

2025 agInnovation Excellence in Multistate Research Award

Purpose

The fundamental mandate of the Multistate Research authority compels State Agricultural Experiment Stations (SAES) to *interdependently* collaborate in projects that two or more states share as a priority, but for which no one state could address singularly. Demonstration of interdependence is a high standard and has become a hallmark of the Multistate Research Program's management objectives.

The purpose of the agInnovation Excellence in Multistate Research Award program is to annually recognize those station scientists who are conducting exemplary multistate activities and enhance the visibility of the multistate program. A recipient Multistate Project will be selected from the pool of nominees submitted by the five regional research associations (NCRA, NERA, SAAESD, WAAESD, and ARD), and judged by the agInnovation Science and Technology Committee (STC) to exhibit sustained, meritorious, and exceptional multistate research activities.

Award

The State Agricultural Experiment Station (SAES) Directors have approved a monetary recognition of \$15,000 from the Hatch Multistate Research Fund (MRF) for the winner of the Excellence in Multistate Research Award. Up to \$5,000 is available to cover travel for members of the recipient project (typically the Administrative Advisor and Chair or their designees) to attend the awards ceremony at the agInnovation Annual Meeting. The remaining \$10,000, and any unused travel funds, are available to support activities which enhance and contribute to the research and/or outreach objectives of that multistate project, consistent with the appropriate use of Hatch MRF. Use of these funds is a project committee decision made in conjunction with its Administrative Advisor.

Eligibility

Any current regional Multistate Project (research, ERA, CC) listed in NIMSS (www.nimss.org) is eligible for consideration for an Excellence in Multistate Research Award. **The nomination is predominantly based on the five-year project period, although outcomes and impacts over the course of the project's lifespan may be considered. A nomination that was submitted in previous years should indicate advances made since the previous submission in the transmission correspondence of the nomination packet.**

The Multistate Research authority allows other non-SAES partners to join in these project-based collaborations. Thus, many multistate projects include extension specialists as members, as well as Agricultural Research Service or Forest Service research scientists. In addition, many projects have private sector and non-land-grant participants. Moreover, the majority of multistate projects have participants from more than a single region, with many having representation from all regions such that they are national in scope.

Basis for Nomination

Each of the five regional research associations may nominate one Multistate Project chosen from the entire national portfolio of active projects. An individual project can document collaborative activities with one or more different multistate projects, if applicable, within the appropriate nomination criteria. Each regional nomination must illustrate how the project addresses at least one of the Grand Challenges outlined at <http://escop.info/roadmaptext/> so that relevant success stories may be posted on the agInnovation website.

Nominations shall be made to the Chair of the respective regional Multistate Research Committee (MRC) or Multistate Activities Committee (MAC) via the regional Executive Director's office. The documentation for this type of nomination should be sufficient to allow the review committee members to evaluate the nomination according to the criteria listed below.

Criteria and Evaluation

Successful selections from regional nominations advanced to the national competition for the Excellence in Multistate Research Award will demonstrate high standards of scientific quality, research relevance to a regional or national priority, multistate collaboration on the problem's solution, and professional leadership in the conduct of the project.

All nominated projects, in the required 4-page format, shall be evaluated using the same criteria (with weights shown) based on the Project's:

- Issue, problem or situation in context of [Grand Challenge\(s\)](#) addressed (5%)
- Objectives (5%)
- Accomplishments predominantly based upon the past five-year project period as
 - **Outputs** (the project's products and deliverables, 10%)
 - And qualitative and quantitative descriptions of social, economic, ecological, and(or) environmental benefits related to relevant Grand Challenge(s) as:
 - **Short-term outcomes** (how has the project created awareness, 5%);
 - **Medium-term outcomes** (how has the project changed behavior, 5%);
 - **Long-term outcomes** (how has the project changed condition, 5%);
 - **Impacts** (what are the direct, indirect, and/or anticipated global benefits; how is society and the world better off, 10%)
- Added value and synergistic activities across mission areas:
 - Multi-disciplinary activities (10%)
 - Multi-functional integrated activities (10%)
 - Additional partnerships, associations, or collaborations beyond land-grant universities (e.g., private, for-profit, non-profit, government and non-government agencies;10%)
 - Emphasize what the committee did together that would not have been accomplished with individual work (10%)
- Evidence of multi-institutional and leveraged funding with examples of sources (10%)
- Summary of participating institutions and units (5%)

