World Academy of Science, Engineering and Technology
International Journal of Agricultural and Biosystems Engineering
Vol:18, No:10, 2024

Enhancing Greenhouse Productivity and Energy Efficiency Through UV-IR Reflective Coatings and Dust Mitigation: A Case Study in Saudi Arabia

Authors : Tayirjan Taylor Isimjan, Essam Jamea, Muien Qaryouti

Abstract : The demand for efficient greenhouse production is escalating, necessitating continuous improvements in controlled plant growth environments. Central to maximizing growth are critical light-related factors, including quantity, quality, and geometric distribution of intercepted radiation. This becomes particularly crucial in regions like the Middle East, characterized by high solar radiation and dusty atmospheric conditions. Existing greenhouse technologies often rely on additional expensive equipment to manage light conditions effectively. In this study, we propose a distinct approach employing functional coatings to mitigate dust and block UV and IR radiation, thereby conserving energy and enhancing productivity. By combining UV-IR reflective coatings with dust mitigation strategies, we aim to address both environmental challenges and energy consumption issues faced by greenhouse agriculture in Saudi Arabia.

Keywords : greenhouse, UV-IR reflective coatings, dust mitigation, energy efficiency, productivity
Conference Title : ICSAFSN 2024 : International Conference on Sustainable Agriculture, Food Security and Nutrition
Conference Location : Los Angeles, United States
Conference Dates : October 28-29, 2024