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Respect to the nature: lessons learned from dryland rice farming practices by Tolaki Tribe

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Abstract. The objectives of the research were (1) to study the cultivation practice of dryland rice by farmers, and (2) to analyse the suitability of the cultivation practice with the requirements of an organic product. The approach used in this research is the survey method of dryland rice farmers in Wolasi Sub-district. The data obtained is the primary data, from the results of interviews with all 37 respondents. The data obtained in the form of qualitative data about the activities of the cultivation process of dryland rice. Data analysis was done descriptively. In this research, the scientific innovation given to the dryland rice farmers is the application of liquid organic fertilizer in the cultivation process. This study is highly relevant because (1) there is now a levelling off of wetland rice farming, so that the productivity of dryland rice traditionally managed needs to be improved, and (2) the yield of red rice is gluten free, it is a healthy food. With crescent, machetes and axes, most farmers use traditional methods of land preparation. approximately 3 percent of farmers have used herbicides to remove grasses. The seeds planted are from the previous harvest. Planting does not use regular plant spacing. The seeds planted are from the previous harvest. No modern pest control efforts. Farmers have applied organic liquid fertilizer. Harvesting is done using *ani-ani*. The conclusion are (1) the cultivation practices applied by farmers are still traditional, and (2) Most of Tolaki's upland rice farmers have practiced organic farming system.

Keywords: Cultivation, dryland rice, organic products, Tolaki

1. Introduction

Food is a basic human need that must always be available in quantity, and in the appropriate quality when needed. Especially in the current era, as the world population is increasing, the challenge of providing good food is felt to be heavier. Food problems have always been the theme of world leaders' talks, namely how to ensure the achievement of global food security [1].

One type of food that became the staple food of the majority of the world community is rice. This commodity is a staple food in the countries of the African continent [2, 3], and also Asia [4], including Indonesia [5, 6]. Rice comes from rice crops, both grown in wetlands and dry land. So far, most rice products are obtained from irrigated wetland rice fields [6].

Rice derived from dry land paddy is still very limited, whereas the potential of land owned is very large. Development of upland rice production in Indonesia is highly potential, because Indonesia has a very wide dry land resources, which reach 52 million ha or 87% of the total land area. The Government of Indonesia has not given adequate attention in exploiting this potential optimally.

The contribution of upland rice to the national rice production is still relatively low, so the predevelopment is still being pursued [6], from red rice or black rice, which has been neglected so that the productivity achieved is relatively low [5]. The productivity of upland rice in 2011 was 3.091 ton ha^{-1}, lower than the productivity of paddy rice reaching 5.179 ton ha^{-1} [6]. The locally, the productivity

of upland rice in South Konawe (Konsel) District only reached 3.12 ton ha^{-1}, while paddy field productivity can reach 4.18 ton ha^{-1} [7].

Rice is one of the plants that can be grown organically [8], both wetland rice and upland rice. Organic Agriculture as a production system that sustains the health of soils, ecosystems and people; relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects; and combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved [9].

Organic farming is a cultivation that fully relies on the use of natural ingredients without synthetic chemicals. The main goal of producing organic products is to provide food stuffs that are safe for the health of producers and consumers, and not to damage the environment [10].

Organic farming has been widely recognized in Indonesia but still being cultivated in a small scale [10], and in the world organic product map, Indonesia is not included. Of the 26 producing countries of organic products, Australia has the largest organic farmland [11, 12]. Therefore, to provide healthy food for all Indonesian people, the movement to popularise the process of organic food production is very necessary to be implemented massively. It seems that there are many differences in the attention given to both types of rice produced by the people of Indonesia.

Compared with white rice, red rice is underestimated [13]. Thus, from the supply side, attention only focuses on white rice produced from paddy fields that use intensive cystic chemicals. Thus, the rice produced and consumed by most Indonesian society is rice contaminated with various hazardous chemicals.

The increased of knowledge and standard of living of the people, accompanied by awareness of the importance of health aspects in consumption, caused some people to start switching to consuming brown rice [5]. This shows that there is an increase in the demand side. Therefore, the responsibility of meeting the needs of the community for healthy food is urgently needed.

Wolasi Sub-district is one of the areas in South Konawe Regency Southeast Sulawesi Province. This area is located in a mountainous area, which a fairly cool temperature. Most of the people in Wolasi are Tolaki ethnic, living in the vicinity of Wolasi forest. Their main job is to cultivate upland rice of local varieties, which are planted once a year. Every year, they do the job with the main goal to meet the basic needs of family food. Their main motive is to produce rice for their own consumption, not for sale. The way in which farming is applied is very simple. In difficult condition, they always strived to be as closely as possible in harmony with nature.

2. Material and Method

Population in this research is dryland rice farmers in Wolasi Subdistrict, which is one of main producing area of upland rice in Konawe Selatan Regency. The selection of respondents was done by using simple random sampling technique. There are 37 farmers involved in this research.

