

## CHAPTER I. INTRODUCTION

### 1.1 Background

Kale is a plant that belongs to the same family as mustard greens, cabbage, kailan, and broccoli and is also one of the long-lived horticultural crops that can grow for more than one year. This plant belongs to the dicotyledonous group of plants with taproots. Kale is known as a superfood or the queen of vegetables, due to its nutritional value and high content of antioxidants, lutein, and zeaxanthin that play a role in maintaining eye health<sup>1</sup>. The demand for kale increases every year, while the existing production is still small and cannot meet the needs of the Indonesian people. In Indonesia, kale is still mostly grown using conventional methods, namely in the ground using chemical fertilizers and pesticides. Growing kale on land requires a large area and additional labor. As an alternative, kale can be cultivated hydroponically using nutrients from organic fertilizers.

Organic fertilizer is a type of fertilizer produced from the remains of metabolic processes or parts of living things that have been fermented and contain elements important for plants. The use of organic fertilizers is crucial to support the sustainability of microorganisms in the soil and provide nutrients for plant<sup>2</sup>. In the market, there are two types of organic

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<sup>1</sup> Atikah Wulansari et al., "Pengaruh Tingkat EC dan Populasi Terhadap Produksi Tanaman Kale (*Brassica Oleracea* Var . Acephala) Pada Sistem Hidroponik Rakit Apung," *Produksi Tanaman* 7, no. 2 (2019): 330–38.

<sup>2</sup> M. Abror dan Rakhmad Pavi Harjo, "Efektifitas Pupuk Organik Cair Limbah Ikan Dan Trichoderma Sp Terhadap Pertumbuhan dan Hasil Tanaman Kailan (*Brassica Oleraceae* Sp) Pada Sistem Hidroponik Substrat," *Jurnal Agrosains Dan Teknologi* 3, no. 1 (2018): 1, <https://doi.org/10.24853/jat.3.1.1-12>.

fertilizers: liquid organic fertilizer and solid organic fertilizer. Solid organic fertilizers are applied by sprinkling or incorporating into the soil. Liquid organic fertilizer (LOF) is applied by sprinkling on the soil or spraying on the leaves. Organic materials that can be used as LOF are crop residues, such as: straw, stover, corn cobs, sugarcane bagasse, coconut husks, and rice bran, livestock manure, market waste, household waste, factory waste, and green manure. The basic ingredients of LOF are very diverse, so the resulting quality varies depending on the materials used and the manufacturing method.

Leguminous plants are one of the sources of organic matter for making LOF. Legumes are flowering plants that can capture nitrogen from the air. These plants have roots that are responsible for providing nitrogen, where in the root nodules there are bacteria that multiply and function to bind free nitrogen from the air. One type of leguminosa that is ideal for growth is legumes because it can produce leaves, has a high N content, and decays quickly<sup>3</sup>. Liquid organic fertilizer is produced from An extract of organic matter that is dissolved using a solvent. One of the advantages of using liquid organic fertilizer is that the nutrients contained in it are quickly available and easily absorbed by plant roots. LOF in hydroponic farming, is used to accelerate the growth stage in the vegetative phase of the plant<sup>4</sup>.

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<sup>3</sup> Sasi Gendro Sari et al., "Potensi Legum Dalam Meningkatkan Bahan Organik Tanah Kritis Cempaka, Banjarbaru," *Jurnal Hutan Tropis* 5, no. 3 (2018): 252, <https://doi.org/10.20527/jht.v5i3.4792>.

<sup>4</sup> Noni Narulita et al., "Pengaruh Sistem Dan Konsentrasi Nutrisi Terhadap Pertumbuhan dan Produksi Tanaman Pakcoy (*Brassica Rapa* L.) Secara Hidroponik," *Galang Tanjung* 15, no. 3 (2022): 1–18, <https://jurnal.una.ac.id/index.php/jb/article/view/1307>.

When applying liquid organic fertilizer to plants, it is important to understand the correct concentration as each type of plant requires a different concentration of LOF<sup>5</sup>

In the cultivation of plants using the hydroponic method, one of the things that affects the vegetative growth of plants is the age of the seeds. The use of methods in seedling age can be done in two ways, namely before transplanting (nursery time) and after transplanting. The nursery is used to monitor the growth of the seedlings and ensure they are able to adapt to the environment when transplanted. When seedlings reach a certain age and are transplanted, this can affect their survival and growth rate. According to Santoso (2020), in pakcoy mustard cultivation using a hydroponic system, harvest time is influenced by the age of the plant. So, the older the age of the seedlings at the nursery, the production time of pakcoy plants at the production site. will be shorter. The longer the seedlings live in the nursery phase, the more competition there will be for environmental resources, as the number of plants in the nursery phase increase<sup>6</sup>.

This study aims to identify the effect of POC and seedling age on the vegetative growth of kale (*Brassica oleraceae* v. Red russian) grown hydroponically in the lowland area.

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<sup>5</sup> Nonny Nailah Hanum dan Syakiroh Jazilah, "Pengaruh Konsentrasi dan Interval Pemberian POC Morinsa Terhadap Pertumbuhan dan Produksi Tanaman Kale (*Brassica Oleracea* Var. Acephala)," *Biofarm: Jurnal Ilmiah Pertanian* 17, no. 1 (2021): 14, <https://doi.org/10.31941/biofarm.v17i1.1436>.

<sup>6</sup> Arik Santoso dan Nugraheni Widyawati, "Pengaruh Umur Bibit Terhadap Pertumbuhan dan Hasil Pakcoy (*Brassica Rapa* sp. *Chinensis*) Pada Hidroponik NFT," *Vegetalika* 9, no. 3 (2020): 464, <https://doi.org/10.22146/veg.52570>.

## 1.2 Problem Formulation

1. How does liquid organic fertilizer affect the vegetative growth of kale hydroponically?
2. How does seedling age affect the vegetative growth of kale in hydroponics?
3. What is the effect of liquid organic fertilizer and seedling age on hydroponic kale vegetative growth?

## 1.3 Objectives

Objectives of this research are:

1. To determine the effect of liquid organic fertilizer on the vegetative growth of kale hydroponically.
2. To determine the effect of seedling age on hydroponic kale vegetative growth.
3. To determine the effect of a combination liquid organic fertilizer treatment and seedling age on the vegetative growth of kale hydroponically.

## 1.4 Benefits

1. Provides an alternative to organic fertilizer for hydroponic cultivation of kale (*Brassica oleraceae* var. Red russian).
2. Help develop horticultural agricultural products that can enhance the growth of kale (*Brassica oleraceae* var. Red russian).

3. Provide a real contribution as scientific information for the development of science and technology in the field of hydroponic cultivation of kale (*Brassica oleraceae* var. Red russian).

