International Journal of Business, Law, and Education
Volume 1, Number 2, 2020

AGRICULTURAL EDUCATION: UTILIZATION OF AGRICULTURAL WASTE

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ABSTRACT
The purpose of writing this article is to to describe some of the functions of waste. Waste is the residue or by-product of the main product. Agricultural waste is part of agricultural plants above the ground or part of the shoots, stems that are left after being harvested or the main product is taken and is an alternative feed used as animal feed. The purpose of writing this article is to to describe some of the functions of waste. The method used in this research is literatur review. Based on the results of literature reviews of several agricultural books, most of the rice straw is used as compost. The percentage of rice straw is 65% is composted and 35% is used for animal feed. Agricultural waste is waste that comes from agricultural activities in a broad sense (agriculture, animal husbandry, fisheries and forestry) and agriculture-based industrial activities (agro-industry) in the form of solid waste (plant residues, leaves, animal waste) or liquid waste.

Keywords:
Agricultural waste, Compost and Animal feed

INTRODUCTION

Waste is the residue or by-product of the main product. Agricultural waste is part of agricultural plants above the ground or part of the shoots, stems that are left after being harvested or the main product is taken and is an alternative feed used as animal feed (Yani, 2011). Various agricultural by-products can be used as a source of new feed ingredients for both ruminants and poultry. Sources of agricultural waste are obtained from food crop commodities, and their availability is influenced by cropping patterns and the area harvested from food crops in an area. Types of agricultural waste as a source of feed include: rice plant waste, corn plants, soybean plants, peanut plants, cassava plants, sweet potato plants, etc.

1.1. Rice Plants

Rice is one of the staple foods in Indonesia. The use of rice as animal feed, especially poultry, is very competitive with human needs. However, waste from rice plants has the potential to be used as animal feed. The waste is in the form of straw, bran, and rice bran.

a. Rice straw can be used as feed for ruminants. The use of rice straw as animal feed is common in the tropics, especially as fodder in the dry season. The amount of straw produced in one hectare of lowland rice is 1.44 times the total yield (Kim and Dale, 2004 in http://agroteknomandiri.blogspot.com/2012). By knowing the amount of straw produced, it can also be seen the capacity of livestock in one hectare of rice fields in one year. For example, the calculation is as follows:

• Rainfed/swamp-fed rice production with the assumption of harvesting 1 time

in a year with an average yield of 4 tons/ha, then the amount of straw produced is = 1.44 x 4 = 5.76 tons/ha.

- If the consumption of livestock per day is 8 kg/head/day, the consumption of livestock per head/year is 1 year = 8 kg x 365 days = 2920 kg/year.
- So per hectare = 5760 kg/ha : 2920 kg/year = 1.97 rounded up to 2 cattle/ha/year.

When viewed from the capacity of livestock, the potential of rice straw as animal feed can be applied in West Bangka Regency. In addition to the potential availability of raw materials, the use of rice straw as animal feed is experiencing problems, mainly due to the limiting factors with low nutritional value, namely low protein content, high crude fiber, and low digestibility. To overcome this, the use of rice straw as ruminant feed needs to be streamlined, namely by adding supplements or other additives so that the complete nutritional value can meet the needs of livestock life completely while increasing the digestibility of feed (Rahadi. S, 2008).

b. Bran and bran as waste from rice milling, can be used as fodder for poultry and ruminants. The amount of bran produced depends on the method of processing. Coarse bran can be produced as much as 14.44%, fine bran as much as 26.99%, bran as much as 3% and 1-17% of groats from dry grain weight (Final Report on Development of Animal Feed Technology in West Bangka Regency, 2014). In West Bangka Regency, based on the results of the laboratory analysis of the Center for Quality Testing and Certification of Feed (2014), the crude protein content in red rice bran is quite high, at 11.57%. While the crude fiber content is quite high, namely 14.78%. For white rice bran, the crude protein content is 7.41%, while the crude fiber is very high at 29.86%. The high content of crude fiber is the cause of the limited use of bran in livestock rations, especially poultry.

