Problem Statement: AI-Based Crop Recommendation for Farmers

■ 1. Soil Health Monitoring & Fertilizer Guidance

How it works:

• Farmers enter their location / upload soil test data (pH, NPK levels, moisture, organic content).
• App connects to a soil database (ICAR/FAO standards).
• AI recommends suitable crops, fertilizers & dosage, and organic alternatives.

Value for farmers:

■ Prevents excessive fertilizer use.
■ Improves soil fertility & crop yield.
■ Reduces environmental damage.

■■ 2. Weather-Based Alerts & Predictive Insights

How it works:

• Real-time weather API integration (IMD, OpenWeather, IBM Weather).
• AI model gives predictive alerts for rainfall, drought, temperature, humidity.
• Farmers get personalized notifications like irrigation advice, mulching, pest prevention.

Value for farmers:

■ Timely action = less crop loss.
■ Saves water & costs.
■ Increases resilience to climate change.

■ 3. Pest & Disease Detection (AI/ML Image Recognition)

How it works:

• Farmer uploads a photo of crop leaf/plant.
• AI/ML model (trained on PlantVillage dataset) analyzes image.
• Returns disease/pest detected, treatment suggestions, and prevention tips.

Value for farmers:

■ Quick identification.
■ Reduces crop loss.
■ Lowers dependency on random advice.

■ Data Requirements & Sources

1. Soil Health Monitoring & Fertilizer Guidance

Needed Data:

Soil type classification (pH, NPK, moisture, organic carbon, micronutrients).
Crop-soil suitability mapping.
Fertilizer recommendation guidelines.

Datasets / Sources:

• ICAR & NBSS&LUP; (India) – soil maps & recommendations.
• FAO Soil Database.
• Government soil health card data.
• OpenAgri / Kaggle datasets.

■■ 2. Weather-Based Alerts & Predictive Insights

Needed Data:

Historical weather data (rainfall, temperature, humidity, wind speed).
Forecast models (7–14 days ahead).
Crop growth stage vs. weather impact.

Datasets / Sources:

• IMD (India) – free weather data.
• NASA POWER API.
• OpenWeather API.
• NOAA climate datasets.

■ 3. Pest & Disease Detection (AI/ML – Image-based)

Needed Data:

High-quality crop disease images.
Pest attack patterns.
Labels: crop name, disease type, treatment.

Datasets / Sources:

• PlantVillage Dataset (Kaggle).
• ICAR-IARI research papers.
• PlantDoc Dataset (India-specific).
• Mendeley / Zenodo datasets.

■ Extra Dataset for Market Price Tracking

• Agmarknet (Govt. of India) – daily mandi prices.
• FAOSTAT – international crop prices.