

## S1087 Multi-State February 25, 2022

**Location: Conference Room at Aloft Coral Gables: Miami, FL**

**Attendance: 18**

<b>In-Person</b>		
Sue	Barton	Delaware
Bridget	Behe	Michigan State
Robin	Brumfield	Rutgers University
Julie	Campbell	University of Georgia
Ben	Campbell	University of Georgia
Charlie	Hall	Texas A&M
Hayk	Khachatryan	University of Florida
Melinda	Knuth	North Carolina State
Alicia	Rihn	University of Tennessee
Daniel	Tregagle	North Carolina State
Debbie	Hamrick	North Carolina Farm Bureau
Debasish	Paul	North Carolina State – Graduate Student
<b>On-Line</b>		
Susan	Duncan	Virginia Tech
Jennifer	Gray	American Hort/Horticultural Research Institute
Alejandro	Gutierrez-Li	North Carolina State
Shouoil	Zhao	University of Florida
<b>Guest</b>		
Junjie	Wu	North Carolina State
Frank	Louws	North Carolina State

Alicia Rihn, chair, called the meeting to order. Melinda Knuth introduced invited guests Junjie Wu (Agricultural Economics Department Head) and Frank Louws (Horticulture Department Head) both of North Carolina State University. Both guests provided a welcome to campus and an overview of their respective departments.

The minutes from the previous meeting were put forth and approved without amendment. Bridget moved to accept, and Melinda seconded.

### **Administrative Advisor comments:**

Susan Duncan (Administrative Advisor) encouraged everyone to fill out Appendix E in order to be listed as an official member of the group. This will also allow the submitted reports to be included in the official group report thus giving us the deserved credit. She encouraged us to

invite NIFFA admiration to our future meetings – however they would most likely need to attend virtually.

She indicated the need to start gathering a summary of accomplishments now to prepare for the group's final report. This would also help if we wanted to apply for a multistate award. The group's mid-term review is scheduled for next year and will need to be ready after the spring meeting. Melinda volunteered to lead the award process.

The best way to gather the needed information was discussed – NIFFA's reporting system or a Google Doc shared by everyone were put forth as options.

We discussed the possibility of having someone talk to us about crafting good impact statements as they are needed for the report and review for each of our objectives. In preparation for the upcoming review volunteers were solicited for each impact statement

#1 – Broad - so group effort

#2 – Charlie

#3 – Alicia

#4 – Ben and Hayk

Alicia asked everyone to make sure they know which objectives they are contributing to and give your impacts. Alicia asked us to add our output to a shared Google file when it is created.

There was a discussion about how to reach out to new potential members. Melinda noted that we have great representation from the Eastern US, but not the Western US.

We discussed the possibility of creating a one-page handout that we could send to anyone interested with our purpose and what we can offer.

### **Discussion of the 2019 National Survey Project / Dataset:**

We discussed where various papers were in the writing and publishing process. More information can be found in the Google Doc <https://docs.google.com/spreadsheets/d/15p3h-TEzr6gdCYyXeakX7zIAO30Se8wjA8Bua0XoF6Y/edit#gid=0>

We discussed starting a shared Google drive for the group due to multiple ownership of resources. This will be a central location to find everything past and present. Melinda will make a Team Drive. Jennifer noted that if we need web space HRI can house anything we need.

### Survey Input

The new grant application is due in June 2023. The funding could be available as early as February 2024. We hope to have the survey ready to go as soon as the funding is available.

It was mentioned that the landscape industry data is still being underutilized and but that is also the messiest data set.

A discussion about slight changes in the survey was had. This will be discussed more before the survey is launched. A document will be added to the Team Drive once it is created for suggestions.

### **Update on graduate student involvement and interaction**

– no update pushed to next meeting –

### **Action Items**

Melinda will set up the Team Drive and give everyone access as requested.

It was mentioned that a good list of journal reviewers needed to be created so we can suggest more than the same few that we always suggest– this could also be added to the Team Drive.

Next meeting date: February 23-24<sup>th</sup> in Savannah, GA – Coordinated by Julie

### **Individual Reports**

#### Robin Brumfield

- Annie's Project – Annie goes online
- Various Crop Budgets

#### Alicia Rihn

- Automation for nursery growers
- Natives Preferences
- SCRI Flatheaded borer management
- SCRI Ambrosia Beetle
- TN perennials

#### Sue Barton

- Native plant initiatives

#### Melinda Knuth

- Benefits of plants
- Labeling tags
- Natives and water use

Debasish Paul – Horticultural supply chain

#### Julie Campbell

- Finishing Boxwood project

- SCRI Ambrosia beetle management
- New buyers surveys

#### Hayk Khachatryan

- Homeowner preferences
- Pest management economic impact study
- Blueberry preferences/issues
- Stormwater issues

#### Ben Campbell

- LED lighting
- Consumer willingness to pay
- SCRI – Ambrosia Beetle, Flathead Borer, Urban Tree, AI
- Local awareness
- Compost incentives

#### Charlie Hall

- Boxwood blight
- Ecosystem Services
- Economic Benefits of plants
- Green Gentrification
- EAGLE program
- Index of prices paid by growers

#### Daniel Tregeagle

- Various projects with Melinda and Ben
- Data Harvesting

#### Bridget Behe

- 3 years of garden motivation data
- Eye Tracking – Shoppers Journey
- Online vs instore satisfaction

Charlie discussed Bridget Behe retiring from Michigan State and thanked her for her many years in the profession.

**With no further business, Bridget moved to adjourn; Melinda seconded.**

Julie Campbell – Secretary

## **S1087-2022 Mid-term Report**

**December 1, 2020 through January 1, 2023**

*Outputs (products that are delivered by a research project [e.g., reports, data, information, observations, publications, patents]):*

