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temperature). Additionally, rainfall showed a strong positive correlation (r = 0.7936) with whitefly incidence and was statistically significant (p = 0.0036**). These findings provide valuable insights into the differential responses of aphids and whiteflies to weather factors, emphasizing the importance of considering environmental influences in pest management strategies. Continuous monitoring and adaptive approaches are essential for mitigating potential crop damage and ensuring the sustainability of potato cultivation practices amidst evolving environmental conditions.

Key words: Temporal Trends, Aphid Populations, Whitefly Dynamics, Weather Influences

Artificial Intelligence in Farming: A Smart Approach to Sustainable Agriculture

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Abstract

The integration of Artificial Intelligence (AI) in farming represents a paradigm shift in agricultural practices, heralding a new era of smart and sustainable agriculture. This paper explores the multifaceted applications of AI in farming, emphasizing its pivotal role in optimizing resource utilization, enhancing crop yields, and promoting eco-friendly practices. AI-driven technologies, such as machine learning, data analytics, and computer vision, empower farmers with real-time insights into crop health, soil conditions, and weather patterns. This smart approach enables precise decision-making, from planting to harvesting, resulting in increased efficiency and reduced environmental impact. The abstract delves into specific AI applications, including predictive modelling for disease detection, autonomous machinery for precision farming, and intelligent irrigation systems. It highlights how AI algorithms process vast datasets to forecast pest infestations, enabling proactive measures that minimize reliance on chemical inputs. The use of robotics and drones equipped with AI enhances crop monitoring, contributing to sustainable practices by minimizing resource wastage. Furthermore, it's important to discuss the economic implications of AI in farming, emphasizing its role in promoting financial sustainability for farmers. AI algorithms process vast datasets to predict weather patterns, enabling farmers to make informed decisions about planting and harvesting. In disease detection, AI-powered systems analyze images of crops to identify early signs of diseases, facilitating timely intervention. The adoption of AI-driven technologies not only improves productivity but also facilitates market access and better price realization. As the agricultural sector faces unprecedented challenges, AI emerges as a transformative force that aligns productivity goals with environmental stewardship, paving the way for a smarter and more sustainable future in agriculture.

Keywords- AI, Smart agriculture, eco-friendly, crop health, weather, precision farming, drones

Bridging The Gap Between Tradition and Innovative Agriculture Through New Age Digital Technologies

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Abstract

Agriculture today faces growing pressure from numerous factors, including population growth, climate change, and resource depletion. Traditional agricultural practices have been used since ancient times but are inadequate to ensure long-term environmental and economic sustainability. In agriculture today, the use of cutting-edge technologies like robotics and artificial intelligence (AI) is increasing, helping achieve sustainable agricultural goals. These practices are paving the way for a future where abundance and environmental responsibility can coexist. Researchers have highlighted the profound impacts of these technologies on the different aspects of sustainability. Precision agriculture, empowered by data-driven insights from sensors and satellite imagery, is leading the charge. Real-time monitoring of soil health, crop stress, and weather patterns allows for the targeted application of water, fertilizers, and pesticides, minimizing waste and environmental impact. Scientists have demonstrated the use of AI-powered irrigation systems to significantly reduce water usage while maintaining yields. Robotics is also crucial in reducing labour dependence and promoting

sustainable practices. Autonomous tractors and drones are now employed for seeding, weeding, and harvesting, minimizing soil compaction and reliance on fossil fuels. Successful deployment of autonomous weeding robots has led to a significant reduction in herbicide use. AI's analytical prowess is also aiding in breeding climate-resilient crops and predicting pest outbreaks. By analysing vast datasets of genetic information and environmental factors, researchers can develop crops better adapted to changing weather patterns and resistant to diseases. AI has been recently utilized to identify genes controlling heat tolerance in wheat, paving the way for more resilient varieties. However, embracing these technologies comes with challenges. Addressing the digital divide in rural areas, ensuring data security and privacy, and building trust among farmers are crucial aspects that require thoughtful solutions. Additionally, ethical considerations surrounding automation and potential job displacement necessitate careful planning and workforce training programs. In conclusion, integrating new-age digital technologies presents a golden opportunity to address the sustainability challenges in agriculture. From precision resource management to climate-resilient crops, these advancements hold immense potential to create a future where agricultural productivity thrives alongside environmental health. By addressing the existing challenges and fostering inclusive innovation, we can cultivate a greener future for future generations.

Keywords*:* Agriculture, Climate change, Digital technologies, Sustainability, Robotics

Digital Agriculture Technologies: Insights from a Developing Nation

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Abstract

Digital agriculture technologies (DATs) provide great promise to transform farming methods in underdeveloped countries by tackling major issues such resource scarcity, climatic variability, and food insecurity. A large percentage of the workforce is employed in agriculture, which is the main driver of the economies of many developing countries. It also contributes to food security and rural livelihoods. But the needs of an expanding population and a shifting environment are frequently beyond the reach of conventional farming practices. DATs provide smallholder farmers with creative ways to increase output, maximize resource utilization, and expand their market access. Blockchain-enabled supply chain management systems, mobile applications, remote sensing, and precision agriculture technology are some of the key DATs.With the use of these technology, farmers can more effectively connect with markets, monitor crop health, and manage irrigation and weather forecasting. DATs enable farmers to make educated decisions and adjust to changing conditions by digitizing agricultural operations and providing them with real-time information and decision support tools. However, there are a number of obstacles to the adoption of DATs in developing countries, such as inadequate digital literacy, inadequate infrastructure, and financial limitations. Through investments in digital infrastructure, the provision of training and capacity building programs, and the promotion of inclusive and sustainable business models, governments, non-governmental organizations, and stakeholders in the private sector all play critical roles in removing these obstacles. Notwithstanding these difficulties, DATs have a number of positive effects on poor countries, from better food security and resilience to the effects of climate change to higher farmer yields and incomes. Developing countries may unleash the potential of their agricultural sector to propel economic growth, mitigate poverty, and accomplish sustainable development objectives by utilizing digital agriculture technologies.

Keywords: Digital Agriculture Technology, Climate Variability, Food Security and Sustainable