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## KNOWLEDGE LEVEL OF NU MA'RUF KUDUS HIGH SCHOOL STUDENTS REGARDING COMPOST FERTILIZER TO SUPPORT SUSTAINABLE AGRICULTURAL EFFORTS

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### ABSTRACT

The waste problem is one of the big challenges faced by communities throughout the world. The environmental impacts of the waste problem include water and air pollution, ecosystem damage, and reduction of natural resources. This research aims to analyze the level of knowledge of NU Ma'ruf Kudus High School students about compost fertilizer, the manufacturing process, and the benefits of compost fertilizer. The research method used is descriptive analysis using a questionnaire as a data collection tool. The respondents of this research were 30 class XII students of SMA NU Ma'ruf Kudus. The data analysis used is a Likert scale. The research results showed that the level of students' knowledge about compost fertilizer, the manufacturing process and its benefits increased after being given education. Most students have a good understanding of the concept of compost fertilizer and its benefits in sustainable agriculture. These findings indicate that there is still a need to improve education and counseling about compost fertilizer in schools, as well as its important role in increasing students' awareness of environmental issues and sustainable agriculture. This research contributes to the understanding of students' level of knowledge regarding compost fertilizer and highlights the importance of education about sustainable agricultural practices at the secondary education level. Further efforts can be made to increase students' understanding of compost and its impact on the environment and agriculture. With a better understanding of compost, students can become agents of change who play a role in protecting and caring for our environment, as well as supporting more sustainable agriculture.

**Keywords** : Sustainable Agriculture; Compost Fertilizer; Level of Knowledge

### ABSTRAK

Masalah sampah merupakan salah satu tantangan besar yang dihadapi oleh masyarakat di seluruh dunia. Dampak lingkungan dari masalah sampah meliputi pencemaran air dan udara, kerusakan ekosistem, dan pengurangan sumber daya alam. Penelitian ini bertujuan untuk menganalisis tingkat pengetahuan siswa SMA NU Ma'ruf Kudus tentang pupuk kompos, proses pembuatan, dan manfaat pupuk kompos. Metode penelitian yang digunakan adalah analisis deskriptif dengan menggunakan kuesioner sebagai alat pengumpulan data. Responden penelitian ini adalah siswa kelas XII SMA NU Ma'ruf Kudus sebanyak 30 orang. Analisis data yang digunakan yaitu menggunakan skala likert. Hasil penelitian menunjukkan bahwa tingkat pengetahuan siswa tentang pupuk kompos, proses pembuatan, dan manfaatnya mengalami peningkatan setelah diberikan edukasi. Sebagian besar siswa sudah cukup memahami dengan baik konsep pupuk kompos dan manfaatnya dalam pertanian berkelanjutan. Temuan ini

mengindikasikan masih perlunya peningkatan pendidikan dan penyuluhan tentang pupuk kompos di sekolah-sekolah, serta peran penting dalam meningkatkan kesadaran siswa terhadap isu-isu lingkungan dan pertanian berkelanjutan. Penelitian ini memberikan kontribusi pada pemahaman tentang tingkat pengetahuan siswa terkait pupuk kompos dan menyoroti pentingnya edukasi tentang praktik-praktik pertanian berkelanjutan di tingkat pendidikan menengah. Upaya lebih lanjut dapat dilakukan untuk meningkatkan pemahaman siswa tentang pupuk kompos dan dampaknya pada lingkungan dan pertanian. Dengan pemahaman yang lebih baik tentang pupuk kompos, siswa dapat menjadi agen perubahan yang berperan dalam menjaga dan merawat lingkungan kita, serta mendukung pertanian yang lebih berkelanjutan.

**Keywords:** Pertanian Berkelanjutan; Pupuk Kompos; Tingkat Pengetahuan

## INTRODUCTION

The waste problem is one of the big challenges faced by communities throughout the world. Increasing population and changes in modern lifestyles have resulted in a drastic increase in waste production. This waste includes various types, such as plastic waste, organic waste, electronic waste, and many others. The problem lies not only in the increasing amount of waste, but also in the environmental and social impacts it causes. The environmental impacts of the waste problem include water and air pollution, ecosystem damage, and reduction of natural resources. Plastic waste, for example, can pollute the ocean and endanger marine life. Electronic waste contains hazardous substances that can pollute soil and water. On the social side, waste problems also include public health issues, worker safety, and conflicts related to waste disposal locations (Hoornweg & Bhada-Tata, 2012).