### **2020 – 2023 Publications (Research, Extension, industry):**

#### **Research/Academic (29 total)**

1. Rihn, A.L., M. Knuth, B. Peterson, M. Palma, A. Torres, J. Campbell, C. Boyer, and H. Khachatryan. 2022. Investigating drivers of native plant production in the U.S. green industry. *Sustainability*, 14, 6774.
2. Rihn, A.L., C.R. Hall, B.J. Peterson, A.P. Torres, M.A. Palma, and H. Khachatryan. 2021. Changes in production practices by green industry growers from 2009 to 2019. *Journal of Environmental Horticulture*. 39(3): 123-130. DOI: <https://doi.org/10.24266/0738-2898-39.3.123>
3. Torres, A., A.L. Rihn, S. Barton, B. Behe, and H. Khachatryan. 2021. Evaluating the business and owner characteristics influencing the adoption of online advertising strategies in the U.S. green industry. *HortScience*, 56(6):659-666. DOI: <https://doi.org/10.21273/HORTSCI15766-21>
4. Rihn, A.L., A. Torres, S.S. Barton, and B.K. Behe. 2021. Marketing and advertising practices of U.S. landscape firms. *HortScience*, 56(6):695-708. DOI: <https://doi.org/10.21273/HORTSCI15774-21>
5. Behe, B.K., M.J. Knuth, A. Rihn, and C.R. Hall. 2022. Plant Novices and Experts Differ in Their Value of Plant Type, Price, and Perceived Availability. *J. Environmental Horticulture*. 40(3):116-122.
6. Staples, A., B.K. Behe, P.T. Huddleston, and T. Malone. 2022. What You See is What You Get and What You Don't Goes Unsold: Choice Overload and Purchasing Heuristics in a Horticulture Lab Experiment. *Agribusiness*. DOI:10.1002/agr.21736
7. Behe, B.K., A. Staples, P.T. Huddleston, and T. Malone. 2022. Display Complexity Affects Visual Processing of Horticultural Plant Retail Displays *J. Environmental Horticulture*. 40(1):1–9. <https://doi.org/10.24266/0738-2898-40.1.1>
8. Behe, B.K. P.T. Huddleston, and C.R. Hall. 2022. Gardening Motivations of U.S. Plant Purchasers During the COVID-19 Pandemic. *J. Environmental Horticulture*. 40(1):10–17. <https://doi.org/10.24266/0738-2898-40.1.10>
9. Knuth, M., B.K. Behe, P. Huddleston, C. Hall, R. Fernandez, and H. Khachatryan. 2020. Water Conserving Messages Influence Consumer Plant Purchase Intentions. *Water* 12, 3487; doi:10.3390/w12123487.
10. Behe, B.K., M. Knuth, P. Huddleston, C. Hall. 2020. Consumer Perceptions of Sale Signs and Prices in the Retail Garden Center. *J. Env. Horticulture*, 38(4):120–127.
11. Knuth, Melinda, Bridget Behe, Alicia Rihn, and Charles Hall. 2022. Plant purchasers perceptions of mental health and optimism for the future. Submitted to the *Journal of Environmental Psychology*, October 11, 2022.
12. Wei, X., H. Khachatryan, A. Torres, R. Brumfield, A. Hodges, M. Palma, and C. Hall. 2023. Exploring Market Choices in the U.S. Ornamental Horticulture Industry. *Agribusiness: An International Journal*, 1-45. DOI: <https://doi.org/10.1002/agr.21769>.
13. Behe, Bridget, Melinda Knuth, Alicia Rihn, and Charles Hall. 2022. Plant novices and experts differ in their value of plant type, price, and perceived availability. *Journal of Environmental Horticulture*. 40(3):116-122.

14. Hopkins, K. A., Arnold, M. A., Hall, C. R., Pemberton, H. B., & Palma, M. A. (2022). Seed Propagation Methods for *Ratibida columnifera* (Nutt.) Wooton & Standl. *HortScience*, 57(7), 836–840.
15. Hopkins, K. A., Arnold, M. A., Hall, C. R., Pemberton, B., & Palma, M. A. (2022). Vegetative Propagation of *Ratibida columnifera* (Nutt.) Wooton & Standl. *HortScience*, 57(7), 831–835.
16. Behe, Bridget, Patricia Huddleston, and Charles Hall. 2022. Gardening motivations of U.S. plant purchasers during the COVID-19 pandemic. *Journal of Environmental Horticulture* 40(1):10-17.
17. Lauren Garcia-Chance, Charles Hall, and Sarah White. 2022. Viability assessment for the use of floating treatment wetlands as alternative production and remediation systems for nursery and greenhouse operations. Submitted to *Journal of Environmental Management*. 305(1):114398. ISSN 0301-4797, <https://doi.org/10.1016/j.jenvman.2021.114398>.
18. Hopkins, Kaitlin, Charles Hall, Michael Arnold, Marco Palma, Melinda Knuth, and H. Pemberton. 2022. Consumer preferences of *Ratibida columnifera* (Nutt.) Wooton & Standl. floral characteristics. *HortScience*. 57(3):431–440. [doi.org/10.21273/HORTSCI16233-21](https://doi.org/10.21273/HORTSCI16233-21)
19. Rihn, Alicia, Charles Hall, Bryan Peterson, Ariana Torres, Marco Palma, and Hayk Khachatryan. 2021. Changes in production practices by green industry growers from 2009 to 2019. *Journal of Environmental Horticulture* 39(3).
20. Khachatryan, H., A. Rihn, and X. Wei. 2021. Effects of Pollinator Related Information on Consumer Preferences for Neonicotinoid Labeling. *International Food and Agribusiness Management Review*, 24(6), 971-991.
21. Khachatryan, H., A. Rihn, G. Hansen, and T. Clem. 2020. Landscape Aesthetics and Maintenance Perceptions: Assessing the Relationship between Homeowners' Visual Attention and Landscape Care Knowledge. *Land Use Policy*, 95, 104645.
22. Kassas, Bachir, Marco Palma, and Charles Hall. 2021. Informing Generic Advertising Programs by Investigating Income and Relative Return Heterogeneities in Voluntary Contributions Mechanisms. *Journal of Agricultural and Resource Economics*. ISSN: 1068-5502 (Print); 2327-8285 (Online) doi: 10.22004/ag.econ.304771.
23. Hall, Charles, Chuan Hong, Fred Gouker, and Margie Daughtrey. 2021. Analyzing the Structural Shifts in U.S. Boxwood Production Due to Boxwood Blight. *Journal of Environmental Horticulture*. 39 (3):91-99.
24. Knuth, Melinda J., Hayk Khachatryan, Charles R. Hall, Marco A. Palma, Alan W. Hodges, Ariana P. Torres, and Robin G. Brumfield. 2021. Trade Flows within the United States Nursery Industry in 2018. *Journal of Environmental Horticulture*. 39(2):77-90.
25. Knuth, Melinda J., Hayk Khachatryan, and Charles R. Hall. 2021. How Consistently Do People Know Their Preferences for Houseplants? *Behavioral Sciences*. 11(5):73. <https://doi.org/10.3390/bs11050073>.
26. Wei, X., and H. Khachatryan. 2021. Analyzing Growers' Pest Management Decisions in the U.S. Ornamental Horticultural Industry. *Journal of Cleaner Production*, 312, 127788.
27. Wu, Xuan (Jade), Melinda J. Knuth, Charles R. Hall, and Marco A. Palma. 2020. Increasing Profit Margins by Substituting Species in Floral Arrangements. *HortTechnology*. <https://doi.org/10.21273/HORTTECH04695-20>.
28. Zhang, X., and H. Khachatryan. 2021. Effects of Perceived Economic Contributions on Individual Preferences for Environmentally Friendly Residential Landscapes. *Land Use Policy*, 101, 105125.
29. Zhang, X., and H. Khachatryan. 2020. Investigating Monetary Incentives for Environmentally Friendly Residential Landscapes. Special Issue Urban Environmental Policy and Planning: Land Use and Water, *Water*, 12(11), 3023.

