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Technical Guidance for Increasing Production of Cow Manure-Based Organic Fertilizer in Farmer's Groups in Konda District

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Abstract. This technical guidance activity aims to teach how to process organic fertilizer based on cow dung which is mostly produced by the community's livestock, so that it can reduce the cost of inorganic fertilizer and be more profitable. This activity was carried out in farmer groups in Morome and Alebo Villages, Konda District, South Konawe Regency. The method of activity is carried out by: (1) lectures and discussions on materials and methods of processing organic fertilizers, (2) demonstrations and guidance on the selection of materials and processing of cow dung-based organic fertilizers, (3) packaging and marketing methods for livestock manure-based organic fertilizers. cow. The counseling material presented received a positive and satisfactory response from the participants. In general the participants wanted to adopt the training materials and were very active in the technical guidance. It was concluded that the participants were very interested in applying the guidance materials taught and producing them commercially. The participants hoped that their village would often be given agricultural and livestock guidance and counseling activities.

Keyword: Technical guidance, farmer groups, organic fertilizer, cow dung

Abstrak. *Kegiatan bimbingan teknis ini bertujuan mengajarkan cara mengolah pupuk organic berbasis kotoran sapi yang banyak di hasilkan dari ternak masyarakat, sehingga bisa menekan biaya pupuk anorganik dan lebih menguntungkan. Kegiatan ini dilaksanakan pada kelompok tani di Desa Morome dan Alebo Kecamatan Konda Kabupaten Konawe Selatan. Metode kegiatan dilakukan dengan cara: (1) ceramah dan diskusi mengenai bahan-bahan dan cara pengolahan pupuk organik, (2) demonstrasi dan pembimbingan pemilihan bahan dan pengolahan pupuk organik berbasis kotoran sapi, (3) pengemasan dan cara pemasaran pupuk organic berbasis kotoran ternak sapi. Materi penyuluhan yang disajikan mendapat respon positif dan cukup memuaskan dari peserta. Secara umumnya para peserta ingin mengadopsi materi pelatihan dan sangat aktif dalam bimbingan teknis. Disimpulkan para peserta sangat berminat untuk menerapkan materi bimbingan yang diajarkan serta memproduksi secara komersial. Para peserta berharap agar desa mereka sering diberikan kegiatan bimbingan dan penyuluhan pertanian dan peternakan.*

Kata Kunci: *: Bimbingan teknis, kelompok tani, pupuk organik, kotoran sapi*

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1. Introduction

Indonesia is a country that is blessed with abundant biomass wealth, including energy from biogas, besides that most of the people in Indonesia who carry out livestock activities will produce manure from the livestock which is still rarely used by the breeders. Hoarding of livestock manure around the barn causes environmental pollution, including a pungent odor, if the manure is also flooded by rain water it can reduce the quality of the environment and the quality of health for the community around the farm, it is necessary to treat the sewage waste so that it is not disposed of in vain. Manure waste treatment is expected to reduce environmental pollution and gain profits. Waste treatment can be done by using beef cattle and dairy cow manure as manure for plants, as a producer of biogas, and a mixture of animal feed ingredients. Manure with a large enough volume still contains various compounds, nutrients and microorganisms, so that it can be utilized optimally. Manure is used as manure, because it contains nutrients, such as nitrogen (N), phosphorus (P) and potassium (K), needed by plants and soil fertility.

Naturally, organic materials will undergo decomposition in nature with the help of microbes and other soil biota. However, the composting process that occurs naturally takes a long time and is slow. Many composting technologies have been developed to speed up the composting process. Both composting with simple, medium, and high technology. The technology of composting waste is very diverse, both aerobically and anaerobically, with or without a composting activator. Composting activators that have been widely circulated include OrgaDec, SuperDec, ActiComp, BioPos, EM4. Each activator has its own advantages. In addition, a method that is quite popular in the context of utilizing livestock manure is biogas. Biogas is increasingly in demand and continues to develop, especially in terms of technology.

