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COMMUNITY-BASED RICE-MUSHROOM PRODUCTION TECHNOLOGIES AND INNOVATIONS IN BATAAN FOR SUSTAINABLE DEVELOPMENT

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ABSTRACT

This project was initiated basically at promoting the rice-based integrated farming system cum mushroom, vegetable and vermicast production as climate change adaptation measures in the low land rain-fed areas. Thirty techno-demo farms were established to showcase the effectiveness of improved straw mushroom, vermin composting and rice production. Technical skills and knowledge of farmer cooperators and adopters were improved through capacity development on production technologies and farming systems. Farmer association was formed and registered to Department of Labor and Employment (DOLE). Project visibility and promotions were performed through radio broadcast, trainings, newspapers, IEC development and posting to Bataan official website, 1Bataan. The project has forge collaboration and partnership with Local Government Unit (LGUs), Agricultural Training Institute (ATI) and Department of Trade and industry for wider promotion and adoption of the technology. The interventions recorded 25.51 % increase on income of farmer beneficiaries.

KEYWORDS

Rice-based integrated farming, mushroom, vermicast, vegetables, FIBA.

1. Introduction

The nation's rice granary, Region 3, will remain the primary rice-producing region. Central Luzon's posted a production record for irrigated and rainfed palay of 3,423,053.00 and 342,097.00 metric tons, respectively. Bataan contributed a total palay production of 155,056 metric tons or equivalent to 4.12 percent of the total palay production in 2014 (da.gov.ph).

This break through has inspired the Department of Agriculture and other agencies to continue and sustain the innovative approaches in improving the performance of rice palay in the region. Several initiatives that will optimize rice production and efficiency have been conducted not only by the Department of Agriculture alone but with other collaborating agencies like the LGUs, SUCs, PhilRice, NGOs, and Peoples Organizations.

The steady increase of palay in Central Luzon is possibly attributed to the massive research and development and extensive technology transfers among partner agencies. The role of research and extension are essentially important in responding to the challenge of food security in the country. Many opportunities exist for increasing the production and profitability of crops and livestock and, at the same time, reducing dependence on food importation. Although rice is the primary dietary staple of most of these communities, the profitability from both land and labor inputs is poor. As a consequence, rice farmers remain in poverty and have little incentive to increase rice production.

Innovation is needed to increase yields (varieties, agronomy, irrigation) and reduce labor inputs (direct seeding, weed management, mechanization, irrigation), and ensure that market returns are optimized. In doing so, individual production systems will need to achieve a significant reduction in their environmental footprint (http://aciar.gov).

Rice stability and sufficiency in general require massive use of technologies and continuing R&D to optimize yield and productivity per unit area.Continuing capacity building among rice farmers remains to be the main menu for them to internalize the essence and potentials of improved technologies in increasing rice performance beyond the average yield index. Extension cum research with greater participation of farmers during the process will create a better understanding and appreciation with the value of the interventions. In this premise, the extension cum research rice-based crop production model that will increase productivity per unit area through efficient use of labor inputs, agricultural supplies, and utilities is proposed for implementation. Other than high-value vegetable crops as rice components, the mushroom culture is eyed to be a potential component of the integrated rice-based technology.

The promotion of the *Volvaceavolvacea* and oyster mushrooms culture and their economic importance had been a regular extension activity of the agriculture campus of BPSU. These were conducted through seminars/trainings, technology demonstrations, and technical assistance. The technological innovations in mushroom culture specifically on the use of stems of leguminous trees as substrate of F1 strain and various bedding materials treated with EMAS like rice straw proved to be a viable technique for optimum results. Despite the potential of mushroom as a livelihood component of rice production, the adoption rate remains minimal due to the in accessibility of the adopters from sources of planting spawn. However, once the planting spawn becomes available in the university through the *Community-Based Spawn Culture,* the production of mushrooms particularly among the farmer organizations that already started on mushroom cultivation will emerge.

This activity makes the use and management of rice straws feasible. The mushroom cultivation will be a best option for rice farmers to avoid the burning of rice straws. The economic opportunities on

mushroom cultivation plus the other activities that can be created out of the spent growing materials like animal feeds, and vermin composting will end-up with a year-round mushroom production. This model offers maximum utilization of farm by-products and residues through other livelihood enterprises other than rice. Through this extension cum research model at the 10 selected and strategic rice-based integrated farming systems through innovative agricultural practices will improve farm productivity, competitiveness, and sustainability in the province.

2. Objectives

Generally, the project aims to develop rice-based integrated farming systems cum mushroom, vegetable and vermicast production as climate change adaptation measures in the lowland rain-fed areas in Bataan.