### **Extension (15 total)**

1. Rihn, A.L., A. Fulcher, H. Khachatryan, L. Warner, A. LeBude, and S. Schexnayder. 2022. A ten-year review of the Southeast U.S. green industry, part II: Addressing labor shortages and internal and external factors affecting business strategies. University of Tennessee Agricultural and Resource Economics Extension Report, W1080.  
<https://extension.tennessee.edu/publications/Documents/W1080.pdf>
2. Rihn, A., A. Fulcher, H. Khachatryan. 2021. A ten-year review of the southeast U.S. green industry, part I: Labor and firm characteristics. University of Tennessee Agricultural and Resource Economics Extension Report, W1026.
3. Rihn, A.L., S. Upendram, and K. Jensen. 2021. Paycheck Protection Program Loans in Tennessee's Landscape Services Industry April 3-August 8, 2020. University of Tennessee Agricultural and Resource Economics Extension Report, W975.
4. Rihn, A., and K. Jensen. 2020. Paycheck Protection Program participation in Tennessee's green industry, April 3 – June 30, 2020. University of Tennessee Agricultural and Resource Economics Extension W937.
5. Khachatryan, H., A. Rihn, X. Zhang, and M. Dukes. 2022. Using Economic Incentives to Encourage Sustainable Alternative Residential Landscaping Practices in Florida. University of Florida, IFAS, Florida Coop. Ext. Serv., Food and Resource Economics Dept., Electronic Data Information Source Publication. FE1120.
6. Khachatryan, H., and X. Wei. 2022. Production Costs and Profitability for Selected Greenhouse Grown Perennial Plants: Partial Enterprise Budgeting and Sensitivity Analysis. University of Florida, IFAS, Florida Coop. Ext. Serv., Food and Resource Economics Dept., Electronic Data Information Source Publication. FE1119.
7. Khachatryan, H., Knuth, M., Hodges, A., and C. Hall. 2021. Florida Nursery and Landscape Industry Economic Contributions Report. University of Florida, IFAS, Florida Coop. Ext. Serv., Food and Resource Economics Dept., Electronic Data Information Source Publication. FE1114.
8. Khachatryan, H., Knuth, M., Hodges, A., and C. Hall. 2021. Florida Nursery and Landscape Industry Characteristics Report. University of Florida, IFAS, Florida Coop. Ext. Serv., Food and Resource Economics Dept., Electronic Data Information Source Publication. FE1108.
9. Khachatryan, H., and X. Wei. 2021. Production Costs and Profitability for Select Greenhouse Grown Annual Bedding Plants: Partial Enterprise Budgeting and Sensitivity Analysis. University of Florida, IFAS, Florida Coop. Ext. Serv., Food and Resource Economics Dept., Electronic Data Information Source Publication. FE1105.
10. Khachatryan, H., A. Rihn, and X. Wei. 2021. Plant Selection Behavior and Promotion Use by Garden Center Customers. University of Florida, IFAS, Florida Coop. Ext. Serv., Food and Resource Economics Dept., Electronic Data Information Source Publication. FE1098.
11. Khachatryan, H., A. Rihn, X. Zhang, and M. Dukes. 2021. Floridian Households' Perceptions of Florida-Friendly Landscapes. University of Florida, IFAS, Florida Coop. Ext. Serv., Food and Resource Economics Dept., Electronic Data Information Source Publication. FE1099.
12. Khachatryan, H., A. Rihn, X. Zhang, and M. Dukes. 2021. Towards Sustainable Urban Landscape Management: Floridians' Perceptions of Residential Landscapes and Their Maintenance Requirements. University of Florida, IFAS, Florida Coop. Ext. Serv., Food and Resource Economics Dept., Electronic Data Information Source Publication. FE1090.
13. Khachatryan, H., A. Rihn, Dong Hee Suh, and M. Dukes. 2020. Homeowners' Preferences for Smart Irrigation Systems and Features. University of Florida, IFAS, Florida Coop. Ext. Serv., Food and Resource Economics Dept., Electronic Data Information Source Publication. FE1080.
14. Khachatryan, H., X. Wei, and A. Rihn. 2020. Consumer and Producer Perceptions and Preferences for Pollinator Friendly Labeling Practices in the U.S. Green Industry. University of

Florida, IFAS, Florida Coop. Ext. Serv., Food and Resource Economics Dept., Electronic Data Information Source Publication. FE1083.

15. Khachatryan, H., and A. Rihn. 2020. Effectiveness of Retail Promotions in the Green Industry by Age Group: A Case Study. University of Florida, IFAS, Florida Coop. Ext. Serv., Food and Resource Economics Dept., Electronic Data Information Source Publication. FE1073.

