



# NWICE 2024

National Water Innovation Conference & Exhibition 2024

**TRANSFORMASI AIR MENUJU KEMAMPAHAN SEJAGAT**

 PUSAT KONVENSYEN KUALA LUMPUR

 26-28 NOVEMBER 2024

## **Automatic Water Drip Irrigation Technique as Smart Agriculture Monitoring System**

Presented by Muhammad Faiz in Mohamad Jaafar





# NWICE 2024

National Water Innovation Conference & Exhibition 2024

**TRANSFORMASI AIR MENUJU KEMAMPAHAN SEJAGAT**

 PUSAT KONVENSYEN KUALA LUMPUR

 26-28 NOVEMBER 2024

## Table of Contents

1. Introduction
2. Problem Statement
3. Objective
4. Methodology
5. Result
6. Conclusion
7. References



# INTRODUCTION

- **Automatic Water Drip Irrigation Technique as Smart Agriculture Monitoring System** is an electronic device-based system driven by a **Raspberry Pi3 model B** that aims to create ideal soil moisture conditions for healthy plant growth through appropriate irrigation frequencies.
- The system's **soil moisture sensor** and **built-in wireless LAN** will identify any alterations that could endanger the cocoa plant nursery.
- This system has to keep the soil moisture in **optimum condition** within **50% - 70%** of range for the cocoa nursery by allowing for the appropriate course of action to be applied automatically.
- The **real-time data** of soil moisture for monitoring provided via the **ThinkSpeak** application on smartphone or computer.
- This project is implemented in cocoa nursery at **Malaysian Cocoa Board (MCB)** Bagan Datuk, Perak.

# PROBLEM STATEMENT

- Soil moisture conditions affect plant nutrients in terms of fertilizer response to soil moisture.
- Soil moisture conditions affect the quality of the plant and increase the cost of nursery maintenance.

# OBJECTIVE

- To provide a device that can **manage** the agriculture plant in the nursery by **soil moisture parameter**.
- To ensure the condition of the plant is constantly **getting enough water and nutrients** without the wastage of water.
- To **improve the efficiency** of agriculture management and helps to reduce the human resource investment.

# METHODOLOGY

- In this project, 30 seedlings had been monitor by **Automatic Drip Irrigation Technique** with soil moisture sensor (**Treatment 1: T1**) and 30 other seedlings will be controlled and monitor by Malaysian Cocoa Board's existing technology which is by using **sprinkler technique (Treatment 2: T2)**.
- The ages of all seedlings taken to extend the **observations** for T1 and T2 are approximately **1 month old** and the plant in cocoa nursery analyzed within **4 weeks** of planting in the nursery to see the **comparison** between this **automatic drip irrigation system** and the **existing technology** in Malaysian Cocoa Board.

# METHODOLOGY

## Qualitative

Data collection for increment of **height** per cocoa plant in cocoa nursery in a week within 4 weeks

## Quantitative

Data collection for increment **number of leaves** per cocoa plant in cocoa nursery in a week within 4 weeks

