

Adapting Wheat Farming to Climate Change: A Comprehensive Review and Prospective Study on Sustainable Agricultural Practices.

Nawel Messaoudi

Mentor: Roberto Mariani, Ph.D.

College: Kingsborough Community College

This study assesses how climate change affects wheat farming methods and evaluates strategies to adopt sustainable agriculture for the future. It highlights the pressing need for innovative solutions to address rapid climate changes, including the impacts of heat stress on wheat crops.

The research emphasizes the importance of drawing upon plant science and employing advanced and novel strategies, such as utilizing cyanobacteria, ancient photosynthetic prokaryotes commonly found in aquatic environments that can thrive in extreme conditions like water scarcity, high temperatures, and nutrient-poor soils.

Cyanobacteria offer a sustainable solution by enhancing soil fertility, nutrient bioavailability, and plant stress tolerance through their ability to form biological soil crusts, fix atmospheric nitrogen, and produce valuable secondary metabolites.

Due to possible global warming and heat stress in the next years, cyanobacteria represent a valid alternative to fortify wheat crop resilience and ensure consistent harvests due to their inherent resilience, multi-functionality, and ability to mitigate climate change through carbon dioxide sequestration. Cyanobacteria are an eco-friendly alternative to current conventional chemical-based agriculture because they can be used to increase safely large-scale production of natural biofertilizers, food, energy, and other products.