Conference Paper

Performance of New Rice Variety (Inpari 24) at Subak Amerta Nadi Kerta Village Payangan Sub-district of Gianyar Bali

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Abstract

Model development of rice farming in the production centre area at Payangan Sub-district of Gianyar is designed to introduce a model called rice field laboratory. The principle of the model used is "build, operate and transfer (BOT), refering to a the disseminated model of innovation which is a large scale pilot model at the grass root level. The study introduced new varieties "Inpari"24 as an attempt to replace the old varieties that has lower productivity. Cultivation technology by implementing Legowo System 2:1. The aim of this study was to determine the performance of new variety Inpari 24 in the cropping system in Subak Amerta Nadi, Kerta Village, Sub-district of Payangan Gianyar in the growing season 2014. This study used a randomized block design with two treatments of different cropping systems, namely: Legowo 2:1 (40 × 20 × 10 cm) and tiles (20 × 20 cm), repeated 10 times. Variables observed in this study were: plant height, number of tillers, panicle length, number of grains per panicle and empty grains and yield per hectare. Data were analysed through analysis of variance, then followed by LSD test at 5% level. It was concluded that: (a) cropping systems significantly affected all variables of rice production, (b) the highest productivity was Legowo System which was 7.50 tons / ha, increased by 26.68% compared to tiles cropping system (the method used by farmers).

Keywords: Inpari 24; planting system; rice.

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1. Introduction

The role of the agricultural sector is vital in providing food for the population. The sustainability of crop production requires innovation in technology that can increase productivity and efficiency. Mastery of technology is a prerequisite in pursuing prosperity which is major investment in economic development. Natural resource wealth is no longer the main determinant of economic success, but the mastery of technology will be able to become a major role in empowering all local potentials. It required the efforts to build knowledge (knowledge-based society) to encourage the creation of technology [1] at the farm level.

In assembling agricultural technologies rooted in the region, participatory approach is very important [2] so the resulting technology at the farm level can be understood, internalized and implemented [3]. The participatory approach was described as the approaches and methods that encourage farmers to participate in improving and analysing the conditions of their own lives in order to make plans and actions required [4]. Related to technology implementation at the farm level, some researchers suggested that integrated farming systems among commodities can improve productivity, efficiency and farmers' income [5, 6].

In accelerating changes in the adoption of technological innovations at the grass root level, especially in increasing the productivity of food crops, rice cultivar Ciherang has been grown for some years ago. Introducing new varieties that have the potential to increase production is highly needed. This has been reported [6] that since the last five years, rice production experienced "levelling off" and the decrease of total production factor (TPF). This means that the provided technology fails to improve the production.

For instance, a package of "Supra Insus" (special technological package for rice) has been implemented since 1987 for self-sustaining sufficiency and further developed until 1990. However, the profit received by farmers from this technology was still low due to its high use of agricultural inputs. The price of inputs as well as its labour costs were expensive and may cause decrease farmers income [7].

The increase of rice production during the period of 1978 to 1983 was 1.6 million ton/year, but experienced further declining to less than 0.2 ton/year during period of 1993 to 1998. Similarly, the highest increase of productivity of rice during period 1978 to 1983 was 206 kg/ha.year, and decreased dramatically to 42 kg/ha.year during the period of 1993 to 1998 [8]. There have been some problems already exist in rice farming practices. Rice intensification has been implemented by farmers since long time ago started in 1959 without thinking the sustainability of its production environment [9].

The application of inorganic fertilizer was known as the source of the problem. Now we should care to our soil environment through the application of organic fertilizer to rice fields for improving the physical, chemical and biological properties of soil. The application of rice straw and dung as organic fertilizer to rice fields will therefore provide efficiency of using input and improve the environment of rice growth.

Based on the above ideas, strategy to sustain rice production currently needs to consider conservation of land resources. A model of integration of rice management (called ICM) was then developed with considering the interaction between crops and the availability of resources. Sukamandi Indonesian Centre for Rice Research has been implementing this as a new model of an alternative strategy to increase rice production in the future in order to cut the levelling off office production. However the technology

Table 1: PTT models rice cultivation technology used in the field.

No.	Treatment	Components of ICM Technology
1	Variety	New Superior Cv. Inpari 24
2	Seedbed	Moist Seedbed with application of compost, husks and manure
3	Seed selection	Selection of seed–filled with salt water with salt water
4	Planting	15 days after seedbed
5	Number of seed per hole	1-3 seedling per planting
6	Planting distance	Based on treatment
7	Fertilizer recommendation	Ministry of Agriculture decree No.1, 2006.
8.	Overcoming pest and diseases	Integrated pest management
9.	Handling weed	Mechanic (weeding)
10.	Watering	Intermittent
11.	Handling of post-harvest	

needs to be tested and applied at some locations to check and clarify the possibility in providing better production, especially in Bali province.

