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Education

Ph.D. 2009 Agricultural and Biosystems Engineering, North Dakota State University, ND,
M.S. 2006 Environmental Engineering, Iowa State University, IA
M.S. 2002 Environmental Science, Anna University, India
B.S. 2000 Zoology, University of Madras, India

Professional Experience

- Assistant Professor, Washington State University (WSU), June 2013 – Present.
- Affiliate Assistant Professor, Center for Precision & Automated Agricultural Systems, WSU, January 2014 – Present.
- Adjunct Professor of Biology, Polk State College, January 2013 – May 2013
- Postdoctoral Research Associate, Citrus Research & Education Center, University of Florida, August 2009 – May 2013
- Research Associate, Environmental Engineering & Management, Asian Institute of Technology, Thailand, January 2003 – June 2004
- Project Associate, Institute of Ocean Management, Anna University, India, June 2002 – December 2002

Refereed Publications (Corresponding author, †Graduate Student, ††Postdoc/Visiting Scholar)

1. Zúñiga Espinoza†, C., Jarolmasjed†, Sinha, R., Zhang†, C., Kalcsits, L.S., Dhingra, A., and **Sankaran, S.** 2017. Spectrometric techniques for elemental profile analysis associated with bitter pit in apples. *Postharvest Biology and Technology*, 128: 121-129.
2. Kalcsits, L., Mupambi, G., Serra, S., Musacchi, S., Layne, D., Schmidt, T., Mendoza, M., Asteggiano, L., Jarolmasjed†, S., **Sankaran, S.,** Khot, L.R., and Zúñiga Espinoza†, C. 2017. Above and below-ground environmental changes associated with the use of photoselective anti-hail netting in apple. *Agricultural and Forest Meteorology*, 237: 9-17.
3. Si††, Y., **Sankaran, S.,** Knowles, N.R., and Pavek, M. 2017. Automated potato tuber length-width ratio assessment using image analysis. American Journal of Potato Research, 94 (1): 88-93.
4. Jarolmasjed†, S., Zúñiga Espinoza†, C., and **Sankaran, S.** 2017. Near-infrared spectroscopy for non-destructive bitter pit detection in apples. *Journal of Food Measurement and Characterization*, doi: 10.1007/s11694-017-9473-x.
5. Wang††, M., Ellsworth, P., Zhou††, J., Cousins, A., and **Sankaran, S.** 2016. Evaluation of water-use efficiency in foxtail millet (*Setaria italica*) using visible-near infrared and thermal spectral sensing techniques. *Talanta*, 152: 531-539.
6. **Sankaran, S.,** Wang††, M., and Vandemark, G. 2016. Image-based rapid phenotyping method of chickpeas seed size. *Engineering in Agriculture, Environment and Food*, 9 (1): 50-55.

7. Kafle[††], G.P., Khot, L.R., **Sankaran, S.,** Bahlol, H.Y., Tufariello, J.A., and Hill Jr. H.H. 2016. State of ion mobility spectrometry and applications in agriculture: A review. *Engineering in Agriculture, Environment and Food*, 9 (4): 346-357.
8. Khot, L.R., **Sankaran, S.,** Carter, A.H., Johnson, D.A., and Cummings, T.F. 2016. UAS imaging-based decision tools for arid winter wheat and irrigated potato production management, *International Journal of Remote Sensing*, 37 (1): 125-137.
9. Trapp, J.J., Urrea, C.A., Miklas, P.N., Zhou[††], J., Khot, L. R., **Sankaran, S**., and Miklas, P.N. 2016. Selective phenotyping traits related to multiple stress and drought response in common bean, *Crop Science*, 56: 1-13.
10. Jarolmasjed[†], S., Zúñiga Espinoza, C., **Sankaran, S.,** and Khot, L.R. 2016. Postharvest bitter pit detection and progression evaluation in 'Honeycrisp' apples using computed tomography images, *Postharvest Biology and Technology*, 118: 35-42.
11. Zhou††, J., Pavek, M.J., Shelton, S.C., Holden, Z.J., and **Sankaran, S.** 2016. Aerial multispectral imaging for crop hail damage assessment in potato. *Computer and Electronics in Agriculture*, 127: 406-412.
12. Si[††], Y., and **Sankaran, S**. 2016. Computed tomography imaging-based bitter pit rating in apples. *Biosystems Engineering*, 51, 9-16.
13. Zhang[†], C., Gao, H., Zhou[††], J., Cousins, A., Pumphrey, M. O., and **Sankaran, S**. (2016). 3D robotic system development for high-throughput crop phenotyping. IFAC-*PapersOnLine*, 49 (16), 242-247.
14. Si[††], Y.**, Sankaran, S**., Knowles, N.R., and Pavek, M. 2016. Automated potato tuber length-width ratio assessment using image analysis. *American Journal of Potato Research*, doi: 10.1007/s12230-016-9545-1, 1-6.
15. **Sankaran, S.,** Khot, L.R., Zúñiga Espinoza, C., Jarolmasjed[†], S., Sathuvalli, V., Vandemark, G., Miklas, P.N., Carter, A.H., Pumphrey, M.O., Knowles, N.R., and Pavek, M.J. 2015. Low-altitude, high-resolution aerial imaging systems for row and field crop phenotyping: A Review, *European Journal of Agronomy*, 70: 112-123. Most Downloaded Article
16. **Sankaran S.,** Ehsani, R., and Morgan, K. 2015. Detection of anomalies in citrus leaves using laser induced breakdown spectroscopy (LIBS). *Applied Spectroscopy*, 69 (8): 913-919.
17. **Sankaran, S.,** Khot, L.R., and Carter, A.H. 2015. Field-based crop phenotyping: multispectral aerial imaging for evaluation of winter wheat emergence and spring stand, *Computers and Electronics in Agriculture*, 118: 372-379.
18. Liaghat, S., Mansor, S.B., Ehsani, R., Shaffri, H.Z.M., Meon, S., and **Sankaran, S**. 2014. Mid-infrared spectroscopy for early detection of basal stem rot disease in oil palm. *Computer and Electronics in Agriculture*, 101: 48-54.
19. Liaghat, S., Ehsani, R., Mansor, S.B., Shaffri, H.Z.M., Meon, S., **Sankaran, S.,** and Azam, S.H.M.N. 2014. Early detection of basal stem rot disease (*Ganoderma*) in oil palms based on hyperspectral reflectance data using pattern recognition algorithms. *International Journal of Remote Sensing*, 35 (10), 3427-3439.
20. **Sankaran, S.,** and Ehsani, R. 2013. Detection of Huanglongbing-infected citrus leaves using statistical models with a fluorescence sensor. *Applied Spectroscopy*, 67 (4), 463-469.
21. **Sankaran, S.**, Maja, J.M., Buchanon, S., Ehsani, R. 2013. Huanglongbing (citrus greening) detection using visible-near infrared and thermal imaging techniques. *Sensors*, 13: 2117-2130; DOI: http://dx.doi.org/10.3390/s130202117.