### **Presentations:**

#### **Research / Academic: (23 total)**

1. Rihn, A.L. Greenhouse / Turf Outlook. 2022 Southern Crops Economic Outlook organized symposium, SAEA Annual Meeting February 13-15, 2022.
2. Wei, X., H. Khachatryan, A.L. Rihn. 2022. Estimating Willingness-to-Pay for Neonicotinoid-Free Plants: Incorporating Pro-Environmental Behavior in Hypothetical and Non-Hypothetical Experiments. AAEA Annual meeting, Anaheim, CA, July 30 - Aug. 2, 2022.
3. Bumgarner, N., A.L. Rihn, J. Campbell, S. Dorn. 2022. Extension outreach and green industry retailer synergies to reach new horticulture consumers. ASHS Annual Meeting, Chicago, IL, July 30 - Aug. 3, 2022.
4. Rihn, A.L., B. Behe, C.R. Hall, and P.T. Huddleston. 2022. How does visual attendance to plant attributes influence choice behavior? International Society of Horticultural Sciences' International Horticulture Congress, Aug. 14-20, 2022, Angers, France.
5. Khachatryan, X. Wei, A. Rihn. The effects of negative and neutral pollinator related information on consumer preferences for ornamental plants. ISHS International Horticulture Congress, Angers, France, August 14 – 20, 2022.
6. Khachatryan, H., and X. Zhang. "Preferences for Sustainable Urban Landscapes: Investigating the Interplay between Financial Incentives and Environmentally Friendly Lawn Attributes." 31st International Horticultural Congress, Angers, France, August 14-20, 2022.
7. Khachatryan, H., and X. Wei. "Investigating the U.S. Ornamental Plant Growers' Market Choice Decisions and Market Share." Annual World Congress of the International Food and Agribusiness Management Association (IFAMA), Costa Rica, June 18-23, 2022.
8. Zhang, X., and H. Khachatryan. "Relating Individual Environmental Concerns to Preferences for Low-Input Residential Lawns in Florida." 135th Florida State Horticultural Society (FSHS) Annual Meeting, Sarasota, June 5-7, 2022.
9. Khachatryan, H., M. Knuth, X. Zhang, X. Wei, C. Yue, A. Hodges. "Investigating households' preferences for turfgrass attributes in Florida." 134th Florida State Horticultural Society (FSHS) Annual Meeting, Daytona Beach, September 26-28, 2021.
10. Khachatryan, H. "Consumer Preferences for Labels Disclosing the Use of Neonicotinoid Pesticides." Seventeenth International Conference on Environmental, Cultural, Economic & Social Sustainability, Virtual Conference Hosted by Vrije Universiteit Amsterdam, Amsterdam, NL, February 23-26, 2021.
11. Knuth, M., H. Khachatryan, X. Zhang, X. Wei, C. Yue, and A. Hodges. "Latent Class Analysis of Florida Household Turfgrass Inputs." American Society for Horticultural Science (ASHS) Annual Conference, Denver, CO, August 5-9, 2021.
12. Knuth, M., H. Khachatryan, and C. Hall. "How Consistently Do Plant Purchasers Know Their Preferences for Houseplants?" American Society for Horticultural Science (ASHS) Annual Conference, Denver, CO, August 5-9, 2021.
13. Rihn, A.L., A. Torres, S. Barton, B. Behe, and H. Khachatryan. "Factors Impacting Online Advertising Use in the U.S. Green Industry." American Society of Horticultural Science, virtual, August 6, 2021.
14. Wei, X., and H. Khachatryan. "Investigating Green Industry Firms' Market Shares to Wholesalers, Landscapers, Retailers and Direct-to-Consumer Channels." 134th Florida State Horticultural Society (FSHS) Annual Meeting, Daytona Beach, September 26-28, 2021.



15. Wei, X., H. Khachatryan, A. Torres, R. Brumfield, A. Hodges, M. Palma, and C. Hall. "An analysis of Market Channel Alternatives for the U.S. Ornamental Plants Growers." International Conference of Agricultural Economists (Virtual), August 17-31, 2021.
16. Wei, X., H. Khachatryan, A. Torres, R. Brumfield, A. Hodges, M. Palma, and C. Hall. "Exploring Firms' Marketing Choices in the US Ornamental Horticulture Industry." American Society for Horticultural Science (ASHS) Annual Conference, Denver, CO, August 5-9, 2021.
17. Wei, X., and H. Khachatryan. "How consequential is policy consequentiality? Evidence from consumer preferences for neonic-free labels." Agricultural and Applied Economics Association (AAEA) Annual Meeting, Austin, TX, August 1-3, 2021.
18. Rihn, A., H. Khachatryan, and X. Wei. "What Eco-label Format is the Most Effective in the Green Industry?" 133rd Florida State Horticultural Society (FSHS) Annual Meeting, Virtual Event (originally Sarasota, FL), October 18-20, 2020.
19. Wei, X., H. Khachatryan, and A. Rihn. "Investigating Consumer Preference for Product Labels Using Visual Attention Data." The Tenth International Conference on Food Studies (Virtual Event), New York, NY, October 17-18, 2020.
20. Wei, X., H. Khachatryan, and A. Rihn. "Analyzing Growers' Pest Management Decisions in the U.S. Ornamental Horticulture Industry." Agricultural and Applied Economics Association (AAEA) Annual Meeting, Virtual Event (originally Kansas City, KS) July 26-28, 2020.
21. Wei, X., H. Khachatryan, and A. Rihn. "Estimating the Treatment Effects of Pollinator Related Information on Consumers' Environmental Choices: An Integrated Choice and Latent Variable Model Approach." Agricultural and Applied Economics Association (AAEA) Annual Meeting, Virtual Event (originally Kansas City, KS) July 26-28, 2020.
22. Zhang, X, and H. Khachatryan. "Using Mixed Logit Based Models to Control Attribute Nonattendance in Choice Experiments." Agricultural and Applied Economics Association (AAEA) Annual Meeting, Virtual Event (originally Kansas City, KS) July 26-28, 2020.
23. Zhang, X, and H. Khachatryan. "Effects of Perceived Economic Contributions on Individual Preferences for Environmentally Friendly Residential Landscapes." American Society for Horticultural Science (ASHS), Virtual Event (originally Orlando, FL), Aug 8-13, 2020.

**Extension or Industry: (64 total)**

1. Rihn, A.L., & N. Bumgarner. 2022. Attracting New Green Industry Consumers. Pick Tennessee Conference, Franklin, TN, February 19, 2022.
2. Rihn, A.L., and A. Fulcher. 2022. Labor Challenges, Trends and Solutions for the Green Industry. University of Tennessee Nursery Production Working Group's Hot Topics (virtual) presentation, May 24, 2022.
3. Rihn, A.L., and A. Fulcher. 2022. Consumer Perspectives and Grower Options for Sustainable Control of Trunk Borers. University of Tennessee Nursery Production Working Group's Hot Topics (virtual) presentation, May 24, 2022.
4. Rihn, A.L., B.K. Behe, M. Knuth, A. VanWingerden. 2022. How Long Will the Plant-buying Consumer Spree Continue? Greenhouse Grower – Green Industry Panel Discussion (virtual), May 25, 2022.
5. Rihn, A.L. 2022. Consumer Perceptions of Alternative Flatheaded Borer Control Methods. TN Green Industry Field Day, virtual, June 28, 2022.
6. A.L. Rihn. 2022. Consumer Impressions of Alternative Borer Management Strategies. AmericanHort's Cultivate, Columbus, OH, July 18, 2022.
7. Behe, B.K., A.L. Rihn. 2022. First Timers to Loyal Buyers: How to Keep the Wave of Customers and Bring Them Back for Even More Sales. AmericanHort's Cultivate, Columbus, OH, July 18, 2022.

