CHAPTER I

INTRODUCTION

1.1 Project Background

The agricultural and plantation sector is one of the most crucial sectors for world food. Even today many people apply vegetable consumption as a healthy lifestyle and campaign for it on their social media. As a source of vitamins, minerals and fiber, vegetables and fruits are very important in supporting the desired healthy lifestyle (Hermina & S, 2016). But the results of Riskesdas Indonesia in 2010-2013 show that nationally the behavior of the population aged >10 years who consume less vegetables and fruits is still above 90%. This condition is in line with the findings of the Individual Food Consumption Survey (SKMI) in the 2014 Total Diet Study (SDT) that population consumption of vegetables and processed vegetables as well as fruits and processed products is still low (Hermina & S, 2016). It is hoped that the emergence of a healthy lifestyle by consuming vegetables and fruits can be a fresh issue for the community to increase the amount of vegetable consumption of the community. It can also help farmers reduce the amount of damaged and wilted vegetables and fruits before they are sold in the market. In this case we will take samples from corn plants which are one of the suppliers of carbohydrates that are high enough side by side with rice. Corn kernels are rich in carbohydrates, most of these carbohydrates are in the endospermium. The carbohydrate content can reach 80% of the whole dry matter of the seeds (Sapto Nugroho, 2015). Indonesia is one of the 10 largest corn producing countries in the world with a share of 1.94% of total corn production in the world. The average corn production in Indonesia reaches 15.44 million tons per year (Pusdatin, 2012) (Revania, 2014).

But from this will emerge a new problem that can become a nightmare for farmers, namely crop failure that is uncertain when it comes. Crop failure itself can be

caused by several factors such as factors from the farmer himself or factors from nature. From the farmer factor itself, there could be crop failure due to lack of farmer knowledge about what factors can be the cause of crop failure, there could also be crop failure because farmers are too slow or even do not know how to prevent and care for plants properly if they have caused symptoms of crop failure. Improper and inefficient fertilizer application can also cause serious problems in the future (Taus & Tukan, 2022). Indeed, natural factors are more frightening and unpredictable, but it does not rule out the possibility that failure due to factors from farmers themselves will not occur considering that there are still many farmers who carry out their gardening activities using conventional methods.

Crop failure from natural factors itself includes many things such as continuous pest attacks, extreme weather, and infertile soil (Taus & Tukan, 2022). Ulat Grayak (Spodoptera frugiperda J.E. Smith) is a tropical insect native to the United States to Argentina. S.frugiperda is considered a dangerous pest because it is able to attack more than 80 species of plants, one of which is corn. This pest can cause significant yield losses if improper handling is carried out (Septian et al., 2021). Pest attacks do not come throughout the growing season, but sometimes the intensity of pests that come beyond the ability of farmers causes a small or even large number of crops to be damaged due to the influence of pests. High rainfall can also cause serious problems such as root rot disease which greatly negatively affects plants. Even this disease can cause serious crop failure if not treated properly (Maryono et al., 2020). In addition to high rainfall, drought can also be a factor in crop failure. Drought can cause all plants to wither because they do not get enough nutrients from the soil due to lack of water elements in the soil.

Therefore, a solution is needed that can be used by farmers to detect the health of their crops. This is an effort to overcome problems that have already arisen so that action can be taken as soon as possible to avoid greater losses. Detection of plant

health based on image processing of leaves may help farmers find out the problems that arise and can take action as soon as possible. Detection of plant health based on eprocecing images on the leaves themselves was chosen because the application is not too complicated and easy to understand by ordinary people about IT such as farmers. Using the help of a webcam, the camera will capture images of leaf and process these images based on predetermined factors based on leaf color or commonly called RGB (Red, Green, Blue). By using the help of RGB image processing, farmers will be helped by separating healthy and unhealthy plants because they have been detected using the RGB color detection method. Red, Green, Blue (RGB) Color Space is a standard color space based on the acquisition of color frequencies by electronic sensors. The output of this sensor is in the form of an analog signal. RGB is an additive color space, which means that all colors start with black and are formed by adding green, red, and blue. Through the combination of red, green and blue colors will be formed (Sanusi et al., 2019). The image will be taken in real-time using the help of a webcam and will be directly processed for RGB value capture which will then determine whether the plant is healthy or not based on its RGB value. Real-time data collection aims to collect data as much as possible because the process is carried out directly in the garden, so different times can produce different data results. Data discrepancies can have a considerable effect on the actions that farmers will take later.

