser. 20 min. 121 Contacts. Kennewick, WA.
- 1/6/2013** Center Pivot Irrigation Management and Irrigation Scheduling on Your Phone. 30 min. 53 Contacts. Ellensburg, WA.
- 12/18/2012** Doing Research Under Irrigation. 1 hr. WSU/OSU Irrigated Agriculture Extension Meetings. 12 contacts. Prosser, WA
- 12/4/2012** The Effects of Deficit Irrigation on Native Spearmint. 30 min. Washington Mint Convention. 140 contacts. Pasco, WA
- 11/27/2012** Effect of Booms on Center Pivot Infiltration and Runoff. 20 min. Potato Commission Research Review. 53 contacts. Pasco, WA
- 11/14/2012** Simplified Irrigation Scheduling on the Computer or Smart Phone. 30 min. Pacific Northwest Vegetable Growers Association Annual Meeting. 98 contacts. Kennewick, WA
- 11/6/2012** Yield and Water Use Efficiency of Deficit Irrigation on Native Spearmint. 20 min. Mint Research Commission Research Review. 13 contacts. Prosser, WA
- 10/3/2012** Update of the Washington Irrigation Guide. 1 hr. Entiat Watershed Planning Group. 10 contacts. Entiat, WA
- 10/2/2012** Irrigation Automation in an Apple Orchard. 15 min. CPAAS Sunrise Orchard Field Day. 123 contacts. Wenatchee, WA
- 9/27/2012** Irrigation Scheduler Mobile. Decreasing Water Use through Improved Irrigation Water Management. 30 min. Palouse Basin Water Summit. 183 contacts.

Moscow, ID

9/14/2012 Drip Irrigation for Home Lawns and Gardens. 1.5 hrs. Master Gardener Annual Meeting. 121 contacts. Pasco, WA

9/12/2012 Irrigation Research and Education at Washington State University. 3 hrs. Seminar and field demonstrations for Afghan Delegation. 18 contacts. Prosser, WA

8/30/2012 Simplified Irrigation Scheduling on the Go. 15 min. Onion Field Day. 112 contacts. Connell, WA

8/27/2012 Revisions to the Washington Irrigation Guide (WIG); Potential Impact on Water Right and Permitting Changes. 1.5 hrs. Water Law in Washington Conference. 84 contacts. Seattle, WA

8/1/2012 Update of Center Pivot Evaluation and Design (CPED) Tool. 20 min. ASABE Annual Conference. 65 contacts. Dallas, TX

7/27/2012 New Irrigation Management Tools for Cranberries. 2.5 hrs. Cranberry Grower Field Day. 95 contacts. Long Beach, WA

7/6/2012 Irrigation Extension Efforts at Washington State University. Seminar. 8 Contacts. Logan, UT

6/28/2012 Simplified Irrigation Scheduling Tools. 15 min. Potato Field Day. 120 Contacts. Othello, WA

6/12/2012 Irrigation Scheduling. 1.5 hrs. Washington Association of District Employees Annual Conference. 6 contacts. Leavenworth, WA

6/11/2012 Simplified Irrigation Scheduling. 30 min. Berry Growers Breakfast. 23 Contacts. Mt. Vernon, WA.

6/9/2012 Irrigation of Grapes. 2 hrs. Grape Camp. 38 Contacts. Prosser, WA

6/7/2012 Simplified Irrigation Scheduling. 20 minutes. Grape Grower's Breakfast. 12 Contacts. Prosser, WA

6/6/2012 Water Stress for Improved Profits in Spearmint. 20 min. Washington State Mint Grower's Field Day. 94 Contacts. Prosser, WA

6/5/2012 Irrigation Management in Washington State. 30 min. WERA1022 Annual Meeting. 16 Contacts. St. Louis, MO.

4/27/2012 Irrigation Scheduling for Power Savings. 1 hr. Benton REA Meeting. 6 Contacts. Prosser, WA

4/19/2012 Irrigation Scheduling. 2 hrs. Whatcom County Irrigation Conference. 59 Contacts. Lynden, WA

4/16/2012 Revised Irrigation Water Requirements for Washington State. 1 hr. WA Dept. of Ecology Water Resources Advisory Committee. 29 Contacts. Lacey, WA

2/29/2012 Consumptive Use and Irrigation Water Requirements for Washington. 1 hr. Columbia River Policy Advisory Group Meeting. 45 Contacts. Lacey, WA

2/17/2012 Water and Agriculture in the West, Now and In the Future. 1 hr. BSysE Seminar. 59 Contacts. Pullman, WA

2/8/2012 Irrigation Management and Drip Irrigation for Lawns and Gardens. 1 hr. Master Gardeners Training. 75 Contacts. Yakima, WA

1/31/2012 Irrigation of Cranberries. 15 min. Cranberry Winter Grower's Meeting. 57 Contacts. Raymond, WA

1/24/2012 Irrigation of Grapevines. 1.5 hrs. Hort 521 Lecture. 20 Contacts. Prosser, WA

1/23/2012 Consumptive Use and Irrigation Water Requirements for Washington State. 30 min. NRCS State Technical Advisory Committee Review. 32 Contacts. Spokane, WA

12/20/2011 Extension Irrigation at Washington State University. 15 min. Irrigated Ag. Research and Extension Coordination Meeting. 14 Contacts. Hermiston, WA.

12/7/2011 Irrigation Scheduling with Kanschd. 30 min. Yakama Nation Water Quality

