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Residual Effects of Repeatable Composting on Growth, Yield, and Uptake of Phosphorus Brassica Rapa.L Pakcoy

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ABSTRACT

This study aimed to determine the potential residues of the rice crop from the second planting period, which were fed with a mixture of pistia compost and rice straw of various compositions with the Brassica rapa L. pakcoy. The study used a factorial randomized block design, the first factor was 7 levels divided into 5 compost mixtures and 2 comparison treatments (NPK fertilizer treatment and control) as follows; control, M_1 : 100% pistia, M_2 : 75% pistia + 25% rice straw, M_3 : 50% pistia + 50% rice straw, M_4 : 25% pistia + 75% rice straw, M_5 : 100% rice straw and M_6 : NPK ., and the second factor is the presence or absence of addition of compost in the second rice planting period divided into 2 levels; 1. (+) = addition of compost, 2.(-) = no addition of compost. The results showed that the residue of composting for the second planting period of rice had a positive effect on soil fertility, especially in the repeated addition of compost, which showed a very significant positive priming effect. The highest positive priming effect was shown by the medium of high-quality compost, namely the treatment of 100% pistia (M1+) seen in the growth parameters and yield of Brassica rapa L pakcoy. The increase in growth due to the addition of repeated compost was 5.10% to 14.24%, and an increase in yield was 5.41% to 11.11% in various treatments of mixed compost media. The treatment with repeated addition of compost gave a significant response to the P uptake of Brassica rapa L plants but the treatment without compost (-) showed 36.72% higher than the treatment with the addition of compost (+).

Keywords: compost mix, P uptake, priming effect, residual effect

1. INTRODUCTION

For plants, phosphorus does not need nutrients to regulate protein synthesis in the process of cell division and the development of plant tissues that form the point of growth of plants. In addition, it is not certain that it functions to strengthen fruit ripening, strengthen stems, for root development, improve plant quality, metabolism of carbohydrates, nucleoproteins (as the maker of RNA and DNA) and store and transfer energy such as ATP. Phosphorus also serves to increase disease resistance.

Phosphorus-deficient plants are stunted, have short stem segments, leaf margins are purplish or reddish, and yield decreases due to reduced fruit and seed formation. One of the additions of phosphorus nutrients can be done through plant input as a source of organic matter as

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well as a source of nutrients for plants. Adding plant residues to the soil is one of the important factors in controlling soil fertility and adding soil organic matter. The introduction of plant residues into the soil has different effects on plant growth depending on the rate of decomposition and mineralization of the plant residues. The rate of mineralization of plant residues is a function of the quality of the residue itself.

In Indonesia, the input of organic matter is often done repeatedly in one year of the growing season. The addition of new organic matter at the beginning of each growing season can affect the decomposition rate of previously applied organic matter (Jenkinson et al., 1985; Kuzyakov, 2002). This effect is called the priming effect where this effect can be positive (stimulation) or negative (retardation) and can affect the recovery of organic matter by plants. Another study stated that organic matter can cause residual effects after one year of application into the soil (Yadvinder-Singh et al., 2005;Daudén et al., 2004).

High residue quality (high N content, low lignin, and polyphenol content) will mineralize quickly and provide nutrients quickly but often exceeds plant requirements at the beginning of the growth period (Hairiah et al., 2000). On the other hand, low-quality residues (low P content, high lignin, and polyphenol content) will experience slow mineralization and little can be absorbed by plants but have sufficient nutrient reserves for the long term.

The provision of organic matter that is mostly done by farmers is not able to increase crop production optimally, this is due to the low amount of nutrients provided in a short time, as well as the low level of synchronization between the time of nutrient release and the plant's need for nutrients. The results of several studies show that organic matter derived from legume crop residues only releases about 20-45% of the nutrients contained in it, in one cycle of seasonal crops of this amount only about 20-30% can be utilized by plants (Handayanto et al., 1997). Under the same environmental conditions, the rate of mineralization of plant residues is determined by their physical and chemical properties. The content of N, lignin, and polyphenols are the main factors that determine whether or not plant residues are easily decomposed and release nutrients (Handayanto et al., 1997;Palm & Sanchez, 1991). The quality of plant residues can be manipulated in various ways, one of which is by mixing high-quality organic matter (*Pistia stratiotes* sp) and low-quality (rice straw) so that plant residues of varying quality will be obtained.

