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# Application of Organic Fertilizer Dosages Results of Ampangsari Red Onion Varieties with Chilli

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A R T I C L E I N F O

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A B S T R A C T

A cultivation method called intercropping involves planting multiple plants in one location to optimize land functions that combine intensification and diversification. The aim of the research was to obtain growth and yield responses in shallot varieties intercropped with chilies when administering organic fertilizer doses, so as to obtain organic fertilizer doses for onion and chili varieties and develop them into the production system. Research was conducted in the rice fields of Selat Village, Abiansemal, Badung. The factorial RKA includes two components: the amount of organic fertilizer (D), four levels D1 = 10 tons per hectare; D2 = 20 tons per hectare; D3 = 30 tons per hectare; D0 = 0 tons per hectareDan Types, two taraf yaitu Super Philip is V1, and Bali Karet is V2.

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## INTRODUCTION

The optimization of land productivity is a top priority in the development of agricultural cultivation. creation of suitable technology in the agricultural sector, including food crops, horticulture, plantations, followed by climate creation, agribusiness and appropriate technology that can be useful and very profitable. The intercropping pattern is one way to get around land constraints and create suitable technology. A double cropping system known as intercropping involves planting two or more distinct plant species on the same piece of land at roughly the same or different times by alternating and spacing them out at regular intervals (Yuliartini et al., 2021). Cropping patterns that involve intercropping are frequently linked to sustainable agricultural systems, where the use of pesticides and fertilizers is more effective, lessens erosion, conserves land, stabilizes soil biology, and yields more stable and varied results than monoculture planting (Guruh and Riajeng 2018).

Comparing the intercropping cropping pattern to the monoculture cropping pattern reveals a number of benefits. The choice of intercropping system and the timing of main crop and intercrop plantings will be based on the identification of the main crops and intercrops. It is believed that a favorable relationship between plants can result from selecting the appropriate commodity. Intercropping will enhance ecological balance, improve resource utilization, boost product quality and quantity, and lessen plant damage from pests, diseases, and plant weeds, according to Rika Despita et al. (2020). Plant selection must take into account the requirements for sunlight, nutrients, and the root system of the plant in order to reduce adverse interactions. In Indonesia, cayenne and shallot peppers are essential commodities that people use on a daily basis for a variety of uses, including industry, medicines, and cooking spices. In addition, they have the potential to raise the country's inflation rate. Intercropping planting patterns are one method of intensification to meet the demand for chilies and shallots (Raisa and Selvia, 2019). The application of varieties is something that needs to be considered in shallot cultivation. Selection of superior varieties is one of the production factors so that the shallot yields obtained can be said to be good. This is because varieties have a very vital role in plant growth. The use of varieties will have the potential to increase plant productivity if varieties are planted that are suitable for environmental conditions (Fatiani, et.al. 2022).

Regional conditions have a significant impact on productivity differences between cultivars and varieties, in addition to their individual characteristics. Climate, soil processing, fertilization, and irrigation all affect how productive and high-quality shallot bulbs are for each variety (Hekmawati et al., 2018). According to Meliala (2011) in Syifa (2019), a variety is considered adaptive if it can coexist with its surroundings, produce high and consistent yields, and grow well in the area where it comes from. Several things that differentiate shallot varieties include shape, size, color, firmness and aroma of the bulbs, plant age and resistance to disease. The varieties of shallots that are often planted are the Bima Juna, Bima Curut, Warso and Kuning Tablet and Bali Karet varieties. This variety is very suitable for planting in the lowlands (Chotimatul Azmi et al. 2022)

To increase yields in intercropping crops, apart from the varieties used, it is also necessary to provide sufficient nutrients so that the plants can grow and produce good results in order to prevent harmful competition between plants for nutrient absorption. Utilize waste to enhance the green environment and go back to organic. The process by which microbes break down organic materials to produce the nutrients that plants require for growth and development is known as organic fertilizer (Susetya, 2016). In addition to having full nutrients, organic materials are crucial for enhancing the soil's physical, chemical, and biological characteristics, which helps to preserve and boost soil fertility and lessen reliance on inorganic fertilizers (Musnamar, 2009).

**LITERATURE REVIEW**

The two most valuable vegetable crops in Indonesia are shallots and cayenne peppers, which are required daily by people and used for a variety of purposes like industry, medicines, and cooking spices. In addition, they have the potential to raise the rate of inflation in the country. One strategy is to use intercropping patterns to intensify and diversify in order to meet the demand for shallots and chilies.

