

# TYLER J. NIGON

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## EDUCATION

- Ph.D.** University of Minnesota-Twin Cities; Saint Paul, MN \*Exp. 2020  
**Land and Atmospheric Science**  
Advisors: Dr. Ce Yang and Dr. David Mulla  
Committee: Dr. Daniel Kaiser, Dr. Fabián Fernandez, and Dr. Joseph Knight  
Dissertation: *Remote sensing and crop systems modeling to improve nitrogen management in corn: a combined approach*  
Concentrations: Precision agriculture, nutrient management, crop systems modeling
- M.S.** University of Minnesota-Twin Cities; Saint Paul, MN 2012  
**Land and Atmospheric Science**  
Advisors: Dr. Carl Rosen and Dr. David Mulla  
Committee: Dr. Joseph Knight  
Thesis: *Nigon, T.J. (2012). Aerial imagery and other non-invasive approaches to detect nitrogen and water stress in a potato crop (Master's thesis). U. of M. Digital Conservancy. <http://purl.umn.edu/143695>*  
Concentrations: Soil fertility, plant nutrition, remote sensing, precision agriculture
- B.S.** University of Wisconsin-Stevens Point; Stevens Point, WI 2010  
**Soil and Land Management**  
Minor study: Geographic Information Systems & Spatial Analysis
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## PROFESSIONAL EXPERIENCE

- Aglytix, Mankato, MN  
**Product Manager** Feb 2014 – Sep 2015
- Jim Cowan Agency (Pioneer Seed Sales), Burlington, WI  
**Sales Associate** Mar 2013 - Feb 2014
- Soil & Waste Department, UW-SP, Stevens Point, WI  
**Laboratory Assistant** Sep 2007 - May 2010
- Northside Elevator, Inc., Loyal, WI  
**Intern Agronomist** May - Sep 2009
- Nigon-View Dairy (family farm), Greenwood, WI  
**Farm Hand** 2000 - 2010
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**REFEREED JOURNAL PUBLICATIONS**

- 6) **Nigon, T.J.**, Dias Paiao, G., Yang, C., Mulla, D.J., Knight, J., and Fernandez, F. (2020). Prediction of early season nitrogen uptake in maize using high resolution aerial hyperspectral imagery. *Remote Sensing*, 12(8), 1234. doi: [10.3390/rs12081234](https://doi.org/10.3390/rs12081234)
- 5) **Nigon, T.J.**, Yang, C., Mulla, D.J., and Kaiser, D.E. (2019). Computing uncertainty in the optimum nitrogen rate using a generalized cost function. *Computers and Electronics in Agriculture*, 167(2019). doi: [10.1016/j.compag.2019.105030](https://doi.org/10.1016/j.compag.2019.105030)
- 4) Vashisht, B.B., **T.J. Nigon**, D.J. Mulla, C.J. Rosen, H. Xu, T. Twine, and S.K. Jalota. (2015). Adaptation of water and nitrogen management to future climates for sustaining potato yield in Minnesota: Field and simulation study. *Agricultural Water Management*, 152, 198-206. DOI: [10.1016/j.agwat.2015.01.011](https://doi.org/10.1016/j.agwat.2015.01.011)
- 3) **Nigon, T.J.**, D.J. Mulla, C.J. Rosen, Y. Cohen, V. Alchanatis, J. Knight, and R. Rud. (2015). Hyperspectral aerial imagery for detecting nitrogen stress in two potato cultivars. *Computers and Electronics in Agriculture*, 112, 36-46. DOI: [10.1016/j.compag.2014.12.018](https://doi.org/10.1016/j.compag.2014.12.018)
- 2) Rud, R., Y. Cohen, V. Alchanatis, A. Levi, R. Brikman, C. Shenderoy, B. Heuer, T. Markovitch, Z. Dar, C. Rosen, D. Mulla, and **T. Nigon**. (2014). Crop water stress index derived from multi-year ground and aerial thermal images as an indicator of potato water status. *Precision Agriculture*, 15, 273-289. DOI: [10.1007/s11119-014-9351-z](https://doi.org/10.1007/s11119-014-9351-z)
- 1) **Nigon, T.J.**, D.J. Mulla, C.J. Rosen, Y. Cohen, V. Alchanatis, and R. Rud. (2014). Evaluation of the nitrogen sufficiency index for use with high resolution, broadband aerial imagery in a commercial potato field. *Precision Agriculture*, 15, 202-226. DOI: [10.1007/s11119-013-9333-6](https://doi.org/10.1007/s11119-013-9333-6)

