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## Community Assistance in Preparing Local Resources-Based Organic Agricultural Production Facilities

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**Abstract.** The decreased soil carrying capacity is due to reduced soil organic matter content, caused by disproportionately larger use of inorganic fertilizers and synthetic chemical pesticides in farming activities than organic fertilizers and environmentally friendly weeds, disease, and insect pests control materials. Reducing the use of inorganic fertilizers and synthetic chemical pesticides could be done by using production facilities of organic agriculture in the form of organic fertilizers and synthetic non-chemical pesticides on a larger scale, which base materials are available in nature. The problem faced by farmers in using these inputs is the lack of awareness and skills in producing organic inputs. This community service program with competitive schematics aims to assist the community in preparing local resource-based organic production inputs in Uwe Nuni Village, Palolo District. Specifically, to increase the awareness and skills of farmers in producing organic inputs based on local resources. The method used for counselling and training is Focus Group Discussion (FGD) approach, as well as practice and demonstration plots, which also provide technical guidance on making compost and botanical pesticides, and organic-based plant cultivation techniques. The results of the community service program show that the implementation of counselling and training increases the community's awareness, skills, and attitudes by 38%, 56% and 54%, respectively. The compost made during the technology training was made from cow and goat manure, while the botanical insecticides were made from quickstick (*Gliricidia sepium*) plant leaves, papaya leaves, and soursop leaves. These plants are potential resources in Uwe Nuni Village, Palolo District.

**Keywords:** botanic pesticide, compost, organic production facilities

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## INTRODUCTION

The intensive use of inorganic fertilizers and chemical pesticides by farmers causes a decrease in land quality which is characterized by reduced soil organic matter and the presence of chemical residues. The presence of soil organic matter is very influential in maintaining sustainability, productivity, and quality of its soil. The lower the organic matter content, the lower the soil productivity (Kusumarini et al., 2020). Efforts to restore the health and fertility of paddy fields can be done by utilizing organic fertilizers and biological fertilizers (biofertilizers) that are adaptive to the ecosystem of agricultural land.

Palolo District is one of the centres of rice production in The Sigi Regency. In 2017, paddy rice production reached 422,869 tons with a harvested area of 9,473 hectares. Uwe Nuni Village, which has the largest populated area in Palolo District, lived by 2,765 people, 1,445 men and 1,320 women to be precise and most of them are farmers. The area of irrigated paddy fields in Uwe Nuni Village reaches 146 ha, and rainfed rice fields reach 340 ha with an average rice production of 4.5 tons/ha. Uwe Nuni village also has 15 ha of yards, 73 ha of fields, and 67 ha of gardens. The community also has cattle and goats (Badan Pusat Statistik, 2018).

The farmer group "Sinar Uenuni IV" in Uwe Nuni Village, Palolo District, consisting of 15 people, is one of the active farmer groups that were into rice farming activities with an area plantation of 20 ha. These farmer group members generally last graduated from high school, with precisely 10 males and 5 females. The farmer group members are still carrying out farming activities conventionally, namely by using inorganic fertilizers that are discordant with the recommendations, which doses tend to be high. The use of chemical fertilizers in high concentrations and doses for a long time causes a nutrient imbalance and a decrease in beneficial soil organic matter content. This event causes certain nutrient depletion which both Zn and Cu deficiency occurred. Nutrient imbalances and the decline in soil organic matter will lead to the degradation of soil fertility which going to threaten the sustainability of farming (Hasibuan, 2015).

The problems felt by farmers who are members of the "Sinar Uenuni IV" farmer group also were into rice cultivation, currently there is a decline in the productivity of the farming business and higher production costs, especially for the purchase of inorganic fertilizers and chemical pesticides. This problem illustrates that early steps must be taken to improve and increase productivity by restoring soil health and quality by eliminating the source that causes declining soil health. Without addressing soil health problems, even the

provision of large-scale inputs cannot produce good results but worsens because of accelerating the decline in soil productivity.

After discussion with members of the problematic farmer group, concluded that there is still potential to increase paddy yields in Uwe Nuni Village, by preparing *organic production inputs* made from locally available materials. One of the yields of rice cultivation is capable to produce organic fertilizer base material (organic matter) in the form of straw. For each hectare produced about 8-12 tons of straw (about 1.2 – 1.5 x grain yield) per season could be used as fertilizer to substitute inorganic fertilizer (Wiada, 2021). The potential of organic matter in Uwe Nuni Village is classified as very abundant in the forms of rice straw, husks, and bran also cow and goat manure, but these materials have not been utilized optimally by farmers to be used as organic fertilizer. Many materials could be made into compost and potentially a lot for formulating (to produce) botanical pesticides.

