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Study on Application of Jarwo Super Rice Technology Package in Gorontalo Indonesia

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Abstract.

The aims of the study are: 1) to determine the level of rice productivity with the application of *jarwo* super technology, 2) to determine the farmers' perceptions of the *jarwo* super rice technology innovation, and 3) financially analyze rice farming with the application of the *jarwo* super technology package in Gorontalo. The study was conducted in Gorontalo Regency, Gorontalo Province. The total area of the applied study demonstration was 15 hectares by involving 15 cooperative farmers. The study was conducted from March to July 2018. The assessment method was to compare the introduction of technology from IAARD with farmer's technology. The varieties of rice planted were Inpari 30, Inpari 31, Inpari 40, Cigeulis, Mekongga, and IR 64. The results of the study revealed that the average rice productivity with the application of *jarwo* super package was 6.49 tons / ha, higher than the rice productivity with farmer's technology (3.53 tons / ha), so that the application of the *jarwo* super rice technology package can increase rice productivity by 84 percent. The average farmers' perception of *jarwo* super rice technology innovation showed that *jarwo* super technology increases production, income, was easy to implement, and farmers are interested in implementing it again. The results of the financial analysis of farming showed that rice farming with the application of *jarwo* super technology package was able to increase the revenue, profits, and R / C ratio compared to existing rice farming system.

Keywords: applied study, *jarwo* super, rice

1. Introduction

Rice is one of the strategic food crop commodities in Indonesia. The Government through the Ministry of Agriculture continues to increase rice production and productivity in order to meet the increasing domestic needs in line with an increase in population. National rice production and productivity during the last 5 years (2014-2018) has increased every year. The trend of rice production from 2012 to 2017 increased by 70.8 million tons in 2014 and 81.38 million tons in 2018 (Ministry of Agriculture, 2019).

In terms of the level of rice consumption, the trend always follows population growth every year. Indonesia's population in 2018 reached 265 million people or increased by 26.4 million compared to 2010's population of 238.5 million, with a population growth rate of 1.33 percent per year (BPS-Statistics Indonesia, 2019). Calculated from the level of rice consumption per capita, Indonesia's rice

consumption in 2017 is 114.6 kg per capita per year. With the population and per capita consumption level, the total rice consumption in 2017 will reach 33.47 million tons. When comparing with the national rice production, which is the rice production in 2017 reached 47.29 million tons, a rice surplus has been achieved (Ministry of Agriculture, 2019).

In order to maintain national rice production so that it can continue to meet domestic and export needs, the Ministry of Agriculture continues to make special efforts to increase national rice production and productivity. The strategy of increasing national rice production by the government is through increased productivity (intensification) and expansion of planting areas, both through increasing the Planting Index (IP) and expanding rice fields (IAARD, 2016). An aspect of concern in increasing rice production is the improvement of efficiency and environmental preservation because it is related to production competitiveness. One of the efforts made in increasing the productivity (intensification) of rice is through the application of cultivation technology. Indonesian Agency for Agricultural Research and Development (IAARD) as a producer of technological innovation, in 2016 has launched an environmentally friendly rice cultivation technology package namely Technology Jajar Legowo (*Jarwo*) Super.

Jarwo super rice technology is an integrated rice cultivation technology based on Jajar Legowo (*jarwo*) planting method (IAARD, 2016). In its implementation in the field, *Jarwo* Super rice technology uses: (1) quality seeds of new high-yielding varieties with high yield potential, (2) biodecomposers during soil processing, (3) biological fertilizers as seed treatment and balanced fertilization, (4) control techniques integrated crop pests, and (5) agricultural machinery especially for planting and harvesting. The application of integrated technology components is expected to increase the efficiency of rice farming production. The superiority of *jarwo* cultivation is in addition to increasing plant population, it is also able to increase the smooth circulation of sunlight and air around the side plants so that plants can photosynthesize better (Husnain et al., 2016).

