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Diagnosing and Providing the Support Systems Needs of Small Scale Organic Rice Farmers in Bicol Region, Philippines

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Abstract With the increasing number of rice farmers wanting to shift to organic farming in the Philippines, there is a need to diagnose the needs in terms of technologies, policies and support services that will promote compliance of our small scale farmers to national standards on organic agriculture. The study determined the practices, gaps and problems of small organic rice farmers, and recommended specific actions to overcome gaps and problems in the adoption of organic rice farming. Data and information were gathered from individuals, organizations and groups known to practice organic farming through primary and secondary data gathering, key informant interviews (KII), and focus group discussions (FGD). Support systems mostly needed are the following: a) seed production and saving b) alternative methods on pest management; c) climate-smart farm planning; d) climate-smart post-harvest facilities; and d) effective market support systems. Moreover, there is a need to conduct extension support services on seed production, localized seed saving systems and ecological pest management to increase knowledge and know-how of organic agriculture adopters. Lastly, provision of community-based common service facilities for seed drying and storage, and marketing support are crucial to improve productivity.

Keywords: diagnosing organic agriculture, small scale organic rice farmers, support systems needs

Introduction

Organic agriculture in the Philippines is a fast growing industry. A significant increase in the number of organic farmers has been observed because of its premium benefits for health (Lopez, *et al.*, 2007; FAO, 2003; Forman and Silverstein, 2012), environment (Cremens and Miles, 2012; FAO, 2003; Mader, *et al*., 2002; Poveda, *et al.*, 2006). Moreover, its contributions to climate change and disaster risk mitigation and adaptation is well recognized (Esham and Garforth, 2012; FAO, 2011; Smit and Skinner, 2002; Scialabba & Müller-Lindenlauf, 2010). Since the ratification of Organic Agriculture Act of 2010 (Republic Act 10068), the organic

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farming adopters in the country increased by 480%, production areas by763% , and production volume from 12,899 metric tons to 442,510 (DA-BAR, 2015).

Different practices in the production of organic rice have been introduced and adopted by farmers in order to comply with the conditions set by the Philippine national standard for organic crop production. However, compliance to standards is still critical since technology and support services appeared to be not sufficiently provided or available at the farmer's level (ADB, 2015; Zorn, Lippert and Dabbert, 2013).

Hence, it is important to identify the needs of organic rice practitioners to determine the gaps between their current farming practices and the standards set for organic crop production practices. This study adopted a diagnostic approach to further understand the support systems needs of small organic rice farmers (with 3 hectares and less lands). It determined the practices and needs of farmers and recommended specific measures to overcome these gaps. The study also identified appropriate policy directions for policy makers and program implementers to improve the compliance of farmers to national standards on OA and meet the market demands for organic rice products.

Materials and methods

Primary data were gathered through interviews of respondents. Secondary data were collected from institutions like the Department of Agriculture, local government units, and local non-government organizations involved in organic agriculture promotion. Key informant interviews (KII), and focus group discussions (FGD) conducted involving people, organizations and groups were done to identify and validate current practices, problems and needs. Participatory approach in FGD was done to draw out recommendations and solutions to the problems encountered by organic agriculture farmers. FGDs were done in finding recommendations and solutions, as this strategy was found to be effective in extension research (Masadeh, 2012; Liamputtong, 2010; Stewart *et al.*, 2013).

Interview respondents included six(6) peoples organizations on organic agriculture and selected Local Goverment Units (LGUs). From the list of organic farmers, about 20-30% were selected for primary data gathering, FGD, and KII.

Figure 1. Focus group discussions during data gathering at Libmanan (left) and Goa (right), Camarines Sur, Philippines.

Results and discussion

Description of Practices

Seed and seed selection

Most organic farmers are secured with seeds. Majority of the seeds used are either traditional cultivars, farmer-bred, or saved seeds from previous harvest. Occasionally, farmers use inbred NSIC varieties like RC 18, RC 10, RC222. Hybrid varieties are also tried. Organic farmers usually maintained several "favorite" varieties or cultivars which they plant alternately depending on season. It is their practice to collect or exchange seeds for farm trial to identify good performing ones. The choice for varieties are based on the following qualities: stress tolerant (against strong wind, floods, drought); pest resistant, early maturing, good eating quality, high yielding, high milling recovery, and those that respond well under organic farming conditions.

