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Smart Water Management in Agriculture: Strategies for Efficient Irrigation and Sustainable Crop Production in a Water-Scarce World

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In a world increasingly challenged by water scarcity, the efficient management of water resources in agriculture has become essential for ensuring sustainable crop production. Smart water management (SWM) in agriculture leverages advanced technologies and strategies to optimize irrigation practices, reduce water waste, and enhance crop productivity. This paper explores the role of smart water management in addressing the global water crisis while promoting sustainable agricultural practices. Key strategies such as precision irrigation, data-driven decision-making, the use of sensor technologies, and the integration of climate-smart practices are discussed. The potential of Internet of Things (IoT) devices, remote sensing, and artificial intelligence (AI) in real-time monitoring and water-use optimization is also examined. Furthermore, the paper highlights challenges and opportunities in implementing these technologies at scale, especially in water-scarce regions. By adopting smart water management techniques, farmers can ensure both water conservation and improved yields, contributing to food security in an era of climate change and resource depletion.

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[illegible]

Statistical analysis

[illegible]

(ANOVA): [illegible]

[illegible]

[illegible] [10].

Challenges and limitations

[illegible]

Ethical considerations

[illegible]

Discussion

[illegible]

[illegible] [8].

Conclusion