Jarwo super technology has been tested on farmers' land in Indramayu Regency covering an area of 50 ha. The varieties planted were Inpari 30, Inpari 32 and Inpari 33, yields above 10 tons per ha of milled dry grain compared to Ciherang varieties on farmers' land outside the research area only produce 6 tons per ha milled dry grain (IAARD, 2016). Haryati and Liferdi (2017) revealed that the application of jajar legowo super technology with Inpari 30 rice variety achieved productivity of 7.60 tons / ha with an increase of 15% compared to the way of farmers. With the *jarwo* planting system, the plant population increases by around 20-25 percent compared to the usual planting system (tile plot). This system can in principle increase population by regulating spacing (Wacim and Dani, 2016). The application of jajar legowo planting system provides air circulation, light intake, water flow and absorption of nutrients more evenly so that it affects plant growth (Azwir, 2007). This is because plant spacing is one way to create an environment and nutrients can be available equally for each plant (Kurniawan et al., 2016).

In 2017, the Ministry of Agriculture initiated to develop and expand the application of *jarwo* super rice technology package. Therefore, in 2018 Gorontalo AIAT continues to disseminate and implement rice cultivation with the *jarwo* super system in Gorontalo. To develop and find out more in depth the results, an application of *jarwo* super rice technology was carried out in Gorontalo Regency, Gorontalo Province.

The aims of this study were: 1) to determine the level of productivity of lowland rice by applying *jarwo* super technology package, 2) to determine farmers' perceptions of *jarwo* super rice technology innovation, and 3) analyze financially of rice farming by applying *jarwo* super technology package in Gorontalo Regency, Province Gorontalo.

2. Research Methods

2.1. Location and Time of Study

The application of *jarwo* super rice technology package was conducted on the Kawa 1 Farmers Group in Hutabohu Village, West Limboto District, Gorontalo Regency. West Limboto District is one of the centers of rice production in Gorontalo Regency. The demfarm covers an area of 15 hectares involving 15 cooperative farmers. This applied study was conducted from March to July 2018.

2.2. Research methods

The applied assessment method was carried out by comparing the technology from the Indonesian Agency for Agricultural Research and Development (IAARD) with existing technology practiced by farmers. The technology applied in the Kawa 1 Farmers Group, Hutabohu Village, West Limboto District, Gorontalo Regency, were:

2.2.1. Jajar legowo (*jarwo*) super technology package.

The technological components applied were new superior varieties of lowland rice (Inpari 30, Inpari 31, Inpari 40, Cigeulis), biodecomposer application (M-Dec), biological fertilizer (Agrimeth), jajar legowo 2:1 planting system, balanced fertilization, pest control using bioprotectors and pheromone rice pellers, liquid organic fertilizer bioslurry, use of indo jarwo transplanter planting machines and combine harvester harvesting machines.

2.2.2. Application of environmentally friendly rice technology (organic jarwo super), without the use of chemical fertilizers and chemical drugs.

The technology components applied were IR 64 wet rice varieties, jarwo planting system 2:1, liquid biofertilizer 1 lt/ha, solid biofertilizer at a dose of 50 kg/ha, M-Dec biodecomposer at a dose of 2.5 kg/ha, as much as manure 2 tons/ha, liquid bioslurry organic fertilizer as much as 10 liters/ha, local microorganisms 2 liters/ha, bioprotector vegetable pesticides, use of indo jarwo transplanter and combine harvester machine.

A list of the application of the jarwo super technology package at the applied study location of Hutabohu Village, West Limboto District, Gorontalo Regency is presented in Table 1.

Table 1: Application of Jarwo Super technology package in Hutabohu Village, West Limboto District, Gorontalo Regency

Technology Components	Introductory Technology Package		Existing Farmer Technology
	Inorganic *Jarwo* Super	Organic *Jarwo* Super	
Rice Varieties	Inpari 30, Inpari 31, Inpari 40, Cigeulis	IR 64	Mekongga
Seed Treatment	Biological fertilizer application (*Agrimeth,*	Liquid Biofertilizer 1 lt/ha	-