22. Garcia-Ruiz, F., **Sankaran, S.,** Maja, J.M., Lee, W.S., Rasmussen, J., and Ehsani, R. 2013. Comparison of two aerial imaging platforms for identification of Huanglongbing infected citrus trees. *Computers and Electronics in Agriculture*, 91: 106-115. Most Cited Article
23. Wetterich, C.B., Kumar, R., **Sankaran, S.**, Belasque Jr., J., Ehsani, R., and Marcassa, L.G. 2013. A comparative study on application of computer vision and fluorescence imaging spectroscopy for detection of Huanglongbing citrus disease in USA and Brazil. *Journal of Spectroscopy*, 2013, Article ID 841738, DOI: http://dx.doi.org/10.1155/2013/841738.
24. **Sankaran, S.,** and Ehsani, R. 2013. Comparison of visible-near infrared and mid-infrared spectroscopy for classification of Huanglongbing and citrus canker infected leaves. *Agricultural Engineering International: CIGR Journal*, 15 (3): 75-79.
25. Johnson, K., **Sankaran, S.,** and Ehsani, R. 2013. Identification of water stress in citrus leaves using sensing technologies. *Agronomy*, 3 (4), 747-756.
26. **Sankaran, S**., Ehsani, R., Inch, S.A., and Ploetz, R.C. 2012. Evaluation of visible-near infrared reflectance spectra of avocado leaves as a non-destructive sensing tool for detection of laurel wilt. *Plant Disease*, 96 (11): 1683-1689.
27. **Sankaran, S**., and Ehsani, R. 2012. Detection of Huanglongbing disease in citrus using fluorescence spectroscopy. *Transactions of the ASABE*, 55 (1): 313-320.
28. Saeed, O.M.B., **Sankaran, S**., Shariff, A.R.M., Shariff, H.Z.M., Ehsani, R., Alfatni, M.S., and Hazir, M.H.M. 2012. Classification of oil palm fresh fruit bunches based on their maturity using portable four-band sensor system. *Computers and Electronics in Agriculture*, 82: 55-60.
29. **Sankaran, S.,** Khot, L.R., and Panigrahi, S. 2012. Biology and applications of olfactory sensing system: A review. *Sensors and Actuators B*, 171-172: 1-17.
30. Panigrahi, S., **Sankaran, S**., Mallik, S., Gaddam, B., and Hanson, A. A. 2012. Olfactory receptor-based polypeptide sensor for acetic acid VOC detection. *Material Science and Engineering C*, 32: 1307-1313.
31. Khot, L.R., **Sankaran, S.,** Maja, J.M., and Ehsani, R. 2012. Applications of nanomaterials in agricultural production and crop protection: a review. *Crop Protection*, 35: 64-70. Most Downloaded and Most Cited Article
32. **Sankaran, S**., and Panigrahi, S. 2012. Investigation on ZnO-Fe_2O_3 based nanocomposite sensors for butanol detection related to food contamination. *Journal of Nanoscience and Nanotechnology*, 12: 2346-2352.
33. **Sankaran, S.,** and Panigrahi, S. 2011. Nanoparticulate zinc oxide chemoresistive sensor for volatile acetic acid detection. *Nanoscience and Nanotechnology Letters*, 3 (6): 755-762.
34. **Sankaran, S**., Panigrahi, S., and Mallik, S. 2011. Olfactory receptor based piezoelectric biosensors for detection of alcohols related to food safety applications. *Sensors and Actuators B*, 155 (1): 8-18.
35. **Sankaran, S**., Panigrahi, S., and Mallik, S. 2011. Odorant binding protein based biomimetic sensors for detection of alcohols associated with *Salmonella* contamination in packaged beef. *Biosensors and Bioelectronics*, 26 (7): 3103-3109.
36. **Sankaran, S**., and Ehsani, R. 2011. Visible-near infrared spectroscopy based citrus greening detection: Evaluation of spectral feature extraction techniques. *Crop Protection*, 30 (11): 1508-1513.

37. **Sankaran, S**., Mishra, A., Maja, J.M., and Ehsani, R. 2011. Visible-near infrared spectroscopy for detection of Huanglongbing in citrus orchards. *Computers and Electronics in Agriculture*, 77 (2): 127-134.
38. **Sankaran, S**., Mishra, A., Ehsani, R., and Davis, C. 2010. A review of advanced techniques for detecting plant diseases. *Computers and Electronics in Agriculture*, 72 (1): 1-13. Most Downloaded and Most Cited Article
39. **Sankaran, S**., Ehsani, R., and Etxeberria, E. 2010. Mid-infrared spectroscopy for detection of Huanglongbing (greening) in citrus leaves. *Talanta*, 83 (2): 574-581.
40. **Sankaran, S.,** Khanal, S.M., Jasti, N., Jin, B., Pometto, A.L., and Van Leeuwen, J. 2010. Use of filamentous fungi for wastewater treatment and production of high value fungal byproducts: a review. *Critical Reviews and Environmental Science and Technology*, 40 (5): 400-449.
41. **Sankaran, S.,** Khanal, S.M., Pometto, A.L., and Van Leeuwen, J. 2008. Ozone as a selective disinfectant for nonaseptic fungal cultivation on corn-processing wastewater. *Bioresource Technology*, 99 (17): 8265-8272.
42. Wichitsathian, B., **Sankaran, S.**, Visvanathan, C., and Ahn, K. H. 2004. Biokinetic parameters as an indicator to ammonia toxicity in leachate treatment using membrane reactor. *Asian Journal of Microbiology, Biotechnology and Environmental Science*, 6 (1): 1-6.
43. Wichitsathian, B., **Sankaran, S.**, Visvanathan, C., and Ahn, K. H. 2004. Landfill leachate treatment by yeast and bacteria based membrane bioreactor. *Journal of Environmental Science and Health A.*, 39 (9): 2391-2404.

Book Chapters

1. **Sankaran, S.,** and Ehsani, R. 2014. Introduction to the Electromagnetic Spectrum. In 'Imaging with Electromagnetic Spectrum: Applications in Food and Agriculture'. Editors: Alahakoon, M.K., Annamalai, M., and Jayasuriya, H.P.W. Springer, 1-15.
2. **Sankaran, S.**, Khot, L.R., and Ehsani, R. 2014. Mid- and Far-infrared Imaging. In 'Imaging with Electromagnetic Spectrum: Applications in Food and Agriculture'. Editors: Alahakoon, M.K., Annamalai, M., and Jayasuriya, H.P.W. Springer, 129-146.
3. Aksenov, A., Guaman, N.A.V., **Sankaran, S.,** Fung, A.G., Pasamontes, A., Frederico, M., Cheung, W.H.K., Ehsani, R., Dandekar, A.M., and Davis, C.E. 2013. Volatile organic compounds (VOCs) for noninvasive plant diagnostics. In 'Pest Management with Natural Products'. Editors, J.J. Beck, J.R. Coats, S.O. Duke, M.E. Koivunen. ACS Publications, doi: 10.1021/bk-2013-1141.fw001, pp. 73-95.
4. Van Leeuwen, J. (Hans), Rasmussen, M.L., **Sankaran, S.,** Koza, C.R., Erickson, D.T., Mitra, D., and Jin, B. 2011. Fungal treatment of crop processing wastewaters with value-added co-products. In 'Sustainable Bioenergy and Bioproducts'. Eds: Kasthurirangan Gopalakrishnan, Hans van Leeuwen, Robert C. Brown. Chapter II, Springer-Verlag Inc, pp. 13-44.

Journal Proceedings/Reports

1. **Sankaran, S**., Carter, A.H., Slaughter, D.C., Kirchhoff, H., Okamuro, J.K., Poland, J., and Kalcsits, L.A. (2016) Conference Summary Report on 'Advances in Field-Based High-throughput Phenotyping and Data Management: Grains and Specialty Crops'. Link:

https://labs.wsu.edu/sankaran-phenomics/wp-content/uploads/sites/1041/2016/06/WhitePaperAFRI_HTP_Spokane-2.pdf.

