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The Effect of Liquid Organic Fertilizer from Kepok Banana Humps on Cayenne Pepper Plants' (*Capsicum frutescens* L.) Growth and Yield

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ABSTRACT

The primary issue encountered in the cultivation of cayenne pepper is the low production levels attributed to the non-intensive cultivation system and poor soil fertility. Enhancing cultivation techniques, mainly through the application of liquid organic fertilizer derived from Kepok banana humps, has the potential to boost production yields. Kepok banana humps harbor microbes that aid in the decomposition of beneficial organic matter. The objective of this study is to assess the impact and optimal concentration of liquid organic fertilizer from Kepok banana humps on the growth and yield of cayenne pepper. Employing a Completely Randomized Design (CRD) with 4 treatments and 3 replications, the findings indicated that the utilization of liquid organic fertilizer from Kepok banana humps significantly influenced flowering age, harvest age, fruit weight per plant, and plant dry weight. At the same time, no notable effects were observed on plant height and leaf width. The most effective treatment was P3 (300 ml/plant), which yielded the most favorable outcomes across these parameters.

Keywords: *Cayenne Pepper, Liquid Organic Fertilizer, Kepok Banana hump, Plant Growth, Production Results*

1. INTRODUCTION

Cayenne pepper, scientifically referred to as *Capsicum frutescens* L., is a member of the Solanaceae family and is classified as a plant that is either annual or short-lived. Culturing Cayenne pepper (*Capsicum frutescens*) shows potential as chillies are a key horticultural crop that has become an integral part of the culinary traditions of Indonesian society. The unique spicy taste of Indonesian cuisine is a significant factor contributing to the widespread consumption of chilies in Indonesia (Putra *et al*., 2021).

Cultivating cayenne pepper often encounters a significant challenge, notably the inability to achieve optimal production. This issue arises from various factors, such as the lack of an intensive cultivation system and poor soil fertility. Consequently, enhancing the cultivation techniques employed for cayenne pepper plants is imperative. Fertilization emerges as one of the critical intensive cultivation methods that can effectively boost the production of cayenne pepper (Yadi, Karimuna, 2022).

Fertilization is a widely practiced cultivation method aimed at enhancing productivity. Incorporating organic substances like Kepok banana hump liquid organic fertilizer into the soil is a superior technique from various standpoints, including technical, economic, social, and environmental aspects. This approach avoids pollution and enhances the soil's physical, chemical, and biological characteristics. Additionally, this fertilizer contains a binding agent, enabling plants to absorb the applied fertilizer solution on the soil surface directly. Moreover, producing liquid organic fertilizer (POC) requires less time than solid organic fertilizers (Siboro *et al*., 2014).

Harvesting Kepok banana trees often results in the abandonment of Kepok banana stems, which are left unused and discarded, thus becoming waste. However, one potential solution to address this issue is to convert these Kepok banana stems into POC. This process not only helps reduce the overall waste volume but also plays a significant role in the plant's vegetative growth phase. Additionally, POC derived from Kepok banana stems proves beneficial in facilitating the flowering and fruit formation process, ultimately leading to increased plant production, such as cayenne pepper.

The challenge encountered in cultivating cayenne pepper plants lies in the improper application of fertilizers, leading farmers to employ inadequate techniques in managing these resources. Consequently, the outcomes farmers achieve fall short of expectations and contribute to environmental degradation, particularly affecting the soil.

The objective of this study is to investigate the impact of liquid organic fertilizer derived from the Kepok banana hump on the growth and productivity of cayenne pepper plants (*Capsicum frutescens* L.). Additionally, the study aims to identify the optimal concentration of Kepok banana hump liquid organic fertilizer that maximizes the growth and yield of cayenne pepper plants (*Capsicum frutescens* L.).

2. MATERIAL AND METHODS

2.1 Time and Place

The research utilized various materials, including Kepok banana tubers, Bhaskara F1 variety cayenne pepper seeds, 4x6 polybags, 35x40 polybags, EM4, water, chicken manure, and brown sugar. Additionally, a range of tools was employed, such as machetes, buckets, hoes, ovens, hand sprayers, ropes, plastic, calipers, knives, research boards, wood, stationery, measuring tape, sprinklers, used cloth, scales, cameras, and 8 mesh sieves.