Selection Process

The STC will serve as the review panel. The review panel will select from the annual group of regional nominees a national winner in time for public announcement and award presentation at the agInnovation Annual Meeting each year. All nominated projects will be evaluated using the same criteria.

Award and Presentation

The national winning project will be recognized by the agInnovation Chair and USDA NIFA Administrator during the Awards Program held at the agInnovation Annual Meeting. Each regional nomination will be included in the APLU Awards Booklet “A Community of Scholars Honoring Excellence” by project number and title, technical committee chair, administrative advisor, and participating institutions. A National Awardee narrative will be created by the MRF Impact Writer and submitted to the STC Executive Vice-Chair. The title of the national winning project will be added to a plaque located at the USDA NIFA Headquarters. Additionally, the national award winner’s application will be shared as an example of a successful application when next year’s call for nominations is distributed.

Timeline

- November/December – Announcement sent to Directors and Administrators, Administrative Advisors and NIMSS participants by agInnovation Chair
- February 28 – Nominations due at Offices of the Executive Directors
- March – Nominations reviewed by regional Multistate Research or Multistate Activities Committees and recommendations submitted to regional associations
- March/April – Regional associations approve regional nominations at Spring meetings
- April/May - Regional associations review, edit and finalize their nomination prior to the final submission
- May 15 – Associations submit final regional nominations to STC Committee via the regional association supporting STC (**pdf or word document**)
- June – STC Committee reviews regional nominations and selects the national winner
- July – National winner announced in the agenda brief at the agInnovation Executive Committee Meeting held at Joint COPs
- July – STC Executive Vice-chair collects information from regional associations, secures project pictures, and submits materials to APLU for booklet and program script; NIFA notified for USDA NIFA Headquarters plaque inscription
- September – National winner presentation at agInnovation meeting
- November – National award announced at APLU Annual Meeting

Nomination Format

(The nomination should be a very concise summary and must be in this format.)

Nominating Region: _____

Nominator: _____ **E-mail:** _____

Project or Committee Number and Title: _____

Technical Committee Chair: _____ **E-mail:** _____

Administrative Advisor: _____ **E-mail:** _____

Project Summary (noting the following):

- Issue, problem or situation in context of Grand Challenge(s) addressed (5%)
- Objectives (5%)
- Accomplishments predominantly based upon the past five-year project period as
 - **Outputs** (the project's products and deliverables, 10%)
 - And qualitative and quantitative descriptions of social, economic, ecological, and(or) environmental benefits related to relevant Grand Challenge(s) as:
 - **Short-term outcomes** (how has the project created awareness, 5%);
 - **Medium-term outcomes** (how has the project changed behavior, 5%);
 - **Long-term outcomes** (how has the project changed condition, 5%);
 - **Impacts** (what are the direct, indirect, and/or anticipated global benefits; how is society and the world better off (10%)
- Added value and synergistic activities across mission areas
 - Multi-disciplinary activities (10%)
 - Multi-functional integrated activities (10%)
 - Additional partnerships, associations, or collaborations beyond land-grant universities (e.g., private, for-profit, non-profit, government and non-government agencies; 10%)
 - Emphasize what the committee did together that would not have been accomplished with individual work (10%)
- Evidence of multi-institutional and leveraged funding with examples of sources (10%)
- Participating institutions and units (5%) (**page 4 only**)