# METHODOLOGY



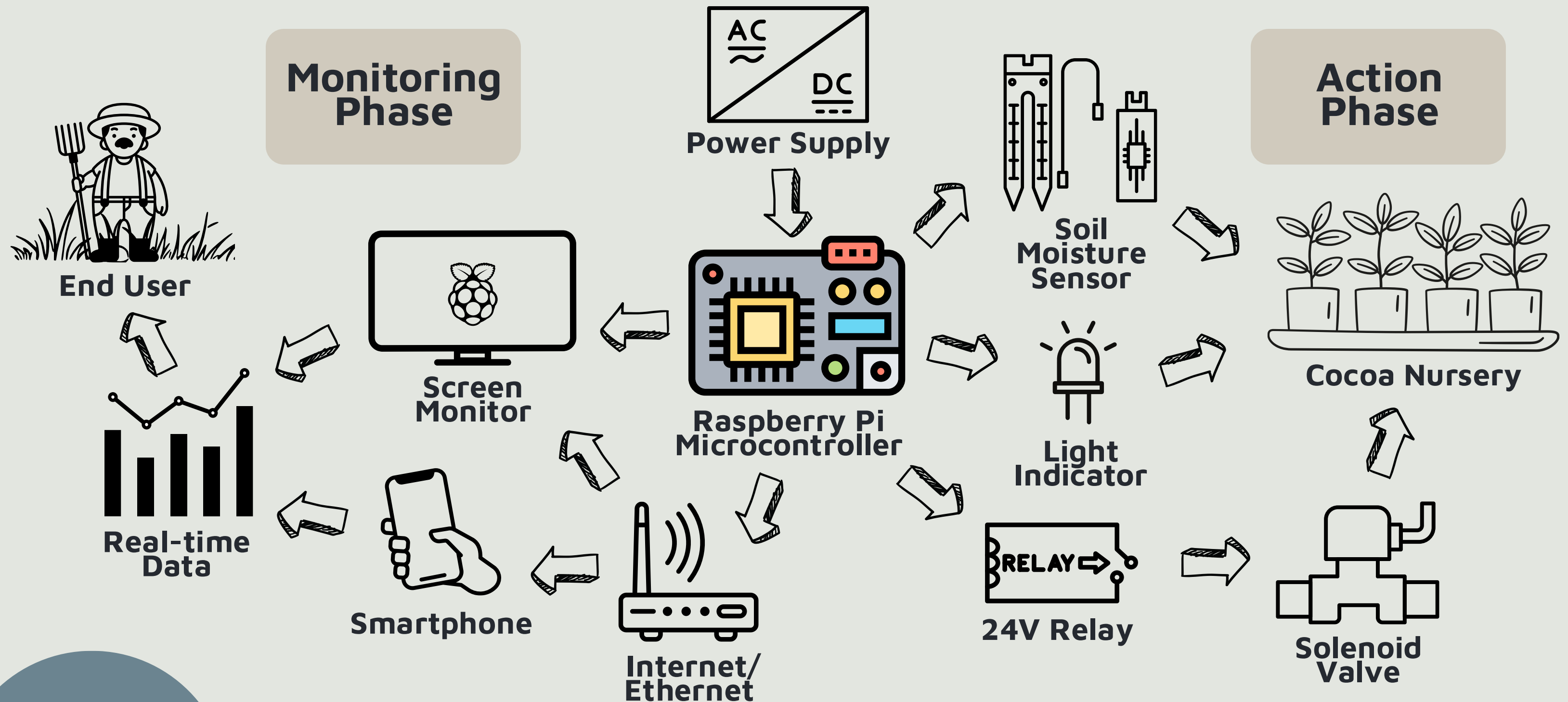
**Treatment 1:  
Automatic Drip  
Irrigation Technique**



