ANALYSIS OF RED CHILLI AND COR INTERCROPPING FARMING BUSINESS WITH ESTIMATED LAND USE RATIO IN PANJI PORSEA VILLAGE, SITINJO DISTRICT, DAIRI DISTRICT

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Abstract

This research aims to analyze how farming works, the effectiveness of utilization and aspects of red and corn production intercropping red chilies and corn with production functions in Panji Porsea Village, Sitinjo District, Dairi Regency. This research was carried out in November 2022. The form of this research was a quantitative method. The population in this study were 50 farmers using corn monoculture, chili monoculture and intercropping red chili with corn. To obtain appropriate research results, the sample used was purposive sampling taken from each village, the data analysis technique used was cost and revenue analysis and Land Use Ratio Analysis.intercropping chili corn.The effectiveness of intercropping land use for red chilies and corn is running very well, because the intercropping system at the time of planting is very suitable and very feasible to implement, able to increase the income of both chili and corn farmers. The production aspect of red chilies and corn after using the intercropping method appears to increase when compared to monoculture because by saving land you can produce 2 different productions.

Keywords :***Chili, corn, intercropping and land use***

1.INTRODUCTION

Sustainable agriculture has an influence on national food security because farming is a farmer's livelihood which has an impact on their economy. Kadarsan (Lubis, 2018) explains that farming is a place where a person or group of people tries to manage elements of production such as nature, labor, capital and skills with the aim of producing something in the agricultural field. The need for food in Indonesia continues to increase along with the increasing population so that the government and farmers need to think of ways to increase food crop production, namely by implementing an intercropping pattern.(Sardianti, 2020). Intercropping cropping patterns can be cultivated in various ecosystems such as dry land, paddy fields, and yards. Compared to the monoculture pattern, the intercropping pattern has many advantages, including improving soil quality, varying crop yields thereby reducing the risk of crop failure, and increasing productivity per unit area. Along with efforts to increase agricultural production, there is an inhibiting factor, namely the decreasing agricultural area (Pangaribuan, et al, 2020). Changing land functions into residential areas is the cause of a lack of agricultural land, therefore appropriate action is needed so that agricultural production can still be increased by land efficiency techniques or agricultural land efficiency (Budiyanto, 2014)

One area that has taken advantage of land efficiency is Panji Porsea Village, Sitinjo District, Dairi Regency. This area itself consists of a very wide expanse of dry land and is very suitable for planting corn and chili plants, so that the mindset of farmers always tends to be oriented towards cultivating these two plants. The tendency of farmers to cultivate both crops is that planting simultaneously provides an advantage compared to planting only one type of crop. Corn plants can be protective for chili plants. This is also supported by village residents who are partners and are daily workers for the land owner. The owner has land measuring 12 m x 20 m which is still empty

and has not been managed. Intercropping is often found in rain-fed rice fields, lowland and upland moor. Intercropping in the lowlands usually consists of various kinds of palawija or a combination of rice and secondary crops, while in the highlands it usually consists of various kinds of horticultural crops (vegetables). Intercropping is an agricultural cultivation practice that can increase the usability of the given inputs as well as existing natural resources. Intercropping has four management aspects, namely (1) management of planting distances and planting patterns, (2) management of plant populations, (3) management of appropriate timing, and (4) management of fertilization (Rifai, et al, 2014). the potential for the development of red chilies and corn in Sitinjo District, Dairi Regency can provide income for existing farmers.

2. RESEARCH METHOD

This research is located in Panji Porsea Village, Sitinjo District, Dairi Regency. This research is planned to take place from November to March 2023. The form of this research is a quantitative method. The population in this study were 50 farmers with planting techniques of corn monoculture, chili monoculture and red chili intercropping with corn, the data analysis techniques used were cost analysis, acceptance analysis and land use ratio analysis. The framework of thought used in this research is:

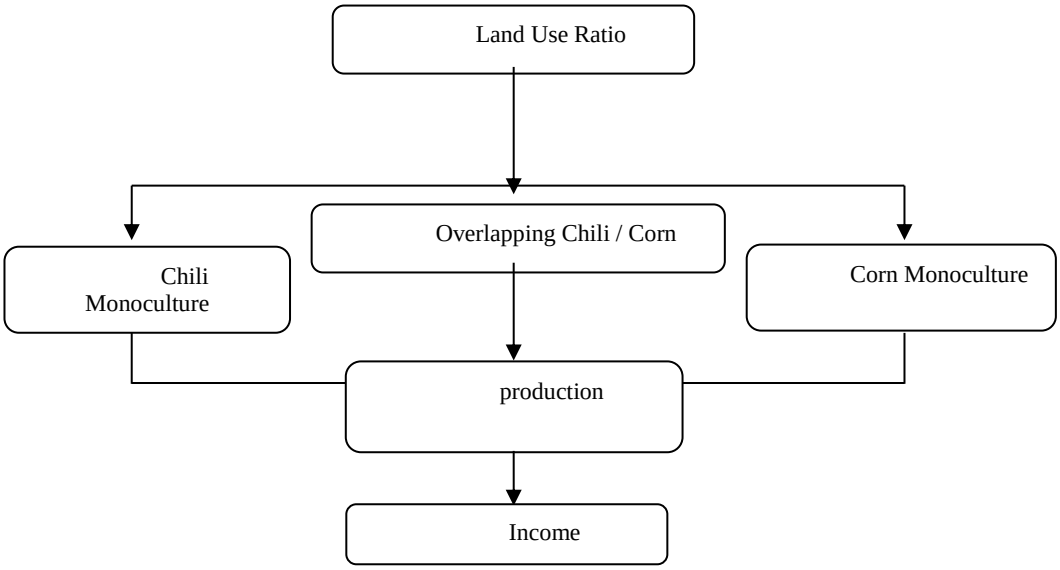

Figure 1. Research framework

Based on the background description, problem formulation, research objectives, research benefits, research framework above, the hypothesis is:

With a combination of polyculture treatment of corn plants and chili plants:

1. Planting There are differences between intercropping farming compared to chili and corn monocultures
2. There is a difference in the effectiveness of intercropping land use for red chilies and corn compared to the use of intercropping in Panji Porsea Village, Sitinjo District, Dairi Regency.
3. The planting method of intercropping with various plant spacings in red chili and corn intercropping farming provides more benefits compared to chili and corn monoculture.

3. RESULTS AND DISCUSSION

3.1.Cost Analysis

Fixed costs are costs that must be incurred by farmers in one year of planting. The fixed costs incurred by farmers are land rental costs and land processing costs. Land rental costs in the Sitinjo sub-district range from Rp. Respondents who own their own land do not issue land leases Apart from renting land, the fixed costs incurred by farmers are land processing costs. Land processing costs also vary from one farmer to another, the range of land rental costs ranges from IDR 135,000 to IDR 700,000. Land processing costs are influenced by several factors, namely land area, land condition and others.

Table 1. Details of Fixed Costs

Plant Type	Information	Cost (IDR)
Chili (Average Total)	Land lease	367,273
	Land Processing	324,583
	Total	691,856
Corn (Total Average)	Land lease	644,000
	Land Processing	368,269
	Total	1,012,269
Overlapping (Average Total)	Land lease	186,667
	Land Processing	659,286
	Total	845,952

Table 1 shows that the chili and corn monoculture farming system for land rental costs, if the average cost is Rp367,273-644,000while for the cost of renting chili and corn intercrops, a fee of Rp186,667this shows that the use of the intercropping system saves more land rent when compared to the monoculture system. Meanwhile, the cost of processing the land for the chili and corn monoculture system, if averaged out, will cost Rp324,583-368,269and for the costs of processing intercropping land, a fee of IDR is charged659,286, this shows that the land processing costs for the intercropping system are greater because there are differences in land processing. From the results of adding up the total costs, it can be seen that by using an intercropping system the costs incurred are more economical compared to 2 monoculture systems

Variable Cost Analysis

Non-fixed costs are costs that can change in nature, both in terms of price and requirements, so that the total funds spent by these non-fixed costs often change according to conditions in the field, while the details of non-fixed costs are as follows

Table 2. Average investment variable costs (Cost/ha)