Preparing seeds for planting

Seeds are dried for few hours when sun is not very hot. Seeds are cleaned by willowing or blowing. The seeds are then placed in a container with water to allow the lighter ones and other non-seed materials to float which are then discarded. The seeds left at the bottom of the container are allowed to germinate. However, some organic farmers especially those using SRI(system of rice intensification) practice a unique way of cleaning seeds. After drying and cleaning, seeds are placed in water with salt (suggested ratio: regular bucket of water with 1/4kg salt). Seeds that float are discarded and only those that sank are used for germination. The remaining seeds are washed properly with water. The seeds that remain are considered more viable and vigorous. Most organic farmers plant more than one variety in a cropping season. They share and exchange seeds to other farmers in small quantity of 50-500gms.

Land Preparation

Most organic farmers do get into land preparation right away for the next planting season. They allow the stubbles to decompose by fallowing or leaving the soil uncultivated for about a month or more before flooding. Some irrigate the field immediately and do plowing and harrowing when soil is soft enough. Field is drained to allow rice stubbles to decompose and weeds to grow. Spraying of IMO combined with FPJ is done every week to hasten decomposition of rice stubbles. Some who are dependent on irrigation schedule allows flooding for 2 to 4 weeks. Land is thoroughly prepared by two plowing and two harrowing done alternately with the use of tractor. There are farmers who do plowing with the use of carabao after every 5 years to destroy the hard pan.

Planting

In lowland organic rice production, planting is either by transplanting or direct seeding. In transplanted rice under SRI, it is done by early planting of seedlings (8-12 days after sowing) at 1-2 seedlings per hill with a distance not closer than 25m by 25 cm in marked soil to obtain the optimum tillering potential of rice plants. Seed requirement is only 6-10 kg per hectare. In non-SRI, transplanting is done 15-25 days old at 3 or more seedlings per hill at 20 x 20 or closer in marked or unmarked soil. Seedling requirement is 1-2 bags per hectare. Direct seeding is also done by some organic farmers to reduce labor cost associated with transplanting. Pregerminated seeds are broadcasted thinly in unflooded soil. Seed requirement in this method is also 1-2 bags per hectare.

Fertilization

Organic fertilizers like vermicompost and composted plant and animal wastes are applied at land preparation at a minimum of 15 bags per

hectare. More are applied by those with available fertilizers in their farms. There are farmers who use organic fertilizer (vermicompost) for top dressing) as they find the practice effective in correcting yellowing of leaves.

While rotation with legumes is a recommended practice to increase soil fertility (Rahman *et al.*, 2014) (Rahman *et al.*, 2014; Schulz, Keatinge and Wells, 1999) and minimize pests (Kathiresan, 2007; Marenco and Santos, 1999), only one farmer was found planting rice after mung bean during the study.

Figure 2. A farmer practicing legume-rainfed rice rotation in Libon, Albay.

Liquid fertilizers like combinations of indigenous microorganism, fermented plant juices, fish or snail amino acid, calcium phosphates and vermin tea are sprayed at 1 small sardine can per tankload (regular size sprayer) at weekly interval. Composts and liquid fertilizers are produced by farmers. However there are farmers who buy commercial organic fertilizers.

Pest Control

Tungro virus is controlled traditionally by staking with madre de cacao stems, inverted coconut stem, and tagbak. Insect pests are controlled with the use of botanicals and natural pest management. Golden Apple Snail (GAS) is controlled through hand picking throughout the growing stage of rice, crushing of eggs, proper water management, duck grazing, application of CRH and making of canalets. Dry land preparation, fallowing during dry season, and alternate wetting and drying are practices found to be effective. Weed control is done through proper water management particularly during vegetative stage, rotary weeding (1 to 4 times) and hand weeding. In direct seeded rice, almost similar methods are used to control pests.

Good water management is also practiced to control weeds and GAS. Good irrigation timing is done by farmers to control both weeds and snails. At seedling stage, soil is just kept moist or dry to avoid GAS damage. Then, farm is flooded at first signs of weed germination. After about three days submerging the field, water is drained to keep GAS away. Additional hand weeding and rotary weeding are done to control weeds. For SRI farmers, rotary weeding is done 4 times during the vegetative stage.

Irrigation management

Intermittent irrigation is practiced for weed and snails management and to encourage more tillering. In SRI, soil is always kept moist but not flooded during vegetative stage. Flooding is done to soften soil before rotary weeding at 2-3 cm depth. Flooding is allowed at the onset and during reproductive stage.

Harvesting

Harvesting is done when 80% of the grains are golden or ripe. The usual process of harvesting is done. However, grains for seeds are harvested first in pre-selected field (those with good uniform crop stands and free from weeds) and off-type varieties. If present, these are removed first before harvesting.

