KONTRIBUSIA, Vol 3, Issue 1, 2020
ISSN 2614-1582 E-ISSN 2614-1590
Published by Research and Community Development Center

Manufacturing Organic Embryo Red Rice using *Sugawa* Machine at Lombok Kulon, Wonosari Subdistrict Bondowoso Regency, East Java

Authors
Rohimatush Shofiyah, Mochamad Alfan, Wiwik Suharso

Correspondence
Universitas Muhammadiyah Jember
rshofiyah@unmuhjember.ac.id, mochamadalfan@unmuhjember.ac.id,
wiwiksuharso@unmuhjember.ac.id

Abstract

Gapoktan Al-Barokah of Lombok Kulon, Wonosari Subdistrict, in Bondowoso Regency has started milling organic rice using husking machine thus produced raw red rice. Raw red rice is rice grain that has its husks removed. The study established that raw red rice is actually covered by hard husk which contains *Phytic Acid* that could obstruct nutrition absorption to the body. Other drawbacks from raw red rice is that soaking is required before cooking, the texture of the cooked rice is hard to eat, and its nutrition is difficult to digest. These make it less favorable among society therefore it is not in a good sale so far, resulting in low revenue of the organic rice farmers. Therefore, this program was initiated to enrich the quality of red rice products through adding a step into the milling process which is milling using sugawa machine to remove the hard husks. The final product expected from the program was organic embryo red rice that is easy for cooking, soft textured cooked rice, and digestable rice in order to increase the chance of optimal nutrition absorption to the body. Among several solutions offered in the program include supplying and testing a milling machine, production training and guidance, socializing and marketing. The first solution administered was supplying and testing a Sugawa machine to mill raw rice into embryo red and brown rice. Then, it was followed by providing a Sugawa pressure cooker tool to mix derived product from the materials used such as embryo rice and bran, that is embryo porridge and bran cereal. The training conducted in the program contains guidance for applying the SOP of producing embryo rice and its derivatives. While socialization was administered specifically to the board and partners of Gapoktan Al-Barokah, village government, field trainers, and muspika (council for local government) of Wonosari aiming to achieve a collective and sustainable movement, as well as a group of patients of degenerative illnesses from Community Health Center of Wonosari. Finally, it was followed by marketing that was performed during the socialization by providing samples of embryo red rice, embryo brown rice, and its derivatives. The embryo rice was packaged in a 1kg-vacuum bag, labelled with *Botanik Beras Embrio Merah* and *Botanik Beras Embrio Coklat* and thereby distributed to nearby stores around Wonosari subdistrict area.

Keywords: Sugawa machine; raw rice; embryo red rice; Gapoktan Al-Barokah; community

Received: 02 Oktober 2019. Accepted: 14 November 2019

Introduction

Organic rice is grain processed under organic agriculture method, grown from local variety of rice seeds in a soil that is free from any chemical substances (Bachtiar, 2015). Lombok Kulon is a central village for organic rice cultivation in Wonosari Subdistrict, Bondowoso Regency. The field is certified organic by LeSOS (Organic Certification Institution of Seloliman) Mojokerto, totalling at 25 Ha with production average of 10 to 12 Ton/Ha of dry grains obtained from 3 harvesting times in a year (Mastika, 2015). Today, the total width of organic field as opened by the Local Government of Bondowoso Regency reaches 128 Ha, 68 Ha of which is registered and tested for international organic certificate to BIOCert (Kompas, 2017). In 2017, the local government from Chief of Agriculture, Food and Horticulture initiated a land expansion to open 10 Ha more in every subdistrict. This program resulted in the increase of organic field by 230 Ha from 23 subdistricts or increasing production by 2.300 Tons per year in 2018. On the other hand, the highest demand of organic rice especially for the red rice from Surabaya and Bali could only supply 40 tons per month or 480 tons per year, which could result in overstocking of grains in the warehouse. It can be problematic as it is likely to hamper the development of organic farming in Bondowoso Regency, thus it needs a collective movement from the government, Tani Mandiri Community and Gapoktan Al-Barokah of Lombok Kulon to be resolved. This resolution is important to raise awareness of healthy living and consuming organic rice to the local people and to expand market access to national and international scale.