Activity	Chili Monoculture	Corn monoculture	Chili Corn Intercropping
	Cost (IDR)		
Mulch	708,750		594,286
Install Mulch	220,000		
Seed Purchase (Rp)			
Chilli	345,833		425,000
Corn		661,852	179,286
Planting		280,000	160,000
Fertilization Energy (Rp)	965,000	315,556	954,286
Harvest (Rp)	2,837,500	339,259	1,920,000
Packing (Rp)	110,833	36,000	30,000
Transport from field to storage (Rp)	94,188	28,667	150,000
Fertilizer (Rp)	2,322,250	980,296	2,071,286
Pesticides (Rp)	1,573,938	286,923	1,217,000
Total	9,353,500	3,593,889	8,070,429

From Table 2. Average non-fixed costs for Monoculture Chili/Ha shows the average non-fixed costs that must be incurred in 1 year from farmers in the research sample who use technical irrigation with the average total expenditure beingRp 9,353,500,- and these costs include Mulching (Rp 708,750, Installing Mulch Purchase of Seeds (Rp 220,000 and 345,833) Fertilizer Labor (Rp 965,000) Harvesting (Rp 2,837,500) Packing (Rp 110,833) Transport from the field to Storage (Rp 94,188) Fertilizer (Rp. 2,322,250) Pesticides (Rp. 1,573,938) Sometimes some farmers whose paddy fields are not too large will usually do some of the work themselves to reduce costs that can be reduced. From Table 2. The average variable cost of Corn Monoculture/Ha shows the average variable cost that must be incurred in 1 year from the farmers who are the research sample using technical irrigation with an average total expenditure ofRp. 3,593,889,- and these costs include Seed Purchase (Rp. 661,852), Planting (Rp. 280.00), Fertilizer Labor (Rp. 315,556) Harvesting (Rp. 339,259) Packing (Rp. 36,000), Transport from the field to Storage (Rp. 28,667)) Fertilizer (Rp 980,296) Pesticides (Rp 286,293) Sometimes some farmers who don't have too much land usually do some of the work themselves to reduce costs that can be reduced.

From Table 2 Average variable costs Intercropping of chili and corn shows the average variable costs that must be incurred in 1 year from the farmers who are the research samples who use technical irrigation with an average total expenditure ofRp. 8,070,429,- and these costs include purchasing mulch (Rp. 594,286), purchasing chili seeds (Rp. 425,000), corn seeds (Rp. 179,286), planting (Rp. 160,000), fertilizing labor (Rp. 954,286), harvesting (Rp. 1,920,000), packing (Rp. 30,000), Transport from field to Storage (Rp. 150,000) Fertilizer (Rp. 2,071,000) Pesticides (Rp. 1,217,000) Sometimes some farmers whose land is not very large will usually do some of the work themselves to reduce costs that can be reduced.

3.2.Revenue and Revenue Analysis

To find out whether a business is worth running or not, it is necessary to compare the costs incurred with the results that will be obtainedTo find out the feasibility analysis of farming for each

type of planting treatment of red chili monoculture, corn monoculture, and red chili and corn intercropping, the data analysis used was: Acceptance Analysis TR = Y . Py
Where: TR = Total Revenue (Total Revenue) Y = Production obtained Py = Product unit price

Table 3. Production Costs and Revenue

Information	**Chili Monoculture**	**Corn Monoculture**	**Intercropping**
Total Production Costs (Fixed Costs + Variable Costs)	IDR 9,353,500	IDR 3,593,889	IDR 8,036,143
Yield (Kg)			
Chilli	1.244 kg		1.270 kgs
Corn		1.334 kg	487 kg
Selling price			
Chilli	IDR 22,000		IDR 22,000
Corn		IDR 3,911	IDR 3,900
Income	IDR 37,716,313	IDR 5,185,748	Rp29,774,543

Table 3 shows that the total costs incurred by chili monoculture farmers if averaged out are equal toIDR 9,353,500, for the harvest itself if averaged at 1,244 kg per chili harvest, assuming a selling price of IDR 22,000/Kg, the gross receipts are equal toIDR 37,716,313, for income analysis, use the formula Pd = TR – TC so that the income obtained by chili farmers is: TR = IDR 37,716,313 – TCIDR 9,353,500 = 28,362,875 for the net income of chili monoculture farmers.for the total costs incurred by corn monoculture farmers if the average is equal toRp. 3,593,889 for the harvest itself if it is averaged at 1.334 Kg for one chili harvest, assuming a selling price of Rp. 3900/Kg, a gross revenue of Rp.IDR 5,185,748 For Income Analysis, use the formula Pd = TR – TC so that the income obtained by chili farmers is: TR = IDR 5,185,748 – TCIDR 3,593,889 = 1,591,859 for the average net income of corn monoculture farmersfor the total costs incurred by corn monoculture farmers if the average is equal toIDR 8,036,143 for the harvest itself if an average of 1,270 Kg is harvested for chili and 487 for corn, assuming a selling price of IDR 3900/Kg for corn and chili IDR 22,000, you get a gross income ofRp29,774,543For Income Analysis using the formula Pd = TR - TC so that the revenue obtained by the Tumpang Sari Corn/chilli farmers is: TR = Rp.29,774,543–TCIDR 8,036,143 = IDR 21,738,400 for the average net income of corn/chili intercropping farmers.

