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BACKGROUND

Dr. Nemali joined the Department of Horticulture and Landscape Architecture at Purdue University in July 2016 as an Assistant Professor and Extension Specialist. At Purdue University, Dr. Nemali has responsibility for developing extension, research and teaching activities related to Controlled Environment Agriculture (CEA) and floriculture. He develops region-specific best production practices that maximize productivity, crop value, and food safety in CEA. Further, he trains CEA growers in Indiana and the Midwest with research-based information to increase their competitiveness and decision-making abilities. In addition to supporting CEA industry, Dr. Nemali is engaged in translating the benefits of CEA to the community. He establishes indoor CEA systems in schools to provide hands-on experience and formal education to schoolchildren on indoor vegetable production. The goal of his program is to increase the awareness and liking for healthy food choices (e.g. leafy greens) among schoolchildren. Dr. Nemali also leads the floriculture program at Purdue. He is focused on developing state-of-the-art and affordable 'smart sensors' (digital sensors) that can aid in improving quality and productivity of floriculture crops and filling the gap created by limited trained workforce in the industry. He transfers the smart technology to floriculture growers through extension programs.

GENERAL INFORMATION

A. Academic Degrees

- Ph.D. in Horticulture, University of Georgia, Athens, GA. December 2005
- M.S. in Horticulture, University of Georgia, Athens, GA. December 2002
- B.S. in Agriculture, Acharya N.G. Ranga Agriculture University, India, December 1992

B. Professional Experience

- July 2016 - Current: Assistant Professor and Extension Specialist, Purdue University
- October 2007- June 2016: Controlled Environment Crop Physiologist, Monsanto Company, U.S.A.
- January 2006 – June 2007: Post-Doctoral Fellow, University of California, Davis, CA
- January 2001- December 2005: Graduate Research Assistant, Horticulture Department, University of Georgia, Athens, GA
- October 1996 – October 2000: Horticulturalist, Ramoji Film City, AP, India

C. Awards and Honors

Purdue University:

- Scholarship of Engagement Fellow, Purdue University (2020)

- Purdue University Cooperative Extension Specialists Association (PUCESA) Early Career Award (2019)
- Seeding for Success Award (2019)

Monsanto Company:

- Technology Award (2015, 2014)
- Above and Beyond Award (2014)
- Regulatory Leadership Team Award (2014)
- Excellence Award for Identification of Area of Improvement in Safety (2010)
- Yield and Traits Program Awards (2008, 2009 and 2011)

D. Membership in Academic, Professional, and Scholarly Societies

- American Society for Horticultural Science, since 2001
- American Society of Plant Biologists, 2006-07

ENGAGEMENT

Extension Publications

(i). Expert Reviewed Extension Publications

Publications with graduate student names (underlined) in the list shown below. These publications can be accessed on Purdue Extension Education Store (link).

1. Nemali, K. (2021). Temperature Control in Greenhouses. (HO-327-W).
2. Adhikari, R. and Nemali, K. (2020). Substrate versus Fertilizer-based Electrical Conductivity Measurements (HO-322-W).
3. Nemali, K. (2020). Plant Monitoring Using Smartphones in Protected Agriculture (HO-318-W).
4. Adhikari, R. and Nemali, K. (2020). Optimal Fertilizer Concentration for Early vs. Late Flowering Petunia Varieties (HO-313-W).
5. Nemali, K. (2020). Slowing Growth of Ornamentals for Holding Plants in Greenhouses (HO-314-W).
6. Miller, A. G., Langenhoven, P., and Nemali, K. (2020). Optimal fertilizer solution concentration for hydroponic lettuce production (HO-311-W)
7. Miller, A. G., Langenhoven, P., and Nemali, K. (2020). Performance of Lettuce Varieties in Greenhouse Hydroponic Production (HO-309-W)
8. Miller, A. G., Langenhoven, P., & Nemali, K. (2020). Performance of Lettuce Varieties under Cold Temperature Conditions in Greenhouse Hydroponic Production (HO-310-W)
9. Miller, A. and K. Nemali. 2019. Heating Requirements for Winter Hydroponic Lettuce Production (HO-308-W).
10. Nemali, K. 2018. Understanding the Pores of a Soilless Substrate (HO-287-W).
11. Nemali, K. 2018. A Detail of Electrical Conductivity Measurements in Greenhouse Production (HO-286-W).
12. Nemali, K. 2018. Pour-through Technique of Measuring Electrical Conductivity of the Substrate (HO-285-W).

