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Comparative Analysis of Production Results and Farming Costs of Tuber Shallots and True Shallot Seed (TSS) in the Off-Season of Sandy Coastal Land

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ABSTRACT

The decline in shallot production was caused by low seed quality in quantity and price. One of the government's efforts to overcome the problem of shallot productivity is by using True Shallot Seed (TSS) seeds. This research aimed to determine the comparison of production results and farming costs for tuber shallot and True Shallot Seed (TSS). This research was conducted in Parangtritis Village, Kapanewon Kretek, Bantul Regency. The research method used was comparative with a sample of 14 tuber shallot farmers and 33 TSS shallot farmers. The sample in this study was selected using a saturated sampling technique. The research results show that the average production of tuber shallot and TSS in the off-season on sandy coastal land is 475 kg/1000 m^2 and 398 kg/1000 m^2. A comparison of the production results of tuber shallot and TSS using SPSS shows Sig. (2-tailed) of 0.597 > 0.05, which means there is no significant (real) difference between the average production of tuber shallot and TSS. The cost of farming TSS shallots during the off-season on sandy coastal land is Rp. 7,106,500, while farming tuber shallot is Rp. 9,427,000. This shows that the costs of farming TSS shallots are cheaper than the costs of farming tuber shallots. Based on this research, it is necessary to increase the role of extension workers and the independence of farmers in developing tuber shallot and TSS shallot farming, which is more prospective to be cultivated in the off-season on sandy coastal land.

1. INTRODUCTION

1.1. Research Background

Agriculture plays an important role in a country because it can encourage the social, economic, and trade sectors in an area to improve people's welfare. The agricultural subsector includes food crops, horticulture, plantations, forestry, livestock, and fisheries. Horticultural crops such as fruit and vegetables are strategic commodities to be developed in Indonesia. This is because fruits and vegetables have a role in achieving the desired food pattern to fulfill quality and balanced nutrition for Indonesian people [1].

One of the leading national horticultural crops and quite prospective for cultivation by farmers is shallots. Shallots are a horticultural commodity that is very profitable for farmers, society, and the country (Figure 1).

The increase in people's need for shallots occurs due to population growth in Indonesia [2].

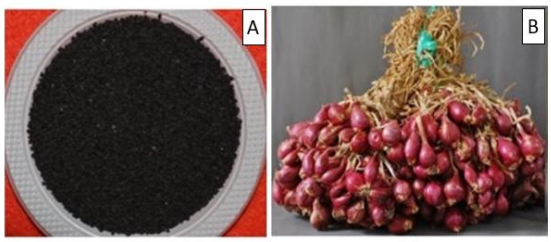

Fig. 1. Shallot Seed and Tuber Shallot

The highest producer of shallots in the Special Region of Yogyakarta Province in 2019 was Bantul Regency with

the production of 90,432 quintals [3]. One of the areas in Bantul Regency which has an area of shallot intensification is Kapanewon Kretek with an area of 881 ha and total production of 12,003 tons in 2023. Shallot productivity in Kapanewon Kretek will reach an average of 117 kw/ha in 2023 [4]. The largest shallot intensification area in the Kapanewon Kretek area is in the Parangtritis District, covering an area of 343 ha with total shallot production of 5,831 tons and the resulting productivity reaching 170 kw/ha in 2023 [4].

1.2. Literature Review

The total production of shallots in the Special Region of Yogyakarta Province in 2021 reached 29,809 tons and in 2022 the amount of production decreased so that the production obtained was 22,307 tons [5].

The decline in production was caused by the low quality of seeds in terms of quantity and price. Based on these indications, emphasis on increasing productivity must be made in developing sustainable shallot farming [6]. One of the government's efforts to overcome productivity problems, as well as meet increasing needs, is by using seeds from seeds or True Shallot Seed (TSS). Shallots from seeds (TSS) have several advantages, including the use of more economical seeds, only 3-7.5 kg/ha, costs incurred in cultivation are lower, have a longer shelf life, and can increase productivity. Another advantage of using TSS as seed is that it can produce better quality crops [7].

Cultivating shallots using TSS technology is well-known to many farmers. However, in reality, shallot farming from TSS has not been widely adopted by shallot farmers in Parangtritis Subdistrict, Kapanewon Kretek. Most farmers in this region still use tubers as seeds. According to the information obtained, only around 3% of the shallot intensification area in this region has implemented TSS shallot cultivation. TSS shallot farmers in the Parangtritis Subdistrict cultivate TSS shallots mostly in sandy areas and during the off-season.

1.3. Research Objective

This research aimed to determine the difference in production results from shallots from tubers and True Shallot Seed (TSS) and to determine the difference in income between shallot farming from tubers and shallot farming using True Shallot Seed (TSS).

2. MATERIALS AND METHODS

This research was carried out in March – July 2024 with the research location in Parangtritis Village, Kapanewon Kretek, Bantul Regency, Special Region of Yogyakarta. The method used in this research is the comparative research method. Comparative research is comparative research with the same variables but different samples. This research tends to use quantitative data. Comparative research in this study was used to find out whether there were differences in production results and farming costs for shallot tuber and TSS. The research location was determined using a purposive technique with certain considerations. The sampling technique used in this research was saturated samples. The number of respondents in this study was 47 shallot farmers in sandy coastal land, consisting of 14 tuber shallot farmers and 33 TSS shallot farmers.

