**🌾 Task Assignment: Agriculture Data Dashboard — Crop Yield, Water Use, and Subsidy Analysis**

**🧩 Objective:**

Build an **interactive agriculture analytics dashboard** to explore relationships between crop yield, water consumption, environmental conditions, and government subsidies. The goal is to help policymakers, farmers, and analysts make **data-driven decisions** to increase productivity, optimize water use, and ensure effective subsidy allocation.

**📁 Dataset Overview**

You’ll work with a dataset that includes detailed crop records, environmental variables, farmer subsidies, and operational factors like electricity and labor. The data is at the **plot-level** and spans multiple regions and crop types.

**📊 Dataset Fields & Categories**

**✅ Crop Data**

| **Column** | **Description** |
| --- | --- |
| crop\_type | Type of crop grown (e.g., wheat, cotton, rice) |
| yield\_per\_acre | Production in tons or kg per acre |
| sowing\_date | Date when crop was sown |
| harvest\_date | Date of harvest |
| number\_of\_acres | Size of land under cultivation |

**✅ Soil & Environmental Data**

| **Column** | **Description** |
| --- | --- |
| soil\_nutrient\_levels | Qualitative level of nutrients (low/medium/high) |
| soil\_type | Soil classification (e.g., alluvial, black, red) |
| rainfall | Rainfall in cm or mm during crop growth |
| temperature | Avg. temperature during crop cycle (°F/°C) |
| location | State or region |

**✅ Subsidy & Financial Info**

| **Column** | **Description** |
| --- | --- |
| farmer\_id | Unique ID per farmer |
| subsidy\_amount | Government support received |
| disbursement\_date | Date of subsidy received |
| amount\_paid | Total money earned from the harvest |

**✅ Resource Usage**

| **Column** | **Description** |
| --- | --- |
| water\_usage(Litres) | Amount of water used |
| electricity | Electricity usage (Boolean or KWh) |
| workers | Number of laborers employed |

**📌 Primary Tasks**

**1. 📈 Crop Yield Analysis**

* Analyze **average yield per crop type**.
* Compare **yield vs. number of acres cultivated**.
* Identify **optimal sowing/harvest periods** for highest yield.

**2. 💧 Water Usage Insights**

* Identify **crops with the highest and lowest water usage per acre**.
* Calculate **yield per litre of water** for efficiency scoring.
* Correlate **rainfall vs. water usage vs. yield** to find water-stress crops.

**3. 💰 Subsidy Effectiveness**

* Analyze the **impact of subsidy on crop yield and earnings**.
* Compare **regions with high vs. low subsidy disbursement**.
* Track **timeliness of subsidy vs. productivity**.

**4. 🌱 Environmental & Soil Impact**

* Assess **yield based on soil nutrient levels and soil type**.
* Determine **temperature ranges** optimal for specific crops.
* Correlate **rainfall and temperature trends** with yield across regions.

**5. 🧾 Regional & Operational Comparisons**

* Benchmark **productivity across different states**.
* Compare **labor efficiency** (yield per worker).
* Find **high-earning vs. low-earning farms** and their characteristics.

**📌 Quantifiable Insights to Extract**

| **Insight Type** | **Sample Quantifiable Metrics** |
| --- | --- |
| **Yield Efficiency** | Top 3 crops by average yield per acre |
| **Water Productivity** | Water used per kg of produce |
| **Subsidy ROI** | ₹ earned per ₹ subsidy (Subsidy ROI ratio) |
| **Environmental Correlation** | Yield correlation coefficient with temperature/rainfall |
| **Sowing Trends** | Average yield for different sowing months |
| **Soil Effectiveness** | Avg. yield by soil type and nutrient level |
| **Labor Efficiency** | Yield per worker |
| **Regional Comparison** | Avg. subsidy and yield by location |

**📊 Suggested Visualizations for Dashboard**

* 📍 **Choropleth Map**: Yield & subsidy across states
* 📅 **Timeline Graph**: Sowing vs. harvest vs. yield
* 📉 **Scatter Plot**: Rainfall vs. yield
* 📊 **Bar Charts**: Yield by crop type / soil type
* 📐 **Heatmaps**: Temperature vs. yield by crop
* 🔍 **Filterable Table**: Per-plot breakdown with sorting

**🛠️ Tools Recommended**

* **Python (Pandas, Seaborn, Plotly)** for data cleaning and analysis
* **Power BI or Tableau** for building the interactive dashboard
* **SQL** if connecting to a relational dataset
* **Excel** for initial data exploration