- 12/6/2011** Improvement Program. 26 Contacts. Toppenish, WA
Deficit Irrigation of Mint for Improved Profitability. 20 min. WA Mint Convention. 120 Contacts. Pasco, WA.
- 11/29/2011** Sensors for Plant Water Status and Precision Irrigation. 12 min. WA State Tree Fruit Technology Research Review. 18 Contacts. Ellensburg, WA.
- 11/17/2011** Irrigation Management for Energy Efficiencies. 30 min. NEEA Agricultural Irrigation Road Map and Market Strategies for Energy Efficiency. 22 Contacts. Walla Walla, WA.
- 11/10/2011** Revised Crop Coefficients for Washington State. 2 hrs. Washington State Department of Ecology. Yakima, WA
- 11/3/2011** Water Limitation Panel. 1 hr. Water in the Columbia Basin: Sharing a Limited Resource. 97 Contacts. Stevenson, WA
- 11/1/2011** Improved Profitability for Mint Growers through Deficit Irrigation. 20 min. WA Mint Review. Prosser, WA.
- 8/23/2011** Irrigation Scheduling for the Yard and Garden. 1 hr. Master Gardener Advanced Education Course. 35 Contacts. Ocean Shores, WA.
- 7/30/2011** Irrigation Management for Corn. 30 min. OSU Corn Field Day. 58 Contacts. Hermiston, OR.
- 7/28/2011** Development of Crop Coefficients for Washington. 30 min. WERA 202 Annual Meeting. 10 Contacts. Prosser, WA
- 7/28/2011** Water Use and Irrigation in Washington State. 30 min. WERA 202 Annual Meeting. 8 Contacts. Prosser, WA
- 6/14/2011** Agricultural Drip Irrigation System Design. 1 hr. Washington Association of Conservation District Employees Annual Training Meeting. 12 Contacts. Leavenworth, WA
- 6/11/2011** Soil Moisture Sensors and Irrigation Management. 1.5 hrs. Viticulture and Enology Certificate Program Grape Camp. 50 Contacts. Prosser, WA
- 6/7/2011** Timing and Degree of Water Stress in Native Spearmint. 20 min. Washington State Mint Commission. 58 Contacts. Prosser, WA
- 5/4/2011** The Role of Irrigation and Dams in Your Life. 5 hrs. Salmon Summit. 229 Contacts. Kennewick, WA
- 5/3/2011** The Role of Irrigation and Dams in Your Life. 5 hrs. Salmon Summit. 283 Contacts. Kennewick, WA
- 4/16/2011** Irrigation Management for Small Farms. 1.5 hrs. Inland Northwest Small Farms Conference. 12 Contacts. Spokane, WA
- 3/7/2011** Irrigation and Soils. 1 hr. Whitstran Elementary School Presentation. 60 Contacts. Prosser, WA
- 3/1/2011** A Multi-Modal Image Sensor System for Identifying Water Stress in Grape Vines. 25 min. Washington Grape Society Research Review. 22 Contacts. Richland, WA
- 2/25/2011** Use of Kanasched for Irrigation Scheduling. 30 min. Western Washington Potato Conference. 85 Contacts. Mt. Vernon, WA
- 2/23/2011** Irrigation Technology Skills Panel. 2 hrs. Walla Walla Community College and Central Washington University. 8 Contacts. Ellensburg, WA
- 2/23/2011** Center Pivot Irrigation Management. 1 hr. Kern Company Grower Education Event. 62 Contacts. Kittitas, WA
- 2/18/2011** Irrigation and Water Management in the Vineyard (partially translated to Spanish). 3 hrs. Latino Viticulture Education. 35 Contacts. Grandview, WA
- 2/17/2011** Irrigation Scheduling and Soil Moisture Monitoring in the Vineyard. 1.5 hrs. WSU Tri-Cities Viticulture Class Presentation. 12 Contacts. Richland, WA
- 2/10/2011** Irrigation Scheduling and Soil Moisture Monitoring in the Vineyard (in Spanish). 1

- hr. Washington Association of Wine Grape Growers Annual Conference and Trade Show. 123 Contacts. Kennewick, WA
- 2/9/2011** Irrigation Scheduling and Soil Moisture Monitoring in the Vineyard. 30 min. Washington Association of Wine Grape Growers Annual Conference and Trade Show. 205 Contacts. Kennewick, WA
- 2/2/2011** Practical Irrigation Systems and Management for Small Acreages. 1 hr. 2011 PNW Farm Forum Seminars as a part of the Spokane Ag. Expo. 45 Contacts. Spokane, WA
- 1/28/2011** The Use of Kanschled for Potato Irrigation Scheduling. 25 min. WA-OR Potato Conference. 123 Contacts. Kennewick, WA
- 12/8/2010** A Review of Irrigation Control and Automation Technologies. 15 min. ASABE/IA Meeting. 53 Contacts. Phoenix, AZ
- 12/7/2010** Impact of Sustained Deficit Irrigation on Peppermin Hay and Oil Yields. 30 min. Washington Mint Convention. 115 Contacts. Kennewick, WA
- 12/7/2010** Status of Microsprinkler System Design, Operation, and Maintenance in 2010. 15 min. ASABE/IA Meeting. 73 Contacts. Phoenix, AZ
- 12/6/2010** Irrigation Research and Outreach in Skagit County. 1 hr. Western Washington Agricultural Retreat. 16 Contacts. Mt. Vernon, WA
- 12/6/2010** Subsurface Drip Irrigation: Status of the Technology in 2010. 15 min. ASABE/IA Meeting. 87 Contacts. Phoenix, AZ
- 12/5/2010** Evaluation of yield quantity and quality of two oil crops in the promotion of sustained deficit irrigation in the Pacific Northwest. 15 min. ASABE/IA Meeting. 45 Contacts. Phoenix, AZ
- 12/2/2010** Practical and User Friendly Management Tools for Irrigation Management. 1 hr. Grape Fieldman's Breakfast. 16 Contacts. Prosser, WA
- 11/8/2010** Canola Yield and Quality Response to Deficit Irrigation and Different Nitrogen Levels. 3 hrs. Bioenergy Research Symposium. 161 Contacts. Seattle, WA
- 11/4/2010** Water and Irrigation in Washington. 2.5 hrs. CEREO Water Forum. 68 Contacts. Spokane, WA
- 10/26/2010** Water Stress for Improved Profits in Spearmint. 20 min. Research Review. 12 Contacts. Prosser, WA
- 9/17/2010** Revised Irrigation and Water Use Estimates for the State of Washington. 1 hr. Research Review. 8 Contacts. Yakima, WA
- 9/16/2010** Water Management and Project Activities in Washington State. 30 min. Western States Irrigation Technical Information Exchange. 14 Contacts. Hood River, OR
- 6/24/2010** Irrigation Management and Uniformity in Potatoes. 4 hrs. Irrigation Uniformity and Management Workshop. 12 Contacts. Othello, WA
- 6/11/2010** Irrigation Uniformity and Management in Cranberries. 6 hrs. Irrigation Uniformity and Management in Cranberries. 27 Contacts. Long Beach, WA
- 6/10/2010** Irrigation Uniformity and Management in Cranberries. 6 hrs. Irrigation Uniformity and Management in Cranberries. 21 Contacts. Grayland, WA
- 6/5/2010** Irrigation Management for Wine Grapes. 2 hrs. Grape Camp. 34 Contacts. Prosser, WA
- 6/1/2010** Deficit Irrigation of Spearmint and Peppermint. 15 min. Mint Field Day. 32 Contacts. Prosser, WA
- 5/18/2010** Irrigation Efficiency and Uniformity. 8 hrs. Irrigation Efficiency and Uniformity Workshop. 21 Contacts. Mattawa, WA
- 5/5/2010** Irrigation, Dams, and Salmon. 5 hrs. Salmon Summit (2nd day). 386 Contacts. Kennewick, WA
- 5/4/2010** Irrigation, Dams, and Salmon. 5 hrs. Salmon Summit. 412 Contacts. Kennewick, WA