1.2. Corn Plant

After the main product is harvested, the by-products of corn can be used as feed for ruminants, namely straw, husks and corn cobs either before or after going through the processing process. tons of dry matter per hectare which is able to provide raw material as a source of fiber/forage substitute for 1 unit of livestock (live weight equivalent to 250 kg with dry feed consumption of 3% live weight) in a year (http://agroteknomandiri.blogspot.com/2012).

1.3. Cassava Plant

Cassava is the third staple food after rice and corn in Indonesia. This plant is a tropical plant with potential and very important as animal feed as a source of energy (tubers) and protein (leaves) in large quantities. Waste from cassava plants can be used as animal feed is divided into 2 parts, namely: 1). Derived from agricultural land, in the form of cassava leaves after harvest. Forage biomass production of cassava consists of leaves, petioles and stems. The results of research conducted by Wanapat et al. (2002) in Sirait J and K. Simanihuruk, 2010) showed leaf production was the highest proportion, which was 61.6% in harvesting carried out when the plant was 4 months old with a cutting height of about 40 cm above the soil surface from the total dry matter production of 1,434 kg/ha. 2). Derived from the cassava processing factory into tapioca flour or the food industry in the form of cassava peels, pieces that cannot enter the grinding machine and

onggok. However, the use of cassava tubers and leaves in livestock rations is quite limited due to the limiting factor in the form of acid poison. cyanide (HCN). Several processing processes that can be carried out to reduce HCN levels in cassava are drying, soaking, boiling, fermentation and a combination of these processes. As for the leaves, the HCN content can be reduced by drying, boiling or adding methionine or other compounds. others containing sulfur. The use of cassava in poultry rations is 5-10% and for ruminants 40-90% (Final Report on Animal Feed Technology Development Activities, 2014).

Waste from the cassava plant which is a by-product of the tapioca industry is onggok. Onggok has a slightly lower nutritional value than cassava, but has a relatively high BETN content so that it can be used as raw material for energy source feed for livestock.

1.4. Other Plants

According to Widayati and Widalestari (1996), other agricultural wastes that can be used as supporting feed for livestock, especially ruminants include pineapple peel, peanut meal, sugarcane shoots, soybean straw, yam straw, peanut straw and vegetable waste. vegetables that are no longer used for humans.

These agricultural wastes on average have a high crude fiber content, but their availability is quite abundant in nature so there is a need for further utilization with a touch of technology that can convert these raw materials into nutritious feed and energy sources for livestock so that they can be used as feed ingredients. especially ruminants.

METHOD

The literature review (LR) was chosen to conduct this study, Because literature review is one of the simpler research methods compared to other more complicated methods, for example systematic review or meta-analysis.

RESULT AND DISCUSSION

Based on the results of literature reviews of several agricultural books, most of the rice straw is used as compost. The percentage of rice straw is 65% is composted and 35% is used for animal feed. There are also those who claim that straw waste is burned in the fields to make ashes as a cover for the nursery. Farmers in making compost are still very simple, which is only collecting straw from the harvest later

piled up on the edge of the rice field near the embankment without the help of activator and protection from hot and rainy. The finished compost is used for basic fertilizer in the growing season next. Rice straw and crop residues are a very significant source of organic fertilizer in the farming system.

In the agricultural system, the presence of livestock can increase subsistence security through diversification of business types to produce food for farming families, transfer nutrients and energy between animals and plants through manure. According to Devendra (1993) in Dwiyanto and Handiwirawan (2004) there are eight the advantages obtained in the application of an integrated farming system between plants food and livestock, namely: 1) diversification of the use of production resources, 2) reduce the occurrence of risk, 3) efficient use of labor, 4) efficiency use of production components, 5) reduce dependence on chemical and energy energy biological and other inputs from outside resources, 6) the ecological system is more sustainable and not pollute 7)

increase output and 8) develop households more stable farmers.

According to Arifin et al (1993), Hadiwigeno (1993) and Basyir and Suyamto (1996) the provision of 5 tons of straw can save the use of KCL by 100 kg. with based on these figures, the availability of straw fertilizer in the district. Polokarto able to substitute the need for KCL fertilizer as much as 199.6 tons. The potential of straw fertilizer in the district level can save 1,606 tons of KCL fertilizer.

