ISSN: 2586-761x (Print)
ISSN: 2635-5817 (Online)
Vol. 02, No. 02, December 2019
International Journal of Advanced Social Sciences
Source: http://ictaes.org
Manuscript received: August 6, 2019; Revised: September 9, 2019 ; Accepted : September 20, 2019

A study on analysis of success, difficulties, and profitability for cropping system of food and feed crops in the rice field instead of rice

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Abstract

First of all, this research leaves a lot to be desired. The design and conduction of this research were done by another researcher, and the research was handed down in the middle. Due to the surrounding situation, the required professionality nor the time was not in place, and this research would have had more depth if there was more time to comprehend the cultivation performance and difficulties of double-cultivating the Italian ryegrass and corn. The cultivation performance table for the Italian ryegrass researched by the colleague covers the double-cultivation with the artichoke, and it is believed that it would not show a significant difference to the corn, the crop of interest in this research. Hopefully, if another chance is given to conduct this research from the start would produce the research with deeper insight. When it comes to the forage, the use of manure produced by oneself will be helpful for the farmer in terms of circulation agriculture. The government once encouraged farmers to use manure dispenser and compost depot with its policy, but such usages are now considered illegal. For the livestock farms that raise cattle, the ox manure is a good resource that has valuable usages, but they are prohibited from using them due to the concern of environment pollution, causing difficulty for circulation agriculture. The establishment of a stable system in resource utilization will naturally resolve environmental issues.

Keywords: *Ice proper production; Crop system; Forage crop; Economic analysis.*

1. INTRODUCTION

The change in the consumption pattern following the agriculture condition, farming regions' condition, and climate change is causing the decrease in farm produce consumption and the severe change in the price of farm produce, and the establishment of the income safety net for the farmers, stable supply of farm produce to increase the consumption, and the optimum yield is in demand. Recently, the increase in the feed price and payroll cost are demanding the reduction of production cost and the following mechanization. The new technologies, including ICT smart farming, are spreading. The 2019 Food Crop Technology Popularization Operation focuses on the technical support for the optimum yield to achieve the stabilized supply of rice, and it promotes "crop change in rice paddy operation," "3 lows and 3 highs initiative," and "food crop-related new technology popularization." It is hoped that the analysis of economic feasibility and profitability data from this research may contribute to the supply control for the optimum yield of rice and the improvement in food self-sufficiency as the basic data.The first industrial revolution, in which the humankind began to use energy and machinery in earnest, the second

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industrial revolution that established the basis of modern civilization through the mass of electricity, the advent of the personal computer and the Internet. There is a world coming in which the boundaries of learning and learning disappear, and barriers between industries are collapsing, and everything is connected. In particular, what sets the Fourth Industrial Revolution apart from the existing industrial revolution is connectivity.

2. Survey method

This research has compared and analyzed farmsteads that implemented the cropping system of corn and the Italian ryegrass, the forage crops, to a rice paddy, to deduct the implications. Additionally, this research analyzed the success, difficulties, and profitability of each cropping system. Each cropping system was implemented by nine farmsteads, and the investigation took place by face to face interview, centering on the investigation result table. The representative farmsteads with over 1hr of land, centering around the chief producing district, were selected and investigated.

3. Previous research

According to “The Directionality of Food Crop Technology Popularization in 2019” (Food Industry-Technology Team, Rural Development Administration, 2019), the offering of safe food for the nation and its promotion strategy aim to stabilize the food supply through the rice production control polity support. Kim (2019) has studied the current status of cultivation of the Italian ryegrass (IRG) by forage businesses in the Yeongnam region. Yoon and Choi (2019) have analyzed the degree of improvement of production and nutrient balance of forage depending on the cropping system of forage crops. “The Analysis of Cultivation Performance per Cropping System for Diversification of Rice Paddy Agriculture” (Rural Development Administration, 2012 ~ 2013) has conducted study and analysis on cropping system for the alternative crop for rice per major regions (Chungboo, Honam, Yeongnam) and the analysis on the cultivation performance of each cropping system focusing on the “rice + barley strains (wheat, barley, forage barley),” “bean + (potato, tobacco),” and “corn + garlic.” “The Profit Model Implementing Diversified Cropping System to Rice Paddy” (Rural Development Administration, 2012 ~ 2014) has conducted a research on the settlement of the technology input, production, and distribution system for “potato + bean” combination for Chungboo region, “garlic + bean” combination for Honam region, and “wheat + bean” combination for Yeongnam region. “The Analysis of Cultivation Performance of Winter Time Barley Strains/Summer Time Crop on Rice Paddy and Development of Cropping System Model” (Rural Development Administration, 2011) has compared and analyzed the profit of double-cropping systems that combines unhulled barley and summer crops (rice, forage rice, forage corn, rice paddy bean), to the single cropping of rice. Additionally, it has researched the combination of unhulled barley with various crops (rice, rice paddy bean, autumn potato, autumn radish, welsh onion, forage corn, forage rice). Jang (2016) has utilized the income study data in the analysis of the economic feasibility of alternative crops to rice in the Jeonbuk region to study the economic feasibility of rice paddy bean, lotus root, and royal azalea.

