International Journal of Artificial Intelligence
p-ISSN: 2407-7275, e-ISSN: 2686-3251

Original Research Paper

The Impact of AI Technologies on Precision Agriculture

Imran Khan Yousafzai[1], Mumtaz Nudrat Akram[1], Farid Khalil Zia[1], Khalid Haeder Adanan[1]

[1] *Faculty of Engineering and Technology, Khyber Pakhtunkhwa University of Science and Technology. Kohat, Pakistan.*

Article History
Received:
29.10.2024

Revised:
10.11.2024

Accepted:
27.11.2024

***Corresponding Author:**
Imran Khan Yousafzai
Email
imrankhan87@yahoo.com

Abstract: The adoption of artificial intelligence (AI) in precision agriculture offers transformative solutions to challenges such as climate change, resource scarcity, and inefficient traditional farming methods. This study evaluates the application of AI in improving crop health monitoring, yield prediction, and optimizing the use of natural resources like water and fertilizers. A quantitative research design was employed, utilizing field experiments and data collected from soil sensors, drones, and AI-based tools across ten diverse agricultural locations in Pakistan. The findings demonstrate that AI enables early detection of crop diseases and stress conditions, reducing response time and improving overall crop health. Predictive models powered by AI provide highly accurate yield estimations, facilitating better planning and resource allocation. Additionally, AI technologies optimize water and fertilizer usage, achieving reductions of up to 15% and 10%, respectively, without compromising crop yields. Despite technical and infrastructural challenges, the results underscore the potential of AI in enhancing sustainability and efficiency in agriculture. To maximize these benefits, collaboration between governments and private sectors is crucial in providing training, infrastructure, and region-specific solutions for farmers. Future research should explore integrating AI with automation technologies to further improve agricultural practices, including harvesting and distribution processes. This study highlights the importance of AI as a key enabler of sustainable food production and agricultural resilience.

Keywords: Artificial Intelligence, Crop Health Monitoring, Precision Agriculture, Machine Learning, Sustainable Agriculture.