In research by Ejaz, Akhtar, Nisar, & Naeem (2010) entitled "*Environmental Impacts Of Improper Solid Waste Management In Developing Countries: A Case Study Of Rawalpindi City*" researchers explored the impact of environmental pollution caused by improper waste management in developing cities. This study highlights the need for changes in waste management practices to reduce negative impacts on the environment and human health.

In an effort to address the waste problem, many countries and communities have developed better waste management programs, such as recycling, composting, and safe waste disposal. Community education, one of which is for students, is also key in changing consumer behavior and increasing awareness from an early age of the importance of reducing, recycling and disposing of waste properly.

Compost is organic material that has undergone a natural or controlled decomposition process into a more stable material, which can be used to increase soil fertility and plant growth (Zainudin, et al., 2022) .

Knowledge about compost fertilizer has an important role for students. It helps students understand practical ways to contribute to sustainable agriculture and a healthier environment. In their learning, students will gain an understanding of how compost can improve soil quality, reduce organic waste, and support better plant growth. In addition, this knowledge also helps students develop awareness about the importance of managing organic waste in an environmentally friendly way. Apart from its practical benefits, knowledge about compost fertilizer also opens the door for students to understand the concepts of ecology, nutrient cycles and sustainable agriculture.

The aim of this research is to determine the extent of understanding of NU Ma'ruf Kudus High School students before and after being given education about compost fertilizer in the context of sustainable agriculture and the environment which includes the

concept of compost fertilizer, how it is produced, and its benefits in agriculture.

The formulation of the problem in this research is as follows: What is the level of knowledge of NU Ma'ruf Kudus High School students before and after being given education about compost fertilizer as an organic material used in sustainable agriculture?; To what extent do NU Ma'ruf Kudus High School students understand before and after being given education about the process of making compost fertilizer?; What is the level of knowledge of NU Ma'ruf Kudus High School students before and after being given education about the benefits of using compost fertilizer?

## RESEARCH METHODS

This research was conducted in March 2023 at the Green House, Faculty of Agriculture, Muria Kudus University. The data used is primary data, which is information obtained directly from the source and collected by researchers (Sugiyono, 2013) . Primary data was collected through surveys and direct interviews with respondents. Interviews were conducted twice, before being given education and after being given education. Respondents consisted of 30 class XII students of SMA NU Ma'ruf Kudus. The data collected relates to

students' perceptions and responses regarding their knowledge about compost fertilizer, the process of making it, and its benefits. Primary data was obtained through a questionnaire designed based on relevant variables. Respondents were selected from the population of class XII students at SMA NU Ma'ruf Kudus using the Stratified proportional random sampling method (Etikan & Kabiru, 2017) .

The method used in this research is a descriptive analytical method with an analytical survey approach, which is a problem solving method. This approach involves collecting, analyzing and presenting data systematically to provide a comprehensive picture of the topic or object of research. It includes various techniques such as observation, surveys, document analysis, interviews, and other data collection methods used to describe the characteristics, behavior, or attributes of the research object. After that, the current data is collected, compiled, analyzed, and concluded. The data that has been collected will be evaluated using a Likert Scale. The Likert scale is used to assess the attitudes, views and perceptions of individuals or groups towards social phenomena around them. Each response is associated with a relevant

statement or attitude indicator (Budiaji, 2013) .

Table 1. Scale likert

Symbol	Information	Score
B	Correct	3
R	Hesitant	2
S	Wrong	1

After the questions have been answered, a response pattern will be formed from respondents based on their answers. The next process involves calculating scores for each question regarding their knowledge about compost fertilizer, the process of making it, and its benefits. The calculation is done by subtracting the number of respondents from the total questionnaire, then multiplying the result by the number of respondents, and finally multiplying it by the highest score possible. In this questionnaire, the respondent's answer number ranges from 1 to 3. The resulting numerical index will have a range of values starting from 150 as the lowest score to 450 as the highest score. After that, the score will be interpreted. The results of the value interpretation will be grouped into three categories: low level of knowledge with a score range of 0 to 150, medium level of knowledge with a score range of 151 to 300, and high level of knowledge with a score range of 301 to 450.