3. Result and Discussion

3.1. The practice of upland rice cultivation in Wolasi Sub-district

Although there have been some aspects beyond these habits, but it can be asserted that the cultivation technique applied is still traditional.They practice what they have been taught and experienced while still with their parents. Overall, farmers do not understand about agriculture and organic products. In fact, they do not understand that the farming they manage, which is done with minimal use of inputs from outside the farm, is a good thing according to modern society. Farmers also never get counselling from any party about organic farming and how to obtain organic products.

The following section described the practice of farming rice paddy farmers in Wolasi Sub-district, which is Tolaki ethnic group.

3.1.1. Land preparation

Land preparation activities were undertaken by farmers to prepare a place for upland rice cultivation is not different from that done at previous times. This activity is done by the husband and sometimes assisted by the wife. Land preparation is done simply.

The land is cleared of weeds by using a machete or sickle and then burned. In addition to this, in order to get faster results and save energy use, some farmers use herbicide. This is not in accordance with the Tolaki tradition of not using chemicals in the production system. 3 of 37 respondents (8%) use

toxic weeds during plant preparation. This is because the limited labour force in the family and farmers has been relatively old.

3.1.2 Planting

"Gogo" rice cultivation is done with the help of reciprocal (*samaturu*, Tolaki language), which involves about 5-20 labour per hectare. People who come to help in planting activities are not paid wages, either cash or natura. To insert the seeds into the planting hole, use the *tugal* (made from sharpened wood)[14]. Each planting hole is placed 5-10 seeds. All farmers used seeds originating from previous crops.

The rice seeds planted by all respondents are local "gogo" rice which is about 4.5 months old. Local rice varieties produce red rice (or brown rice). In every farm, farmers grow local rice, which is a hereditary necessity in the Tolaki Tribe community.

It should be pointed out that the planting season of "gogo" rice is generally not simultaneous as in the rice paddy field, so that the farmers who harvest later will face the risk of pest attack. Implementation of simultaneous cultivation is difficult to implement because the "gogo" paddy farmers do it in mutual assistance, so that the planting is done alternately on every farm.

3.1.3 Maintenance

Something very encouraging is the willingness of farmers to use the liquid organic fertilizer given from UHO (Halu Oleo University) Research Team. As it is known that the adoption of a technology is not easy, especially for Tolakiethnic. For several decades they have engaged in upland rice cultivation, very few modern technologies are adopted.

The results show clearly that until 2016 there is no use of fertilizer in the process of cultivation of upland rice, both organic fertilizer and chemical fertilizer [14]. The results of the current study indicate that farmers have used organic fertilizer in the form of ZPT, NPK, and POC (liquid organic fertilizer).

After the age of about 1 month after planting, weeds began to grow around the rice plant. The purpose of weed cleaning is to remove the weeds so as not to interfere with plant growth. Weeds that grow will absorb the available nutrients, so the nutrients for rice crops will be reduced. The existence of weeds will also invite the emergence of pests of diseases that can attack and disrupt the growth of upland rice.

Weed cleaning is generally done by women farmers using sickle tool (*saira*, Tolaki language). The activity of mowing the grass is called *mosaira*. Weed cleaning activities are generally carried out independently by the farmer's family, where the wife is the dominant party, and sometimes assisted by the husband.

As well as other cultivation activities, upland rice farming also faces pests and plant diseases. The results of the interview show that in the year 2017, the type and intensity of pest attacks on "gogo" paddy plants more than the previous year. Not just pest aphis, and grasshoppers, but also other pests such as rats, monkeys, and pigs. However, farmers still do not use chemicals to eradicate the pests, not even using physical methods to kill rats, monkeys, and pigs. According to peasant beliefs, if all three animals were killed, it would only infuriate the herd of the animals. If that happens, then these animals will increase their attacks on rice crops. In fact, while in the rice field "gogo", words issued during the talk should also be maintained. Should not say 'carelessly' that will invite more pest attacks.

Previous results showed that in 2016 most of respondents (95 percent) stated there was no pests and plant diseases (HPT) attack. If there is a disease attack, then the farmers use mystical means, which is praying (*monggawui*, Tolaki language). This activity is generally done by relatively old farmers. Hereditary, this *monggawui* way is considered effective to cure the diseased plants [14].

3.1.4 Harvesting

Overall, the type of rice grown by the respondents is local "gogo" rice. Rice crops can be harvested when they are about 4.5 months old. As with other upland rice farms, the tools for harvesting local "gogo" rice varieties are *ani-ani* (*Osowi*, Tolaki Language). Rice harvest done by farmers is not done simultaneously, because the planting period is also not simultaneous. If rice is planted in early to mid-January, then the harvest can be done in mid-month to end of May each year. In the harvesting activities, the farmers also apply the working system of *gotong royong* as in the activity of planting.

The farmers who will participate in the rice harvest will come rolling. Wage system for harvest workforce is done by harvested sharing system (*metia*, Tolaki language). In addition to getting a share

of the proceeds from the rice, people who come to harvest are also given lunch and snacks, as well as drinks. In harvesting activities, there are no restrictions on the number of people allowed to harvest. Other families, neighbours, peasant friends in one village or from another village can participate in harvesting activities.