Gapoktan Al-Barokah of Lombok Kulon, Wonosari is a joint group of 13 farmers communities consisting of 350 farmer members. One of the pioneered farmer communities for organic rice cultivation is Tani Mandiri Group which had 40 members. In this context, Gapoktan Al-Barokah is a producer of Bondowoso's organic rice holding the label 'Botanik', while the Tani Mandiri Group is responsible for supplying the organic red rice, specifically.

Red rice is manufacured by milling the grain using husking machine to remove the husks. This process results in raw red rice seeds which are still in fact covered with hard layer containing *Phytic Acid*. Phytic Acid is a substance commonly contained in seeds, including organic rice seeds. This substance can reduce absorbability of essential micronutrients such as Ca, Fe, Zn, Mg (Aurum and Guntoro, 2013). Phytic Acid is an organic molecule used by plants to store phosphorus in a seed. To this use, phytc acid has an important function to plants, but might damage humans when consumed (www.edubio.info). To this harm, phytic acid can be categorized as anti-nutrition molecule which is capable to obstruct nutrition absorption to human digestion system. Therefore, technological solution is required to this acid problem contained in the raw red rice, for instance, a solution to scrape the hard layer of the red rice precisely and safely in order to produce phytic acid-free organic red rice.

Not only it is disadvantageous for nutrition absorption, the phytic-acid contained in the hard layer of the rice grain is also less favorable because it has other weaknesses in terms of consumption purposes, that it has to be soaked prior to cooking and has rather stiff texture when eaten. These weaknesses make the red rice less of a favorite for the market. It causes not optimum price, scarce sales, and limited revenues to the organic rice farmers in Tani Mandiri Group. Therfore, the present program aims to enrich the quality of red rice products through adding a step into the milling process using sugawa machine that could remove the outer layer of raw red rice. The final product expected from this program is organic embryo rice which is easily cooked, tender textured, and digestable. Meanwhile the specific target to be achieved through this program is unit reinforcement by adding another variety, organic embryo red

rice which can be of people's preference, healthy for human, better valued thus raise sold products, and provide a system for applying standard financial management through basic accounting and marketing model based on health and education community in Bondowoso. The targeted health communities for this program is patients of degenerative diseases, such as diabetes mellitus, hypertension, colesterol, and elderly community, public health services, as well as integrated services center. Furthermore, the targeted education communities will include students of formal educational intitutions, from early childhood education to higher education.

Methods

The solutions and targeted outcomes of the present Community Partnership Program (PKM) are described in Table 1 and Table 2. Table 1 depicts the solutions through production activities, and Table 2 describes the financial management and marketing.

Table 1. Stages of Production Activities

Solutions	**Outomes**	**Stages**
Supplying Appropriate Technology	Sugawa Milling Machines	1. Identifying and collecting advanced data to program partners. 2. Determining types of technology and models of Sugawa machine. 3. Purchasing machinery components and other supporting tools. 4. Lab-testing for machine performance. 5. Testing embryo red rice production.
Training and Guiding Program: Embryo Red Rice Production	Documents of SOP	1. Composing SOP for preparing production tools and materials. 2. Composing SOP for embryo red rice production made of raw red rice. 3. Composing SOP for packaging and food storing. 4. Composing SOP for production machine maintenance.
	Knowledge and Skills	1. Deciding training setting and preparing production tools and materials in the location. 2. Socializing production processes of raw red rie into embryo red rice, material and nutritions potentials, market opportunity, and human resources management of Gapoktan Al-Barokah. 3. Training of production for embryo red rice following the applicable SOP in order to assure knowledge and skills transfer to both partners and assure quality of embryo red rice produced.