**Treatment 2:  
Sprinkler Method**

# METHODOLOGY

## Smart Agriculture Monitoring System

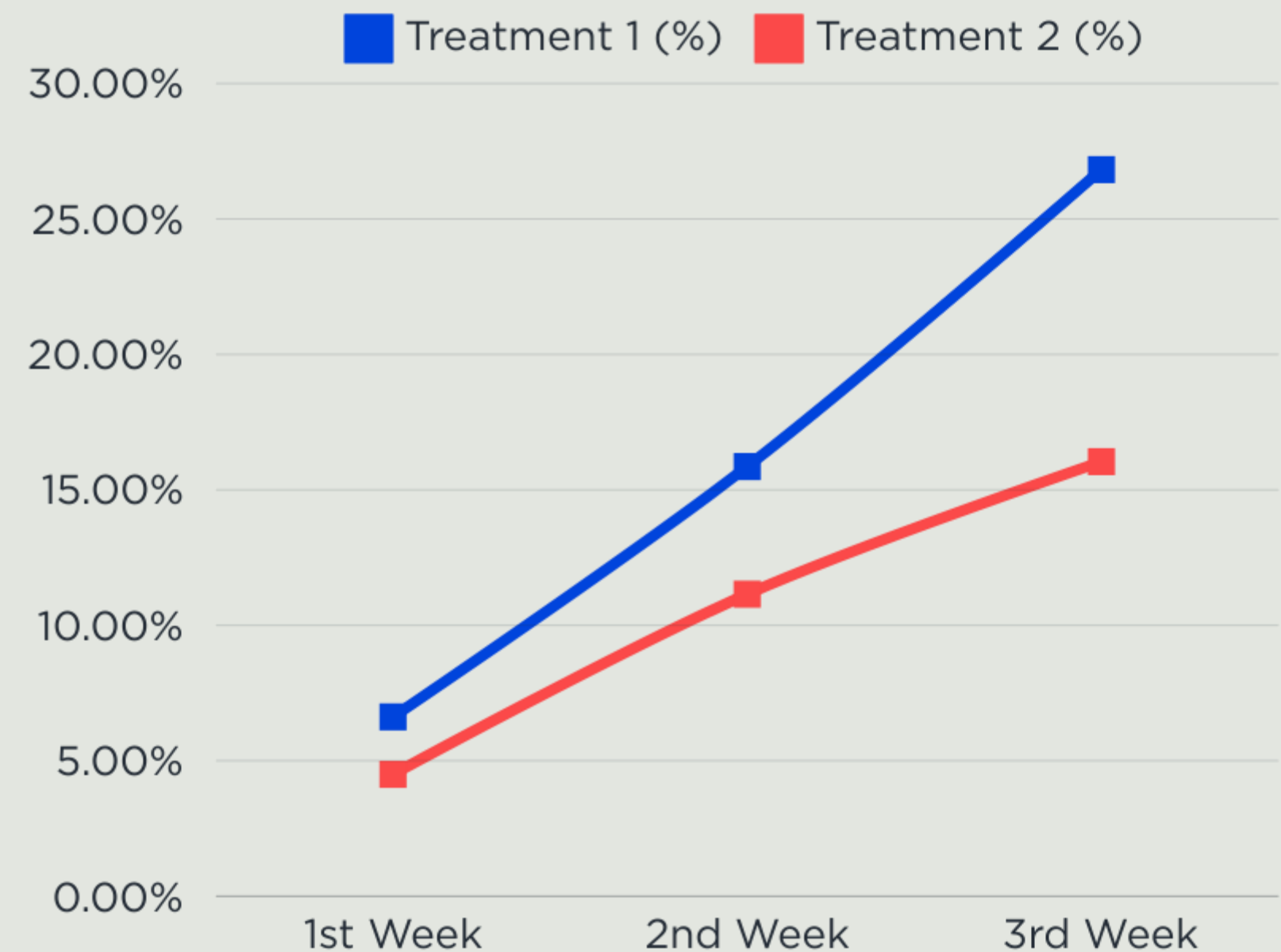


# RESULT

- As an observation technique, the **height of each cocoa plant (cm)** and the **quantity of leaves** on each plant are measured within 4 weeks.
- Comparatively, this **Automatic Water Drip Irrigation Technique as Smart Agriculture Monitoring System** is recorded as **Treatment 1 (T1)**
- While the **overhead sprinkler method** used at Malaysian Cocoa Board (MCB) Bagan Datuk, Perak is recorded as **Treatment 2 (T2).**