## PROBLEMS

### A. Farming Productivity Problems

1. The productivity of rice produced has decreased compared to the expected potential yield because the carrying capacity of the land is decreasing.
2. Organic fertilizers are not available in the local market, so farmers still use inorganic fertilizers for plant cultivation.
3. Pests and diseases that often hit the rice crop.
4. Farmer groups still found it difficult to produce bioinsecticides/bio-fungicides that are effective in controlling pests, that often hit on the vegetable plantation.
5. Farmer groups still have difficulty obtaining very quality seeds.

### B. Managerial problems

The administration and marketing management of farmer groups are still conventional and less progressive.

## METHOD OF IMPLEMENTATION

The methods applied in the community service program in the competitive schematic are.

- a. **Counselling and training;** as an effort to increase awareness, skill, and attitude for the target group, it is carried out with an adult learning approach.

- b. **Technology introduction;** carried out with demonstration plots and technology assemblies.
- c. **Empowerment of the designated group;** carried out by the mentoring approach.

## RESULTS AND DISCUSSION

### 1. Counselling and Training

Counselling is an educational process that aims to improve the awareness, attitudes, and skills in this case it was of the farming community. The subject of agricultural counselling is all community members. Agricultural counselling also teaches people to collect their ideas and how to achieve them. The method applied in agricultural counselling is learning by practising so they could believe what they saw. While the communication pattern approaches were two-way communications, mutual respect, and mutual trust in the form of cooperation to improve the welfare of the community. This is an application by the research of (Amanah, 2007) and (Riadi, 2020) which counselling is an effort to convey information or technology to participants so that they know, are willing, and able to use the conveyed technological innovations.

The subjects that were presented at the counselling activity consisted of several, namely: sustainable agriculture, fertilization, pest control, and the use of the local potential for the preparation of organic production inputs (Table 1).

**Table 1.** Counselling Subjects

No.	Subjects	Main Topics
1.	Sustainable Agriculture	Definition
2.	Fertilization	<ol style="list-style-type: none"> <li>a) Physical, chemical, and biological fertility.</li> <li>b) Organic fertilizer: manure (organic) and biological fertilizer</li> <li>c) Inorganic fertilizer: Urea, TSP, KCl (Potassium Chloride)</li> <li>d) Benefits of macro and micronutrients</li> <li>e) Fertilization method</li> </ol>
3.	Plant Pest Organisms (disease, pest, and weed) control	Organic (Botanic) Pesticide
4.	Use of available (local) resources for the preparation of organic inputs	Organic fertilizer, use of Local Microorganisms, organic pesticides, cropping pattern or habit.

After the delivery of the counselling material, it was followed by training for preparation techniques of organic inputs, especially techniques for making organic fertilizers (compost) and techniques for providing biorational pesticides (Figure 1).



Figure 1. Atmospheric Photos of Counselling Program

## 2. Application of organic fertilizers and biorational pesticides

### a. Formulation of compost

The organic fertilizer that was made is compost which uses organic waste and livestock manure, this is because livestock manure is one of the locally available resources that is quite found at the location considering that almost all members of farmer groups have cattle or goats. Composting is done by taking cow or goat manure and then mixing it with organic waste, then adding decomposer microbes (EM-4) after that, dousing it with water which already had been added with molasses. The addition of the decomposer microbes (EM-4) plays a role in accelerating the formation of compost (Indrayani et al., 2021). The mixture is then stirred until evenly distributed and stacked with a height of no more than 30 cm and left for 7 days. On the third day onwards, turned over the pile until the composting process is successful (Figure 2).

To find out if the composting process were successful, check the temperature every day on the compost mixture, which is a maximum of 35°C. If the temperature was high, it is necessary to sprinkle the water and the process of re-harrowing so that the temperature is maintained at 35°C (Widiyaningrum and Lisdiana, 2015). A rake is an agricultural tool, shaped like a comb that functions to flatten ploughed land; rake. This is intended so that microbial activity can take place properly, which also means



that the composting process was also going well (Sasaki et al., 2016; Zhou et al., 2015). Compost was going to be formed after 2 weeks which is marked by changes in colour and aroma. With farmers' capability for creating compost, the need for relying on using inorganic fertilizers can be met by substituting organic fertilizers.



