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PRODUCTIVITY AND INCOME PERFORMANCE COMPARISON OF SMALLHOLDER CORN PLANTATION AT DRY LAND AND WETLAND OF KEDIRI DISTRICT, EAST JAVA

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ABSTRACT

Corn is a sustainability crop commodity that has the potential to contribute to the growth and progress of the agricultural industry. The objective of this research is to examine the various factors that impact maize production on dry and wet soils, compare the relationship between maize yield and income on dry and wet lands, and assess the sustainability of maize in the Mekikis village of Purwoasri district. Descriptive and statistical analyzes (double regression analysis), enterprise feasibility analysis, and differential tests of averages (independent sample t-test) comprise the method of analysis in this study. Nonproportional stratified random sampling was utilized to obtain a sample size of 64 respondents, 32 of whom were wetland farmers and 32 of whom were dry land farmers. The attributes of the farmers who participated in the research encompassed gender, age, most recent educational attainment, primary occupation, family count, land area ownership, and land area. The results of the double linear regression analysis indicate that both the land area and labor force significantly impact maize production on moist soil. The impact of various factors such as land area, seeds, inorganic fertilisers, and pesticides on maize production in arid soil is substantial. The results of the independent sample t-test indicate a statistically significant difference between the yield and income of maize grown in moist and dry soils. specifically, the profit on maize is Rs. 1,624,218,099.94, while the yield on maize in dry soils is 1,899.87 per kilogramme. The usability analysis of maize indicates that the R/C ratio differs when the soil is moist versus when it is dry.

Keywords: corn farming, dry land, feasibility analiysis, wetland

INTRODUCTION

Indonesia possesses an extensive array of natural resources, which are both plentiful and very diverse. The agricultural sector is a critical and significant component of the national economy, constituting one of its sectors. The agricultural industry is a critical contributor to ensuring that people have access to sustenance. Furthermore, a significant proportion of the Indonesian population continues to be preoccupied with the agricultural industry. The provision of sustenance and employment for the Indonesian populace is a function of agribusiness within the national economy (Purwanto et al., 2015).

Corn is a food crop commodity that has the potential to contribute significantly to the growth and advancement of the agricultural sector. Corn plants in Indonesia rank second in terms of food commodities, following rice. They serve as a significant source of calories and can be used as a substitute for rice, as well as animal feed. The demand for maize is steadily rising due to the economic growth of the society and advancements in the animal feed industry. Therefore, it is necessary to enhance output by utilising human and natural resources, available land, and maximising yield potential through technological advancements. Indonesia, as the foremost maize producer in Southeast Asia, has a legitimate ambition to achieve self-sufficiency in maize production (Cristo et al., 2009).

Corn crops are an agricultural commodity that has the potential to be developed. Maintain corn as a second source of carbohydrate food after rice. Maize plants have extensive adaptation in subtropical or tropical teruma areas in Indonesia (Ilyas & Afandi, 2016). Maize commodities are multipurpose commodity, which have many derivatives when processed (Setiawan & Prajanti, 2011).

Table 1. Maize production in 5 districts in East Java based on BPS, 2018

District	Maize production (ton)
Kediri	373. 705
Nganjuk	239. 872
Jombang	283. 091
Blitar	355. 902
Tulungagung	338. 243

Source: Data BPS Produksi Jagung (2018)

According to the provided table, Kediri Regency has been identified as a promising region for cultivating maize and contributing to economic growth through increasing production, which amounts to 373,705 tonnes per year. Mekikis village is a prominent maize producer in Kediri Regency. Corn output in Kediri Regency experiences an annual growth. Researchers are interested in undertaking a comparative investigation of maize agricultural output and income in wetlands and drylands in Mekikis Village, Purwoasri District, Kediri Regency.