Biogas is a flammable gas produced from the decomposition of organic materials by anaerobic bacteria or bacteria that live in conditions without oxygen in the air [1] . Biogas itself is a gas from the end product of digestion or anaerobic degradation of organic materials carried out by anaerobic bacteria found in a free environment. And we can see this in human waste, animal waste, household waste, and biodegradable waste under anaerobic conditions.

According to [2] , cow dung can produce biogas because it has a high cellulose content, this makes cow dung very good to be used as a starter in the fermentation process when making biogas.

This technical guidance provides information on the fermentation of livestock waste which is expected to increase the organic matter content and reduce crude fiber content. Crude fiber content in animal feed that is too high if consumed by livestock can reduce digestibility.

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The results of [3], showed that the addition of EM-4 is a step that aims to remodel the cells that have not been broken down during fermentation in the bio gas unit so as to increase the crude protein content. The activity of microorganisms contained in EM-4 stimulates the growth of microorganisms found in solids to remodel cells that have not been decomposed during fermentation in the bio gas unit. So that this technical guidance activity aims to teach how to process organic fertilizer based on cow dung which is mostly produced from community livestock, so that it can reduce the cost of inorganic fertilizer and be more profitable.

2. Method

2.1 Location and Time

This technical guidance activity was carried out in Morome and Alebo Villages, Konda District, South Konawe Regency in January 2020.

2.2 Materials and Tool

The tools and materials used in this technical guidance are as follows: stationery, camera, vehicle.

2.3 Technical Guidance Procedure

The steps for visiting Morome and Alebo Villages, Konda Subdistrict, following the procedures that have been carried out by Hafid et al, [4],[5],[6],[7], are as follows:

1) All group members go to technical guidance
2) Conducting observations at the location of technical guidance
3) Discussion with farmer groups
4) Documentary picture taking

3. Results and Discussion

The results of observations on technical guidance in Morome and Alebo Villages, Konda District can be presented in Table 1.

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Table 1. The results of observations on technical guidance in Morome and Alebo Villages, District Konda

No.	Variable	Desa Morome	Desa Alebo
1.	Farmer groups	Sumberojo	Sumber Agung
2.	Type of business	Cooperation with the provincial government	Self-help farmer group members
3.	Production quantity	Depends on request consumer	Depends on request consumer
4.	Capabilities of a chopping machine	5 tons/day	2 tons/day
5.	Consumer	Group members and local farmers, and sometimes buyers from outside the area.	Group members, farmers and sometimes the UHO Faculty of Agriculture
6.	Constrain	Marketing and Labor	Marketing and Labor

Based on the results of interviews with the stages of making compost in the village of Morome and Alebo District Konda are as follows:

a) Cow feces storage

The purpose of the reservoir is to reduce the water content and methane gas from the feces. The length of the shelter depends on consumer demand.

b) Addition of sawdust and lime

The purpose of adding sawdust is to speed up drying and increase the volume of compost. In addition, sometimes the rest of the animal feed is added.

c) Stirring

The purpose of stirring is to ensure that the compost is mixed evenly.

d) The fermentation process is carried out for 2-3 weeks

e) Puree using a chopper machine

f) The compost is ready to be used and marketed

3.1 Benefits of Organic Compost

The benefits of organic compost include 1) improving the structure of the clayey soil so that it becomes lighter; 2) increase the binding capacity of sandy soil so that the soil does not crumble; 3) increase soil binding capacity to water and soil nutrients; 4) improve drainage and air conditioning in the soil; 5) contains complete nutrients, although the amount is small (this amount depends on the ingredients for making organic fertilizers); 6) assist the process of weathering mineral materials; 7) provide food availability for microbes; and 8) reduce the activity of harmful microorganisms [8].

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Processing cow manure which has high N, P and K content as compost can supply the nutrients needed by the soil and improve soil structure for the better [9]. In good/healthy soil, the solubility of inorganic elements will increase, and the availability of amino acids, sugars, vitamins and bioactive substances resulting from the activity of effective microorganisms in the soil will increase, so that plant growth becomes more optimal [10].