**RESULTS AND DISCUSSION**

Compost fertilizer is an important aspect of sustainable agriculture and organic waste management. By converting organic materials such as leaves, wood chips, and food scraps into

useful fertilizer, we can create valuable resources for plants and soil. The following is a table of knowledge of NU Maarif Kudus High School students regarding compost fertilizer before and after being given education.

Table. 1 Knowledge of NU Maarif Kudus High School Students Regarding Compost Fertilizer Before and After being given Education

No	Indicator	Before					After		
		Criteria	Score	Answer	Value Table	Value Weight (%)	Answer	Value Table	Value Weight (%)
1	Knowledge about Compost fertilizer								
	Is compost the result of the weathering of various materials originating from living creatures such as leaves, branches, twigs, plants, animal waste and organic waste?	a. Correct	3	20	60	86.7	30	90	100
		b. Doubtful	2	2	4	13.3	0	0	0
		c. Wrong	1	8	8	0.0	0	0	0
		<b>Amount</b>		30	72	100.0	30	90	100
	Is Compost Fertilizer the result of organic materials going through a decomposition process?	a. Correct	3	12	36	93.3	28	84	93
		b. Doubtful	2	10	20	6.7	2	4	7
		c. Wrong	1	8	8	0.0	0	0	0
		<b>Amount</b>		30	64	100.0	30	88	100
	Does the process of making compost go through a decomposition process?	a. Correct	3	9	27	46.7	22	66	73
		b. Doubtful	2	12	24	50.0	8	16	27
		c. Wrong	1	9	9	3.3	0	0	0
		<b>Amount</b>		30	60	100.0	30	82	100
	Does the compost need to be added with EM4 decomposer bacteria?	a. Correct	3	8	24	40.0	25	75	83
		b. Doubtful	2	10	20	53.3	5	10	17
		c. Wrong	1	12	12	6.7	0	0	0
		<b>AMOUNT</b>		30	56	100.0	30	85	100
	Can the decomposition process occur by itself in an open natural environment?	a. Correct	3	8	24	56.7	20	60	67
		b. Doubtful	2	9	18	30.0	6	12	20
		c. Wrong	1	13	13	13.3	4	4	13
<b>AMOUNT</b>			30	55	100.0	30	76	100	
<b>Amount</b>				307	68.22		421	93.55	

Source: Primary data processed, 2023

Table 1 showed that the knowledge of NU Ma'ruf Kudus High School students before being given education

about compost fertilizer from five questions got an overall score of 307. While the knowledge of NU Ma'ruf

Kudus High School students after being given education about compost fertilizer from five questions got an overall score of 421. In the first question, "*Is compost the result of the weathering of various materials originating from living creatures such as leaves, branches, twigs, plants, animal waste and organic waste?*" Before being given education about compost fertilizer, they got a score of 72, while after being given education about compost fertilizer, they got a score of 90. Compost fertilizer is the result of the process of weathering and decomposing various organic materials that come from living things. These materials include leaves, branches, twigs, plant remains, animal waste, and natural organic waste. During the process of decay or decomposition, microorganisms such as bacteria, fungi and earthworms play a role in breaking down these materials into simpler compounds and nutrients that are useful for plants. The end result of this process is a natural fertilizer rich in nutrients and humus, which significantly increases soil fertility and supports healthy plant growth (Magdoff & Van Es, 2009).