The purpose of the study was to introduce new rice variety that can be possible to increase of rice production through exploration of a new technological package for rice production systems.

2. Materials and Method

Experiment was arranged in a randomized block design (RBD), with two different cropping systems, namely the system of planting Legowo 2: 1 (40 × 20 × 10 cm) and planting system tiles (20 × 20 cm), repeated 10 times, according to the number of farmer co-operators involved. The activities of this study were in Subak Amrita Nadi, Kerta Village, Payangan Sub-distric Gianyar, at planting season (MT) in 2014.

This study uses the approach called Integrated Crop Management. The ICM components used in these activities are presented in Table 1. Variables observed in this study were plant height, number of tillers, panicle length, number of grains per panicle and empty grains and weight of harvested dry grain per hectare. The data were then analyzed by Anova. If the there were significant differences among treatments, data were further tested with LSD at 5% level [10].

3. Results and Discussion

Rice production is much influenced by the availability of technologies such as seeds, varieties, cultivation, pest and disease control of effective primary, water availability and others [11]. The use of new high yielding varieties will increase yield per hectare

Table 2: Average Number of High Plant and Seedlings of Rice in Subak Amrita Nadi Kerta Village of Payangan Gianyar.

No.	Plant hight (cm)			Number of tillers(stems / clump)		
	30 HST	60 HST	Panen	30 HST	60 HST	Harvest
Jajar Legowo 2:1	73.50b	90.80b	106.00b	17.40b	29.00b	30.00b
Farmer's Way (Tile system)	72.00a	89.00a	104.00a	13.00a	22.50a	24.00a

HST (Days after planting); The figures in the same column followed by the same letter are not significantly different at the level of BNT 5%

and further sustain the security of national food availability. Likewise, the application of different cropping systems by farmers such as applying cropping system legowo 2:1 can increase the productivity of rice. Several studies on Legowo cropping system 2:1 is reported to provide the highest grain yield of 6.25 ton/ha, an increase of 18.1% compared to the tiles cropping system 20 × 20 cm [12].

New varieties such as Inpari 24 was introduce to farmers at Subak Amerta Nadi Penyabangan Kerta village subdistrict of Payangan, Gianyar in 2014. The introduced technology was integrated crop management (ICM) with Legowo row planting system 2:1 in 3 hectares areas. To view the performance of growth and yield of rice, it was observed on plant height and number of tillers at the age of 30 and 60 days after planting and at harvest period. The components of rice production such as the number of panicles, panicle length, number of grains per panicle fill, empty and dry harvested grain yield per hectare were also observed.

The results on the observation of plant height and number of tillers per hill at age 30 and 60 days after planting are presented in Table 2. The mean height of plants at the age of 30 HST on Legowo row planting system 2:1 was 73.5 cm, whereas the farmer's way was 72.0 cm.

At the age of 60 HST rice plants, the highest average height of the plants grown in Legowo row planting system 2:1 was 90.80 cm and followed by 89.00 cm in farmer's way. The same thing during harvest time, the plant height in Legowo row planting system 2:1 and in the farmer's way were 106.0 cm and 104.0 cm, respectively. From Table 2, it was also shown the PTT models Legowo row planting system 2:1 gave the best results on the development of seedling growth. Number of tillers at the age of the plants 30 days after planting, 60 days after planting and harvest were found to be higher in the system Legowo row planting 2:1 than in farmer's way.

The system of Legowo row planting 2:1 gave better performance on the average number of panicles per clump, panicle length, number of filled grain/panicle, number of grain hollow/panicle, weight of 1000 seeds and the results GKP / ha in Subak Amrita Nadi Hamlet Penyabangan. In addition, the amount of empty grain / panicle in Legowo system was lower than that in the planting sytem used by farmers (Table 3).

Table 3: Average number of panicles per clump, panicle length, amount of filled grain / panicle, Number of empty grain / panicle, weight of 1000 seeds and Results GKP / ha in Subak Amerta Nadi.

No.	No. of panicles per hill	Panicle Length (cm)	No. of filled grain / panicle	No. of Hollow grain	Dried grain yield / ha	Weight of 1000 seeds (g)
Jarwo 2:1	22.00b	25.00b	128.00b	3.60a	7.50b	22.50b
Tile system	20.00a	24.10a	121.00a	5.60b	6.40a	21.20a

Table 4: Analysis of rice farming with Jajar Legowo 2:1 system for Inpari 24 in Subak Amerta Nadi with total area of 1 ha.

