

## Organic Rice Cultivation System to Support Food Security

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**Abstract.** Along with changes in community lifestyle toward organic lifestyle, organic rice becomes the choice of staple food intake. One of the producers of organic rice in Karang Anyar village Deli Serdang are Mekar Pasar Kawat and Bina Tani farmer groups. The purpose of the community service activities was to increase the production of organic rice as a healthy food intake that is safe to consume and environmentally friendly, to increase the prospect and expand its marketing level to become the superior product in Deli Serdang. Problems in the production of organic rice included the improvement of technology and cultivation management system, development in marketing, post-harvest and packaging techniques. The implementation to solve the problem was done by improving the availability of compost raw materials, improving the production facilities, improvements in the continuity of organic rice products availability and expansion of regional marketing network. The community service activity that has been done was making demonstration plot of organic rice combined with organic rice-duck as a pilot project, handover of technology transfer goods in the form of complete hand tractor, as well as training of organic rice cultivation, organic liquid fertilizer and organic pesticide and organic rice farming management.

**Keywords:** Rice, Organic, Environmentally friendly

**Abstrak.** Seiring dengan peralihan pola hidup masyarakat ke arah pola hidup organik, maka beras organik menjadi pilihan asupan makanan pokok. Salah satu produsen beras organik di Deli Serdang adalah kelompok tani Mekar Pasar Kawat dan Bina Tani yang terdapat di Desa Karang Anyar. Tujuan kegiatan pengabdian masyarakat ini yaitu untuk meningkatkan produksi beras organik sebagai asupan pangan sehat yang aman dikonsumsi serta ramah lingkungan, sehingga berprospek untuk memperluas tingkat pemasarannya sehingga menjadi produk unggulan di Deli Serdang. Permasalahan dalam produksi beras organik meliputi perbaikan teknologi dan sistem manajemen budidaya, pengembangan dalam pemasaran dan perbaikan dalam pasca panen serta teknik pengemasan. Metode pelaksanaan untuk

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*memecahkan masalah tersebut yaitu perbaikan ketersediaan bahan baku kompos, peningkatan sarana dan fasilitas produksi, perbaikan dalam kontinuitas ketersediaan produk beras organik, penataan dalam manajemen pembukuan kelompok tani, perluasan jaringan pemasaran baik lokal regional dan membidik peluang pemasaran secara nasional. Kegiatan pengabdian yang telah dilakukan yaitu pembuatan demplot percontohan budidaya padi organik yang dikombinasikan dengan bebek padi organik sebagai pilot project, serah terima barang alih teknologi berupa traktor tangan lengkap, serta pelatihan budidaya padi organik, pembuatan pupuk organik cair dan pestisida organik.*

**Kata Kunci:** Beras, Organik, Ramah lingkungan

Received 15 October 2018 | Revised 10 December 2018 | Accepted 10 January 2019

## 1. Introduction

Rice as the main staple food of the Indonesian people continues to strive to increase its productivity, through the application of technology in accordance with local agroecology. Until now, Sumatera Utara Province is certain to remain self-sufficient in rice and survive in the fifth rank as the largest rice producer in Indonesia. Based on forecast figures in 2014, rice production in Sumatera Utara is estimated at 3,604,602 tons. Deli Serdang Regency is the center of rice production in North Sumatera with an area of 90,601 ha of rice or 36.27% of Deli Serdang's land area, with an irrigated rice field area of 25,002 ha, non-irrigated rice fields 19,365 ha and dryland / public land covering 46,234 ha [1].

Healthy and highly nutritious food can be produced with organic farming techniques. According to the International Federation of Organic Agricultural Movement (IFOAM), Indonesia is only utilizing 40,000 ha (0.09 percent) of its agricultural land for organic farming, so there are still a variety of synergic programs to make Indonesia one of the organic producer countries in the world. Based on land use area, Indonesia is the third country in Asia to develop organic farming after China and India. The land used for organic farming has only reached 40,000 ha [2].

One of the organic rice producers in Deli Serdang is Mekar Pasar Kawat and Bina Tani farmer groups. The two farmer groups are located in Karang Anyar Village (area 18,839 km<sup>2</sup>) which is an agrarian village located in Beringin Subdistrict, Deli Serdang District. Mekar Pasar Kawat farmer group consists of 72 farmer families with a land area of 25 ha, while the Bina Tani Farmer Group consists of 45 farmer households with a land area of 25 ha.