The second question is "*Is Compost Fertilizer the result of organic material through a decomposition process?*" Before

being given education about compost fertilizer, they got a score of 64, while after being given education about compost fertilizer, they got a score of 88. Compost fertilizer is the result of the decomposition or breakdown of natural organic matter through a process of decay or decomposition by microorganisms under controlled conditions. This process converts organic materials such as kitchen waste, dry leaves, plant residues, and other organic materials into products that are more stable and rich in nutrients. This process occurs naturally but can be accelerated and controlled in compost processing. During the decomposition process, microorganisms such as bacteria, fungi, and earthworms break down organic materials into simple compounds such as humus, plant nutrients, and stable organic materials. The result is a natural fertilizer that can increase soil fertility, improve soil structure, and supply important nutrients for plants (Paradelo, Moldes, & Barral, 2013)

The third question is "*Does the process of making compost go through a decomposition process?*" before being given education about compost fertilizer, they got a score of 60, while after being given education about

compost fertilizer they got a score of 82. The process of making compost fertilizer involves the decomposition process of natural organic material which involves the activity of microorganisms such as bacteria, fungi and earthworms. In the initial stage, organic materials such as plant remains, leaves, animal waste and other organic waste are placed in certain piles or containers. During this process, these microorganisms begin to decompose these organic materials (Brinton, 2000) .

In the fourth question, " *Does the compost need to be added with EM4 decomposer bacteria?*" before being given education about compost fertilizer, they got a score of 56, while after being given education about compost, they got a score of 85. The addition of decomposer bacteria such as EM4 (Effective Microorganisms 4) in the process of making compost is a common practice to speed up and improve the decomposition process of organic material. . EM4 is a mixture of microorganisms that includes various bacteria and fungi that have the ability to decompose organic matter (Higa, 1991) .

And the fifth question is " *Can the decomposition process occur by itself in an open natural environment?*" Before being

given education about compost fertilizer, they got a score of 55, while after being given education about compost fertilizer they got a score of 76. In an open natural environment, the decomposition process can occur naturally. This process is an important part of the natural cycle in which dead organic matter or organic waste is decomposed by microorganisms, such as bacteria, fungi, insects and earthworms. This process is important for returning nutrients to the soil and producing rich humus, which increases soil fertility. ( (Bardgett & van der Putten, 2014) .

Even though the knowledge of NU Ma'ruf Kudus High School students before being given education was included in the category with a high level of knowledge, they still experienced a significant increase from initially 68.22% to 93.55% after being given education. Understanding compost fertilizer for students has important implications in the context of sustainable agriculture in Indonesia. This is important because compost is a sustainable solution for increasing soil fertility, reducing dependence on chemical fertilizers, and managing organic waste more efficiently. Students' understanding of compost fertilizer

allows them to play an active role in environmentally friendly agricultural practices and contribute to the sustainability of agriculture in Indonesia.

In order to create quality and effective compost, it is important to understand the requirements for making it. The composting process is a natural way to convert organic materials

into nutrient-rich fertilizer. By fulfilling these conditions, we can ensure that the decomposition of organic material goes well, and the end result is compost that is good for the soil and plant growth.

The following is a table of knowledge of NU Maarif Kudus High School students regarding the requirements for making compost fertilizer before and after being given education.

Table. 2 NU Maarif Kudus High School Students' Knowledge regarding the requirements for making Compost Fertilizer Before and After being given Education

No	Indicator	Criteria	Score	Answer	Value Table	Value Weight (%)	Answer	Value Table	Value Weight (%)
	Knowledge of Requirements for Making Compost Fertilizer								
1	Is the ideal size of material as raw material for making compost around 10-15 cm?	a. Correct	3	8	24	63	19	57	63
		b. Doubtful	2	19	38	33	10	20	33
		c. Wrong	1	3	3	3	1	1	3
		<b>Amount</b>		30	65	100	30	78	100
2	Is the ideal temperature in the composting process between 34-35 degrees C?	a. Correct	3	7	21	63	19	57	63
		b. Doubtful	2	10	20	20	6	12	20
		c. Wrong	1	13	13	17	5	5	17
		<b>Amount</b>		30	54	100	30	74	100
3	Is the ideal humidity in the composting process between 50-60%?	a. Correct	3	7	21	83	25	75	83
		b. Doubtful	2	8	16	10	3	6	10
		c. Wrong	1	15	15	7	2	2	7
		<b>Amount</b>		30	52	100	30	83	100
4	Is the ideal pH of organic material in composting between 5.5-8.0?	a. Correct	3	7	21	73	22	66	73
		b. Doubtful	2	12	24	23	7	14	23
		c. Wrong	1	11	11	3	1	1	3
		<b>Amount</b>		30	56	100	30	81	100
5	Does the compost need to be covered during the fermentation process to	a. Correct	3	15	45	90	27	81	90
		b. Doubtful	2	7	14	10	3	6	10
		c. Wrong	1	8	8	0	0	0	0
		<b>Amount</b>		30	67	100	30	87	100