2.2 Research Design

The study utilized a Completely Randomized Design (CRD) with 4 treatments, each comprising 3 replications, resulting in 12 experimental

units. Each experimental unit consisted of 6 plants, with 4 plants designated samples. The treatments are outlined below:

P_0 = Without treatment POC Kepok banana hump (control),
P_1 = 100 ml, POC Kepok banana hump/plant,
P_2 = 200 ml POC Kepok banana hump/plant,
P_3 = 300 ml POC Kepok banana hump/plant.

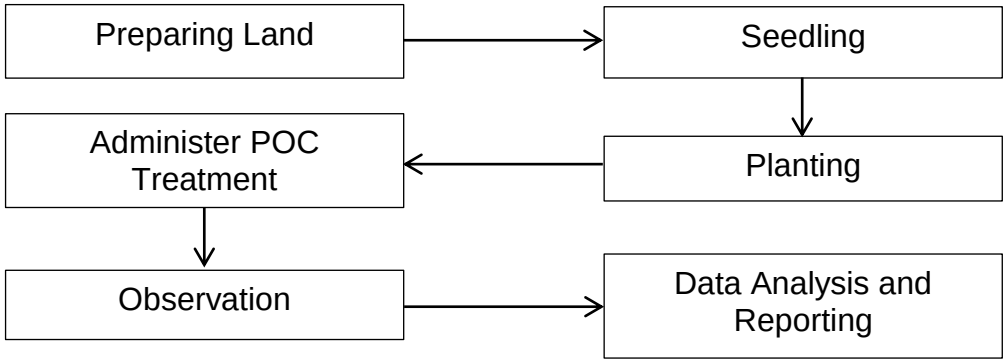

Figure 1. Research flow diagram

3. RESULT AND DISCUSSION

3.1 Age of First Harvest (days)

The results of the variance analysis showed that the provision of various concentrations of POC of Kepok banana roots had a significant effect on the harvest age of cayenne pepper in each treatment. The average harvest age of cayenne pepper plants can be seen in Figure 2.

Figure 2 illustrates that the harvest age of cayenne pepper plants varies significantly across treatments P0, P1, P2, and P3. The cayenne pepper plants subjected to the P3 treatment (300 ml) exhibited the shortest harvest age, precisely 73.52 days. In contrast, the harvest ages for P0, P1, and P2 were 77.62 days, 76 days, and 75.03 days, respectively. These findings align with the observations on flowering time, indicating that higher concentrations of POC given to the Kepok banana hump result in faster flowering and harvest times.

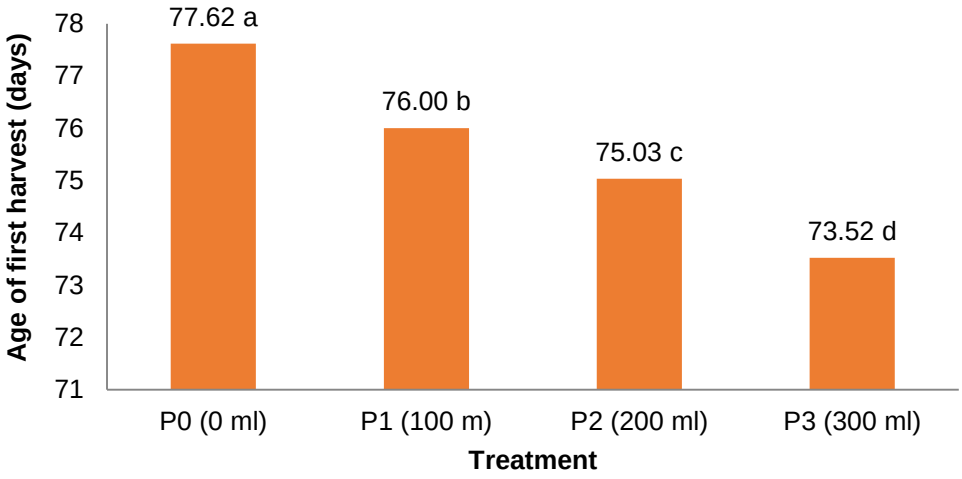

Figure 2. Average Age of First Harvest of Cayenne Pepper Plants in the Kepok Banana Hump POC Treatment