3.2 Organic Compost Production And Content

A cow is able to produce solid and liquid manure 23.6 kg/day and 9.1 kg/day [11]. A calf will produce 15-30 kg of dung per day. The manure that has just been produced by cows cannot be directly applied as plant fertilizer, but must undergo a composting process first. Some of the reasons why organic matter such as cow dung needs to be composted before being used as plant fertilizer include: 1) when the soil contains enough air and water, the decomposition of organic matter takes place quickly so that it can interfere with plant growth, 2) the decomposition of fresh matter supplies only a small amount of humus. and nutrients into the soil, 3) the structure of fresh organic matter is very coarse and its resistance to water is small, so that if it is directly immersed it will cause the soil to become very crumbly, 4) cow dung is not always available when needed, so composting is a way of storing organic matter before being used as fertilizer. The content of nitrogen (N), phosphorus (P) and potassium (K) in beef cattle manure is listed in Table 2.

Table 2. Content of N, P and K in beef cattle dung

Weight (kg)	N (%)	P (%)	K (%)
277	28,1	9,1	20,0
340	42,2	13,6	30,0
354	56,2	18,2	39,9
567	70,3	22,7	49,9

3.3 How to Make Compost

Composting begins with the collection of cow dung by harvesting from the group cage system, followed by processing into bulk compost, blocks, granules and bokhasi.

3.3.1 Compost harvesting

Compost harvesting is carried out after the thickness of cow dung and urine in the group cage reaches 25 - 30 cm (1.5 - 2 months). Harvesting is carried out according to the purpose of the type of organic compost, namely bulk compost, block compost, granu compost and bokhasi.

3.3.2 Bulk compost making process

Manure harvested from the cages is aerated in the shade for 2 months in the rainy season or 1 month in the dry season, the manure is crushed and sieved with a hole size of 0.5 x 0.5 cm, then packed in sacks.

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3.3.3 Block compost process

Freshly harvested manure (still wet condition), is printed using a simple manual press or by using a brick press machine. p . size block compost mould = 20 x l = 12 or 6 x h = 5 cm

3.3.4 Bokhasi Compost Making Process

Material:

a) Cow dung after draining

b) Husk (10% of the weight of cow dung)

c) Husk ash (10% of the weight of cow dung)

d) Rice bran (5% of the weight of cow dung)

e) Solution of EM-4 + Drops + Water (2 : 2: 1000) or 1 liter of water + 2 cc of EM-4 + 2cc of drops or 1 liter of water + 2 cc of EM-4 + 6 tablespoons of sugar

How to make:

a) Mix cow dung + husk + husk ash + rice bran according to the dose, then stir until evenly distributed.

b) Pour the mixture of EM-4 solution + drops + water into the No. mixture. 1. and stir until evenly distributed to form a dough with a water content of + 40%.

c) Cover with a burlap sack or mat. Under aerobic conditions the fermentation will take place quickly so that the bokkhasi temperature increases by 35-40 C. When the temperature reaches 50%, then the bokashi is turned back and forth so that the air enters and the temperature drops. Fermentation time is between 4-5 days and bokhasi is considered finished if it has a characteristic fermented smell, dry, cold and overgrown with white fungus. If it smells bad, then the making of bokashi is considered a failure.

3.4 How to Use Organic Compost

Organic compost produced by partners using innovative technology produced by the Beef Cattle Research Workshop can be used for rice, polowijo and horticulture crops. The method of administration is spread evenly on the soil surface with a dose according to the type of plant; for individual fertilization such as potted plants (orange, mango, flower, etc.), compost is spread under the outer canopy of leaves; for expanses of rice and polowijo plants, 10 tons/ha are given every 6 months; for shallots 20,000 kg/ha; for watermelon plants 2 kg/bed. [12] stated that the use of organic compost based on plant age is 500 g/plant at the age of 1-3 months, 1000 g/plant at the age of 4-9 months. Based on the results of the West Java AIAT study, it showed that

cherry tomato varieties fertilized with cow dung compost were able to produce 3.15 kg/plant. Meanwhile, for leek and celery plants with the use of organic cow dung compost, their production can increase by 57.1% and , respectively 47.6%