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**INVITED PRESENTATIONS**

- 8) **Nigon, T.J.** (2019). Digital agriculture: where have we been and where are we going? 14 Mar 2019. *LG Seeds STAR Partner Training*, Courtyard by Marriot, Mankato, MN.
  - 7) **Nigon, T.J.** (2019). [Drones in agriculture: past, present, and future](#). 7 Feb 2019. *AgroFIELD Akadémia Konferencia*, Four Points Conference Center, Kecskemét, Hungary.
  - 6) **Nigon, T.J.** (2018). Non-invasive tools for in-season nitrogen management. 12 Jan 2018. *2018 Winter Crop Days*, Heinz Center, Rochester, MN & So. Research and Outreach Center, Waseca, MN.
  - 5) **Nigon, T.J.** (2015). How data gathering by unmanned aerial vehicles can help farm operators with decision-making. 24-26 Feb 2015. *Central MN Farm Show*, Rivers Edge Convention Center, St. Cloud, MN.
  - 4) **Nigon, T.J.** (2015). Assessment of field variability for precision agriculture. 10 Feb 2015. *UMN Production Agriculture Symposium*, University of Minnesota, Saint Paul, MN.
  - 3) **Nigon, T.J.** (2014). Integrated solutions using UAV technology. 2 Dec 2014. *Corn & Soybean Management 2014*, Eagles Club, 917 15th Ave SE, Rochester, MN.
  - 2) **Nigon, T.J.** (2014). Unmanned aerial mapping. 15 Oct 2014. *Sixth annual South Dakota Invasive Species Management Association*, SD Game, Fish, & Parks, Rapid City, SD.
  - 1) **Nigon, T.J.** (2014). Use of computer vision, spectral data, and analytics to improve the location of agricultural inputs. 5 Aug 2014. *12th annual Nitrogen Use Efficiency Conference*, South Dakota State University, Sioux Falls, SD.
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**CONFERENCE PROCEEDINGS**

- 4) Laacouri, A., **T.J. Nigon**, D.J. Mulla, & C. Yang. (2018). A Case Study Comparing Machine Learning and Vegetation Indices for Assessing Corn Nitrogen Status in an Agricultural Field in Minnesota. *Proceedings of the 14<sup>th</sup> International Conference on Precision Agriculture*, Montreal, Quebec. ([online only](#))
- 3) **Nigon, T.J.**, C. Yang, & D.J. Mulla. (2018). Utilization of Spatially Precise Measurements to Autocalibrate the EPIC Agroecosystem Model. *Proceedings of the 14<sup>th</sup> International Conference on Precision Agriculture*, Montreal, Quebec. ([online only](#))
- 2) Cohen, Y., V. Alchanatis, B. Heuer, H. Lemcoff, M. Springstin, C.J. Rosen, D.J. Mulla, **T.J. Nigon**, Z. Dar, A. Cohen, A. Levi, R. Brikman, T. Markovits, & R. Rud. (2012). Evaluating Water Status in Potato Fields Using Combined Information from RGB and Thermal Aerial Images. 17 July 2012. *Proceedings of the 11<sup>th</sup> International Conference on Precision Agriculture*, Indianapolis, IN. ([online only](#))
- 1) **Nigon, T.J.**, C.J. Rosen, D.J. Mulla, Y. Cohen, V. Alchanatis, & R. Rud. (2012). Hyperspectral imagery for the detection of nitrogen stress in potato for in-season management. *Proceedings of the 11<sup>th</sup> International Conference on Precision Agriculture*, Indianapolis, IN. ([online only](#))