This study used the remaining planting media of the second planting period of rice plants that were previously treated with a mixture of rice straw and pistia compost in various mixed compositions. Considering that rice straw is rich in various organic matter contents but is classified as low quality, it is possible that rice straw residues in previous studies still exist or there are still

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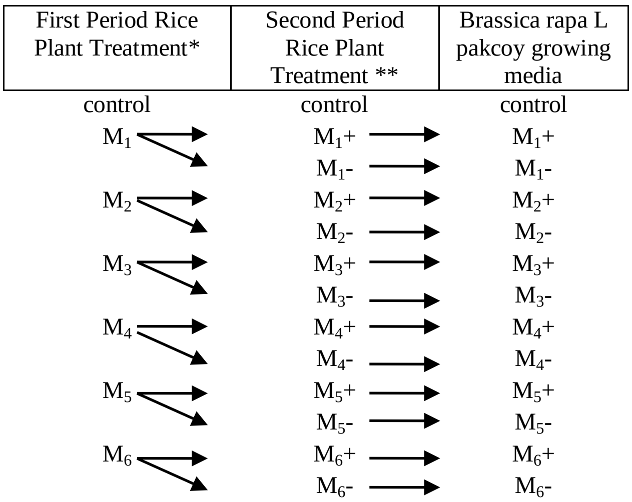
many reserves of nutrients that have not been mineralized. This study aims to determine the potential residues of the growing media for rice crop residues in the second planting period which were fed with a mixture of pistia compost and straw of various compositions the indicator plant used was *Brassica rapa* L. which belongs to the potential vegetable group and has a fairly high nutritional value.

2. RESEARCH METHOD

This study was conducted from March – May 2022, at the Green House at 7,5° South Latitude and 137,35° North Latitude ±500 masl, with day temperature 24-28° C and night temperature 16-21° C. During the day, relative humidity is approximately 79% and 95% at night, while the average rainfall is 167.6 mm/day. Furthermore, the analysis of P uptake was carried out at the Soil Chemistry Laboratory, Department of Soil, Faculty of Agriculture, Universitas Brawijaya. Analysis of chlorophyll, vitamin C and yield variable were carried out in the laboratory of the Faculty of Agriculture, Islamic University of Malang. The research was carried out in 2 stages as follows:

Stage 1. Preparation of Planting Media

The planting medium used in this study was the remaining rice planting media for 2 times the planting period which was previously given a mixture of pistia compost and rice straw of various compositions. After the first rice planting period, it is used as a rice planting medium for the second period but is divided into two parts, namely the first part of the media plus new compost (+) as in the first period and the second part without the addition of more compost (-), as shown in Figure 1 below.



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Noted: control = no compost; M_1: 100% pistia, M_2: 75% pistia + 25% rice straw, M_3: 50% pistia + 50% rice straw, M_4: 25% pistia + 75% rice straw, M_5: 100% rice straw and M_6 : NPK; (+) = addition of compost; (-)= without compost. *First period polybag size 10 kg; **Second period polybag size 5 kg

Figure 1. Media Used In Research

Furthermore, in this study, without the addition of pure compost, the remainder of the second planting period (Figure 1). The design used is the same as the design in the second rice planting period, namely a factorial randomized block design where the first factor is a mixture of compost (M) and 2 comparison treatments so that there are 7 levels; control = no compost; M_1: 100% pistia, M_2: 75% pistia + 25% rice straw, M_3: 50% pistia + 50% rice straw, M_4: 25% pistia + 75% rice straw, M_5: 100% rice straw and M_6: NPK; (+) and the second factor is the presence or absence of addition of compost, namely 2 levels; 1. (+) = new compost was added and 2. (-) = no new compost was added. Tools and materials used in this stage; 5 kg polybag, hoe, trowel, digital scale, rake, water, label paper, stationery and leftover media.