13. Nemali, K. 2018. Starter Fertilizer Can Provide Substantial Amount of Nutrients in Sub-irrigation (HO-284-W).
14. Nemali, K. and P. Langenhoven. 2018. Determining the Economic Value of Providing Supplemental Light to Lettuce during Winter Production (HO-283-W).
15. Nemali, K. 2018. Normalized Difference Vegetation Index (NDVI): A Promising Method to Detect Crop Light Use in Greenhouses (HO-282-W).

Table 1. Metrics on extension publications on Purdue Education Store

Period	Number of Publications	Number of Downloads	Avg. Downloads per publication	Range
Jan, 2018 to Dec 2020	14	12620	902	67 to 5052

(ii). Articles in Industry Magazines

Following is a list of articles of Dr. Nemali and his graduate students published in popular industry magazines:

1. R. Adhikari, C. Li, and K. Nemali. 2019. Sensing the N. GrowerTalks.
2. K. Nemali. 2019. Phone Home. Greenhouse Management.
3. K. Nemali. 2019. Monitor Plant Quality with Next Generation Sensors. Greenhouse Management.
4. R. Adhikari, C. Li, K. Kalbaugh, and K. Nemali. 2019. A low-cost sensor connected to smartphone/computer for measuring plant nitrogen content. American Floral Endowment Newsletter.
5. J. Craver, K. Nemali, and R. Lopez. 2019. Monitoring growth of bedding plant seedlings using images. Greenhouse Management.
6. K. Nemali. 2019. Monitor Plant quality with next generation sensors. Nursery Management
7. K. Nemali, R. Adhikari, C. Li, and K. Kalbaugh. 2020. Smart sensor for measuring plant nitrogen status of floriculture crops. American Floral Endowment newsletter.

Technology Transfer Tools

(i) Website Development

Dr. Nemali manages CEA website (www.purdue.edu/hla/sites/cea) specifically developed for growers, extension educators, and students to learn about his extension and applied research programs. Since its inception in January 2018, Dr. Nemali's website had 16,266 sessions, 12,791 users, and 34,876 page views with 77% of them viewed by new visitors (source: Google Analytics; Feb 28, 2021).

(ii) Social Media

Dr. Nemali hosts separate Facebook pages for Indiana Flower Growers Association and Indiana Hydroponic Growers Alliance. There are 274 members on both Facebook pages. There has been an increase of 35% in membership and more than 2000 active posts in the last 12 months.

Extension Presentations

(i) Invited Extension Presentations

Table 2. List of invited Extension presentations since 2016

Month, Year	Sponsor	Title	Topic	Attendees
Dec, 2016	University of Kentucky-Extension	Speaker	Temperature effects on growth of floriculture crops	60
Jan, 2017	Iliana Conference/ Schererville, IN	Speaker	Greenhouse transplant production	70
Mar, 2017	Indiana Small Farms Conference/Danville, IN	Speaker	Smartphone apps for sensing irrigation needs	15
Jan, 2019	Illinois Specialty Crop Conference, Springfield, IL	Speaker	Greenhouse and indoor hydroponics	24
Feb, 2020	Women in Ag conference, Muncie, IN	Speaker	Home hydroponics	32
Aug, 2020	University of Missouri Extension, Springfield	Speaker	In-service training on Hydroponics	postponed (COVID)
Oct, 2020	Booker T. Washington High School, Houston, TX	Speaker	Floriculture in the US	14
Nov, 2020	The Tippecanoe Senior Center, Lafayette, IN	Speaker	Growing leafy greens at home	8
Feb, 2021	University of New Hampshire, Extension	Speaker	Indoor farming for beginner farmers	24
Mar, 2021	Gary Urban Farming Initiative	Speaker	Hydroponics 101	16
Jul, 2021	Cultivate' 21	Speaker	HRI, thrive series	TBD

(ii). Other Extension Presentations

Table 3. List of other Extension presentations since 2016

Date	Conference/Location	Role	Topic	Attendees
Oct, 2016	Annual Conference of Indiana Flower Growers Association, Purdue	Chair/ Speaker	Multiple/ Business related	41
Jan, 2017	Indiana Horticulture Congress, Indianapolis	Session Chair	Supplemental lighting in greenhouses, Forms of N fertilizer	15
Mar, 2017	Hydroponic Workshop, Purdue University	Chair/ Speaker	Nutrition, lighting and temperature requirements of hydroponic crops	41
Sep, 2017	Hydroponic Workshop/Purdue University	Chair/ Speaker	Supplemental lighting in greenhouses	66
Oct, 2017	Annual Conference of Indiana Flower Growers Association, Purdue University	Chair	Multiple/ Business related	28
Feb, 2018	Indiana Horticulture Congress/ Indianapolis	Chair/ Speaker	Lighting and plant nutrition	34
Sep, 2018				73