2. **Sankaran, S.,** Khot, L.R., Quirós, J., Vandemark, G.J., and McGee, R.J. 2016. UAV-based high-throughput phenotyping in legume crops, Proceeding SPIE 9866, Autonomous Air and Ground Sensing Systems for Agricultural Optimization and Phenotyping, 98660G (May 17, 2016); doi: http://dx.doi.org/10.1117/12.2228550.
3. Zúñiga Espinoza, C., Khot, L.R., Jacoby, P., and **Sankaran, S**. 2016. Remote sensing based water-use efficiency evaluation in sub-surface irrigated wine grape vines. Proceeding SPIE 9866, Autonomous Air and Ground Sensing Systems for Agricultural Optimization and Phenotyping, 98660O (May 17, 2016); doi: http://dx.doi.org/10.1117/12.2228791.
4. Jacoby, P.W., Peters, R.T., **Sankaran, S.,** and Khot, L.R. 2015. Advancing water use efficiency in vineyards with subsurface micro-irrigation. Emerging Technologies for Sustainable Irrigation, Joint ASABE/ Irrigation Association Symposium Proceedings, 10-12 Nov., 2015, Long Beach, CA.
5. Khot, L., **Sankaran, S.,** Cummings, T., Johnson, D., Carter, A., Serra, S., and Musacchi, S. 2014. Applications of Unmanned Aerial System in Washington State Agriculture, Paper No. 1637, 12th International Conference Precision Agriculture, July 20-23, 2014, Sacramento, CA.
6. Wang[††], M., **Sankaran, S.,** Ellsworth, P., and Cousins, A. 2014. Rapid sensing for water stress detection in foxtail millet (*Setaria italica*), Paper No. 1588, 12th International Conference Precision Agriculture, 20-23 July, 2014, Sacramento, CA.
7. **Sankaran, S.,** Khot, L.R., Maja, J.M., and Ehsani, R. 2013. Comparison of two multiband cameras for use on small UAVs in Agriculture. 5th IEEE Workshop on Hyperspectral Image and Signal Processing: Evolution in Remote Sensing (WHISPERS), 25-28 June, 2013, Gainesville, FL, pp. 25-28.
8. Ehsani, R., Maja, J.M., and **Sankaran, S.** 2012. Applications of low-cost multi-rotor remote sensing UAV in agriculture, CAFEi2012-135, The International Conference on Agricultural and Food Engineering for Life (CAFEi) 2012, 26-28 Nov., 2012, Selangor, Malaysia.
9. Ehsani, R., **Sankaran, S.,** Maja, J.M., and Neto, J.M. 2012. Affordable multi-rotor remote sensing platform for applications in precision horticulture, Paper No. 1066, 11th International Conference Precision Agriculture, 15-18 July, 2012, Indianapolis, IN.
10. **Sankaran, S.,** and Ehsani, R. 2010. Detection of Huanglongbing (greening) in citrus plantations using mid-infrared spectroscopy, Paper No. 1009199, American Society of Agricultural and Biological Engineers (ASABE) 2010 Annual International Meeting, 20-23 June, 2010, Pittsburg, PA.
11. **Sankaran, S.,** and Ehsani, R. 2010. Spectral evaluations for developing optical methods of Huanglongbing (HLB) detection in citrus orchards. 2010 Florida Society Horticultural Society (FSHS) Proceedings, 123: 121-123.
12. **Sankaran, S.,** Ehsani, R., and Dima, C. 2010. Development of ground-based sensor system for automated agricultural vehicle to detect diseases in citrus plantations, Paper No. 304, 10th International Conference Precision Agriculture, 18-21 July, 2010, Denver, CO.
13. **Sankaran, S.,** and Panigrahi, S. 2008. Investigation on selected metal oxide-based nanocomposite sensors for contamination detection in food, Paper No. 085238, ASABE 2008 Annual International Meeting, 29 June 29- 2 July, 2008, Providence, RI.

14. **Sankaran, S.,** and Panigrahi, S. 2007. Systematic performance evaluation of nanoparticulate ZnO thin film based chemoresistive sensor for food safety, Paper No. RRV-07108, CSBE/ASABE North Central Inter-Sectional Conference, 12-13 Oct., 2007, Fargo, ND.
15. **Sankaran, S.,** Panigrahi, S., and Chang, Y. 2007. Evaluation of nanostructured novel sensing material for food contamination applications, Paper No. 073134, ASABE 2007 Annual International Meeting, 17-20 June, 2007, Minneapolis, MN.
16. **Sankaran, S.,** and Panigrahi, S. 2006. Olfactory sensing: Overview of the biology, mechanism and applications for food safety, Paper No. MBSK 06-216, CSBE/ASABE North Central Inter-Sectional Conference, 5-7 Oct., 2006, Saskatoon, SK, Canada.

Abstracts and Technical Presentations (*Presenter)

1. Khot, L.R.*, Zúñiga, C.E., Sankaran, S., and Jacoby, P. 2017. Role of low altitude remote sensing tools in growing wine grapes with less water. 3rd International Grape Symposium, Table Grape Growers Association, Hermosillo, Sonora, México, 26-27 January, 2017.
2. Khot, L.R.*, **Sankaran, S.**, and Kalcsits, L. 2016. Role of sensing technologies in apple bitter pit management. 1st International Apple Symposium, 10-16 Oct., 2016, Yangling, Shaanxi, China. Sponsored by ISHS.
3. Zhang, C.*, Gao, H., Zhou, J., Cousins, A., Pumphrey, M., and **Sankaran, S.** 2016. 3D robotic system development for high-throughput crop phenotyping. Agricontrol 2016, Paper 53, 5th IFAC Conference on Sensing, Control and Automation for Agriculture, 14-17 Aug., 2016, Seattle, WA.
4. **Sankaran, S.***, Slaughter, D.C., Carter, A.H., Kalcsits, L.A., Okamuro, J.K., Kirchhoff, H., and Poland, J. 2016. Integrating science and engineering to address needs in high-throughput phenotyping, Paper No. 2472820, ASABE 2016 Annual International Meeting, Orlando, FL, July 17-20, 2016.
5. **Sankaran, S.***, Quiros, J., Khot, L.R., Knowles, N.R., and Knowles, L. 2016. UAV-based imaging to assess potato emergence in horticulture and breeding programs, Paper No. 2540198, ASABE 2016 Annual International Meeting, Orlando, FL, July 17-20, 2016.
6. **Sankaran, S.***, and Si, Y. 2016. Visible imaging tools for high-throughput crop phenotyping, Paper No. 2461858, ASABE 2016 Annual International Meeting, Orlando, FL, July 17-20, 2016.
7. Zúñiga Espinoza, C., Jarolmasjed, S., Khot, L.R., Knowles, R. N., Pavek, M. J., **Sankaran, S.** 2016. Water stress tolerance detection in potatoes using visible-near infrared sensing techniques, Paper No. 2461685, ASABE 2016 Annual International Meeting, Orlando, FL, July 17-20, 2016.
8. Zhou, J.*, Khot, L.R., Pavek, M.J. and **Sankaran, S.** 2015. Rapid assessment of hail damage in potato crops using remote sensing technology, Paper No. 162459762, 2016 ASABE Annual International Meeting, 17-20 July, 2016, Orlando, FL.
9. Jarolmasjed, S.*, Zúñiga Espinoza, C., Sinha, R.R., Zhang, C., Kalcsits, L.A., Khot, L.R., and **Sankaran, S**. 2015. Evaluating effect of location on bitter pit incidence in 'Honeycrisp' apples using sensing techniques, Paper No. 162461752, 2016 ASABE Annual International Meeting, 17-20 July, 2016, Orlando, FL.
10. Zhang, C.*, Gao, H., Zhou, J., Cousins, A., Pumphrey, M., and **Sankaran, S.** 2016. Developing low-cost 3D platform for automated phenotyping in controlled environment.

ASABE Paper No. 162461532, 2016 ASABE Annual International Meeting, 17-20 July, 2016, Orlando, FL.