	4. Special guiding or supervising to 12 members of Gapoktan as supplying agents of embryo red rice so they could apply SOP accordingly.
Self-manufacturing skills	1. Ongoing monitoring to participants' skills in implementing production activities field observations and periodic reports. 2. Evaluating achievement of targeted programs and periodic development to achieve autonomy.
Making coorporation and communication	1. Signing off memorandum of understanding (MoU) on a legal document. 2. Managing permissions to the Health Department (PIRT) and Indonesia National Agency of Drug and Food Control (BPOM)

In supplying appropriate technology, the Team took their roles as (1) a supplier of sugawa machine following the recent research on related technology and machine models and the deal with the partners, (2) evaluator of machine and final products performance using organoleptic test (on texture, taste, color) of the cooked embryo rice, (3) authors of SOP documents composed in accordance with best practices and experiments on time management and thickness of the removed rice hard layer. Both partners, on the other hand, played their roles as information sources about organic red rice specification, production capacity of the embryo red rice as adjusted to the market demands, material availability, and production schedule. Such participations are important to assure that the designed machine suits the needs and expectation of the partners in producing processed food products (tender textured embryo rice and optimum nutritions in the rice).

Furthermore, during the training and guidance program, the Team acted as trainers or guides for the production activities, as evaluators for the monitoring and evaluation, and as mastermind for cooperation. Whereas, in the training and guidance program, both partners were all involved to participate, as agents and owners. In this program, materials of the training were delivered in discussion, direct practice and supervision, and monitoring and evaluation, which all aimed to production autonomy.

Table 2. Stages of Financial Management and Marketing Activities

Solutions	**Outcomes**	**Stages**
Supplying Financial and Marketing Models, and Supervision	Financial Accounting	1. Creating a design for financial accounting model. 2. Composing SOP for recording transactions and writing reports. 3. Supervising the implementation of the SOP.
	CommunityMarketing Model	1. Creating a model design for marketing based on health and education communities. 2. Establishing a company profile

	and proposal for cooperation with community partners and health as well as educational institutions. 3. Making a MoU with community partners. 4. Signing off the memorandum of understanding (MOU) established between the team and community partners.	adjustment and monitoring and evaluating to assure profits as it is a target of the program.
QR Code Promotion Model	1. Creating a model design for promotion using QR Code technology 2. Designing a QR Code. 3. Setting the QR Code in the final product. 4. Supervising the implementation of the QR Code based promotion model.	
Increase of Turnover and Sales	1. Determining a marketing strategy to by adjusting it to variables of price, number of production, and market segmentation. 2. Periodic monitoring and evaluating business development. 3. Supervising the marketing strategey	

In the supplying of financial administration ad marketing model based on health and education communities and supervision, the team acted as (1) designers of financial accounting model, community based marketing model, and QR Code based promotion model, (2) proposal planner for business development of embryo rice product, (3) trainers and guides in the training and practice activities when practicing to implement both models in the business activities done during the program period, (4) monitors and evaluators for model implementation, business development and unit reinforcement for the partner's business activities. The partner Gapoktan Al-Barokah as training participants and implementers of the community based financial accounting and marketing models in every business activity. It s important to be practiced directly by the program partners because they will handle the production and business management activities when the program is finished, while the farmers involved in the Tani Mandiri Group would continously act as suppliers of raw red rice as the main materials of the product.

Results and Discussion

The Community Partnership Program (PKM) entitled Manufacturing Organic Embryo Red Rice using Sugawa Machine at Lombok Kulon, Wonosari Subdistrict, Bondowoso Regency, East Java has been completed. The program started by the team coordination with the program partners; the board of Gapoktan (Joint Farmers Communities) Al-Barokah to plan and arrange schedules of program activities. The program continued to another activity, which is supplying and testing milling machine for producing embryo red rice and other product processing tools. Once the machines and tools were supplied, the training and guidance to embryo red and brown rice production were given following the applicable SOP. Such production skills will allow partners to produce embryo rice in a larger scale autonomously and contiously.

As the training and guidance program was complete, information was socialized to expanded communities, starting from the closest communities to the program partners, such as village and subdistrict government, health communities especially patients of degenerative illnessees, and religion communities established in Wonosari. During the program, marketing was conducted by distributig final products to the nearby stores and retail outlets in Wonosari.

