

Analysis of Corn Farming and Its Contribution to Family Income in Palipi Village, Palipi District, Samosir Regency

Maryanti Sitohang*¹, Cyprianus PH Saragi², Mariani Nainggolan³

^{1,2,3}Study of Agribusiness Program, Faculty of Agriculture, Catholic University of Saint Thomas, Medan 20123, Indonesia

Article Info

ABSTRACT

Keywords:

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This study aims to (1) determine the amount of production spent by farmers to manage corn farming per hectare/planting season in Palipi Village, Palipi District, Samosir Regency, (2) determine the amount of net income obtained from corn farming per hectare/planting season in Palipi Village, Palipi District, Samosir Regency, and (3) determine the contribution of net income from corn farming to family income. The research area was determined using purposive sampling. The research data is primary data with a sample size of 34 determined using the accidental sampling method. The results show that the average production cost is Rp. 14,216,693.63/ha/planting season, the average net income is Rp. 7,383,306.37/ha/planting season, and the contribution of corn farmer income to total family income in the research area is 70.80%. This contribution of corn farming income is considered high (>50%).

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Corresponding Author:

Maryanti Sitohang

Catholic University of St. Thomas

E-mail: ryotrg9@gmail.com

INTRODUCTION

Corn is a strategic commodity with relatively broad or multifunctional uses (4F): food, feed, fuel, and industrial raw materials (fiber) (Panikkai et al., 2017). Indonesia's corn needs include corn for direct consumption, feed, seed, and non-feed ingredients. Based on agricultural and data center data (2018 and 2019), the largest share of corn demand comes from animal feed and the independent animal feed industry (feed demand), at 66.27%. The smallest share of corn is used for seed, at 0.55%. The use of corn as animal feed is quite high, exceeding the need for corn for direct consumption and as a non-feed ingredient. This is due to the growing development of broiler poultry farming in Indonesia (Pusdatin 2020). According to Panikkai et al. (2017), corn is a major component, accounting for approximately 60% of animal feed rations, particularly poultry. North Sumatra is one of the provinces that produces corn. The development of harvested area, production and productivity of corn in North Sumatra Province 2018-2022 can be seen in Table 1.

Table 1.Harvested Area, Production and Productivity of Corn in North Sumatra

Year	Harvested Area (Ha)	Harvested Area (Ton)	Productivity (Ton/Ha)
2018	295,849	1,710,784	5.78
2019	319,507	1,960,424	6.13
2020	321,184	1,965,444	6.11
2021	273,703	1,724,398	6.30

2022	289,238	1,806,544	6.24
Total	1,499,481	9,167,594	30.56
Average	299,896	1,835,996	6.11

Table 1 shows that the harvested area of corn farming fluctuates annually, while corn production and productivity in North Sumatra remain relatively constant from year to year, with the exception of lower productivity in 2018. Samosir Regency is one of the regencies in North Sumatra Province that produces corn. The harvested area, production, and productivity of corn in Samosir Regency are presented in Table 2 below:

Table 2.Harvested Area, Production and Productivity of Corn in Samosir Regency 2018 – 2022

Year	Harvested Area (Ha)	Production (Ton)	Productivity (Ton/Ha)
2018	3,237.40	17,412.48	5.37
2019	8,683.90	47,850.70	5.51
2020	5,706	30,815	5.40
2021	4,868	27,260	5.59
2022	9,389	51,783	5.51
Total	31,884.3	175,121.18	27.38
Average	6,376.86	35024,236	5.47

Source: Central Statistics Agency of Samosir Regency, 2022

Table 2 shows that the harvested area of corn in Samosir Regency fluctuated from 2018 to 2022, and data on corn production and productivity also fluctuated. One government program to increase corn production and productivity, including in Samosir Regency, is the Integrated Crop Processing Field School (SL-PTT) corn program. This program provides facilities/support for the provision of hybrid corn seeds over 300 hectares. Through this program, farmers will be able to increase productivity, yield, income, and welfare. The SL-PTT corn program aims to increase hybrid corn productivity by approximately 2.0-3.0 tons/hectare in SL-PTT areas to support national corn production (Sidabutar et al., 2014).

