

# CHAPTER I

## INTRODUCTION

### 1.1 Background

Melon (*Cucumis melo L.*) is an annual horticultural crop that has high economic potential, so melons are widely cultivated in Indonesia. The appeal of melon to consumers lies in the sweet, fragrant and refreshing taste of the fruit. Besides its delicious taste, melon is also popular with people because it contains a lot of vitamins A and C, does not contain fat and cholesterol, and is low in calories. Melon also has a high attraction for its cultivators, because the selling price of melons is relatively higher than horticultural fruit commodities in general.<sup>1</sup>

The many benefits of melon are one of the reasons for cultivating this plant more intensively. According to the Statistics Agency, the level of melon production in Indonesia from 2018 to 2020 has increased significantly, namely 118,781 tons in 2018, 122,105 tons in 2019 and 138,177 tons in 2020. However, it decreased in 2021, namely 129,147 tons and 118,696 tons in 2022 which was influenced by unpredictable climate change, while melons are plants that are sensitive to climate change.<sup>2</sup>

Good melon growth requires suitable climatic conditions, namely high and relatively dry air temperatures, and full sun. In the rainy season, high rainfall can inhibit melon growth, so the quality and quantity of their crops decrease.<sup>3</sup> In order to achieve the maximum level of melon production, certain cultivation techniques are required. Some of the efforts that can be made can be through the use of proper planting media, fertilization, irrigation and others. The use of proper planting media and the use of biological agents are one of the alternatives to improve the quality and quantity of melon plant production. The right planting medium will provide optimal environmental conditions for the growth of melon plants. One alternative that can be applied is the use of biochar which has various important benefits for soil and plants.

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<sup>1</sup> Happy Birthday and Happy Birthday, *Cultivation of Melon Plants* (Dee, 2021).

<sup>2</sup> Central Statistics Agency, "Fruit Crop Production 2021-2023," Central Statistics Agency, 2023.

<sup>3</sup> Nanik Furoidah, "The Nutritional Effectiveness of AB Mix on the Yield of Two Melon Varieties," *Agritrop Journal* 16, no. 1 (2018): 187.

Biochar is a charcoal organic matter that is deliberately applied to the soil to improve the properties of soil properties. Biochar can significantly improve chemical conditions such as increasing the pH of acidic soils, increasing alkaline saturation, increasing the available alkaline elements of soil. In addition, biochar is also known to improve soil microbial populations, increasing the absorption of P and K nutrients in plants.<sup>4</sup> Biochar is a carbon-rich product with a very stable composition and does not degrade. The organic components of biochar have a high content and the inorganic components contain minerals, such as Ca, Mg, K, and inorganic carbonates change in the type of raw materials.<sup>5</sup> With its stable properties and ability to increase soil microbial populations, biochar can be an ideal medium for biological agents such as *Trichoderma harzianum*, which play a role in pathogen biological control as well as increase nutrient availability for plants

*Trichoderma harzianum* is one of the fungi that has been proven to be effective in improving soil health and root growth. *Trichoderma harzianum* is a soil saprophytic fungus that attacks many types of fungi that cause plant diseases because it produces gluconase and chitinase enzymes that can dissolve the cell walls of pathogens, trichodermin that attacks and destroys the propagule of pathogenic spores around it and also produces gliotoxin and viridian antibiotics that protect plant seedlings from disease attacks.<sup>6</sup> *Trichoderma harzianum* also acts as a decomposer (decomposer species) and plant stimulator. The organic matter in the soil is decomposed faster by *Trichoderma harzianum* so that the soil pH and groundwater absorption increase, then the soil structure will become loose and the nutrients bound in the soil will decompose.

The organic compounds produced by *Trichoderma harzianum* from the decomposition process have an important role in spurring plant growth, accelerating the removal process, increasing biosynthesis, increasing crop yields, preventing

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<sup>4</sup> Parlindungan Lumbanraja et al., "Oil Palm Empty Fruit Bunch Alkaline Biochar Influences Total Soil Microbial Population, Number of Root Nodules and Soybean Growth in Wonosari Inceptisol" 11, no. 3 (2020): 451–56.

<sup>5</sup> Siti Suharyatun et al., "The Effect of the Combination of Rice Husk Biochar and Microbially-Based Organic Fertilizer on Vegetable Growth and Production," *Teknotan Journal* 15, no. 1 (2021): 21–26, <https://doi.org/10.24198/jt.vol15n1.4>.

<sup>6</sup> Restua Mahardday Situmorang et al., "Effect of NPK Phonska Plus and *Trichoderma* Fertilizer Dosage on the Growth and Production of Melon Plants (*Cucumis melo* L.)," *Journal of Agrotropic* 21, no. 1 (2021): 24, <https://jurnal.fp.unila.ac.id/index.php/JAT/article/view/5527/0>.

plants from being affected by soil-borne diseases, loosening and improving soil structure, and decomposing nutrients bound in the soil.<sup>7</sup> *Trichoderma harzianum* can produce phytohormones such as *Indole Acetic Acid* (IAA) which can increase the growth rate of plants both roots and stems, accelerate germination, help in the process of cell division, accelerate fruit ripening, and can reduce the number of seeds present in fruits and similar hormones.<sup>8</sup> Based on the results of research conducted by and research conducted by it, it is known that (Mahardady Situmorang et al., 2021) (Ananda Putri et al., 2018) *Trichoderma harzianum* can have a significant effect on plant growth, fruit diameter, and fruit weight which has differences from plants without *Trichoderma harzianum*

Regarding the nutrient needs of melon plants and low soil fertility, choosing the right planting medium and fertilizing is the best solution. The selection of planting media and the application of *Trichoderma harzianum* are suspected to affect the growth and production of melon plants.

Therefore, this study was conducted to determine **the effect of biochar and *Trichoderma harzianum* on the growth and production of melon plants (*Cucumis melo* L.)" with a hydroponic substrate system.**

## 1.2 Problem Formulation

1. How does biochar affect the growth and production of melon plants?
2. How does *Trichoderma harzianum* affect the growth and production of melon plants?
3. How does the biochar interacted with *Trichoderma harzianum* affect the growth and production of melon plants?

## 1.3 Research Objectives

1. Knowing the influence of biochar on the growth and production of melon plants.
2. Knowing the effect of *Trichoderma harzianum* administration on the growth and production of melon plants

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<sup>7</sup> Lena Ananda Putri, Jamillah, and Widodo Haryoko, "The Effect of Liquid Organic Fertilizer and *Trichoderma* sp on the Growth and Yield of Melon (*Cucumis melo*)," *Bibiet Journal* 3, no. 1 (2018): 17–24.

<sup>8</sup>Ibid

3. To determine the effect of biochar administration interacted with *Trichoderma harzianum* on the growth and production of melon plants.

#### **1.4 Research Benefits**

Students can find out the response of plants through the application of biochar and *Trichoderma harzianum* to melon plants (*Cucumis melo L.*).

