



AeroFarms Annual Report for NCERA-101 2020

We are entering the third and final year of the Foundation for Food and Agriculture Research, Seeding Solutions in Urban Food Systems Program (# 534680) grant. The grant allows us to examine how to use our control of the growth environment to demonstrate the phenotypic plasticity of cultivars. In the first year of the project four leafy green varieties were chosen and exposed to six abiotic stressors, including light and nutrient conditions. Using our own internal analysis and that of Rutgers University labs (Dr. James Simon's biochemistry lab and Dr. Beverley Tepper's sensory lab) we have been able to document methods to alter color, taste, texture, and phytochemicals.

In our second year, we narrowed the stressor field and started combining them. Spectrum, intensity, and timing of light were altered in various combinations representing 10 unique growth cycles that included: combined red, blue, green and far red; light intensity x spectrum; far red start x blue finish; and nitrogen x light. The greens produced in these experiments were again measured by AeroFarms and analyzed by Simon and Tepper labs. We then focused on 4 varieties, and grew those plants under 3 stressors at 5 levels. These experiments included: blue light finishing treatment, added on different days of the growth cycle in five different trials; combined spectrum experiment comparing plants exposed to at least five different red to blue light ratios; and light intensity experiments testing 5 different light levels with one spectrum.

In our third and final year we will expand our knowledge of control range and will combine multiple stressors towards creating bespoke growth algorithms that can make our produce more attractive, nutritious or tasty. We will also produce journal publications.

Two outcomes of the project worthy of note stem from work of PhD candidate Regina O'Brien in Dr. Tepper's lab. Regina obtained a North East – Sustainable Agriculture Research & Education (NE-SARE) pre-doctoral grant (GNE19-212-33243) entitled, "Increasing Consumer Acceptance of Baby Leafy Greens Grown in a Controlled Environment" and gave a presentation at the 2019 NY Produce show entitled, "Controlled Environment Agriculture: A Tool to Understand Flavor Profiles and Consumer Demand for Baby Leafy Greens." She will present at the Institute of Food Technologists Annual Meeting, Chicago, IL, in July 2020 "Development of a lexicon to describe *Brassicaceae* and non-*Brassicaceae* baby leafy greens grown with Controlled Environment Agriculture with links to chemical composition." The introduction reads, "Baby leafy greens are increasingly popular with consumers and Controlled Environment Agriculture allows rapid, consistent growth, and high-quality production of these plants. While published lexicons exist for adult plants, descriptive language for baby leafy greens is lacking. This study developed a lexicon for *Brassicaceae* and non-*Brassicaceae* varieties of baby leafy greens grown indoors, and linked the sensory profiles of these plants to their phytochemical composition.

AeroFarms is grateful for the NCERA-101 meetings for sharing valuable insights into current research and for providing a gathering where meaningful discussions happen on timely topics.