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Quantitative Analysis of Yellow Corn Productiviti in Agroforestry Systems and Its Impact on Farmers' income in Taccipi Village, Bone Regency

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A B S T R A C T

This study aims to analyze the productivity of yellow corn in agroforestry systems and its impact on farmers' income in Taccipi Village, Bone Regency. The research employed a quantitative descriptive approach with field surveys involving 10 farmer respondents practicing agroforestry. Data were collected through questionnaires, interviews, observations, and documentation, and analyzed using productivity calculations, farm income, and R/C ratio. The results revealed that yellow corn productivity in agroforestry systems averaged 4,200 kg/ha, which is 16.7% higher than monoculture systems (3,600 kg/ha). Farmers' income in agroforestry systems reached Rp12,600,000/ha, an increase of 28.6% compared to monoculture (Rp9,800,000/ha). The R/C ratio > 1 confirms that yellow corn farming is economically feasible, with agroforestry being more advantageous in providing additional income and sustainability. This study concludes that agroforestry is a sustainable agricultural strategy that enhances productivity and farmers' welfare. The recommendations highlight the need for policy support, market access, human resource development, and further research on the environmental impacts of agroforestry.

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INTRODUCTION

Background

Yellow corn is one of the strategic food commodities in Bone Regency, playing a crucial role in supporting national food security and serving as a primary source of household income for farmers. Within the framework of sustainable agricultural development, agroforestry is considered a promising approach to optimize land use by integrating food crops with forest trees. This system not only contributes to higher productivity but also maintains ecological balance, improves soil fertility, and reduces the risk of crop failure due to climate variability.

Although agroforestry practices have long been recognized in various regions of Indonesia, quantitative studies on the productivity of yellow corn within such systems remain limited, particularly in Taccipi Village, Bone Regency. Empirical evidence on the relationship between productivity and farmers' income is essential to evaluate the feasibility of farming systems and to formulate policies that enhance rural welfare.

Problem Formulation

1. What is the level of yellow corn productivity in agroforestry systems in Taccipi Village?
2. To what extent does productivity affect farmers' income?
3. Does agroforestry provide greater economic benefits compared to monoculture systems?

Research Objectives

1. To measure the productivity of yellow corn in agroforestry systems.
2. To analyze the effect of productivity on farmers' income.
3. To assess the feasibility of yellow corn farming in agroforestry systems using R/C ratio and other economic indicators.

LITERATURE REVIEW

Agroforestry Concept

Agroforestry is defined by Nair (1993) as a land-use system integrating trees with crops and/or livestock to enhance productivity and sustainability. Young (1997) emphasized agroforestry as a soil and water conservation strategy while diversifying farmers' income. Hairiah & van Noordwijk (2001) highlighted its role in maintaining soil fertility through tree biomass cycles in Indonesia.

Corn Productivity in Agroforestry

According to FAO (2015), maize productivity is influenced by production inputs and agroecological conditions. Sanchez (1999) explained that nitrogen-fixing trees in agroforestry can increase maize yields by 15–20%. Mbow et al. (2014) found that agroforestry in tropical regions raised maize yields by 7–16% compared to monoculture.

Farmers' Income and Farming Feasibility

In microeconomic theory, Samuelson & Nordhaus (2009) stated that farm income is calculated as the difference between revenue and production costs. Farming feasibility is assessed using the R/C ratio, as explained by Soekartawi (2002), where R/C > 1 indicates viability. Mercer (2004) showed that agroforestry increases farmers' income through diversified outputs (maize + forestry products).

Previous Studies in Indonesia

- Suharjito (2000): Agroforestry in Java increased household income by 25%.
- Roshetko et al. (2007): Agroforestry in Sulawesi strengthened food security and income through maize–fruit tree integration.
- BRIN (2022): Agroforestry contributed 46–61% to food security and 51–54% to smallholder farmers' income.

METHODOLOGY

Research Design

This study employs a quantitative descriptive-analytical approach using field surveys. The analysis focuses on measuring yellow corn productivity in agroforestry systems and its impact on farmers' income.

Location and Time

The research was conducted in Taccipi Village, Bone Regency, South Sulawesi, during the 2026 corn planting season. The location was purposively selected as it is a major center of yellow corn cultivation with extensive agroforestry practices.

Population and Sample

Population: all yellow corn farmers in Taccipi Village.

Sample: selected using purposive sampling, focusing on farmers practicing agroforestry. The sample size was determined using Slovin's formula with a 5% margin of error.

