CHAPTER I. INTODUCTION

1.1 Background

Onion plants (Allium ascalonicum L.) are superior horticultural commodities classified as spice vegetables with high economic value. Shallots are widely used as a seasoning to add flavor to dishes and are beneficial for health. The content of antioxidant substances possessed by shallots can prevent cancer. Shallots have antioxidant substances that play a role in fighting the effects of free radicals. The content of active compounds contained in shallots, such as allicin (SAC), adenosine, and diallyl disulfide, can launch the circulatory and digestive systems and neutralize and remove harmful toxic substances from the body.[1]

The prospect of shallot cultivation is quite good when viewed in terms of increasing demand along with the increasing population and food industry. Based on data collected from the Central Statistics Agency (BPS) for the 2021-2022 period regarding the results of the survey on the production of seasonal vegetable and fruit crops, it was noted that the production of shallot bulbs in the East Java province area decreased in 2022 by 478,393.00 tons, where in 2021 the production reached 500,992.00 tons.[2]

The increasing demand for shallots has not been matched by an increase in production. The need for shallots in Indonesia averages direct consumption of 860.62 thousand tons per year. Factors that affect shallot production include the

[1] Aryanta, "Bawang Merah dan Manfaatnya Bagi Kesehatan," *Widya Kesehatan* 1, no. 1 (2019): 29–35, https://doi.org/10.32795/widyakesehatan.v1i1.280.

[2] BPS, "Produksi Tanaman Sayuran," 2022, https://doi.org/https://www.bps.go.id/id/statistics-table/2/NjEjMg==/produksi-tanaman-sayuran.html.

use of inappropriate seeds, climate change, lack of use of organic fertilizers, more and more HPT attacks, and less balanced fertilization.[3] The solution to increase shallot productivity can be done through fertilization. Generally, shallot cultivation currently depends on the use of inorganic fertilizers. Inorganic fertilizers are currently used more often because they are practical in use. However, the use of inorganic fertilizers has disadvantages, including expensive prices. In addition, chemical fertilizers that are applied continuously with high doses can pollute the environment and cause loss of soil fertility. Agricultural products can pose a threat to consumer health due to chemical residues found in inorganic agricultural products.[4] To reduce the excessive use of chemical fertilizers, one solution that can be used is to utilize organic fertilizers.

Organic fertilizers come from the process of decomposing organic matter with the help of microbes. Organic fertilizers are able to provide nutrients needed by plants to support their growth and development. The use of organic fertilizers can overcome obstacles in increasing plant productivity, does not have a negative impact on the soil, and there are no chemicals that can pollute the environment, maintain health from exposure to harmful substances, and produce crops that are safe for consumption and save the use of inorganic fertilizers whose prices tend to be expensive.[5]

[3] T. Sudaryono, "Respon Tanaman Bawang Merah Terhadap Pemupukan Boron," *Ilmu-Ilmu Pertanian* 11, no. 2 (2017): 161–69.

[4] P. Purbosari et al., "Peningkatan Kesadaran Lingkungan dan Kesehatan Masyarakat Desa Somongari Melalui Edukasi Dampak Pupuk Dan Pestisida Anorganik," Agrokreatif Jurnal Ilmiah Pengabdian Kepada Masyarakat 7, no. 2 (2021): 131–37.

[5] Muhtiara Yaser et al., "Perbandingan Produksi Panen Pupuk Organik dan Anorganik Pada Tanaman Cabai Keriting (Capsicum Annuum L .)," *Jurnal Ilmiah Pertanian* 11, no. 1 (2023): 112–16.

One type of organic fertilizer is liquid organic fertilizer (POC). Liquid organic fertilizer (POC) is a solution produced through the fermentation process of organic materials such as livestock manure, either solid or liquid, and vegetable or fruit waste. One of the organic wastes that can be used as raw material for making POC is coconut fiber. Coconut fiber contains various nutrients important for plants, including nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg), and sodium (Na).[6]

The process of making POC from coconut fiber is done by putting 15 kg of coconut fiber into a sack and then tying the top of the sack with a rope. The sack is then immersed in a drum containing water; the drum is closed tightly and then allowed to stand for approximately 15 days. The application of coconut fiber POC can increase the growth of plant height, number of leaves, number of branches, crown fresh weight, fresh weight, root dry weight, and number of tubers of potato plants at concentrations of 5%, 10%, 15%, and 20%. The growth and development of potato plants are better than the control.[7]

