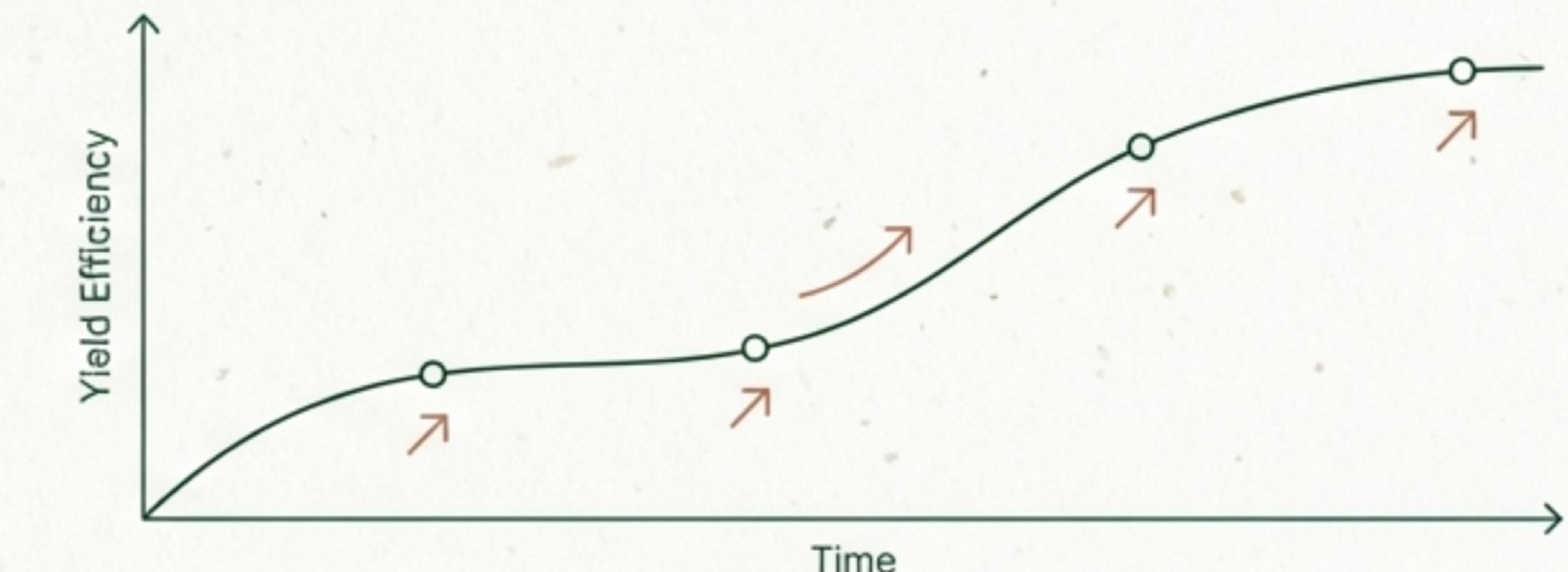


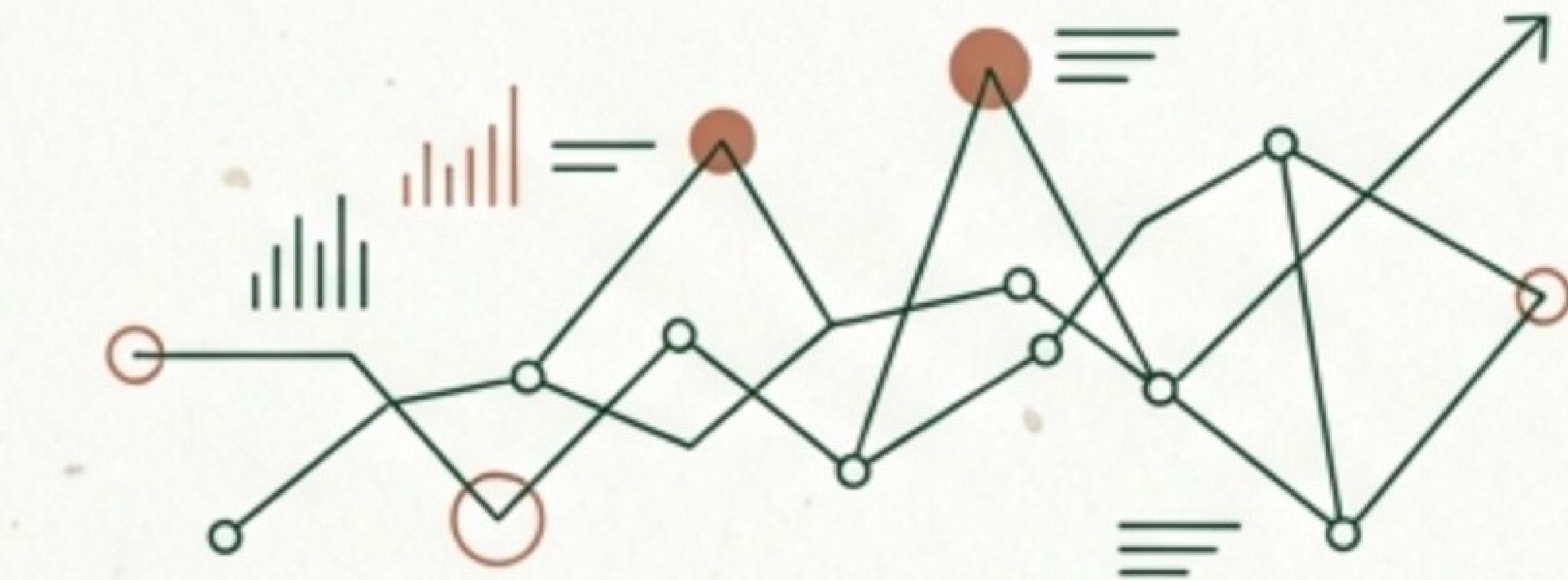


# SmartHarvest Engine

AI-Powered Decision Support for Smarter Farming



Predictive Analytics • Machine Learning • Real-time Advisory



# SmartHarvest Engine: Integrated Intelligence



## **Yield Prediction**

Predicts crop production (tons/hectare) based on soil and climate.



## **Price Prediction**

Forecasts market value using ML and supply-demand logic.



## **AI Agri-Advisor**

Real-time chatbot guidance powered by Groq + Llama 3.