Palipi District is one of the corn production centers in Samosir Regency. The harvested area, production, and productivity of corn in Palipi District in 2018 were 7,125 hectares, yielding 17,543 tons, and yielding 2.46 tons/ha (BPS, 2019). This increased in 2022 to 597.9 hectares, yielding 3,240.6 tons, and productivity reaching 5.41 tons/ha (BPS, 2023).

The productivity of corn, cultivated by the community as their primary crop, remains far from optimal productivity. In 2022, corn productivity, particularly in Palipi District, reached 5.41 tons/ha, while the national corn productivity standard is 10.68–13.70 tons/ha. Corn productivity in Samosir Regency is lower than the national average (Coordinating Ministry for Agriculture, 2022).

Palipi Village is one of the villages in Palipi District, Samosir Regency, that contributes significantly to corn production. Palipi Village had a population of 150 families growing Pioneer 32 corn during the first planting season, September–December 2024, with a narrow

plot of land measuring 0.2 hectares and a wide plot of land measuring 1.6 hectares. The hybrid corn variety grown in Palipi Village is Pioneer 32. The majority of Palipi Village residents earn their living from the agricultural sector, specifically corn farming. In addition to corn farming, farmers in Palipi Village also engage in several other agricultural activities, including shallots, farm labor, and trading.

Corn farmers in Palipi Village complained that the difficulty in obtaining fertilizer resulted in delayed fertilization, or even no fertilizer at all, resulting in decreased corn yields. The decline in corn production is influenced by several production factors, such as land area, labor, seeds, fertilizers, pesticides, and others. Increased corn production is expected to increase farmer incomes, but farmer production varies due to several factors, including land quality, cultivation techniques, seed varieties, fertilizer use, pesticide use, climate, and capital. Income differences will impact the welfare of each farming family. Declining corn production can be due to suboptimal use of production factors (inputs) by farmers. Mubyarto (1989) stated that the problem faced in farming generally is how to appropriately allocate limited resources or production factors to maximize income. The primary activity and primary source of income for communities, particularly those in rural areas, still depends on the agricultural sector. This means that the livelihood of most households depends on this sector.

Family income is any form of remuneration received as compensation or reward for a person's contribution to the production process. Family income can come from self-employment, employment, or assets. Family income can be received in the form of money (pensions, donations or gifts, loans or debt), or in the form of goods (rice allowances, produce from one's own rice fields or yards), or facilities (official housing, free medical treatment). The size of a family's income will influence the size of a family's expenditure, because the larger the family's income, the larger the amount of expenditure, conversely, the smaller the family's expenditure, the smaller the expenditure (Gilarso, 2001).

Palipi Village, located in Palipi District, Samosir Regency, has significant potential in the agricultural sector, particularly corn farming. Corn is an important commodity that can improve the welfare of village communities. However, the contribution of corn farming to family income has not been studied in depth. This study aims to analyze the contribution of corn farming to family income in Palipi Village. Based on this background, the researcher was interested in conducting a study entitled "Analysis of Corn Farming and Its Contribution to Family Income in Palipi Village, Palipi District, Samosir Regency."

RESEARCH METHOD

This research was conducted in Palipi Village, Palipi District, Samosir Regency. The research area was selected purposively. Based on a pre-survey, and information obtained from the Head of the Agricultural Extension Center, the number of households farming corn was 150 farmers. According to Arikunto (2012) if the population is less than 100 people, then the sample size is taken as a whole, but if the population is greater than 100 people, then 10-15% or 20-25% can be taken. The method for determining the sample size used is the Slovin method:

$$n = \frac{N}{1+n(e)^2}$$

$$n = \frac{150}{1+150(0,15)^2}$$

$$n = \frac{150}{1+150(0,0225)}$$

$$n = = 34, 28 = 34 \text{ Farmer} \frac{150}{1+3,375}$$

Where:

n = Sample Size

N = Population

e = Tolerance Limit (error tolerance) 15% (0.15)

So the sample size in this study is 34 farmers.