Post-harvest and Marketing

Organic farmers who own threshers do not allow the renting of the equipment to non-organic farmers. Farmers who rent threshers do thorough cleaning of the equipment before threshing their organic palay. However, there are still farmers who do not clean rented thresher. Palay is usually sold locally as organic milled rice or palay (fresh or dry) at higher price compared to conventionally produced ones. The usual market is Pecuaria Development Cooperative Inc. (PDCI), an organic rice consolidator. PDCI however have preference for colored rice. Those who have no access to PDCI sell rice in local *compradas* (local grain buyers) at prevailing market price or sell to friends and relatives.

Other practices

Some farmers practice ratooning to minimize capital and labor. It is also used as climate change mitigation strategy since expenses are minimized when farmers wanted to ensure harvest (even little) weather will not be favorable . Most organic rice farmers practice diversified farming system. Aside from the main crop rice, other crops are raised for food, seeds, fuel , feeds and as raw materials for liquid fertilizers. Likewise, animals are raised as source of manure for compost, additional income and food. As practiced by most farmers, rice straw is spread out evenly into the

field immediately after threshing. Rice straw is plowed back to the soil. IMO and FPJ are sprayed weekly to hasten decomposition. Some farmers use it as feeds for livestock , mulch for vegetables and for composting purposes.

Gaps, Problems and Support systems needs of small scale organic rice farmers

The growing demand for organic rice products requires widespread promotion and adoption of organic agriculture through the national research and extension program (Mendoza, 2004). Determining the gaps and problems is the basic step to determine the support and policy systems needs of organic rice farmers.

With the absence of seed certification in the Philippines, most farmers use seeds from informal sources (farmers' seeds, seed exchanges). Supply of organic seed and availability of varieties which respond well under organic production system is inadequate. Farmer-based sustainable seed production and distribution system needs to be functional at community level to address the issue of organic seed scarcity. This should be backed-up with selection of varieties and cultivars appropriate for organic production and varying farm conditions. The selection process can be participatory as was found effective in the Philippines through Masipag Program (Medina, 2002), and in Myanmar (Rahman *et al.*, 2015) and other countries. found Certification system for organic seeds should be addressed immediately to have increase access for planting materials.

Alternative pest management using effective indigenous practices and locally available materials were limited or whenever available, are not accessed by farmers. Modifying rice farming systems to optimize green manuring and ratooning practices are identified to be necessary. Immediate concerns for soil fertility management include limited sources of locally available materials for organic fertilizer production and research-based methods of preparation and utilization of liquid and solid fertilizers. The system of rice intensification (SRI), a popular practice among organic farmers needs to be backed-up with demonstration farms and practical trainings for farmers and farm workers as well. With the need to control weeds through rotary weeding in this system, the efficient and low cost motorized weeding equipment is necessary and urgent.

The study identified the following support systems needs of the farmers : a) effective seed system which will sustain the supply of organic seeds, including know how on seed production, selection and keeping; b) knowledge on alternative methods on pest management; c) appropriate and climate-smart farm planning which will make farming more resilient to the effects of changing climate and market; c) post-harvest technology and d) effective market support systems. Asian Development Bank (2015) found similar needs of small scale farmers that must be addressed such as

minimal infrastructure, rampant market and institutional failures,…. and lack of technical knowledge to increase compliance with complex certification.

Concerned government and non-government organizations should build partnership to develop and implement a sustainable program on organic agriculture in the countryside. The approach may be patterned on the partnership framework to rice self-sufficiency in Bicol Region as formulated by the Collaborative Research, Development and Extension Services (CRDES) where technical assistance, training, and seed production and seed system development are components (Carada, *et al*., 2012). The collaborative endeavors should be done essentially to a) consolidate and disseminate science-based technologies on organic production, particularly on seed production, selection and saving, pest management, and post-harvest and marketing systems; b) increase the demonstration of models; c) increase the production and dissemination of effective IEC materials; d) improve access to common service facilities at the village level for fertilizer production, seed drying and storage, trading and marketing; e) conduct of more intensive trainings of educators and farmer technicians; and, f) include OA in the curricular programs in agriculture, environment and health education to create more awareness.

Table 1. Problems and issues, coping mechanisms and required interventions for organic rice farming in Bicol, Philippines. May, 2012.