11. **Sankaran, S.,** Khot, L.R.*, Quirós, J., Vandemark, G.J., and McGee, R.J. UAV-based high-throughput phenotyping in legume crops. SPIE Conference (9866) on Autonomous Air and Ground Sensing Systems for Agricultural Optimization and Phenotyping, 17-21 Apr., 2016, Baltimore, MA.
12. Zúñiga Espinoza, C.*, Khot, L.R., Jacoby, P., and **Sankaran, S**. 2016. Remote sensing based water-use efficiency evaluation in sub-surface irrigated wine grape vines. SPIE Conference (9866) on Autonomous Air and Ground Sensing Systems for Agricultural Optimization and Phenotyping, 17-21 Apr., 2016, Baltimore, MA.
13. Trapp, J.*, Mafimoghaddam, S., Nchimbi, S., Proch, T., **Sankaran, S.,** Khot, L.R., McClean, P., and Miklas, P. 2016. Durango diversity panel: abiotic and biotic stress characterization and potential for introducing new germplasm into East Africa. 2016 Joint Pan-African Grain Legume and World Cowpea Conference, 28 Feb.-4 Mar., 2016, Livingstone, Zambia (Poster).
14. **Sankaran, S. *,** Zhou[††], J., and Khot, L.R. 2016. Remote sensing technologies for in-field specialty crop field phenotyping. Plant and Animal Genome Conference XXIV, 9-13 Jan., 2016, San Diego, CA. (Invited, 250 participants)
15. **Sankaran, S.***, Carter, A.H., Kalcsits, L.A., Okamuro, J.K., Slaughter, D.C., Kirchhoff, H., and Poland, J. 2016. Challenges and Opportunities in High-Throughput Field Phenotyping. Plant and Animal Genome Conference XXIV, 9-13 Jan., 2016, San Diego, CA. (Invited, 250 participants)
16. Sexton, T.*, **Sankaran, S.,** and Cousins, A. 2016. Screening for Improved Crop Water Use and Carbon Fixation, 25th Western Photosynthetic Conference, 3-6 Jan., 2016, Tabernash, CO.
17. Kalcsits, L.*, Wheeler, C., Asteggiano, L., Jarolmasjed[†], S., Khot, L.R., Layne, D., Mendoza, M., Musacchi, S., Schmidt, T., **Sankaran, S.,** Serra, S., and Zúñiga Espinoza, C. 2015. Colored anti-hail nets alter canopy and soil environment in apple. 2015 Washington State Tree Fruit Association (WSTFA) 111th Annual Meeting, 7-9 Dec., 2015, Yakima, WA (Poster).
18. Zúñiga Espinoza, C.*, Jarolmasjed[†], S., Jacoby, P., Khot, L.R., and **Sankaran, S.** 2015. Role of non-contact sensing for water management in grapevines at different growth stages. 2015 WSTFA 111th Annual Meeting, 7-9 Dec., 2015, Yakima, WA (Poster).
19. Jarolmasjed[†], S.*, Zúñiga Espinoza, C., Sankaran, S. Kalcsits, L.A., **Sankaran, S.,** and Khot, L.R. 2015. Assessment of high-throughput sensing techniques for pre and postharvest apple bitter pit detection. 2015 WSTFA 111th Annual Meeting, 7-9 Dec., 2015, Yakima, WA (Poster).
20. Jacoby, P.W.*, Peters, R.T., **Sankaran, S.,** and Khot, L.R. 2015. Advancing water use efficiency in vineyards with subsurface micro-irrigation. Emerging Technologies for Sustainable Irrigation, Joint ASABE/ Irrigation Association Symposium Proceedings, 10-12 Nov., 2015, Long Beach, CA.
21. Sathuvalli, V.*, Khot, L.R., and **Sankaran, S.** 2015. Applications of UAVs in potato breeding. Conference on Advances in Field-Based High-throughput Phenotyping and Data Management: Grains and Specialty Crops, 9-10 Nov., 2015, Spokane, WA.

22. **Sankaran, S.*** 2015. Advanced sensing for high-throughput phenotyping in grains and specialty crops. Conference on Advances in Field-Based High-throughput Phenotyping and Data Management: Grains and Specialty Crops, 9-10 Nov., 2015, Spokane, WA.
23. Trapp, J.J.*, Moghaddam, S.M., McClean, P.E., Song, Q., Zhou[††], J., Khot, L.R., **Sankaran, S.,** and Miklas, P.N. 2015. Characterizing traits related to drought tolerance within the durango race of common bean, 2015 Biennial Bean Improvement Cooperative (BIC) Meeting, 1-4 Nov., 2015, Niagara Falls, Canada.
24. **Sankaran, S.***2015. Applied Remote Sensing Systems in Phytopathology. 48th Brazilian Congress of Phytopathology, 10-14 Aug., 2015, São Pedro, SP, Brazil. (Invited, 350-400 participants)
25. Zúñiga Espinoza, C.*, Jarolmasjed[†], S.*, Khot, R.L., Knowles R., Pavek, M., **Sankaran, S.,** 2015. Evaluating abiotic stress in potato cultivars using proximal and remote sensing techniques, Paper No. 152191080, ASABE 2015 Annual International Meeting, 26-29 July, 2015, New Orleans, LA.
26. Zúñiga Espinoza, C.*, Jarolmasjed[†], S., **Sankaran, S.,** Khot L., 2015. Calcium evaluation in healthy and bitter pit apples using Fourier transform infrared (FTIR) spectroscopic technique, Paper No. 152191056, ASABE 2015 Annual International Meeting, 26-29 July, 2015, New Orleans, LA.
27. Jarolmasjed[†], S.*, Zúñiga Espinoza, C., Khot, L.R., **Sankaran, S.** 2015. Visible-near infrared spectroscopy for bitter pit detection in apples, Paper No. 152190895, ASABE 2015 Annual International Meeting, 26-29 July, 2015, New Orleans, LA.
28. Zhou[††], J.*, **Sankaran, S.,** Khot, L.R., Pumphrey, M., and Carter, A. 2015. Crop height estimation in wheat using proximal sensing techniques, Paper No. 2188566, ASABE 2015 Annual International Meeting, 26-29 July, 2015, New Orleans, LA.
29. Khot, L.R., Zhou[††], J.*, **Sankaran, S.,** and Sathuvalli, V. 2015. Evaluation of viral infection in potatoes using proximal and remote sensing techniques, Paper No. 2246054, ASABE 2015 Annual International Meeting, 26-29 July, 2015, New Orleans, LA (Poster).
30. **Sankaran, S.*,** Khot, L.R., Zhou[††], J., Trapp, J., and Miklas, P. 2015. Evaluating plant responses to water stress in dry bean genetic breeding populations using remote sensing technique, Paper No. 2190729, ASABE 2015 Annual International Meeting, 26-29 July, 2015, New Orleans, LA.
31. **Sankaran, S**.*, Panigrahi, S., and Garzynski, S. 2015. Odorant binding protein-based biosensor for volatile organic compounds detection in agriculture, Paper No. 2211853, ASABE 2015 Annual International Meeting, 26-29 July, 2015, New Orleans, LA.
32. Zhou[††], J.*, Ellsworth, P., Wang[††], M., Cousins, A., **Sankaran, S**. 2015. Evaluation of water-use efficiency in *Setaria italica* using thermal imaging and visual-near infrared spectroscopy, Paper No. 94, Western American Society of Plant Biologists Section Meeting, 26-28 June, 2015, Pullman, WA.
33. **Sankaran, S.***2015. Leaf-level to Field Phenomics: Advancements and Challenges. PhytoPhenomics: EMSL Workshop in Plant Phenotyping, 12-13 Mar., 2015, Organized by Pacific Northwest National Laboratory, Richland, WA. (Invited, 25 participants)
34. Zúñiga Espinoza, C., Jarolmasjed[†], S., Kalcsits, L.A., **Sankaran, S.,** Khot, L.R., Dhingra, A., and Lewis, K. M. 2014. Fourier transform infrared and X-Ray fluorescence spectrometry based analogies of calcium and magnesium in healthy and bitter pit Honeycrisp apples, 110th

Annual Meeting of the Washington State Horticultural Association (WSHA), 1-3 Dec., 2014, Kennewick, WA (Poster).

