



# FINANCE MODELLING BASED ON SOIL TESTING

Transforming Agriculture with IoT and Financial Insights

# Problem Statement

*Agriculture is a testament to the power of patience and perseverance in business. Every harvest is a result of months of hard work and dedication.*

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# AGENDA

01

Crops

02

Nutrients

03

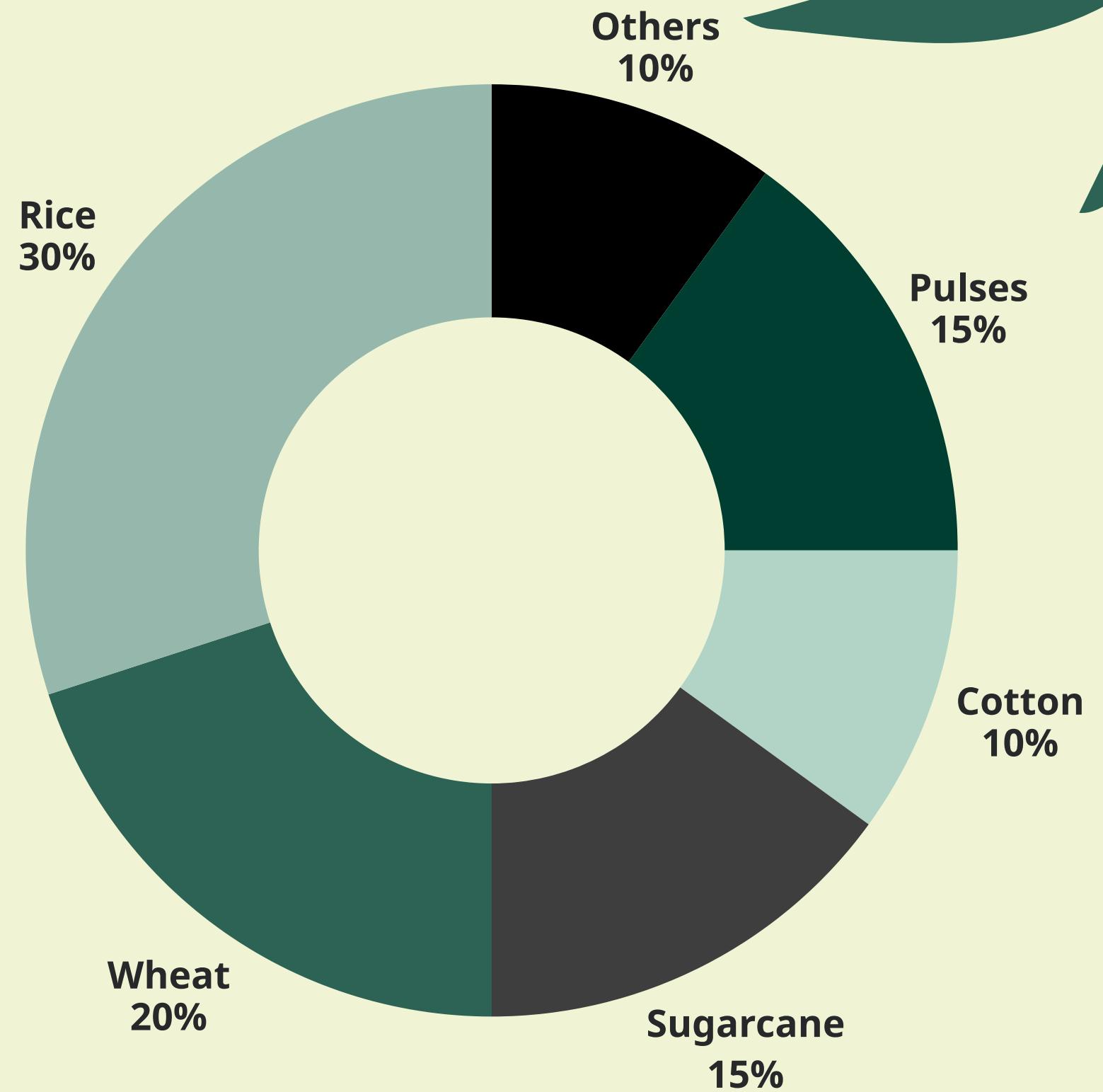
Analysis

04

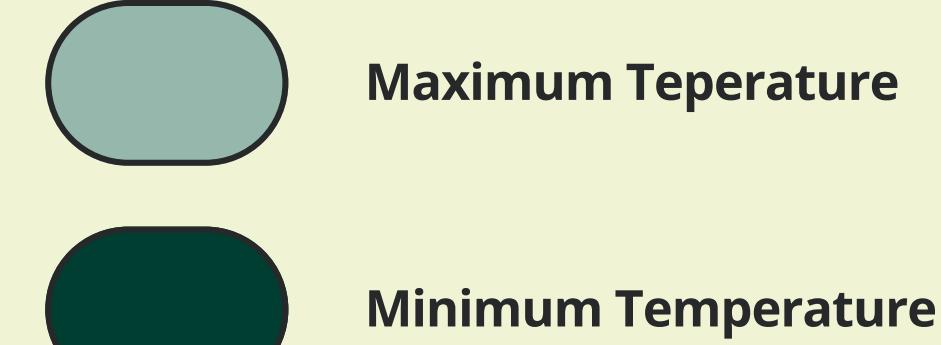
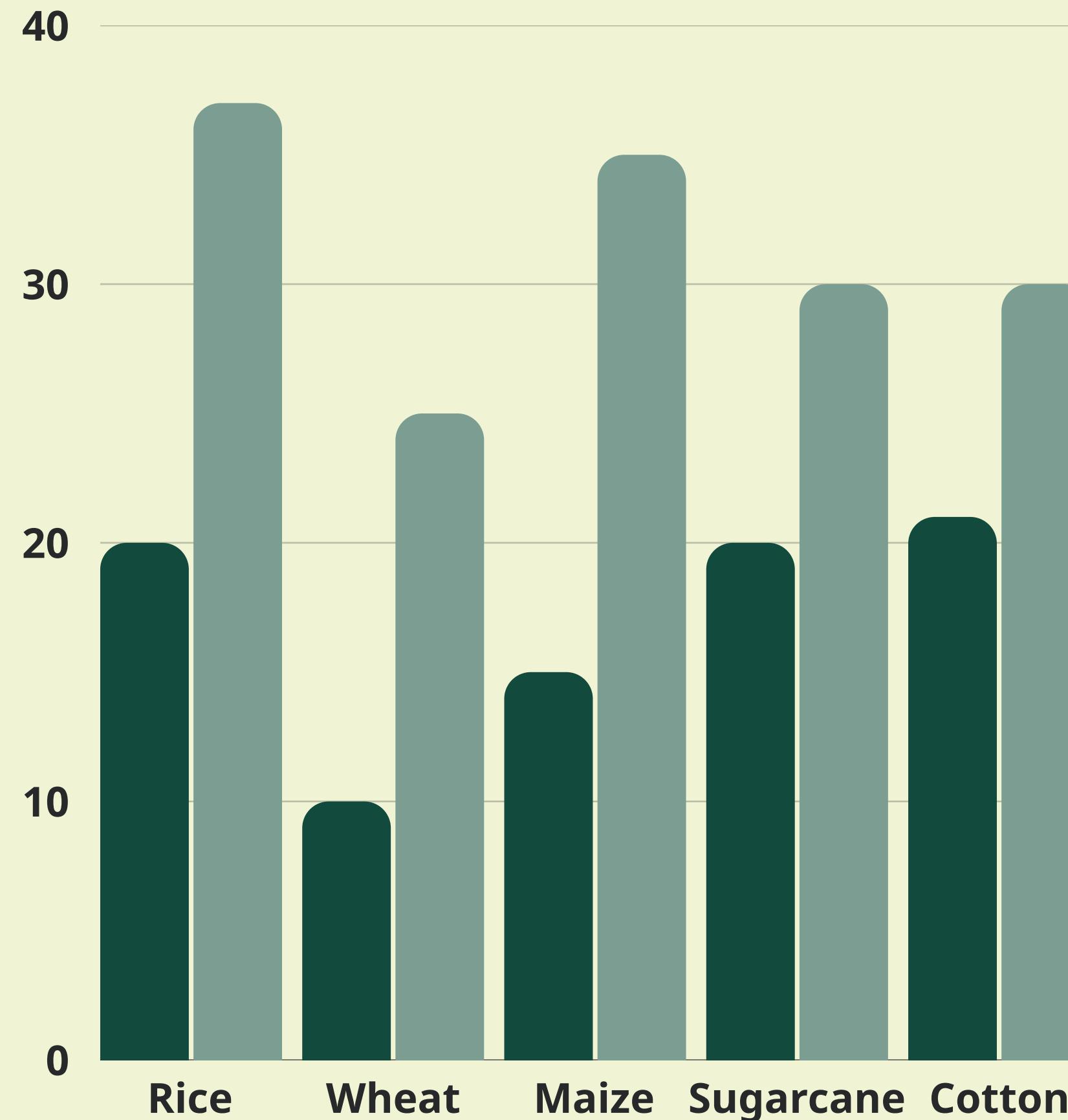
Outcomes

# MAJOR CROPS

- Rice
- Pulses
- Cotton
- Sugarcane
- Wheat
- Others



# TEMPERATURE RANGE REQUIRED FOR MAJOR CROPS



# Crop-wise Analysis

We observe that N,P and K are most commonly required by commercial crops.