Nominations should be **no more than 3 single-spaced pages** (Times Roman 12 point and one-inch margins) plus a 1-page summary of participating institutions and units (alphabetized) for a **total of 4 pages**. Regions may utilize other information in selecting their nominee. The final regional nomination should be submitted by email to the Offices of the regional Executive Directors, by **c.o.b. February 28, 2024**:

Chris Hamilton, North Central <christina.hamilton@wisc.edu>
David Leibovitz, Northeast <david_leibovitz@uri.edu>
Cindy Morley, South <cmorley@uark.edu>
Jennifer Tippetts, West <jennifer.tippetts@waaesd.org>
Lisa Williamson, ARD <lmwilliamson1@ncat.edu>

Nominating Region: North-Central Region

Nominators: Celina Gómez, **E-mail:** cgomezva@purdue.edu; Ricardo Hernández, **E-mail:** rhernan4@ncsu.edu; A.J. Both **E-mail:** both@sebs.rutgers.edu

Project or Committee Number and Title: NCERA-101 Committee on Controlled Environment Technology and Use; <https://www.controlledenvironments.org/>

Technical Committee Chair: Ricardo Hernández

E-mail: rhernan4@ncsu.edu

Administrative Advisor: Ramesh Kanwar

E-mail: rskanwar@iastate.edu

PROJECT SUMMARY

Issue, problem or situation addressed: The NCERA-101 Committee, or "the Committee," plays a key role in addressing two Grand Challenges for food and agricultural research: 1) enhancing sustainability, competitiveness, and profitability in food and agriculture by leveraging technological advances that enable competitive specialty-crop production in controlled environment (CE) facilities; and 2) contributing to the mitigation of climate change impacts on food, feed, fiber, and plant-based energy systems by providing technical guidelines for the sustainable operation of CE facilities. The Committee has been instrumental in educating the national and international CE user community by providing a platform for information exchange among researchers, students, CE facility managers, and industry representatives, and by promoting the sustainable use of new and existing technologies.

Selected objectives:

1. Technology advancement and transfer: Advance the use of high-tech CE facilities (i.e., growth chambers, greenhouses, indoor vertical farms) used for research and commercial production.
2. Standards and guidelines: Develop measurement protocols and best practices for environmental control and data acquisition in CE facilities to improve reproducibility of crop responses.
3. Environmental: Promote sustainable operating practices, including responsible resource consumption (energy, water, nutrients) for CE facilities.
4. Education and training: Support the participation of graduate students during annual meetings to benefit career development of future researchers and academics, and to expand the human-resource capacity for CE research and industry.

Accomplishments:

Selected outputs: Since 1975, members have developed numerous professional collaborations that were facilitated because of interactions during annual meetings. Collaborations have resulted in successful grant proposals, publications, and professional standards. Notably, the Committee has published the [*Plant Growth Chamber Handbook*](#) and *International Guidelines for Measuring and Reporting Environmental Parameters for Experiments on Plants in [Greenhouses](#), [Growth Rooms and Chambers](#), and [Tissue Culture Facilities](#)*. These guidelines, exemplified by over 8600 views last year, are highly regarded. Committee members have contributed to the development of industry standards and guidelines (e.g., [ANSI/ASABE EP411.4](#), [ANSI/ASABE/ASHRAE EP 653](#), [ANSI/ASABE S640](#) and [S642](#)) with over 2000 views since 2017. Committee members also wrote a [book](#) used by most academics teaching CE related courses with over 1000 copies sold since 2017. Furthermore, Committee members have played a major role in guidelines for life-support systems for space missions led by NASA. Currently, the Committee is working with the [Design Lights Consortium](#) (DLC) to update guidelines for reporting light use by plants based on a recent [discovery](#) made by Committee members who showed that photons between 700 and 750 nm contribute to photosynthesis. Such findings have only been possible due to collaborative efforts of multiple Committee members.