- 1/28/2010** What is Poor Irrigation Distribution Uniformity, What It Looks Like, How It is Determined, and Its Horrendous Cost. 30 min. Washington Potato Conference. 168 Contacts. Pasco, WA
- 1/19/2010** Efficacy of Soil Surfactants. 45 min. Wilbur Ellis Crop Consultants Training Workshop. 95 Contacts. Pasco, WA
- 1/15/2010** The Importance of Sprinkler Uniformity for Chemigation. 1 hr. Wilbur Ellis Crop Consultants Training Workshop. 208 Contacts. Pasco, WA
- 1/14/2010** Irrigation Math. 45 min. 3rd Annual Basin Producers Pesticide Recertification Day. 38 Contacts. Moses Lake, WA
- 1/14/2010** When to Stop Irrigation Mint, Wheat, and Corn. 30 min. Columbia Basic Crop Consultants Association. 82 Contacts. Moses Lake, WA
- 12/16/2009** Extension Irrigation Education Programs in Washington. 15 min. Irrigated Agriculture Research and Extension Update Meetings. 35 Contacts. Prosser, WA
- 12/8/2009** Soil Penetrants. 1 hr. Far West Agribusiness Association Training Meeting. Contacts. Pasco, WA
- 11/10/2009** Irrigation Training Workshop. 4 hrs. Pacific Northwest Vegetable Association Irrigation Training Workshop. 25 Contacts. Kennewick, WA
- 11/5/2009** Expert Panel Member for "Intersection of Economics, Land Use, and Resources". 10 min. Water and Land Use in the Pacific Northwest: Integrating Communities and Watersheds. 70 Contacts. Stevenson, WA
- 11/5/2009** Updated Consumptive Use and Irrigation Water Requirement Estimates for Washington. 25 min. Water and Land Use in the Pacific Northwest: Integrating Communities and Watersheds. 78 Contacts. Stevenson, WA
- 11/3/2009** Response of Mint Oil Yields, Weeds, and Pests to Deficit Irrigation. 20 min. Mint Research Review. 10 Contacts. Prosser, WA
- 10/23/2009** Water and Agriculture in the West. Now and Into the Future. 1.25 hrs. Washington State University Biological Systems Engineering Seminar. 52 Contacts. Pullman, WA
- 10/13/2009** Bioenergy Tour. 3 hrs. PNW Section of the ASABE Annual Meeting and Tour. 15 Contacts. Prosser, WA
- 9/17/2009** Irrigation Water Management (IWM) Online Experience and Issues. 20 min. IWM Online progress and evaluation. 12 Contacts. Coupeville, WA
- 8/27/2009** Efficacy of soil surfactants in Onions. 15 min. Onion Field Day. 35 Contacts. Quincy, WA
- 7/30/2009** Distribution Uniformity and Efficiency. 7 hrs. Irrigation System Evaluation Workshop. 18 Contacts. Pasco, WA
- 7/28/2009** Distribution Uniformity and Efficiency. 7 hrs. Irrigation System Evaluation Workshop. 29 Contacts. Othello, WA
- 7/21/2009** Irrigation Management in the Pacific Northwest States. . Region 10 National SCREES Water Quality Review. 12 Contacts. Spokane, WA
- 7/16/2009** Distribution Uniformity and Efficiency. 7 hrs. Irrigation System Evaluation Workshop. 7 Contacts. Quincy, WA
- 7/14/2009** Distribution Uniformity and Efficiency. 7 hrs. Irrigation System Evaluation Training and Workshop. 23 Contacts. Prosser, WA
- 7/2/2009** Switchgrass Biofuel and Forage Field Day. 30 min. Roza Research Farm. 23 Contacts. Prosser, WA
- 6/26/2009** Irrigation Uniformity and Efficiency. 2 hrs. Othello Potato Field Day. 25 Contacts. Othello, WA
- 6/23/2009** Consumptive Use and Irrigation Water Requirements for Washington. 15 min. ASABE Annual Conference. 38 Contacts. Reno, NV
- 5/13/2009** Irrigation. 5 hrs. Salmon Summit (2nd day). 402 Contacts. Kennewick, WA