- ✓ Improved the productivity of rice-based lowland farmer adopters through community-based modality on integrated rice-mushroom, vermin composting and off-season eggplant in Bataan.
- ✓ Develop and capacitate 30 farmer cooperators on a crop diversification system
- ✓ Strengthen the community-based model farm on integrated rice-based cum mushroom and vegetable production.
- ✓ Serve as a show window for farmers, stakeholders, extensionists, and students.
- ✓ Strengthen institutional collaborations and partnerships for wider promotion of the technology.

3. Review of Literature

Almost two decades ago, the country enacted the Philippine Clean Air Act of 1999 to introduce stringent pollution standards and provide comprehensive policies to reduce, control, and prevent air pollution. The law not only covers the industrial and transportation sectors but also prohibits open-field burning, including that of rice straw. Although the legislative framework is important, it is seldom sufficient on its own to reduce the incidence of burning. There is also a need to provide incentives for farmers to reduce straw burning. Such incentives include the use of rice straw in ways that contribute to improved farmers' livelihoods. To meet this challenge, the International Rice Research Institute (IRRI), Philippine Rice Research Institute, and the Philippine Carabao Center recently started *Sustainable rice straw management for bioenergy, food, and feed in the Philippines* (RiceStrawPH), a two-year project funded by the Department of Agriculture's Bureau of Agricultural Research. This project aims to develop sustainable technologies and management practices for rice straw that include the production of bioenergy, mushrooms, and fodder for livestock. To meet this challenge, the International Rice Research Institute (IRRI), Philippine Rice Research Institute, and the Philippine Carabao Center recently started *Sustainable rice straw management for bioenergy, food, and feed in the Philippines* (RiceStrawPH), a two-year project funded by the Department of Agriculture's Bureau of Agricultural Research. This project aims to develop sustainable technologies and management practices for rice straw that include the production of bioenergy, mushrooms, and fodder for livestock. Mushrooms can break down organic material that other microorganisms cannot decompose. Many types of mushrooms grow well on compost that comes from rice straw. Farmers can generate income from mushroom production. Furthermore, the organic matter that remains after collecting the mushrooms can be used as fertilizer on farmers' fields. An important consideration is not to flood the market so that supply outstrips demand and the price drops so much that mushroom production becomes uneconomical for farmers (ricetoday.irri.org).

The Community-based Mushroom Production (CBMP) is a project funded under the DA AgriPinoy Rice Program, which was launched in September 2013 primarily to Raise farm productivity and incomes in rice-based farming communities, Increase and improve nutritional quality of food supply in rural areas, Utilize farm waste materials such as rice straw and rice hull in the production of edible mushrooms. The project features the following: Immediate increase in farm household income, Sustainable income source, Farm waste utilization, least cost technologies easily adopted by small farmers and Minimal cash investment outlay (bicol.da.gov).

4. Methodology

4.1 Selection of farmer cooperators

As the farmer participatory technology transfer modality, the selection of the most progressive rice farmers in the community rice is said to be a critical element in production to achieve the production efficiency and productivity. Therefore, the farmer cooperators were selected according to the farmers technical capability and willingness of the farmer cooperators to adopt the interventions and practices; willingness to share the counterpart fund, attendance to the project trainings,meetings,and cross visits, and development of the techno-demo into learning site and GAP accreditation by DA and BPI. Moreover, the farmer cooperators who are expected to be an active partner by LGUs and BPSU extension service on technology promotion and extension service should possess leadership potentialand network.

4.2 Selection of techno-demonstration sites

The accessibility of the techno-demo to farm-to-market road, water supply, and availability of rice straw and farm resources for year-round production of mushroom and vegetable crops were also considered.The identified techno-demo farms were strategically situated for greater access of stakeholders and farmers who will be willing to observe the production systems adopted in the model farm.

The number of farmers in the area who already implement the integrated rice–based farming cum mushroom, off-season solanaceous crops, and vermicomposting production were also assessed. Interestingly, most of them have been cultivating straw mushrooms as a subsistent commodity. The rice farmers in the project sites have been practicing integrated farming system and application of organic fertilizers. The practice of organic-based crop production particularly on palay is already established thus making vermicomposting and mushroom production to become sustainable and productive activities among farmers.

Definitely, this modality does not only improve farmers practices, efficiency and productivity but is essentially a reliable climate change adaptation strategy through improved use of farm resources and substantial increase of farmers adopting the protocol.

4.3 Implementing Strategies

The pre-implementing phase includes; formation of the local team; identification/validation of the farmer co-operators thru FGD; baseline data gathering and identification of the management and technology gaps, presentation of the extension cum research protocols. The management plans and process documentation were implemented by the co-operators. The production data were measured and analyzed.