8. Rihn, A.L. "New consumer trends in the green industry." Western Region Ag Econ Market Outlet In-service Training, TN, November 2-4, 2021
9. Rihn, A.L. "Green industry outlook." Southern Outlook Conference, Southern Extension Economics Committee, Atlanta, GA, September 21, 2021.
10. Rihn, A.L. "Specialty crop trends." Farm Management Workshop, Department of Agricultural and Resource Economics – University of Tennessee, Knoxville, TN, August 12, 2021.
11. Rihn, A.L. "Specialty Crop Marketing & Trends." Tennessee Specialty Crops Virtual Lunch Meetings, July 21, 2021.
12. Behe, Bridget. Keynote: InVigorateU sponsored by the Illinois Green Industry Association. 2022. Plant Feature or Benefit: Which Cue is More Effective? Bloomington, IL. January 18.
13. Behe, Bridget. The Art and Science of Pricing. 2022. InVigorateU sponsored by the Illinois Green Industry Association. Bloomington, IL. January 19.
14. Behe, Bridget. What is on the Horizon for Consumers in 2022? 2021. Big Grower Meeting (online webinar). December 2. 184 participants.
15. Behe, Bridget. Keynote for 10<sup>th</sup> Anniversary of Annie's Project (Empowering Women in Agriculture). 2021. How Can Farmers Retain All the New Customers COVID Brought In? November 4. 23 online participants.
16. Behe, Bridget. Synergy with Retailers: What (Great) Growers Know and Do. 2021. Webinar in Executive Series for Meister Media. November 4. 28 online participants.
17. Behe, Bridget. Retail Better Practices Post-Pandemic. 2021. Online presentation for Carlin, Inc., Buyerfest. August 25. 27 participants.
18. Behe, Bridget. The Art and Science of Pricing Products. 2021. Online presentation for Carlin, Inc., Buyerfest. August 25. 33 participants.
19. Behe, Bridget. Plant Pricing in Horticulture's New Normal. 2021. Increasing Profits Virtual Conference, Online webinar for GIE Media. June 16. 55 participants.
20. Behe, Bridget. Connecting With Remote Shoppers. 2021. Increasing Profits Virtual Conference, Online webinar for GIE Media. June 16. 43 participants.
21. Behe, Bridget. Feature or Benefit: Which Cue is More Effective? 2021. Online webinar for AmericanHort in the tHRIve series. April 15. 122 participants.
22. Behe, Bridget. Cashing In on Gardening Motivations. 2021. Online webinar presented for the Vancouver (British Columbia) Nursery & Landscape Association. January 27. 58 virtual participants.
23. Behe, Bridget. Making Messages People Will Read (and Use). 2020. Kentucky Nursery & Landscape Association Winter Outing (virtual). December 10. 28 participants.
24. Behe, Bridget. The Art & Science of Pricing. 2020. Kentucky Nursery & Landscape Association Winter Outing (virtual). December 10. 25 participants.
25. Behe, Bridget. Consumer Trends in the Pandemic. 2020. Big Grower Meeting (online webinar). December 3. 135 participants.
26. Behe, Bridget. Gardening Motivations and Cashing In on Them. 2020. Landscape Alberta (online webinar). November 18. 47 participants.
27. Behe, Bridget. Making Signs People Will Read (and Use). 2020. Landscape Alberta (online webinar). November 18. 45 participants.
28. Behe, Bridget. Pricing to Win! What Are Consumers Willing to Pay? 2020. AmericanHort (online virtual seminar). July 22. 85 participants.
29. Behe, Bridget. Connecting with the Emotional Side of the Consumer. Turfgrass Producers International. 2020. Orlando, FL. February 20.
30. Behe, Bridget. Pricing for Greater Profit. 2020. ProGreen Expo. Denver, CO. February 8.
31. Behe, Bridget. Create a Better Shopping Environment. 2020. ProGreen Expo. Denver, CO. February 8.
32. Behe, Bridget. Stop the Race to the Bottom: More Profitable Pricing. 2020. Garden Center Executive Summit. New Orleans, LA. February 5.

33. Behe, Bridget. Build a Better Retail Shopping Experience. 2020. Mid-Atlantic Fruit, Vegetable, and Greenhouse Expo. Hershey, PA. January 29.
34. Behe, Bridget. Pricing for Greater Profit. 2020. Mid-Atlantic Fruit, Vegetable, and Greenhouse Expo. Hershey, PA. January 29.
35. Behe, Bridget. Home-grown Consumer Research. 2020. Gulf States Expo. Mobile, AL. January 15.
36. Behe, Bridget. Pricing Products for Growers and Retailers. 2020. Gulf States Expo. Mobile, AL. January 15.
37. Hall Jr, C. R. (2022, August). The role of biophilia in expanding the demand for ornamental plants. Ball Horticultural Company. West Chicago, Illinois.
38. Hall Jr, C. R. (2022, July). The current state and forecast for the green industry economy. Corteva Agriscience Distributor and Formulator Meeting. Banff, Canada: Corteva Agriscience.
39. Hall Jr, C. R. (2022, May). The state of the green industry economy in the Houston metroplex region. Texas Nursery and Landscape Association Region 2 Meeting. Waller, TX: Texas Nursery and Landscape Association.
40. Hall Jr, C. R. (2022, July). The effect of the pandemic on the green industry in Texas. Texas Nursery and Landscape Association. Region 3 Meeting: Texas Nursery and Landscape Association.
41. Hall Jr, C. R. (2022, July). 2022 State of the Industry: The Economy. AmericanHort Cultivate'22. Columbus, OH: AmericanHort.
42. Hall Jr, C. R. (2022, January). Managing Risk in a Post-COVID Green Industry. Great Lakes Horticulture Expo. Michigan: Michigan Nursery and Landscape Association.
43. Hall Jr, C. R. (2022, January). Post-COVID Outlook for the Green Industry. Green and Growing. North Carolina: North Carolina Nursery and Landscape Association.
44. Hall Jr, C. R. (2022, January). COVID Impacts on Green Industry Economics. Utah Green. Utah: Utah Nursery and Landscape Association.
45. Hall Jr, C. R. (2022, January). Valuing the Benefit of Plants. Utah Green. Utah: Utah Nursery and Landscape Association.
46. Hall Jr, C. R. (2022, February). The Economic Impact of Boxwood Bight. Annual meeting of the Southern Division-American Phytopathological Society. Tennessee: Southern Division-American Phytopathological Society.
47. Hall Jr, C. R. (2022, March). Inflation, Supply and The Fed, Oh My! Charlie Hall's 2022 Outlook. SAF webinar. online: Society of American Florists.
48. Hall Jr, C. R. (2021, October). The effect of the COVID pandemic on the floral industry. Ellison Chair Distinguished Lecture. College Station, TX: Ellison Chair in International Floriculture.
49. Hall Jr, C. R. (2021, August). Mitigating Risk in a Post-COVID Green Industry. BFG Supply Expo. Online: BFG Supply.
50. Hall Jr, C. R. (2021, September). The Monetary Value of Green Infrastructure in Communities. Poland Urban Green Conference & Green is Life. Poland: Polish Nursery Association.
51. Xuan, W., Khachatryan, H., Torres, A., Brumfield, R., Hodges, A., Palma, M. A., & Hall, C. (2021, August). An Analysis of Market Channel Alternatives for the US Ornamental Plants Growers. International Association of Agricultural Economists (IAAE) 2021 Conference. Virtual: International Association of Agricultural Economists.
52. Hall Jr, C. R. (2021, September). Searching for the end of uncertainty. Society of American Florists Annual Conference. Orlando, FL: Society of American Florists.
53. Hall Jr, C. R. (2021, September). The Post-Pandemic Monetary Value of Improved Landscapes and Urban Forests. America in Bloom Symposium. online: America in Bloom.
54. Hall Jr, C. R. (2021, September). Marketing Sustainability. AIPH International Conference: The path to sustainability in ornamental horticulture. online: International Association of Horticultural Producers (AIPH).