Stage 2. Planting Brassica rapa L pakcoy

This stage aims to determine the growth response, yield of Brassica rapa L pakcoy, and uptake of P. Tools and materials used; planting media in polybags containing residual media in stage 1, buckets, digital scales, rakes, water, meters, writing instruments, and seeds of Brassica rapa L pakcoy. Nurseries were carried out 2 weeks before transplanting into polybags. The experimental design used a factorial randomized block design with 3 replications and each replication consisted of 4 plant samples so that there were 84 experimental units. The placement of treatments was arranged neatly after randomization between groups was carried out. During growth, maintenance is carried out including; watering, weeding, and eradicating HPT with preventive and curative measures if an attack occurs. Growth observation variables include; plant height, number, and area of leaves were measured once every 7 days (DAT) while the yield variables at harvest around the age of 35-40 days after planting were measured including; the total fresh weight of plants, fresh weight of consumption, fresh weight of roots, total dry weight of plants, dry weight of consumption, dry weight of roots and total phosphorus uptake, shoot phosphorus uptake and root phosphorus uptake. Plant height (measured from the base of the plant stem to the highest growth point of the plant per polybag in cm), the number of leaves was measured for each leaf that had fully opened in strands. The leaf area of the plant was measured using a ruler by measuring the length and width of the leaves. Leaf area is divided into three categories of leaf area, namely, large, medium, and small. Leaf area calculation can be done by leaf area meter in cm^2.

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The total fresh weight of the plant was measured by weighing the whole plant after the plant was harvested and cleaned of soil adhering to the roots. Fresh weight consumption was measured by weighing the upper plant parts after being separated from the roots. Root fresh weight was measured by weighing the roots after being separated from the upper plant. The total dry weight of the plants was measured by weighing them as a whole after the plants were harvested and cleaned of soil attached to the roots and then in the oven for 2x24 hours at 70^{o}C. The dry weight of consumption was measured by weighing the upper plant parts after being separated from the roots and then in the oven for 2x24 hours at 70^{o}C. Root fresh weight was measured by weighing the roots after being separated from the upper plants and then in the oven for 2x24 hours at 70^{o}C. Uptake P of the crown = % P of the crown x BK of the crown, the P uptake of the root = % P of the root x BK of the root, and the total N uptake = the uptake of the crown + the uptake of the root. Phosphor (P) uptake analysis of plants was carried out using the Bray I method.

The experimental data were analyzed using analysis of variance (F test) with a level of 5% to determine the effect of treatment and continued with the 5% BNJ test if there was a real treat.

3. RESULTS AND DISCUSSION

Plant growth

The treatment with repeated addition of compost in the second planting period (+) significantly increased plant growth including plant height, the number of leaves, and leaf area (Figure 2) compared to no additional compost (-) unless the control generally showed the lowest growth. Treatment of 100% pistia compost (M_1) had the highest growth trend and decreased with decreasing percentage of pistia in the compost mixture in the order M_1>M_2>M_3>M_4>M_5 except for control and M_6 (NPK).

Plant growth is an indicator of plant response to fertilizer application, in this study the application of compost mixed fertilizer from the previous period still showed a very good response for the third-period plant, namely Brassica rapa L pakcoy. Giving compost to the soil will change the microbial activity that plays a role in the organic decomposition process of the soil and the release of nutrients so that it can be utilized by plants to support their growth (Hamilton & Frank, 2001;cKuzyakov, 2002). Pistia is an aquatic weed that contains relatively high nitrogen (N) nutrients 2.14%, lignin content 6.86%, cellulose 14.92% and polyphenols 0.82% low so that kiapu can be classified as high-quality organic matter on the other hand rice straw included in the low-quality group considering the relatively low nutrient (N) content of 1.73%, lignin content 32.65%, cellulose 35.87% and polyphenols 2.65% high (Lestari et al., 2022). The quality of the compost

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largely determines the level of decomposition and mineralization of the compost (Myrold et al., 2011;Van Kessel & Reeves, 2002;Stadler et al., 2006). The content of nitrogen, lignin, and cellulose is a factor controlling the rate of mineralization of nutrients either N or P (Wijanarko et al., 2012;Handayanto et al., 1997;Talbot & Treseder, 2012). Mineralization is a nutrient release process carried out by microorganisms under conditions controlled by the environment, the quality of organic matter, pH and humidity, and other conditions that control the development of microbes (Melillo et al., 2008;Spohn & Kuzyakov, 2013).