According to Pandiangan (2016), the age at which cayenne pepper plants are harvested is closely linked to their flowering age—an earlier onset of flowering results in an earlier harvest. The timing of the harvest is significantly influenced by the nutrient composition of the POC (Peel Over Core) of the Kepok banana hump. Adequate levels of nutrients, particularly nitrogen (N), phosphorus (P), and potassium (K), in the plant's metabolic processes, have an impact on the harvest time (Lingga and Marsono, 2021). Agustina et al. (2015) further emphasized that the generative development of plants heavily relies on the availability of N, P, and K nutrients to support optimal plant metabolism. This research aligns with the findings of Pranoto (2020), who stated that POC could accelerate the harvesting period of curly red chilies

3.2 Plant Dry Weight

The analysis of variance results indicated a significant impact on the dry weight of cayenne pepper plants when administered with varying concentrations of Kepok banana hump POC. Figure 2 displays the average dry weight of the cayenne pepper plants.

In Figure 2, it is evident that the dry weight of cayenne pepper plants significantly varies across the P0, P1, P2, and P3 treatments with Kepok banana hump POC. Notably, the P3 treatment, with a dry weight of 33,977 g, exhibited the highest plant dry weight among all treatments, surpassing P0 (15,227 g), P1 (24,220 g), and P2 (32,837 g).

The dry weight of the stove is an essential parameter for assessing plant growth and development, as it represents the accumulation of organic compounds synthesized by the plant (Sitorus et al., 2015). Hendra et al. (2016) further explained that the unit weight of plant biomass resulting from nutrient uptake is reflected in plant growth and dry weight. Additionally, Putriantari et al. (2014) highlighted that nitrogen not only increases the number of leaves and branches, as well as the wet weight, but also positively impacts the dry weight of plants.

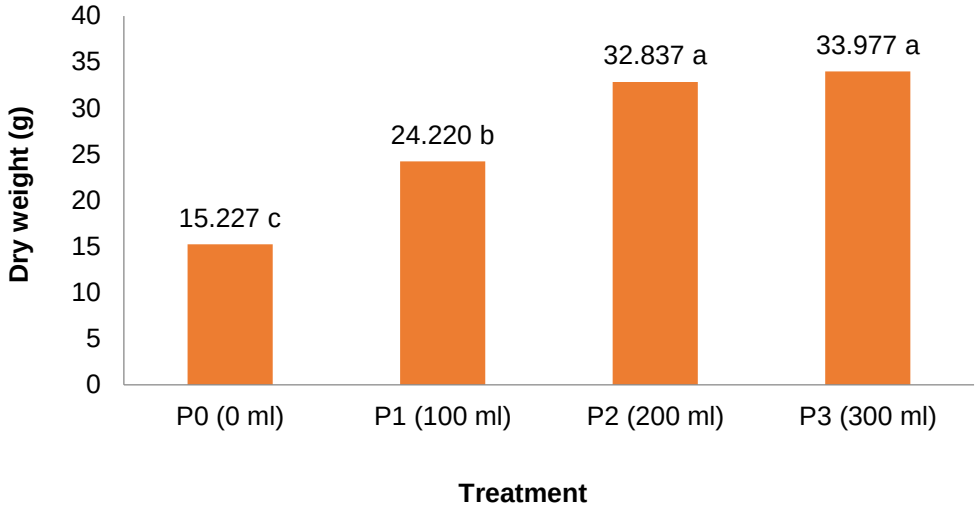

Figure 3. Average Dry Weight of Cayenne Pepper Plants with the Treatment of POC Bonggol Banana Kepok.

4. CONCLUSION

According to the findings from the conducted research, it can be deduced that the provision of POC for the Kepok banana hump has a notable impact on the parameters related to the observation of the initial harvest age and the dry weight of the plant. The most rapid harvest age was achieved at P3, precisely 73.52 days, while the dry weight

of the plant was recorded at P3 as 33.97 g.

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