Data obtained from direct field observations through interviews with corn farmers using a questionnaire. After the data from the questionnaire was collected, tabulation was performed. According to the research objectives, the following calculations were used:

1. To calculate total production costs, use the following formula:

$$TC = TFC + TVC$$

Where :

TC = Total Cost

TFC = Total Fixed Cost

TVC = Total Variable Cost

2. To calculate net income use the following formula:

$$TR = P \times Q$$

$$TC = TFC + TVC$$

$$Net\ Income = TR - TC$$

Where :

TR = Total Revenue (Total Income)

TC = Total Cost

TFC = Total Fixed Cost

TVC = Total Variable Cost

P = Price (Price)

Q = Quantity (Production Quantity)

3. To calculate the net income contribution of corn, use the following formula:

$$Pa = x \ 100\% \frac{Pw}{Pd}$$

Where :

Pa = Family income contribution

Pw = Respondent's income from corn farming

Pd = Total family income.

RESULTS AND DISCUSSION

Corn Farming Production Costs

Corn farming production costs are the costs incurred by farmers in managing their corn farms for one planting season. Production costs in the research area consist of variable costs, namely production inputs and labor, and fixed costs, such as equipment depreciation and land rent.

Production Facilities

Several production facilities are used to manage their farms. The use of production facilities in corn farming in Palipi Village, Palipi District, Samosir Regency for one planting season can be seen in Table 9.

Table 3. Average Use of Production Facilities for Corn Farming in Planting Season I (September-December) 2024

No	Description	Number of Production Facilities		Number of Production Facilities
		Per Farmer	Per Hectare	
1.	Seeds (Kg)	10	15	
2.	Fertilizer (Kg)			
	• Urea	190.59	300	
	• Phonska	190.59	300	
	• SP36	158.82	250	
3.	Herbicide (Ltr)			
	• Roundup	1.03	1.6	
	• Calaris	0.96	1.5	

Source: Processed primary data

From the data in Table 3, it can be seen that the production inputs used by farmers in the study area are seeds, fertilizers, and herbicides. The use of these inputs is described as follows:

a. Seeds

Seeds are the result of the plant propagation process that is ready for planting, which can come from generative propagation (seeds) or vegetative propagation (grafting, budding, cuttings). Typically, seeds prepared for planting have undergone optimal growth. In Palipi Village, farmers use 15 kg/ha of hybrid corn seed of the Pioneer 32 variety at a price of IDR 130,000/kg. Compared to the national corn seed recommendation of 15-20 kg/ha (Ministry of Agriculture, 2022), seed use in Palipi Village is in accordance with existing recommendations.

Compared with Gilbert's (2021) research in Bayu Bagasan Village, Tanah Jawa District, Simalungun Regency, farmers in the area use Pioneer 32 variety seeds for corn farming, with a usage rate of 20.24 kg/ha and a price of IDR 104,000/kg. Selecting quality seeds and using them appropriately are essential requirements for farmers to produce quality corn. Comparatively, corn seed use in Bayu Bagasan Village is higher than that in Palipi Village and the national average.

b. Fertilizer

Fertilizer is a substance added to the growing medium or plants to meet their nutrient needs, enabling optimal plant production. Farmers apply nutrients, either organically or chemically, to increase the nutrient content of the land and plants, resulting in improved yields. Farmers in Palipi Village use three types of fertilizer for corn cultivation: urea (300 kg/ha) at IDR 4,000/kg, phonska (300 kg/ha) at IDR 6,000/kg, and SP-36 (250 kg/ha) also at IDR 6,000/kg. Compared to the national recommended fertilizer usage of urea, which ranges from 250-300 kg/ha, phonska 300-350 kg/ha, and SP-36 250-300 kg/ha (Ministry of Agriculture, 2022), the fertilizer dosages used in Palipi Village are in line with the recommendations. Compared to the research results of Gilbert (2021), the amount of urea fertilizer used was 400 kg/ha at a price of IDR 3,000/kg; Phonska fertilizer was used at 351 kg/ha at a price of IDR 3,600/kg; and SP-36 fertilizer was used at 55 kg/ha at a price of IDR 2,800/kg. The research results above indicate differences in fertilizer use for corn farming. This is because each farmer has a different approach to increasing and accelerating crop yields. Compared to national fertilizer use and fertilizer use in Palipi Village, fertilizer use in the study area by Gilbert (2021) was higher.