3.4.1 Morome village farmers group

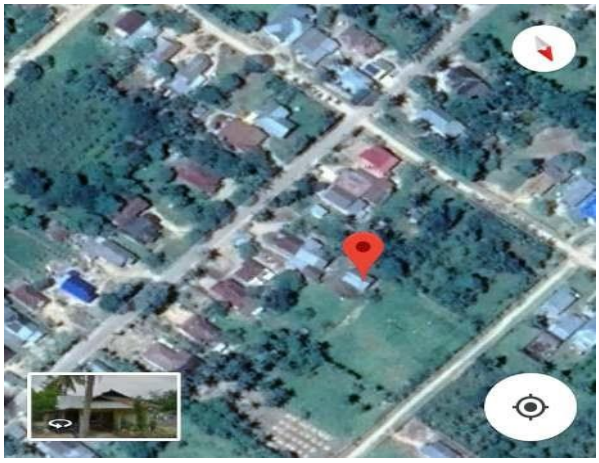

Figure 1. Morome Village Observation Location

Our first visit was a visit by a farmer group in the village of Morome. This farmer group makes organic fertilizer using cow dung. This farmer group has as many as 25 cows so that the manure produced can be sufficient in making organic fertilizer which will be used in the gardens of each group member. Basically, most of the people in Konda have their main job as farmers.

Figure 2. Chopper Machine for Chopping Grass and Organic Fertilizer

This farmer group has a copper facility which is used to grind or loosen the finished organic fertilizer, a compost house as a place to do composting activities and a cage as a shelter for livestock. The copper machine owned by this farmer group has size number 1, this machine can operate up to 5 tons in 1 day. The existence of this machine is very helpful in making the workforce more efficient and time efficient in making organic fertilizers.

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Figure 3. The Condition of The Compost House of The Morome Village Farmer Group

The compost house is the center of activity in this farmer group, the compost house that is owned is 10x10 meters in size. This house can accommodate up to 10 tons of animal feces which will be used as raw material for compost. There are two cages in this farmer group. The first cage is a cage used for adult cattle consisting of 15 cattle and a cage for calves totaling 10 cattle. Livestock reared in this farmer group use an intensive rearing system, i.e. cattle are housed full time or 24 hours a day. Livestock needs, in this case, animal feed, are provided by the farmers continuously and do not forget to pay attention to the quality and quantity of feed provided.

The organic fertilizer of this farmer group uses cow faeces, rice husks, EM4 and forage. 90% of the compost made by this farmer group uses cow feces from 25 livestock belonging to this farmer group. Rice husk in the manufacture of farmer group compost serves to compact livestock feces, as well as facilitate the evaporation of water during feces storage. The rice husks used in making compost for this farmer group are 5% of the livestock feces used. The rice husks used come from the rest of the results of rice milling that are no longer used, right, this helps the government in realizing the concept of zero-waste agriculture. The EM4 used is EM 4 for brown livestock. Many types of EM4 are found in farmer's shops so that to obtain these materials, farmer groups do not have difficulty. This EM4 serves as a fermenter or a source of decomposing microorganisms which will accelerate the decomposition process of feces during the fermentation process.

The main obstacles faced by livestock groups in Morome village are lack of consumers in marketing and lack of labor. So what needs to be done to increase the yield of compost fertilizer is to make labels on the compost that is made to attract people's interest in buying the compost made. In addition, you can do marketing through online media such as Facebook, Instagram, WhatsApp, and so on. Meanwhile, to overcome the problem of lack of manpower, it can be done by increasing the salary of employees in order to attract people's interest to work in

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composting. In addition, an increase in salary can improve the standard of living of the community.

The increase of awareness of the benefits of vegetables and fruits to preschool children among participants could be seen by the increment in the mean value from the pretest compared to the posttest, which is 6.2 from the pretest, to 8.27 from the posttest. There was an increase of 2.07 points. The improvement in skills on processing doughnuts with the addition of vegetables and fruits extract could be seen from the participants successfully making doughnuts with the addition of vegetables and fruits independently at each home.

