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American Floral Endowment (AFE)
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To the Paul Ecke, Jr. Scholarship Selection Committee,

I hope that you are all having a great start to your year. I would like to express my gratitude to you all for selecting me as the 2021 Paul Ecke, Jr. Scholarship recipient. Throughout this past year, your support has been incredibly helpful in navigating my research, course work, and industry interactions. I am grateful for the opportunity to provide you with an update on my academic career and industry endeavors, and to request continued funding.

Throughout this past year I have continued my research on the greenhouse cultivation of specialty cut flowers. In January of 2021 I conducted a study quantifying the influence of supplemental lighting (SL) quality (spectrum) on the growth and development of godetia 'Grace Rose Pink' (*Clarkia amoena*), snapdragon 'Potomac Royal' (*Antirrhinum majus*), and stock 'Iron Rose' (*Matthiola incana*). We grew plants under one of six SL treatments: 100% blue (B) SL, 100% red (R) SL, B+R+far-red (FR) SL, white (W) SL with and without FR light, and high-pressure sodium (HPS) lamps, serving as the control treatment as they are the current industry standard for SL. All treatments provided 120 $\mu mol \cdot m^{-2} \cdot s^{-1}$ of light for 16 hours each day. We found that SL emitting 100% B light, and fixtures emitting B+R+FR light, promoted flowering the fastest in all genera. Additionally, plants grown under these treatments had the shortest stem lengths at harvest compared to the other treatments, although these stems were of sufficient length to meet market specifications. Additionally, these treatments promoted flowering faster than HPS lamps, indicating that LEDs with these spectra may be suitable for applications in the cut flower industry, while offering potential energy savings for growers. W SL with and without FR light promoted flowering slightly slower than HPS lamps and produced stems with moderate lengths. We also found that SL emitting 100% R light significantly delayed flowering and produced plants with the longest stems of any treatment.

Additionally, I conducted trials quantifying the influence of photoperiod and light intensity (daily light integral; DLI) on four cultivars of dianthus Amazon series (*Dianthus barbatus* interspecific). We found that all cultivars demonstrated a weak facultative long-day plant response, with photoperiods of 16 h promoting flowering faster, albeit slightly, compared to 9-h photoperiods. DLI, however, had a predominate role in producing high-quality cut flowers. We found that a moderate DLI of 14 $mol \cdot m^{-2} \cdot d^{-1}$ produced thicker and longer stems with fully developed flower heads compared to a low DLI of 5 $mol \cdot m^{-2} \cdot d^{-1}$. Our findings further support that increasing the DLI via SL when solar radiation is limiting is critical to the growth and development of these four cultivars, while the photoperiod delivered during culture is of less importance.

I have had the privilege of sharing these research findings locally and internationally through various conferences and expos, including the 2021 International Society for

Horticultural Science Lighting Symposium, the 2021 American Society for Horticultural Science Annual Conference, and the 2021 Michigan Greenhouse Grower's Expo. It has been incredibly rewarding to share our research findings with both academia and industry, and I am looking forward to continuing my research and further disseminating results.

This semester I will complete a second replication of each of the described studies and will subsequently complete and defend my MS thesis. Additionally, later this month I will be traveling to Colombia with Dr. James Faust of Clemson University to visit several cut flower operations and trials in Bogotá and Medellín. I am very excited to broaden my view of the industry and make new professional connections. I am especially looking forward to seeing how Colombian cut flower growers manipulate photoperiod to control flowering, as my research has been primarily focused on this subject. After I graduate this summer, I will be applying to The Ohio Program, an international agricultural and horticultural internship program offered through The Ohio State University. I aim to embark on an internship in the Netherlands to further broaden my scope of the global cut flower industry and to learn more about cultivating cut flowers under protected cultivation in northern latitudes. After I complete this internship, I hope to find a position in commercial greenhouse management or cut flower research and development. It is my hope that I will be able to finish my program and begin my career, as described, with continued support from AFE.

I am honored to have been selected as the 2021 Paul Ecke, Jr. Scholar. Support through this scholarship has helped make my graduate school experience more memorable and meaningful, and has allowed me to continue my research and present at various conferences and expos. I am incredibly grateful to have AFE's support, and I am very enthusiastic to continue my career in the floral industry. Thank you very much for considering further support.

Best regards,

Caleb E. Spall