Application of Organic and Inorganic Fertilizer Against Results Onion Plants with Chillies

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Abstract

Intercropping is a crop cultivation system where more than one plant is planted in one planting area, this is used to maximize land function and increase farmers’ income. The aim of the study was to obtain the response of growth and yield of intercropping to reducing doses of inorganic fertilizers with organic fertilizers, in order to obtain the optimal dosage mix. The research was conducted in rice fields in Subak Rapuan, Banjar Tarukan, Mas Village, Ubud, Gianyar. This experiment is a factorial experiment with a Randomized Block Design (RAK) which consists of two factors, namely organic fertilizer kerambitan agro (K) consisting of 4 levels: K0 = 0 ton.ha-1; K1 = 10 ton.ha-1; K2 = 20 ton.ha-1; K3 = 30 ton.ha-1 and the dose of NPK Mutiara fertilizer consisted of 3 levels, namely N1= 100 kg.ha-1; N2= 200 kg.ha-1 N3= 300 kg.ha-1 . The results showed that the interaction of organic fertilizers with inorganic fertilizers had no significant effect (P≥0.05) on all observed variables. The fresh weight of shallot bulbs per clump and the highest fresh weight of chili fruit per plant were obtained from the application of organic fertilizers Kerambitan Agro 20 tons.ha-1, namely 85 g and 202.56 g, increased by 20.28% and 26.59% compared to the application of organic fertilizers Kerambitan Agro 0 tons. ha-1 are 70.67 g and 160.01 g. The application of NPK fertilizer 200 kg.ha-1 gave a higher fresh weight of shallot bulbs per clump, namely 79.83 g, which increased by 6.19%, as well as fresh weight of chilies, which was 187.80 g, an increase of 5.55% compared to the application of NPK fertilizer at 100 kg.ha-1.

Keywords

chili; inorganic fertilizer; intercropping shallots; onion plants; organic fertilizer;
1 Introduction

The development of appropriate technology in agriculture followed by the creation of a climate, limited land can be useful and profitable with the solution being the application of intercropping cropping patterns, which are associated with sustainable agricultural systems, where the use of fertilizers and pesticides is more efficient, reduces erosion, land conservation, biological stability soil and obtain greater yield stability and diversity than monoculture cultivation (Warman & Kristiana, 2018). Shallots are a spice vegetable used as a delicacy in cooking according to the tongue of the Indonesian people. Almost all Indonesian dishes use onions as one of the seasonings (Wibowo, 1991). The government is intensifying and encouraging farmers to return to planting crops that are needed by the community, because the need for onions in Indonesia is still an important record in advancing agricultural production. One of them is the intensification of horticultural lands through intercropping patterns, namely planting shallots between chili plants. Chili plant is one of the popular vegetable commodities and has high value and high nutritional content. Almost all households in Indonesia consume chilies every day, not only for household consumption but also in the food processing industry. To increase yields with an intercropping system, it is necessary to have sufficient availability of nutrients so that plants can grow and give good results, so competition between plants in nutrient absorption is not at a detrimental level. Nutrients can be obtained from organic and inorganic fertilizers. Organic fertilizers are the result of the decomposition of organic materials that are broken down by microbes, so that they can provide nutrients needed by plants for plant growth and development. Organic matter in addition to containing complete nutrients, also plays an important role in improving the physical, chemical, and biological properties of the soil so that it can maintain and increase soil fertility, and reduce dependence on inorganic fertilizers (Baharuddin & Sutriana, 2019). The provision of organic fertilizers needs to be balanced with inorganic fertilizers. How large the dose of organic fertilizer given combined with inorganic fertilizer has an effect on the yield of plants with an intercropping system. The results Yuliartini & Kartini (2021), obtained that the fresh weight of shallot bulbs per clump and the highest fresh weight of okra fruit per plant was obtained at a dose of NPK Mutiara 300 kg.ha-1, namely 58.77 g and 171.63 g, an increase of 23.59% and 15.08% compared to the dose of NPK Mutiara 100 kg.ha-1, namely 47.55 g and 149.14 g (Mejia et al., 2007; Surh & Lee, 1996).

