AgriScope
Monthly e-Magazine on Agriculture and Interdisciplinary Sciences
Visit at us: www.agriscope.in
Email at us: agri4scope@gmail.com
ISSN: 3139-6488

How Gen Z is Transforming Modern Agriculture

Prashant Mishra[1], Vishal Dadheech[2], Disha Joshi[3] and Shubham Mishra[4*]

1-M.Sc. Scholar, Department of Agricultural Extension, BRDPG College, Deoria, Uttar Pradesh
2- Senior Research Fellow, ICAR-ATARI-Zone-II, Jodhpur, Rajasthan
3- Guest Faculty, Department of Agronomy (Agriculture), Govt. College Uniara, Tonk, Rajasthan
4*- Assistant Professor, Department of Department of Agricultural Extension, BRDPG College, Deoria, Uttar Pradesh
Corresponding Author- krishnaagrian.1990@gmail.com

Article ID: 28006

Abstract

Agriculture remains fundamental to global food and nutritional security, yet the sector faces mounting challenges from climate change, soil degradation, water scarcity, biodiversity loss, and labour shortages. Generation Z (Gen Z), born amid rapid advances in digital technology, artificial intelligence, and connectivity, is emerging as a pivotal force capable of accelerating agriculture's transition toward a knowledge-based, climate-resilient, and sustainable system. This paper reviews the ways in which Gen Z's digital literacy and entrepreneurial orientation are reshaping modern farming, with emphasis on the adoption of precision agriculture tools such as unmanned aerial vehicles, remote sensing, geographic information systems, and Internet of Things-based sensors for real-time crop and resource monitoring. It further examines the role of smart farming systems, including automated irrigation, variable-rate technology, and predictive analytics, in improving input-use efficiency and farm resilience. The paper also discusses Gen Z's potential contribution to climate-smart and regenerative agriculture, including natural farming inputs such as Jeevamrit and Beejamrit, conservation tillage, cover cropping, and organic farming practices that restore soil health and sequester carbon. The review concludes that by integrating digital innovation with ecological stewardship, Gen Z can drive a new agricultural revolution that secures livelihoods, strengthens food systems, and builds a more sustainable future for farmers worldwide.

Keywords: Generation Z; Precision agriculture; Smart farming; Climate-smart agriculture; Regenerative agriculture; Natural farming; Digital technology; Sustainability

1. Introduction

AgriScope
Monthly e-Magazine on Agriculture and Interdisciplinary Sciences
Visit at us: www.agriscope.in
Email at us: agri4scope@gmail.com
ISSN: 3139-6488

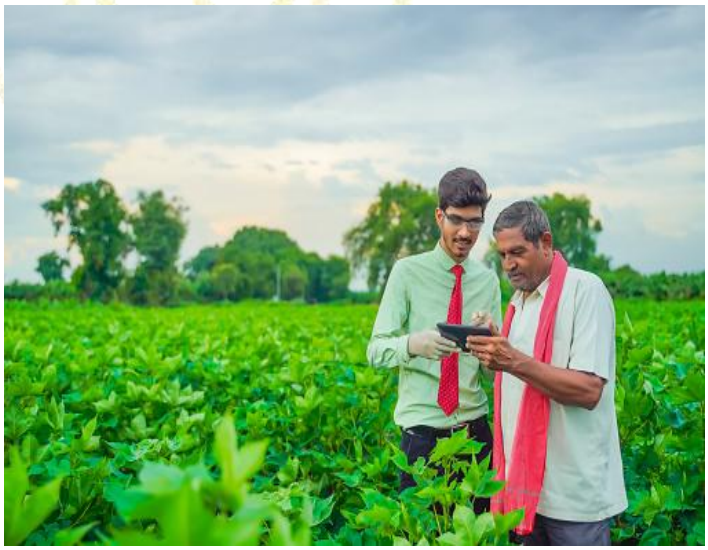
Agriculture constitutes the foundation of global food and nutritional security while providing raw materials, employment, and livelihood opportunities for billions of people worldwide. Despite significant technological advancements, the sector is confronted with multiple challenges, including climate change, land degradation, declining soil fertility, water scarcity, biodiversity loss, increasing production costs, and labour shortages. These constraints threaten agricultural productivity and sustainability, particularly in developing countries. Simultaneously, Generation Z (Gen Z) is emerging as a technologically proficient and environmentally conscious workforce. Their digital literacy, innovative thinking, and entrepreneurial orientation position them as key stakeholders capable of accelerating the transformation of conventional agriculture into a knowledge-based, climate-resilient, and sustainable production system.

Generation Z generally comprises individuals born between 1997 and 2012 who have grown up in an era characterized by rapid advances in information and communication technologies (ICT), artificial intelligence (AI), cloud computing, and digital connectivity. Their familiarity with data-driven technologies, mobile applications, automation, and social media enables them to rapidly adopt and disseminate innovative agricultural practices.

Consequently, Gen Z represents a valuable human resource for promoting technological modernization and strengthening agricultural resilience under changing climatic and socio-economic conditions (Benítez-Márquez *et al*., 2022).