No	Description	volume	Unit	Price / unit	Total (IDR)
A	Variable costs				
1	Seed Inpari 24	34	kg	7,000	238,000
2	Fertilizer				
	- Urea	250	kg	2,500	625,000
	- Phonska	100	kg	3,000	300,000
	- K_2O_5	100	kg	500	50,000
	- Compost	3000	kg	500	1,500,000
	- Bio urine	60	ltr	1,000	60,000
3	Pesticide	3	btl	100,000	300,000
4	Labor				
	Watering	13	HOK	70,000	910,000
	Land cultivation	11	HOK	70,000	770,000
	Planting	18	HOK	70,000	1,260,000
	Clearing	18	HOK	70,000	1,260,000
	Fertilizing	11	HOK	70,000	770,000
	Pest and diseasis control	18	HOK	70,000	1,260,000
	Harvest	10	HOK	70,000	700,000
5	Rent land	100	are	25,000	2,500,000
6	Rate interest	7	%	12,822,800.00	1,538,736
	Total variable cost				14,041,736
B	Fixed Cost				
	depreciation tool	1	package	100,000	100,000
	Total fixed cost				100,000
C	Other cost				
	Others	2	year	200,000	200,000
	Total others				200,000
	Total cost				14,341,736
D	Revenue	7500	kg	4,100	30,750,000
E	Profit				16,408,264
F	Farmers profit				26,677,000
G	R/C ratio				2.14

Table 5: Analysis of paddy Inpari 24 by way of farmers (system tiles) in Subak Amrita Nadi by conversion of land area 1 ha.

No	Description	volume	Unit	Price/unit	Total (IDR)
A	Variable costs				
1	Seed inpari 24	36	kg	7,000	252,000
2	Fertilizer				
	- Urea	300	kg	2,500	750,000
	- Phonska	100	kg	3,000	300,000
	- K2O5	75	kg	500	37,500
	- Compost	3000	kg	500	1,500,000
	- Bio urine	60	ltr	1,000	60,000
3	Pesticide	4	btl	100,000	400,000
4	Labor				
	- Watering	14	HOK	70,000	980,000
	Land cultivation	11	HOK	70,000	770,000
	Planting	10	HOK	70,000	700,000
	- Clearing	24	HOK	70,000	1,680,000
	- Fertilizing	12	HOK	70,000	840,000
	Pest and diseasis control	18	HOK	70,000	1,260,000
	Harvest	10	HOK	70,000	700,000
5	Rent land	100	are	25,000	2,500,000
6	Rate interest	7	%	13,029,500	1,563,540
	Total variable cost				14,293,040
B	Fixed Cost				
	depreciation tool	1	paket	100,000	100,000
	Total fixed cost				100,000
C	Other cost				
5	Others	1	th	200,000	200,000
	Total others				200,000
	Total cost				14,593,040
D	Revenue	6400	kg	4,100	26,240,000
E	Profit				11,646,960
F	Farmers profit				21,940,500
G	R/C ratio				1.80

Number of panicles per hill and panicle length in Legowo row planting system 2:1 were 22.00 per clump and 25.00 cm, respectively. These results were better than that in the method used by farmers i.e. 20.00 per clump and panicle length of 24.10 cm, respectively. The average number of filled grain/panicle in Legowo system was 128.00, higher than that in the method used by farmers (121.00 filled grain per panicle). Analysis on the weight of 1000 seeds showed that the system Legowo row 2:1 provided higher weight (22.50 grams) than that in the method used by farmers (21.20 grams).

Results of dry grain harvest (GKP) indicates that the system Legowo row 2:1 gave higher result (7.50 tons per hectare) compared to 6.40 tons per hectare in the method used by farmers.

The lower rice production in planting method developed by farmers is likely due to the lower effectiveness of the cultivation technology such as (1) the seeds used were seeds that they used in the previous season (not labelled) with an average of planting about 5 stems per clump of plants, (2) the use of spacing which was parallel to one direction only, (3) Improper fertilization type, dose, time and manner, (4) without intermittent irrigation system. In addition, the attack of pests and diseases on rice plants cultivated according to farmer's method was higher than that in Legowo cultivation method. Intermittent irrigation has in important to fix the cycle of exhaust gases which damage the land, giving the chance of the formation of plant-available nutrients in soil. Intermittent irrigation can also regulate the humidity, a factor that often influences the development of plant pest and diseases.

Economic analyses of growing Inpari 24 rice variety are presented in Table 4. From the results of this analysis indicate that these two ways of planting gave good economic benefits. The planting system of Jarwo 2:1 (legowo) resulted in higher B/C ratio (2.14) than that of the farmer planting system (1.80).

4. Conclusion

The treatments of cropping system showed a significant influence on all observed variables. The highest productivity was generated by the system of planting Legowo 2:1, which was GKP 7.5 tonnes / ha with the increase of 26.68% compared to the farmer planting system. The level of profits earned by the system of Legowo row 2:1 is higher than that of the way of farmers. To know the potency of Inpari 24 variety, it is necessary to do similar studies in other agro-ecosystems, different season or with the treatment of other cropping systems.

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