A double cropping system known as intercropping involves planting two or more distinct plant species on the same piece of land at roughly the same or different times by alternating and spacing them out at regular intervals (Yuliartini et al., 2021). It is believed that a favorable relationship between plants can result from selecting the appropriate commodity. Intercropping will enhance ecological balance, improve resource utilization, boost product quality and quantity, and lessen plant damage from pests, diseases, and plant weeds, according to Rika Despita et al. (2020). The intercropping pattern also has a weakness, namely competition between plants above and below the ground. The results of research by Aini, et al (2020) show that intercropping chilies and shallots with 2 rows of plants can increase the Land Equivalent Ratio value compared to monoculture. To increase yields in a cropping system, adequate nutrient availability is necessary in order that plant growth does not experience competition between and between plants. And this can be obtained by providing organic fertilizer made from waste found in the local farmers' environment. Organic fertilizer can enhance the soil's chemical, biological, and physical characteristics. Nutrients can be obtained from organic fertilizer from fermented pig waste.

Most farmers use non-certified seeds (95%), including seeds set aside from previous plantings, either their own or those of other shallot farmers (Adiyoga, 2021). For the success of shallot cultivation, apart from the growing requirements and cultivation techniques, the variety used will influence the results. The Ministry of Agriculture has released the super superior variety Philip which is capable of producing yields of 17 tons/ha, with a shorter lifespan. The aims of the research are (1) to obtain a response to giving doses of organic fertilizer on the results of intercropping shallot varieties with chilies so that a combination of doses of organic fertilizer and shallot varieties between chilies is obtained. applying the right technology and other elements in integrated cultivation in a

sustainable production system, and (3) achieving stability and diversity of results that impact farmers' income.

## METHODOLOGY

The research was carried out in the rice fields of Selat Village, Abiansemal District, Badung Regency, starting from February – June 2024. The research method used a Factorial Randomized Block Design, consisting of two factors, namely the dose of organic fertilizer (D) consisting of 4 levels: $D_0$ = 0 ton.ha$^{-1}$; $D_1$ =0 ton.ha$^{-1}$; $D_2$ = 0 ton.ha$^{-1}$; $D_3$ = 0 ton.ha$^{-1}$ and the variety consists of 2 levels, namely, 2 levels, namely V1= Super Philip; V2= Rubber Bali. So we got 8 combination treatments repeated 3 times. The research implementation included land preparation, making 24 plots measuring 1.5 x 1.7 m with a mound height of 20 cm, distance between repetitions of 50 cm; planting is done in the afternoon, for shallot seeds, before planting, cut off the ends of 1/3 of the part, then plant them to a depth of 3 cm, which are planted in two rows, alternating between varieties with a planting distance of 15 x 15 cm between the chili plants; then covered with dirt and dusted with husks to protect it from rain and sunlight. Planting chilies involves a 50 x 35 cm spacing and a 10 cm depth. Depending on the dosage, an organic fertilizer treatment is applied one week prior to planting. Watering, replanting, weeding, and disease and pest control are all examples of maintenance. Chili plants are harvested in phases based on harvest criteria, and shallot plants are harvested after 60 days. Plant height, number of leaves, number of onion bulbs, number of chili fruit, fresh weight of the bulb, and fresh weight of the chili fruit were among the variables noted in shallot and chili plants. Diversity analysis was used to statistically analyze the data.

## RESEARCH RESULT

Table 1 displays the significance of organic fertilizer dose (D), variety (V), and their interaction (DxV) on the observed variables based on the statistical analysis of all observed variables.

**Table 1. Significance of Organic Fertilizer Dosage (D) and Variety (V) and Their Interaction (DxV) on all Observed Variables**

| No | Variable | Perlakuan | | |
|---|---|---|---|---|
| | | Organic Fertilizer Dosage (D) | Variety (V) | Interaction (DxV) |
| 1 | Maximum shallot plant height (cm) | ** | ** | ns |
| 2 | Maximum number of red onions (strands) | ** | ** | ns |
| 3 | Number of tubers per hill (tubers) | ** | ** | ns |
| 4 | Fresh weight of tubers per hill (g) | ** | ** | ns |
| 5 | Maximum chili plant height (cm) | ** | ns | ns |

| | | | | |
|---|---|---|---|---|
| 6 | Maximum number of chili leaves (strands) | ** | ns | ns |
| 7 | Number of chilies per plant (fruit) | ** | ns | ns |
| 8 | Fresh weight of chili fruit per plant (g) | ** | ns | ns |

Keterangan : ns = Not significant effect (P≥0,05)
* = Significant effect (P<0,05)
** = Verry Significant effect (P<0,01)