Technology Components	Introductory Technology Package		Existing Farmer Technology
	Inorganic *Jarwo* Super	Organic *Jarwo* Super	
	Potensida)		
	-	Solid Biofertilizers 50 kg/ha	-
Tillage	Biodecomposer application (M-Dec), dose of 2.5 kg/ha	Biodecomposer M-dec 2.5 kg/ha	-
Planting system	Jajar legowo 2 : 1 (50 x 25 x 12.5 cm)	Jajar legowo 2 : 1 (50 x 25 x 12.5 cm)	Tile planting system
Fertilization	Dose I (Urea: 100 kg / ha and NPK Phonska 200 kg / ha) Dose II (Urea: 200 kg / ha and NPK Phonska 300 kg / ha)	-	Urea: 150 kg/ha and NPK Phonska 250 kg/ha
	Liquid Organic Fertilizer Bioslurry with a dose of 10 liters / ha	Liquid Organic Fertilizer Bioslurry with a dose of 10 liters / ha	-
	-	Local micro organisms 2 lt / ha	-
	Application of manure 1 ton / ha, and non-manure	manure 2 ton / ha	-
Plant Pests and Diseases Control	Bioprotector application 2 lt / ha,	Bioprotector application 2 lt / ha,	Pesticide
Harvest	Transplanter Planting Machine and Combine Harvester Machine	Transplanter Planting Machine and Combine Harvester Machine	Manual planting dan harvesting

In its application in the field, the jarwo super technology package was divided into five technology packages namely *Jarwo* Super Package I (with Inpari 40 rice varieties), *Jarwo* Super Package II (with Inpari 31 rice varieties), *Jarwo* Super Package III (with Inpari 30 rice varieties), *Jarwo* Super Paket IV (with Cigeulis rice varieties), and *Jarwo* Super Package V (Full Organic *Jarwo* Super with IR 64 rice varieties). As a comparison was farmer technology using the Mekongga variety. The *jarwo* super technology package treatment applied at the study area in Hutabohu Village, West Limboto District, Gorontalo Regency were explained in Table 2.

Table 2: Application of jarwo super technology package in the Kawa 1 farmer group, Hutabohu Village, West Limboto District, Gorontalo Regency

No	Technology Package Name	Technology Components	Land Area (ha)
1	*Jarwo* Super Package I	Inpari 40, Biofertilizer, Biodecomposer (M-dec) 2.5 kg / ha, Bioprotector, Jajar Legowo Planting System 2: 1, Fertilization (Urea: 100 kg / ha and NPK Phonska 200 kg / ha), Manure 1 ton / ha , Bioslurry Organic Fertilizer 10 lt / ha, *Jarwo* transplanter planting machine and Combine Harvester harvesting machine	2
2	*Jarwo* Super Package II	Inpari 31, Biofertilizer, Biodecomposer (M-dec) 2.5 kg / ha, Bioprotector, Jajar Legowo Planting System 2: 1, Fertilization (Urea: 200 kg / ha and NPK Phonska 300 kg / ha), Bioslurry Organic Fertilizer 10 lt / ha, *Jarwo* transplanter planting machine and Combine Harvester harvesting machine	3
3	*Jarwo* Super	Inpari 30, Biofertilizer, Biodecomposer (M-dec) 2.5 kg /	3

No	Technology Package Name	Technology Components	Land Area (ha)
	Package III	ha, Bioprotector, Jajar Legowo Planting System 2: 1, Fertilization (Urea: 200 kg / ha and NPK Phonska 300 kg / ha), Bioslurry Organic Fertilizer 10 lt / ha, *Jarwo* transplanter planting machine and Combine Harvester harvesting machine	
4	*Jarwo* Super Package IV	Cigeulis, Biofertilizer, Biodecomposer (M-dec) 2.5 kg / ha, Bioprotector, Jajar Legowo Planting System 2: 1, Fertilization (Urea: 200 kg / ha and NPK Phonska 300 kg / ha), Bioslurry Organic Fertilizer 10 lt / ha, *Jarwo* transplanter planting machine and Combine Harvester harvesting machine	3
5	*Jarwo* Super Package V (Full Organic)	IR 64 rice varieties, Liquid Biofertilizer 1 lt / ha, Solid Biofertilizer 50 kg / ha, Biodecomposer (M-dec) 2.5 kg / ha, Bioprotector 2 lt / ha, Jajar Legowo Planting System 2: 1, Manure 2 tons / ha, Bioslurry Organic Fertilizer 10 lt / ha, Local Micro Organisms 2 lt / ha, Transplant Planting Machine and Combine Harvester Harvesting Machine	2
6	Comparator (Farmer technology)	Mekongga Rice Varieties, Tile Planting System, Fertilization (Urea: 100 kg / ha and NPK Phonska 250 kg / ha), Chemical Pesticides, Planting and Manual Harvesting	2
		Total	15