# Core Intelligence I: Precision Yield Prediction

## INPUTS



Soil pH



Rainfall

150mm



Temperature

28°C



Fertilizer



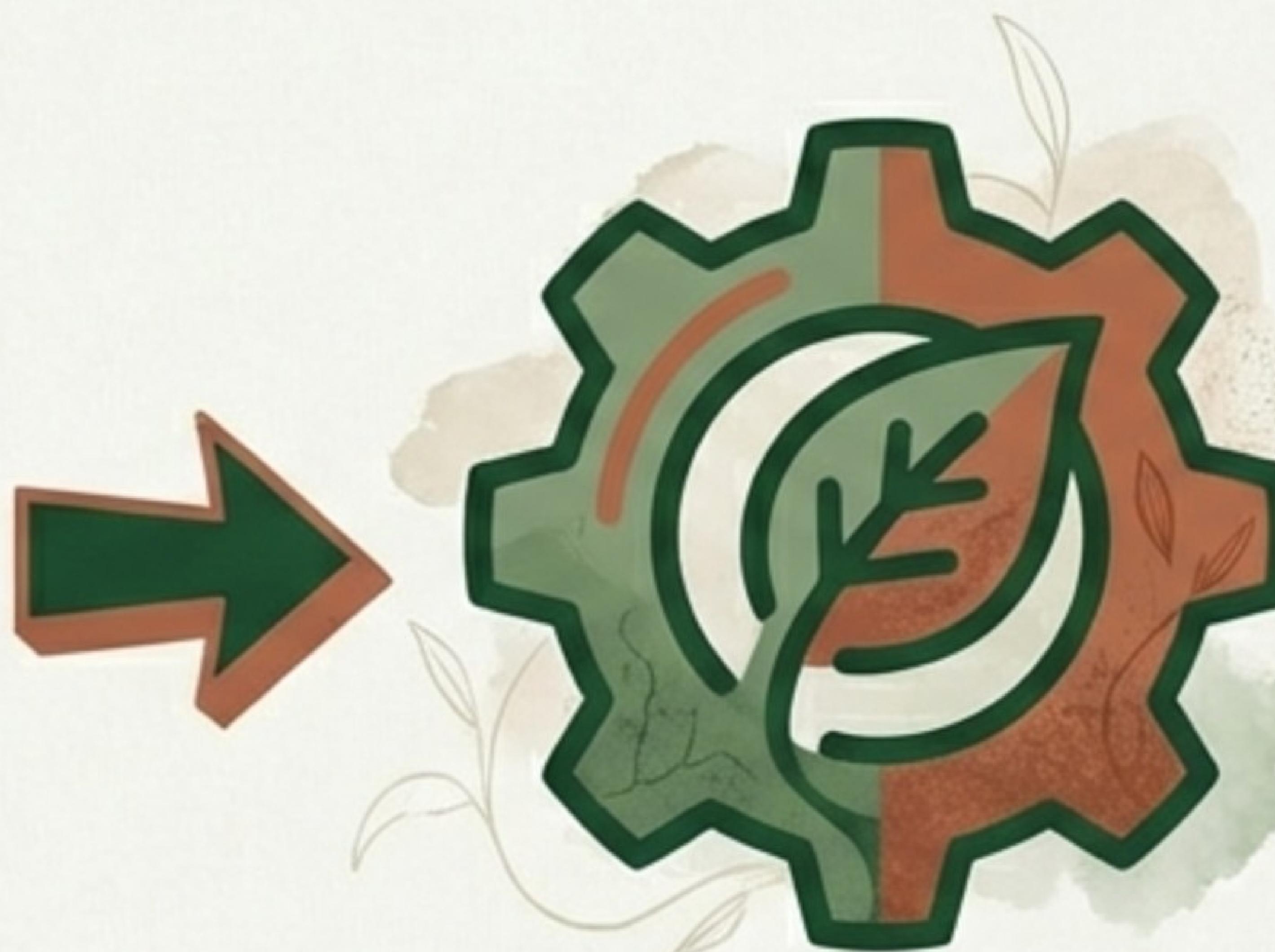
Pesticide



Crop Type

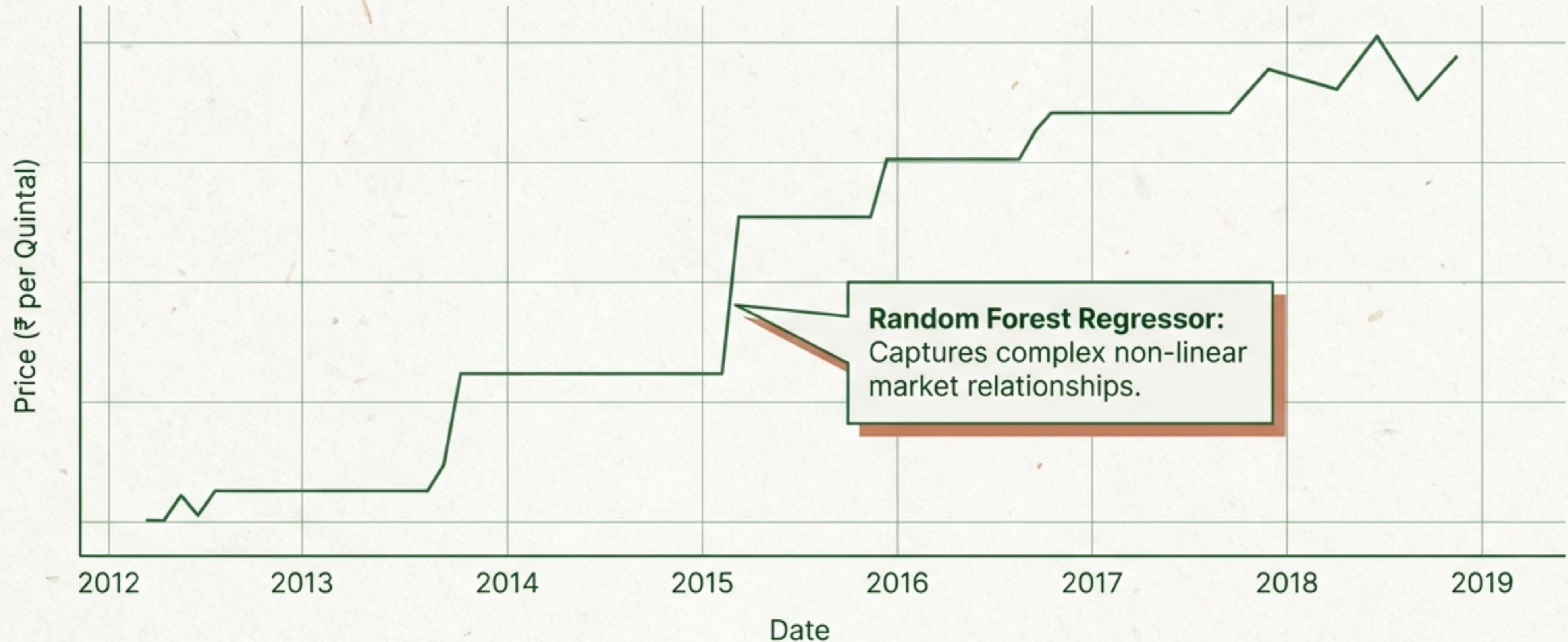
## OUTPUT

4.5  
Tons/Hectare



SmartHarvest  
Algorithm

# Core Intelligence II: Market Price Forecasting



Simulates supply-demand logic  
to prevent distress sales.

# Core Intelligence III: The AI Agri-Advisor.



**Powered by groq™**  
**Groq API + Llama-3**

-  Real-time guidance
-  Crop suggestions
-  Soil & Irrigation advice

# Intuitive User Experience.

**Price Prediction Form**

Select State  
Maharashtra  
Select the state where you want to predict crop prices

Select Commodity  
Sugarcane  
5 crop(s) available in Maharashtra

Month: December      Year: 2027

Average Rainfall (mm) (optional)  
26.6  
[Check rainfall data](#)

Average Temperature (°C) (Optional)  
27.4

**Recent Predictions**

Sugarcane	₹4343.86
Sugarcane	₹4343.86
Sugarcane	₹4343.86

**Categorical Selection (State/Crop)**

**Interactive Sliders & Numeric Inputs**

**Instant Real-Time Prediction**

# How It Works: The Data Pipeline.



# Under the Hood: Technology Stack.

## Machine Learning



Random Forest Regressor.

## AI & LLM



Groq



Llama-3

## Frontend



## Data Processing



## Environment



# Technical Architecture: Project Structure.

```
1 | SmartHarvest/
2 |   └── Crop_Prediction_Tool.ipynb
3 |   └── dataset.csv
4 |   └── model_training/
5 |     └── gradio_ui/
6 |       └── README.md
```

Modular codebase  
designed for  
scalability and  
maintenance.

# The Dataset.

## Crop Types:

Rice, Maize, Chickpea, Kidney Beans, Pigeonpeas.

## Soil Characteristics:

N-P-K ratios, pH values.

