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ORGANIC RICE STANDARD: TRANSITION TOWARD SUSTAINABLE ORGANIC FOOD SYSTEM

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Abstract: Strategic research is important to understand drivers of sustainable organic food from production to consumption and link this to real world example. In this research we elaborate the organic rice standard in Indonesia. The research is attempted to identify the current condition of organic rice standard in Indonesia and finding the gap that could possible to enhance the sustainable approach. Is the organic rice standard suitable for supporting sustainable organic food system or not? We conduct three-year research starting from cultivation, processing and consumption of organic rice in Indonesia. We found that (1) Cultivation organic rice is fitting the sustainable approach in term of less residue of pesticide, better farmer incomes as well as protecting biodiversity (2) Organic rice processing following the conventional milling standard and resulted the decreasing of nutritional ingredient (3) Consumer perception on organic rice is highly on the healthiness attribute which cannot be easily proven as long as the milling approach using conventional standard. From this study we conclude that the gap of research in processing and consumption of organic rice should be in the priority, i.e. what is the standard of milling in organic rice? Or what is the perception of consumer on organic brown rice in Indonesia. Based on this, we could develop the organic food system start from an example of organic rice.

Introduction: The objective of this paper is to describe the organic food and organic farming as an organic food system by referring to case study on organic rice in Indonesia. We describe the gap of current organic rice research and identify the sustainable approach in food system. Food System are highly complex (HPLC 2017, IPES 2015). In this manuscript, complexity of the systems is identification of any possibility of activity during cultivation, processing and consumption which create organic rice is become un-sustainable. This study is under umbrella of organic food system programme (OFSP) which launched 2017 at BIOFACH Nuremberg.

David and Kofahl (2017) purpose organic rice as a model to evaluate organic food system because of most of organic rice in the Indonesia market is followed the “conventional milling principle” whereas many of them being sold in polished/milled rice (refined). In the perspective of the principle of organic agriculture, refined rice may not be in accordance to the philosophy because the terminology health (in term of nutrition) will not be as expected.

Unlike conventional rice, organic rice has unique properties, beside the no contamination of pesticides, most of the consumers perception has agreed that organic rice is nutritious comparing to the conventional (David and Ardiansyah

2017a; David and Ardiansyah, 2017b). However, there is vast of study confirmed that there is no significant different between organic rice and conventional one in term of nutritional profiles unless they are in form of whole grain. In this situation, as the most comparative study about organic versus conventional has the similar or equal in nutrition profile.

Material and methods: Three years study has been done to identify the gap of organic rice to become sustainable food system. This study was divided into three phases; (1) to identify agrochemical residue during cultivation. Comparative study between each five hectare of organic and conventional were conducted in the similar agroclimatic (topical condition) in *Tasikmalaya*, West Java, Indonesia, (2) to identify in which degree of milling on organic rice in three different varieties to provide better nutrition content, (3) to identify consumer preferences toward organic rice with various degree of milling. The intervention of nutritional information was performed to twenty panellist and record their response on sensory attributes.

Results: *Cultivation (Agrochemical residue)*

The result show that agrochemical residues are detected only in conventional rice cultivation. Diazinon, Aldrin, Heptachlor, and Dieldrin were detected as the major chemicals present. Diazinon was detected in the water, soil and plants with a frequency of occurrence at 60%, 80% and 40%, respectively. Aldrin, Heptachlor and Dieldrin were detected in plants with the frequency of occurrence at 40%, 60% and 60%, respectively. Furthermore, heavy metals such as Hg and As were also detected in the water with a frequency of occurrence at 10% and 40%. Meanwhile in organic rice sample none of the agrochemical residue has been detected. This reflected that organic rice can be an option to protect environment as well as biodiversity. Cost for plant protection has been recoded 0.8 ± 0.43 USD/Ha for organic and 16.17 ± 3.12 USD/Ha. Cost for manure/fertilizer for organic is 20.03 USD/Ha and 92.85USD/Ha for conventional. Furthermore, margin of profit for organic is 0.32 USD/kg and 0.21 USD/kg for conventional rice.

Processing (Degree of milling)

Based on three different varieties of organic rice, the degree of milling and degree of whiteness increase when milling time increases. Meanwhile, the total phenolic, flavonoid and dietary fibre decrease significantly as milling time increases. Moisture content remains constant as the milling time increases. According to David (2017) whole grain rice has highest bioactive compound compare to refined rice, besides whole grain rice has lowest cost for post-harvest compare to refined rice.

Considering the criteria for the nutritional properties for healthy food, the degree of milling may be an important factor for setting the standard for organic rice in Indonesia. This finding gives the evidence that, even though organic rice has no agrichemical residue however when if we are applying the highest degree of milling would affect the decrease of nutritional content of the organic rice.

Consumer perception

Based on the nutritional information intervention of twenty panellist, the nutritional information of brown rice affects panellist responses on colour and texture. There is a significant different between groups with information and non-information in their responses on attributes, colour and texture ($p < 0.05$). The intervention of nutritional information may help in organic brown rice preferences.

Furthermore, we need to educate the consumer about nutritional information to increase the awareness of the consumer. The transformation process of organic rice standard toward food system can be seen as table 1 below:

Table 1. Comparative of organic rice vs conventional

Indicators of sustainable	Conventional	Organic
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	Refined	Whole grain	Refined	Whole grain
Agri-chemical residue (Environment)	None	moderate	None	None
Bioactive compound (Health attribute)	Low	High	Low	High
Post-harvest cost (Farmers income)	High	Low	High	Low
Consumer perception (consumer awareness)	High	Low	High	Low*

an alternative to increase the awareness of the consumers as we proved on this three-years study.

Discussion: Based on the result we found, we could conclude that, there is still need research on organic rice not only in the cultivation but also in the processing and consumer perception. There is an important attention to a concept of whole grain in the organic rice otherwise, the healthiness attribute will be not significant different between organic and conventional.

This must be accomplished by spreading information about its benefits and taking proactive actions towards encouraging its use by consumers and other stakeholders, such as public services. To set the milling time as part of the standard is a political (consensus) process between the actors. Various actions towards consumers and public awareness may be taken e.g. revealing nutritional information to the consumers, as well as introducing less polished organic rice in restaurants and canteens.

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