

NE1835: Resource Optimization in Controlled Environment Agriculture

Renewal Proposal (2023)

Responses to Reviewers' Comments

We appreciate the time and feedback from all reviewers and have revised the renewal proposal accordingly. The reviewers' comments are in black text below, whereas our responses and specific changes made are in blue text.

Reviewer 1:

Project has an outstanding team of key players in these areas of research and technology development and implementation. This is a interesting, detailed, and well planned series of tests to gather data on complex plant interactions with controlled environment crop variables such as lighting, temperature of the root zone, microbiome, growth method, aquaponics, etc. The teams approach will be to integrate multiple investigations, test multiple technologies and approaches, and forward the knowledge in this area for the benefit of multiple stakeholders. The addition of modeling, artificial intelligence/machine learning components and guidelines and recommendations for growers will help translate data collected into usable products for researchers and industry. The addition of the personnel training component enables the continued transfer of information. There are a few typographical and grammatical challenges with the writing, consistent with a proposal being written by multiple contributors, but in general this is an excellent planned project that will have significant return on investment and great benefits for the field of controlled environment agriculture.

Response: We appreciate the reviewer's helpful feedback and have made corrections of typographical and grammatical errors throughout the document.

Reviewer 2:

Excellent research/extension team and well structured proposal. The only item that seems out of place is that under objective 2, which is about root zone optimization, objective 2.1 seems more appropriate under objective 1 related to plant responses to the environment. Similarly, the "Related, Current and Previous Work" paragraph on air temperature and herbs at MSU seems more appropriate under objective 1.

Response: We appreciate the reviewer's constructive input.

We understand the confusion of listing Objective 2.1 under Objective 2 and have rephrased Objective 2.1 as "To research new crops that may be grown all year round in soilless substrates and water culture or using novel production techniques." It emphasizes the intended scope of this work to optimize the root-zone environment to grow new crops in soilless culture.

We agree that the related, current, and previous work on how air temperature influences herb growth fits better under Objective 1 and have moved it under Objective 1.

Reviewer 3:

There is significant overlap with the NCERA-101 regional working group, particularly activities related to Objective 1. The proposal would be strengthened if objectives and methods were more unique to this group and the scope was focused. Activities read as a compilation of what individuals are doing or are planning to do in other projects, with little evidence of planned research collaboration. A strength of the project is teaching/education collaboration and development of resource materials for students. The proposed work is expansive and goals/outcomes seem unrealistically lofty (i.e., aspirational).

Response: We thank this reviewer's time and feedback.

We understand that there are seemingly overlapping goals with the NCERA-101 group since both NE-1835 and NCERA-101 revolve around controlled-environment agriculture, and many of our members are actively participating in both groups. However, the proposed objectives of the renewed NE-1835 project are distinctly different from those of NCERA-101. NCERA-101 is more extension and outreach-oriented, with focuses on 1) technology advancement, dissemination, and transfer; 2) development of standards and guidelines for environmental control and monitoring; 3) communication of research and educational materials to stakeholders; 4) instrument calibration; 5) advocacy of sustainable operation of controlled-environment facilities; and 6) support of students' participation and presentations in annual meetings. In contrast, NE-1835 has specifically defined research and educational goals to tackle present and emerging issues in the controlled-environment agriculture industry. In addition, NCERA-101 historically originated from work conducted in growth chambers, especially those in academia and government agencies, and has evolved to include greenhouse and indoor vertical farming systems, whereas NE-1835 is specifically addressing resource use efficiency bottlenecks in the greenhouse and indoor vertical farming industry.

Considering the scope of the funding support for this multistate project, the extent of collaborations is inevitably based more on individual participants' existing projects, collaborations, and interest areas. A multistate group like NE1835 provides a helpful platform for like-minded researchers to meet and exchange information, and to foster and develop new collaborations. Our proposal thus leverages our existing resources and connections, combines our shared interests in new collaborations, and expands into new directions that members of this group believe would advance this field. We are confident that we will be able to achieve the proposed goals.