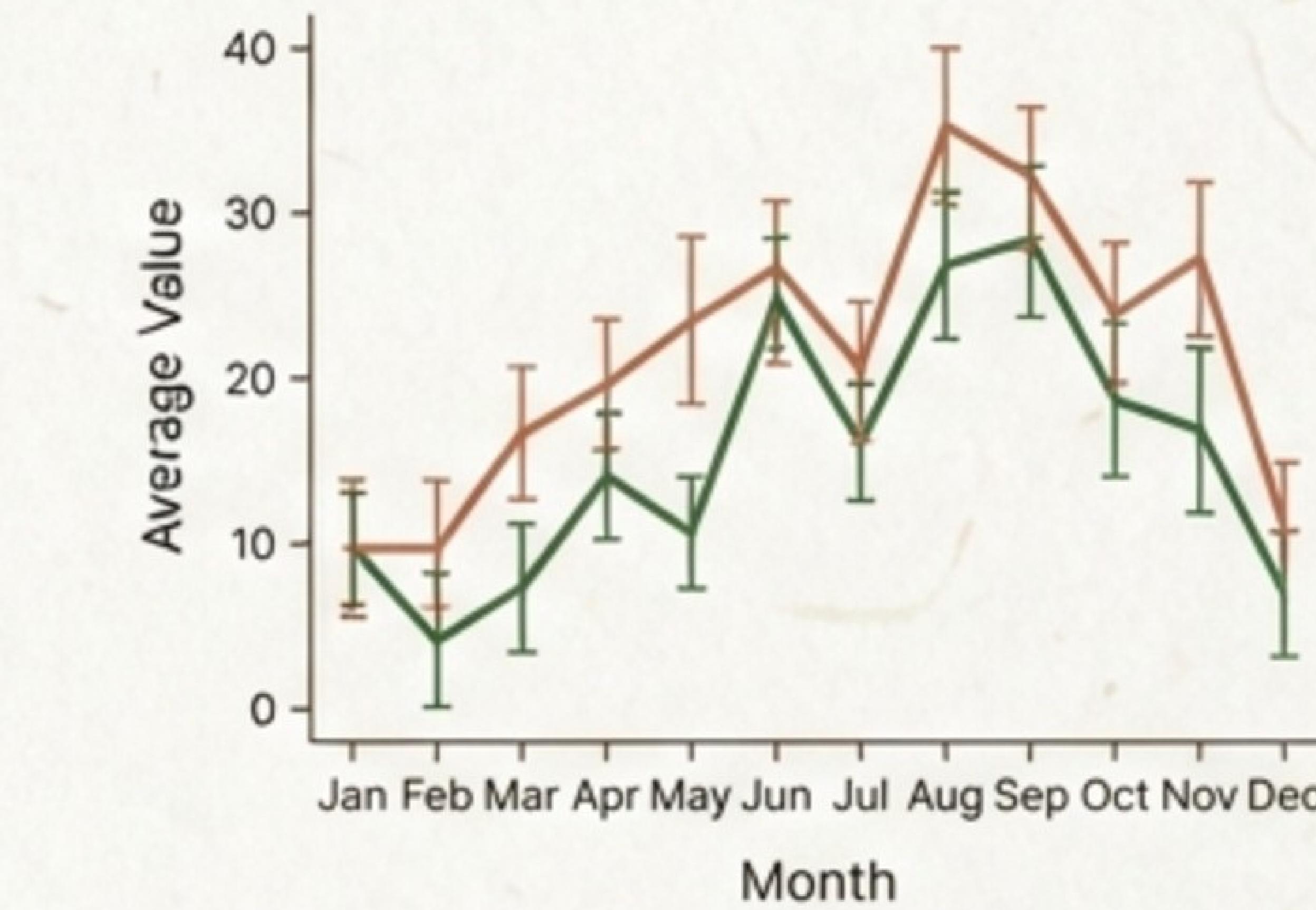
## Climate Data:

Rainfall, Temperature, Humidity.

## Farming Inputs:

Fertilizer, Pesticide.