2. Digital Technologies and Precision Agriculture

The integration of advanced technologies into agricultural production systems represents one of the most significant contributions Gen Z can make to modern agriculture. Precision agriculture technologies, including unmanned aerial vehicles (UAVs), remote sensing, geographic information systems (GIS), global positioning systems (GPS), Internet of Things (IoT)-based sensors, and artificial intelligence, facilitate real-time monitoring of crop growth, nutrient status, pest and disease incidence, and water requirements. UAVs equipped with multispectral and hyperspectral imaging



systems enable early detection of biotic and abiotic stresses, while AI-driven decision-support systems improve the precision of irrigation, fertilization, and crop protection practices. Furthermore, mobile-based digital advisory platforms provide real-time weather forecasts, market intelligence, and crop management recommendations, thereby enhancing farm productivity, input-use efficiency, and economic returns (Tsouros *et al.,* 2019; Sharma *et al.,* 2021).

3. Smart Farming and Precision Agriculture Systems

Another important area where Gen Z can contribute is the adoption of precision and smart farming systems. Smart agriculture integrates sensor networks, satellite observations, weather forecasting, big data analytics, and machine learning algorithms to optimize farm management decisions. Soil moisture sensors and automated irrigation systems improve water-use efficiency by applying irrigation according to crop requirements, whereas variable-rate technology enables site-specific nutrient application, thereby minimizing fertilizer losses and environmental contamination. Predictive analytics further assist in yield forecasting, disease surveillance, and risk assessment, improving the resilience and profitability of agricultural production systems (Dhanaraju *et al*., 2022).

4. Climate-Smart, Regenerative, and Natural Farming Approaches

Climate change has emerged as one of the most critical challenges affecting global agricultural sustainability. Increasing temperatures, erratic precipitation patterns, recurrent droughts, floods, and the emergence of new pests and diseases adversely influence crop productivity and food security. In this context, Gen Z can facilitate the transition towards climate-smart and regenerative agricultural systems. Natural farming, regenerative agriculture, and organic farming represent complementary approaches that promote ecological sustainability while maintaining agricultural productivity. Natural farming emphasizes the use of on-farm biological inputs, such as *Jeevamrit*, *Beejamrit* (Patel *et al.,* 2024), mulching, and crop diversification, thereby reducing dependence on synthetic agrochemicals.

Regenerative agriculture focuses on restoring soil ecosystem functions through conservation tillage, cover cropping, crop rotation, integrated crop-livestock systems, and agroforestry, leading to enhanced soil organic carbon sequestration, microbial diversity, nutrient cycling, and water-holding capacity. Organic farming relies on ecological processes, biofertilizers, compost, green manures, and biological pest management to produce safe and environmentally sustainable food. The integration of these agroecological approaches with digital technologies can simultaneously enhance resource-use efficiency, climate resilience, environmental sustainability, and long-term agricultural productivity (Newton *et al.,* 2020).

5. Conclusion

Gen Z has the knowledge, energy, and technological skills needed to transform agriculture. By promoting smart farming, sustainability, innovation, entrepreneurship, and digital communication, they can address many of the challenges facing the agricultural sector today. Agriculture is not just about growing food; it is about securing the future of humanity. If Gen Z actively participates in this field, they can bring a true revolution in agriculture and build a more productive, sustainable, and prosperous future for farmers and society as a whole.

References

1. Benítez-Márquez, M. D., Sánchez-Teba, E. M., Bermúdez-González, G., & Núñez-Rydman, E. S. (2022). Generation Z within the workforce and in the workplace: A bibliometric analysis. Frontiers in Psychology, 12, Article 736820. https://doi.org/10.3389/fpsyg.2021.736820
2. Dhanaraju, M., Chenniappan, P., Ramalingam, K., Pazhanivelan, S., & Kaliaperumal, R. (2022). Smart farming: Internet of Things (IoT)-based sustainable agriculture. Agriculture, 12(10), Article 1745. https://doi.org/10.3390/agriculture12101745
3. Newton, P., Civita, N., Frankel-Goldwater, L., Bartel, K., & Johns, C. (2020). What is regenerative agriculture? A review of scholar and practitioner definitions based on processes and outcomes. Frontiers in Sustainable Food Systems, 4, Article 577723. https://doi.org/10.3389/fsufs.2020.577723
4. Patel, M., Islam, S., Glick, B. R., Choudhary, N., Yadav, V. K., Bagatharia, S., Sahoo, D. K., & Patel, A. (2024). Zero budget natural farming components Jeevamrit and Beejamrit augment Spinacia oleracea L. (spinach) growth by ameliorating the negative impacts of the

salt and drought stress. Frontiers in Microbiology, 15, Article 1326390. https://doi.org/10.3389/fmicb.2024.1326390

5. Sharma, A., Jain, A., Gupta, P., & Chowdary, V. (2021). Machine learning applications for precision agriculture: A comprehensive review. IEEE Access, 9, 4843–4873.
6. Tsouros, D. C., Bibi, S., & Sarigiannidis, P. G. (2019). A review on UAV-based applications for precision agriculture. Information, 10(11), Article 349. https://doi.org/10.3390/info10110349