The types of data in this research are primary data and secondary data. Primary data is data collected directly by researchers through observation, interviews, and questionnaires. Secondary data is data obtained from programs, BPS data, administrative groups, theses and journals, as well as all information related to research.

The data analysis technique in this research is by calculating the costs of farming shallot tuber and TSS. Farming income can be determined using the following formula:

$$TC = TVC + TFC$$

Information:
TC = Total costs of shallot farming (IDR/ha)
TVC = Total variable costs of shallot farming (IDR /ha)
TFC = Total fixed costs of shallot farming (IDR /ha)

A comparative test of tuber shallot farming and TSS was carried out to determine whether there was a significant difference in the production results of tuber shallots and TSS. The statistical technique used for sample groups that have differences in their calculated averages only consists of two groups, so the technique used is the Independent Sample T-Test technique. Comparative analysis of farming income in this study was calculated using the SPSS application. The statistical formula used is the polled variance t-test, which is as follows:

$$t = \frac{\bar{x}1 - \bar{x}2}{\sqrt{\frac{(n1-1)S1^2 + (n2-1)S2^2}{n1+n2-2}\left(\frac{1}{n1} + \frac{1}{n2}\right)}}$$

$$Db = n_1 + n_2 - 2$$

Information:
$\bar{x}1$ = Average value of variance in sample 1
$\bar{x}2$ = Average value of variance in sample 2
n1 = Number of sample members 1
n2 = Number of sample members 2
S1 = Sample variance 1
S2 = Sample variance 2

3. RESULTS AND DISCUSSION

3.1. Respondent Characteristics

The respondent farmers in this study are shallot farmers who cultivate shallots in the off-season on sandy coastal land. In this study, the characteristics of respondent farmers were seen from age, education level, farming experience, and land area. This is done because these characteristics are considered to influence farmers' motivation in managing their farming business.

Based on age, the respondents in this study were in the productive age category, namely in the range of 15 – 64 years. The age of the respondents in this study was mostly between 44 - 55 years. The highest level of education of respondents in this study was at the high school level. The characteristics of respondent farmers based on land area show that on average respondent farmers have a land area of 1000 m^2 to 1500 m^2.

Farming experience influences a farmer's skills in running his business. Experienced farmers are usually supported by sufficient education so that they become more skilled farmers in achieving better production results. On average, respondent farmers in this study have farming experience of approximately 6 – 20 years.

3.2. Production Inputs for Shallot Farming

Production input is a production factor that can determine the size of the production obtained. Knowledge regarding the relationship

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between production inputs such as land, labor, seeds, fertilizer, pesticides, and production (output) needs to be given to plants so that they are able to grow and produce good production [8].

Agricultural land is one of the factors of agricultural production. The average area of sandy coastal land used by farmers in Parangtritis District for cultivating tuber shallot and TSS during this year's off-season is 1000 m^2. The area of land used by each farmer is different so the results of shallot production obtained between farmers are also different.

Labor is an important factor in production because it can maximize productive efforts quantitatively and qualitatively. The most labor needed in shallot farming is during planting and harvesting. Based on the data obtained, planting tuber shallot in 1000 m^2 can be done by 4 people and harvesting can be done by at least 2 people with the same work time, namely 1 day. Meanwhile, planting TSS shallots in 1000 m^2 requires 10 workers, and for harvesting TSS shallots 2 people with the same work time, namely one day.

One of the determinants of success in farming is seeds. The quantity and quality of seeds used in farming influence the productivity and economic value of plants. The results of research carried out in Parangtritis District, TSS shallot farmers on sandy coastal land during this off-season only need around 3 kg/ha of TSS seeds with the variety used, namely Sanren. Meanwhile, shallot farmers who use tuber seeds need 1 ton/ha of tubers ready for planting.

Fertilizer is a production factor that can increase production results if applied optimally. Based on research, cultivating shallots in sandy coastal land requires quite a lot of manure. According to Ref. [9], the recommended basic fertilization for off-season shallots on sandy coastal land includes manure or compost. The dose of manure consists of cow dung (10 – 15 tonnes/ha) and SP-36 fertilizer (15-200 kg/ha). Meanwhile, the additional fertilizer given to plants aged 15 and 30 days is urea (100-150 kg/ha) + ZA (200-350 kg/ha) + KCL (150-200 kg/ha). However, from the results of research that has been carried out, the fertilizer given by farmers to TSS shallots is 1/3 – 1/2 less than the fertilizer required for cultivating tuber shallots.

Pesticides influence in maintaining an increase in the production results of a farming business. Pesticides contain addictive substances that plants need to eradicate pests and diseases that attack plants. The pesticides that are widely used by farmers in this region contain the active ingredients Deltamethrin, Beta Cyfluthrin, profenofos, Spinosad, and Quinalfos. Meanwhile, the planting medicine used by farmers in this region to treat fungal attacks contains Mancozeb, Ben Rail, Metalaksil, Propamokarb, Chlorothalonil, and Azoxystrobin. In this research, several botanical pesticides used by shallot farmers were also found, such as Pseudomonas, Fluorescens, Bacillus subtilis, PGPR, Trichoderma, and Beauveria bassiana.