2.3. Types and data collection procedures

The types of data collected in this activity were agronomic data, including production and productivity data; socioeconomic data, including data on input and output of production, input price and output of production, and data on farmers' perceptions of technological innovations introduced. Production data is the real harvest collected through direct field records. Data on farmers' perceptions of technological innovations were collected through structured questionnaires that were prepared before and interviews with respondent farmers. The number of respondent farmers were 15 people's who are cooperating farmers and were directly involved in the activities of *jarwo* super rice technology in the field.

2.4. Data analysis

For production analysis, yield data that had been collected were tabulated and analyzed descriptively. To find out farmers' perceptions, the data collected by questionnaire was tabulated using the percentage method of each statement given. For financial analysis of farming is done using descriptive methods, the data obtained are analyzed by tabulation which includes the structure of costs, revenues, and profits of farming. The results of the analysis of revenues and costs can also show the benefits of a farm through the calculation of R / C ratio. Analysis of the balance of revenue and costs (R / C ratio) is used to see the benefits of farming from the amount of revenue received by farmers for each rupiah that has been spent on farming. Farming is indicated as efficient if the R / C ratio value is greater than one. The greater the value of R / C ratio, it shows the more efficient farming activities.

3. Result and Discussion

3.1. Performance of the *jarwo* super rice technology application

In this research, the application of inorganic super *jarwo* technology used superior varieties of rice produced by the IAARD, namely Inpari 40, Inpari 31, Inpari 30, and Cigeulis. For the application of super organic *jarwo* technology, without the application of chemical fertilizers and pesticides, using the IR 64. As a comparison with farmer's technology, Mekongga rice varieties were used. The performance of the application of super *jarwo* rice technology can be seen in Table 3.

Table 3: Performance of the application of jarwo super rice technology in Hutabohu Village, West Limboto District, Gorontalo Regency

No	Technology Package Name	Productivity (Ton / Ha)
1	*Jarwo* Super Package I (Inpari 40 rice varieties)	8.19
2	*Jarwo* Super Package II (Inpari 31 rice varieties)	4.41
3	*Jarwo* Super Package III (Inpari 30 rice varieties)	7.73
4	*Jarwo* Super Package IV (Cigeulis rice varieties)	6.05
5	*Jarwo* Super Package V (Full Organic IR 64 rice varieties)	6.09
6	Comparator / Existing Farmer Technology (Mekongga Rice Variety)	3.52

Source: Primary data in 2018

From the yields it was known, that *jarwo* super package I with Inpari 40 rice variety results the highest rice productivity in the amount of 8.19 tons / ha of harvested dry grain. The second level was jarwo super package III, with Inpari 30 variety, resulting in productivity of 7.73 tons / ha. The third was achieved by *jarwo* super package V (organic *jarwo* super with IR 64 varieties) which reached productivity of 6.09 tons / ha. The fourth was *jarwo* super package IV with productivity of 6.05 tons / ha. The lowest productivity was achieved by the *jarwo* super package II, the Inpari 31 rice variety, with a productivity of 4.41 tons / ha.

Super *jarwo* technology package I applied all components of the *jarwo* super rice planting technology to a new superior variety of Inpari 40 with the use of manure 1 ton/ha. The development of rice plants with the application of the *jarwo* super package I technology package had been very good since the beginning of plant growth, shown by the resilience of the Inpari 40 variety, compared to other rice plants that got relatively many rice stem borer attacks. The results of interviews in the field also showed that the Inpari 40 rice variety, were most preferred by farmers. It was seen from the growth from the beginning to the harvest which was quite good and relatively resistant to pests and plant diseases. Rice varieties that also have quite good growth with the application of the *jarwo* super rice technology package was Inpari 30. This variety is a new superior rice variety which is a derivative of a variety that is widely developed and preferred by farmers, namely the Ciherang variety. Sutaryo (2015) showed that the number of productive tillers of Inpari 30 was quite large (20.50 sticks). The low yields of the application of *jarwo* super technology package II, namely the Inpari 31 variety, was due to the attack of rice stem borer pests with very high intensity from initial growth to harvest.