The increase in plant growth of Brassica rapa L pakcoy due to the addition of repeated compost was 8.59% -17.39% (plant height), 1.85% -7.41% (number of leaves), and 4.86% - 17.95% (leaf area). The addition of repeated compost in the second planting period of rice indicates that the newly added compost has a positive effect (stimulation) compared to the addition of one time, this indicates that the soil organic matter pool is affected by the priming effect. The addition of a second substrate (repetition) in the soil turned out to produce a higher priming effect than the first addition, as (Hamer & Marschner, 2005) added, adding a second anelin substrate caused a higher positive priming effect than the first on Cambisol Oa and Podzol EA soils. organic carbon was twice as high after the addition of the second alanine, namely 115% and 129%, except for Cambisol B soils where the organic matter content of Cambisol Oa and Podzol EA soils was higher than Cambisol B.

Phosphorus Uptake Of Brassica Rapa L Pakcoy

The treatment of adding compost in the second rice planting period gave a real response to the P uptake of Brassica rapa L pakcoy plants grown on the remaining media of the second planting period. The total P uptake without the addition of compost (-) showed 36.72% higher than the treatment with the addition of compost (+) but the treatment with various mixtures of compost did not show a significant response to the P uptake of roots, shoots and total P of mustard plants (Figure 3).

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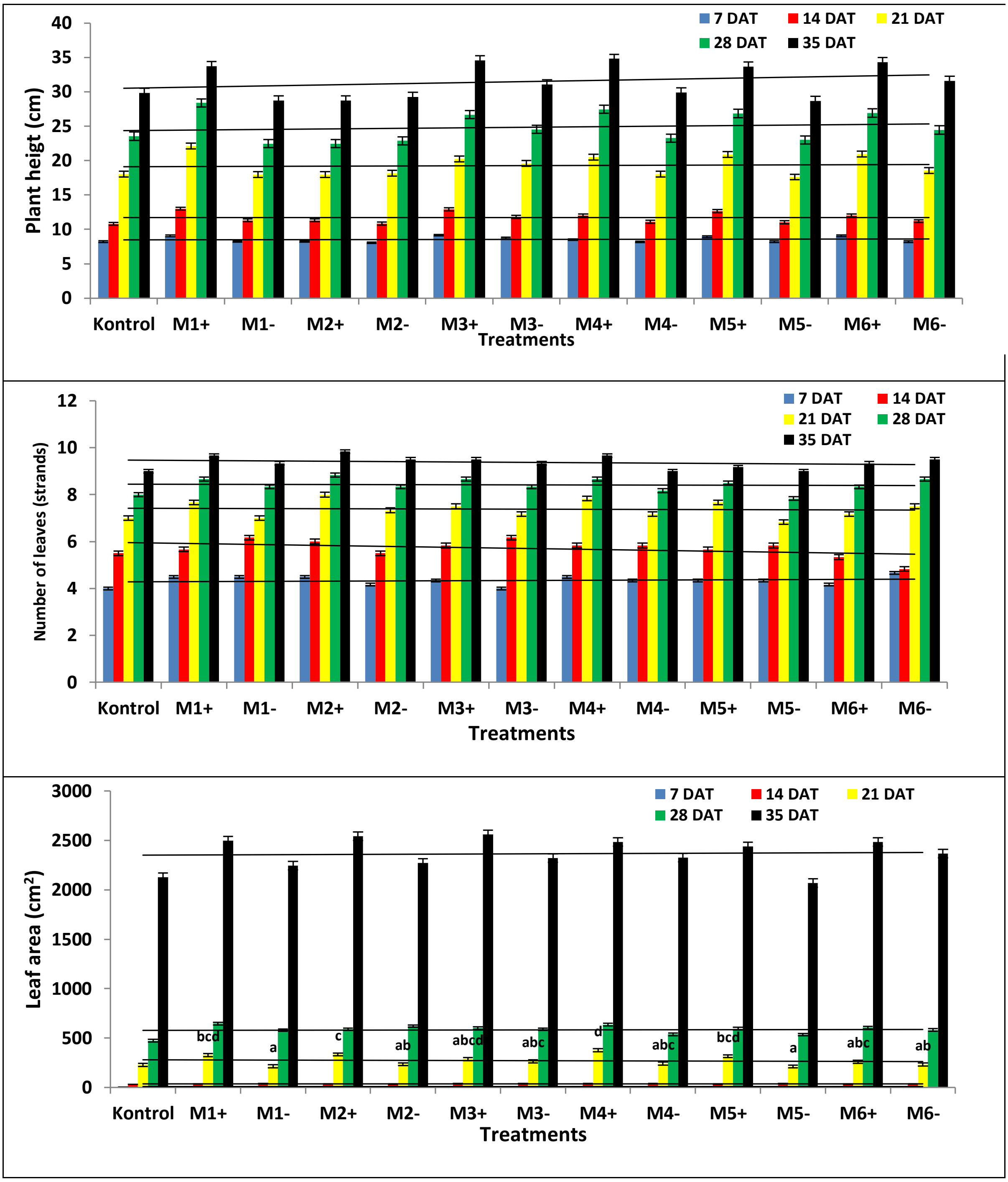

