ISSN: 2338-1345 – Vol. (5) 2. 1-2 2017 (Editorial) Journal online http://journal.bakrie.ac.id/index.php/APJSAFE

Asia Pacific Journal of Sustainable Agriculture Food and Energy (APJSAFE)

A mini-review of conventional rice milling: It is suitable for organic rice?[#]

Wahyudi David[1]*,

[1]*Department of Food Science and Technology, Universitas Bakrie, Jakarta, Indonesia*
**Corresponding author's Email address: wahyudi.david@bakrie.ac.id*
[#] *This article has been presented at 2nd IFOAM Asia Organic Congress 18-22 Mei 2017, Xichong, Sichuan, China*

Abstract- Many attempt has been made in previous study to understand how milling processing influence the nutritional properties of rice. However, there is no study address how the milling processing can be adopted to the organic rice. This study is preliminary stage to understand the influence of milling processing on rice as a food system. This article has reviewed 54 articles comparing refined and whole grain rice and categorized into production cost, bioactive compound, and pesticide/residue contamination as well as consumer perception. The result shown that milling processing as one of value chain contributes the significant impact on nutritional properties of rice. If the organic rice using the conventional "milling processing principle" it will resulted the equal feature of nutritional properties both organic rice and conventional, thus expectation of consumer for healthier properties of organic rice may not be suitable anymore.

Keywords- Organic food system, milling processing, organic rice, whole grain

INTRODUCTION

One of the future challenges based on organic 3.0 producing sufficient healthful safe and affordable food for 9-11 billion people as well as taking to account of food habits lifestyle and consumers need (Rahmann et al. 2017). Increasing food production is also driven by the amounts of food consumed. Inefficient production and over-consumption may lead to an unsustainable food chain.

David and Kofahl (2017) pourpose 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" where as 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 nutrious comparing to the conventional (David and Ardiansyah 2017; David and Ardiansyah, 2017). 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.

As the sustainability terminology has a rigid system which includes whole aspect related from production to consumption, then the value of nutrition profile should take into account the milling processing as a part of sustainable processing, which mean, sustainable processing should maintain the nutritional profile of organic food in the optimum level. Figure 1 below explained how organic Paddy has lost the valuable nutrition during processing. Even though organic rice production can assure no pesticide but if the processing (milling) reduce the nutritional properties, then it makes the "value" of the organic principle become diluted.

Fig. organic values and principle

This study is aiming to investigate how the milling processing on rice influences the nutritional properties of rice and how milling rice processing adopted to organic agriculture principles.

MATERIALS AND METHODS

This study has been divided into two steps. First, the systematic review has been applied in selecting 124 lists of articles. This study using international database platform such as AgEcon, EconPapers, Emerald Insight, NAL Catalog and Science direct. The article has been screened which published in between 2011 to 2016 (15 years).

This study limited the search term which related to milled, un-milled, bioactive compound and production cost. The

article were coded, compared and analysis by using descriptive analysis and confidential interval (CI). From 124 articles only 54 articles further analyzed using CI. Secondly, comparative study to incorporate the organic agriculture principle into the milling rice is performed by using table.

RESULTS AND DISCUSSIONS

Milling processing and its impact

Table 1 is describes the comparison of refined and whole grain rice in four categories by using confidential interval. Whole grain rice has highest in component bioactive (Phenolic, Tocopherol, Tocotrienol and ɣ- Oryzanol). In production refined rice has better income and profit as well as selling price however labor force and farming cost, whole grain rice is efficient compare to refined rice. There is still limited study regarding consumer perception on milled rice, therefore no suggestion can be made for this categories.

Table 1. comparison ratio of refined and whole grain rice

Categories		refined	Whole grain
Bioactive compound	Phenolic,	1	1.1
	α Tocopherol	1	13.5
	α Tocotrienol	1	8.35
	ɣ- Oryzanol	1	5.94
Production cost	Income	2.02	1
	Farming cost	2.12	1
	Profit	2.01	1
	Selling price	1.6	1
	Labor force	2.09	1

How milling processing adopted to organic agriculture principles? It is clear that the consumer concern can be categorized into several groups:

1. Health: no contamination of herbicide, insecticide, fungicide, and pesticide. Organic food has not been allowed using antibiotics for animals and is very strict in assuring animal welfare, as well as not being allowed to use hormones for growth. In some cultivations, organic foods have high levels of phenol and flavonoid (Bao, 2015; Huang and Ng, 2012; Moongngarm and Saetung, 2010; Ti et al., 2014);
2. Environmental concern: most of the consumers understand that organic food producers are committed to protecting biodiversity;
3. Fair trade: organic food consumers understand that they are giving the value to the farmers as well as to the traders fairly; they believe this concept can sustain the organic agriculture not only for the environment but also for the economic point of view.

CONCLUSIONS

Based on the mini-review above, it is obvious that milling processing can reduce the nutritional properties. Organic food system (organic rice) should consider milling processing as significant factor to nutritional attribute in organic rice.

ACKNOWLEDGEMENT

The authors acknowledge with gratitude the support given by IFOAM Asia, Organic Food System Programe and Univesitas Bakrie. Ms. Yunita Darius for gathering data.

SELECTED REFERENCES

Bao J, Lilei Y, Guanglei L, Meil L, Feifei X dan Trust B. 2015. Genotype variation in phenolic acids, vitamin e and fatty acids in whole grain rice. Food Chemistry 197(PtA) 776-782.

David, W and Ardiansyah. 2017. Organic agriculture in Indonesia: challenges and opportunities. Organic Agriculture, 7: 329.

David, W and Ardiansyah. 2017. Perceptions of young consumers toward organic food in Indonesia. International Journal of Agricultural Resources, Governance and Ecology (in press).

David, W, and Kofahl, D (Eds). 2017. Food Culture of Southeast Asia: Perspective of Social Science and Food Science. Kassel University Press.

Huang, S.H and Ng, L.T. 2012. Quantification of polyphenolic content and bioactive constituents of some commercial rice varieties in Taiwan. Journal of Food Composition and Analysis, 26(1-2), 122-127

Rahmann, G., Reza Ardakani, M., Bàrberi, P. et al. (2017) Organic Agriculture 3.0 is innovation with research. Organic Agriculture. 7: 169-197.

Moongngram, A and Seuting, N. 2010. Comparison of chemical composition and bioactive compounds germinated rough rice and brown rice. Food Chemistry, 122(3), 782-788.

Ti, H et al. 2014. Free and bound phenolic profiles and antioxi-dant activity of milled fractions of different indica rice varieties cultivated in southern China. Food chemistry, 159, 166-174.