The use of POC in plants can be modified by the addition of silica (Si). Silica is one of the nutrients needed by plants because it provides several advantages to plants. Silica plays a role in increasing the rate of photosynthesis, reducing evaporation, and increasing the transportation of other nutrients so that it can fertilize plants.[8] The addition of silica can increase the absorption and availability of N, P, K, Ca, Mg,

[6] Ray Wijaya et al., "Aplikasi Pupuk Organik Cair dari Sabut Kelapa dan Pupuk Kandang Ayam Terhadap Ketersediaan dan Serapan Kalium serta Pertumbuhan Tanaman Jagung pada Tanah Inceptisol Kwala Bekala," *Jurnal Agroekoteknologi FP USU* 5, no. 2 (2017): 249–55.

[7] Widagdo Suripto dan Tyastuti Purwani, "Pengaruh Konsentrasi Pupuk Organik Cair Sabut Kelapa terhadap Pertumbuhan dan Hasil Kentang Kleci," *Seminar Nasional UNS* 2, no. 1 (2018): 220–29.

[8] Agus Moh Susanto dan Raden Soedradjad, "Pengaruh aplikasi pupuk organik dan silika terhadap pertumbuhan dan produksi tanaman cabai merah," *Bioindustri* 01, no. 02 (2019): 164–75.

S, Zn elements so as to encourage more optimal plant growth[9] The addition of silica to POC is significantly different from plant height, number of leaves, stomatal density, root length, plant wet biomass, and measurement of relative water content of soybean plant leaves with the optimal concentration that gives the best results is 20 ml/liter + 1 gram of silica[10]

In addition to fertilization, efforts to increase shallot production are by selecting quality varieties. Some superior varieties of shallots such as Super Philip, Bauji, Bima Brebes, are known to have good growth and production.[11] The use of different varieties in shallot cultivation will show different growth and production responses. The Bima shallot variety can produce a higher number of bulbs, fresh weight of plants and fresh weight of bulbs / clump than the Palu Valley variety cultivated in North Sulawesi[12]

1.2. Problem Formulation

1. What is the effect of silica-modified POC fertilizer on shallot productivity?
2. How does variety affect shallot productivity?
3. How does the combination of silica-modified POC and shallot varieties affect shallot productivity?

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[9] Amrullah et al., "Peningkatan produktivitas tanaman padi (*Oryza sativa* L.) melalui pemberian nano silika increased productivity of rice plants (*Oryza sativa* L.) through the application of nano silica," *Jurnal Pangan* 23, no. 1 (2014): 17–32, https://www.jurnalpangan.com/index.php/pangan/article/view/46.

[10] Fauziah Khoirun Nisa and Yuni Sri Rahayu, "Pengaruh Pupuk Organik Cair Nabati dan Silika Terhadap Pertumbuhan Tanaman Kedelai (*Glycine Max*) Yang Mengalami Cekaman Air," *LenteraBio : Berkala Ilmiah Biologi* 11, no. 1 (2022): 80–88, https://doi.org/10.26740/lenterabio.v11n1.p80-88.

[11] Harahap, Luta, and Sitepu, "Karakteristik Agronomi Beberapa Varietas Bawang Merah (Allium Ascalonicum L.) Dataran Rendah," Seminar Nasional Surakarta, 2022, 287–96.

[12] Neneng Gusti Ayu, Abdul Rauf, and Sakka Samudin, "Pertumbuhan dan Hasil Dua Varietas Bawang Merah (*Allium Ascalonicum* L.) Pada Berbagai Jarak Tanam," *J. Agrotekbis* 4, no. 5 (2016): 530–36.

1.3 Research objectives

1. Knowing the effect of silica-modified POC fertilizer on shallot productivity
2. Knowing the effect of variety on shallot productivity
3. Knowing the effect of a combination of silica-modified POC and shallot varieties on shallot productivity.

1.4. Research benefits

The benefits of research are divided into two, namely practical benefits and theoretical benefits.

a. Practical benefits. The research is expected to help in increasing the productivity of shallot plants (Allium ascalonicum L.) by using silica modified POC fertilizer. Through this research is expected to reduce the need for inorganic fertilizers and get a combination of silica modified POC that is able to provide the best growth and yield of shallot plants.

b. Theoretical Benefits. Research can be used as a basis for further research.