35. Jarolmasjed[†], S., Zúñiga Espinoza, C., Khot, L.R., **Sankaran, S.,** Dhingra, A., and Lewis, K. M. 2014. X-ray computer tomography imaging and visible-near infrared spectroscopy for non-destructive apple bitter pit detection, 110th Annual Meeting of the WSHA, 1-3 Dec., 2014, Kennewick, WA (Poster).
36. Khot, L.*, **Sankaran, S.,** Cummings, T., Johnson, D., Carter, A., Serra, S., and Musacchi, S. 2014. Applications of Unmanned Aerial System in Washington State Agriculture, 12th International Conference Precision Agriculture, 20-23 July, 2014, Sacramento, CA.
37. Wang[††], M., **Sankaran, S***., Ellsworth, P., and Cousins, A. 2014. Rapid sensing for water stress detection in foxtail millet (*Setaria italica*), 12th International Conference Precision Agriculture, 20-23 July, 2014, Sacramento, CA.
38. **Sankaran, S.*,** Khot, L.R., Carter, A., Garland-Campbell, K. 2014. Unmanned aerial systems based imaging for field-based crop phenotyping: winter wheat emergence evaluation, ASABE 2014 Annual International Meeting, Montreal, Quebec, Canada, 13-16 July, 2014, Montreal, Quebec, Canada.
39. **Sankaran, S.*,** Pappu, H., and Brown, C. 2014. Computer tomography (CT) imaging for detecting anomalies in potato tubers, ASABE 2014 Annual International Meeting, 13-16 July, 2014, Montreal, Quebec, Canada.
40. **Sankaran, S.,** Brown, C., Quick, R., Hamlin, L., and Pappu, H*. 2014. Magnetic resonance imaging for detecting viral infections in potato tubers. American Phytopathological Society-Canadian Phytopathological Society (APS-CPS) 2014 Annual Joint Meeting, 9-13 Aug., 2014, Minneapolis, MN.
41. **Sankaran, S.*** 2013. Advanced Sensing Technologies for Crop Monitoring, Tree Fruit Research and Extension Center Guest Seminar, 9 Oct., 2013, Wenatchee, WA (Invited Presentation).
42. **Sankaran, S.*,** Khot, L.R., and Ehsani, R. 2013. Applications of an unmanned aerial system for field-based crop phenotyping, Donald Danforth Plant Science Center's Fall Symposium on 'PhenoDays: Imaging and Robotics for 21st Century Science', 25-27 Sep., 2013, Saint Louis, MO (Poster).
43. **Sankaran, S.*** 2013. Advancements in Sensing Technologies for Detecting Diseases in Crops, Plant Pathology Special Guest Seminar, Pullman, WA, August 26, 2013 (Invited Presentation).
44. **Sankaran, S.*,** and Ehsani, R. 2013. Overview of non-invasive sensing technologies for detecting citrus diseases, ASABE 2013 Annual International Meeting, 21-24 July, 2013, Kansas City, MO.
45. **Sankaran, S.,** Khot, L.R., Maja, J.M.*, and Ehsani, R. 2013. Comparison of two multiband cameras for use on small UAVs in Agriculture. 5th IEEE Workshop on Hyperspectral Image and Signal Processing: Evolution in Remote Sensing (WHISPERS), 25-28 June, 2013, Gainesville, FL.
46. Ehsani, R*., and **Sankaran, S**. 2013. Low-cost remote sensing tool for agricultural applications in developing countries, Innovations for International Development Symposium, University of Florida. 2 May, 2013, Gainesville, FL (Poster).

47. **Sankaran, S.,** and Ehsani, R*. 2013. Comparison of optical sensing techniques for detecting citrus diseases, 3rd International Research Conference on Huanglongbing (IRCHLB III), 4-8 Feb., 2013, Orlando, FL (Poster).
48. Ehsani, R.*, Maja, J.M., and **Sankaran, S.** 2012. Applications of low-cost multi-rotor remote sensing UAV in agriculture, CAFEi2012-135, 2012 CAFEi, 26-28 Nov., 2012, Selangor, Malaysia.
49. Ploetz, R.*, Smith, J., Hughes, M., Inch, S., Dreaden, T., Spence, D., Carrillo, D., Duncan, R., Peña, J., Kendra, P., **Sankaran, S.,** Ehsani, R., Held, B., Blanchette, R., Campbell, A., and White, T., Laurel wilt: An unusual and destructive disease of American members of the Lauraceae, Ambrosia Beetle/Fungal Symbiont Workshop, 12-14 Aug., 2012, Riverside, CA (Poster).
50. **Sankaran, S.*,** and Ehsani, R. 2012. Identification of Laurel-Wilt infected avocado plants using visible-near infrared spectroscopy, ASABE 2012 Annual International Meeting, 29 July 29-1 Aug., 2012, Dallas, TX.
51. Ehsani, R., **Sankaran, S.,** Maja, J.M., Neto, J.C., and Saraswat, D.* 2012. Implementation of multi-rotor remote sensing system for stress detection in citrus, ASABE 2012 Annual International Meeting, 29 July 29-1 Aug., 2012, Dallas, TX.
52. Ploetz, R.*, Smith, J., Peña, J., Hughes, M., Inch, S., Dreaden, T., Spence, D., Carrillo, D., Kendra, P. , **Sankaran, S.,** Ehsani, R., Mayfield, B., Campbell, A., Hulcr, J. and Stelinski, L., Laurel wilt: Understanding an unusual and exotic vascular wilt disease, 54th Annual Southern Insect Work Conference/Southwide Forest Disease Workshop, 24-27 July, 2012, Charlottesville, VA.
53. Ehsani, R., **Sankaran, S.,** Maja, J.M.*, and Neto, J.C. 2012. Affordable multi-rotor remote sensing platform for applications in precision horticulture, 11th International Conference Precision Agriculture, 15-18 July, 2012, Indianapolis, IN.
54. Ehsani, R.*, **Sankaran, S.,** and Albrigo, G.L. 2011. Optical sensors and sensor platforms for detection of citrus greening (HLB) diseases, 2011 American Society for Horticultural Science (ASHS) Annual Conference, 25-28 Sep., 2011, Waikoloa, HA.
55. **Sankaran, S.*,** and Ehsani, R. 2011. Stress detection in citrus leaves using fluorescence spectroscopy, ASABE 2011 Annual International Meeting, 7-10 Aug., 2011, Louisville, KY.
56. **Sankaran, S.*,** and Mishra, A*. 2010. Mid-infrared and near-infrared spectroscopy for Huanglongbing (HLB) detection in citrus, UF/IFAS Citrus Research and Education Center, 18 Oct., 2010, Lake Alfred, FL.
57. **Sankaran, S.*,** and Valentine, A*. 2010. Disease management and mechanical harvesting in citrus orchards, UF/IFAS Citrus Research and Education Center, 9 Sep., 2010, Lake Alfred, FL.
58. **Sankaran, S.,** Ehsani, R.*, and Dima, C. 2010. Development of ground-based sensor system for automated agricultural vehicle to detect diseases in citrus plantations, 10th International Conference Precision Agriculture, 18-21 July, 2010, Denver, CO.
59. Mishra, A., Ehsani, R., Albrigo, G.L., and **Sankaran, S.*** 2010. Application of hyperspectral imaging for the detection of citrus greening, ASABE 2010 Annual International Meeting, 20-23 June, 2010, Pittsburg, PA.
60. **Sankaran, S.*,** and Ehsani, R. 2010. Detection of Huanglongbing (greening) in citrus plantations using mid-infrared spectroscopy, ASABE 2010 Annual International Meeting, 20-23 June, 2010, Pittsburg, PA (Poster).

61. **Sankaran, S.,** and Ehsani, R.* 2010. Optical methods for Huanglongbing (HLB) detection in citrus orchards. 2010 Florida Society Horticultural Society (FSHS) Annual Meeting, 6-8 June, 2010, Crystal River, FL.
62. **Sankaran, S.*,** and Panigrahi, S. 2009. Biomimetic olfactory sensing for detection of volatile organic compound associated with Salmonella contamination in meat, 14th Annual Conference of Institute of Biological Engineering (IBE) on 'Biological Engineering: An Emerging Discipline', 19-21 Mar., 2009, Santa Clara, CA (Poster).
63. **Sankaran, S.*,** and Panigrahi, S. 2008. Investigation on selected metal oxide-based nanocomposite sensors for contamination detection in Food, ASABE 2008 Annual International Meeting, 29 June 29- 2 July, 2008, Providence, RI.
64. Panigrahi, S.*, **Sankaran, S**., and Khot, L.R. 2008. Evaluation of metal-oxide-based nanostructured sensing material for detection of compounds associated with meat contamination, 13th Annual Conference of IBE on 'A Platform for Partnerships and Progress', 6-8 Mar., 2008, Chapel Hill, NC (Poster).
65. **Sankaran, S.*,** and Panigrahi, S. 2007. Systematic performance evaluation of nanoparticulate ZnO thin film based chemoresistive sensor for food safety, CSBE/ASABE 2007 North Central Inter-Sectional Conference, 12-13 Oct., 2007, Fargo, ND.
66. **Sankaran, S.*,** Panigrahi, S., and Chang, Y. 2007. Evaluation of nanostructured novel sensing material for food contamination applications, ASABE 2007 Annual International Meeting, 17-20 June, 2007, Minneapolis, MN.
67. **Sankaran, S.*,** and Panigrahi, S. 2006. Olfactory sensing: Overview of the biology, mechanism and applications for food safety, CSBE/ASABE 2006 North Central Inter-Sectional Conference, 5-7 Oct., 2006, Saskatoon, SK, Canada.

