Multinutrient Biofortification of Microgreens for Human Health

Crawford, Lilian (School: Lincoln Park Academy)

Microgreens have the potential to play a significant role in the intake of vegetables by children, by members of communities with restricted access to fresh vegetables, and are even being considered as a nutrient dense food for astronauts during space exploration. The quantities of nutrients microgreens contain can be manipulated by the input of fertilizer during their production. In a previous experiment, the quantities of zinc and iron were individually increased by increasing these nutrients in the fertilizer. In this experiment zinc and iron were applied alone or in combination with either standard NPK fertilizer or an increased amount of NPK. Treatment combinations were replicated four times and the experiment was conducted twice. A high level of mortality was found with microgreens grown in the sun with additional Fe, which might have been the result of the formation of formaldehyde by the breakdown of chelated Fe in sunlight. Increasing the NPK concentration also had a negative impact on microgreen biomass production and nutrient accumulation. Co-application of Fe and Zn did result in multi-nutrient biofortification at both NPK levels, although more Fe and Zn were accumulated when applied alone. While increasing micronutrient content in microgreens is a feasible approach to biofortification, it is important to test numerous levels of increased nutrient content in order to avoid causing phytotoxicity. Optimal fertilization levels that result in multiple element biofortification without causing phytoxicity should be able to be defined with additional research.

Awards Won:
Air Force Research Laboratory on behalf of the United States Air Force: First Award of $750 in each Regeneron ISEF Category