55. Hall Jr, C. R. (2021, December). Vaccines, Plants, and Dollars: The Year in Review. AmericanHort Connect Webinar Series. online: AmericanHort.
56. Hall Jr, C. R. (2021, October). The Post-COVID outlook for the green industry. Cornell Distinguished Lecture. Ithaca, NY: Cornell University.
57. Hall Jr, C. R. (2021, October). The effect of COVID on the floral industry. LIFGA Fall Dinner Meeting. Long Island, NY: Long Island Flowers Growers Association.
58. Hall Jr, C. R. (2021, November). Managing post-pandemic risk in the green industry. CNGA Leadership Meeting. Vail, Colorado: Colorado Nursery and Greenhouse Association.
59. Hall Jr, C. R. (2021, November). COVID influences on the Canadian landscape sector. HortEast. online: Landscape Nova Scotia.
60. Hall Jr, C. R. (2021, December). What's on the horizon for the coming year in the economy? Big Grower Executive Summit. online: GPN Big Grower Magazine.
61. Hall Jr, C. R. (2021, December). An Update of TAMU Economic-related Research Projects. Viticulture & Enology Research Symposium. College Station, TX: Extension Horticulture.
62. Hall, C. R. (2021, August). Caples J, Arnold MA, Hall J, Rangel J, Stein LA. *Fragaria* × *anassa* and pollinator-attracting container grown companion plantings effects on edible crop yield, aesthetic appearance, and bloom time overlap. Annual Conference of the American Society for Horticultural Sciences. Denver, CO.
63. Hall Jr, C. R. (2021, July). Economic State of the Industry. AmericanHort Cultivate 2021. Columbus, OH: AmericanHort.
64. Hall Jr, C. R. (2021, August). Mid-Year State of the Industry. TNLA Expo. San Antonio, TX: Texas Nursery & Landscape Association

**Online Content:** (95 total)

1. Rihn, A.L. 2022. Engaging the New Green Industry Consumer. e-GRO Alert, Vol. 7, No. 2. <http://e-gro.org/pdf/E702.pdf>
2. Rihn, A.L. 2022. Don't forget the picture! E-GRO Blog post on 4/21/22. <http://www.egroblog.com/showblog.php?ID=176>
3. Rihn, A.L. 2022. Updating online content. E-GRO Blog post on 3/4/22. <http://www.egroblog.com/showblog.php?ID=169>
4. Rihn, A.L. 2022. What business factors and marketing strategies impact green industry firms with landscaping services? E-GRO Alert, Vol 11., No. 17, 3/10/22. <https://www.e-gro.org/pdf/2022-11-17.pdf>
5. Rihn, A.L., P. Konjoian, and M. Klieger. 2021. The local premium. in The Grower and The Economist Podcast. April 14, 2021. Available [online] at <https://podcasts.apple.com/us/podcast/the-local-premium/id1510172400?i=1000517116507>
6. Behe, B.K. Marketing Munchies Podcast series (Episodes 100-190) available at <https://www.connect-2-consumer.com/121-2/>

**Grants:** (9 total)

1. "Flatheaded borer management in specialty crops." Adesso, K., N. Wiman, J.-H. Chong, J. Oliver, D.W. Held, L. Nackley, C.L. Palmer, A.F. Fulcher, A. Lebude, J. Rijal, W.E. Klingeman, B. Campbell, A. Witcher, A.L. Acebes, F. Baysal-Gurel, O.E. Liburd, D.I. Shapiro-Ilan, C. Seavert, K.L. Jensen, A. Rihn. USDA-NIFA, 09/2020 –08/2024. \$3.5M.
2. "Ecology and integrated management of ambrosia beetles in eastern US orchard and ornamental tree crops." Acebes-Doria, A., S. Joseph, B. Blaauw, B. Campbell, J. Campbell, L. Mibrath, P. Jentsch, J. van Zoeren, G. Krawczyk, A. Delpozio-Valdivia, K. Adesso, J. Oliver, W. Klingeman, A. Rihn, S. Villani, J. Walgenbach, T. Kon, J.C. Chong, A. Rabinowitz, R. Gazi-

- Seregina, J. Hulcr, C. Ranger, D. Shapiro-Ilan, T. Cottrell, C. Werle, L. Mibrath. USDA-SCRI, 09/2021 – 8/2025. \$7.5M.
3. “Enhancing marketplace acceptance of native plants.” Rihn, A., A. Torres, S. Barton, B. Behe. Horticulture Research Institute (HRI), 04/2022 – 03/2023. \$35,000.
  4. “L.E.A.P, labor, efficiency, automation, and production for sustainability in the nursery crops industry.” Fulcher, A., N. Bumgarner, A. LeBude, S.C. Marble, L. Nackley, M. Palma, L. Ribera, L. Warner, A. Rihn, and M. Velandia. USDA-NIFA, 09/2020 – 08/2021. \$50,000.
  5. Behe, Bridget K., J. Mundel, P. Huddleston, and J. Yang. 2022. Images of People or Plants: Which Sells More Plants? Horticultural Research Institute. \$34,900.
  6. Behe, Bridget K. and Patricia Huddleston. 2021. Influence of COVID-19 on Plant Purchasing. Horticultural Research Institute. \$30,000.
  7. Behe, Bridget K., Patricia Huddleston, and Kevin Childs. 2020. Greater Strides Down the Visual Path to Purchase. Project Green 19-032. \$39,950.
  8. Behe, Bridget K., Patricia Huddleston, Charlie Hall, and Marco Palma. 2020. Benefits or Features: Which Cue is More Effective on Retail Signs? Horticultural Research Institute. \$30,000.
  9. Behe, Bridget K., Patricia Huddleston, and Kevin Childs. 2019-2021. Predicting Plant Purchases from Consumer Characteristics and Gaze Sequences. USDA-FSMIP. \$124,645.