Mekar Pasar Kawat farmer group is active in organic rice cultivation with paddy secondary crops of cropping patterns since 2003, while Bina Tani has been active in organic rice cultivation since 2013. Up to now, the area for cultivated for organic rice cultivation reached 15 ha (10 ha in the Mekar Pasar Kawat farmer group, 5 ha in the Bina Tani farmer group), with average dry grain productivity of 7.5 tons/ha. In fact, the organic rice produced by farmers of Mekar Pasar Kawat has passed Organic Certification (LSS LeSOS) since December 18, 2013. The product was re-certified on December 5, 2016 and the certificate is valid until December 4, 2019, for rice and secondary crops (Figure 1????). The application for organic certification was funded by the Agriculture Service of Sumatera Utara Province. LeSOS stands for Seloliman Organic Certification Institute, an organic food certification institution in Indonesia that has been accredited by the National Accreditation Committee, is based in Mojokerto (Jawa Timur).

The rapid growth of public awareness in a healthy lifestyle make the community consume organic rice lead to the sharp increase in demand for organic rice. Until now, the two farmer groups can only fulfill the demand for organic rice for a limited group, so there is often a gap between market demand and organic rice production. Actually, the two farmer groups have a lot of potentials that can be developed in an organic rice cultivation system, including the availability of land that has not been cultivated organically. For the Mekar Pasar Kawat and Bina Tani farmer groups, each of them has 10 and 20 ha of land that has not been cultivated organically, respectively. In addition, the availability of human resources, namely farmers and family members of farmer groups who have not been effectively empowered about 87 families for the Mekar Pasar Kawat farmer group and 45 families for Bina Tani), availability of husks and straw as raw materials for composting. The attitude of farmers group who are responsive, open and enthusiastic attitude in the transfer of technology to the development of organic rice cultivation.

The main problems in organic rice production in the two farmer groups namely raw materials for composting in the form of manures, are often limited so that they are often not available when needed; the production process of organic rice cultivation is still done by limited equipment, so the production process needs a long time; labor-intensive and inefficient, limited organic rice production and new technical marketing is done by order. Management carried out by farmer groups is still traditional, still not using good and correct management and bookkeeping theories.

Based on the analysis of community service partner situations and problems mentioned above, priority issues to be addressed include improving technology and management systems for organic rice cultivation. Moreover, there is a need to solve the problem in providing grinding machines and small buildings for grinding machines. The farmers also need to be trained in solving post-harvest and packaging , marketing the organic rice products, and bookkeeping problems.

## **2. Method**

Based on the problems faced by Mekar Pasar Kawat and Bina Tani farmer groups in organic rice production, the empowerment efforts can be carried out in the form of improving farmer management, marketing and financial groups related to the improvement of the availability of compost raw materials for organic rice cultivation, improving production facilities, improvement in the continuity of organic rice products availability, structuring in farmer group bookkeeping management, and expansion of network marketing. Approach method will be carried out to support the realization of science and technology service activities for Regional Superior Products, namely lectures and discussions, training, direct practice and assistance in the management of production and marketing of organic rice, procurement of technology transfer equipment and marketing sites.

The approach method was divided into 2 years. The activities at the first year are providing adequate raw materials in organic rice cultivation, especially the availability of manure by raising ducks. In addition, the shortage of raw materials for compost is substituted by the increase in biochar production. The availability of rice husks, bran and abundant straw compost can be used as biochar which serves to increase soil fertility. Procurement of plant production equipments (hand tractors, tubes for making liquid organic fertilizer) and continuity of plant production facilities availability (liquid organic fertilizer, compost and organic pesticides) that have standardized standards in the manufacturing process. Lectures and discussion (training) in improving farmer's understanding of organic rice cultivation through training in organic rice cultivation techniques, composting, liquid organic fertilizer, biochar and organic pesticides and multiplication of local wisdom-based biological agents.

There are some materials were given during the activities, including organic rice cultivation techniques, the technique of making compost, liquid organic fertilizer and biochar and its function for increasing organic rice production. Moreover, the

communities were taught on techniques for making vegetable pesticides and multiplication of biological agents based on local wisdom.

