



## AI Revolution in Indian Agriculture

**For Prelims:** [Artificial Intelligence](#), Project Farm Vibes, [Per Drop More Crop](#), [Internet of things](#), [AgriStack Initiative](#), [PM-WANI](#)

**For Mains:** AI in Sustainable Agriculture and Climate Resilience, Digital Agriculture Mission

[Source: TH](#)

### Why in News?

Microsoft Chairman **Satya Nadella** recently highlighted the transformative impact of [Artificial Intelligence \(AI\)](#) in agriculture through **Project Farm Vibes (PFV)** in Baramati, Maharashtra, which has **boosted crop yields by 40%** while reducing resource consumption.

### What is the Project Farm Vibes?

- **About:** Project Farm Vibes, developed by Microsoft Research with the Agricultural Development Trust, Baramati (MH), is an **open-sourced AI suite of farm-focused technologies** transforming farming with data-driven insights, empowering researchers, farmers.
- **Technologies Used:**
  - **Azure Data Manager for Agriculture:** Aggregates satellite, weather, and sensor data for a holistic view of field conditions.
  - **FarmVibes.AI:** Uses AI to analyze soil moisture, temperature, humidity, and pH for precise farming recommendations.
  - **Agripilot.AI:** Offers real-time, actionable insights for sustainable farming and generates personalized recommendations in local languages.
- **Impact:** **40% increase in crop production**, with healthier and more resilient crops.
  - **25% reduction in fertiliser costs** through precise, AI-guided spot fertilization.
  - **50% less water consumption**, promoting sustainable irrigation.
  - **12% decrease in post-harvest wastage**, improving profitability.
  - Reduced **chemical runoff**, [soil erosion](#), and [greenhouse gas emissions](#) and [deforestation](#), leading to environmental benefits.

### How is AI Revolutionizing Indian Agriculture?

- **Smart Irrigation:** Water scarcity is a significant challenge in Indian agriculture. AI is addressing this issue through **Soil moisture and climate analysis** to optimize **irrigation schedules**.
  - **AI-integrated drip and sprinkler irrigation systems** under the ["Per Drop More Crop" scheme](#), improving water efficiency.
  - **IoT-based irrigation solutions**, developed by ICAR, which **automate water supply based on real-time field conditions**, reducing wastage.
- **Pest & Weed Control:** The [National Pest Surveillance System](#), which leverages AI to monitor pest activity and provide real-time alerts.

- **Automated weed detection**, where AI-powered computer vision **distinguishes weeds from crops** and applies herbicides only where needed, reducing chemical usage.
- **Economic Impact of AI in Agriculture:** The AI in agriculture market is expected to grow from **USD 1.7 billion in 2023 to USD 4.7 billion by 2028** at a CAGR of 23.1%, driven by advancements in precision farming, drone analytics, and labour management.
  - **Kisan e-Mitra**, an AI-powered **chatbot** assisting farmers with queries about the **PM Kisan Samman Nidhi** scheme.

## What Challenges Does AI Adoption in Agriculture Face?

- **Lack of Awareness:** Many farmers, especially in rural India, **lack digital literacy** to use AI-based tools effectively hindering large-scale adoption.
- **High Implementation Costs:** AI solutions like **drones**, [Internet of things \(IoT\) sensors](#), and automated irrigation systems require significant investment.
  - Small and marginal farmers, **who make up 85%** of India's farming community, **struggle with affordability**.
- **Infrastructure Gaps:** **Unreliable internet connectivity** in rural areas restricts access to AI-powered platforms.
  - Out of 5,97,618 inhabited villages in the country, 25,067 villages lack mobile connectivity and Internet.
- **Data Availability and Quality:** AI relies on **real-time and historical data** for accurate predictions. **Incomplete or inaccurate agricultural data** limits AI's effectiveness.
- **Limited Customization:** Most AI models are **not tailored** to India's **diverse agro-climatic conditions**.
  - More research is needed to develop **region-specific AI solutions**.

## Way Forward

- **Data Frameworks:** The [AgriStack Initiative](#) and **India Digital Ecosystem for Agriculture (IDEA)** can be utilized as digital platforms for farm data management, enabling accurate predictions through seamless data integration.
  - Utilize the **National AI Centres of Excellence** on developing region-specific AI solutions for Indian agriculture.
- **Digital Infrastructure:** Public Wi-Fi hotspots under the [Prime Minister's Wi-Fi Access Network Interface \(PM-WANI\)](#) and [BharatNet Project](#) can enhance rural connectivity, enabling farmers to access AI-driven platforms.
- **Skilling and Awareness:** The [National e-Governance Plan in Agriculture \(NeGPA\)](#) educates farmers on **AI applications**, while [FutureSkills PRIME](#), reskills professionals in AI and emerging technologies for agriculture.
- **Financial Support:** Under the [Digital Agriculture Mission \(2021-2025\)](#), offer subsidized loans to **agri-tech startups and farmer cooperatives**, promoting innovation in farming.

### **Drishti Mains Question:**

Discuss how Artificial Intelligence (AI) is transforming Indian agriculture. What are the key benefits and challenges associated with AI adoption in farming?

## UPSC Civil Services Examination, Previous Year Question (PYQ)

### **Prelims**

**Q. In the context of India's preparation for Climate -Smart Agriculture, consider the following statements: (2021)**

1. The 'Climate-Smart Village' approach in India is a part of a project led by the Climate Change, Agriculture and Food Security (CCAFS), an international research programme.

2. The project of CCAFS is carried out under Consultative Group on International Agricultural Research (CGIAR) headquartered in France.
3. The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) in India is one of the CGIAR's research centres.

**Which of the statements given above are correct?**

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

**Ans: (d)**

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### **Mains**

Q. Explain various types of revolutions, took place in Agriculture after Independence in India. How these revolutions have helped in poverty alleviation and food security in India? **(2017)**

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