RC Ratio.

The R/C ratio is the number of ratios used to see the relative profits that will later be obtained on a project or business. To calculate the RC Ratio, the R/C formula = TR / TC R/C Criteria is used.

If R/C >1 it is declared profitable.
If R/C <1 it is declared a loss
If R/C = 1 it is declared breakeven.

Actually a project will be said to be feasible if the R/C value obtained is stated to be greater than 1.

Chili MonocultureTR = IDR 37,716,313/TCIDR 9,353,500 R/C = TR/TC = 4.03
Corn MonocultureTR = IDR 5,185,748 /TCIDR 3,593,889 R/C = TR/TC = 1.44
Chili Corn IntercroppingTR = Rp29,774,543/tcIDR 8,036,143 R/C = TR/TC = 3.71

Based on the RC ratio above, it can be seen that in terms of the R/C ratio, chili monoculture is technically more profitable because the R/C ratio value is the largest compared to other types of planting.

3.3.Analysis of Land Use Ratio (LER)

Land Use Ratio,Many analyzes confirm that polyculture can be expressed through the land equivalent ratio (LER) which compares productivity measures, but its main strength lies in efficiency. LER estimates how efficiently a plant or agroecosystem uses a resource. With general basics, namely monocultural results between agricultural systems that can be applied as agroecological standards.

Table 4. Land Use Ratio (LER)

Planting distance	Corn	Chilli	total	Equivalent Ratio
40 x 120	1, 0472 a	0.5490 a	2, 2788 a	2, 2542a
35 x 70	1, 0772 a	0.5684 a	1, 4833b	1, 4382b
60 x 140	1, 1620 a	0.6846 a	1, 2751 b	1, 2205b
Meeting Room Zone				
Zone 1	1, 07973 a	0.6682 a	1, 7104 a	1, 6649 a
Zone 2	1, 11117a	0.5331 a	1, 6477 a	1, 6103 a
Interaction	(-)	(-)	(-)	(-)

The intercropping pattern between corn and chili plants in this study shows LER and ATER values > 1, this shows that the intercropping system at planting is very suitable and very feasible to implement. This is in line with Hiebsch and McCollum's statement (Ceunfin et al. 2015), that LER and ATER values > 1 indicate that a monoculture crop system requires a larger area of land compared to an intercropping pattern.

Variety Print Analysis (Test F)

From the results of the analysis of variance on the income of chili and corn farmers based on the planting method used based on the Duncan Multiple Range Test. with α=0.05. It was found that farmers who used technical irrigation for 1 ha/year earned the greatest income. that is, an average of IDR 37,716,313 for chili monoculture, for an average income of corn monoculture is IDR 5,185,748, and IDR 29,774,543 for an average farmer who uses chili and corn intercropping.

Table 5. Duncan Factor Test: Income

Order	Treatment	Average Income (Rp)
1	P1 (Chili Monoculture)	IDR 37,716,313
2	P2 (Maize Monoculture)	IDR 5,185,748
3	P3 (Corn Chili Intercropping)	Rp29,774,543

Table 6. ResultsScan the Variety of Farming and Corn Business Income

Income					
	Sum of Squares	Df	Mean Square	F	P
Between Groups	431374.538	17	25374.973	12,401	003
Within Groups	1249930.560	69	18114.936		
Total	1681305.099	86			