Crops	Nutrients Required	Weather Conditions	Farming Practices
Rice	N, P, K (Primary) Ca, Mg, S, Fe, Zn, Mn, Cu (Secondary)	Warm and humid climate, high rainfall	Transplanting of seedlings, flooded fields, use of fertilizers and pesticides
Wheat	N, P, K (Primary) Mg, S, Zn, Mn, B (Secondary)	Cool climate, moderate rainfall	Seed sowing in well-prepared soil, irrigation, application of fertilizers
Maize	N, P, K (Primary) S, Mg, Zn, Mn, Cu, B, Cl (Secondary)	Warm climate, well-distributed rainfall	Direct sowing or transplanting, use of fertilizers and pesticides, weed control
Cotton	N, P, K, B (Primary) Ca, Mg, S, Zn, Fe, Mn, Cu, Cl (Secondary)	Tropical climate, abundant rainfall	Seed sowing or transplanting, use of fertilizers and pesticides, pest management, irrigation
Sugarcane	N, P, K (Primary) S, Zn, Mn, B, Mg, Cu, Si (Secondary)	Warm climate, moderate rainfall	Planting stem cuttings, irrigation, application of fertilizers, weed control
Soybean	N, P, K (Primary) Ca, Mg, S, Fe, Mn, Mo, B, Zn (Secondary)	Warm climate, well-distributed rainfall	Direct sowing, use of inoculants, fertilizers, and pesticides, weed control
Potato	N, P, K (Primary) Ca, Mg, B, Zn (Secondary)	Cool climate, well-drained soil	Seed tuber planting, hilling, irrigation, application of fertilizers and pesticides, weed control
Tomato	N, P, K (Primary) Ca, Mg, S, Zn, Fe, Mn, Cu, B, Mo (Secondary)	Warm climate, well-drained soil	Transplanting or direct seeding, staking, trellising, mulching, fertilization, pest and disease control
Mustard	""	Cool climate, well-drained soil	Tillage, proper spacing, fertilization, irrigation, weed control, and disease management.
Banana	""	Tropical climate, well-distributed rainfall	Planting suckers, irrigation, fertilization, pest and disease management, harvesting when ripe
Mango	N, P, K (Primary) Ca, Mg, S, Zn, Fe, Mn, Cu (Secondary)	Tropical climate, well-distributed rainfall	Seed sowing or grafting, irrigation, fertilization, pest and disease management, pruning
Groundnut	N, P, K (Primary) Ca, Mg, S, Zn, Fe, Mn, B(Secondary)	Warm climate, well-drained soil	Seed sowing, use of fertilizers and pesticides, irrigation, weed control



## 5-STEP PLAN

### **Measure**

Sensors are used to measure soil fertility.

### **Analyse**

Soil test result is analysed to suggest suitable crops.

### **Estimate**

Estimates the financial aspect of cultivating the crops.

### **Display**

Display test results, crop recommendations and financial estimates clearly.

### **Store**

All readings and estimates are stored for future reference.

# Outcomes

## SAMPLE- SANDY SOIL FROM JAIPUR

Average pH level - 7.49.

Average NPK values - 30.0 : 19.7 : 39.8

Rainfall - 20-22.2 inches

Temperature - 25.1 C

## POST-ANALYSIS

The aformentioned crops are suitable for the tested soils.

Tomatoes and Wheat can be cultivated here. They benefit from balanced NPK values and grow well in regions with moderate rainfall.

## Finance Expenditure

- pH maintenance: No cost as the pH level is already balanced
- NPK level: The cost of 1kg of NPK fertilizer of 3:2:4 ratio is Rs.150
- For 100 kg/hectare: 15000 Rupees
- For irrigation purposes: Around Rs.800 per hectare (including subsidy in Rajasthan)
- For land preparation and labour: Rs.13000 per hectare
- Overall cost of production: Rs.30,000 per hectare

# Finance Modelling

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## SAMPLE-1

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### **Land Preparation:**

Preparing the land for planting tomatoes requires an average of 200\$ per acre depending on the condition of the land.