1.2 Problem Statement

1. Farmers do not understand the characteristics of corn plant diseases.

2. Farmers do not understand how to treat and prevent the occurrence of diseases in plants.

3. Farmers do not understand what diseases are being faced and the causes of the disease.

1.3 Objective of The Project

1. Identify corn plant diseases based on the condition of the leaves.

2. Provide clarity and causes regarding the disease being faced.

3. Provide knowledge on how to treat and control related diseases.

1.4 Significance of The Project

Detection of diseases in corn plants using leaf imagery will be very beneficial for farmers. In addition to providing information about the health of corn plants, this detection can also encourage farmers to take action faster than before with more specifics. This can drive up losses from crop failure if farmers succeed in overcoming health problems in the corn crops planted. In addition to the benefits in terms of money, the benefits in terms of energy are also quite significant because diseases that have been left for too long will of course drain a lot of time and energy for farmers to restore the crop as it was before.

Market demand will also continue to be met if the corn crop harvest is successful. This is in line with the data, namely corn as one of the main food commodities has a very important role in supporting food availability. Food availability can be reflected through how much production level there is. Indonesia is one of the 10 largest corn producing countries in the world with a share of 1.94% of total corn production in the world. The average corn production in Indonesia reaches 15.44 million tons per year (Revania, 2014). Corn (Zea mays L.) is a food that plays an important role in the Indonesian economy, and is a traditional food or staple food in several regions. Corn also plays an important role in the development of the food industry. According to Suarni and Firmansyah (2005), the nutritional content of corn is not inferior to wheat germ, it even has advantages because it contains functional foods such as dietary fiber, Fe elements, and beta-carotene (pro vitamin A) . (Ramadhani, 2012) The good content in corn itself can boost the status of Indonesia

which is currently in epidemiological transition, on the one hand it still experiences malnutrition problems, but on the other hand there is obesity and an increase in the prevalence of nutrition-related non-communicable diseases such as diabetes mellitus, hypertension, coronary heart disease, stroke. The prevalence of malnutrition in children of primary school age (5-12 years) is still high (>10%) at 11.2% (2013). But on the other hand, school-age children suffering from obesity tend to increase, namely by 18.8% (2013), doubling compared to 2010 (9.2%). Eating behavior may have something to do with the double nutrition problem (Hermina & S, 2016).

Another benefit of health detection in corn plants using leaf imagery is the improvement of quality and number of harvests. The detection system using RGB will of course process the data quickly so that farmers will get answers to the condition of their crops at that time. That way farmers no longer need to waste time looking for answers to the problems of the corn plants they plant. But this quality improvement can only be done when all plants are confirmed to be healthy and free from problems that can make plants wither. Before this is achieved, farmers should focus more on increasing the percentage of harvest because this is also one of the initial goals of this project is to meet market demand for corn consumption. Improving the quality of corn crops also has several factors that are not the same when compared to farmers' knowledge. This will be too difficult to do if you do not start first with an increase in the amount of harvest.

1.5 Scope of The Project

1.5.1 User Scope

- Users can enter images in realtime using the camera
- Users can upload pre-taken images
- Users can find out suspected plant diseases from the uploaded images
- Users can find out the cause why the disease appears
- Users can know how to prevent and overcome the disease

1.5.2   System Scope

- **Plant Disease Classification**

    This system will have two classifications regarding plant diseases in corn obtained from several data sets that have been prepared. The classification will be divided into three, namely healthy plants, leaf rust disease, and leaf blight disease.

- **Suspected Illness Experienced**

    The system will automatically display suspected illnesses suffered from photos captured by cameras or photos uploaded by users. If the input image does not seem too clear then there is a possibility that the estimated results are not optimal.

- **Treatment and Countermeasures**

    From the output released by the system, steps will appear that must be taken by the user with the aim of treating plants infected with the disease. The output that appears will also include preventive measures to prevent the same problem from happening in the future

- **Causes of the Disease Appear**

    To increase user knowledge about diseases that attack plants, users need to know what causes the disease that arises. It can also be the first step to prevent the same disease from coming again