5/12/2009 Irrigation. 5 hrs. Salmon Summit. 378 Contacts. Kennewick, WA
4/7/2009 Irrigation Management for the Yard and Garden. 2 hrs. Yakima Co. Master Gardeners. 65 Contacts. Yakima, WA
4/7/2009 Irrigation Management for the Yard and Garden. 2 hrs. Benton-Franklin Master Gardeners. 120 Contacts. Kennewick, WA
4/2/2009 The efficacy of soil surfactants. 1 hr. Columbia Basin Crop Consultants. 25 Contacts. Moses Lake, WA
2/21/2009 Irrigation Field Demonstration. 1.5 hrs. Western Washington Viticulture Field Day. 70 Contacts. Mt Vernon WA
2/21/2009 Irrigating and Soil Moisture Monitoring for Grapes in Western Washington. 45 min. Western Washington Viticulture Workshop. 70 Contacts. Mt. Vernon, WA
2/20/2009 Irrigation Potatoes and Soil Moisture Monitoring in Western Washington. 45 min. Western Washington Potato Conference. 8 Contacts. Mt. Vernon, WA
2/17/2009 Irrigation for Advanced Viticulture. 1.5 hrs. Guest Lecture for Advanced Viticulture in Tri-Cities. Contacts. Richland, WA
2/8/2009 Regional irrigation Education Website for the Pacific Northwest. 15 min. USDA-CSREES National Water Quality Conference. 8 Contacts. St. Louis, MO
2/3/2009 The Effect of Deficit Irrigation on Mint. 20 min. Washington Mint Commission Research Meeting. 60 Contacts. Prosser, WA
2/4/2009 Water Needs and Irrigation Timing of Green Peas. 30 min. Green Pea and Alternate Crops Workshop. 33 Contacts. Milton Freewater, OR
2/3/2009 The Basics of Irrigation Management. 1 hr. Blue Mountain Horticultural Society Annual Meetings. 45 Contacts. Milton Freewater, OR
1/20/2009 Extension Irrigation Education in Washington. 12 min. PNW Extension Irrigation. 9 Contacts. Seattle, WA
1/19/2009 Center Pivot Irrigation. 1.5 hrs. Valmont Grower Center Pivot Training. 28 Contacts. Sunnyside, WA
1/15/2009 Practical Surface Irrigation Management. 30 min. Yakama Nation Environmental Management Seminar. 30 Contacts. Toppenish, WA
1/14/2009 Irrigation Math. 30 min. Wilbur Ellis Crop Consultants Training Workshop. 38 Contacts. Pasco, WA
12/9/2008 Irrigation Math: How to "Figure" the Answers to Commonly Asked Questions. 1 hr. Columbia Basin Crop Consultants Association Winter Conference. 53 Contacts. Kennewick, WA
12/9/2008 Calculating Chemigation Injection Rates. 1 hr. Columbia Basin Crop Consultants Association Winter Conference. 25 Contacts. Kennewick, WA
11/20/2008 Drip Irrigation for Agriculture. 1 hr. Focus on Farming Conference. 28 Contacts. Lynden, WA
11/19/2008 Irrigation Management for Vegetable Crops. 30 min. Pacific Northwest Vegetable Growers Association Meeting. 118 Contacts. Kennewick, WA
11/5/2008 Will Wetter Water Make Fatter Wallets? The Use of Surfactants with Irrigation Water on Agricultural Fields. 20 min. Irrigation Association International Annual Meeting. 49 Contacts. Anaheim, CA
11/4/2008 Response of Mint Oil Yields, Weeds and Pests to Deficit Irrigation. 15 min. Mint Research Review. 10 Contacts. Prosser, WA
11/3/2008 Boom-Type Carts vs. Big-Guns in Northwestern Washington. 20 min. Irrigation Association International Annual Meeting. 38 Contacts. Anaheim, CA
10/17/2008 Growers and Water Management. 30 min. Soil and Water Conservation Society. 12 Contacts. Ellensburg, WA
9/25/2008 Irrigation Research Program Overview. 15 min. Biological Systems Engineering Department. 12 Contacts. Pullman, WA

- 9/18/2008** Mint and alfalfa yield and water use efficiency under sustained deficit irrigation. 20 min. United States Commission on Irrigation and Drainage Meeting. 35 Contacts. Portland, OR
- 9/18/2008** Irrigation Energy Efficiency. 30 min. Energy and Water Workshop. 25 Contacts. Walla Walla, WA
- 9/15/2008** An Irrigation Extension Education Multi-state Website. 1 hr. USDA CSREES Regional Water Quality Meeting. 8 Contacts. Seattle, WA
- 9/11/2008** Yield Impact from Sustained Deficit Irrigation of Alfalfa and Mint. 20 min. PNW ASABE Meeting. 21 Contacts. Boise, ID
- 9/8/2008** Irrigation Research and Extension Programs in Washington State. 30 min. Western States Irrigation Technical Exchange. 15 Contacts. Boise, ID
- 9/4/2008** The Whys and Hows of Irrigation Water Management. 1 hr. Crop Consultants Group. 15 Contacts. Moses Lake, WA
- 8/28/2008** Is Wetter Water Better? A Study of Soil Surfactants. 15 min. Onion Field Day. 83 Contacts. Pasco, WA
- 7/31/2008** Irrigation Water Management. 1.25 hrs. Columbia Basin Crop Consultants Meeting. 25 Contacts. Pasco, WA
- 7/17/2008** Washington State Report for WERA-202. 30 min. WERA 202. 18 Contacts. Bushland, TX
- 7/10/2008** Drip irrigation of cucumbers underneath plastic mulch. 15 min. Vegetable, Grape, and Berry Farmer Field Day. 180 Contacts. Mount Vernon, WA
- 7/9/2008** Drip Irrigation Management in Northwestern Washington. 1 hr. Berry and Vegetable Grower Seminar. 8 Contacts. Mount Vernon, WA
- 6/29/2008** Canopy Temperature Sensors on Center Pivots for Irrigation Scheduling and Crop Mapping. 20 min. ASABE Annual Meetings. 60 Contacts. Providence, RI
- 6/17/2008** Irrigation Management and Efficiencies. 1.5 hrs. Washington Association of Conservation District Employees Annual Training Meeting. 25 Contacts. Leavenworth, WA
- 6/17/2008** WSU Research, On-line tools & Irrigation management of Wheel-lines, Center pivots, and Rill irrigation. 1.5 hrs. Washington Association of Conservation District Employees Annual Training Meeting. 12 Contacts. Leavenworth, WA
- 6/14/2008** Irrigation Systems, Irrigation Management and Soil Moisture Monitoring Equipment for Wine Grapes. 2 hrs. Vine to Wine. 18 Contacts. Prosser, WA
- 6/4/2008** Surge Irrigation Demonstration Project. 3 hrs. Yakama Nation. 12 Contacts. Harrah, WA
- 6/4/2008** Mint Field Day. 3 hrs. Washington Mint Commission. 93 Contacts. Prosser, WA
- 5/12/2008** Water for Salmon and Agricultural Irrigation. 4 hrs. Salmon Summit. 225 Contacts. Benton City, WA
- 4/12/2008** Grapevine Irrigation. 30 min. Viticulture Certification Training on Water Management. 100 Contacts. Prosser, WA
- 4/8/2008** Irrigation Management for Hand-lines and Wheel-lines. 1 hr. Irrigation Training. 8 Contacts. Prosser, WA
- 3/28/2008** WSU Academic Showcase. 1 hr. Washington State University. 67 Contacts. Pullman, WA
- 3/12/2008** Soils and Irrigation Management in Yakima. 4 hrs. Master Gardener Training. 80 Contacts. Yakima, WA
- 3/11/2008** Irrigation Management and Soils in the Tri-Cities Area. 4 hrs. Master Gardener Training. 120 Contacts. Richland, WA
- 2/25/2008** Drip Irrigation Field Day Demonstration. 15 min. Field Day. 15 Contacts. Mt. Vernon, WA
- 2/25/2008** Drip Irrigation for Northwestern Washington. 2 hrs. Western Washington Berry