### **Seeding:**

Acquiring seeds to plant 1 acre would amount to about 100\$.

### **Fertilizers and Pesticides:**

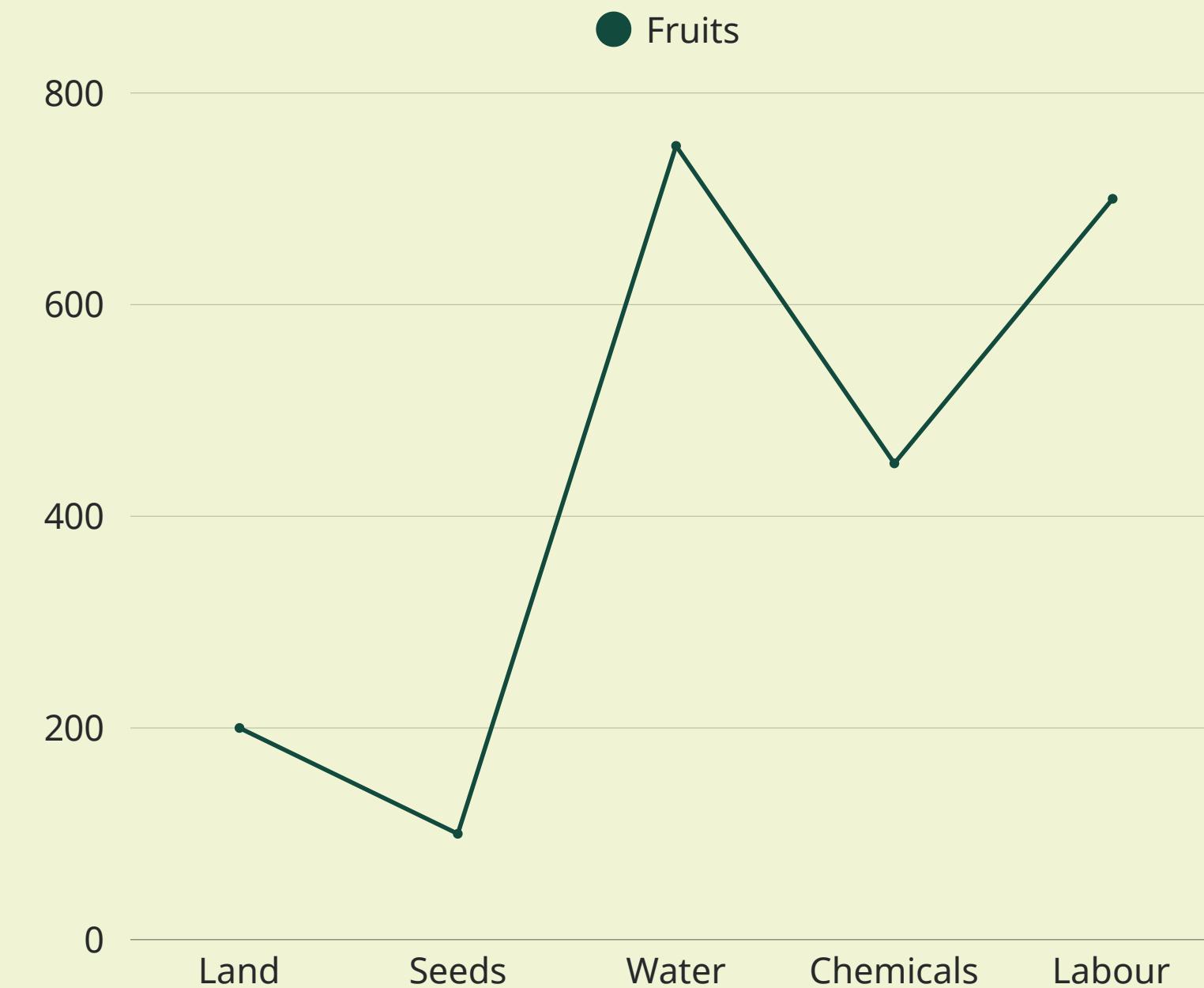
Per acre, these costs sum up to 450\$ per acre on average

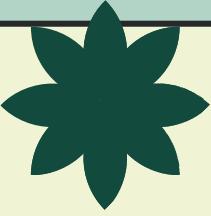
### **Watering:**

Depending on the moisture retention capacity of the soil, it could cost anywhere between 500-1000\$.

### **Labour and equipment:**

Rental equipment and seasonal labour will set us back 700\$ per acre.