Extension/Outreach Presentations

1. **Sankaran, S.*** 2016. High-Throughput Sensing in Agriculture. SciTech Northwest '16, 9 Nov., 2016, Seattle, WA. Event partnership: TechAlliance, Washington State University, University of Washington, and Pacific Northwest National Laboratory (Invited). Link: http://www.technology-alliance.com/scitech/. Number of participants: 200+.
2. **Sankaran, S.***, and Khot, L.R. 2016. Role of sensor technologies in precision agriculture and high-throughput phenomics. 2nd International Workshop on the Role of Robotics in Precision Agriculture, 13 Oct., 2016, Lahore, Pakistan (Invited, Webinar). Number of participants: 60.
3. **Sankaran, S.*** 2016. Advancing sensing tools and future of phenomics. North American Plant Phenotyping Network Inaugural Convening Event, Cohosted by Foundation for Food and Agriculture Research (FFAR) and Purdue University, 29-31 Aug., 2016, West Lafayette, IN (Invited). Number of participants: 170.
4. Zúñiga Espinoza, C.*, Jacoby, P., Khot, L.R., and **Sankaran, S.** 2016. Role of non-contact sensing for water management in grapevines. 2016 Viticulture Field Day, co-sponsored by Washington State University Viticulture Extension and the Washington State Grape Society, 12 Aug., 2016, Benton City, WA.
5. **Sankaran, S.*** 2016. Wheat field phenomics. Western Wheat Workers Meeting, WERA-97, 7-8 July, 2016, Pullman, WA (Invited). Approximate number of participants: 35.
6. Khot, L.R.*, and **Sankaran, S.** 2016. sUAS technology for precision ag and high-throughput phenotyping. Tutorial at Emerging sUAS Technology for Precision Agriculture Applications (AgDroneTech16), The 2017 International Conference on Unmanned Aircraft Systems, IEEE

Robotics and Automation Society, 8-10 June, 2015, Arlington, VA (Invited). Approximate number of participants: 35.

7. Zhou[††], J.*, and **Sankaran, S.** 2016. High-throughput crop phenotyping at Washington State University. Phenotypic Prediction: Image Acquisition and Analysis Workshop, Iowa State University, 23-25 Feb., 2016, Ames, IA (Invited, Poster).
8. Zhou[††], J.*, Khot, L.R., **Sankaran, S.,** and Boydston, R. 2016. Estimation of yield and water use efficiency in dry beans using airborne multispectral and thermal imagery. The 2016 Precision Farming Expo, 7-8 Jan., 2016, Kennewick, WA (Poster).
9. Zhou[††], J.*, Khot, L.R., Pavek, M., and **Sankaran, S.** 2016. Remote sensing based crop loss assessment: an application in the evaluation of potato crop damage due to hailstorms. The 2016 Precision Farming Expo, 7-8 Jan., 2016, Kennewick, WA (Poster).
10. **Sankaran, S***. 2016. Envisioning phenomics advancements relevant to northwest wheat, legumes and potatoes. The 2016 Precision Farming Expo, 7-8 Jan., 2016, Kennewick, WA (Invited). Approximate number of participants: 75-100.
11. Jarolmasjed[†], S.*, and **Sankaran, S.** 2016. Phenotyping in potato cultivars using proximal and remote sensing techniques. The 2016 Precision Farming Expo, 7-8 Jan., 2016, Kennewick, WA (Poster).
12. **Sankaran, S.*,** Zhou[††], J.*, and Bahlol, H. 2015. Drones in Agriculture. Drones @ THE REACH Program, 15 Oct., 2015, Richland, WA. Approximate number of participants: 300 (Invited Public Presentation and Demo for Elementary, Middle, High School students, and Public).
13. Zúñiga Espinoza, C.*, Jarolmasjed[†], S., Jacoby, P., Khot, L.R., and **Sankaran, S**. Evaluating water-use efficiency using advanced sensing techniques. 2015 CPAAS Open House and Agricultural Technology Day, 17 Sep., 2015, Prosser, WA. Approximate number of participants: 150-200.
14. Jarolmasjed[†], S.*, Zúñiga Espinoza, C., Kalcsits, L.A., **Sankaran, S.,** and Khot, L.R. 2015. Sensing technologies in apple bitter pit management. 2015 CPAAS Open House and Agricultural Technology Day, 17 Sep., 2015, Prosser, WA. Approximate number of participants: 150-200.
15. **Sankaran, S.*,** and Khot, L.R. 2015. High-throughput sensing technologies for evaluating phenotypes in crop improvement programs. 2015 CPAAS Open House and Agricultural Technology Day, 17 Sep., 2015, Prosser, WA. Approximate number of participants: 150-200.
16. Khot, L.R*., and **Sankaran, S.** 2015. Unmanned aerial systems in agricultural production management. 2015 CPAAS Open House and Agricultural Technology Day, 17 Sep., 2015, Prosser, WA. Approximate number of participants: 150-200.
17. **Sankaran, S.*** 2015. Sensors for high-throughput phenotyping. 2015 Louis Stokes Alliance for Minority Participation (LSAMP) Fall Symposium, 2 Sep., 2015, Pullman, WA.
18. **Sankaran, S.***, and Khot, L.R*. 2015. Phenotype-sensing technologies for plant breeding and precision agriculture applications, Element 8 Angels Tour, 19 May, 2015, Pullman, WA. Approximate number of participants: 15.
19. **Sankaran, S.*** 2015. Unmanned aerial systems for Field Phenomics. 5th: National Association of Plant Breeders Annual Meeting/9th Plant Breeding Coordinating Committee Annual Meeting, 28-30 July, 2015, Pullman, WA. Approximate number of participants: 150-200.

20. **Sankaran, S.*,** and Garzynski, S. 2015. Development of biosensor technology using olfactory proteins. WTFRC Technology Review Meeting, 2 Feb., 2015, Prosser, WA. Approximate number of participants: 25.
21. **Sankaran, S.*** 2014. Unmanned aerial systems (drones) in agricultural production and high-throughput phenotyping for plant breeding research. 2014 Washington State Crop Improvement Association (WSCIA/WNISA) Annual Meeting, 10 Nov., 2014, Pullman, WA. (Invited) Approximate number of participants: 100-125.
22. **Sankaran, S.***, Khot, L.R., Pavek, M., and Knowles, R. 2014. Developing Emerging technologies towards improving agronomic practices in field conditions. Northwest Potato Research Consortium Meeting, 31 Oct., 2014, Moscow, ID. Approximate number of participants: 30.
23. **Sankaran, S.***and Khot, L.R*. 2014. Unmanned Aerial Vehicle Research program highlight, AgriBusiness Council, Greater Spokane Cooperated, WSU Tour, 28 Oct., 2014, Pullman, WA. (Invited) Approximate number of participants: 25-30.
24. **Sankaran, S.***, Khot, L.R., Carter, A.H. 2014. Evaluating plant responses using aerial sensing techniques in wheat. Washington Grain Commission Research Review Meeting, 22 Oct., 2014, Pullman, WA.
25. **Sankaran, S.***Sensors for Phenomics in Plant Breeding, WSU Innovation Open House, WSU Foundation Annual Meeting of the Board of Trustees, 18 Sep., 2014, Pullman, WA. (Invited) Approximate number of participants: 25-30.
26. **Sankaran, S.*,** and Khot, L.R*. 2014. 'WSU Unmanned Aerial Vehicle Research in Agriculture', WSU Congressional & Legislative Staff Fact Finding Tour, 14 Aug., 2014. Pullman, WA. (Invited). Approximate number of participants: 30-50.
27. **Sankaran, S.***and Khot, L.R*. 2014. Unmanned Aerial System: Rapid Sensing Technologies in Potato Production and Management Participation, WSU Potato Field Day, 26 June, 2014, Othello, WA. Approximate number of participants: 50-70.
28. Khot, L.R.*, and **Sankaran, S.***2014. Unmanned Aerial System in Agriculture. Wilbur-Ellis Field Day, 24 June, 2014, Colfax, WA. (Invited) Approximate number of participants: 35-40.
29. Khot, L.R.*, and **Sankaran, S.***2014. Unmanned Aerial System in Agriculture. WSU Weed Science Field Tour, 18 June, 2014, Pullman, WA. (Invited) Approximate number of participants: 20-30.
30. **Sankaran, S.***and Khot, L.R*. 2014. Unmanned aerial systems (UAS) for field-based crop phenotyping in wheat. WSU Lind Dryland Research Station Field Day, 12 June, 2014, Lind, WA. Approximate number of participants: 20-30.
31. **Sankaran, S.*** 2014. Drones in Agriculture, The Othello Sandhill Crane Festival, Othello, WA, sponsored by the Greater Othello Chamber of Commerce and the Columbia National Wildlife Refuge (U.S. Fish & Wildlife Service), 29 Mar., 2014, Othello, WA (Invited Public Lecture).
32. **Sankaran, S.*** 2014. Advanced Sensing Technologies for Crop Stress and Phenotyping Monitoring, Controlled Environment Agriculture Center, University of Arizona, 6 May, 2014, Tuscon, AZ (Special Presentation).
33. **Sankaran, S.*,** and Naidu, R. 2014. Non-destructive Sampling Methods for the Detection of Grapevine Leafroll disease in Vineyards. WA State Grape and Wine Research Program, Research Review Meeting, Washington State University Tricities campus, 28 Feb., 2014, Richland, WA.