Coordinating and Consolidating

The personnels of the team consist of team leader, members, field assistants, and college students. The team conducted internal coordination and consolidation among the team members. This phase marked as the starting point of the community service program, in which some other points were discussed, such as job descriptions for every member, and timetable of the program, as seen in Table 3. This activity was also conducted with the board of Gapoktan Al-Barokah as the program partner. It aimed to establish mutual commitment and coordination to conduct the programs that would follow manufacturing organic raw rice, specifically of the red and brown varieties, into organic embryo rice and their derivatives. Meanwhile, the coordination between the interested parties would involve the availability of basic materials such as organic raw red and brown rice, and the siftings left out after milling. Such coordination was also intended to transfer technology and assure the business sustainability.

Table 3. Timetable of PKM 2019

Date	Description
May 2019	Coordination and consolidation of internal team members and that with program partners.
June 2019	Supplying the milling machine for organic embryo rice and a pressure cooker at a distributor of Sugawa machinery. Testing production machinery for the composing of SOP.
July 2019	Conducting a training and guidance on manufacturing embryo red/brown rice and its derivatives following the agreed SOP. Conducting a training for designing a sticker for 1 kg-type of packages. Socializing the advantages of consuming organic embryo rice and porridge by discussing their nutritional values, cooking process, and taste. Handing over tools; Sugawa milling machine and Sugawa pressure cooker.
August 2019	Socializing organic embryo products to communities; patients of degenerative diseases at Health Centers. Socializing products to health service staff, agriculture investigators, and muspika (council for local government). Marketing organic embryo red and brown rice, distributing 1 kg-vacuumed packacged products to nearby stores in Wonosari.
September 2019	Socializing and marketing embryo rice products to education and religion communities (Aisyiyah and Muslimat) in Wonosari. Preparing and applying financial and marketing development model.
October 2019	Refining package quality (QR Code labeling) on embryo rice products. Expanding product markets, monitoring and evaluating the progress of raw rice and organic red and brown rice demands.

Supplying Tools

The team members made another appointment with Gapoktan Al-Barokah as partners to decide the specifications of the milling and pressure cooker machines. From the meeting, it was agreed that the main specification of the milling machine is that an embryo rice milling machine with at least 1 kg per 5 minutes speed, 400 Watt at max of electricity consumption, portablity to ease mobility, and made of durable materials. On the other hand, the main specifications of the pressure cooker include as follows; has at least 5 litre capacity, needs at max 900 Watt of electrical power, portable so it could support mobility, and made of durable materials.

With the needs of the program partner, the team started to search for a distributor of the machinery in Indonesia. At the end of the search, the team identified PT. Sonata Green Indonesia centered in Jakarta and branched in Surabaya, East Java. The team, then, participated in the an assembly for product presentation held by the corporate to be well informed about the machinery manufactured by Sugawa and distributed by PT. Sonata Green Indonesia in Surabaya. The detailed specifications of the two demanded machines, milling and pressure cooker machine, can be seen in Table 4. Proofs of products in sealed packages of SPC-6DMKF and SN 1112039457 models as well as handing over of tools to the program partner Gapoktan Al-Barokah at Lombok Kulon, Wonosari Subdistrict Bondowoso are shown in Figure 1.

Table 4. Machinery Specifications of Milling Machine and Pressure Cooker

No	Tool Name	Specifications	Qty
1	Sugawa Embryo Rice Milling Machine	Electricity 240V (50 HZ), Power 200 W, Timer 1-20 / 1-20 minutes, Measurement & Weight 42 cm (L) x 20 cm (W) x 38 cm (H), 10 Kg, Ultra Violet (UV)	1
2	Sugawa Press Cooker	Product Electric Pressure Cooker, Model SPC-6DMKF, 240 V ~ 50 HZ, 1000 W, Capacity 6 L	1

Source: Official Report of Machinery Handing Over

Figure 1. Machinery Handing Over

Testing of Machinery; Milling Machine and Pressure Cooker

As planned in the program timetable, the team was required to test the machinery by operating it. To test the milling machine, the team operated it for milling the organic raw rice to become embryo organic red and brown rice. Gapoktan Al-Barokah provided the materials, such as red, brown, and black raw rice, for the test. This test was intended to investigate the thickness of the grain husk removed from the raw rice. It was controlled through the knob (*thickness*) at its front.