c. Herbicides

There are various types of herbicides used for corn, and each region typically has its own unique preferences for selecting and using them. In Palipi Village, farmers chose two types of herbicide: Roundup at 1.6 liters/ha at a price of IDR 170,000/liter, and 1.5 liters of Calaris per hectare at a price of IDR 100,000/liter. Compared to the national recommendation for Roundup herbicide use, which recommends 1.5-2 liters per hectare and the same dosage of Calaris per hectare (Ministry of Agriculture, 2022), the herbicide dosages used in Palipi Village are in accordance with these recommendations.

According to Gilbert's research (2021), farmers used Roundup herbicide at a dosage of 2.88 liters per hectare at a price of Rp. 70,000 per liter. Meanwhile, Gromoxone was used at a dosage of 0.97 liters per ha at a price of Rp. 55,000 per liter. The results showed that although farmers used the same Roundup, they applied different dosages, reflecting the different methods employed in pest control in corn crops. In this context, the use of Roundup herbicide in the area studied by Gilbert (2021) apparently exceeded the recommended national dose, which is between 1.5 and 2 l/ha.

Table 4. Average Cost of Corn Farming Production Facilities for Planting Season I (September-December) 2024

No	Description	Production Facility Costs (Rp)	
		Per Farmer	Per Hectare
1.	Seeds (Kg)	1,238,823.53	1,950,000
Total		1,238,823.53	1,950,000
2.	Fertilizer (Kg)		
	• Urea	762,352.94	1,200,000
	• Phonska	1,143,529.41	1,800,000
	• SP-36	952,941.18	1,500,000
Total		2,858,823.53	4,500,000
3.	Herbicide		
	• Roundup	218,000	340,000
	• Calaris	96,176.47	150,000
Total		314,176.47	490,000

Source: Processed primary data

The data in Table 4 shows that the cost of production inputs per hectare per planting season in Palipi Village varies significantly. For fertilizer purchases, the highest costs are for Phonska and SP-36, at IDR 1,800,000 and IDR 1,500,000, respectively. Meanwhile, the lowest cost is for Urea fertilizer, at IDR 1,200,000. In the herbicide category, the highest price is for Roundup, reaching IDR 340,000, while the lowest price is for Calaris, at IDR 150,000. Therefore, it can be concluded that the highest average cost of production inputs is for fertilizer purchases, driven by high prices due to difficulties in obtaining fertilizer.

This is in comparison to research by Gilbert (2021), which states that the cost of seed production inputs is IDR 1,906,000/ha/MT. The cost of urea fertilizer production inputs was IDR 1,198,363.63/ha/MT, Phonska fertilizer IDR 1,266,218.18/ha/MT, and SP-36 IDR 144,929.69/ha/MT. Based on these research results, the cost of production inputs in the study area was higher due to the higher prices and use of these inputs compared to Gilbert's (2021) study.

Total Costs

Total production costs are all costs incurred for corn farming activities, such as the purchase of

seeds, fertilizers, pesticides, and labor, equipment depreciation, land rental, and other variable costs such as sacks and plastic rope used for harvesting. An increase in any one production cost will increase the total fixed costs and variable costs. A breakdown of the total corn farming production costs incurred by farmers for one planting season can be seen in Table 5 below:

Table 5.Total Costs for Corn Farming in the First Planting Season (September-December) 2024