34. Khot, L.R.*, and **Sankaran, S.** 2014. Optical sensors for non-symptomatic 'bitter pit' detection in apples. 2014 Apple/Apple Crop Protection Research Review, 29-31 Jan., 2014, Yakima, WA.
35. Mazzola, M*., Mussacchi, S., Khot, L.R., and **Sankaran, S.** 2014. Investigation on a canker disease in pears. PNW Pear Research Committee Research Review Meeting, 18 Feb., 2014, Yakima, WA.
36. **Sankaran, S.*,** Khot, L.R., and Chen, W. 2014. Early Detection of Ascochyta Blight in Chickpeas using Optical Sensing Technologies. USA Dry Peas and Lentil Council, Research Review Meeting, 6-7 Feb., 2014, Moscow, ID.
37. Khot, L.R., **Sankaran, S.***, and Johnson, D. 2013. Early anomalies detection by unmanned aerial systems for reducing potato crop losses. Northwest Potato Research Consortium Fall Research Planning Meeting, 22-23 Oct., 2013, Boise, ID.
38. **Sankaran, S.*,** and Johnson, D. 2013. Feasibility study: evaluation of visible-near infrared sensing technology for rapid detection of late and early blight in potatoes. Northwest Potato Research Consortium Fall Research Planning Meeting, 22-23 Oct., 2013, Boise, ID.
39. **Sankaran, S.*,** and Pappu, H. 2013. Non-invasive imaging techniques for mitigating potato quality, processing, marketing and trade issues. Northwest Potato Research Consortium Fall Research Planning Meeting, 22-23 Oct., 2013, Boise, ID.
40. **Sankaran, S.*** 2013. Advanced Sensing Technologies for Crop Monitoring, Tree Fruit Research and Extension Center Guest Seminar, 9 Oct., 2013, Wenatchee, WA (Invited).
41. **Sankaran, S.*** 2013. Advancements in Sensing Technologies for Detecting Diseases in Crops, Plant Pathology Special Guest Seminar, 26 Aug., 2013, Pullman, WA (Invited).
42. Ehsani, R.*, and **Sankaran, S.** 2013. Low-cost remote sensing tool for agricultural applications in developing countries, Innovations for International Development Symposium, University of Florida. 2 May, 2013, Gainesville, FL.
43. **Sankaran, S.*** and Ehsani, R. 2010. HLB detection using fluorescence spectroscopy, Integrated Automation for Sustainable Specialty Crops Farming Field Day, Lykes Bros., 19 Nov., 2010, Ft. Basinger, FL (Poster).
44. **Sankaran, S.*** and Ehsani, R. 2010. HLB Detection using visible-near infrared spectroscopy, Integrated Automation for Sustainable Specialty Crops Farming Field Day, Lykes Bros., 19 Nov., 2010, Ft. Basinger, FL (Poster).
45. **Sankaran, S.*** and Ehsani, R. 2010. HLB Detection using mid-infrared spectroscopy, Integrated Automation for Sustainable Specialty Crops Farming Field Day, Lykes Bros., 19 Nov., 2010, Ft. Basinger, FL (Poster).

Teaching Experience and Training

1. Course instructor for BSysE 551: Sensors in Phenomics at Washington State University (1 credit, Spring, 2016).
2. Course instructor for BSysE 598: Graduate Seminar at Washington State University (1 credit, Fall 2015).
3. Course instructor for BSysE 541: Instrumentation and Measurements at Washington State University (3 credits, Spring, 2014; Spring, 2015; Fall 2016).
4. Guest lecture and laboratory for Biol 504: Methods in Plant Physiology at Washington State University (3 credits, Fall, 2013).

5. Course instructor for BSC 1005C: Survey of Biological Sciences at Polk State College (3 credits, Spring, 2013).

Extension and Trade Magazine Articles

1. **Sankaran, S**. 2016. High-Throughput Crop Phenotyping Technologies. ASABE Resource Magazine, May/June Issue, pp. 24-25.
   Link: http://www.asabe.org/media/227864/resource23-03mayjune2016.pdf
2. Khot, L.R., Zhang, Q., Karkee, M., **Sankaran, S.**, and Lewis, K. 2016. Small Unmanned Aerial Systems in Agriculture: Part I (Systems). FS194E. Washington State University Extension and the U.S. Department of Agriculture Extension Bulletin. Link: http://cru.cahe.wsu.edu/CEPublications/FS194E/FS194E.pdf
3. **Sankaran, S.** 2015. Phenotyping in the field goes high-tech. Good Fruit Grower, November 2015, pp. 20-21. Link: http://goo.gl/SPFaPM
4. Ehsani, R., **Sankaran, S.**, Maja, J., Garcia, F. 2012. Advanced tree stress detection technologies for citrus. Citrus Industry, May, 2012, pp. 6-7.
5. Ehsani, R., and **Sankaran, S.** 2010. Sensors and sensing technologies for disease detection. Citrus Industry, June, 2010, pp. 14-17.
6. Ehsani, R., **Sankaran, S.** and Dima, C. 2010. Growers expectations of new technologies for applications in precision horticulture (AE467). Agricultural and Biological Engineering Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida.

Leadership Activities

- Generated funds, organized, and chaired successfully a conference on '*Advances in Field-Based High-throughput Phenotyping and Data Management: Grains and Specialty Crops*' on Nov. 9-10, 2015 at Spokane, WA (Funds generated: USDA-NIFA-$48,184; Monsanto- $5,000; Total participants = 90+).
- Initiated the development of a lecture session in "Sensing for High-Throughput Phenotyping" to be available for abstract submission at 2016 ASABE AIM.

Grants Awarded

1. Integration of large-scale genomics, phenomics, and systems-level modeling for next-generation biomarkers in breeding. PIs: Stephen Ficklin, Rebecca McGee, Sindhuja Sankaran. *Funding Agency: WSU Agricultural Research Center –Emerging Research Issues* (2017-2019).
2. High-throughput phenotyping techniques to advance variety selection in grain legume. PIs: Sindhuja Sankaran, Rebecca McGee, George Vandemark, Weidong Chen. *Funding Agency: USDA-AFRI Foundation –Agricultural Engineering* (2016-2020).
3. Multispectral camera (visible and near infrared) to phenotype wheat varieties. PIs: Sindhuja Sankaran, Mike Pumphrey. *Funding Agency: Washington Wheat Foundation* (2016-2017).
4. Next generation variety development and education for grains, apples, alternative crops, and cool season legumes. PIs: Arron Carter, Sindhuja Sankaran, Zhiwu Zhang, Deven See et al. *Funding Agency: USDA-AFRI Food Security* (2015-2019).