Short-term outcomes: Annual meetings provide an excellent platform for information exchange about new technologies, guidelines, and advances in CE-related plant sciences. Outreach efforts that are part of several projects led by Committee members further create awareness about collaborative projects. For example, the [Indoor Ag Science Café](#), initially funded through a USDA-SCRI grant led by members of the Committee, has become a popular platform for sharing research updates from the CE community with the general public. Since 2018, enrollment in the 60 webinars presented has increased from 138 to 1,607 (as of February 2024), including participants from multiple countries.

Medium-term outcomes: The CE industry (including academia and commercial operations) has experienced exponential growth over the last decade, which is reflected in membership growth. Since 2010, the number of institutions represented at NCERA-101 meetings has increased 125%. Membership has substantially expanded beyond university faculty and institutional researchers, and now includes a sizeable number of industry members (66), some of whom are direct competitors with each other. This underscores the Committee's collaborative approach, fostering idea-sharing and discussions on opportunities and challenges in the CE industry. Student attendance at annual meetings has surged, partly attributed to \$10,000 travel awards supporting around 20 students yearly. Industry donations primarily fund this award.

Long-term outcomes: Throughout the years, the Committee has positively impacted the expansion of CE programs at multiple academic institutions. Approximately 15 years ago, only a handful of states, including AZ, UT, NY, MI, and IN, offered research and teaching programs in CE agriculture. As of today, established CE programs exist in at least 30 U.S. states, some with multiple experts. Various members of the Committee started as student-attendees during the annual meetings and are now leaders in the field. In addition, the Committee has supported expansion of the CE industry, leading to increased demand for equipment, production, and retail. CE-related industries collectively contributed \$77 billion to the U.S. economy in 2024, reflecting an average 6% revenue increase across industries over the past 5 years (ranging from 1.6% to 20.4%) ([1,2,3,4,5](#)). The Committee also contributes to NASA-sponsored space biology and life-support programs. Members address challenges with growing plants in space and make these findings applicable to earth-based systems.

Positive impacts: CEs promote local and regional food security by enabling year-round crop production close to target markets at competitive prices. Knowledge generated and transferred by Committee members through various publications and [workshops](#) has enabled growers to optimize yields while making operations more efficient, thus enhancing profitability while minimizing environmental impacts. The Committee will continue to support such efforts through the development of Design Standards ([CEADS](#)) that are helping define goals for the rapidly growing CE industry, considering social, economic, and environmental advances focused on sustainability.

Added-value and synergistic activities:

Multi-disciplinary activities: The Committee facilitates collaborations among members with diverse technical backgrounds. Areas of expertise represented by all participating institutions include engineering (e.g., CE facility design, sensor experts, and lighting specialists), plant sciences and physiology, business management and economics, and computer sciences and modeling. Furthermore, active participation by industry members is vital for the Committee, as it advances development and implementation of new technologies and control strategies. Collectively, members have published approximately 820 peer-reviewed papers or technical reports during the last 5 years, several co-authored by at least two members of the Committee. In addition, standards and guidelines described in the 'Outputs' section highlight the

multidisciplinary and international nature of Committee collaborations. During workshops, grower meetings, and other events hosted by various Committee members, thousands of stakeholders improved their knowledge about plant- and engineering aspects of CEA.

Multi-functional integrated activities: Committee collaborations have resulted in various multi-disciplinary and multi-institutional projects. Recent examples include Greenhouse Lighting And Systems Engineering ([GLASE](#)), Lighting Approaches to Maximize Profits ([LAMP](#)), Optimizing Indoor Agriculture ([OptimIA](#)), Next-Generation Propagation Strategies for the US Strawberry Supply Chain ([PIP-CAP](#)), Controlled Environment Agriculture Herb Extension and Research Base ([CEA HERB](#)), Advancing Controlled Environment agriculture through data-driven decision making and workforce development ([ADVANCEA](#)), in addition to various NASA-funded projects involving multi-institutional research organizations and commercial companies who all have representatives that are members of the Committee.