No	Indicator	Criteria	Score	Answer	Value Table	Value Weight (%)	Answer	Value Table	Value Weight (%)
	Knowledge of Requirements for Making Compost Fertilizer								
	speed up the decomposition of the material?								
	Amount				294	65.33%		403	89.55%

Source: Primary data processed, 2023

Table 2 shows that the knowledge of NU Ma'ruf Kudus High School students before being given education regarding the requirements for making compost fertilizer from five questions obtained an overall score of 294, while the knowledge of NU Ma'ruf Kudus High School students after being given education regarding the requirements for making compost fertilizer from five questions obtained The overall score is 403. In the first question: *Is the ideal size of material as raw material for making compost around 10-15 cm?*" Before being given education about compost, they got a score of 65, while after being given education about compost, they got a score of 78. The ideal size of raw materials for making compost generally ranges from 5 to 10 cm, not 10-15 cm. This measure allows organic raw materials to decompose more efficiently and ensures good air circulation in the compost pile. Smaller sizes can speed up the decomposition process due to the greater surface area for microorganisms

to work on. Larger sizes, such as 10-15 cm, may take longer to decompose completely (Nguyen, et al., 2022) .

The second question is " *Is the ideal temperature in the composting process between 34-35 degrees C?*" Before being given education about compost fertilizer, they got a score of 54, while after being given education about compost fertilizer they got a score of 74. The ideal temperature in the composting process is usually between 34 and 35 degrees Celsius. Higher temperatures in this range help kill unwanted pathogens and weeds, as well as speed up the decomposition process of organic matter in compost. This internal heating is the result of the activity of microorganisms working hard during the decomposition process (Bernal, Alburquerque, & Moral, 2009) .

In the third question, " *Is the ideal humidity in the composting process between 50-60%?*" before being given education about compost fertilizer, they got a score of 52, while after being given education

about compost fertilizer they got a score of 83. The ideal humidity in the composting process generally ranges from 40% to 60%. This range allows optimal conditions for the microorganisms involved in the decomposition of organic materials to work efficiently. Humidity that is too low can inhibit the activity of microorganisms, while humidity that is too high can cause undesirable anaerobic conditions in the compost pile (Bernal, Albuquerque, & Moral, 2009).

The fourth question is " *Is the ideal pH of organic material in composting between 5.5-8.0?*" before being given education about compost fertilizer, they got a score of 56, while after being given education about compost fertilizer they got a score of 81. The ideal pH of organic material in the composting process usually ranges from 5.5 to 8.0. This range creates suitable environmental conditions for the microorganisms involved in the decomposition of organic materials to work effectively. Although a slightly acidic to neutral pH (pH 6 to 7) is generally considered ideal, some microorganisms can still function in a wider pH range (Waqas, et al., 2022).

And the fifth question is " *Does the compost need to be covered during the fermentation process to speed up the*

*decomposition of the material?*" Before being given education about compost, they got a score of 67, while after being given education about compost, they got a score of 87. In the process of composting or fermenting compost, there are various methods that can be used, including whether the compost needs to be covered or not. This decision can be influenced by various factors, such as environmental conditions, pile size, and the final destination of the compost. It is not always necessary to cover the compost pile, but in some cases, covering can help maintain optimal conditions for decomposition of organic matter. If the compost is covered, it can help maintain a more stable humidity, prevent rainwater poisoning, and reduce the risk of evaporation. However, closures must allow sufficient air circulation and effective temperature control to prevent undesirable anaerobic conditions (Bernal, Albuquerque, & Moral, 2009).