## Impact Statements:

### **Obj. 1: Investigate environmental, social, and economically sustainable practices in ornamental crop production and landscape systems.**

***Project 1. Key Performance Indicators of Young and Finished Plant Producers.*** The 2022 Your MarketMetrics Insights Report summarizes major findings from this year’s benchmarking efforts for green industry growers. The purpose of the Your MarketMetrics benchmarking program is to enable growers to compare their operational and financial performance on several key performance indicators (KPI’s) and identify critical industry trends (direction of movement) relative to those KPI’s. It is anticipated that growers will use this report in conjunction with the online dashboard to help support (or justify) meaningful business decisions to drive improved profitability and financial stability. The online dashboard is comprised of several sections including a Historic View, a Company View, a Comparison View, and an Index of Prices section. Each of these sections is discussed in detail in this report. The Your MarketMetrics (YMM) benchmarking program is based on the financial variables included in the Strategic Profit Model including profit margin, asset turnover, return on assets, financial leverage, and return on equity. The data collected in the YMM program is specifically targeted in order to provide the necessary information to calculate these parameters in the strategic profit model. There are 3 main levers or drivers of profitability in this model, including profit margin, asset turnover, and financial leverage. The historic view of the online dashboard is intended to show direction of movement in the KPI’s for the YMM cohort as a whole, as a proxy for the industry at large. All aggregate calculations use cohort totals instead of averaging individual metrics for all firms. For example, instead of averaging net profit margin percentage for each firm to calculate an industry average, the aggregate net profit dollars for all firms was summed and then divided by the aggregate net sales for all firms to determine the industry average net profit margin percentage. This method is used to mitigate the variance that occurs among firms. Highlights from these aggregated data include the following: Aggregate gross and aggregate net sales experienced YOY increases in 2021 (17.8% YOY and 8.3% YOY, respectively). The aggregate gross sales total for YMM growers increased from \$1.2 billion in 2015 to over \$2.6 billion in 2021. Similarly, aggregate net sales increased similarly in the same period. Net sales is defined as gross sales less any

contra accounts such as credits, discounts or price adjustments, returns, allowances or rebates, and billing corrections. Assuming that credits and allowances make up a majority of the difference between gross and net sales, then they represented less than 1% of sales in 2021 and this difference between gross and net sales was higher for nurseries than for greenhouses. Aggregate dollars for EBITDA, operating profit, and net profit all increased significantly YOY in 2021 over the entire cohort. Aggregate shrink dollars for the entire cohort of participants decreased 9.2% in 2020 from what they were the year before. These percentages may seem small, but collectively the YMM cohort lost \$131 million in shrink-related losses. It is interesting to note, however, the differences that occur between sizes of firm and the inverse relationship between shrink dollars and net profit dollars. Thus, shrink continues to be a critical metric to measure (for those who aren't doing so currently) because it represents the lowest-hanging fruit in terms of improving profitability.

**Project 2. Index of Prices Paid by Growers.** The green industry is currently in the mature stage of the industry life cycle. As such, there are numerous pressures on existing firms in the industry, particularly one that is often referred to as the price-cost squeeze (or margin compression), where the prices obtained for products offered by green industry firms are held constant from real and perceived competitive forces while, at the same time, the costs of the inputs used to produce these products are increasing. Thus, growers are in the process of increasing their prices on finished crops to cover the inflationary pressures from the distressed supply chain due to COVID. It is essential for growers to have full and accurate information about inflationary trends so that they can better understand the cost of operating their business for managerial decision-making such as SKU rationalization, customer profitability analyses, and determining the need for price increases. The use of the standard Producers Price Index (PPI) and Consumer Price Index (CPI) for this purpose is insufficient because wholesale growers purchase different goods and services from those used for calculating these indexes. The National Agricultural Statistics Service (within USDA) also calculates an Index of Prices Received by Farmers for their crops and livestock and an Index of Prices Paid by Farmers for the inputs they use during production. However, these indices also fall short in that they contain (or exclude) many items that are not applicable to nursery and greenhouse growers. To overcome this issue, the Index of Prices Paid by Growers was updated for 2022 to reflect inflationary pressures on the most important inputs used by green industry growers. This index reflects the differences in the prices of goods and services purchased by growers during the last several years. Each cost-related line item is weighted by its relative share of the total of the typical assortment of goods and services purchased by growers for producing, marketing, and shipping plants. Using this methodology, a weighted average rate of inflation in the prices of these grower inputs is estimated, where the weights used to aggregate these individual inputs are the average proportions of grower budgets allocated to each input category. Results from this analysis indicate that the summary weighted Index of Prices Paid by Growers ranges from 100 in 2007 to a high of 159.3 in 2022. This means that the overall cost of producing nursery and greenhouse crops is almost 59.3% higher in 2022 than it was in 2007, with labor experiencing the largest increase (177.6% higher in 2021). The year-over-year (YOY) increases are also presented, reflecting the inflationary pressures of costs over time. YOY costs associated with the tracked expenses in 2022 increased about 8% over what they were in 2021.

**Project 3. Initiated a meta-analysis regarding the economic benefits of plants.** The economic benefits associated with flowers, shrubs, trees, and other green infrastructure elements in residential and municipal landscapes can be classified into two major categories: (1) those that result in additional revenues in the form of economic development mechanisms, and (2) those that result in cost savings mainly through the substitution of green infrastructure for gray infrastructure. Each of these types of benefits will be discussed in this series, with concluding articles on the issues of gentrification associated with increased property values and the role that plants and improved landscapes play in the resiliency of urban and rural communities (Resilience is the capacity of a community's systems, businesses, institutions, communities, and individuals to survive, adapt, and grow, no matter what chronic stresses and acute shocks they experience). The valuation of these economic benefits has been the subject of dozens of research projects over the last two decades, though this study focuses on those conducted over the most recent decade. This ongoing study will provide a review of the substantial body of peer-reviewed research that has been

conducted regarding the economic benefits of green industry products and services. A previous FNRI-funded series documented the health and well-being benefits including emotional and mental health benefits, physiological health benefits, the benefits that plants provide to society at large and the role they play in addressing critical societal issues, and an overview of resources available for green industry firms to find more detailed information on these plant-related health and well-being benefits. Industry firms should be armed with the economic benefits described in this new series to strategically incorporate these benefits into both industry-wide and firm-level marketing messages that highlight how local and regional economies are affected in order to enhance the perceived value and relevance of green industry products for municipal leaders and gardening and landscaping consumers in the future.