The research focuses on two types of land: wetland and dryland. Wetlands are cultivated areas where rice is grown and water is efficiently managed by irrigation. Meanwhile, dry land refers to rice fields or Tegal land that lacks irrigation. Therefore, the cultivation of this area necessitates the use of implements for the purpose of irrigation. Typically, this arid terrain relies on diesel fuel to facilitate the irrigation process. According to the given description, there is a requirement for study that examines the comparability of maize cultivation. Due to the absence of prior scholarly investigations, there is a dearth of information regarding farming practices in Mekikis Village. Hence, scientists did a study titled "Comparative Analysis of Corn Farming Production and Income on Wetlands and Dry Lands in Mekikis Village, Purwoasri District, Kediri Regency."

This study's objectives are to identify the determinants of maize farming income on wet and dry land in Mekikis Village, to compare the yields of maize farming on both types of land, and to identify the factors that influence maize farming production on wet and dry land in Mekikis Village. Determine a comparison between the viability of cultivating maize on moist and arid land in Mekikis Village.

METHOD

The study aimed to assess the disparity in maize farming productivity and revenue between wetland and dryland areas in Mekikis Village. The study employed a location survey methodology to gather information from respondents, specifically wetland and dryland maize farmers in Mekikis Village, Purwoasri District, Kediri Regency. The research design can be validated by establishing the timeframe, doing an analysis, and selecting the appropriate analytical approach.

The data utilised consists of both primary and secondary sources. Primary data refers to the data collected from firsthand observation and interviews conducted with maize farmers in Mekikis Village. The primary data collected included information on the respondents' age, education level, number of family dependents, land area, maize production, selling price of maize, and other relevant data for documentation purposes. The installation office provided secondary data pertaining to the village head's office. The research utilises secondary data comprising village demographic data, village geography data, and village maps.

The investigation was conducted between January and March 2021. The research sample was determined using the non-proportional stratified random sampling approach, which is also known as simple random sampling. Non-proportional stratified random sampling is a method employed when the population consists of members or elements that are homogeneous and equal in nature (Silitonga et al., 2018). Below is the demographic of maize cultivators residing in Mekikis Village:

Table 2. Number of Population and Sample of Farmers

Information	Total	Number of samples taken	Sample percentage (%)
Wetland Corn	72	32	44,44
Dryland Corn	108	32	29,62
Total	180	64	-

Source: Primary Data Processed, 2021

The subsequent equation represents the sampling formula for Non-proportional stratified random sampling.

$$n = \frac{N}{1 + Ne^2}$$

Information:
n = Sample Size
N = Total Population
1 = Constant
e^2 = The acceptable margin of error for sampling in this study was set at 10%.

Researchers selected a sample of 64 maize producers residing in drylands and wetlands in Mekikis Village, in accordance with this theory. The population numbers and sample sizes for each terrain stratum are provided in Table 2.

The research employs a data analysis approach that combines descriptive analysis, statistical analysis using the average difference test or independent sample t-test, and business feasibility analysis. This descriptive study is employed to elucidate the farmer's age, greatest degree of education, and number of family dependents. The independent sample t-test was employed to examine the contrast between the production and income of maize cultivation in wetland and dryland. Farming feasibility analysis is employed to assess the viability of operating a farming enterprise, with the business feasibility analysis in this study incorporating the R/C ratio.

1. T-test

This test is employed to ascertain the disparity in the mean of two distinct populations or data sets that are not related to each other (NuryadiI et al., 2017). The statistical test employed is the Independent sample t-test. The independent sample t-test is a statistical test that employs the hypothesis approach to analyse paired data. The comparative comparison of output and income use the Independent sample t-test formula in the following manner:

a. The data follows a normal distribution
b. The two sets of data are unrelated
c. The variables that are associated are discrete and fall into two categories

The comparative analysis of production and income use the paired sample t-test formula in the following manner:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\left[\frac{(n1-1)S_2^2 + (n2-1)S_1^2}{n1+n2-2}\right]\left[\frac{1}{n1} + \frac{1}{n2}\right]}}$$

Information:
$\bar{X}1$ = average variable 1
$\bar{X}2$ = average variable 2
S_1 = standard deviation of variable 1
S_2 = standard deviation of variable 2
n_1= Count of observations in variable 1
n_2= Count of observations in variable 2

The conditions for decision making are as follows:

a. If tcount > Ttable and the sig value. < 0.05, it can be said that there is a significant difference.
b. If tcount ≤ Ttable and the sig value. ≥ 0.05 then it can be said that there is no significant difference.