3.4.2 Alebo village farmers group

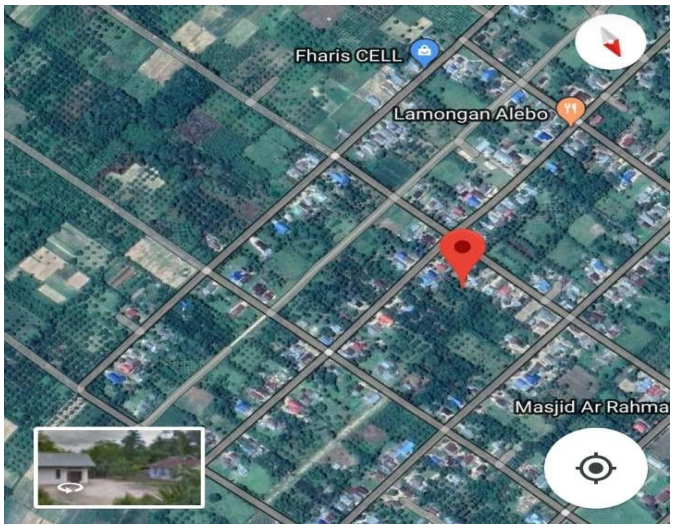

Figure 4. Observation locations in Alebo Village

Our second visit was a farmer group visit in Alebo village. This farmer group makes organic fertilizer with the material used, namely cow dung which is maintained by the farmer group itself. This farmer group has 13 cows so that the manure produced can be sufficient in making organic fertilizer which will be used in the gardens of each group member. Basically, most of the people in Konda have their main job as farmers.

The compost produced is used by the farmer groups themselves and some is sold. Based on interviews, the compost that is sold is usually sold to local farming communities, at the UHO Animal Science Faculty, and other areas that require organic fertilizer.

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Figure 5. Chopper machine for chopping grass and organic fertilizer for Alebo Village Farmers Group

This farmer group also has a copper facility which is used to grind or pulverize the finished organic fertilizer, a compost house as a place to do composting activities and a cage as a shelter for livestock. The copper machine owned by this farmer group has size number 2, this machine can operate up to 2 tons in 1 day. The existence of this machine is very helpful in making the workforce more efficient and time efficient in making organic fertilizers. In addition to chopping compost, this machine is also used to chop animal feed so that it can be easily eaten by livestock.

Figure 6. Shelter for organic fertilizer from Alebo village farmer group

The compost house is the center of activity in this farmer group, the compost house that is owned is 3x4 meters in size. This house can accommodate up to 2 tons of animal feces which will be used as raw material for compost. There are two cages in this farmer group. The first cage is a cage used for adult cattle and chicks consisting of 9 cattle and a cage for adult cows totaling 4 cattle. Livestock reared in this farmer group use an intensive rearing system, i.e. cattle

are fully housed time or for 24 hours in 1 day. Livestock needs, in this case, animal feed, are provided by the farmers continuously and do not forget to pay attention to the quality and quantity of feed provided.

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The main obstacles faced by livestock groups in Alebo village are the lack of consumers in marketing and the lack of labor. So what needs to be done to increase the yield of compost fertilizer is to make labels on the compost that is made to attract people's interest in buying the compost made. In addition, you can do marketing through online media such as Facebook, Instagram, WhatsApp, and so on. Meanwhile, to overcome the problem of lack of manpower, it can be done by increasing the salary of employees in order to attract people's interest to work in composting. In addition, an increase in salary can improve the standard of living of the community.

4. Conclusion

The manufacture of organic fertilizer in Morome village and Alebo village, Konda sub-district is carried out by members of farmer groups by making shelter houses and making organic fertilizer with the help of a chopper machine, near the cattle pens, and the daily production is uncertain depending on demand but the maximum production of Morome village is 5 ton and 2 ton Alebo village and marketing can be increased through product advertising through mass media and also the high interest of participants to produce commercially.

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