The application of the full organic *jarwo* super rice technology package (package V) results in excellent productivity reaching 6.05 tons / ha. In the application of this technology package, no chemicals were applied, fertilizers and pesticides were not

applied. The variety used for the application of this package is IR 64 variety. This variety was used based on previous farmers' experience that IR 64 rice was very suitable as organic rice because it has good taste and preferred by consumers. Other technological components applied are liquid biological fertilizer at a dose of 1 lt / ha, solid biological fertilizer at a dose of 50 kg / ha, use of biodecomposers (M-Dec) at a dose of 2.5 kg / ha, use of biopesticides "bioprotector" at a dose of 2 lt / ha, *jarwo* row system 2: 1 , liquid organic fertilizer "bioslurry" at a dose of 10 lt / ha, use of local micro-organisms at a dose of 2 lt / ha, use of the *jarwo* transplanter planting machine and combine harvester machine. In addition, *jarwo* super package V is also applied to mature manure at a dose of 2 tons / ha.

The average rice productivity with the application of the *jarwo* super technology package in Hutabohu Village, West Limboto District, Gorontalo Regency is 6.49 tons / ha. This result was higher when compared to the application of rice farming with existing technology by the farmers with Mekongga varieties which was 3.53 tons / ha. If you see the results achieved, the average yield of the application of the *jarwo* super technology package at this location still had not reached the expected yield potential because in that season the intensity of rice stem borer attack was very high. Rice stem borer attacks in most areas in the West Limboto District that cause the average production to be very low.

In addition to the use of high yielding varieties, the characteristics of the application of the *jarwo* super technology package are the application of environmentally friendly rice cultivation technology components such as the use of biological fertilizers, biodecomposers, and biopesticides. The application of this technology reduces chemicals and uses more organic matter which increases soil microbes that are beneficial in improving soil structure, increasing soil fertility and beneficial for plants. According to Suriadikarta and Simanungkalit (2010), the availability of organic matter in the soil can prevent micro nutrient deficiency, increase cation exchange capacity (CEC), and can form complex compounds with metal ions that poison plants such as Al, Fe, and Mn.

The planting system used in the application of super *jarwo* technology package was the 2:1 *jarwo* row system, because it was planted using a 2:1 *jarwo* transplanter planting machine. The *jarwo* row system 2:1 increases the population of rice plants. Ikhwani (2013) stated that the jajar legowo planting system had more clumps per unit area compared to the tiled planting method. Besides that, with the *jarwo* system, there are empty rows every two rows of plants, so that all rows of rice plants become edge crops, which tend to have the potential to produce high productivity because sunlight is more optimal and air circulation is better because of the empty space between rows of rice plants. The more plants absorbing sunlight will accelerate the process of photosynthesis, as well as the formation of photosynthates so that the filling of grain will be optimal (Supriyanto et al., 2010). According to Wang et al. (2013) peripheral effects had an influence on higher biomass production, more panicles per unit area and higher percentages of filled grain. Side effects from the legowo method provide plants the ability to photosynthesize better (Mohaddesi et al., 2011).

The use of agricultural machinery and tools, namely the *jarwo* transplanter planting machine and the combine harvester harvesting machine, can increase the efficiency of rice production. The use of tools and machines can improve time and cost efficiency of rice production. With a combine harvester harvesting machine, it is able to reduce the loss of rice yields, and is more efficient because the crops are broken down and packed immediately. All components of this rice cultivation

technology must be managed in an integrated manner. The use of superior varieties, balanced fertilization, pest control, and integrated use of agricultural tools and machinery will enhance the *jarwo*-based rice cultivation (Husnain et al., 2016).