- Growers. 28 Contacts. Mount Vernon, WA
- 2/22/2008** Comparison of Boom-Type Carts with Big-Gun Irrigation Systems in Skagit and Whatcom Counties. 20 min. Western WA, Potato Commission. 78 Contacts. Mount Vernon, WA
- 2/11/2008** An Online Irrigation Advisory Service for Improved Irrigation Water Management. 15 min. Conservation District Training Seminar. 5 Contacts. Waterville, WA
- 2/7/2008** Potato Irrigation and Center Pivots. 30 min. Washington State Potato Commission. 182 Contacts. Moses Lake, WA
- 1/29/2008** Why and How to Monitor Trends in Soil Moisture. 25 min. Washington Tree Fruit School. 186 Contacts. Wenatchee, WA
- 12/14/2007** Irrigation in Washington. 2 hrs. CBC Student presentation and tour. 4 Contacts. Prosser, WA
- 12/6/2007** Irrigation automation using infrared temperature sensors. 20 min. Washington Tree Fruit Research Commission Technology Committee. 17 Contacts. Wenatchee, WA
- 12/4/2007** Mint oil yields, weeds and pests under deficit irrigation. 20 min. Washington Mint Growers Association Annual Convention. 35 Contacts. Pasco, WA
- 11/29/2007** Big guns vs. boom system evaluations in Skagit County. 1 hr. Focus on Farming Conference in Snohomish County. 40 Contacts. Lynnwood, WA
- 11/15/2007** Irrigation principles and system comparisons. 1 hr. Small acreage management workshop. 40 Contacts. Ellensburg, WA
- 11/7/2007** Irrigation in Washington. 2 hrs. PNW Water Quality Conference: Moving Science and Policy into Action. 22 Contacts. Stevenson, WA
- 9/19/2007** Irrigation research at WSU. 15 min. Western States Irrigation Technical Exchange Meeting. 15 Contacts. Ontario, OR
- 9/14/2007** Comparison of the performance and economics of boom-type carts with big-gun irrigation systems in northwest Washington. 20 min. PNW ASABE meeting presentation. 25 Contacts. Moscow, ID
- 9/6/2007** Comparison of boom-type carts with big-gun irrigation systems in Skagit and Whatcom Counties. 2.5 hrs. WSU and Benaroya Hall: In concert with communities. 25 Contacts. Seattle, WA
- 8/23/2007** Irrigation research at WSU. 15 min. Onion Field Day. 45 Contacts. Patterson, WA
- 6/5/2007** Mint oil yields, weeds and pests under deficit irrigation. 15 min. Mint Growers Research Field Day. 26 Contacts. Prosser, WA
- 5/2/2007** Irrigation: What you need to know. 4 hrs. Yakima County Master Gardeners. 55 Contacts. Yakima, WA
- 5/1/2007** Irrigation: What you need to know. 4 hrs. Benton and Franklin County Master Gardeners. 85 Contacts. Richland, WA
- 3/10/2007** Irrigation and Water Quality. 2 hrs. Grant and Adams County Master Gardeners. 16 Contacts. Moses Lake, WA
- 2/23/2007** Potato Irrigation in Skagit County. 1 hr. Western Washington Potato Workshop. 82 Contacts. Mt. Vernon, WA
- 2/22/2007** Irrigation System Comparison. 20 min. National Grape Growers Association. 18 Contacts. Wapato, WA
- 2/22/2007** Irrigation System Comparison. 20 min. National Grape Growers Association. 23 Contacts. Grandview, WA
- 2/21/2007** Irrigation System Comparison. 20 min. National Grape Growers Association. 29 Contacts. Wapato, WA
- 2/20/2007** Thermal Infrared for Irrigation Scheduling. 20 min. Info Ag Conference. 43 Contacts. Kennewick, WA
- 2/14/2007** Efficient Irrigation of Corn. 30 min. Monsanto annual corn growers meeting. 35

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| | Contacts. Moses Lake, WA |
| 1/26/2007 | Irrigation Management for Improved Profitability. 20 min. Annual Columbia Basin Crop Consultant's Association Meeting. 75 Contacts. Moses Lake, WA |
| 1/17/2007 | Practical Guidelines for Center Pivot Management. 30 min. Washington State Hay Growers Association Annual Conference and Trade Show "Putting the Pieces Together. 63 Contacts. Pasco, WA |
| 1/11/2007 | Surface Irrigation Management. 30 min. Sustaining Productive Soils Seminar and Workshop for the Yakama Nation. 83 Contacts. Toppenish, WA |
| 12/15/2006 | Center Pivot Irrigation Management. 30 min. Agri-Northwest Farm Managers Seminar. 30 Contacts. Prosser, WA |
| 12/5/2006 | Chemigation and Irrigation in Small Fruits. 30 min. Berry Grower's Workshop. 120 Contacts. Linden, WA |
| 11/16/2006 | Managing Irrigation to Avoid Abiotic/Biotic Crop Problems. 30 min. Pacific Northwest Vegetable Growers Association Meeting. 76 Contacts. Pasco, WA |
| 11/15/2006 | Irrigation Management for Improved Profitability. 30 min. Pacific Northwest Vegetable Growers Association Meeting. 145 Contacts. Pasco, WA |
| 11/12/2006 | Irrigation Fundamentals. 1.5 hrs. Tilth Producer's Conference. 45 Contacts. Vancouver, WA |
| 11/2/2006 | Irrigation Efficiencies. 30 min. Bureau of Indian Affairs. 45 Contacts. Toppenish, WA |
| 11/2/2006 | Deficit Irrigation of Spearmint and Peppermint. 30 min. Washington State Mint Commission. 9 Contacts. Prosser, WA |
| 10/11/2006 | NRCS Irrigation Engineering Technology Transfer Meeting. 20 min. Irrigation Research at WSU. 9 Contacts. Prosser, WA |
| 9/15/2006 | Irrigation in Washington. 1 hr. Biological Systems Engineering Seminar. 43 Contacts. Pullman, WA |
| 9/14/2006 | Infrared Based Automatic Irrigation Control Systems. 30 min. Washington Tree Fruit Research Commission. 23 Contacts. Ellensburg, WA |
| 8/1/2006 | Irrigation Extension. 15 min. Clearwater Supply Customer Appreciation Meeting. 32 Contacts. Ephrata, WA |
| 6/26/2006 | Washington Progress Towards ET Based Irrigation Scheduling. 30 min. Climatic Data Applications in Irrigation Scheduling and Water Conservation Meeting (WERA 202). 22 Contacts. Fargo, ND |
| 5/11/2006 | Irrigation Extension. 30 min. Grape Fieldperson's Breakfast. 15 Contacts. Prosser, WA |
| 5/4/2006 | Center Pivot Irrigation Management. 1 hr. Columbia Basin Crop Consultants Association. 9 Contacts. Moses Lake, WA |
| 4/29/2006 | Irrigation. 1 hr. Ferry County Irrigation and Water Resources Workshop. 32 Contacts. Republic, WA |
| 4/27/2006 | Irrigation. Water Management Tips and Tricks for Consultants.. 1 hr. Lower Columbia Basin Fieldman's Association. 8 Contacts. Pasco, WA |
| 4/18/2006 | Irrigation Extension. Introduction to extension programs. 15 min. Roza-Sunnyside Board of Joint Control Meeting. 24 Contacts. Sunnyside, WA |