The knowledge of NU Ma'ruf Kudus High School students before being given education was included in the category with a medium level of knowledge, but experienced a significant increase so that they became a high level of knowledge category from initially 65.33% to 89.55%. It is important

for students to know the requirements for making compost because this knowledge equips them with relevant skills to contribute to environmental conservation and sustainable agriculture. By understanding terms such as the correct ratio of organic matter, humidity, aeration, and pH, students can practice wiser organic waste management, reduce the negative impact of organic waste on the environment, and promote more environmentally friendly agriculture. Additionally, this knowledge also gives them insight into the natural processes of decomposition and nutrient cycling in soil, which is important for a broader understanding of ecology and environmental conservation.

Level of Knowledge Regarding the Benefits of Compost Fertilizer for NU Ma'ruf Kudus High School Students Before and After Being Given Education

About Compost Fertilizer as an Organic Material .

The benefits of compost fertilizer in agriculture and environmental management have long been recognized. Compost is not only a source of nutrition for plants, but also has a wider positive impact. Compost increases soil fertility, makes the soil looser, and helps in better water retention. It is an important component of sustainable farming practices, which aim to reduce dependence on chemical fertilizers that are harmful to the environment. In addition, the use of compost helps manage organic waste, reduces waste entering landfills, and reduces negative impacts on the environment. The following is a table of knowledge of NU Maarif Kudus High School students regarding the benefits of compost fertilizer before and after being given education.

Table. 3 Knowledge of NU Maarif Kudus High School students regarding the benefits of Compost Fertilizer Before and After being given Education

No	Indicator	Criteria	Score	Answer	Value Table (%)	Value Weight	Answer	Value Table	Value Weight (%)
1	Knowledge about the benefits of compost fertilizer Is compost able to provide nutrients to plants?	a. Correct	3	22	66	97	29	87	97
		b. Doubtful	2	8	16	3	1	2	3
		c. Wrong	1	0	0	0	0	0	0
		<b>Amount</b>		30	82	100	30	89	100
2	Can compost make the soil loose?	a. Correct	3	15	45	60	20	60	67
		b. Doubtful	2	11	22	30	8	16	27
		c. Wrong	1	4	4	10	2	2	7
		<b>Amount</b>		30	71	100	30	78	100

3	Is compost able to increase soil pH in acidic soil?	a. Correct	3	15	45	57	20	60	67
		b. Doubtful	2	10	20	33	9	18	30
		c. Wrong	1	5	5	10	1	1	3
		<b>Amount</b>		30	70	100	30	79	100
4	Is compost able to increase the availability of micronutrients for plants?	a. Correct	3	12	36	43	24	72	80
		b. Doubtful	2	12	24	50	6	12	20
		c. Wrong	1	6	6	7	0	0	0
		<b>Amount</b>		30	66	100	30	84	100
5	Is compost able to improve soil characteristics and structure?	a. Correct	3	12	36	60	27	81	90
		b. Doubtful	2	11	22	40	3	6	10
		c. Wrong	1	7	7	0	0	0	0
		<b>Amount</b>		30	65	100	30	87	100
Amount				354	78.66%		417	92.66%	

Source: Primary data processed, 2023

Table 3 shows that the knowledge of NU Ma'ruf Kudus High School students before being given education about the benefits of compost fertilizer from five questions got an overall score of 354, while the knowledge of NU Ma'ruf Kudus High School students after being given education about the requirements for making compost fertilizer from five questions got a score a total of 417. In the first question, "Is compost able to provide nutrition to plants?" Before being given education about compost fertilizer, they got a score of 82, while after being given education about compost fertilizer, they got a score of 89. Compost fertilizer has the ability to provide nutrients to plants. The composting process breaks down organic material into humus which is rich in nutrients. This humus contains important nutrients such as nitrogen,

phosphorus, potassium, and other micro elements needed by plants for healthy growth and development. When compost is used in agriculture or horticulture, it provides sustainable nutrition and contributes to increasing soil fertility (Bernal, Alburquerque, & Moral, 2009).