3.2. Farmers' perception of the *jarwo* super technology package

In the study of the application of agricultural innovation, a measurement of farmers' perceptions of technological innovation in *jarwo* super rice was carried out. The number of 15 cooperating farmers involved in the application of the *jarwo* super rice technology package. The results of the analysis of farmers' perceptions of the *jarwo* super rice technology innovation in Hutabohu Village, West Limboto District, Gorontalo Regency can be seen in Table 4.

From Table 4, it can be seen the farmers' perceptions of *jarwo* super rice technology innovation from several statements about the technology components applied. Most farmers (80 percent) agreed and strongly agreed that the application of *jarwo* super rice technology could increase rice yield/production. This was also evidenced by the average yield of rice with the application of *jarwo* super rice technology was higher than the existing technology of farmers. Furthermore, farmers stated that *jarwo* super technology increased farmers' income (> 85 percent). The results are in line with research by Asaad et al. (2017) which revealed that farmers' perceptions of *jarwo* technology mostly agree because it was proven that *jarwo* technology provides higher income compared to the planting system that was commonly practiced by farmers.

From the level of ease of application, farmers stated that the components of the *jarwo* super technology package were easy to understand, and easy to apply at the field (> 65 percent), because farmers were experienced in rice farming and were accustomed to the application of rice cultivation technology components. From this experience, farmers (100 percent) expressed interest in re-implementing the *jarwo* super technology package. The results of this study were consistent with the research of Hutapea et al. (2017).

The main problem in the application of the *jarwo* super technology package is the relative unavailability of production facilities from the *jarwo* super technology components such as biodecomposers, biological fertilizers and biopesticides produced by the IAARD in the farm shop in Gorontalo Province. To get this technology component, farmers must place an order in the Research Center, so it is inefficient in terms of time. To overcome this, it can be advisable to use *jarwo* super components such as biological fertilizers, biodecomposers and biopesticides produced by private industry that are available at farm shops. For the application of this component, most farmers stated that it was easy to apply in the field.

Table 4: Farmers' perceptions of jarwo super rice technology innovation in Hutabohu Village, West Limboto District, Gorontalo Regency

No	Statement	Perception (%)					
		Strongly agree	Agree	Doubtful	Agree Less	Disagree	Total
1	The application of *jarwo* super technology increases rice yield / production	46.67	33.33	20.00	0.00	0.00	100
2	The application of *jarwo* super technology increases farmers' income	53.33	33.33	13.33	0.00	0.00	100

3	*Jarwo* super technology package is easily implemented by farmers	46.67	20.00	26.67	6.67	0.00	100
4	The application of *jarwo* super technology package is beneficial for farmers	46.67	46.67	6.67	0.00	0.00	100
5	*Jarwo* super technology is easily understood by farmers	40.00	33.33	20.00	0.00	6.67	100
6	Farmers are interested in applying *jarwo* super technology again	40.00	60.00	0.00	0.00	0.00	100
7	The use of biological fertilizer (agrimeth) in *jarwo* super technology is easy to apply	40.00	60.00	0.00	0.00	0.00	100

To develop the application of the *jarwo* super package, it is very necessary to provide technological assistance, especially in the application of the planting machine *jarwo* transplanter in terms of preparation of rice seedbed using "dapog" / seedling box. Many farmers in Gorontalo still do not have guidance and know how to develop rice seedlings using "dapog" and the implementation of a *jarwo* transplanter planting mechine. Hutapea et al. (2017) revealed that the knowledge needs to be improved is planting with a 2: 1 *jarwo* system using transplanter machine, "dapog" seedling system, balanced fertilization, control of mice with trap plants and the use of plastic fences.

Financial analysis of farming

The results of the financial analysis of rice farming using the *jarwo* super technology package in Hutabohu Village, West Limboto District, Gorontalo Regency is shown in Table 5. It can be seen that the average rice farming revenue by applying the *jarwo* super technology package was 37,382,400 IDR per ha, higher than the acceptance of rice farming with existing farmer technology, which was 20,332,800 IDR per ha. The assumption of the price of rice used in the analysis of rice farming in this study is to use the price of rice in effect at the time of the study in Gorontalo, which was 9,000 IDR. The total cost of rice farming with the application of the *jarwo* super technology package was 9,364,000 IDR per ha, higher than the total cost of existing rice farming, which was 7,977,000 IDR/ha. These results indicate that the application of the *jarwo* super technology package increases production costs than usual, due to the addition of technology applications.