**Figure 2.** Process of Creating Organic Fertilizer

#### **b. Formulation of bio-rational insecticides**

The biorational insecticides that were made are botanical insecticides which it made from pesticide plants that grow at the location of the community service program, so the community could further aware and capable to utilize the potential of locally available resources. The plants that are known to have pesticides characteristic were collected and then do simple extraction using water as a solvent. The utilization of plant extracts as botanical insecticides is based on the effects of toxicity and insecticidal activity towards insect pests which can be in any form, there are antifeedant, repellency, preventing oviposition, and growth agents against the insect pest. The advantages of plant extracts as botanical pesticides for pest management are that they are cheap and easy to make, relatively safe for the environment, do not cause poison to plants, and produce healthy agricultural products because they were free of any chemical pesticide residues (Rioba & Stevenson, 2020). Thus, the use of botanical pesticides in pest and disease control is environmentally friendly (Joseph & Sujatha, 2012; Lengai et al., 2020).

In the community service program, plant extracts made as botanical insecticides are quickstick (*Gliricidia sepium*) leaves, papaya leaves, and soursop leaves. This is because the three types of plants are abundant and potentially available resources in Uwe Nuni village, Palolo district. After completing the extraction process, the process of distillation, storage and packaging of the product is carried out.

Extraction was made by taking plant leaves and then blending them until they were smooth and adding distilled water in a ratio of 1:2 and then squeezing them out. The juice is then accommodated in a basin container and fermented for 24 hours. Furthermore, the fermentation product was contained in a jerrycan and stored for use as a botanical insecticide (Figure 3).



Figure 3. Organic (Botanic) Insecticide Formulating Process

### c. Demonstration plot of the use of organic inputs

Production facilities obtained in training activities are applied to areas that have been prepared as demonstration plots and pilots. The demonstration plot is made on a plot of rice fields that have been processed. The application of compost was carried out before planting paddy, and the application of botanical pesticides was carried out when the plants show indications of pest attack.

The dose of compost applied was 10 tons/ha by scattering the compost evenly on the rice fields 2 weeks before the planting. Furthermore, rice planting is carried out by the recommendations of the local government. Plant maintenance is done by removing grown weeds. The growth development of rice plants that have been applied with organic fertilizers is shown in Figure 4.



**Figure 4.** Rice Cultivation of Demonstration Plot

The application of organic fertilizer in the experimental demonstration plot was seen to increase the vegetative growth of rice plants in contrast to land that was not given any organic fertilizer. This is supported by research (Lasmini et al., 2021), (Lasmini et al., 2022) and (Idham et al., 2021) that the application of organic fertilizers both solid and liquid can increase the vegetative growth of plants. In addition, organic fertilizers also play a role in providing nutrients to the soil and making efficient use of fertilizers and substituting inorganic fertilizers (Yang et al., 2020).

### 3. Empowerment by guidance and assistance

Community guidance and assistance are intended to aid the community became capable to develop so that what was expected is achieved (Suharto, 2005). In this community service, the community guidance and assistance activities carried out are those related to the preparation of organic inputs so the community can break away from being dependent on inorganic fertilizers and chemical insecticides. To find out how the success of this community service program, an evaluation was carried out in the form of distributing questionnaires to participants, both given before the activity and after the activity (Table 2).

**Table 2.** Assessment of Community Service Program Before and After Execution

Assessments	Statements	5	4	3	2	1
Awareness	Awareness of organic fertilizer.	20 (10)	0 (4)	0 (5)	0 (1)	0 (0)
	Awareness of the Local Microorganisms.	10 (0)	5 (0)	5 (10)	0 (5)	0 (5)
	Awareness of biopesticides.	12 (0)	3 (3)	5 (5)	0 (4)	0 (8)
	Awareness of cropping patterns.	8 (0)	8 (0)	4 (4)	0 (5)	0 (11)