	Hydroponic Workshop/Purdue University	Chair/ Speaker	Heating, Nutrition, Biological Control, Marketing, Disease Management and Food Safety; hands-	
Oct, 2018	Annual Conference of Indiana Flower Growers Association, Purdue University	Chair/ Speaker	Multiple/ Business related	25
Feb, 2019	Indiana Horticulture Congress/ Indianapolis	Speaker	Heating requirement for greenhouses; Vertical farming	33
Sep, 2019	Hydroponic Workshop/Purdue University	Speaker	Identifying nutrient deficiencies, measuring light intensity using sensors, calibrate electrical conductivity sensors, demonstration on building an indoor production facility, and growth under different hydroponics substrates	85
Oct, 2019	Annual Conference of Indiana Flower Growers Association, Purdue University	Speaker	Smartphone for monitoring germination, height and compactness; Low-cost N sensor/ automated container irrigation; Experience EC/pH sensors; Light spectrum effects on bedding plants	25

Table 4. Extension webinars on 'Greenhouse and Indoor Production of Specialty Crops'

Month, Year	Topic (Presenter)	Participants
Jun, 2020	Greenhouse Construction (Nemali)	28
Jul, 2020	Heating and Cooling in Greenhouses (Nemali)	31
Aug, 2020	Integrating Biopesticides into Pest Management Programs (Ingwell)	35
Sep, 2020	Identifying Nutrient Deficiencies in Greenhouse and Indoor Crops (Nemali)	34
Oct, 2020	Hydroponics 101 (Nemali)	65
Nov, 2020	Indoor (Vertical) Farming (Nemali)	32
Feb, 2021	Greenhouse Strawberry Production (Kubota, The Ohio State University)	34

DISCOVERY

Scientific Publications

(i). Publications after joining Purdue (graduate student names are underlined)

1. Kong, Y. and K. Nemali. (2020). Blue and Far-red Light Affect Number and Area of Individual Leaves to Influence Vegetative Growth and Pigment Synthesis in Lettuce. Frontiers in Plant Science (submitted).

2. Burgner, S., Nemali, K., Massa, G., Wheeler, R., Morrow, R., & Mitchell, C. A. (2020). Growth and photosynthetic responses of Chinese cabbage (*Brassica rapa* L. cv. Tokyo Bekana) to continuously elevated carbon dioxide in a simulated Space Station "Veggie" crop-production environment. Life Sciences in Space Research. Published. https://doi.org/https://doi.org/10.1016/j.lssr.2020.07.007
3. Miller, A., Adhikari, R., & Nemali, K. (2020). Recycling nutrient solution can reduce growth due to nutrient deficiencies in hydroponic production. Frontiers in Plant Science. https://doi.org/https://doi.org/10.3389/fpls.2020.607643
4. Adhikari, R., & Nemali, K. (2020). A Novel Method for Estimating Nitrogen Stress in Plants Using Smartphones. Horticulturae (MDPI Journal), 6(4), 76. https://doi.org/https://doi.org/10.3390/horticulturae6040074
5. Miller, A., Langenhoven, P., & Nemali, K. (2020). Maximizing Productivity of Greenhouse-grown Hydroponic Lettuce during Winter. HortScience, 55(12). https://doi.org/https://doi.org/10.21273/HORTSCI15351-20
6. Adhikari, R., Li, C., Kalbaugh, K., & Nemali, K. (2020). A low-cost smartphone controlled sensor based on image analysis for estimating whole-plant tissue nitrogen (N) content in floriculture crops. https://doi.org/https://doi.org/10.1016/j.compag.2019.105173
7. Fischer, J., Nemali, K., & Rogan, G. (2020). Yield component responses of biotechnology-derived drought tolerant maize under controlled environment conditions. Agricultural and Environmental Letters, 5(1). https://doi.org/https://doi.org/10.1002/ael2.20007
8. Craver, J., Nemali, K., & Lopez, R. (2020). Acclimation of growth and photosynthesis in petunia seedlings exposed to high intensity blue radiation. Journal of the American Society for Horticultural Science, 145(3). https://doi.org/https://doi.org/10.21273/JASHS04799-19
9. Li, C., Adhikari, R., Miller, A., Kalbaugh, K., & Nemali, K. (2020). Measuring Plant Growth Characteristics Using Smartphone Based Image Analysis Technique in Controlled Environment Agriculture. 2020. Computers and Electronics in Agriculture. https://doi.org/https://doi.org/10.1016/j.compag.2019.105123.
10. Nemali, K., & van Iersel, M. (2019). Relating Whole-plant Photosynthesis to Physiological Acclimations at Leaf and Cellular Scales under Drought Stress in Bedding Plants. Journal of the American Society for Horticultural Science. https://doi.org/https://doi.org/10.21273/JASHS04665-19.
11. Kong, Y., Nemali, A., Mitchell, C. A., & Nemali, K. (2019). Spectral Quality of Light Can Affect Energy Consumption and Energy-Use Efficiency of Electrical Lighting in Indoor Lettuce Farming. HortScience. https://doi.org/https://doi.org/10.21273/HORTSCI13834-18.