The interaction of organic fertilizer type and variety had no significant effect (P ⩾0.05) on all observed variables. The dose of organic fertilizer (D) had a very significant effect (P<0.01) on all observed variables. Variety had a very significant effect (P<0.01) on plant height, maximum number of shallot leaves, number of bulbs and fresh weight of shallot bulbs per cluster; and had no significant effect (P⩾0.05) on the growth and yield of other chili plants (Table 1). In the Organic Fertilizer Dosage (D) and Variety (V) treatments, the scallot plants' average maximum height (cm), maximum number of leaves (pieces), number of bulbs per cluster, and fresh weight of bulbs per cluster (Table 2)

Average maximum plant height (cm); maximum number of leaves (strands); number of harvested fruit and fresh weight of harvested chili plants in the Organic Fertilizer Dosage (D) and Variety (V) treatments (Table 3) Table 2 Average maximum plant height (cm); maximum number of leaves (pieces); number of bulbs per cluster and fresh weight of bulbs per cluster of shallot plants in the treatment of Organic Fertilizer Dosage (D) and Variety (V)

**Table 2 shows the number of bulbs per cluster, fresh weight of bulbs per cluster, maximum number of leaves (pieces), and average maximum plant height (cm) for shallot plants treated with organic fertilizer dosage (D) and variety (V).**

| Treatment | Maximum plant height (cm) | Maximum number of leaves (pieces) | Number of bulbs per cluster (fruit) | Fresh weight of bulbs per cluster (g) |
|---|---|---|---|---|
| Organic Fertilizer Dosage | | | | |
| $D_1$ ( 0 ton.ha$^{-1}$) | 41,5 d | 28,58 c | 5,92 b | 66,60 d |
| $D_2$ ( 10 ton.ha$^{-1}$) | 43,42 c | 32,33 b | 8,17 a | 75,18 c |
| $D_3$ ( 20 ton.ha$^{-1}$) | 44,92 b | 32,25 b | 8,67 a | 82,73 b |
| $D_4$ ( 30 ton.ha$^{-1}$) | 46,58 a | 40,58 a | 10,08 a | 90,13 a |
| BNT 5 % | 1,03 | 3,03 | 2,05 | 5,36 |
| Variety | | | | |

| | | | | |
|---|---|---|---|---|
| $V_1$(Super Philip) | 42,96 b | 44,92 a | 9,88 a | 69,02 b |
| $V_2$ (Bali Karet) | 45,25 a | 23,46 b | 6,54 b | 88,30 a |
| BNT 5 % | 0,73 | 2,14 | 1,45 | 3,79 |

**Table 3. Average Maximum Plant Height (Cm); Maximum Number of Leaves (Strands); Number of Harvested Fruit (Fruit) And Fresh Weight of Harvested Fruit (G) of Chili Plants in the Treatment of Organic Fertilizer Dosage (D) and Variety (V)**

| Treatment | Maximum plant height (cm) | Maximum number of leaves (strands) | Number of harvested fruit (fruit) | fresh weight of harvested fruit (g) |
|---|---|---|---|---|
| Organic Fertilizer Dosage | | | | |
| $D_1$ ( 0 ton.ha$^{-1}$) | 75,33 d | 136,50 c | 94,83 c | 210,33 c |
| $D_2$ ( 10 ton.ha$^{-1}$) | 81,00 c | 141,33 c | 110,17 b | 264,17 b |
| $D_3$ (20 ton.ha$^{-1}$) | 84,50 b | 165,33 b | 112,00 b | 297,83 a |
| $D_4$ ( 30 ton.ha$^{-1}$) | 90,17 a | 193,00 a | 126,33 a | 306,00 a |
| BNT 5 % | 2,16 | 18,18 | 2,83 | 23,95 |
| Variety | | | | |
| $V_1$ (Super Philip) | 82,17 a | 154,67 a | 109,92 a | 261,67 a |
| $V_2$ (Bali Karet) | 83,33 a | 163,42 a | 111,75 a | 277,50 a |
| BNT 5 % | - | - | - | - |

Note: The average value followed by the same letter in the same treatment and column is not significantly different at the 5% BNT test level.

## DISCUSSION

Organic fertilizer dosages have an impact on the outcomes of intercropping different types of cayenne pepper and shallot. Because a variety of plants can boost land efficiency and productivity when planted simultaneously in a single planting area, the intercropping system is a planting method that can support sustainable agriculture. Each plant's growth will benefit from the appropriate combination. Through interactions between various plant species, intercropping produces a complex agroecosystem. The competition that takes place demonstrates the efforts of plants to acquire the same resources and is not harmful. This supports the idea that intercropping can boost output per area per unit of time, according to Baharuddin et al. (2019) can lower the chance of crop failure, boost land use productivity, and make more time and resources available during a single planting season, all of which contribute to a single, valuable output. substantial economic worth. Apart from that, intercropping still provides an opportunity for farmers to get results if one of the types of plants planted fails [Rika Despita, et.al. 2020].