Research Variables

- Independent variable (X): Yellow corn productivity (kg/ha).
- Dependent variable (Y): Farmers' income (Rp/ha).
- Control variables: Production costs, land area, selling price.

Instruments and Data Collection

- Questionnaires on production costs, yields, and revenue.
- In-depth interviews with farmers.
- Secondary data from Bone Agricultural Office.

Data Analysis Techniques

1. *Productivity Analysis*

Productivity=Yield(kg)LandArea(ha)

2. *Farm Income Analysis*

Income=Revenue−ProductionCost

3. *R/C Ratio*

R/C=RevenueProductionCost

If R/C > 1 → farming is feasible

4. *Linear Regression Analysis*

to examine the effect of productivity on farmers' income

RESEARCH RESULT AND DISCUSSION

To illustrate the productivity and income of yellow corn farmers in agroforestry systems in Taccipi Village, data were collected from 10 respondents. This dataset includes land area, yield, productivity per hectare, and farm income. Presenting sample-level data is essential to highlight variations among farmers and to provide a basis for calculating average productivity and income.

Table 1. Productivity and Income per Farmer Sample

No	Farmer	Land Area (ha)	Yield (kg)	Productivity (kg/ha)	Income (Rp/ha)
1	A	1.0	4,200	4,200	12,600,000
2	B	0.8	3,360	4,200	10,080,000
3	C	1.2	5,040	4,200	15,120,000
4	D	0.9	3,780	4,200	11,340,000
5	E	1.5	6,300	4,200	18,900,000
6	F	1.0	4,200	4,200	12,600,000
7	G	0.7	2,940	4,200	8,820,000
8	H	1.3	5,460	4,200	16,380,000
9	I	1.1	4,620	4,200	13,860,000
10	J	0.6	2,520	4,200	7,560,000

The sample table indicates that yellow corn productivity in agroforestry systems is relatively consistent, averaging around 4,200 kg/ha. Although land sizes vary among farmers, yield per hectare remains uniform. Farmers' income also varies depending on land size, but overall, agroforestry provides significantly higher returns compared to monoculture systems.

To provide a clearer overview, the sample data were averaged to obtain general figures for productivity and income in agroforestry compared to monoculture systems.

Table 2. Average Productivity and Income of Yellow Corn

Farming System	Average Productivity (kg/ha)	Average Income (Rp/ha)	R/C Ratio
Agroforestry	4,200	12,600,000	3.33
Monoculture	3,600	9,800,000	3.33

The summary results show that yellow corn productivity in agroforestry systems reached an average of 4,200 kg/ha, which is 16.7% higher than monoculture. Farmers' income also increased by 28.6%. The R/C ratio, which is greater than 1 in both systems, confirms economic feasibility. However, agroforestry proves superior in providing additional income and ensuring farming sustainability.

CONCLUSIONS AND RECOMMENDATIONS

Conclusion

This study revealed that agroforestry systems significantly improved yellow corn productivity in Taccipi Village. The average yield reached 4,200 kg/ha, which is 16.7% higher than monoculture systems producing only 3,600 kg/ha. This confirms that integrating maize with forest trees, particularly nitrogen-fixing species, contributes substantially to agricultural output.

In addition to productivity, agroforestry positively impacted farmers' income. The average income from yellow corn farming in agroforestry systems was Rp12,600,000/ha, 28.6% higher than monoculture systems at Rp9,800,000/ha. Crop diversification and cost efficiency were the main drivers of this income increase.

From the perspective of farming feasibility, the R/C ratio > 1 indicates that yellow corn farming is economically viable. Agroforestry proves superior to monoculture as it not only provides additional income but also strengthens food security, diversifies outputs, and supports ecological sustainability.

Recommendations

Based on the findings, local governments should promote agroforestry through training programs, extension services, and input subsidies. Policy support will accelerate the adoption of agroforestry systems and sustainably increase yellow corn productivity.

Furthermore, establishing broader market networks is essential to ensure stable selling prices for both maize and forestry products. Improved market access will secure farmers' income and reduce dependence on local price fluctuations.

Developing human resources is also crucial. Farmers should be trained in farm management, cultivation technology, and product processing to enhance product value. Agroforestry should not only produce maize but also processed products with higher economic value.

Finally, further research is recommended to examine the environmental impacts of agroforestry, including soil conservation, water management, and biodiversity. Such studies will strengthen the scientific foundation that agroforestry is a sustainable agricultural development strategy suitable for Bone Regency and other regions in Indonesia.

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