(ii). Publications prior to joining Purdue

1. K.S. Nemali, C. Bonin, F.G. Dohleman, M. Stephens, W.R. Reeves, D.E. Nelson, P. Castiglioni, J. E. Whitsel, B. Sammons, R.A. Silady, D. Anstrom, R. E. Sharp, O. R. Patharkar, D. Clay, M. Coffin, M. A. Nemeth, M. E. Leibman, M. Luethy & M. Lawson. 2015. Physiological Responses Related to Increased Grain Yield under Drought in the First Biotechnology-Derived Drought Tolerant Maize. Plant Cell & Environment 38 (9): 1866-80.
2. H.M. Easlon, K.S. Nemali, J.H. Richards et al. 2013. The physiological basis for genetic variation in water-use efficiency and carbon isotope composition in Arabidopsis thaliana. Photosynthesis Research 119 (1-2):119-29.

3. J.K. McKay, J.H. Richards, K.S. Nemali, S. Sen, T. Mitchell-olds, S. Boles, E.A. Stahl, T. Wayene, T.E. Juenger. 2008. Genetics of drought adaptation in Arabidopsis thaliana II: QTL analysis of new mapping population, Kas-1 x Tsu-1. Evolution 62 (12): 3014-3026.
4. K.S. Nemali and M.W. van Iersel. 2008. Physiological responses to different substrate water contents: screening for high water-use efficiency in bedding plants. J. Amer. Soc. Hort. Sci. 133: 1-8.
5. K.S. Nemali and M.W. van Iersel. 2007. A new controller for irrigation and simulating drought stress in potted plants. Scientia Horticulturae 110: 292-297.
6. K.S. Nemali, F. Montesano, S.K. Dove, and M.W. van Iersel. 2007. Calibration and Performance of moisture sensors in soilless substrates: ECH2O and Theta probes. Scientia Horticulturae. 112: 227-234.
7. van Iersel, M.W. and K.S. Nemali. 2004. Drought stress can produce small but not compact marigolds. HortScience 39: 1298-1301.
8. Kang, J-G., M.W. van Iersel, and K.S. Nemali. 2004. Fertilizer concentration and irrigation method affect growth and fruiting of ornamental pepper. J. Plant Nutr. 27: 867-884.
9. Nemali, K.S. and M.W. van Iersel. 2004. Acclimation of wax begonia to light intensity: changes in photosynthesis, respiration, and chlorophyll concentration. J. Amer. Soc. Hort. Sci. 129: 745-751.
10. Nemali, K.S. and M.W. van Iersel. 2004. Light effects on wax begonia: photosynthesis, growth respiration, maintenance respiration, and carbon use efficiency. J. Amer. Soc. Hort. Sci. 129: 416-424.
11. Nemali, K.S. and M.W. van Iersel. 2004. Light Intensity and fertilizer concentration: II. Optimal fertilizer solution concentration for species differing in light requirement and growth rate. HortScience 39:1293-1297.
12. Nemali, K.S. and M.W. van Iersel. 2004. Light Intensity and fertilizer concentration: I. estimating optimal fertilizer concentration from water-use efficiency of wax begonia. HortScience 39:1287-1292.
13. Nemali K.S. (Sainath-Krishna, M.N) and M.W. van Iersel. 2003. Light effects on wax begonia: photosynthesis, growth respiration, and maintenance respiration. Acta Hort. 624:541-547.

(iii). Book Chapters

1. K.S. Nemali and M. Stephens. 2014. Plant Abiotic Stress: Water. Encyclopedia of Agriculture and Food Systems, Elsiever Publishing Company 4: 335-43.
2. Nemali, K. and M.van Iersel.2004. Acclimation and growth of photosynthesis of wax begonias grown at different light levels. In: E. Runkle and P. Fischer (eds.) Lighting up profits. Understanding greenhouse lighting. p. 22-23. Meister publishing, Willoughby, Ohio. (ISBN 1-892829-10-X).

(iv). Accepted Conference Abstracts (student names are underlined)

1. Adhikari, R. and Nemali, K. 2020. A low-cost image based technique for measuring tissue nitrogen. Annual Conference of the American Society for Horticultural Science. Orlando, FL, United States.
2. Kong, Y. and Nemali, K 2020. Increasing productivity and phytochemical content in crops grown in vertical farms. Annual Conference of the American Society for Horticultural Science. Orlando, FL, United States.