# ADVANTAGES OF SOIL TEST KITS

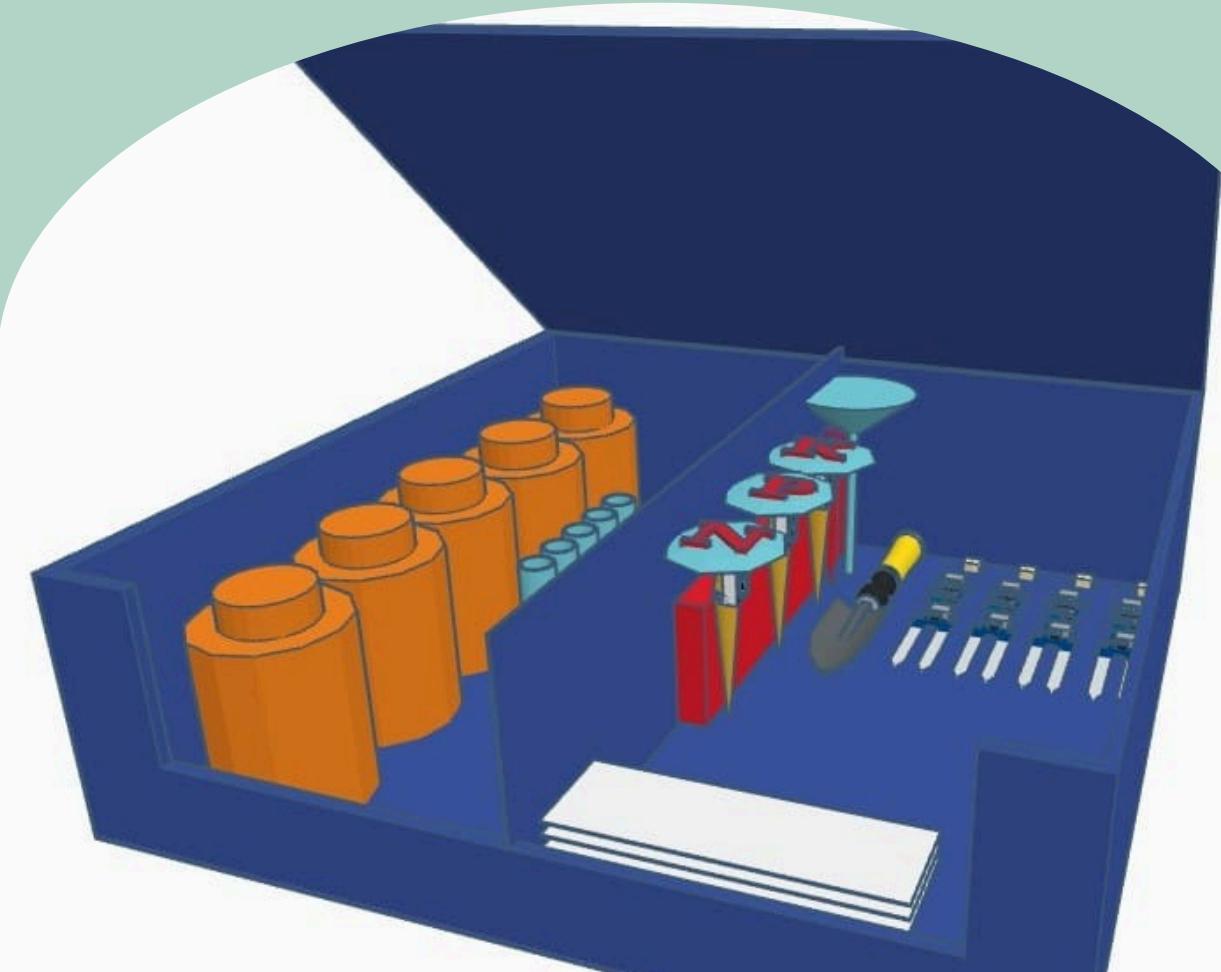
- **CONVENIENT AND COST-EFFECTIVE** ●

- Soil test kits provide a convenient way for individuals to assess the nutrient levels and pH of their soil without the need for specialized equipment or laboratory analysis.
- Soil test kits are generally more affordable than sending soil samples to a laboratory for analysis.

- **PORTABLE AND RAPID RESULTS** ●

- Soil test kits are often portable and lightweight, making them suitable for use in the field or remote locations where access to laboratory facilities may be limited.
- Soil test kits provide rapid results, often within minutes or hours, allowing users to quickly assess the soil conditions and make informed decisions regarding fertilization, soil amendments, or crop selection.

# Future Outlook



This 3D model an approximate representation of how the finished soil test kit and its components are supposed to look like.