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**CONTRIBUTED ORAL PRESENTATIONS (WITH ABSTRACTS)**

- 7) **Nigon, T.J.** (2019). A Python Tool for Computing the Optimum Nitrogen Rate and Its Confidence Intervals Using a Generalized Cost Function. 13 November 2019. *International annual meeting of ASA-CSSA-SSSA*, San Antonio, TX. ([link to abstract](#))
  - 6) **Nigon, T.J.** (2019). Computing uncertainty in the optimum nitrogen rate using a generalized cost function. 6 August 2019. *2019 Nitrogen Use Efficiency Workshop: Developing Tools Adaptive to Wicked Nitrogen*, University of Missouri, Columbia, MO. ([link to slides](#))
  - 5) **Nigon, T.J.** (2019). The social cost of nitrogen: acknowledging the gap between the economic and socially optimum rate. 5 April 2019. *Earth and Environmental Science Student Research Symposium*, University of Minnesota, Minneapolis, MN.
  - 4) **Nigon, T.J.** (2019). The social cost of nitrogen: acknowledging the gap between the economic and socially optimum rate. 8 March 2019. *Production Agriculture Symposium*, University of Minnesota, Saint Paul, MN.
  - 3) **Nigon, T.J.**, B. Bohman, C.J. Rosen, & D.J. Mulla. (2017). Utilizing remote sensing for variable-rate nitrogen and irrigation management in potato. 23 October 2017. *International annual meeting of ASA-CSSA-SSSA*, Tampa, FL. ([link to abstract](#))
  - 2) **Nigon, T.J.**, C.J. Rosen, D.J. Mulla, Y. Cohen, V. Alchanatis, & R. Rud. (2012). Hyperspectral imagery for the detection of nitrogen stress in potato for in-season management. 17 July 2012. *11<sup>th</sup> International Conference on Precision Agriculture*, Indianapolis, IN. ([link to abstract](#))
  - 1) **Nigon, T.J.**, C.J. Rosen, & D.J. Mulla. (2011). Fusion of hyperspectral and thermal imagery for evaluating nitrogen and water status in potato for variable rate application. 17 October 2011. *International annual meeting of ASA-CSSA-SSSA*, San Antonio, TX. ([link to abstract](#))
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**CONTRIBUTED POSTER PRESENTATIONS (WITH ABSTRACTS)**

- 6) **Nigon, T.J.**, D.J. Mulla, & C. Yang. (2018). Independent calibration of the EPIC model using in-season aerial imagery. 5 November 2018. *International annual meeting of ASA-CSSA-SSSA*, Baltimore, MD. ([link to abstract](#)) (1<sup>st</sup> of 7 in poster competition)
- 5) **Nigon, T.J.**, D. Kaiser, C. Yang, & D.J. Mulla. (2017). Active and passive spectral sensing for predicting the optimum nitrogen rate and timing in corn. 15-16 November 2017. 47<sup>th</sup> *North Central extension-industry soil fertility conference*, Des Moines, IA. ([link to abstract](#)) (2<sup>nd</sup> of 29 in poster competition)
- 4) **Nigon, T.J.**, A. Laacouri, C. Yang, & D.J. Mulla. (2017). Spectral imagery to estimate leaf area index and above-ground biomass in maize. 23 October 2017. *International annual meeting of ASA-CSSA-SSSA*, Tampa Bay, FL. ([link to abstract](#)) (3<sup>rd</sup> of 16 in poster competition)
- 3) **Nigon, T.J.**, C. Yang, D.J. Mulla, & D. Kaiser. (2016). Tetrypy: a Python package for cleaning and preprocessing Tetracam multispectral imagery. 9 November 2016. *International annual meeting of ASA-CSSA-SSSA*, Phoenix, AZ. ([link to abstract](#))
- 2) **Nigon, T.J.**, C.J. Rosen, & D.J. Mulla. (2012). Plant-based approaches for in-season detection of nitrogen stress in potato. 24 October 2012. *International annual meeting of ASA-CSSA-SSSA*, Cincinnati, OH. ([link to abstract](#))
- 1) **Nigon, T.J.**, C.J. Rosen, D.J. Mulla, Y. Cohen, V. Alchanatis, & R. Rud. (2011). Hyperspectral and thermal imagery for the detection of nitrogen and water stress. 16-17 November 2011. 41<sup>st</sup> *North Central extension-industry soil fertility conference*, Des Moines, IA.