On the other hand, the pressure cooker was tested by using it for processing rice into products/food such as porridge and cooked rice made of red and brown embryo rice. This test was important to identify the viscosity of the porridge gravy and other processed products made for children and adults.

Figure 2. Machinery Testing, Embryo Cooked Rice, and Porridge

After conducting the machinery test, some Standard Operating Procedures (SOPs) were written, including SOP for milling raw into organic embryo red and brown rice, for packaging organic embryo rice, and for making porridge and other products. The SOPs will be explained in the following.

The Procedure for Milling Red Rice

1. Plug in to power source or a wall socket.
2. Set up rice and siftings container.
3. Choose organic raw rice from red or brown rice.
4. Pour 1 kg of raw rice into the container at the top of the machine.
5. Adjust the knob (*thickness*) (at the front) by turning it clockwise to 90^{o} - 135^{o}.
6. Adjust the timer by pressing the timer button until it displays 2 (2 minutes per 1 kg)

7. Press the power button to start milling.

8. Wait until 2 minutes to allow the machine produce embryo rice and collect it using the rice container, and siftings using the sifting container.
9. Unplug and remove the plug from the wall socket.

The Procedure for Making Embryo Porridge

1. Pour in a glass of embryo rice.
2. Add some water with the ratio of rice and glasses of water 1:20.
3. Put on the pressure cooker cap.
4. Plug in to power source.
5. Adjust timer to at least 40 minutes up to 50 minutes.
6. Press the start button to start making the porridge.
7. Wait until timer displays 0 or until it is finished processing.
8. Waith for another 10 minutes until the cap is removable.
9. Unplug and remove the plug from the wall socket to switch off the pressure cooker.

Training

The team of conduct held a training and guidance on processing organic raw rice into organic embryo red and brown rice using the Sugawa milling machine. The activity continued to another training and guidance on making processed food from embryo rice, such as porridge and cooked embryo rice. These activities took place in the meeting room owned by Gapoktan Al-Barokah at Lombok Kulon Wonosari Subdistrict, Bondowoso.

Participants of these activities included members of the board, members and staff of Gapoktan Al-Barokah, agriculture field investgators, the village government and Muspika Babinsa (law enforcement officer) of Lombok Kulon, Wonosari, as seen in Figure 3. The training was started by a speech from the chief of Gapoktan Al-Barokah (Mr. Mulyono), a speech from agriculture investigator (Mrs Yani) and Muspika Babinsa (Mr Didik). The main agenda in the activity was a presentation of processing raw rice from obtained from the harvest of organic rice farmers into embryo rice, advantages of embryo rice, nutritional values of embryo rice, and the danger of consuming polished rice continously. This part of activity can be seen in Figure 4. The training ended with direct practices and guidance of organic embryo red and brown rice at the meeting room. While the practice of packacging the final product of 1 kg embryo rice using a *vacuum sealer* was done at Packaging and Production room, as shown in Figure 5.

Figure 3. Direct Practice and Guidance on Production

Figure 4. Presentation of Embryo Rice Program

Figure 5. Practice of Embryo Rice Packaging

Socializing and Marketing

The socialization aimed the trainee farmers of Gapoktan Al-Barokah, as well as the local people, including possible customers of the products, such as patients of degenerative diseases and hypertension nursed by the Health Center of Wonosari, Bondowoso, as seen in Figure 6. Socializing was important to raise awareness of the communities about self and family health by changing the polished white rice consumption habit, that is believed to contain high sugar and harmful chemical substances, to organic embryo red or brown rice consumption which contains useful nutritions. It is known that consuming organic embryo red or brown rice daily can stabilize blood sugar and calm down hypertension.

Figure 6. Socializing Organic Embryo Rice

On the other hand, the community based marketing strategy is found ideal for organic embryo rice marketing, since organic embryo rice has relatively been more expensive than the polished white rice. This way, only a few would make purchases, such as people who care about the health of their family and themselves, well-read, educated, and financially capable that can make them loyal customers. This socialization activity was inserted with promotion and marketing activities, in which participants would be introduced to cooked embryo and porridge, while the program partner Gapoktan directly immediately conducted sales and transactions of organic embryo rice.