2. Farming Feasibility Analysis

Business feasibility analysis is a process employed to assess the likelihood of business failures in both the initial planning stages and ongoing operations of a business. A business is considered practical when its revenue or income surpasses its expenses or production costs. This study does a company analysis by employing the R/C Ratio calculation method (Sari, 2019).

$$R/C\ Ratio = \frac{TR}{TC}$$

Information:
TR = Total *Revenue*
TC = Total *Cost*

Criteria:
If R/C > 1 then corn farming is said to be profitable.
If R/C = 1 then corn farming is said to have no loss and no profit.
If R/C < 1 then corn farming is said to be unfit/incurring losses.

RESULTS AND DISCUSSION

The independent sample t-test is being conducted with a significance threshold (α) of 5%. There are disparities in the outcomes of the mean difference test. Table 2 demonstrates that the Tcount value (2.327) exceeds the Ttable value (1.67), and the significance level (0.023) is lower than the threshold of 0.05. This indicates that the null hypothesis (H0) is rejected, and the alternative hypothesis (H1) is accepted. In other words, there is a statistically significant difference between the production of maize in wetland and dryland areas.

Table 3. T-test Results for Corn Production on Wetlands and Dry Lands

No.	Corn Production	Average Production (Kg)	Production Difference (Kg)	t	Sig. (2-tailed)
1.	Wetlands	16.252.28	1.899.87	2.327	0.023
2.	Dry land	14.352.41			

Source: Primary Data Processed, 2021

The average yield of maize production in wetland areas is higher than in dryland areas, specifically at 16,252.28 kilogrammes per hectare. The mean dry land maize output is 14,352.41 kilogrammes, with a variance in maize production of 1,899.87 kilogrammes. This is impacted by distinct factors that impact maize productivity in wetlands and drylands. The key determinants of maize production in wetlands are the size of the field and the availability of labour. The key determinants of maize production on land are land area, seeds, inorganic fertilisers, and insecticides. The primary determinant of maize productivity is the accessibility of water, which includes both precipitation and irrigation sources. The primary impediments to dryland farming are inadequate precipitation and unpredictable rainy seasons. Nurwahidah (2014) states that maize cultivation on arid ground is highly reliant on precipitation during the rainy season. The inability to regulate water levels in plants can lead to hindered plant growth, particularly during the flowering stage. In addition, the insufficient water supply in arid areas does not meet the requirements of plants, resulting in suboptimal maize yield in dry land farming compared to wet land farming. This study aligns with Nurwahidah (2014) findings, which demonstrate that the productivity of paddy field (wet) corn cultivation surpasses that of dry land corn farming.

Table 4. Results of the T-test on Corn Farming Income from Wetland and Dry Land

No	Corn Income	Average Income (Rp)	Income Difference (Rp)	t	Sig. (2-tailed)
1.	Wetlands	Rp. 4.058.436.150,50	Rp. 1.625.218.099,94	6.664	0.000
2.	Dry land	Rp. 2.433.218.050,56			