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**FUNDING**

- 6) Bohman, B. (PI), Rosen, C. (co-PI), & **Nigon, T.J.** 2019-20  
 Project title: *STTR Phase I: A novel approach to manage nitrogen fertilizer for potato production using remote sensing.*  
 Funding source: **National Science Foundation** (award no. 1913435)  
 Amount: \$225,000
- 5) Mulla, D.J. (PI), Miao, Y. (co-PI), Yang, C. (co-PI), Wilson, G., & **Nigon, T.J.** 2019-20  
 Project title: *Integration of real-time crop N stress sensing and crop modeling for precision management of N fertilizer and improvement of water quality.*  
 Funding source: **Minnesota Dept. of Agriculture Clean Water Research**  
 Amount: \$100,000
- 4) **U. of Minnesota Informatics Institute MnDRIVE Assistantship** (\$22,500 + tuition) 2017 – 2018  
 Financially supports UMN Ph.D. graduate students pursuing research at the intersection of informatics and any of the four MnDRIVE areas: *i)* Robotics, sensors, and advanced manufacturing; *ii)* global food ventures; *iii)* advancing industry while conserving our environment; and *iv)* discoveries and treatments for brain conditions.

**FUNDING** (*continued*)

- 3) **MnDRIVE Global Food Ventures Fellowship** (\$33,500 + tuition) 2016 - 2017  
Supports graduate students conducting research in the areas of food systems, safety, and security; it provides professional development opportunities to broaden the understanding of food production, processing, protection, and policy to advance Minnesota food economies.
- 2) **International Plant Nutrition Institute Scholarship** (\$2000) Oct 2011
- 1) **Hueg-Harrison Fellowship – UMN** (\$26,500) 2011 - 2012  
Recognizes graduate students with an excellent academic record and the relationship forged between the student and advisor.

**SOFTWARE CONTRIBUTIONS**

- 2) [HS-Process](#): a Python package for geospatial processing of aerial hyperspectral imagery. Released 16 Feb 2020. (download from [Anaconda Cloud](#) or [PyPI](#))
- 1) [EONR](#): a Python package for computing the optimum nitrogen rate and its confidence intervals from agricultural research data. Released 30 Mar 2019. (download from [PyPI](#))

**PATENTS**

- 1) Johnson, J.D., **Nigon, T.J.**, Abouali, M. (2016). Crop Stand Analysis – a method and system for determining crop stand count using aerial imagery. **U.S. Patent No. 9,489,576**. Issued 8 Nov 2016.