Table 5: Financial analysis of rice farming by applying the Jarwo Super technology package in Hutabohu Village, West Limboto District, Gorontalo Regency

Description	***Jarwo* Super Rice Technology**		**Existing farmer technology**	
	Value (Rp./Ha)	**%**	**Value (Rp./Ha)**	**%**
Rice Production	4,154		2,259	
Price of rice per kg	9,000		9,000	
Revenue	37,382,400		20,332,800	
Cash cost :				
Land	17,000	0.18	17,000	0.21
Seed	400,000	4.27	400,000	5.01
Biodecomposer	70,000	0.24	-	0.00
Organic fertilizer	82,000	0.29	-	0.00

Urea fertilizer	360,000	3.84	180,000	2.26
ZA fertilizer	-	0.00	-	0.00
Phonska Fertilizer	575,000	6.14	460,000	5.77
Organic fertilizer	500,000	5.34	-	0.00
Vegetable Pesticides	440,000	4.70	-	0.00
Herbicide	650,000	6.94	650,000	8.15
Outside Family Labor	4,525,000	48.32	4,525,000	56.73
Cost is calculated:				
Family Labor	1,721,000	18.38	1,721,000	21.57
Shrinkage of Equipment	24,000	0.26	24,000	0.30
Total Cash Costs	7,619,000	81.36	6,232,000	78.12
Total cost	9,364,000	100.00	7,977,000	100.00
Advantages of Cash Costs	29,763,400		14,100,800	
Advantages of Total Costs	28,018,400		12,355,800	
R / C Over Cash Costs	4.91		3.26	
R / C Over Total Cost	3.99		2.55	

The results of other studies, Abidin et al. (2013), revealed that the application of legowo technology requires an additional cost of around 150,000 – 200,000 IDR per ha. However, the results of the analysis showed that the application of the *jarwo* super technology package was able to increase the profitability of rice farming. The advantage of rice farming with *jarwo* super application was 28,018,400 IDR/ ha, far higher compared to the benefits of rice farming with existing technology, which was 12,355,800 IDR / ha. That was because the application of the *jarwo* super technology package can increase rice productivity. The application of the *jarwo* super rice technology produces an R / C Ratio of 3.99, higher when compared to the existing rice farming which produces an R / C Ratio of 2.55. These results were consistent with the research of Hutapea et al. (2017), which revealed that rice cultivation with *jarwo* super was more efficient with an R / C Ratio of 2.29 while those who do not apply produce an R / C Ratio of 2.19.

4. Conclusion and Suggestion

4.1. Conclusion

1. Rice productivity with the application of the *jarwo* super technology package from highest to lowest respectively was the *jarwo* super package I Inpari 40 (8.19 tons/ha), *jarwo* super package III Inpari 30 (7.73 tons / ha), *jarwo* super package V IR 64 (6.09 tons/ha), *jarwo* super package IV Cigeulis (6.05 tons/ha), and *jarwo* super package II Inpari 31 (4.41 tons/ha) . The average rice productivity with the application of the *jarwo* super package of 6.49 tons/ha, was higher than the productivity of rice with existing farmers technology (3.53 tons/ha), so that the application of the *jarwo* super rice technology package can increase rice productivity by 84 percent from existing technology the farmer.
2. The average perception of farmers on *jarwo* super rice technology innovation shows that the *jarwo* super technology package increases rice production, increases farmers' income, is easy to implement, and farmers are interested in implementing it again.

3. The results of the financial analysis of farming showed that rice farming with the application of the *jarwo* super technology package was able to increase the revenue, profits, and R/C ratio of rice farming compared to existing rice farming system.

4.2. Suggestion

It is necessary to provide and develop production facilities from the technological components of the Indonesian Agency for Agricultural Research and Development (IAARD) such as biodecomposers, bio-fertilizers and biopesticides to be available at farm shops or production input distributors so that farmers can easily obtain when needed or will implement this component.

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