**Obj. 2: Evaluate structural economic characteristics and economic contributions of the U.S. green industry to the national and state economies of the United States.**

The *Green Industry Research Consortium* (GIRC) has regularly conducted national surveys to document production, management, marketing, and trade practices within the U.S. Green Industry since 1989. The 2019 *National Nursery Survey*, which gathered annual information for 2018 or most recent fiscal year completed, represents the seventh such effort by the GIRC. Previous national surveys for 1988, 1993, 1998, 2003, 2008, and 2014 were reported by Brooker et al. (1990, 1995, 2000, 2005) and Hodges et al. (2010, 2015). The objective of these surveys is to document changes in business practices over time and across regions and provide information useful to stakeholders, including nursery/greenhouse growers, re-wholesalers, allied industry professionals, garden center retailers, Extension personnel and researchers. Additionally, the information is regularly used by university outreach communities and researchers in communicating the relevance and economic impacts of the green industry at the county, state and regional levels. The descriptive reports focus primarily on production efforts (plant types and forms grown, personnel and labor issues, irrigation methods, water sources, and pest management), marketing practices (market distribution channels, selling methods, in-store advertising practices, and social media presence), and a range of factors affecting pricing strategies and overall business growth and opportunities. The reports also summarized domestic (regional and state) and international trade flows of finished products and propagation materials.

The Green Industry has experienced unprecedented growth, innovation, and change over the last three decades, during which it has been among the fastest-growing agricultural industries in the 1980s and 1990s. The industry growth was primarily due to robust demand for ornamental plants and related supplies and services from commercial and residential construction. However, the economic recession of 2007-09 considerably reduced residential construction and home ownership rates. Decreased demand for horticultural products and services, coupled with an increasingly competitive business landscape, has placed considerable financial pressure on the industry (Hall 2010). After recovering from the 2007-09 recession, direct industry output for all Green Industry sectors in 2013 was estimated at \$136.44 billion (B), and total economic contributions, including regional economic multiplier effects, were estimated at \$196.07 B (Hodges et al. 2015). According to the same study, the industry had direct employment of 1.59 million (M) full-time and part-time jobs, and total employment contributions of 2.03 M jobs in the broader economy. Since the previous study (conducted for 2007), the total economic contributions increased by 4.4% for employment, 2.0% for revenues, and 2.7% for real (price change-adjusted) GDP. Business survival and growth in the current fast-paced, consumer-driven economy require a progressive mindset and a willingness to strengthen existing or develop new core competencies or markets, which may incur higher risk. While the outlook may be somewhat uncertain in terms of the growth and nature of consumer demand, it is clear that innovativeness will continue to be a requisite skill in ensuring the survivability and profitability of Green Industry firms in the future. Much of this innovativeness must focus on enhancing the value proposition offered by industry firms by emphasizing the economic (e.g., enhanced property value), social (e.g., health and well-being), and environmental (e.g., energy/water saving production methods, or use of recyclable/compostable containers) benefits that Green Industry products and services offer to end consumers (Hall and Dickson 2011). The most recent survey expanded

its focus on POS and digital marketing strategies used by industry representatives, thus attempting to identify needs and opportunities in active and effective communication with end consumers.

**Obj. 3: Evaluate consumer preferences for environmental plants and related horticultural products, and their contribution to health and well-being.**

Impact Statement Lead: Alicia Rihn

Objective 3 addresses marketing and communication efforts through evaluating consumer preferences for environmental plants and related horticultural products, and their contribution to health and well-being. Plants have been scientifically shown to positively impact emotional and mental health (Hall & Knuth, 2019a), improve physiological health (Hall & Knuth, 2019b), and provide numerous social benefits (Hall & Knuth, 2019c). Marketing communications related to ornamental plants and their benefits have the potential to positively impact consumer preferences, valuation for plants, personal health, and overall well-being. A clear understanding of marketing efforts and potential impacts to consumer behavior could benefit green industry stakeholders (e.g., growers, wholesalers, landscapers, retailers) through improved marketing communications. End consumers could benefit through increased understanding by the industry of their needs, improved marketing communications informing them about the products, and greater availability of desirable products.

To address this objective, the Green Industry Research Consortium (GIRC) has integrated multidisciplinary research, education and outreach activities. The group has developed and disseminated information to green industry stakeholder groups that is related to ornamental plant marketing practices, business strategies, pricing strategies, and behavioral responses to informational nudges. The primary tool utilized by the group is the National Nursery Survey, which has regularly collected national green industry data since 1989. The most recent version in 2019 contained questions related to marketing practices (market distribution channels, selling methods, in-store advertising practices, social media presence) and factors related to business growth and pricing strategies (e.g., weather uncertainty, labor availability).

Since 2020, key outputs include:

**Research -**

- 10 peer-reviewed manuscripts published related to landscape services marketing (Rihn et al., 2021), online advertising (Torres et al., 2021), native plant production (Rihn et al., 2022), green industry marketing channels (Yue et al., 2022), novice versus expert plant purchasers (Behe et al., 2022), visual attention to promotions (Staples et al., 2022; Behe et al., 2022; Behe et al., 2020), gardening motivations (Behe, Huddleston, and Hall, 2022), and water conservation communications in relation to plant purchasing behavior (Knuth et al., 2020).
- 6 academic conference presentations on economic outlooks (Rihn, 2022), pollinator related labeling (Wei, Khachatryan, & Rihn, 2022; Khachatryan, Wei, & Rihn, 2022), engaging new consumers (Bumgarner et al., 2022), visual attendance to information (Rihn et al., 2022), and online advertising use (Rihn et al., 2021).
- Provided support for 9 grant proposals through federal agencies (e.g., USDA-SCRI, USDA-FSMIP) and industry associations (Horticulture Research Institute) totaling over \$10 million.

**Extension and Outreach -**

- 4 Extension publications related to labor shortages (Rihn et al., 2021, 2022) and the Paycheck Protection Program loans in the green industry (Rihn, Upendram, & Jensen, 2021; Rihn & Jensen, 2020).
- 36 industry or Extension presentations related to retailing, pricing, profitability, motivations, trends, marketing messages, and so forth.
- 6 multi-media outputs (e.g., blogs, alerts, podcasts) addressing better marketing communications for green industry stakeholder groups.



Publications (current year only):

**Peer-reviewed Journal Articles:**

1. Rihn, A.L., M. Knuth, B. Peterson, M. Palma, A. Torres, J. Campbell, C. Boyer, and H. Khachatryan. 2022. Investigating drivers of native plant production in the U.S. green industry. *Sustainability*, 14, 6774.

**Extension Reports:**

1. Rihn, A.L., A. Fulcher, H. Khachatryan, L. Warner, A. LeBude, and S. Schexnayder. 2022. A ten-year review of the Southeast U.S. green industry, part II: Addressing labor shortages and internal and external factors affecting business strategies. University of Tennessee Agricultural and Resource Economics Extension Report, W1080.  
<https://extension.tennessee.edu/publications/Documents/W1080.pdf>