CHAPTER I
INTRODUCTION

1.1 Background

Drought is one of the most frequent disasters caused by extreme climates in Indonesia with different frequencies and levels of risk. In the agricultural sector, the climate is a limiting factor in the process of plant growth and production as well as a very valuable resource and plays an important role in agricultural development. The impact of climate change is not only related to the warming of the earth's surface temperature, but, more importantly, also related to its impact on food vulnerability [1].

Vegetable commodities are increasingly important. Their high demand is in line with the population growth. One of the most popular vegetable commodities in Indonesia is land spinach. The demand for land spinach continues to increase, in line with the increasing public awareness of the importance of nutrition. Therefore, land spinach cultivation has potential marketing opportunities. In addition to local markets, land spinach is sold in supermarkets. Cultivating the right vegetable commodity can increase farmers' incomes [2]. Increased land spinach production certainly requires a lot of attention in cultivation techniques[3], especially in terms of water needs.

Recent developments in the field of information and communication enable the emergence of a new paradigm of intelligent sensor technology that can be widely used to monitor and control aspects of the environment and water needs. Today, the Internet of Things is a crucial transformation of traditional technology. Traditional agriculture is limited by climate change. One of the impacts of climate change is fluctuating rainfall which affects crop productivity. Therefore, a tool to monitor the development of vegetable crops is a technological development that transforms the traditional technology and helps overcome the limitation.

Internet of Things (IoT) is a term that recently gains its popularity, but few understand the meaning of this term. In general, the Internet of Things can be interpreted as objects around us that can communicate with each other through the internet network. The Internet of Things (IoT) plays an important role in daily life by controlling electronic devices using networks. Control is done by carefully observing important parameters that produce important information [4].The ability

to remotely track and correlate the influence of local environmental conditions on healthy plant growth can have a major impact on increasing the survival rates of plants and increasing agricultural yields[5].A number of abiotic factors including drought, salinity, excessive irrigation, and extreme temperature and humidity levels can have a large impact on crop productivity and plant survival rates [6]. This study focuses on land spinach by monitoring the conditions of temperature and soil moisture using sensors controlled by a microcontroller[7]. NodeMCU control system was used to measure device temperature and humidity, pressure, and height. The setup contained height measuring devices and instruments or controllers.

The utilization of Internet of Things can integrate sensors connected to a machine or device in monitoring soil moisture and soil pH which can automatically operate a machine or device remotely. The lack of research is the basis of this important research that was conducted to assist farmers in making decisions based on information on soil moisture values.

1.2 Problem Statements

1. Some areas in Indonesia experience a prolonged dry season which makes farmers experience crop failure.
2. The measurement results are displayed on WhatsApp and smartphone applications.
3. Monitoring of land spinach (Ipomoea reptans) can only be done at the locations where land spinach is planted.

1.3 Research Objectives

This study has several objectives and benefits as follows:

1. to offer a solution to create an alternative automatic watering tool usingmultiple sensors;
2. to display the measurement results on the website in detail and in real-time; and
3. to monitor of land spinach (Ipomoea reptans) anywhere and anytime using this tool.

1.4 Research Boundaries

This study has several research boundaries as follows.

1. Internet connection was needed.
2. The maximum range of the HC-SR04 sensor, the soil moisture sensor, and the soil pH sensor were only three meters.
3. The sensor could only display soil quality values but could not determine what were contained in the soil.
4. The trial data were used as reference data in measuring soil moisture.

1.5 Research Methods

1. Library research: data from several journals about related works.
2. Design process: designing the tool to measure air quality.
3. Realization: implementing the tool that had been designed and tested properly according to the design.
4. Analysis: examining which aspects could be compared.

1.6 Presentation

This undergraduate thesis is written in the following order.

- Chapter 1 INTRODUCTION

  This chapter contains background, scope of the study, research objectives, etc

- Chapter 2 BASIC CONCEPTS

  This chapter contains an explanation of the basic theory, website, and tools.

- Chapter 3 SYSTEM DESIGN

  This chapter contains the flowchart, algorithm, experimental diagram and the methods.

- Chapter 4 RESULT AND ANALYSIS

  This chapter contains research procedures, tests conducted, results of the tests, and analysis of the results of the tests.

- Chapter 5 CONCLUSION AND SUGGESTIONS

  This chapter contains the conclusion and suggestions of this undergraduate thesis.