**TEACHING EXPERIENCE**

- 6) **Teaching assistant** (instructed by Dr. Ce Yang & Dr. Peter Huang)  
Computer Appl. in Bioproducts and Biosystems Eng. (BBE 2003): U of M-Twin Cities Fall 2018
- 5) **Substitute instructor: Remote Sensing of Vegetation**  
Environmental Physics (ESPM 3131): U of M-Twin Cities 27 Apr 2017
- 4) **Substitute instructor: How GPS Works**  
Environmental Physics (ESPM 3131): U of M-Twin Cities 25 Apr 2017
- 3) **Guest lecture: Remote Sensing for High Throughput Phenotyping**  
Topics in Applied Plant Sciences (HORT/AGRO 8280): U of M-Twin Cities 1 Feb 2017
- 2) **Guest lecture: Overview of the CropScan Multispectral Radiometer**  
Advanced Remote Sensing and Geospatial Analysis (FNRM 5412): U of M-Twin Cities 9 Feb 2016
- 1) **Guest lecture: Managing Spatial Variability for Precision Agriculture Applications**  
Precision Agriculture (SOIL 4111): U of M-Twin Cities 23 Feb 2015

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**HONORS AND AWARDS**

- 9) **Outstanding Graduate Student Award – International Society of Precision Agriculture** Jun 2018  
Recognizes graduate student achievement, training, preparation, and research in the area of precision agriculture. It is awarded to ten graduate students that presented their research at the 14<sup>th</sup> International Conference on Precision Agriculture in Montréal, Quebec.
  - 8) **President’s Student Leadership and Service Award – UMN** Apr 2018  
Recognizes the accomplishments and contributions of outstanding student leaders at the University of Minnesota-Twin Cities. It is presented to approximately one-tenth of one percent of the student body for their exceptional leadership and service to the University of Minnesota and the surrounding community.
  - 7) **Future Leaders in Science Award – Congressional Visits Day, Washington, DC** Mar 2018  
Recipients receive policy, communication, and advocacy training to learn how to effectively work with members of Congress and their staff, then get the opportunity to meet with Congressional delegation; sponsored by the American Society of Agronomy.
  - 6) **Graduate Student Poster Presentation Competition – Des Moines, IA (\$200)** Nov 2017  
North Central extension-industry soil fertility conference – 2<sup>nd</sup> place of 29
  - 5) **International Plant Nutrition Institute Regional Scholar Award (\$300)** Nov 2017
  - 4) **Graduate Student Poster Presentation Competition – Tampa, FL (\$100)** Nov 2017  
International annual meeting of ASA-CSSA-SSSA – 3<sup>rd</sup> place of 16
  - 3) **Graduate Student Leadership Conference** Nov 2016  
The American Society of Agronomy awards 75 graduate students to participate in skills sessions to improve speaking, professionalism, leadership, science communication, and ethics.
  - 2) **Chancellor’s Leadership Award – UWSP** May 2010  
Honors graduating students who have contributed leadership, demonstrated campus and community service, and have shown a commitment to personal growth throughout their UWSP career.
  - 1) **Outstanding Soil and Waste Resources Student – UWSP** May 2010  
Honors a student who has an excellent academic record and has shown leadership within the department.
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**PROFESSIONAL MEMBERSHIPS AND ACTIVITIES***Memberships:*

<b>American Society of Agronomy &amp; Soil Science Society of America</b>	Since 2008
<b>Soil and Water Conservation Society</b>	Since 2008
<b>International Society of Precision Agriculture</b>	Since 2012
<b>Soil &amp; Water Conservation Society – UW-Stevens Point Student Chapter</b>	2007 - 2010
President	2009 - 2010
Treasurer	2008 - 2009

*Journal Reviews (11):*

<b>Agronomy Journal</b>	(1)
<b>Computers and Electronics in Agriculture</b>	(5)
<b>GIScience &amp; Remote Sensing</b>	(1)
<b>IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing</b>	(2)
<b>International Journal of Remote Sensing</b>	(2)

*Review Committees:*

<b>Precision Nutrient Management Search Committee</b>	2016 - 2017
<i>Department of Soil, Water, &amp; Climate, University of Minnesota</i>	
Served on the search committee for Precision Nutrient Management faculty position	
<b>Travel Grants Committee</b>	2016 - 2017
<i>Council of Graduate Students, University of Minnesota</i>	
Reviewed grant applications and served on a team to delegate funding to students	