3. Nemali, K. 2020. Lettuce Growth in Different Hydroponic Production Systems, Annual Conference of the American Society for Horticultural Science. Orlando, FL, United States.
4. Miller, A. G., Langenhoven, P., Nemali, K. 2020. Energy-Use-Efficiency Differences Between LED Supplemental Lights under Nutrient Film Technique (NFT) and Constant Flood Table (CFT) Systems, Indiana Horticultural Conference and Expo, Purdue Extension, Indianapolis, IN.
5. Miller. A, P. Langenhoven and K. Nemali. 2019. Nighttime Supplemental Lighting and Heated Hydroponic Solution Effects on the Growth of Different Lettuce Varieties in Nutrient Film and Deep Flow Techniques. HortScience.
6. Y. Kong and K. Nemali. 2019. Improving Energy Use Efficiency and Nutritive Quality of Lettuce in Indoor Production. HortScience.
7. Adhikari, R and K. Nemali. 2019. Physiological Bases for Differential Growth Responses to Supplied Nitrogen Concentration in Poinsettia Cultivars. HortScience.
8. Adhikari, R., C. Li and K. Nemali. 2019. Measuring Tissue Nitrogen (N) Content Using Smart Phones. HortScience.
9. Miller. A, P. Langenhoven and K. Nemali. 2019. Energy-Use-Efficiency Differences between Light Emitting Diode Based Supplemental Lights Under Nutrient Film and Deep Flow Techniques. HortScience.
10. Nemali, K. 2019. Modern Climate-Controlled Greenhouses. HortScience.
11. Miller, A and K. Nemali. 2018. Recycled Nutrient Solution Effects on Hydroponic Lettuce Growth in Deep Water Culture and Nutrient Film Technique. HortScience.
12. Miller, A and K. Nemali. 2018. Automated and Non-destructive Measurement of Plant Growth Characteristics using a Multispectral Image Based Technique in Controlled Environment Agriculture (CEA). HortScience.
13. R. Adhikari and K. Nemali. 2018. Estimating Tissue Nitrogen (N) Content in Floriculture Crops using Image Analysis. HortScience.
14. R. Adhikari and K. Nemali. 2018. .Image Analysis Technique for Remotely Estimating Light Absorption Efficiency in Plants Grown in Controlled Environment Agriculture (CEA). HortScience.
15. Kong, Y and K. Nemali. 2018. Comparison and basis of differences in energy use efficiency among different light emitting diode fixtures with varying light quality in indoor production. HortScience.
16. Kong, Y and K. Nemali. 2018. Development of a light controller for optimizing light use in plant factories. HortScience.
17. Nemali, K. 2017. Application of Remote Sensing to Monitor Plant Input Needs in Controlled Environment Agriculture. HortScience.
18. Nemali, K. 2017. Monitoring Supplemental Light Use of Petunia Using Normalized Difference Vegetation Index (NDVI) and Quantum Sensors HortScience.
19. Nemali, K. 2017. Managing Recycled Nutrient Solution for Maximum Growth of Hydroponic Lettuce. HortScience.
20. Nemali, K. 2017. Using Crop Reflectance Ratio to Optimize Nitrogen Concentration in the Nutrient Solution for Hydroponic Lettuce. HortScience.
21. Craver, J.C., K. Nemali and R. Lopez. 2017. Physiological acclimation of petunia seedlings to varying light intensity, light quality and CO2 concentrations in indoor production. HortScience.

22. Craver, J.C., K. Nemali and R. Lopez. 2017. Noninvasive imaging using fluorescence to measure growth of annual bedding plant seedlings. HortScience.
23. Nemali, K and M.W. van Iersel. 2016. Photosynthesis response of tomato plants subjected to drought treatments that differed in the rate but not level or duration of exposure to drought stress. HortScience.
24. Nemali, K. 2016. Improving production efficiency in controlled environment agriculture by utilizing remote sensing technologies. HortScience.
25. Nemali, K and M.W. van Iersel, 2016. Improving water and nutrient retention capacity of the pine bark substrate using amendments. HortScience.