Additional partnerships, associations, or collaborations: The Committee maintains international collaborations with both the UK Controlled Environment User Group (CEUG) and the Australasian CE Working Group (ACEWG) and has met with these organizations during several international meetings. The Committee (in 2015) also co-organized an annual meeting with the Association of Education and Research Greenhouse Curators (AERGC), and in 2019 with the NE-1835 Committee (Resource Optimization in Controlled Environment Agriculture). Members of the Committee also are active participants in professional horticultural and agricultural engineering societies, and serve in leadership roles as executive committee members, division chairs, and/or working group chairs of these societies.

Project goals that would not have happened without the collaboration of committee members: None of the outcomes and impacts previously mentioned would have occurred without Committee collaborations. Broad industry participation, adoption of new standards and guidelines, and expansion of CE-related academic programs can all be attributed to the concerted collaborative efforts led by Committee members.

Evidence of multi-institutional and leveraged funding: Only in the last 6 years, collaborative projects receive funding totaling over \$28 million dollars. Examples of currently-funded projects with multiple Committee members include: Cornell U and Ohio State U (2020-2024) Accelerating workforce development for the controlled environment agriculture (USDA-NIFA); U of Georgia, Colorado State U, Cornell U, Rutgers U, Texas A&M U, Utah State U, and USDA-ARS, (2018-2022) LAMP (USDA-SCRI); Michigan State U, Purdue U, Ohio State U, U of Arizona (2019-2024) OptimIA: Improving the Profitability and Sustainability of Indoor Leafy Greens Production (USDA-SCRI); North Carolina State U, Ohio State U, USDA-ARS, Rutgers U, Virginia Tech U, U of Florida, UC-Davis, CalPoly, U of Maryland, and Purdue U (2021-2025) PIP-CAP: Next-Generation Propagation Strategies to Increase the Resilience of the US Strawberry Supply Chain (USDA-SCRI); Ohio State U, Rutgers U, U of Arizona, Cornell U (2022-2026) ADVANCEA (USDA-SCRI); Michigan State U, Iowa State U, North Carolina State U, Texas Tech U, the U of Tennessee, and USDA-ARS (2022-2025) CEA HERB (USDA-SCRI); U Delaware, Colorado State U, and Arizona State U (2023-2026) Tailoring hydroponic factors to controlled-environment production of emerging food crops (USDA-NIFA); McGill U and U Guelph (2024) CSA/DLR Ground Test Demonstrator (GTD) Subsystems Conceptual Design Study (CA Space Agency); Cornell U, Rensselaer Polytechnic Institute, Rutgers U (2017-2024) Greenhouse Lighting and Systems Engineering (GLASE) (NYS Energy Research and Development Authority); Sierra Space and NASA (2024-2026) Hydroponic/Aeroponic Nutrient Delivery In Volumetrically Efficient Garden (HANDIVEG) (NASA).

Participating institutions and units:

Since the first meeting of the Committee in 1976, membership has steadily increased from 12 to 176. The Committee is comprised of members from 142 different institutions representing 35 U.S. states and nine countries. Currently, Land Grant Universities, NASA research centers, and USDA research labs with Committee members include:

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|---------------------------------|---------------------------|
| Brigham Young University | University of Arizona |
| Clemson University | University of California |
| Cornell University | University of Connecticut |
| Duke University | University of Delaware |
| Iowa State University | University of Florida |
| Kansas State University | University of Georgia |
| McGill University | University of Guelph |
| Michigan State University | University of Hawaii |
| NASA - Ames Research Center | University of Illinois |
| NASA - Kennedy Space Center | University of Maryland |
| North Carolina State University | University of Minnesota |
| Ohio State University | University of Tennessee |
| Penn State University | University of Wisconsin |
| Purdue University | USDA-ARS |
| Rutgers University | Utah State University |
| Texas A&M University | West Virginia University |
| University of Alaska | University of Wyoming |

A detailed list of all members (including members representing commercial companies and international members) can be found at: <https://www.controlledenvironments.org/members/>