Problems and Issues	**Coping Mechanisms**	**Technology Needs**	**Recommendations**	
			Training	Others
Seed and Seed Selection				
Genetic breakdown of some farmers' cultivars. Many farmers lack the knowledge and skills in selection to maintain seed purity/uniformity	Train farmers on seed selection	Seed selection skills for untrained farmers	Training on rice breeding	Establish community seed banking;
	Seed exchange of farmers	Organic seed production and technology	Training on organic seed production	Identify and strengthen existing farmers seedbanks;
Lack access to high yielding traditional and inbred varieties, including colored and fancy rice with good response to organic farming and environmental stresses.	Few farmers test varieties for adaptibility	Seed banking		Continuous collection and selection;
	Secure seeds from Local government units (LGU) and Department of Agriculture (DA)			Strengthen seed saving and exchange system;
Most organic farmers believe that modern varieties will not respond well to organic farming				Certification system for organic seed.
	Save and use their own seeds	Maintain seed quality during storage		
Seed is not readily available after calamites				

<u>Land preparation</u>				
Expensive fuel-based land preparation				
Lack of tools and equipment				
Lack of draft animals				
<u>Soil nutrient supplementation</u>				
Labor intensive production of organic fertilizers	Make own fertilizer to lessen buying of commercial ones.	Technology to enhance quality of liquid fertilizers	Training on vermicomposting	Community approach (*bayanihan*-type) fertilizer production
Expensive vermiworms and lack of knowledge on vermicomposting	LGU and DA provided the initial vermiworms	Protocol on the use of liquid fertilizers alone or in combination with solid fertilizers	Training on production of inputs should be a continuing program	Provision of more equipment like shredders to group of farmers
Expensive commercial organic fertilizers	Molasses bought in large quantities (in drums or 20 li containers) during milling season of sugarcane	Modifying farming system to accommodate green manuring		Simplified IEC materials oncomposting
Molasses (which is the based materials for liquid fertilizers) not always available especially during off milling season of sugarcane	All needed liquid materials are made ready			

Weekly spraying liquid plant supplements and pest not religiously done	for one cropping season.			
<u>Pest Control</u>				
Insect Pests				
Presence of new strain of insect pests of stemborers and rice black bug (rbb)	Spray with OHN; light trapping for rbb	Availability and testing of pest tolerant varieties at farmers field	Training on alternative/ natural/ ecological pest management	
		Preparations of natural pest control solutions	Training on production and utilization of natural pesticide solutions	
		Identification and processing of plant and natural materials with pest control properties		
		Conduct adaptability trials during pest outbreak.		
<u>Golden Apple Snail and weed control</u>	Allowing ducks to graze to control snails and	Integrated snail and weed control	Training on integrated	Production and distribution of IEC

Timing of field operations are difficult: too much rain encourage snail infestation, dry condition is favorable for weed growth **Difficulty in timing of water application during early vegetative stage to control snail and weeds** **Additional expenses for snail picking and replanting, handweeding and rotary weeding** ***Birds*** **Bird attacks at ripening stage**	weeds (only few farmers do it Practice good timing on water management Integrated management to control snail Picked snail is fermented with molasses for fertilizer production (high in N) Planting sacrificial plants like corn (corn flowers are eaten by birds) and sorghum Plant rice varieties which are difficult for birds to eat.	management Testing of the effectiveness and economy of planting sacrificial plants Collection and trial of rice varieties that birds cannot eat easily	management on snail and weed control	materials Farmers should be provided with subsidized motorized rotary weeders, or they should be available for loan

	Synchronized planting		
problems on weeds and rat infestation for upland rice	Planting sacrificial plants like camote for rats	Seed banking for upland rice	Collection and trial of upland rice varieties
High yielding upland rice varieties are difficult to access			
Post harvest			
Difficulty to cope with weather during drying time		Training farmers on how to build low costs dryer	Provision of common service facilities on post harvest in communities
Water Source			
Most water sources are contaminated with chemicals;	Build decontamination ponds in strategic areas	Select/identify common water pond for water decontamination	Ask support for to LGU to provide farmers with backhoes, bulldozers

Summary and Conclusions

As organic rice farming becomes popular and more conventional farmers are shifting to this farming system, there is a need to assess and "polish" the production system and identify policy support and services to ease the compliance to national standard on organic agriculture. Hence, the study determined the practices, problems and problems of small organic rice farmers, and recommended specific actions to overcome gaps and problems in the adoption of organic rice farming. Information were gathered from people, organizations and groups known to practice organic farming through primary and secondary data gathering, key informant interviews (KII), and focus group discussions (FGD).