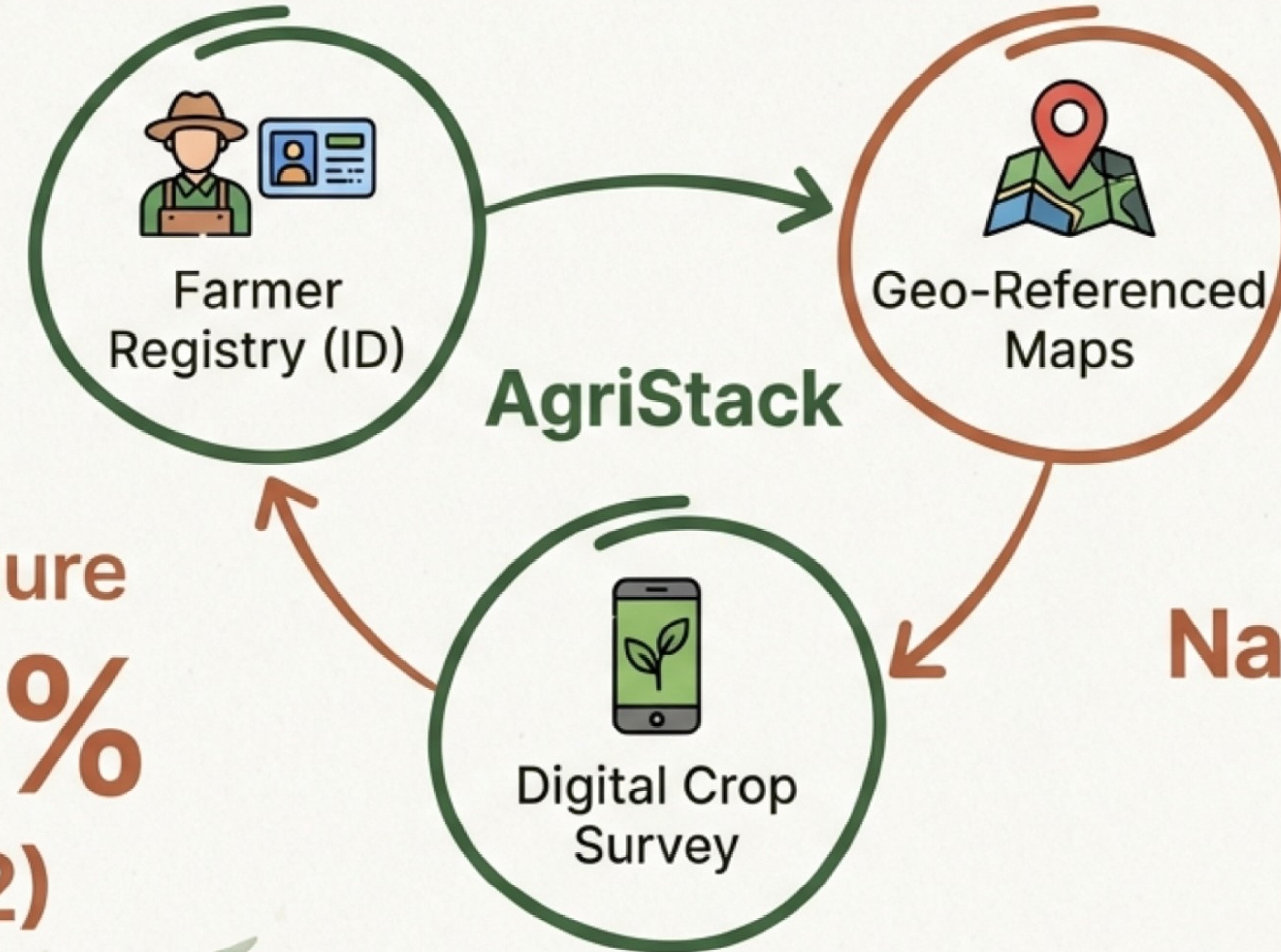
## Seasonal Patterns



**Note:** Price data is synthetically generated for modeling purposes to simulate market supply-demand logic.

# Strategic Alignment: The Ecosystem

**Global  
AI-in-Agriculture  
22.39%  
(2025-2032)**



**Aligned with  
National Digital  
Agriculture  
Mission**

# Future Roadmap.



**Live API  
Integration.**  
Real-time Weather  
& Mandi Prices.

**Accessibility.**  
Mobile-First App &  
Vernacular  
Language Support.

**Advanced AI.**  
Computer Vision for  
Disease Detection.

# Key Highlights.



## Real-World Use Case.

Directly addresses yield and price uncertainty.



## Hybrid Intelligence.

Combines Scikit-learn ML with Llama-3 Generative AI.



## Interactive UI.

User-friendly Gradio interface with instant feedback.



## Extensible.

Modular architecture ready for future integration.



# Empowering Smarter Farming

From Guesswork to Precision

**Disclaimer:** This project is for educational and experimental use only. Predictions may not reflect actual market or farm outcomes.

**SmartHarvest Engine**