Source: Primary Data Processed, 2021

The significance level for independent sample t-tests is 5%. Variations can be observed in the mean difference test outcomes. As shown in Table 3, the T value is greater than the critical T value (6.664 > 1.67), and the significance level is 0.000 0.05. This indicates that H1 is accepted and H0 is rejected; in other words, the income from wetland maize cultivation differs significantly. including dryland maize cultivation. An examination of the average income for maize produced on moist land reveals that it is IDR 4,058,436,150.50 greater than that on dry land. A difference of IDR 1,624,218,099.94 in maize income is associated with the average arid land maize income of IDR 2,433,218,050.56. This is due to the fact that the quantity of maize harvested from each field varies. Low income will also be a consequence of low productivity. The level of crop yield is influenced and determined in part by land area, seeds, and additional resources including fertiliser, water, climate light, and pesticides (Zen et al., 2017). According to Nurwahidah (2014) excessive humidity during land processing and fertilisation can result in significant infestations of pests and plant diseases. By optimising water usage and ensuring that plants receive ample sunlight, it is possible to enhance maize productivity, consequently leading to increased income.

In addition, the expenses accrued on terrestrial areas exceed those on aquatic areas. This is due to the fact that cultivating dry land necessitates regular maintenance and irrigation, typically 9-10 times during the planting process. Wetlands do not necessitate maintenance or water provision, as water irrigation is available to fulfil their water requirements at any given time. Processing costs are higher in dry land farming. This study aligns with Nurwahidah (2014) research, which asserts that the revenue generated from rice cultivation in wetland areas surpasses the revenue generated from maize cultivation in arid regions.

Table 5. Results of Feasibility Studies for Corn Farming on Wetlands and Dry Lands

No	Description	Value per Hectare	
		Wetland Farmers	Dry Land Farmers
1.	Average Income	Rp. 34.015.625	Rp. 31.429.688
2.	Average cost	Rp. 16.000.991,32	Rp. 17.565.379,86
3.	R/C ratio	2,12	1,78

Source: Primary Data Processed, 2021

According to table 4, the overall expenses for wet land are lower than those for dry land. Specifically, the average total cost for wet land is IDR 16,000,991.32, while the average total cost for dry land is Rp. 17,565,379.86, resulting in a difference of Rp. 1,564,388.54. This occurs due to the elevated production costs associated with dry land compared to wet land. Processing water irrigation on dry ground incurs supplementary expenses for utilising diesel engines, petrol, water hoses, and personnel responsible for operating the diesel equipment. Wetlands do not necessitate supplementary expenses for water irrigation treatment. According to Nursan (2016), the expense of cultivating maize on wet soil is less than on dry soil. Table 27 displays the R/C ratio values of respondents categorised as wetland farmers and dryland farmers. The R/C ratio, which represents the ratio of returns to costs, is higher for wetland farmers compared to dryland farmers, specifically at a value of 2.12. The ratio of rainfall to evapotranspiration on dry terrain is 1.78. These findings indicate that both wetland and dryland maize growing are economically viable, as the R/C ratio analysis reveals a value exceeding 1. The disparity in the R/C ratio arises from the contrasting output outcomes and total costs accrued in the two domains. This remark contradicts the findings ofNurwahidah (2014) research, which indicated that the R/C ratio for dry land is higher than that for wetland. Specifically, the R/C ratio for dry land was reported as 4.6, while the R/C ratio for wetland was 3.3.

CONCLUSIONS

The independent sample t-test results indicate a highly significant disparity in maize farming productivity between wetland and dryland areas, with wetland maize production averaging at 16,252.28/kg. The mean yield of maize on arid terrain is 14,352.41 kilogrammes per hectare, with a variation in production of 1,899.87 kilogrammes per hectare. The independent sample t-test results indicate a highly significant disparity in income between wetland and dryland maize cultivation. The average income for wetland maize is Rp. 4,058,436,150.50. The mean revenue generated from dry land maize is IDR 2,433,218,050.56, with a variance of IDR 1,624,218,099.94. There exists a disparity in the ratio of carbon to nitrogen between wetland and arid land. The ratio of carbon to nitrogen (R/C) on wet land is higher than in dry land, specifically 2.12, whereas the R/C ratio in dry ground is 1.78.

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