Organic fertilizer/compost has been widely used even since our ancestors farming. Organic fertilizer is the result of fermentation or decomposition of organic matter due to the interaction of the microorganisms working in it. Organic fertilizers can come from waste plant, animal waste, animal urine or other organic waste in the form of solid or liquid. As a result of decomposition of the remains of living things, organic fertilizers classified as a complete fertilizer, containing macro and micro nutrients plants need.

Organic fertilizers are bulk / bulky with levels of nutrients contained in units of low weight so that its application to plants is required in volume the big one. These nutrients can be absorbed by plants after going through the process of decomposition in the soil is used as basic fertilizer. Organic fertilizers include

fertilizers that are environmentally friendly and have several advantages over other types of Other fertilizers are: 1) improve and keep the soil structure loose, so that better plant root growth, 2) improve soil absorption and holding power to water, so that the availability of water needed by plants is adequate, 3) increase living conditions in the soil, 4) reduce phosphate absorption and increase availability of useful nutrient elements (Balittanah, 2008).

The content of nutrients contained in compost varies greatly depending on the composted material, composting method and storage method. According to Adiningsih and Rochayati (1988) in Arafah and Sirappa (2003)

The addition of organic matter is an action to improve the growing environment Among other things, plants can increase fertilizer efficiency. Arafah and Sirappa (2003) added that the use of organic fertilizers increases soil productivity and fertilizer efficiency and reduce the need for fertilizers, especially K. Adiningsih fertilizer(1984) in Arafah and Sirappa (2003) added that the use of organic fertilizers increases soil productivity and fertilizer efficiency and reduce the need for fertilizers, especially K. Adiningsih fertilizer (1984) in Arafah and Sirappa (2003) stated that the use of straw compost as much as 5 tons/ha for 4 growing seasons can contribute nutrients of 170 kg K, 160 kg Mg and 200 kg Si. Rochayati et al. (1991) in Arafah and Sirappa (2003) states that 80% of the potassium absorbed by plants is in the straw. This matter reinforced by Dobermann and Fairhurst (2000) that the highest nutrient content in straw other than Si (4-7%) is potassium which is about 1.2-1.7% and other elements such as N (0.5-0.8%), P (0.07-0.12%) and S (0.05-0.10%). Nutrients of nitrogen, phosphorus and potassium is the main limiting factor for lowland rice productivity.

The technology for utilizing organic waste is directly related to the objectives of the use of the waste. In general, the objectives of utilizing organic waste include: are as follows:

a. **Growing Media**. Many agricultural wastes can be used as media in the production of certain foods or products. For example, rice straw is used in production of edible mushroom, sawdust and rice bran were used as a mushroom medium. How many types of edible mushrooms or fungi can be found? cultivated on media based on textile waste (cotton), sugarcane waste (bagasse), empty bunches (tankos) and other wastes.

b. **Organic fertilizer**. Agricultural waste (food crops, plantations, forestry, urban and livestock) and urban sewage (domestic sewage) which is available in abundance can used as organic fertilizer or compost through the composting process.

c. **Bioenergy (biogas)**.Utilization of organic waste as raw material in production Bioenergy has good prospects. Currently, various technologies have been developed utilizing waste from livestock, urban and industrial plantations in environmentally friendly biogas production. Biogas waste, either in solid form or liquid can be used as organic fertilizer.

d. **Animal feed**. Agricultural products that are volumenous and rich in energy and nutrients can be used as animal feed, either in fresh or processed feed (fermentation, silage, etc.). Fermentation processing technique has been shown to be able to improve the quality of animal feed (content nutrition)