2 Methodology

The research was conducted in paddy fields in Subak Rapuan, Banjar Tarukan, Mas Village, Ubud, Gianyar, starting from January-August 2021. The research method used a factorial randomized block design, consisting of two factors, namely organic kerambitan agro fertilizer (K) consisting of 4 levels: K0 = 0 ton.ha-1; K1 = 10 ton.ha-1; K2 = 20 tons.ha-1; K3 = 30 ton.ha-1 and the dose of NPK Mutiara fertilizer consisted of 3 levels, namely N1 = 100 kg.ha-1; N2= 200 kg.ha-1 N3= 300 kg.ha-1. So that 12 combination treatments were obtained 3 times, so 36 experimental plots were needed. The implementation of the research included land preparation, making plots measuring 2 x 2 m as many as 36 plots with a mound height of 20 cm, a distance between plots of 30 cm and between replications of 50 cm; planting is carried out in the afternoon, for shallot seeds before planting, cut the ends of 1/3 of the next part planted with a depth of 3 cm with a spacing of 15x15 cm., planted in rows of chili planted with a spacing of 60x60 cm The treatment of organic fertilizer is given 1 week before planting while inorganic fertilizers are given 2 times, namely 7 days after planting and 35
hst. according to treatment. Maintenance includes watering, replanting, weeding and controlling pests and diseases. Harvesting is done after the onion plants are 60 days after planting, for chili plants are harvested in stages according to the harvest criteria. Variables observed in shallot and chili plants were plant height, number of leaves, number of onion bulbs, number of chilies, fresh weight of bulbs and fresh weight of chilies. The data were analyzed statistically by using analysis of variance (Eze et al., 2018; Gimeno-García et al., 1996).

3 Results and Discussions

The results of statistical analysis of all observed variables, obtained the significance of the doses of organic fertilizers (K) and NPK 16:16:16 (N) and their interactions (KxN)) on the observed variables are presented in Table 3.1.

<table>
<thead>
<tr>
<th>No</th>
<th>Variable</th>
<th>Treatment</th>
<th>Interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Organic Fertilizer Dosage (K)</td>
<td>Inorganic fertilizer (N)</td>
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<tr>
<td>1</td>
<td>Fresh weight of onion bulbs per clump (cm)</td>
<td>ns</td>
<td>*</td>
</tr>
<tr>
<td>2</td>
<td>Maximum number of red heat leaves (strands)</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>3</td>
<td>Number of tubers per clump (tuber)</td>
<td>**</td>
<td>*</td>
</tr>
<tr>
<td>4</td>
<td>Fresh weight of onion bulbs per clump (g)</td>
<td>**</td>
<td>ns</td>
</tr>
<tr>
<td>5</td>
<td>Maximum chili plant height (cm)</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>6</td>
<td>Number of chili plant leaves (strands)</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>7</td>
<td>Number of chilies per plant (fruit)</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td>8</td>
<td>Fresh weight of chili per plant (g)</td>
<td>**</td>
<td>**</td>
</tr>
</tbody>
</table>

Description: ns = Influence not significant (P≥0.05)
* = Significantly influential (P<0.05)
** = Very significant effect (P<0.01)

From Table 3.1, it can be seen that the interaction of the dose of organic fertilizer for organic kerambiatn agro with NPK 16:16:16 (KxN) fertilizer had no significant effect (P≥0.05) on all observed variables. The dose of Kerambitan Agro organic fertilizer (K) had a very significant effect (P<0.01) on the number of bulbs and fresh weight of shallot bulbs per clump; the number of fruits and fresh weight of chilies per plant and had no significant effect (P≥0.05) on other treatments. The dose of NPK 16:16:16 had a significant effect (P<0.05) on the maximum shallot plant height and the number of bulbs per clump; had a very significant effect (P<0.01) on the number of fruits and fresh weight of chilies per plant and no significant effect (P≥0.05) on other treatments. The average values of the observed variables on the dose of organic fertilizer (K) and 16:16:16 NPK fertilizer (N) and their interactions are presented in Table 3.2 and Table 3.3 (Swamy & Gowda, 2006; Yang et al., 2022).
fertilizer Kerambitan Agro 20 ton.ha-1, namely 24.11 pieces and 202.56 g, increased by 11.83% and 26.59%
comparatively to the application of organic fertilizer Kerambitan Agro 0 ton.ha-1, namely 21.56 pieces and 160.01
g (Table 3.2). This is because rambitan agro fertilizers are organic fertilizers with the basic ingredients of
fermented cow manure, cocopeat and roasted husks which improve soil structure, increase cation exchange
capacity, increase water retention and contain macro and micro nutrients so that they are available and can be
used. absorbed by intercropping shallots and chilies for growth and development (Walling & Vaneeckhaute,
2020; Wang et al., 2018).