Organized Outreach Demonstration Projects and Workshops

- **Large Scale LEPA Demonstration Project.** Worked with University of Idaho and Bonneville Power Administration to demonstrate low energy precision application (LEPA) technology on center pivots in WA, ID, OR, and NV. This was

a multi-year project throughout the above states. Sections of these pivots were converted to LEPA to show the growers that it is a viable technology and to demonstrate the water and pumping power savings, as well as the decreased losses to wind drift and improved yields when water supplies are limited. Thus far we have converted a section of 14 different pivots in Washington, 6 in Idaho, 4 in Nevada, and 7 in Oregon. This is a multi-year, ongoing project and is having a huge impact especially in areas that are water short like central Oregon, Nevada, northern Washington, northern California, and the Snake River plain of Idaho. The pivot dealers have reported that they have received requests to convert 60 pivots to LESA or LEPA in Idaho, 52 in Oregon and Northern California, and 12 in Washington state. Pivot sprinkler companies like Nelson Irrigation and Senninger have changed their advertising and outreach to focus on LEPA/LESA as they see the huge demand for that in the Pacific Northwest into the future. Based on our research results it is reasonable to save 52 acre-ft of water (17 million gallons), 20,000 kwh of pumping energy, and \$1,870 in pumping costs per pivot. Based on the pivots converted thus far that results in *2.5 Megawatts of electricity, 6,400 acre-ft of water, and \$230,000 in pumping energy costs conserved per year in the Pacific Northwest*. These savings are recurring and based on our feedback thus far we expect the LEPA/LESA movement to expand in the future.

- **LEPA Field Days.** Organized, advertised, and held two different field days to demonstrate LEPA and LESA irrigation methods at grower's fields. This was done in both 2014 *and* in 2015. One was held near Mabton, and the other was held north of Pasco. These were well attended by center pivot dealers and sprinkler manufacturers as well as by growers.
- **Surge Irrigation Demonstration Project.** Worked with the Yakima Nation to purchase, install, and set-up surge irrigation on a growers field near Harrah, WA. Held a field day to demonstrate this technology and how it . 3 hrs. 12 attendees.
- **Drip Irrigation Demonstration Project.** Purchased and installed a drip irrigation system on vegetables in Western Washington. This included soil moisture sensors. Held a field day that was attended by Western Washington growers to demonstrate this technology. 1.25 hrs. 182 attendees.
- **Evaluation of Simple Irrigation Scheduling Aids.** Purchased, installed and evaluated atmometers (ET-gauges) over two seasons. This was compiled into an extension publication. Also did careful irrigation scheduling using Kanschd in a local grower's pasture over two seasons to evaluate the effectiveness and user friendliness of these tools. The results were presented in seminars during regularly scheduled commodity commission meetings.
- **Irrigation System Evaluations.** Worked with the Yakima Conservation District to do surface, center pivot, and hand-line sprinkler irrigation systems. These were done free of charge and the results were provided back to the growers. 6 grower fields were evaluated comprising about 260 acres.
- **Big Guns vs. Booms.** Obtained funding for, and did efficiency and uniformity evaluations of big-gun and boom irrigation systems in Western Washington. Comparisons were done and the economics of converting due to energy savings

alone were calculated. The results were presented during a regularly scheduled potato commission and a local grower meeting. 45 min. 118 total attendees.

- **Washington Consumptive Use and Irrigation Water Requirements.** Worked with the Washington State Natural Resource Conservation Service office as well as the Washington State Department of Ecology to re-work the Washington consumptive use and irrigation water requirement estimates. We are also re-working and compiling update crop coefficients for the state. Ecology has requested that we don't publish the results until the crop coefficient work is done.
- **Regional Evaluation of a Web-Based Irrigation Advisory Service.** Worked with 15 different growers throughout the state to implement and evaluate a web-based irrigation advisory service over two years. The results were presented during regularly scheduled meetings, and provided back to the developers.
- **Irrigated Switchgrass, Giant Reed, and Canola for Biofuels.** Helped organize a field day where we demonstrated the advantages, disadvantages, challenges, and potential yields and returns of irrigation switchgrass, giant reed, and canola for biofuel production. Approximately 1.5 hours. 23 attendees.
- **Irrigation Efficiency and Uniformity Workshop for Hop Growers on Drip Irrigation.** Worked with the Washington State Department of Agriculture and the National Resource Conservation Service to put on a whole-day education and hands-on demonstration workshop of why it is important, and how to do a uniformity evaluation on drip irrigation in hop fields. Held in Prosser. 7 hours. 23 attendees.
- **Irrigation Efficiency and Uniformity Workshop for Potato Growers on Center Pivots.** Worked with the Washington State Department of Agriculture and the National Resource Conservation Service to put on a whole-day education and hands-on demonstration for potato growers of why it is important, and how to do a uniformity evaluation on center pivots. *Six different workshops* on this same subject were held in Othello (twice), Mattawa, Pasco (twice), and Quincy. 7 hours each. 101 total attendees.
- **Irrigation Efficiency and Uniformity Workshop for Cranberry Growers on Solid Set.** Worked with the Washington State Department of Agriculture and the National Resource Conservation Service to put on a whole-day education and hands-on demonstration for cranberry growers of why it is important, and how to do a uniformity evaluation on solid set sprinkler irrigation systems. This was done in *two different locations* (separate workshops), Grayland, and Long Beach. 6 hours each. 48 total attendees.