CONCLUSION

Waste can be interpreted as residual material from the production process or materials that are not have economic value damaged or defective goods in the production process or materials unwanted residue from a production process. Waste can be grouped between other based on (a) source, (b) compound or basic framework, (c) form, (d) moisture content, (e) degradability and (f) hazard. Based on the source of the waste can be grouped into (1) Municipal Waste, (2) Industrial Waste (industrial waste), (3) agricultural waste and (4) mining waste (mining waste). Agricultural waste is waste that comes from agricultural activities in a broad sense (agriculture, animal husbandry, fisheries and forestry) and agriculture-based industrial activities (agro-industry) in the form of solid waste (plant residues, leaves, animal waste) or liquid waste. The characteristics of agricultural waste are volumenous and can be found in land, settlements, markets and processing industries. Related technical terms wastes include wet organic waste (garbage), dry waste (rubbish), ash (ashes), street waste (street sweeping), residential waste or domestic waste and special trash. Agricultural waste is an organic compound that can be used as a raw materials to produce a product. In general, agricultural waste can be used as (a) a growing medium to produce food or a product. (b) organic fertilizer (compost) to increase soil fertility and crop productivity, (b) bioenergy (biogas) as a renewable source environmentally friendly and (d) animal feed to support livestock activities.

REFERENCE

1. Arifin, Z., Suprapto dan A.M. Fagi. 1993. *Pengaruh kalium anorganik dan organic terhadap hasil padi sawah.* Reflektor 6 (1-2):13-17. Balitan Sukamandi.
2. Arafah dan M.P. Sirappa. 2003. *Kajian penggunaan jerami dan pupuk N, P, dan K pada lahan sawah irigasi.* Jurnal Ilmu Tanah dan Lingkungan Vol 4 (1). Hal : 15-24.
3. Basyir, A. dan Suyamto. 1996*. Penelitian padi untuk mendukung pelestarian swasembada pangan. Pros. Seminar Apresiasi Hasil Penelitian Balittan Padi*. Badan Litbang Pertanian. Buku I. Hal. 146-170.
4. Badan Pusat Statistik. 2007. Kabupaten Sukoharjo Dalam Angka. BPS- Pemda. Kab.Sukoharjo. 2007.
5. Badan Pusat Statistik. 2008. Kecamatan Polokarto. Dalam Angka. BPS-Pemda.

Kab.Sukoharjo. 2008.
6. Balai Penelitian Tanah. 2008*. Pupuk organic untuk tingkatkan produksi pertanian.* Balittanah.Bogor. Soil-fertility@indo.net.id.
7. Djuarnani, N., Kristian dan Setiawan. BS. 2005. Cara Cepat Membuat Kompos. Agromedia Pustaka. Jakarta.
8. Dobermann, A. dan T. Fairhurst. 2000. Rice: *Nutrient Disorders & Nutrient Management Potash & Potash* Institute/Potash Potash Institute of Canada.
9. Dwiyanto, K dan E. Handiwirawan. 2004. *Peran libang dalam mendukung usaha agribisnis pola integrasi tanaman ternak*. Dalam Prosiding Seminar Nasional Sistem Integrasi Tanaman dan Ternak. Puslitbangnak. Bogor.
10. Http://agroteknomandiri.blogspot.com/2012. Berapa Ton Jerami dalam 1 Hektar.
11. Hadiwigeno, S. 1993. Kebijaksanaan dan arah penelitian pupuk dan pemupukan dalam menghadapi tantangan peningkatan produksi tanaman pangan di masa dating. Jurnal
Litbang Pertanian. XII (1): 1-6.
12. Purwa DR. 2007. Petunjuk Pemupukan. Agromedia Pustaka. Jakarta.
13. Kim and Dale. 2004. Dalam Http://agroteknomandiri.blogspot.com/2012.
14. Rahadi S. 2008. Pembuatan Amoniasi Urea Jerami Padi. Sulawesia Selatan.
15. Reijntjes, S.J., D. Andow, M.A. Altieri. 1999. *Pertanian masa depan, Pengantar untuk Pertanian Berkelanjutan dengan Input Luar Rendah.* Kanisius. Yogyakarta
16. Suriatna, S., Fagi, A.M. dan Las Irsal. 2005. Menuju Revolusi hijau lestari. BPTP JatengBalitpa. Sukamandi.
17. Widayati E dan Widalestari Y. 1996. *Limbah untuk Pakan Ternak.* Trubus Agrisarana. Surabaya.
18. Yani Y. Desember 2011. *Pemanfaatan Limbah Pertanian sebagai Pakan Ternak Ruminansia.* pertanian293.blogspot.com