This is in line with the opinion Suliasih et al. (2010) that the provision of organic matter plays a role in
improving soil structure so that air aeration and water movement are smooth, thereby increasing the
absorption of water in the soil and being able to increase the available nutrients for plants, and increasing the
population and activity of soil microbes so that it effects on growth and yield. This is supported by the results
of research Yuliartini et al. (2021), which found that the application of liquid organic fertilizer with a
concentration of 150 ml·l-1 gave an increase in the yield of shallot bulbs by 35.28% compared to the lowest
yield at a concentration of 25 ml·l-1 of liquid organic fertilizer; and the results of the study showed that giving
a dose of rabbit compost 15 tons.ha-1 gave an increase in fresh weight of onion bulbs by 73.48% compared to
da dose of rabbit compost 0 tons.ha-1 (Thyagaraju, 2016; Giler & Cedeño, 2020).

The application of 200 kg.ha-1 NPK fertilizer gave higher number and weight of tubers per clump, namely
11.42 bulbs and 79.83 g which increased by 9.59% and 6.19%, as well as the number and weight of chilies,
namely 24.38 pieces and 187.80 g which increased by 12.29 % and 5.55% compared to the application of 100
kg.ha-1 NPK fertilizer (Table 3.1 and Table 3.2). As the dose of fertilizer increased, there was an increase in
growth in shallot and chili intercropping, although it was not significantly different because as the plants
matured, the root system developed properly and completely, so that the plants were increasingly able to
absorb nutrients in the form of anions and cations which contains the elements N, P and K contained in the
NPK fertilizer. According to the opinion Sutedjo (2008), that for vegetative and generative growth of plants,
nutrients are needed, especially N, P and K. N is needed for the formation of carbohydrates, proteins, fats and
other organic compounds. Element P plays a role in the formation of the generative parts of plants (Gascho et
al., 2001).

The application of inorganic NPK fertilizers plays a role in meeting the nutrient needs of intercropping
shallots with chilies, especially N, P, and K nutrients. Meanwhile, organic fertilizers, in addition to containing
N, P, and K elements, also contain abundant micro-nutrients and are required for growth. plant. Several
studies have proven that the use of organic fertilizers can reduce the use of inorganic fertilizers. Saha et al.
(2013), added that the application of organic fertilizers with inorganic fertilizers in addition to saving the use
of inorganic fertilizers, preventing nutrient imbalances, can also reduce the risk of environmental pollution,
increase soil fertility and increase crop yields.

4 Conclusion

From the research it can be concluded:

1. The interaction of organic fertilizers with inorganic fertilizers had no significant effect (P ≥0.05) on all
observed variables
2. The highest fresh weight of shallot bulbs per clump and fresh weight of chili fruit per plant was
obtained from the application of organic fertilizers Kerambitan Agro 20 ton.ha-1, namely 85 g and
202.56 g, increased by 20.28% and 26.59% compared to the application of organic fertilizers Kerambitan
3. Agro 0 ton.ha-1 ie 70.67 g and 160.01 g.
4. The application of 200 kg.ha-1 NPK fertilizer gave a higher fresh weight of tubers per clump, namely
79.83 g which increased by 6.19%, as well as the weight of chilies, which was 187.80 g, an increase of
5.55% compared to the application of 100 kg.ha-1 NPK fertilizer.
The suggestions put forward in this research are:

1. To increase the yield of intercropping shallots and chilies, 20 ton.ha\(^{-1}\) organic fertilizer and 100 kg.ha\(^{-1}\) inorganic fertilizer can be applied.
2. Further research needs to be done on different places and technological inputs

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References


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