Soil Analysis & Crop Recommendation

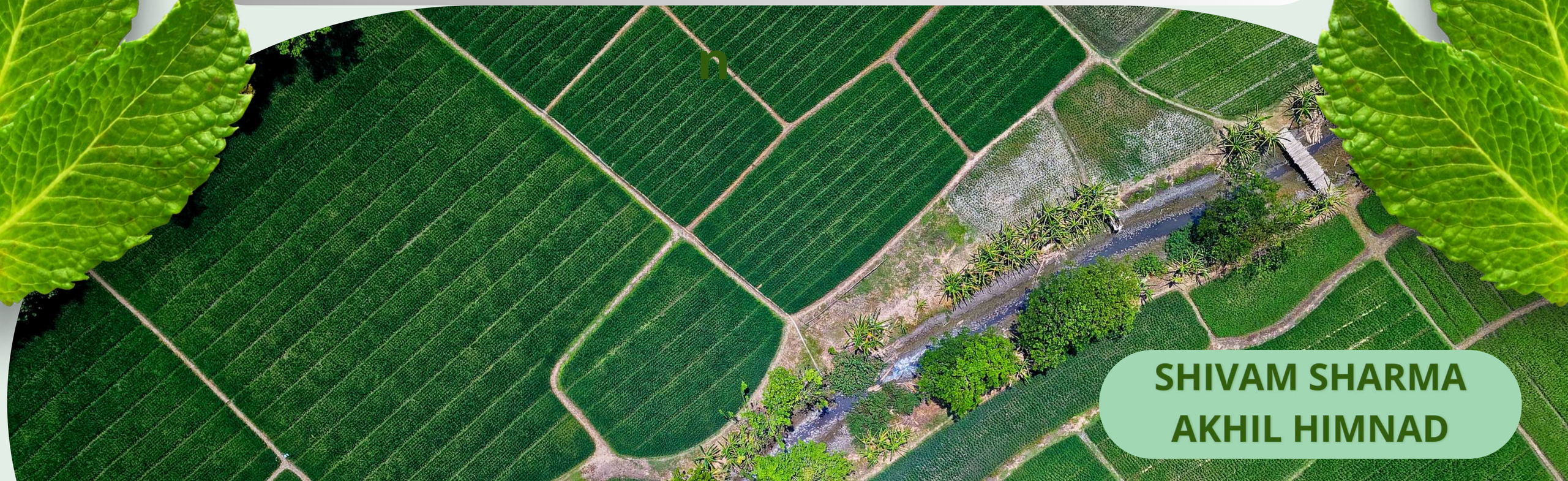

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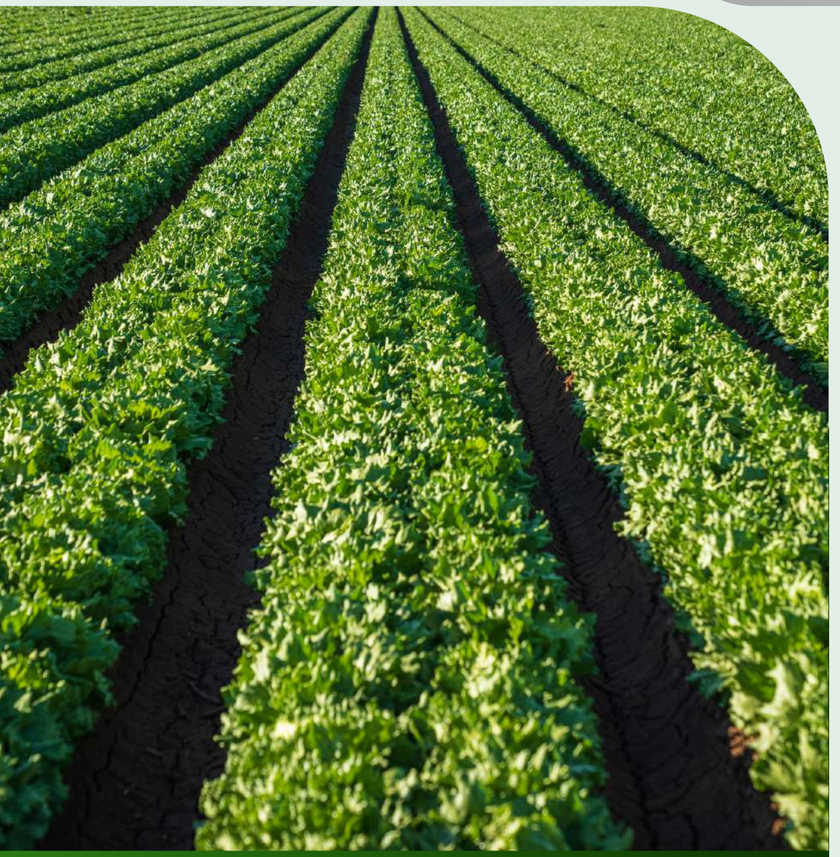
Table Of Content