In every community-based socialization and marketing, the program final product, organic embryo red and brown rice, as well as the cooked rice. It was done to allow participants taste the embryo rice directly on the spot. Participants also could pre-order or purchase, as displayed directly by Figure 7. Attached on these final products were sticker labels of organic embryo red, brown, and black rice with the brand's name BOTANIK as shown in Figure 8.

Figure 7. Organic Embryo Rice and Cooked Organic Embryo Rice in Final Packages

Figure 8. Sticker Label of Organic Embryo Red, Brown, and Black Rice

Follow-Up Plans

The following stage after the conduct of the community service program includes reinforcing socialization and community-based marketing, especially those implemented to education and religion communities based in Wonosari, Bondowoso, and expanding market to increase sales of 1 kg organic embryo rice to outlets in Bondowoso. Moreover, the final stage of the program is conducting training and guidance on financial model, monitoring and evaluating the business progress, and publishing on scientific paper and national newspaper. These explanations are detailed in Table 5.

Table 5. Follow-Up Stages

No	Activities	Description
1	Marketing Reinforcement	Marketing embryo rice to education and religion communities (Aisyiyah, Muslimat)
2	Expanding Market to SMEs Product Markets	Focusing market on searching and increasing number of outlets and SMEs product exhibition. Improving package quality by QR Code labelling.
3	Guiding Financial Model Implementation	Composing and implementing financial model to Gapoktan Al-Barokah
4	Monitoring and evaluating (Monev)	Monitoring and evaluating production related activities, marketing, and financing. It aims to identify business progress and resolving business problems.
5	Managing Publication Outputs	Publishing outputs which include publishing on community service journals with ISSN, national newspaper, videos, and books with ISBN.

Conclusion

The team has conluded their community service program about manufacturing organic embryo red rice using Sugawa machinery at Lombok Kulon, Wonosari Subdistrict, Bondowoso, East Java into several points, as follows: (1) The team has conducted the community service as manifested into supplying and testing machinery for milling organic raw red rice into organic embryo red rice, obtaining 1 kg in 2 minutes milling. The testing during production was done to determine the thickness of hard layer removal on organic raw rice. The testing was also performed on the pressure cooker which processes embryo rice into porridge, and obtains that a glass of embryo rice could be processed with 20 glasses of mineral water for 40-45 minutes. To this matter, the testing was important for completing an optimal SOP, (2) The training and guidance on organic embryo red and brown rice production were done to produce 1 kg vacuumed package of rice kg and on designing sticker label, (3) Socialization and marketing were done to the program partners and the local people, especially to health communities including patients of degenerative diseases, such as diabetes and hypertension. Furthermore, marketing was done by distributing the final products to nearby outlets and stores in Wonosari, Bondowoso.

To follow-up the program, some plans need to be realized, including: (1) socialization and community-based marketing need reinforcement and

expansion such as to education, social religion, integrated health center, (2) it needs to diversify organic embryo rice processed products, such as cereal, flavored rice floor, and bran oil, (3) organoleptic and nutritional tests are required to be conducted in food and nutrition laboratorium to every product, including embryo rice and its derivatives so the results are written on the package.

References

Bachtiar, (2015). *Rantai Pasokan dan Prospek Pengembangan Beras Organik di Kabupaten Bondowoso*. Digital Repository Universitas Jember.

Matika, Julianto, Juhanda, (2016). *Model Pengembangan Desa Wisata Organik Lombok Kulon Kabupaten Bondowoso*, FISIPOL Universitas Jember.

Siwi Yunita, (2017). *Botanik Beras Organik Andalan Bondowoso.* Kompas 4 Februari 2017, https://www.pressreader.com/indonesia/kompas/20170204/ (Retrieved on 20 June 2017).

Aurum, Guntoro, (2013). *Analisis Senyawa Tanin, Total Fenol, Dan Asam Fitat Pada Produk Olahan Tepung Sorgum (Sorghum Bicolor L.).* Prosiding Ekspose dan seminar Nasional Balai Pengkajian Teknologi Pertanian.