Research Presentations

(i). Invited Presentations

1. Smart Sensors for Vertical Farming Industry. Department of Horticulture and Crop Science. **The Ohio State University**, Columbus, OH (May, 2021).
2. Smart Sensors in Controlled Environment Agriculture. Horticulture and Landscape Architecture Department. **Oklahoma State University**, Stillwater, OK (March, 2021).
3. Increasing Crop Value and Productivity in Vertical Farming. Department of Horticulture. **University of Arkansas**, Fayetteville, AK (2021)
4. Smart Sensors for Greenhouse Production. Horticulture Department. **G.B. Pant University of Agriculture and Technology, Pant Nagar, India** (2020).
5. Smart Sensors. Department of Horticulture and Landscape Architecture. **Colorado State University**, Fort Collins. CO (2020)
6. Optimizing energy use in vertical farming. Department of Horticulture Science, **Texas Agriculture & Mechanical University.** College Station, TX (2019)
7. Modern Climate-Controlled Greenhouses. **American Society for Horticultural Science Annual Conference**, Las Vegas, NV. (2019)
8. Next Generation Sensors. **Cultivate**, Columbus OH (2019).
9. Smartphone based Estimation of Plant Growth and Nitrogen Status. **American Society for Horticultural Science Annual Conference**, Washington DC. (2018)
10. Controlled Environment Agriculture. **Utsunomiya University, Tochigi, Japan** (2017)
11. Application of Remote Sensing to Monitor Plant Input Needs in Controlled Environment Agriculture. (Workshop Presentation). **American Society for Horticultural Science Annual Conference**, HI (2017).

(ii). Conference Presentations

1. Nemali, K., Adhikari, R. 2020. "A low-cost image based technique for measuring tissue nitrogen," Annual Conference of the American Society for Horticultural Science, Orlando, FL, United States.
2. Kong, Y. and Nemali, K. 2020. "Increasing productivity and phytochemical content in crops grown in vertical farms," Annual Conference of the American Society for Horticultural Science, Orlando, FL, United States. (August 2020).
3. Nemali, K. 2020. "Lettuce Growth in Different Hydroponic Production Systems," Annual Conference of the American Society for Horticultural Science,, Orlando, FL, United States. (August 2020).

4. Miller. A, P. Langenhoven and K. Nemali. 2019. Nighttime Supplemental Lighting and Heated Hydroponic Solution Effects on the Growth of Different Lettuce Varieties in Nutrient Film and Deep Flow Techniques. ASHS Annual Conference, Las Vegas, NV.
5. Y. Kong and K. Nemali. 2019. Improving Energy Use Efficiency and Nutritive Quality of Lettuce in Indoor Production. ASHS Annual Conference, Las Vegas, NV.
6. Adhikari, R and K. Nemali. 2019. Physiological Bases for Differential Growth Responses to Supplied Nitrogen Concentration in Poinsettia Cultivars. ASHS Annual Conference, Las Vegas, NV.
7. Adhikari, R, C. Li and K. Nemali. 2019. Measuring tissue nitrogen content using smartphones. Cultivate. Columbus OH.
8. Kong, Y and K. Nemali. 2018. Comparison and basis of differences in energy use efficiency among different light emitting diode fixtures with varying light quality in indoor production. ASHS Annual Conference, Washington, DC.
9. Nemali, K and A. Miller. 2017. Managing Recycled Nutrient Solution for Maximum Growth of Hydroponic Lettuce. ASHS Annual Conference, Waikoloa, HI.
10. Nemali, K and A. Miller. 2017. Using Crop Reflectance Ratio to Optimize Nitrogen Concentration in the Nutrient Solution for Hydroponic Lettuce. ASHS Annual Conference, Waikoloa, HI.
11. Nemali, K and M.W. van Iersel. 2016. Photosynthesis response of tomato plants subjected to drought treatments that differed in the rate but not level or duration of exposure to drought stress. ASHS Annual Conference, Atlanta, GA
12. Nemali, K. 2016. Improving production efficiency in controlled environment agriculture by utilizing remote sensing technologies. ASHS Annual Conference, Atlanta, GA.
13. Nemali, K and M.W. van Iersel, 2016. Improving water and nutrient retention capacity of the pine bark substrate using amendments. ASHS Annual Conference, Atlanta, GA.

External Grants

Dr. Nemali received a total of **$509,477** in external grants

1. Agency/Title of Grant: USDA/Developing technology and best practices for producing *Escherichia coli* (*E.coli*) free hydroponic lettuce, IN
2. Duration of Funding (Dates): 09/30/2019 to 09/29/2022
3. Total amount of award: $90,115.00
4. Your role: PI
5. If Co-PI, for how much of the total funding are you directly responsible: NA

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1. Agency/Title of Grant: Horticulture Research Institute/ Measurement of Plant Nitrogen Status in Floriculture and Nursery Production Using Smartphones
2. Duration of Funding (Dates): 03/01/2019 to 12/31/2020
3. Total amount of award: $48,000
4. Your role: PI
5. If Co-PI, for how much of the total funding are you directly responsible: NA