INTRODUCTION

- Crop production was once a major contributor to the economy and GDP.
- Crop production falls under the primary sector.
- Youth are increasingly focused on technology, which belongs to the tertiary sector and is a major economic contributor.
- Technology and agriculture should progress hand in hand.
- Like all organisms, mother nature (soil) has a capacity to regenerate and sustain productivity.

- It aims to improve decision-making in the agriculture sector.
- Key soil fertility parameters include Nitrogen, Phosphorus, Potash, pH, and Rainfall.
- Feature Engineering techniques are utilized.
- Exploratory Data Analysis (EDA) is conducted.
- Machine Learning algorithms are applied.
- Soil Science principles are integrated.
- The project supports environmental sustainability.

Problem Statement

-**Traditional Methods:**
Persistent use of the same cultivation methods & fertilizers.

- **Soil Health Decline:**
Results in nutrient imbalances and weakened soil.

- **Reduced Crop Yields**:
Lower productivity and poor crop growth.

- **Higher Vulnerability**:
Crops more prone to pests and diseases.

- **Soil Fertility Degradation:**
Overall decline in soil quality and resilience.

Our Methodology

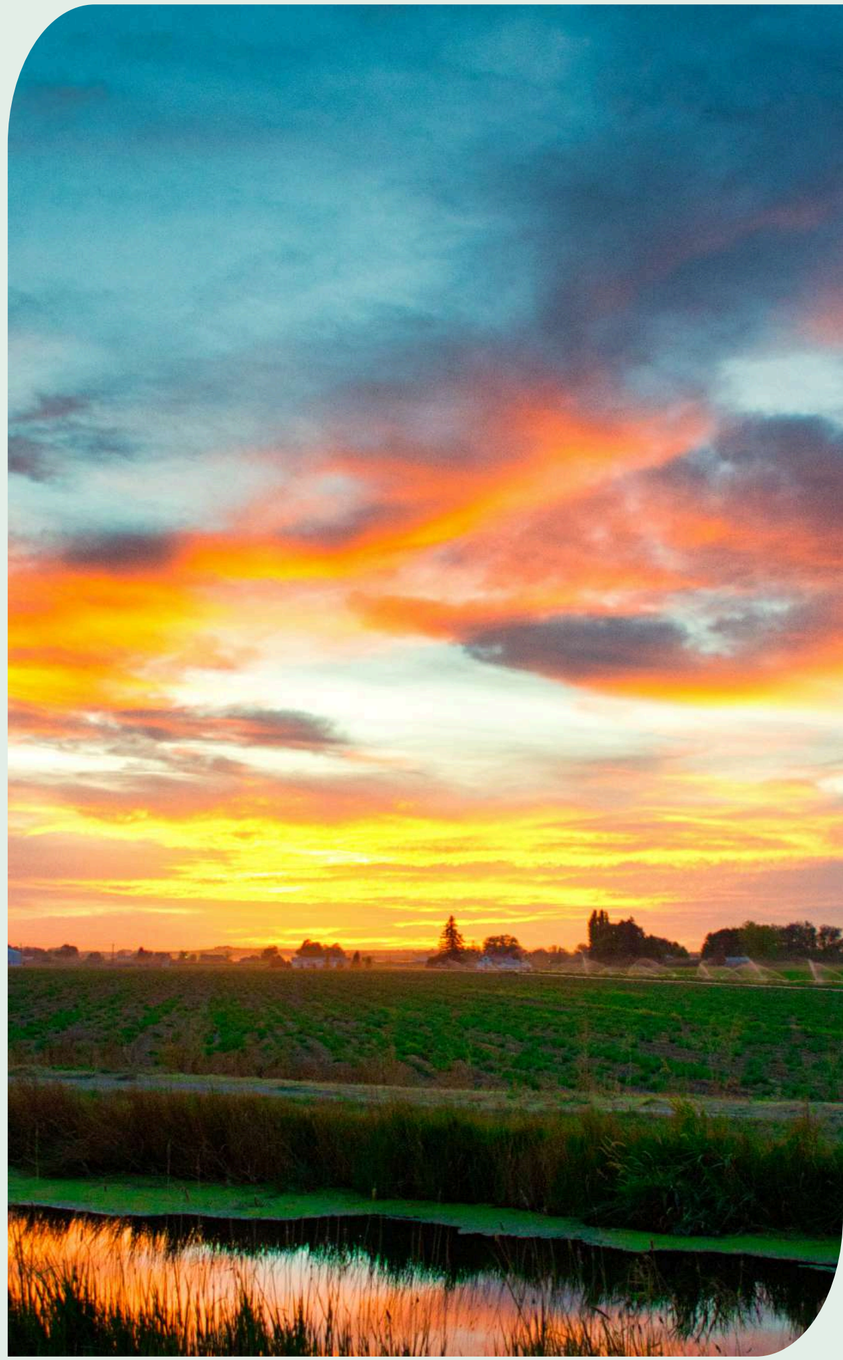
1. Data Collection:
Gather soil samples from areas with high crop productivity.