Regarding the size of the received portion, there is no patent agreement on the distribution of the proceeds received by the farmer with the beneficiaries during the harvest. The harvested sharing system that is generally applied in the research location is 3: 1, that means if the harvesters get 4 bunches; harvester gets 1 bunch, while the farm owner gets 3 bundles. There are also respondents who use 4: 1 proportion, which, if the harvesting participants get 5 bunches, harvester gets 1 bunch and the owner of the farm get 4 bundles.

The results confirm that Tolaki ethnic still holds a strong culture of togetherness and has a high social responsibility. This can be seen from the feeling of compassion to fellow farmers who experienced crop failure. To them, the farm owner implements the share with a larger share. For example, for 3: 2 (for every 5 bunches of rice, 2 bunches for harvesters, 3 bundles for owners), even '*bagi sama*' (for 4 bunches, 2 bunches each). Sometimes, farm owners do not take the harvested crops from harvesters.

3.2. Discussion

Wolasi is a cool weather sub-district located in the mountain which has a cool air. Most of the people in Wolasi are of Tolaki ethnic living in the vicinity of Wolasi forest. Their main job is to cultivate upland rice of local varieties, which are planted once a year. Every year, they do the job with the main goal to meet the basic needs of family food. Their main motive is to produce rice for their own consumption, not for sale.

The way in which farming is applied is very simple. In the struggle, they strived to be as closely as possible in harmony with nature. The whole process of rice farm management is done simply, without the application of chemicals.

Based on guidance on the procedure of organic upland rice cultivation, the farmers in Wolasi District have applied some of the suggested ways. Because farmers were actually never get counselling about organic "gogo" rice cultivation [14]. They just do the habits learned from their predecessor and other parties.

3.2.1 Land preparation

In the land preparation activities, the way some farmers in Wolasi Sub-district have been compatible, that is to clear land from crop residues and weeds or weeds [15]. Some farmers do the cleaning only for the rest of the plants and shrubs, yet the weeds are still retained. Farmers do not conduct further cultivation of land, such as hoeing or ploughing (minimum tillage). There is also no basic fertilizer, There is also no basic fertilizer, which commonly done by farmers in other places, namely the application of basic fertilizers in the form of manure as much as 3 ton ha^{-1} [15].

3.2.2 Planting

Rice cultivation in the research area is not conducted simultaneously. There are farmers who grow very fast, around December, and view of them in January and February. This is very high risk to the possibility of pests and plant diseases. Rice plants are available in a long time span from December to June in the following year.

As suggested [15], planting is done by direct seeding system (TABELA). This planting system is to plant rice directly in the field without seeding it beforehand. Preparation of planting holes was carried out using *tugal* to plant seeds. It is not recommended that farmers do not set the spacing and the depth of the hole is very varied. Each hole are seeds about 5-10 grains and the hole is not closed again. Properly, the planting hole is closed again.

One way to plant by using *tugal* is like some "gogo" paddy farmers in the mountain area of Yogyakarta. Until recently they are still using the system of cultivation in planting [15].

3.2.3 Maintenance

According to good and proper cultivation techniques, plant maintenance is an activity that includes embroidery, weed cleaning, fertilization, and pest and disease control. Stitching is done at 1-3 weeks

after planting by replacing dead or unhealthy plants [15]. Embroidering is done by farmers at the study site, if the seeds are not grown.

Weed cleaning needs to be done because of its growth will greatly affect the growth of upland rice plants. If the growth of grass is faster than the growth of rice plants, it will cause the nutrients absorbed by weeds, so that rice growth is inhibited. This of course will lead to decreased production of rice crops. Weed cleaning at the research site has been appropriately done by using a sickle. This activity is generally done by women. In general, farmers do not use chemicals.

Provision of fertilizer is important because it encourages growth and increase production. The absence of fertilizer, will cause the growth of plants be disturbed. Fertilization should be done by using organic fertilizer. Farmers at the research sites have never done fertilization [14], but in this year's planting season, they have applied liquid organic fertilizer.

The use of inorganic fertilizers (synthetic) will have a negative impact on the soil, which is to damage the soil structure, so that the roots of plants will be difficult to penetrate [10]. One of the efforts that can be done in intensive dry land management is by giving organic fertilizer [16], one of which is bokashi. Giving bokashi is able to increase dry seed [13].

The farmers at the study sites never control the pests physically. They do so by reciting prayers, called *monggawui* (Tolaki).The use of pesticides has adverse effects, both for the health of producers and consumers. On agricultural land, the impact of pesticide use is resulting in 'loss' of biological control agents from plant pests' organisms and can increase pest resistant ability [10].

3.2.4 Harvesting

Dryland or "gogo" rice is generally harvested at about 4.5 months after planting. Harvesting rice is done by using *ani-ani*, because the grain is easily to fall out. Therefore, the farmers never use the sickle. Harvesting is done by men and women with wages paid by harvested sharing system for the harvested rice.

4. Conclusion

Farmers do not understand what is meant by organic products, they do the production process of upland rice based on knowledge and skills gained from generation to generation. Most of Tolaki's upland rice farmers have practiced Organic Farming System, because the production system used does not neglect the health of the soil, ecosystems and humans; in harmony with nature, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects; also combine tradition, and innovation.

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