The increasing dose of organic fertilizer to 30 ton.ha-1 gives In comparison to the lowest dose, the fresh weight of chili fruit per plant and shallot bulbs per hill increased by 35.33% and 45.49%, respectively (Tables 2 and 3). Plant height, the number of leaves, the number of tubers per cluster, and the maximum number of fruits per plant attained at an organic fertilizer dose of 30 tons.ha-1 all support the high fresh weight of tubers per cluster and fresh weight of fruit per plant. This is due to the fact that organic fertilizers can bridge or mobilize nutrients in the soil to create ion particles that plants can readily absorb. In addition, organic fertilizer can release soil nutrients gradually and consistently, in order to help avoid an overabundance of nutrients that could poison plants; it can keep the soil moist, which lowers the strain or pressure that the soil structure puts on plants. By increasing soil porosity, organic fertilizers' capacity to bind water can enhance plant root growth and respiration. Additionally, rhizobium, mycorrhiza, and bacteria are among the beneficial soil microorganisms that organic fertilizer can promote [Guruh dan Riajeng, 2018]. The physical, chemical, and biological qualities of the soil will naturally improve or the productivity of agricultural land will rise as a result of increasing the amounts of organic matter and nutrient elements in the soil, which will ultimately boost plant growth and yieldsAccording to the study's findings [Yuliartini et al., 2022], applying 20 tons of organic kerambitan fertilizer per hectare, balanced with 200 kg of NPK fertilizer per hectare, produced the highest fresh weight of shallot bulbs per cluster and the highest fresh weight of red chilies per plant, which were 85 g and 202.56 g, respectively, increasing 20.28% and 26.59%. In contrast, the Kerambitan Agro fertilizer type produced the highest fresh weight of cayenne pepper and onion bulbs per hill, increasing by 10.93% and 10.64%, respectively, when compared to the rabbit manure type, according to research findings [Yuliartini et al., 2023].

The Bali Karet variety gave a higher fresh weight of shallots which increased by 27.93% compared to the Super Philip variety. The use of varieties is something that needs to be considered in shallot cultivation. Selection of superior varieties that are suitable for planting is one of the production factors so that the shallot yields obtained can be said to be good. This is because varieties have a very vital role in plant growth. The use of varieties will have the potential to increase plant productivity if varieties are planted that are suitable for environmental conditions [Chotimatul Azmi, et.al.,2022]. Applying 20 tons of organic kerambitan fertilizer per hectare, balanced with 200 kg of NPK fertilizer per hectare, produced the highest fresh weight of shallot bulbs per cluster and the highest fresh weight of red chilies per plant, which were 85 g and 202.56 g, respectively, increasing 20.28% and 26.59%, according to the study's findings [Yuliartini et al., 2022]. When compared to the rabbit manure type, however, the Kerambitan Agro fertilizer type yielded the highest fresh weight of cayenne pepper and onion bulbs per hill, increasing by 10.93% and 10.64%, respectively [Yuliartini et al., 2023]. High rainfall will cause excessive water availability so that it can inhibit the photosynthesis process which will later support optimal translocation of results to plant components, namely tubers. The characteristics of the Super Philip variety of shallots are that they are very suitable for planting

in the dry season rather than the rainy season. Fusarium wilt disease, which is particularly vulnerable to attack during the rainy season, is the cause of the low shallot yield [Attika Fadilanniza, 2022].

## CONCLUSIONS AND RECOMMENDATIONS

From the research it can be concluded:

1. For every variable that was observed, the relationship between organic fertilizer dosage and variety had no discernible impact ($P \geqslant 0.05$).
2. The organic fertilizer dosage has increased to 30 tons.ha-1, resulting in an increase of 35.33% and 45.49% in the fresh weight of shallot bulbs per hill and chilies per plant, respectively, in comparison to the dosage of 0 tons.ha-1.
3. The Bali Karet variety provides a higher fresh weight of shallots which increases by 27.93% compared to the Super Philip variety.

Recommendations from research results :

1. A dose of organic fertilizer will boost the yield of intercropping shallots and chilies.
2. To get higher shallot yields, it is recommended to plant the Bali Karet variety in the same environment as the research site

## ADVANCED RESEARCH

It is necessary to conduct additional research on various locations and technological inputs because differences in the growing environment and altitude greatly influence the varieties that must be cultivated. Apart from that, it is necessary to use a combination of plants or an intercropping system with more than two plants so that diversification can be increased and utilize waste in the planting area.

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