2. Soil Analysis/Exploratory Data Analysis:
Analyzed fertility parameters for specific crops.

3. Data Preprocessing:
Data encoding is performed and data is being prepared for model training.

4. Model Training:
Trained the model using soil data and climatic conditions e.g Using algorithms like Logistic Regression, Decision Tree Classifier, SVM, Random Forest Classifier, etc.

5. Crop Recommendation:
Random forest algorithm is selected on the basis of accuracy for input new soil data to get the best-suited crop suggestions.



Soil Analysis

Nitrogen

Essential for plant growth, especially in leaf and stem development.

pH

Affects nutrient availability; optimal pH ensures efficient nutrient absorption.

Rainfall

Adequate and well distributed rainfall helps in healthy plant growth.

Phosphorus

Vital for energy transfer and storage, crucial in root development, flowering, and fruiting

Potassium

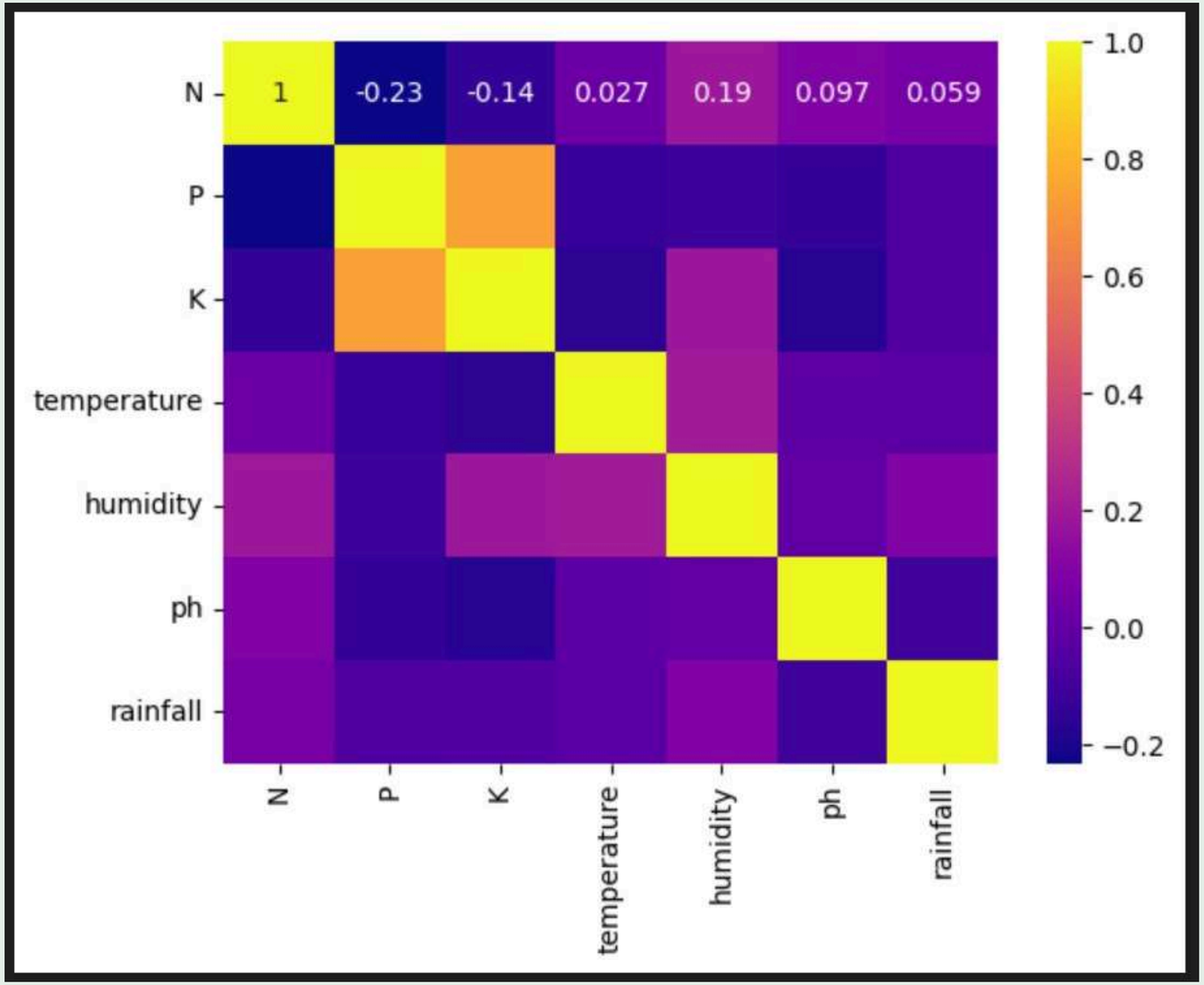
Supports various physiological processes, enhances drought and disease resistance, regulates water uptake, and contributes to overall plant health.