No	Description	Total Average Cost (Rp)	
		Per Farmer	Per Hectare
1.	Seed	1,238,823.53	1,950,000
2.	Fertilizer	2,858,823.53	4,500,000
3.	Herbicide	314,176.47	493,602.94
4.	Labor	4,332,988.24	6,834,417.37
5.	Depreciation of equipment	83,047.06	142,496.85
6.	Sack cost	127,058.82	200,000
7.	Plastic rope cost	19,058.82	30,000
8.	Land lease	48,088.24	66,176.47
Total		9,022,064.71	14,216,693.63

Source: Processed primary data

The data in Table 5 shows that the total cost per hectare per planting season for corn farming in the study area was the highest for labor costs, and the lowest for plastic rope. Therefore, the total cost of corn in Palipi Village was IDR 14,216,693.63/ha/MT. This compares with the results of Gilbert's (2021) study, which found that the total cost incurred by farmers for corn farming was IDR 12,356,731/ha/MT. Based on these results, it was concluded that the total cost of production inputs in Palipi Village was higher due to the higher prices of seeds, fertilizers, and herbicides, and the greater use of non-family labor compared to Gilbert's (2021) study.

Net Income from Corn Farming

Net income from corn farming is the difference between revenue and production costs. Net income from corn farming provides an overview of the profitability of farming activities and is one of the determinants of a farmer's success.

Revenue is the product of production times the selling price. The amount of farmer income is influenced by the amount of production and the price. The higher the production volume at the prevailing price, the higher the farmer's income, and vice versa. Farmer income is highly dependent on the market price of corn. If the selling price of corn is relatively high, farmers will also receive relatively high income. Conversely, if the selling price of corn is low, farmers will also receive low income. This will impact farm income. The average net income of corn farming can be seen in Table 14 below:

Table 6.Net Income from Corn Farming in Planting Season I (September-December) 2024

No	Description	Net Income (Rp)	
		Per Farmer	Per Hectare
1.	Production (Kg)	3,811.76	6,000
2.	Price (Rp)	3,600	7,080
3.	Revenue (Rp)	13,722,352.94	21,600,000
4.	Production costs (Rp)	9,022,064.71	14,216,693.63
5.	Net income (Rp)	4,700,288.24	7,383,306.37

Source: Processed primary data

Table 6 shows that the net income from corn farming reached IDR 7,384,306.37 per hectare per planting season. This compares with research conducted by Gilbert (2021), where production was recorded at 4,373 kg per hectare with a selling price of IDR 4,269, resulting in total revenue of IDR 18,668,690 per hectare per planting season. Total production costs were IDR 12,356,731 per hectare per planting season, resulting in a net income of IDR 6,311,959 per hectare per planting season. The results of this study indicate that corn farming income in the study area is higher, due to differences in production volume and selling price compared to the data obtained by Gilbert (2021).

Corn Farming Contribution

The contribution referred to in this study is the contribution of income from corn farming to the income of corn farming families. In addition to corn farming, farmers in Palipi Village also earn income from other agricultural and non-agricultural activities, such as farm labor, trading, and private/civil servant employment. The contribution of corn farming income to total family income can be seen in Table 7.

Table 7. Contribution of Corn Farming to Total Family Income in Planting Season I (4 months)

No	Description	Income (Rp/4 months)	Contribution (%)
1.	Corn Farming	4,701,170.59	70.80%
2.	Red Onion Farming	1,296,786.03	18.72%
3.	Non-Farming	636,470.59	10.48%
	Total	6,634,427.21	100.00

The data in Table 7 shows that the contribution of corn farming to total family income per hectare per planting season is relatively high, at 70.80% (>50%) of total family income, and corn farming is the primary source of income among several sources.

Conclusion

From the results of the study on the Analysis of Corn Farming and Its Contribution to Farmer Family Income in Palipi Village, Palipi District, Samosir Regency, it can be concluded that the average production cost of corn farming in the study area is IDR 14,216,693.63/ha/planting season, the average net income of corn farming in the study area is IDR 7,383,306.37/ha/planting season, and the contribution of corn farmers' income to total family income in the study area is 70.80% per hectare. This means that corn farming income contributes to total family income in the study area at a high level (>50%).

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