The activities at the second year are repair of radiators and rice grinding machines ; improving the rice quality ; training on rice quality and procurement of weighing equipment ; mentoring at every stage of organic rice cultivation and post-harvest and motivating farmers to further increase their organic rice production.

This community service activity has been succeeded because of the active participation from both partners. The College (USU) has an active role in empowering farmer groups by conducting technology transfer from universities to farmers. Likewise, farmer groups play an important role in the implementation of community service in providing paddy fields for organic rice cultivation, tillage, planting, maintenance, harvesting and post-harvest organic rice cultivation systems, and providing a place for training. Farmer groups were expected to have a high enthusiasm to increase organic rice production, so that the organic rice has a positive prospect to be marketed nationally. The farmers were also suggested to participate in training and practices on organic rice cultivation, packaging techniques, production management and marketing development. Close cooperation and active participation from the community service USU team and farmer groups are the keys to the success of the community service program (Fig.1).

### **3. Result and Discussion**

Based on the results of the activity in the form of a series of training and direct practice of organic rice cultivation (Fig. 2) and farmer bookkeeping training, it was revealed that members of farmer groups still needed to improve their knowledge about organic rice cultivation that lead to the increase in organic rice production. The community still needs to improve their understanding on the use of rice waste into biochar, how to increase organic rice production through the introduction of hand tractor engines, and the utilization of business opportunities in the midst of busy organic rice cultivation by maintaining organic rice ducks. In this community service activity, the making of rice duck demonstration plots was also carried out, so that the community could get more income not only from organic rice but also from the ducks.



**Figure 1.** Community service team from USU and farmer group leader **Figure 2.** Training of organic rice cultivation

The community service activities produce biochar, duck and organic rice products and organic fish-rice cultivation that utilized biochar from rice waste. Husk as rice waste has the potential as a raw material for biochar because it has N, P, K, C-organic and Mg-nutrients. The use of rice husk can increase soil pH and cation exchange capacity (CEC) so that rice husk can reduce nutrient washing especially potassium and  $N-NH_4$  [3].

Biochar is also very useful as a carbon deposit. The biochar increased the binding of greenhouse gases, prevents the loss of fertilizers due to surface flow and washing, so that the biochar can save the use of fertilizers, reduce pollution, reduce emissions and help plants during periods of drought. Addition of biochar to agricultural land can increase  $CH_4$  absorption and water holding capacity [4-8].

The community service activities have also addition benefit such as the production in the form of ducks and rice and training in bookkeeping management for organic rice farmer groups. The farmers were very enthusiastic in carrying out the training and implementation of the organic rice duck demonstration plot. The transfer of technology was handed over in the form of the Quick brand hand tractor engine, with the Kubota RD85DI-2S engine complete with rakes, *glebek* and plows (Fig. 3). The Hand tractor machines play an important role in increasing organic rice production because it can accelerate and simplify soil management and increase employment.



**Figure 3.** Hand tractor introduced

In general, community service activities are very successful as expected. This activity has provided additional knowledge and diversification of business opportunities for members of farmer groups with the existence of organic paddy duck culture demonstration plots that can increase income and improve community nutritional status. The hand tractor engine is useful in labor efficiency, accelerates and facilitates the processing of land, thereby increasing organic rice production.

#### **4. Conclusion**

Based on the community service that has been done, farmers who are members of the Mekar Pasar Kawat and Bina Tani farmer groups were very enthusiastic and can understand the training and direct practice of organic rice and the making of biochar from rice husks. The introduction of hand tractor machines was very useful in increasing organic rice production. Organic rice cultivation yielded superior organic rice, so that the production can increase the income of farmers groups, improve nutritional status, open business opportunities and preserve the environment because organic rice is proven to be environmentally friendly.

#### **Acknowledgement**

The authors gratefully thank Community Service Institution, Universitas Sumatera Utara for funding this activity in accordance with the Letter of Agreement for the Implementation of Community Service Multi-Year Program, Fiscal Year 2018 Number : 73/UN5.2.3.2.1/PPM.2018, date April 16, 2018. The author also thank M. Syariful Muharrami Harahap for his assistance in the community service activities.

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