Graduate Students Advised

| <u>Student</u> | <u>Degree</u> | <u>Mir Advisor</u> | <u>Department</u> | <u>Start</u> | <u>Graduation</u> |
|-----------------------|----------------------|---------------------------|--------------------------|---------------------|--------------------------|
| Anjela Begmatova | Masters | R.T. Peters | BSysE | 2006 | May-08 |
| Tamara Mobbs | Masters | R.T. Peters | BSysE | 2008 | May-10 |
| Tina Karimi | Masters | R.T. Peters | BSysE | 2010 | Dec-11 |
| Romulus Okwany | Ph.D. | R.T. Peters | BSysE | 2007 | Dec-11 |
| Prossie Nakawuka | Ph.D. | R.T. Peters | BSysE | 2009 | May-13 |
| Hossein Sadeghi | Ph.D. | R.T. Peters | BSysE | 2011 | Dec-14 |
| Yasin Osroosh | Ph.D. | R.T. Peters | BSysE | 2011 | Aug-14 |
| Mohammad Amini | Ph.D. | R.T. Peters | BSysE | 2012 | Dec-16 |
| Abid Sarwar | Ph.D. | R.T. Peters | BSysE | 2016 | Dec-19 |
| Moneim Mohamed | Ph.D. | R.T. Peters | BSysE | 2017 | Dec-19 |
| Edward Thomas | Masters | R.T. Peters | MSAg | 2017 | May-20 |
| Behnaz Moalaei | Ph.D. | R.T. Peters | BSysE | 2019 | Aug-22 |
| John Sacdalan | Ph.D. | R.T. Peters | BSysE | 2018 | Aug-22 |
| Claire Castillo | PhD. | R.T. Peters | BSysE | 2019 | |
| Kiraga Shafik | PhD. | R.T. Peters | BSysE | 2022 | |
| Elda Yitbarek | Masters | R.T. Peters | BSysE | 2022 | |
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| Yahya Alwahaibi | Masters | C. Stockle | BSysE | 2009 | May-11 |
| Kyle Bair | Ph.D. | J. Davenport | Crops&Soils | 2005 | Aug-12 |
| Brian Bodah | Ph.D. | J. Ullmann | BSysE | 2008 | May-13 |
| Susan Swanson | Ph.D. | P. Micklas | Crops&Soils | 2010 | May-13 |
| Mark Dekline | Ph.D. | Q. Zhang | BSysE | 2011 | Dec-14 |
| Karen Welch | Masters | J. Davenport | Crops&Soils | 2012 | Jan-14 |
| Aleana Gongal | Masters | M. Karkee | BSysE | 2013 | Dec-14 |
| Jason Stout | Ph.D. | J. Davenport | Crops&Soils | 2010 | May-15 |
| Jennifer Trapp | Ph.D. | M. Pumphrey | Crops&Soils | 2011 | Dec-15 |
| Rodrigo Ferreyra | Ph.D. | C. Stockle | BSysE | 2012 | May-15 |
| Nadia Valverdi | Masters | M. Whiting | Horticulture | 2013 | Dec-15 |
| Fan-Hsuan Yang | Ph.D. | D. Bryla | OSU Hort. | 2013 | Dec-17 |
| Paul Gamble | Masters | P. Ndegwa | BSysE | 2013 | Aug-15 |
| Keyvan Malek | Ph.D. | Jennifer Adam | Civil Engr | 2011 | Dec-16 |
| Tina Karimi | Ph.D. | C. Stockle | BSysE | 2013 | Dec-16 |
| Muhammad Khan | Masters | C. Stockle | BSysE | 2013 | Dec-16 |
| Kisusan Khati | Masters | K. Desta | Crops&Soils | 2013 | May-16 |
| Yunxiang Ye | Ph.D. | Qin Zhang | BSysE | 2013 | May-16 |
| M. Azeem Khan | Ph.D. | C. Stockle | BSysE | 2014 | Dec-16 |
| Carlos Zuniga | Ph.D. | S. Sankaran | BSysE | 2014 | May-18 |
| Yorav Dave Klawer | Masters | C. Miles | MS Ag | 2016 | NA |
| Haitham Bahlol | Ph.D. | L. Khot | BSysE | 2016 | May-19 |
| Momtanu Chakraborty | Masters | L. Khot | BSysE | 2017 | Dec-17 |
| Abhilash Chandel | Ph.D. | L. Khot | BSysE | 2017 | May-21 |
| Rakesh Ranjan | Ph.D. | L. Khot | BSysE | 2017 | May-21 |
| Fidel Sotomayor | Ph.D. | C. Stockle | BSysE | 2017 | May-20 |
| Mugal Samrate Dahal | Masters | J. Wu | BSysE | 2019 | Nov-20 |
| Firas Aloqaili | Ph.D. | S. Good | OSU BSE | 2016 | Sep-20 |
| Edward Thomas | Masters | F. Critzer | MS Ag | 2017 | May-20 |
| Jonathan Flores | Masters | C. Stockle | BSysE | 2018 | May-20 |

R. Troy Peters, P.E., Ph.D.

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| Dennis Bonilla | Masters | G. Grove | MS. Ag. | 2018 | May-20 |
| Sushma Thapa | Masters | M. Karkee | BSysE | 2018 | May-21 |
| Chenchen Kang | Ph.D. | Q. Zhang | BSysE | 2018 | May-23 |
| Anish Mahat | Masters | J. Wu | BSysE | 2020 | Dec-22 |
| Srikanth Gorthi | PhD | L. Khot | BSysE | 2022 | |
| Karisma Yumnam | PhD | L. Khot | BSysE | 2022 | |
| Dattatray Ganesh | PhD | L. Khot | BSysE | 2022 | |