4. Results

4.1. Main Result 1

Table 1. Profitability Analysis

(Standard: Year One Mechanism/10a)

Classification		Amount	Note
	Amount (kg)	1,564	

Total Revenue	Unit Price (KRW/kg)	144	
	Sum (Unit: 1000 KRW)	226	
Cost	Intermediary Material Cost (Unit: 1000 KRW)	189	
	Operating Expense (Unit: 1000 KRW)	204	
Income	Added Value (Unit: 1000 KRW)	37	16.5% added value ratio
	Net Income (Unit: 1000 KRW)	22	9.6% income rate
Productivity	Productivity (KRW/hour)	1,908	Added Value ÷ Labor Hours
	Land Productivity (KRW/m^2)	37	Added Value ÷ Cultivated Area
Production Cost per 1 kg (KRW)		160	
Labor Hours per 10a		19.5	

(Source: In the total revenue, the amount per kg is KRW 11,564 per 10a, and the unit price is KRW 144. The sum is KRW 226,000. For the cost, the intermediary material is KRW 189,000, and the operating expense is KRW 204,000. For the income, the added value is KRW 37,000, and the net income is KRW 22,000 per 10a.)

4.2. Main Result 2

Table 2. Profitability Analysis

(Standard: Year One Mechanism/10a)

Item of Expenditure				Amount (Unit: KRW)	Proportion (%)	Note
Production Cost	Operating Cost	Intermediary Material Cost	Seed and seedling	26,066	10.4	
			Inorganic fertilizer	35,252	14.1	
			Organic fertilizer	-	-	
			Agricultural chemicals	-	-	
			Water, light, heat	10,600	4.2	
			Other materials	41,066	16.4	
			Small equipment	250	0.1	
			Large tool depreciation	67,219	26.8	
			Agricultural facility depreciation	2,500	1.0	
			Repair and maintenance	-	-	
			Other expenses	5,750	2.3	
			Subtotal	188,703	75.3	
		Machinery and facility rent		1,390	0.6	
		Land rent		12,516	5.0	
		Trusted farming		-	-	
		Hiring and labor expense		1,500	0.6	8.0 hours
		Subtotal		204,109	81.5	

	Family labor expense	2,072	0.8	11.5 hours
	Liquid capital service expense	1,960	0.8	
	Fixed capital service expense	23,658	9.4	
	Land capital service expense	18,774	7.5	
	Total	250,572	100.0	

(Footnote: The average wage of a manufacturing business with 5 to 29 employees (KRW 18,015/hour) by the National Statistics Agency (2019) was applied for the unit price of wage.
Source:)

4.3. Success and difficulties

When it comes to the forage, the use of manure produced by oneself will be helpful for the farmer in terms of circulation agriculture. The government once encouraged farmers to use manure dispenser and compost depot with its policy, but such usages are now considered illegal. For the livestock farms that raise cattle, the ox manure is a good resource that has valuable usages, but they are prohibited from using them due to the concern of environment pollution, causing difficulty for circulation agriculture.

5. Conclusion and Suggestions

It is a shame that the research is not fully completed. The design and conduction of this research were done by another researcher, and the research was handed down in the middle. Due to the surrounding situation, the required professionality nor the time was not in place, and this research would have had more depth if there was more time to comprehend the cultivation performance and difficulties of double-cultivating the Italian ryegrass and corn. The cultivation performance table for the Italian ryegrass researched by the colleague covers the double-cultivation with the artichoke, and it is believed that it would not show a significant difference to the corn, the crop of interest in this research.

Acknowledgment

This research was carried out by the support of R&D expenses for the Agenda project of the Rural Development Administration (RDA) in 2019. (Assignment Number : PJ 013911042019), (Assignment Title : A study on analysis of success, difficulties and profitability for cropping system of food and feed crops in the rice field instead of rice).

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