3.3. Comparison of Shallot Production Results

Shallot production is the result of economic activity using several inputs. Production in shallot farming is obtained through a long and risky process, namely the cultivation process. According to Ref. [10], shallot production factors such as land area, seeds, fertilizer, pesticides, and labor greatly influence the production of tuber shallot and TSS. According to Ref. [11], TSS productivity is higher than seeds from tubers, namely 24-34 tonnes/ha for TSS and ± 17.1 tonnes/ha for tubers.

In this study, the average production yield of tuber shallot in sandy coastal fields in the off-season was 475 kg/1000 m^2 and was considered low. Meanwhile, TSS shallot production in the region during the off-season this year only reached 398 kg/1000 m^2. TSS shallot production in this study was very low because farmers did not understand the cultivation of TSS shallots and this was the first experience for most of the respondent farmers in this study. Apart from that, the weather factor is the main obstacle to cultivating shallots in the off-season because the photosynthesis process in shallot plants is disrupted by high-intensity rain so disease attacks become high and cause production to decrease [12]. Another obstacle to cultivating shallots in the off-season in sand fields is the low nutrient content in sand fields and high soil temperatures during the day and evening [13].

3.4. Analysis of Shallot Farming Costs

Farming costs are all costs incurred for farming which include variable costs and fixed costs. Variable costs are costs whose size is influenced by the volume of production consisting of seeds, fertilizer, pesticides and labor. Meanwhile, fixed costs are costs that are not influenced by changes in production, such as land costs, land rental, and equipment depreciation [14]. Farming costs in this research are calculated as the costs that farmers must incur per 1000 m^2 in one off-season planting season. The production costs that farmers must incur in farming TSS shallots and tuber in sandy coastal land during the off-season per 1000 m^2 are as follows:

Table 1. Costs of Shallot Farming

Description	TSS Cultivation	Tuber Cultivation
	Value (IDR)	Value (IDR)
Fixed Costs		
Irrigation Costs	50,000	50,000
Equipment	32,500	32,500
Depreciation costs		
Amount	82.500	82,500
Variable Costs		
Seed	1.000,000	4,000,000
Fertilizer	1,184,000	2,025,400
Pesticide	540,000	620,000
Labor	4,300,000	2,700,000
Amount	7,024,000	9,345,400
Total Cost	7,106,500	9,427,900

Table 1 also shows the fixed costs and variable costs that must be incurred in farming tuber shallot and TSS in the off-season with a land area of 1000 m^2. The fixed costs incurred by tuber shallot and TSS farmers in the Parangtritis Village area are irrigation costs and equipment depreciation. There is no difference between the fixed costs of shallot tuber and TSS farming, both in one planting season incur costs of IDR 82,500 for fixed costs. Variable costs incurred by tuber shallot farmers include the costs of seeds, fertilizer, pesticides, and labor. In contrast to fixed costs, the use of variable costs between tuber shallot farming and TSS has significant differences in the costs of seeds, fertilizer, and labor. The variable costs of tuber shallot farming are more expensive than the variable costs of TSS shallot farming. The variable costs that must be incurred by shallot tuber

farming are IDR 9,345,400 and for TSS shallot farming it is IDR 7,024.00.

Based on the data obtained from the fixed costs and variable costs previously incurred, the total expenditure on production costs for shallot tuber and TSS farming can be determined. The total cost of tuber shallot farming is IDR 9,427,900/1000 m^2/planting season, while the total cost of TSS shallot farming is IDR 7,106,500/1000 m^2/planting season. The data above can be concluded that the total cost of farming TSS shallots is lower than the total cost of farming tuber shallots.

3.5. Different Test Analysis of Shallot Production Results

In statistical tests using SPSS at a significant level of 5%, Sig. (2-tailed) is 0.597 > 0.05, so as is the basis for decision-making in the independent sample t-test, it can be concluded that H0 is accepted and Ha is rejected. Therefore, it can be concluded that there is no significant (real) difference between the average production of tuber shallot and TSS.

4. CONCLUSION

The average yield of tuber shallot and TSS in the off-season on the sandy coastal land of Parangtritis Village, Kapanewon Kretek, at the beginning of 2024 was 475 kg/1000 m² and 398 kg/1000 m², respectively. A statistical comparison using SPSS at a 5% significance level yielded a p-value of 0.597, which is greater than 0.05. This indicates that there is no statistically significant difference between the average production of tuber shallots and TSS. From an economic perspective, the cost of farming TSS shallots during the off-season was IDR 7,106,500, compared to IDR 9,427,000 for tuber shallots, highlighting that TSS farming is more cost-effective. The primary cost difference stems from the lower requirements for seeds, fertilizers, pesticides, and labor in TSS cultivation, particularly due to the reduced seed demand. This suggests that TSS shallot farming presents a more economical option in terms of input costs.

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