Humidity

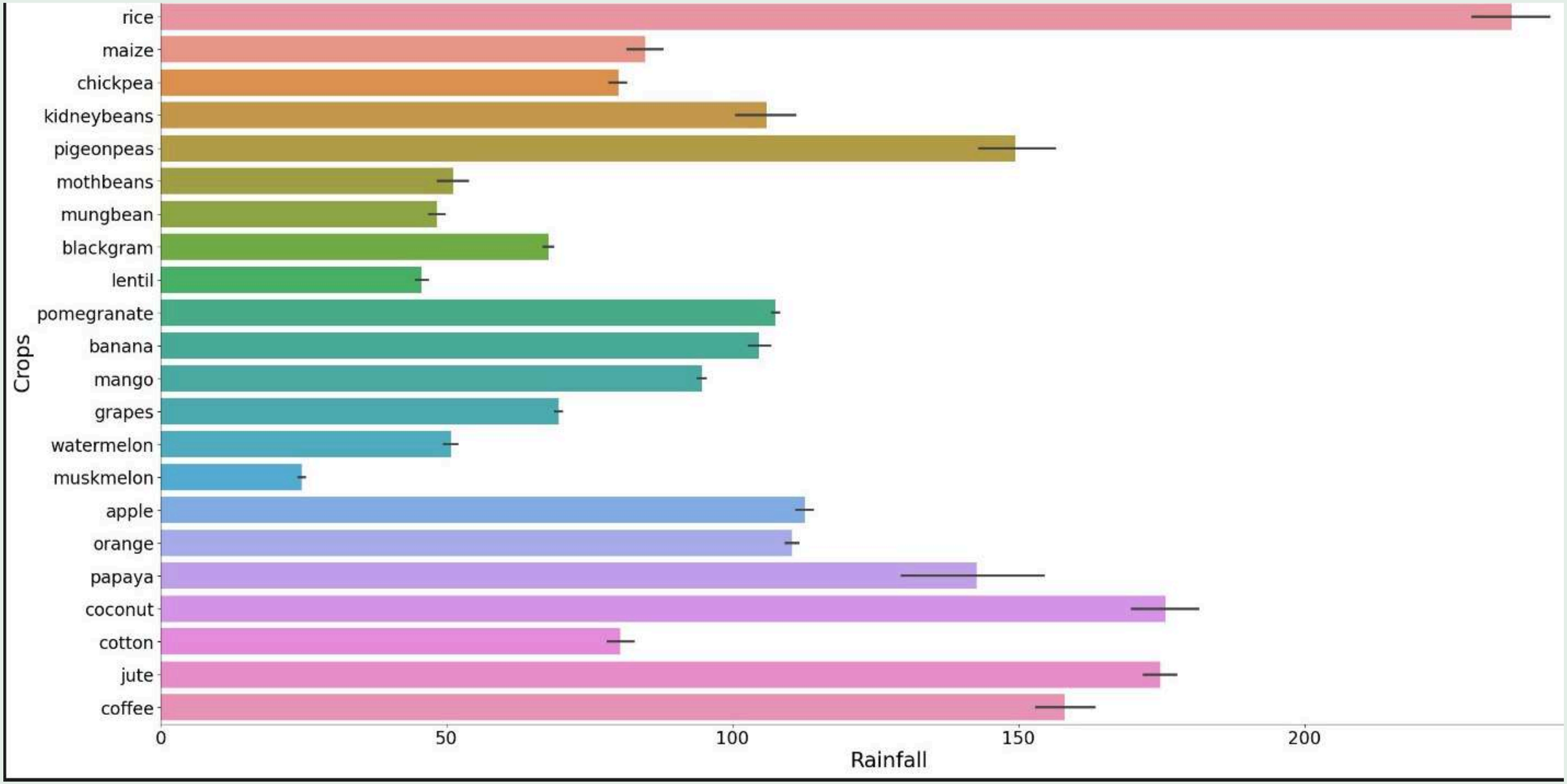
Impacts transpiration and water uptake by plants. High humidity can reduce water loss but may also lead to disease susceptibility in certain crops.