6. Results and Discussion

6.1 Breakthrough and milestone

Figure 1 presents the profitability of the rice-based farms that employed the CBRM interventions and farmers' practice.

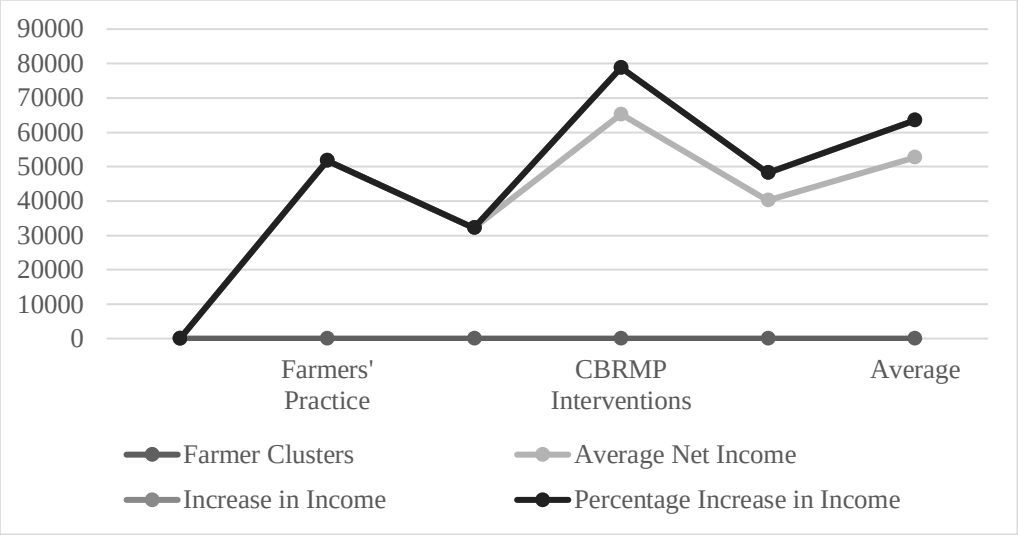

Figure 1. Profitability Analysis Between Farmer's Practice and CBRMP Interventions

Table 1. Percent of Average Net income Increase of the Farmers Practice Versus CBRMP Interventions from Cluster 1 and 2 of Farmer Cooperators.

Cluster	Farmers' Practice		Package of Technology						Average Net Income Increase	Average Percentage Increase
	Rice Yield (bags/hectare)	Average Net Income Php 1000/bag	Rice Yield (bags/hectare)	Rice Yield (Net Income)	Mushroom (Net Income)	Solanaceous Crop (Net Income)	Vermicast (Net Income)	Total Average Net Income		
Cluster I	76.43	51,728.57	80.79	54,942.86	2,212.86	5,825.36	2,196.43	65,258.30	13,529.73	26.16%
Cluster II	71.13	32,200.00	70.56	30,750.00	1,355.00	6,923.44	1,106.25	40,205.25	8,005.25	24.86%
Average	**73.78**	**41,964.29**	**75.68**	**42,846.43**	**1,783.93**	**6,374.40**	**1,651.34**	**52,731.78**	**10,767.49**	**25.51%**

This table presents the average percentage increase of income of the Farmer's Practice versus CBRMP interventions from 1st to 2nd Batch of farmer cooperators. It can be noted through the summary table that all of the farmer cooperators from all the two clusters have earned anincome which is way higher compared to that of farmers' field practice. Cluster 1, in terms of average net income increase is 13,529.73 which is 26.16% increase after adoption of CBRMP interventions while Cluster 2 earned 8,005.25 increase in average net income which is 24.86% increase after adoption.

Moreover, the target of 15% increase in yielded income was also achieved by all of the adaptors of the CBRMP interventions.The results clearly indicate the viability of the interventions in-terms economic benefits.

Despite incurring additional costs due to increased labor and land use in terms of the processing of mushroom production and solanaceous vegetables because of the adoption of the CBRMP technological interventions, it can still be noted that rice yield before and after the CBRMP was

higher after the interventions, with the added gains coming from solanaceous vegetables such as eggplant, tomato, bell pepper, and organic fertilizers such as vermicast and vermicomposting.

7. Conclusion and Recommendations

Based on the foregoing findings, it is recommended to undertake upscaling of modality for wider application and adoption of the rice-based farmers in the locality. Likewise, the support of LGUs on policy creation will be a vital mechanism that enhances sustainability and institutionalization of the said project leading to commercialization and enterprise development of the participating farming communities.

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