Figure 2. Growth of Brassica rapa L pakcoy on Residual Media Second Period Rice Plants

The M_3 treatment (50% pistia + 50% rice straw) showed the highest total P uptake compared to the compost and M_6 (NPK) treatment, which was 27291.02 mg.kg^{-1}. The input of compost into the soil will increase microbial activity through organic decomposition and

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mineralization resulting in the release of nutrients which further increases the availability of nutrients and P uptake (Yakov Kuzyakov, 2002).

The availability of P in the soil is strongly influenced by many factors (Shen et al., 2011;Spohn & Kuzyakov, 2013). Hairiah et al., (2000) explained that high quality organic matter will be quickly weathered as a result the released nutrients become available quickly so that high nutrient synchronization is achieved, on the other hand if the organic matter is of low quality then low synchronization will occur. Low quality organic matter has a long-term effect, it can be seen that the media remaining from the second planting period can still be used as a medium for Brassica rapa L pakcoy which shows P uptake (Figure 3) and significant growth compared to controls (Figure 2).

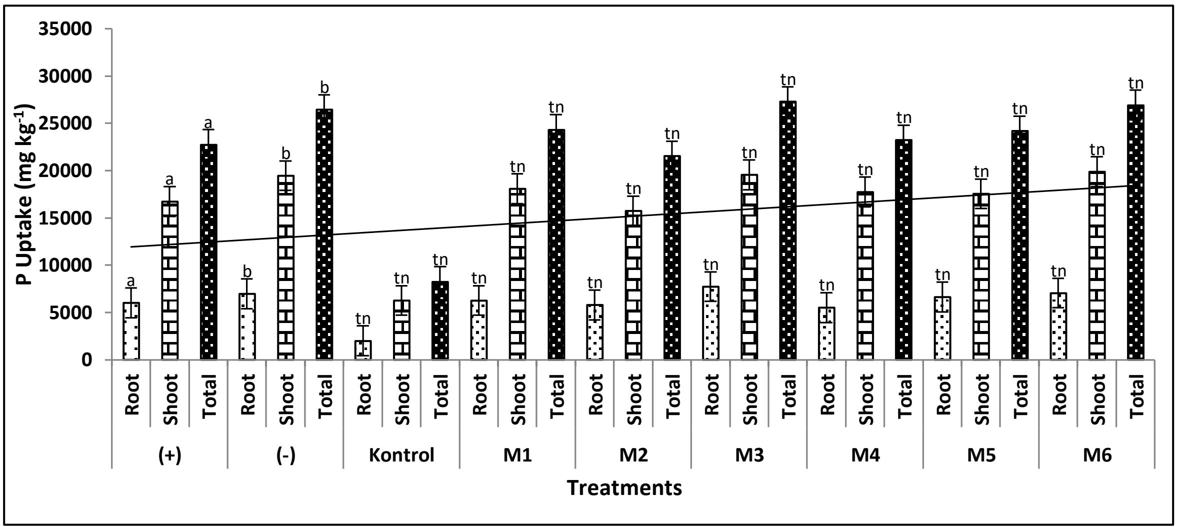

Figure 3. Uptake of Root P, Shoot P, and total P of Brassica rapa L pakcoy Using Plant Residual Media For The Second Period.