Practices on seed selection and preparation, seedling production, land preparation, planting, soil fertilization, pest control, irrigation management and post-harvest were looked into and most were found to be in accordance to OA principles. However, there were areas that need to be enhanced to make these practices more compliant to OA standards such as: sustained supply of inputs like quality of seeds and fertilizers, pest and water management, and post-harvest handling. SRI was observed to be practiced by most organic farmers in the study area.

Innovations for a more vibrant organic rice industry should include: sustainable seed production and distribution system in the community, certification system for organic seeds, increased information on good agricultural practices on alternative pest management, improved practices on water management and fertilizer production and usage, mechanization support for weeding and post-harvest operations, preparation and implementation of climate smart farm plans, production of quality value adding rice products and increased access to market. In these aspects, collaboration across sectors was found to be necessary to effectively deliver the support systems needed to increase compliance of small rice farmers to OA standards and consequently strengthen the organic rice sector.

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References

Asian Development Bank (2015). Organic agriculture and post 2015 development goals: building on the comparative advantage of poor farmers. Mandaluyong City, Philippines. 98 pp.

Carada, W. B., Amit, M. G. C., Querijero, N. J. V. B., Paunlagui, M. M. and Quimbo, M. A. T. (2012). Formulating Partnership: A Framework for Analysis and Application in Southern Tagalog and the Bicol Region, Philippines. Partneship for Food Security. Department of Agriculture-Bureau of Agricultural Research and University of the Philippines Los Banos pp. 30-34.

Barry, H. and Yoder, B. L. (2002). Multiple Predictors of contribution by women to agriculture. Cross-Cultural Research 36:286-297.

Esham, M. and Garforth, C. (2012). Agricultural adaptation to climate change: insights from a farming community in Sri Lanka. Mitigation and Adaptation Strategies for Global Change 18:535-549.

FAO (2011). Organic agriculture and climate change mitigation: A Report of the round table on organic agriculture and climate change. Natural Resources Management and Environment Department, Rome. pp. 1-82.

Kathiresan, R. (2007). Integration of elements of a farming system for sustainable weed and pest management in the tropics. Crop Protection 26:424-429.

Liamputtong, P. (2010). Focus group methodology : introduction and history. In Qualitative Research Methods pp. 1-14.

Marenco, R. A. and Santos, V. M. B. (1999). Crop rotation reduces weed competition and increases chlorophyll concentration and yield of rice. Pesquisa Agropecuaria Brasileira 34:1881-1887.

Masadeh, M. A. (2012). Focus group : reviews and practices. International Journal of Applied Science and Technology 2:63-68. Retrieved from http://www.ijastnet.com/journals/Vol_2_No_10_December_2012/9.pdf.

Medina, C. P. (2002). Empowering farmers for rural development: the MASIPAG experience. Biotechnology and Development Monitor 49:15–18. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=lah&AN=20023064613&site=ehost-live\nemail: masipag@mozcom.com.

Mendoza, T. C. (2004). Evaluating the benefits of organic farming in rice agroecosystems in the Philippines. Journal of Sustainable Agriculture 24:93-115.

Rahman, M. A., Thant, A. A., Win, M., Tun, M. S., Moet, P., Thu, A. M. and Singh, R. K. (2015). Participatory varietal selection (PVS): A "bottom-up" breeding approa. pp. 299-314.

Rahman, M. M., Islam, A. M., Azirun, S. M. and Boyce, A. N. (2014). Tropical legume crop rotation and nitrogen fertilizer effects on agronomic and nitrogen efficiency of rice. Scientific World Journal. 11 pp.

Schulz, S., Keatinge, J. D. H. and Wells, G. J. (1999). Productivity and residual effects of legumes in rice-based cropping systems in a warm-temperate environment: II. Residual effects on rice. Field Crops Research 61:37-49.

Scialabba, N. E. H. and Müller-Lindenlauf, M. (2010). Organic agriculture and climate change. Renewable Agriculture and Food Systems 25:158-169.

Smit, B. and Skinner, M. W. (2002). Adaptation options in agriculture to climate change : A mitigation and adaptation strategies for global change, *7*(UNFCCC 1992). pp. 85-114.

Stewart, D. W., Shamdasani, P. N. and Rook, D. W. (2013). Conducting the Focus Group. In Focus Groups. pp. 89-109.

Vanclay, F., Russel, A. and Kimber, J. (2013). Enhancing knowledge in agriculture at the policy level: The potential contribution of technology assessment. Land Use Policy Journal. pp. 406-411.

Zorn, A., Lippert, C. and Dabbert, S. (2013). An analysis of the risks of non-compliance with the European organic standard: A categorical analysis of farm data from a German control body food control. pp. 692-699.

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