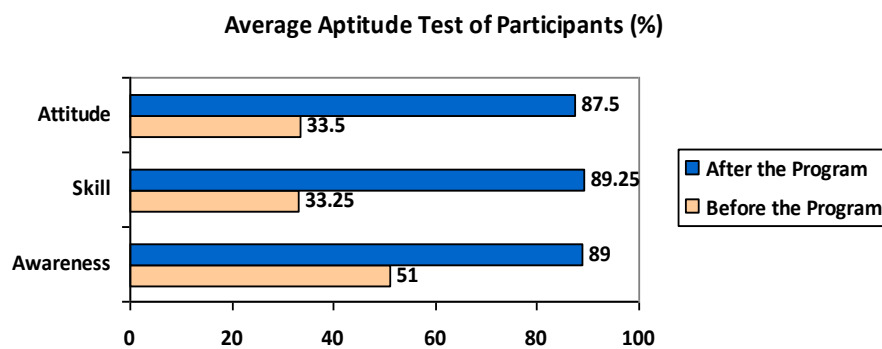


**Table 2.** (Cont.) Assessment of Community Service Program Before and After Execution

Skill	How to use organic fertilizer.	20	0	0	0	0
		(0)	(0)	(4)	(5)	(11)
	Making various uses of Local Microorganisms.	12	4	4	0	0
		(0)	(0)	(0)	(5)	(15)
	Making a variety of organic pesticides with available (local) resources.	10	5	5	0	0
		(0)	(3)	(5)	(4)	(8)
Attitude	Set the type of plants in the plantation according to the cropping pattern.	8	8	4	0	0
		(0)	(0)	(4)	(5)	(11)
	Willingness and interest in the utilization of organic fertilizers.	15	3	2	0	0
		(7)	(4)	(5)	(1)	(3)
	Willingness and Interest in the utilization of various local microorganisms.	12	4	4	0	0
		(2)	(3)	(7)	(5)	(3)
	Willing and motivated in the utilization of organic pesticides	10	5	5	0	0
		(0)	(3)	(7)	(6)	(4)
	Willing and motivated in setting cropping pattern	8	8	4	0	0
		(00)	(2)	(4)	(5)	(9)

(5: Know Best, 4: Know, 3: Don't Know, 2: Not Know, 1: Completely Don't Know). Numbers in parentheses indicate after execution of the program

The results show that the awareness, skills, and attitudes of participants have increased after they were participating in the community service program. Attitudes increased by 54%, skills by 56%, and awareness by 38% (Figure 5).



**Figure 5.** Aptitude Test Diagram of Assessment Points; Awareness, Skill, and Attitude of Participants of the Community Service Program

By providing production facilities made from local potential in a community service program, besides being able to increase the economic value of local resources, it can also minimize production costs for farmers during managing their businesses.

## CONCLUSION

The results of the program community service show that counselling, training, and technology demonstration plots increase the awareness, skills, and attitudes of its participants in providing organic production facilities made from local resources, which are 38%, 56% and 54% respectively. The compost (manure) is made from cow and goat dung waste, while the botanic insecticides are made from quickstick leaves, papaya leaves, and soursop leaves. These plants include potential resources in Uwe Nuni Village, Palolo District.

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**Original Title:**

Pendampingan Masyarakat Dalam Penyiapan Sarana Produksi Pertanian Organik Berbasis Sumberdaya Lokal

**Abstrak.** Penggunaan pupuk anorganik dan pestisida kimia sintetik dalam aktivitas usaha tani tanpa diimbangi dengan pupuk organik dan bahan pengendali Organisme Pengganggu Tanaman (OPT) yang ramah lingkungan menyebabkan semakin menurunnya daya dukung lahan akibat berkurangnya kandungan bahan organik tanah. Untuk mengurangi penggunaan pupuk anorganik dan pestisida kimia sintetis dapat dilakukan dengan penggunaan sarana produksi (saprodi) pertanian organik berupa pupuk organik dan pestisida non kimia sintetis yang bahan bakunya tersedia di alam. Permasalahan yang dihadapi petani dalam penggunaan saprodi tersebut adalah minimnya pengetahuan dan ketrampilan dalam memproduksi saprodi organik. Program pengabdian kepada masyarakat skema kompetitif ini bertujuan untuk mendampingi masyarakat dalam penyiapan saprodi organik berbasis sumberdaya lokal di Desa Uwe Nuni Kecamatan Palolo. Target khusus yang ingin dicapai adalah peningkatan pengetahuan dan ketrampilan petani dalam memproduksi saprodi organik berbasis sumberdaya lokal. Metode yang digunakan yaitu penyuluhan dan pelatihan dengan pendekatan Focus Group Discussion (FGD), serta praktek dan demplot percontohan serta bimbingan teknis pembuatan pupuk kompos dan pestisida botani serta teknik budidaya tanaman berbasis organik. Hasil pelaksanaan pengabdian kepada masyarakat memperlihatkan bahwa pelaksanaan penyuluhan dan pelatihan meningkatkan pengetahuan, ketrampilan dan sikap masyarakat yakni masing-masing sebesar 38%, 56% dan 54%. Pupuk kompos yang dibuat pada pelatihan teknologi yaitu berbahan baku limbah kotoran sapi dan kambing, sedangkan insektisida botani berbahan baku daun tumbuhan gamal, daun pepaya, dan daun sirsak. Tumbuh-tumbuhan tersebut termasuk sumberdaya yang potensial di Desa Uwe Nuni Kecamatan Palolo.

**Kata kunci:** Pestisida botani, pupuk kompos, saprodi organik