SIMULATION

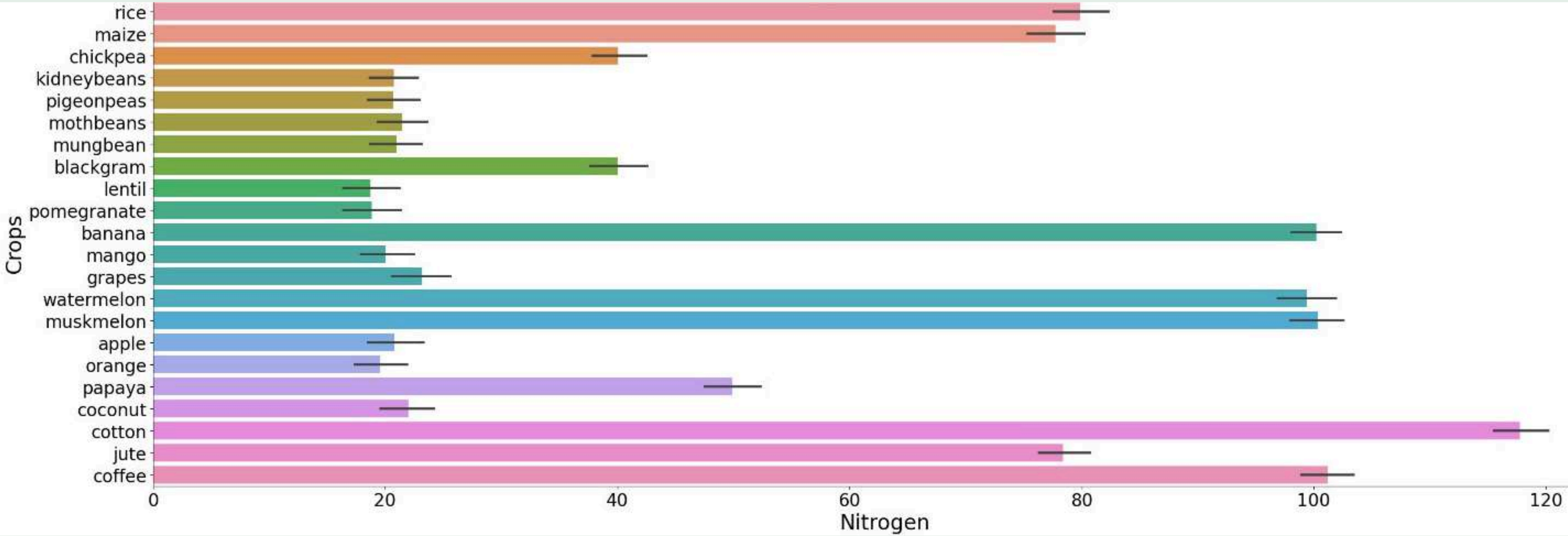
Parameters Correlation



Rainfall Distribution



Nitrogen Distribution



Demonstration

Soil Parameters Values

Nitrogen = 23 kg/ha
Phosphorus = 50 kg/ha
Potassium = 180kg/ha
Temperature= 30°C
Humidity = 14 gm/kg
Rainfall =100 cm per year
pH = 5

Recommended Crop: ***BANANA***

CHALLENGES

- Data quality and accessibility
- Environmental Dynamics
- User Adoption and Trust
- Resource Constraints
- Long Term Sustainability

Future Scope and Conclusion

- Global agricultural impact.
- Increased Crop yields.
- Soil health analysis.
- Optimized resource utilization.
- Farmers economic sustainability.

ANY QUESTIONS?