# RESULT

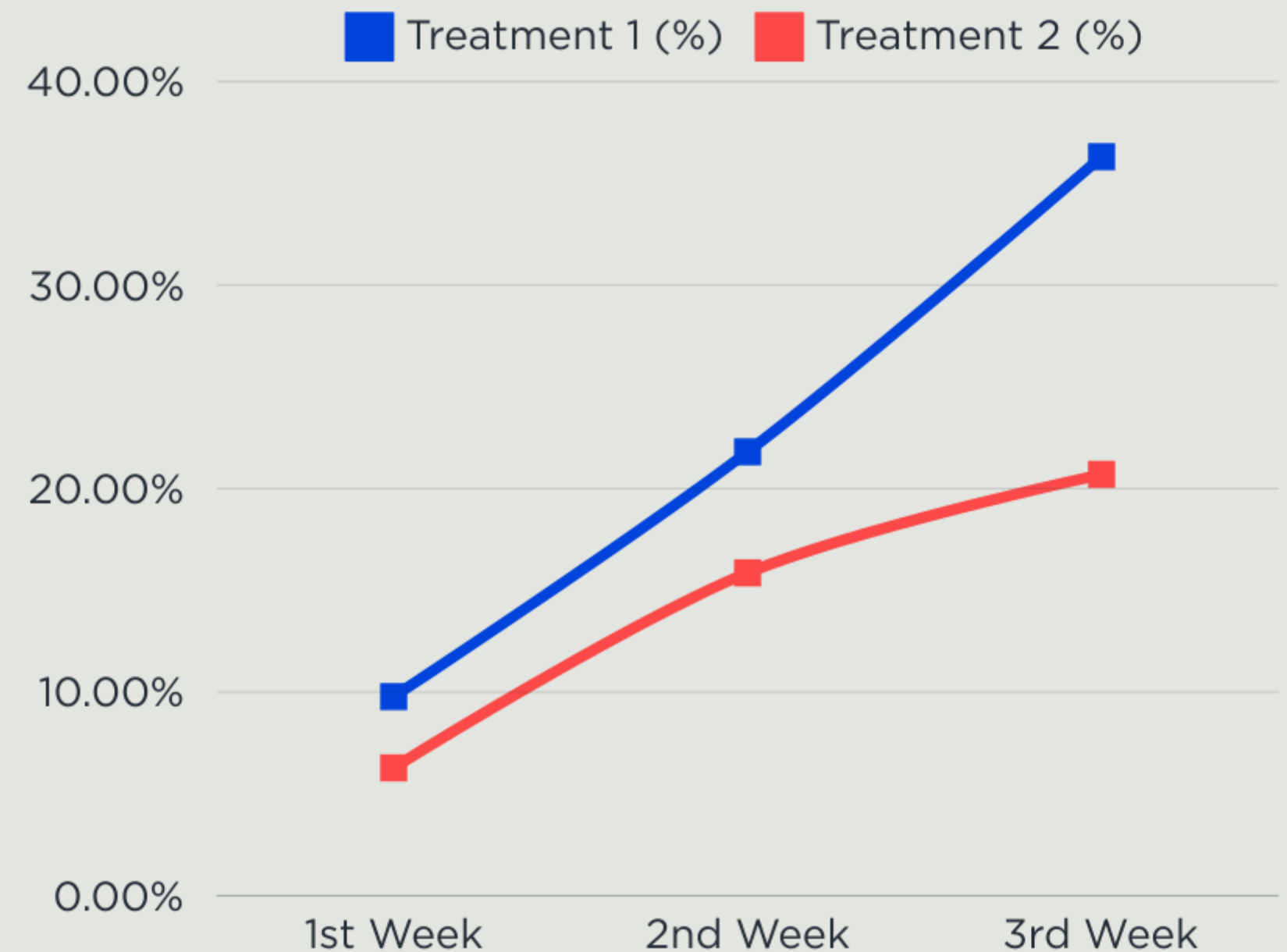
- Outcomes of the observation revealed the percentage height of the cocoa plant (cm) based on **T1** is shown to have increased by **26.82%**, however **T2** shows a **16.04%** growth.
- Based on the **increment of cocoa plant height data in Graph 1**, it shows that data on T1 is more effective than T2.
- Thus, the length of time taken by Treatment 1 to reach a height level is much faster than Treatment 2.



**Graph 1 : Cocoa plant height data**

# RESULT

- In terms of percentage growth of leaves, **T1** is **36.31%**, whereas **T2** is **20.70%**.
- Based on the **increment number of leaves per cocoa plant data in Graph 2**, it shows that data on Treatment 1 also is more effective than treatment 2.
- Thus, the length of time taken by Treatment 1 in the scope of leaf growth is faster than Treatment 2.



**Graph 2 : Number of leaves data**

# CONCLUSION

- One of the **popular applications of technology** in the food and agriculture industries is **Smart Agriculture Monitoring System**.
- This enables the plantation to become more **productive and efficient**.
- The technology might offer a device to assist in continuously **monitoring the soil moisture** conditions in cocoa nurseries.
- **Improve quality** of plantations in the agricultural sector by assisting producers in making decisions by analyzing the **data collected**.
- The performance, resilience, and efficiency of this system is enhanced by these methods, which have been shown to be an alternative to the **conventional method** that uses **individual effort** to monitor the environment.
- This application system is help to **sustain food production for industry**.

# REFERENCE

- [1] P. Zhang, Q. Zhang, F. Liu, C. Song, and J. Li. (2017). The Construction of the Integration of Water and Fertilizer Smart Water Saving Irrigation System Based on Big Data, pp. 392–397
- [2] F. Hu and L. Shao. (2017). Design of Remote Irrigation System in Farmland based on the cloud platform, pp. 1125–1129
- [3] M. H. Ferguson. (1959) The Role of Water in Plant Growth, USGA J. Turf Manag., pp. 30–32
- [4] S. Athani. (2017). Soil moisture monitoring using IoT enabled arduino sensors with neural networks for improving soil management for farmers and predict seasonal rainfall for planning future harvest in North Karnataka - India, pp. 43-48
- [5] D. Liu, X. Cao, C. Huang, and L. Ji. (2016). Intelligent agriculture greenhouse environment monitoring system based on IOT technology, Proc. - 2015 Int. Conf. Intell. Transp. Big Data Smart City, ICITBS 2015, pp. 487–490



# Thank You

For your attention