5. Deep sub-surface micro-irrigation to increase water use efficiency in Washington vineyards. PIs: Pete Jacoby, Sindhuja Sankaran, Lav Khot, Sayed Sadeghi. *Funding Agency: Washington State Department of Agriculture – Specialty Crop Block Grant* (2015-2018).
6. Advances in high-throughput crop phenotyping. PIs: Sindhuja Sankaran, Arron Carter, Lee Kalcsits, Helmut Kirchhoff et al. *Funding Agency: USDA-AFRI Foundation- Plant Breeding for Agricultural Production* (2015-2016).
7. Rapid detection technologies for in-field and post-harvest apple bitter pit management. PIs: Lav Khot, Sindhuja Sankaran. *Funding Agency: Washington State Department of Agriculture – Specialty Crop Block Grant* (2014-2017).
8. Effectiveness of foliar calcium applications in apple bitter pit management. PIs: Lee Kalcsits, Sindhuja Sankaran, Lav Khot. *Funding Agency: Washington Tree Fruit Research Commission* (2015-2017).
9. 2D light detection and ranging (LiDAR) system for rapid field phenotyping of spring and winter wheat varieties. PIs: Sindhuja Sankaran, Arron Carter, Lav Khot, Mike Pumphrey. *Funding Agency: Washington Wheat Foundation* (2015-2016).
10. Developing high-throughput sensor technologies to screen water use efficiency in model crops. PIs: Sindhuja Sankaran, Asaph Cousins. *Funding Agency: WSU Agricultural Research Center –Emerging Research Issues* (2014-2016).
11. National Crop Insurance Services, Gift Funds.
12. External Mentor Program. PIs: Sindhuja Sankaran, Murat Kacira. *Funding Agency: WSU NSF-Advance* (2013-2014).

USDA-NIFA Hatch Project

Rapid Sensing Systems for Monitoring Crop Growth and Physiology. Collaborators: Asaph Cousins, Arron Carter, Mike Pumphrey, Helmut Kirchhoff (2014-2019).

Honors and Awards

- Outstanding Reviewer, Computers and Electronics in Agriculture, 2015.
- Certificate of Excellence in Reviewing, Computers and Electronics in Agriculture for year 2013.
- 2013 ASABE Superior Paper Award.
- Invited member of Alpha Epsilon.
- Invited member of Gamma Sigma Delta.
- Frank Bain Scholarship for the academic year, 2008-2009.
- North Dakota State University, Masters of Success's '2008 Student of the year' award, 2008.
- Lectureship eligibility through National Educational Test (NET) for the entrants in the teaching profession conducted jointly by University Grants Commission (UGC) and Council of Scientific and Industrial Research (CSIR), New Delhi, 2002.
- University First Rank in MS, 2002.
- University Fourth Rank in BS, 2000.

Professional Memberships

- American Society of Agricultural and Biological Engineers (ASABE) (2007-Present)
- Institute of Biological Engineering (IBE) (2009-Present)
- Association of Environmental Engineering and Science Professors (AEESP) (2011-Present)
- Society of Applied Spectroscopy (SAS) (2013-Present)
- International Society of Precision Agriculture (ISPA) (2014-Present)

Professional Services

Reviewer/Editor

- Serving as reviewer in 23 international agricultural and sensor journals such as Applied Engineering in Agriculture, Transactions of the ASABE, Agricultural Engineering International: CIGR Journal, IEEE Sensors, Talanta, Material Science and Engineering C. Materials for biological applications, Computers and Electronics in Agriculture, Biosensors and Bioelectronics and Crop Protection.
- Editorial Advisory Board Member, Computers and Electronics in Agriculture

Grant Review Panel Member

- USDA-NIFA Small Business Innovation Research Program: Phase 1 and 2 (
- USDA-AFRI Foundation

Professional Society

At ASABE Annual International Meeting (AIM):

- Member of following committees: Biosensors (ITSC-230); Electromagnetics and Spectroscopy (ITSC-348); Instrumentation and Controls Division (ITSC-353); Specialty Crop Engineering (MS-48); Precision Agriculture (MS-54).
- Served as a Chair for *Biosensors (ITSC-230)* committee.
- *Biosensors and Bioelectronics and Sensors in High-throughput Phenotyping* session moderator.
- Mentor, *Women in ASABE Speed Networking*, ASABE AIM.
- Currently serving as ASABE ITSC 02 Steering Committee member, as a representative to 'Meeting Council'.

At Other Conferences:

- Scientific Committee, 30th International Horticultural Congress Symposium, ISHS. 12-16 August, 2018, Istanbul, Turkey.
- National Organizing Committee, AGRICONTROL 2016: The 5th IFAC Conference on Sensing, Control and Automation for Agriculture, 14-17 August, 2016, Seattle, WA.
- *High-throughput Crop Phenotyping* moderator, AGRICONTROL 2016: The 5th IFAC Conference on Sensing, Control and Automation for Agriculture, 14-17 August, 2016, Seattle, WA.
- Program Committee, SPIE conference on 'Autonomous Air and Ground Sensing Systems for Agricultural Optimization and Phenotyping', 18-19 April, 2016, Baltimore, MA.
- *Remote Sensing* session moderator, 48th Brazilian Congress of Phytopathology, 10-14 August, 2015, São Pedro, SP, Brazil.

Other Services

Community

- Participated at Drones @ The REACH, a community outreach program that provided about 275 and more elementary-, middle- and high-school students from different backgrounds (such as STEM, Computer Science, FFA, Technology) and general public an opportunity to interact and understand the use of advanced sensing technologies in agriculture, 15 Oct., 2015, Pullman, WA.
- Judge in Imagine Tomorrow (competition for 9th to 12th graders).
- Invited Public Lecture, The Othello Sandhill Crane Festival, Othello, WA.

Media Releases

- Plant biologists welcome their robot overlords. Nature. 26 January, 2017, 541, 445-446. doi: 10.1038/541445a . Link: http://www.nature.com/news/plant-biologists-welcome-their-robot-overlords-1.21352
- Washington Scientists Forge Ahead Amid Uncertainty. Xconomy. 10 November, 2016. Link: http://www.xconomy.com/seattle/2016/11/10/washington-scientists-forge-ahead-amid-uncertainty/
- WSU researchers aim to make farming more efficient. The Spokesman-Review. 28 April, 2016. Link: http://www.spokesman.com/stories/2016/apr/25/wsu-researchers-aim-to-make-farming-more-efficient/
- WSU researchers aim to make farming more efficient. Columbia Basin Herald. 28 April, 2016. Link: http://goo.gl/Fg0QMh
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Postdoctoral Associates

- Dr. Yasin Osroosh, PhD (November 2016-Present)
- Dr. Jianfeng Zhou, PhD (September 2014-August 2016, Assistant Professor, University of Missouri)
- Dr. Gopi Kafle, PhD (January 2015- January 2016, Postdoc, Washington State University)
- Dr. Meng Wang, PhD (September 2013-July 2014, Imaging and Automation Scientist, Benson Hill Biosystems, Inc.)

Visiting Scholars

- Dr. Xiaodan Ma, Associate Professor, Heilongjiang Bayi Agricultural University (December 2016-November 2017, supported by Chinese Scholarship Council)
- Dr. Si Yongsheng, Agricultural University of Hebei (February 2015- February 2016, supported by Visiting Scholar Project, Agricultural University of Hebei)
- Ms. Honghong Gao, Xi'an Technological University (January 2015- January 2016, supported by Cultivation Fund, Xi'an Technological University)

Graduate Students

- Ms. Sanaz Jarolmasjed (Fall 2014-Present, PhD student)
- Mr. Carlos Zúñiga Espinoza (Fall 2014-Present, PhD student)
- Ms. Afef Marzougui (Fall 2016-Present, MS student, AMIDEAST Fulbright Student)
- Mr. Chongyuan Zhang (Fall 2015- Present, MS student)