Service

National Service

American Society of Agricultural and Biological Engineers (ASABE)

- District 5 (PNW) Representative (An elected position).
- Chair of the ASABE Heermann Sprinkler Irrigation Award Committee for 3 years.
- Vice Chair of the Irrigation Steering Committee (SW-24)
- Chair of the Irrigation Steering Committee (SW-24)... Twice.
- Vice Chair of the Sprinkler Irrigation Committee (SW-241) - two different times
- Chair of the Sprinkler Irrigation Committee (SW-241) - two different times
- Chair of the Sprinkler Irrigation Awards Committee – two different times
- Active member of the Irrigation management Committee (SW-244)
- Active member of the Microirrigation Committee (SW-245)
- ASABE soil and water steering committee (SW-01)
- Vice Chair of the PNW ASABE/CSAE (helped organize the 2009 meetings and tours and hosted them at Prosser)
- Soil and Water outstanding paper review committee.

National Irrigation Association

- Organizing Committee for the Decennial National Irrigation Symposium

Bonneville Power Administration Regional Technical Forum Irrigation Subcommittee. WSITIE

- Annually attend the Western States Irrigation Technical Information Exchange.
Hosted in Prosser in 2009.

Multi-State Project/Activities

- Chair of WDC018 “Meteorological and Climate Data to Support ET-Based Irrigation Scheduling, Water Conservation, and Water Resources Management.” Organized and hosted a meeting at WSU IAREC.
- Chair of WERA 202 “Climate Data Applications in Irrigation Scheduling and Water Conservation.”
- Vice Chair of WERA 202 Member “Climate Data Applications in Irrigation Scheduling and Water Conservation.”
- Participate on the Pacific Northwest Water Quality Team.

Service to the State

- Yakima River Basin Groundwater Advisory Committee (GWAC). I attend monthly, highly contentious and politicized meetings. These meetings are followed closely in the news.

- Chair of the Irrigated Agriculture Working Group of the GWAC. I lead monthly meetings full of arguing.
- Washington Water Resources Leadership Team
- USDA-CSREES PNW Regional Water Quality Team
- Research Task Force Gap Analysis for Viticulture and Enology
- Steering committee for the biannual water conference “Water in the Columbia Basin: Sharing a Limited Resource.” Held in Stevenson, WA.
- Appointed by Dan Bernardo and the US Secretary of Interior Sally Jewell to the Yakima River Basin Conservation Advisory Group to represent WSU.

Service to the University/College

Faculty Senate

- Senator representing the Biological Systems Engineering Department and the CAHNRS Extension Tenure and Promotion Committee
- Evaluation extension tenure and promotion packets and make recommendations to the Dean. Served for 2 years.

Promotion and Tenure Mentoring Committees

- For Kirti Rajagopalan (chair)
- For Jenny Bolivar Medina
- For Michelle Moyer
- For Lav Khot

Search Committees

- IAREC Facilities Manager
- Agricultural Weather Network Project Manager
- Agricultural Meteorologist
- Agricultural Weather Network Systems Programmer
- IAREC Finance and Grants Manager

Other

- ExTerra Advisory Board Member for undergraduate startup.
- Invited member of an exploratory committee for the combination of Chemical and Biological Engineering department with Biosystems engineering department.
- New Orchard Committee for the orchard outside of Wenatchee.
- Member of the Extension Web Development Team.
- Re-initiated the “Irrigated Agriculture Research and Extension Update Meetings” with Andy McGuire.
- Nominated by Dean Bernardo to represent WSU College of Agriculture Human and Natural Resource Sciences and Agricultural Extension on the Yakima River Basin Conservation Advisory Group (CAG).
- Affiliated faculty member with the Center for Precision and Automated Agricultural Systems (CPAAS)
- Affiliated faculty member with the Viticulture and Enology Center.

Service to the Department/Experiment Station

- BSysE Diversity Equity and Inclusion Committee.

- IAREC Dorm Committee Chair. Responsible for the IAREC dormitory.
- IAREC Irrigation Systems Update Planning and Evaluation Committee.
Consulted with the station leadership to update the station irrigation system to an on-demand system. Also was instrumental in getting a \$75,000 universal linear irrigation system donated and installed on the Roza farm. This is used for research.
- Graduate Student Admissions Evaluation Committee
- Chair of the IAREC employees fund committee.
- BSysE Department Marketing and Recruitment Committee.
- BSysE Department Development and Scholarships Committee.
- CPAAS and IAREC Graduate Student Club advisor. I hosted a dance in my barn and coordinate activities with the students. I also host game nights and have taken the IAREC graduate students camping twice.

Professional Development

- *Became a licensed as a professional agricultural engineer (PE).* As my department members understand, this is not a trivial process or accomplishment.
- Became *Certified as an Agricultural Irrigation Specialist (CAIS)* through the Irrigation Association.
- Attended over 50 professional conferences. I focus on attending the ASABE and Irrigation Association conferences and try to stay closely affiliated with those societies.
- Attended the Irrigation Faculty Academy put on by the Irrigation Association.
- Take time out to upgrade my skills and learn new things. For example I purchased books and learned PHP, Javascript and MySQL for web and database programming. I also learned a lot about microelectronics and to use miniature Linux-based computers like the Raspberry Pi. I've prototyped many things in my basement in my free time for use in data collection and irrigation automation.
- Attended a workshop on water law and water rights issues in the Columbia Basin and on the US-Canada water treaty.
- Attended the Irrigation Efficiency Workshop, "Exploring the Future of Agricultural Irrigation." Put on by the Northwest Energy Efficiency Alliance.
- Attended a professional grant writing workshop in Seattle.
- Attended Valve School in Walla Walla, WA. 1.5 days.
- Annually attend and participate in the Western States Irrigation Technical Information Exchange (WSITIE).
- Attended Irrigation Service Seminars put on by LAD Irrigation.
- Annually participate in and am the current chair of WERA 1022 "Climate Data Applications in Irrigation Scheduling and Water Conservation."
- I have gained tremendous professional development by carefully listening to farmers and ranchers. I spend time talking with these down-to-earth folks at each seminar or workshop at which I present and have learned a huge amount

R. Troy Peters, P.E., Ph.D.

from them. I hope to be able to continue to learn from these wise and seasoned individuals in the future.