The results of the variance analysis test show that the calculated f value is12,401and the significance level is 0.003. In this study there were significant differences between the planting methods between chili monoculture, corn monoculture and chili and corn intercropping because the p value was 0.003 <0.05 so there were significant differences between planting systems between chili monoculture, corn monoculture and chili and corn intercropping Analysis of intercropping farming of red chilies and corn with an estimated land use ratio in Panji Porsea Village, Sitinjo District, Dairi Regency has been going very well, this can be seen from the results of the R/C testChili Corn IntercroppingTR = Rp29,774,543/tcRp. 8,036,143 R/C = TR/TC = 3.70, although the RC ratio above shows that in terms of the R/C ratio, chili monoculture is technically more profitable because the R/C ratio value is the largest compared to other types of planting. But with utilizationLand Use Ratio,Many analyzes guarantee that polyculture can be expressed through a land equivalent ratio (LER) that compares productivity measuresseems likeThe effectiveness of intercropping land use between red chilies and corn in Panji Porsea Village, Sitinjo District, Dairi Regency is running very well because the intercropping pattern between corn and chili plants in this study shows LER and ATER values > 1, this shows that the intercropping system at the time of planting is very suitable and very feasible to implement, able to increase the income of both chili and corn farmers, by utilizing the available land

There is a significant difference between the planting methods between chili monoculture, corn monoculture and intercropping of chili and corn because the p value is 0.003 < 0.05 so there is a real difference between the planting systems between chili monoculture, corn monoculture and intercropping of chili and corn. The production aspect of red chilies and corn in Panji Porsea Village, Sitinjo District, Dairi Regency after using the intercropping method appears to have increased when compared with monoculture because saving land can produce 2 different crops. The results of this research are also supported by previous research, namely:

1. Research conducted by Lindi Fidalia (2018), with the title "Effectiveness of Farmer Groups in Increasing Farming Income of Red Chili (Capsicum 23 Annum L) and Corn (Zee Mass)" Case Study in Margototo Village, Metro Kibang District, East Lampung Regency, The results showed thatThe average income of curly chili monoculture farming is higher than that of intercropping corn with cayenne pepper. The average income of curly chili monoculture farming is IDR 54,179,546.67 per average land area of 0.3568 Ha, while the average income of intercropping corn with cayenne pepper is IDR 36,026,190.00 per average area of 0. 3493 Ha. The average income per hectare of curly chili monoculture farming is IDR 160,310,138.90 and the average income from intercropping corn with cayenne pepper is IDR 105,837,220.40. Statistically,
2. Research conducted by Pangaribuan, et al, 2021 with the title "Intercropping between Corn and Cayenne Pepper as Agricultural Processing in Kabawetan" shows that it is processed optimally. This land is suitable for intercropping between corn and cayenne pepper. How to cultivate partners' land to make it more productive is the aim of the activity and shows that this intercropping system can improve partners' welfare.
3. Research conducted by Apriyansah (2017) entitled "Analysis of the Feasibility of Overlapping Farming of Red Chili (Capsicum annum L) and Shallots (Allium cepa L) on Sand Land in Bantul Regency" The results using the R/C Ratio show that the average land area for red chili and shallot farming is 1230 m2, the average total cost is IDR 11,621,226/farm, the average income is IDR 46,911,033/farm, and the income earned by farmers is IDR 35,289,807/farm. Based on the results of the feasibility analysis, an R/C ratio of 4.04 was obtained which indicated that red chili and shallot farming on sandy land in Bantul Regency was feasible for planting.

4. CONCLUSION

1. There is a difference between intercropping farming when compared to chili and corn monocultures, which can be seen from the results of the R/C test for Chili Corn Intercropping TR = IDR 29,774,543/TC IDR 8,036,143 R/C = TR/TC = 3.70 from the RC ratio above, it can be seen that from In terms of the R/C ratio of chili monoculture, it is technically more profitable because the value of the R/C ratio is the largest compared to other types of planting.
2. There is a difference in the effectiveness of intercropping land use for red chilies and corn compared to the use of intercropping in Panji Porsea Village, Sitinjo District, Dairi Regency. because the pattern of intercropping between corn and chili plants in this study shows the value of LER and ATER> 1, this shows that the intercropping system at the time of planting is very suitable and very feasible to implement
3. In this study, planting intercropping methods with various plant spacings in intercropping farming of red chilies and corn provides more benefits compared to monocultures of chilies and corn. It can be seen from the analysis of variance test that the calculated f value is 12.401 and a significant level is 0.003 < 0.05.

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