The second question is "Is compost able to make the soil loose?" Before being given education about compost fertilizer, they got a score of 71, while after being given education about compost fertilizer, they got a score of 78. Compost fertilizer has the ability to improve soil structure and make it more loose. The composting process produces humus which increases soil aggregation, increases aggregate stability, and increases the soil's ability to hold water. This makes the soil looser and prevents soil erosion. Compost also helps

increase the organic matter content in the soil, which in turn improves the soil texture and improves its physical properties (Beni, Neri, Papetti, & Altimari, 2021).

The third question is "*Is compost able to increase soil pH in acidic soil?*" Before being given education about compost fertilizer, they got a score of 70, while after being given education about compost fertilizer they got a score of 79. The ideal humidity in the composting process is generally between 40% and 60%. Compost usually has little effect on changing acidic soil pH. Because compost has a pH that is close to neutral, its use in acidic soil may slightly increase the soil pH. However, this effect depends on how acidic the soil is initially and the chemical composition of the compost used (Pergola, et al., 2018).

The fourth question is "*Is compost able to increase the availability of micronutrients for plants?*" Before being given education about compost fertilizer, they got a score of 66, while after being given education about compost fertilizer they got a score of 84. Compost fertilizer has the ability to increase the availability of micronutrients for plants. The composting process produces complex

organic compounds that can bind micronutrients and help dissolve them in the soil. Apart from that, microorganisms in compost can also produce organic compounds that increase the availability of micronutrients for plants (Pergola, et al., 2018).

And the fifth question is "*Is compost able to improve the characteristics and structure of the soil?*" Before being given education about compost fertilizer, they got a score of 65, while after being given education about compost fertilizer, they got a score of 87. Compost fertilizer has the ability to improve soil characteristics and structure. The composting process produces humus which increases soil aggregation, increases aggregate stability, and increases the soil's ability to hold water. This makes the soil looser and prevents soil erosion. Apart from that, compost also increases the organic matter content in the soil, which improves the soil texture and improves its physical properties (Beni, Neri, Papetti, & Altimari, 2021).

Even though the knowledge of NU Ma'ruf Kudus High School students before being given education was included in the category with a high level of knowledge, it still experienced a significant increase from initially 78.66%

to 92.66%. It is important for students to understand the benefits of compost fertilizer because this knowledge equips them with a deep understanding of the importance of organic waste management, sustainable agriculture, and environmental conservation. Compost has many benefits that are relevant in everyday life, including in agricultural, environmental and economic contexts. Understanding the benefits of compost fertilizer can have a positive impact on students and society as a whole.

First, knowledge about compost allows students to appreciate its important role in reducing environmental pollution. By converting organic waste into compost, students can reduce the amount of waste that goes to landfills, reduce greenhouse gas emissions, and reduce water pollution. Second, understanding the benefits of compost fertilizer in sustainable agriculture prepares students to become agents of change in supporting more environmentally friendly agricultural practices. Compost increases soil fertility, reduces dependence on harmful chemical fertilizers, and supports healthy plant growth. Third, knowledge about economic benefits is also relevant. Students can understand how making

compost can save costs on a farm or as a small business. It also creates business and employment opportunities related to waste management and organic farming. By understanding the benefits of compost, students can play a role in preserving the environment, supporting sustainable agriculture, and making wiser decisions in their daily lives.

### CONCLUSION

The level of knowledge of NU Ma'ruf Kudus High School students about compost fertilizer, the manufacturing process and its benefits is quite good, and their knowledge has increased after the education was carried out. The results showed that the majority of students had fairly good knowledge of this topic. The importance of understanding compost fertilizer lies in its positive impact on the environment, sustainable agriculture and organic waste management. Compost can play an important role in maintaining the sustainability of our planet, reducing environmental pollution, and increasing agricultural productivity. Therefore, increasing students' level of knowledge about compost fertilizer is very important.

1. To achieve this goal, efforts are needed in broader education and outreach about the benefits of

compost fertilizer. Schools can incorporate material about compost into their curricula, and outreach programs can be used to increase public awareness and understanding of this topic. With a better understanding of compost, students can become agents of change who play a role in protecting and caring for our environment, as well as supporting more sustainable agriculture. Thus, this research underlines the importance of education about compost fertilizer in order to create a society that cares more about the environment and sustainable agriculture.

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