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1. Agency/Title of Grant: American Floral Endowment/ Smartphone-Based Rapid, Inexpensive, and Accurate Estimation of Plant Nitrogen Status in Floriculture
2. Duration of Funding (Dates): 08/20/2018 to 07/20/2020
3. Total amount of award: $33,000
4. Your role: PI
5. If Co-PI, for how much of the total funding are you directly responsible: NA

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1. Agency/Title of Grant: ISDA SCBG/ Research-Based Extension Education Program for Increased Year-Round-Profitability in Hydroponic Lettuce Production
2. Duration of Funding (Dates): 09/30/2017 to 09/30/2020
3. Total amount of award: $50,000
4. Your role: PI
5. If Co-PI, for how much of the total funding are you directly responsible: NA

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1. Agency/Title of Grant: ISDA SCBG/ Research-Based Education for Indiana Beginner Farmers on Profitable Indoor (Vertical) Farming
2. Duration of Funding (Dates): 09/30/2017 to 09/30/2020
3. Total amount of award: $35,000
4. Your role: PI
5. If Co-PI, for how much of the total funding are you directly responsible: NA

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1. Agency/Title of Grant: Multi-Sponsored/ Galema Greenhouse Inc.
2. Duration of Funding (Dates): 01/10/2018 to 12/31/2075
3. Total amount of award: $3,000
4. Your role: PI
5. If Co-PI, for how much of the total funding are you directly responsible: NA

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1. Agency/Title of Grant: Fred Gloeckner Foundation/ Smartphone-Based Rapid, Inexpensive, and Accurate Estimation of Plant Nitrogen Status in Floriculture Production
2. Duration of Funding (Dates): 09/01/2017 to 08/31/2019
3. Total amount of award: $25,000
4. Your role: PI
5. If Co-PI, for how much of the total funding are you directly responsible: NA

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1. Agency/Title of Grant: USDA-FAS/ Plant Health/IPM for hydroponic vegetable crops
2. Duration of Funding (Dates): 08/15/2018 to 09/30/2020
3. Total amount of award: $46,660
4. Your role: PI
5. If Co-PI, for how much of the total funding are you directly responsible: NA

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1. Agency/Title of Grant: USDA-FAS/ Development of an affordable and efficient hydroponic or aeroponic crop production technology for Egypt and their adoption through extension

2. Duration of Funding (Dates): 08/012019 to 07/31/2021
3. Total amount of award: $49,830
4. Your role: PI
5. If Co-PI, for how much of the total funding are you directly responsible: NA

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1. Agency/Title of Grant: Purdue Graduate School/ Ross Fellowship or Assistantship
2. Duration of Funding (Dates): 01/01/2017 to 07/31/2020
3. Total amount of award: $28,872
4. Your role: PI
5. If Co-PI, for how much of the total funding are you directly responsible: NA

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1. Agency/Title of Grant: Purdue Office of Provost/ Advanced Hydroponic Production and Phenotyping for Horticulture Education
2. Duration of Funding (Dates): 01/01/2020 to 12/31/2020
3. Total amount of award: $100,000
4. Your role: PI
5. If Co-PI, for how much of the total funding are you directly responsible: NA

In addition, Dr. Nemali received several thousands of dollars in kind from industry. He received LED lights worth $3200 from Happy Leaf Corporation, IL, a $2000 in discount for research from Venttis, MI, and LED lights worth $4500 from Fluence BioScience, TX.

Mentoring

Table 5. List of graduate students mentored at Purdue

Name	Role	Degree	Completion Date
Past Students:			
Joshual Craver	Committee Member	PhD	2018
Samuel Burgner	Committee Member	MS	2018
David Flores	Committee Member	MS	2019
Alexander Miller	Major Advisor	MS	2019
Maria Roja Zea	Committee Member	MS	2020
Ranjeeta Adhikari	Major Advisor	PhD	April, 2021
Present Students:			
Yuyao Kong	Major Advisor	PhD	Dec, 2022
Fatemeh Sheibani	Committee Member	PhD	n.a.

Table 6. List of visiting students mentored at Purdue

Name	**Country**	**Degree**	**Training Period**
Yuyao Kong[1]	China Agricultural University, China	MS	2017-18
Reham Mohammed[2]	Plant Protection Research Institute, Egypt	Borlaug Fellow	2018
Chen Li[3]	China Agricultural University, China	MS	2018-19
Isabela Scavacini	Sao Pãulo University, Brazil	PhD	2021

[1] Y. Kong's work resulted in publication, [2] R. Mohammed collaborated further with Dr. Nemali which resulted in funding by USDA FAS to both Purdue and Plant Protection Research Institute; [3] C. Li's work resulted in publication

Table 7. List of undergraduate students mentored at Purdue.

