AI-Based Agricultural Models: A Scientific Approach to Enhancing Agricultural Practices

Venus Kaushik[1] and Dr. Kalpana Sharma[2]

Research Scholar, Department of CSE[1]

Assistant Professor, Department of CSE[2]

Bhagwant University, Ajmer, Rajasthan

Abstract: *Agriculture remains a cornerstone of human livelihood and economic stability, yet it faces growing challenges such as climate unpredictability, pest outbreaks, soil degradation, and inefficient water and supply chain management. This research explores the integration of Artificial Intelligence (AI) to address these critical issues by developing data-driven, scalable agricultural models. The study investigates scientific aspects of agriculture including soil science, agronomy, climatology, and plant pathology, and applies AI techniques—such as machine learning, deep learning, and computer vision—for crop yield forecasting, soil health monitoring, pest and disease identification, precision irrigation, and supply chain optimization. Experimental results demonstrate high accuracy in plant disease detection (96.3%), effective yield prediction ($R^2 = 0.94$), improved water usage efficiency (27% savings), and enhanced supply chain logistics (15% reduction in post-harvest losses). The study concludes that AI can serve as a transformative force in sustainable and precision agriculture when integrated with field-level data and farmer-centric platforms.*

Keywords: Artificial Intelligence, Agriculture, Precision Farming, Machine Learning, Crop Prediction, Soil Monitoring, Smart Irrigation, Sustainable Agriculture