**Tomatoes growth rate analysis:**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Day** | **Height (cm)** | **Leaf Count** | **Fruit Count** | **Soil Moisture (%)** | **Temperature (°C)** | **Growth Stage** | **Notes** |
| 1 | 2 | 2 | 0 | 60 | 20 | Germination | Seeds planted |
| 2 | 2.5 | 3 | 0 | 65 | 21 | Seedling | First true leaves visible |
| 3 | 3 | 3 | 0 | 70 | 22 | Seedling | Healthy growth |
| 4 | 4 | 4 | 0 | 65 | 23 | Seedling | Transplanted to pots |
| 5 | 5 | 5 | 0 | 60 | 24 | Early Vegetative | Increased sunlight |
| 6 | 6.5 | 6 | 0 | 55 | 25 | Early Vegetative | Watered regularly |
| 7 | 8 | 7 | 0 | 50 | 26 | Vegetative | Strong leaf development |
| 8 | 9 | 8 | 0 | 55 | 24 | Vegetative | Healthy leaf color |
| 9 | 10 | 9 | 0 | 60 | 25 | Vegetative | No pests observed |
| 10 | 12 | 10 | 0 | 65 | 24 | Vegetative | Stable growth |
| 11 | 13.5 | 11 | 0 | 70 | 23 | Early Flowering | Buds starting to form |
| 12 | 15 | 12 | 0 | 68 | 22 | Early Flowering | Pollination observed |
| 13 | 16.5 | 12 | 1 | 65 | 23 | Flowering | First fruit visible |
| 14 | 18 | 13 | 1 | 60 | 24 | Flowering | Healthy pollination |
| 15 | 20 | 14 | 2 | 55 | 25 | Flowering | More fruits developing |
| 16 | 22 | 15 | 3 | 50 | 26 | Fruit Set | Fruits growing larger |
| 17 | 24 | 16 | 4 | 52 | 27 | Fruit Set | Good weather conditions |
| 18 | 26 | 17 | 4 | 55 | 26 | Fruit Set | Monitoring for pests |
| 19 | 28 | 18 | 5 | 60 | 25 | Maturing | Fruits changing color |
| 20 | 30 | 19 | 6 | 65 | 24 | Maturing | Continuous watering |
| 21 | 32 | 20 | 7 | 70 | 23 | Maturing | Good fruit size |
| 22 | 34 | 21 | 8 | 68 | 22 | Maturing | Preparing for harvest |
| 23 | 36 | 22 | 9 | 65 | 23 | Harvesting | Early fruits ready |
| 24 | 38 | 23 | 10 | 62 | 24 | Harvesting | Harvested first batch |
| 25 | 40 | 24 | 11 | 60 | 25 | Harvesting | Continued harvest |
| 26 | 42 | 25 | 12 | 58 | 26 | Post-Harvest | Plant still growing |
| 27 | 44 | 26 | 13 | 55 | 27 | Post-Harvest | Monitoring new blooms |
| 28 | 46 | 27 | 14 | 52 | 26 | Post-Harvest | New fruits forming |
| 29 | 48 | 28 | 15 | 50 | 25 | Post-Harvest | Preparing for late harvest |
| 30 | 50 | 30 | 17 | 48 | 24 | Post-Harvest | Final harvest completed |

**Additional Parameters Explained:**

* **Soil Moisture (%)**: Indicates the percentage of moisture in the soil, which affects plant health.
* **Temperature (°C)**: Daily temperature, crucial for growth.
* **Growth Stage**: Describes the developmental phase of the plant.
* **Notes**: Additional observations regarding care and conditions.

**Height growth analysis:**

**Leaf growth analysis:**

**Fruit growth analysis:**

**Overview of the Dataset:**

1.Growth Parameters:

* **Height (cm):** This column tracks the vertical growth of the tomato plant, showing a steady increase over the 30 days, indicating healthy growth.
* **Leaf Count:** The number of leaves is a critical indicator of the plant’s health and vigor. An increase from 2 to 30 leaves suggests good photosynthetic capability and overall plant health.
* **Fruit Count:** This measures the plant's productivity. The dataset shows gradual fruit development, with the first fruit appearing around Day 13 and reaching 17 fruits by Day 30.

2.Environmental Conditions:

* **Soil Moisture (%):** Optimal moisture levels are crucial for tomato plants. The dataset indicates a slight decrease over time, which could suggest either a natural drying process or changes in watering practices.
* **Temperature (°C):** The temperatures recorded range from 20°C to 27°C, which are generally favorable for tomato growth. The consistent temperature indicates a stable growing environment.

3.Growth Stages:

* The dataset categorizes growth into distinct phases: Germination, Seedling, Early Vegetative, Flowering, Fruit Set, Maturing, and Post-Harvest. This classification helps in understanding the life cycle of the tomato plant.

4.Notes:

* The notes section provides qualitative observations about the growth conditions, such as pest monitoring, watering practices, and the health of the plant. This is useful for identifying potential issues and successes in cultivation.

**Key Insights:**

* **Steady Growth**: The height and leaf count increase steadily, suggesting that the plant is receiving adequate nutrients, water, and sunlight.
* **Fruit Development**: The gradual increase in fruit count shows that the flowering and fruit-setting processes are successful, indicating effective pollination and environmental conditions.
* **Optimal Conditions**: The temperature range and soil moisture levels suggest that the plants are growing under favorable conditions. The slight decrease in soil moisture might indicate a need for more regular watering as the plants mature and require more resources.
* **Timely Harvesting**: The dataset shows a transition from maturing to harvesting stages around Day 23, indicating that the fruits were ready to be picked, reflecting successful cultivation practices.

**Considerations for Improvement:**

* **Water Management**: The gradual decline in soil moisture could be monitored more closely, especially during the fruiting phase, to prevent stress on the plants.
* **Pest and Disease Monitoring**: While the notes indicate no pests were observed initially, continuous monitoring is essential, especially as plants mature and attract more pests.
* **Nutrient Management**: Ensuring balanced nutrient supply through fertilizers can optimize growth and fruiting, particularly in later stages when the demand increases.

**Conclusion:**

The extended tomato growth dataset provides a comprehensive view of the growth and development of tomato plants over a 30-day period. The following conclusions can be drawn:

1. **Healthy Growth Dynamics**: The steady increase in height and leaf count demonstrates robust plant health and vigorous growth, indicative of optimal conditions in terms of light, nutrients, and care.
2. **Successful Fruit Development**: The gradual rise in fruit count, starting from Day 13 and culminating in 17 fruits by Day 30, highlights effective flowering and pollination processes, leading to a productive harvest.
3. **Environmental Suitability**: The recorded temperatures (20°C to 27°C) and soil moisture levels suggest that the environmental conditions were generally favorable for tomato growth. However, a slight decline in soil
4. moisture over time indicates a need for careful water management, especially during the fruiting stage when plants require more resources.
5. **Growth Stage Insights**: The dataset effectively outlines the key growth stages of tomato plants, from germination to harvesting. This categorization aids in understanding the developmental milestones and optimizing care practices throughout the lifecycle.
6. **Future Considerations**: Continuous monitoring of soil moisture, pest management, and nutrient supply will be crucial for sustaining healthy growth and maximizing yield in future cultivation cycles. Adjustments to watering practices and vigilant pest monitoring can mitigate risks and enhance productivity.

Overall, this dataset serves as a valuable resource for gardeners and agriculturalists seeking to understand the growth patterns of tomato plants and improve their cultivation practices for better yield and plant health.