Name	Department	Work Period
Victoria Wilson[1]	Horticulture and Landscape Architecture	2016
Alexander Miller[1]	Horticulture and Landscape Architecture	2017-2018
Stephanie Millet[1]	Horticulture and Landscape Architecture	2018
Farhan Sohail	Mechanical Engineering	2018-19
Manuel Perez[1]	Agric. Biological Engineering	2019
Uel Kwame	Agric. Biological Engineering	2019
Tej Shah	Agric. Finance Management	2019-20
Juliana Brustolin	Agric. Biological Engineering	2018-20
Jacob Brasseur[1]	Horticulture and Landscape Architecture	2020-21

[1] Secured jobs in Controlled Environment Agriculture industry upon completion of work

TEACHING

Courses Taught and Evaluation of Course and Instructor

(i) HORT 31900. Controlled Environment Production of Horticultural Crops

Enrollment:
2018: 13
2019: 9
2020: 24
2021: 36

Evaluations:
2018: (11/12 students): Overall rating for course: 4.1/5.0; Overall rating for instructor: 4.4/5.0
2019: (6/9 students): Overall rating for course 4.5/5.0; Overall rating for instructor: 4.5/5.0
2020: Student evaluations were not collected due to COVID)

Support to other courses in the department

Dr. Nemali provides guest lectures in Fundamentals of Horticulture (HORT 10100) during the fall and spring semesters, Greenhouse and Landscape Fundamentals for Educators (HORT 21200) in the spring semester, and Aquaponics (SFS 31100) in the fall semester on topics related to CEA and floriculture.

Capstone Course

Dr. Nemali sponsors a Capstone project 'APTUS: Analyzing Plant Traits Using Smartphone' involving Purdue Polytechnic undergraduate students to develop a smartphone app for growers to utilize the 'smart' sensing technology on their phones for managing fertilizer application in floriculture production.

MEDIA APPEARANCES

Table 8. List of media appearances since 2016

Month, Year	Publisher	Title
Oct, 2016	Purdue Agri News	Indiana FFA Leaders Talk Flowers
Sep, 2017	Purdue Ag Exposure	What's behind the curtains? Hydroponics at Purdue University
Aug, 2018	Agriculture News, Purdue University	Purdue University greenhouse workshop aims to promote sustainable growing practices
Nov, 2018	News and Stories, Purdue University	Technology distilled to grow hydroponics
Dec, 2018	News and Stories, Purdue University	10 most read stories of 2018
Jan, 2019	News and Stories, Purdue University	Purdue helps Egypt go with the flow
May, 2019	Envision Magazine	An inside take on agriculture
May, 2019	Greenhouse Management	Phone Home
Jul, 2019	Nursery Management	Monitoring plant quality with next generation sensors
Sep, 2019	Agriculture News, Purdue University	Purdue University workshop to feature hydroponic technology
Sep-19	Purdue Agriculturalist	Researcher driven to keep learning and sharing
Oct, 2019	Greenhouse Management	Monitoring growth of bedding plant seedlings using images
Dec, 2019	Agriculture News, Purdue University	Purdue Extension honors outstanding service at Annual Professional Development Conference
Jun, 2020	American Floral Endowment	Smart sensors for measuring plant nitrogen content
Jun, 2020	Greenhouse Grower	How Smart Sensors Can Help You Better Manage Nitrogen Content in Annuals
Jul, 2020	Floral Daily	Smart sensors for measuring plant nitrogen content
Jan, 2021	IndyStar	What should I do to keep my plants alive during winter
Mar, 2021	Indiana Environmental Reporter	Controlled Environment Agriculture and Vertical Farming

ADMINISTRATIVE SERVICE

(i). Departmental Committees and Service

- Committee Chair, HLA Safety Committee, (January 2018 – March 2020)
- Committee Chair, HLA Greenhouse Manager Search (2018)
- Committee Member, HLA Curriculum Changes (2017)
- Committee Chair, Diversity Lunch and Learn. (January 2017 – May 2019)
- Chair- Climate and Diversity Committee involved in developing a document for five-year academic program review (2018)

(ii). College and University Committee and Service

- Dept. Representative for Leadership Development and Certificate Program Committee (since January 2018)
- Committee Member, Search Committee, Director of Digital Phenomics (2018)
- Committee Member, Awards Committee (since January 2020)
- Dept. Representative for PK-12 Council (since 2020)
- Member, Minorities in Agriculture, Natural Resources and Related Sciences (MANRRS) Conference (2017)