The Content Of Chlorophyll And Vitamin C In The Leaves Of The Brassica Rapa L Pakcoy Plant

The application of compost from the first and second planting periods showed a significant residual effect on the chlorophyll and vitamin C content in the leaves of the Brassica rapa L pakcoy plant planted in the third period. Treatment of 100% pistia compost with the addition of compost in the second period (M_1+) had the highest chlorophyll content (8.89 g/ml) and decreased with decreasing percentage of pistia in the compost mixture in the order M_1>M_2>M_3>M_4>M_5 except for the control. The addition of repeated compost in the second planting period showed a significant residual effect on the chlorophyll content of Brassica rapa L pakcoy except for the M_5 treatment (100% rice straw), where the treatment without the addition of (M_5-) 17.49% chlorophyll content

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was higher, higher than the repeated compost treatment (M_5+). This proves that low-quality organic matter (rice straw) has a long-term residual effect because the mineralization process runs slowly so that the availability of nutrients in the third planting period will be higher (Figure 4). Mineralization, decomposition, and nitrification are very important processes in soil that are controlled by moisture, temperature, and quality of the organic matter (Silver & Miya, 2001;Núñez et al., 2001;Yadvinder-Singh et al., 2005). Important factors affecting P availability are P concentration in soil solution, soil texture, organic matter content, soil pH, presence of other important nutrients in quantity and proportion, and microbial activity (Chepkwony et al., 2001;Recena et al., 2015).

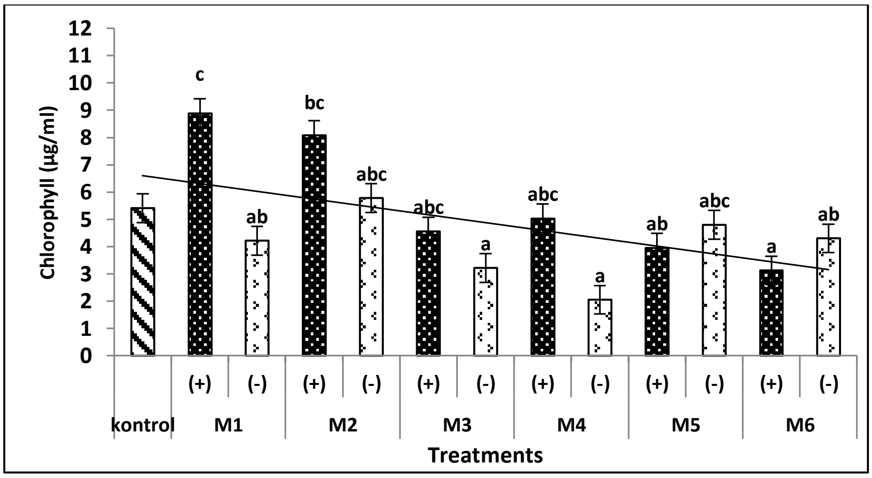

Figure 4. Chlorophyll Content In The Leaves Of The Brassica Rapa L.Pakcoy Plant Using The Second Period Plant Residue Media

According to (Augustien & Suhardjono, 2017) in his research on *Brassica rapa* L plants, he said that the chlorophyll content was influenced by nitrogen and phosphorus nutrients, which was also added by Arifiansyah et al., (2020) in his research on the application of organic fertilizer to the growth and chlorophyll content of wheatgrass plants obtained in sand media treatment has the lowest chlorophyll content of 1.51 mg/g while the highest chlorophyll content is produced in the treatment of rabbit manure compost media which is 2.25 mg/g. In line with this research, in this study, the highest chlorophyll content was in 100% kiapu compost media with repeated additions (M_1+) which was compost with high nitrogen and phosphorus content, thereby increasing the formation of chlorophyll in the leaves and further increasing the rate of photosynthesis (Heil, 2005). Increasing the rate of photosynthesis in plants will increase photosynthesis. Glucose as one of the photosynthates is used as a precursor for vitamin C biosynthesis (Carr & Frei, 2018).

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The results showed that repeated compost treatment (+) gave a positive response in increasing the vitamin C content of Brassica rapa L pakcoy plants where treatments M_1, M_2, M_5 and M_6 gave the same and higher results than other treatments and treatments without the addition of compost (-) (Figure 5). The existence of repeated compost treatment will increase the content of organic matter in the soil thereby increasing the availability of nutrients in the soil. The availability of nutrients makes it easier for plants to absorb so that it increases the process of photosynthesis and increases photosynthesis, including vitamin C. The increase in vitamin C content in Brassica rapa L pakcoy due to composting is related to the increase in plant growth of Brassica rapa L pakcoy. This is related to the precursor required in the biosynthesis of vitamin C, which is the product of primary metabolism, namely glucose.

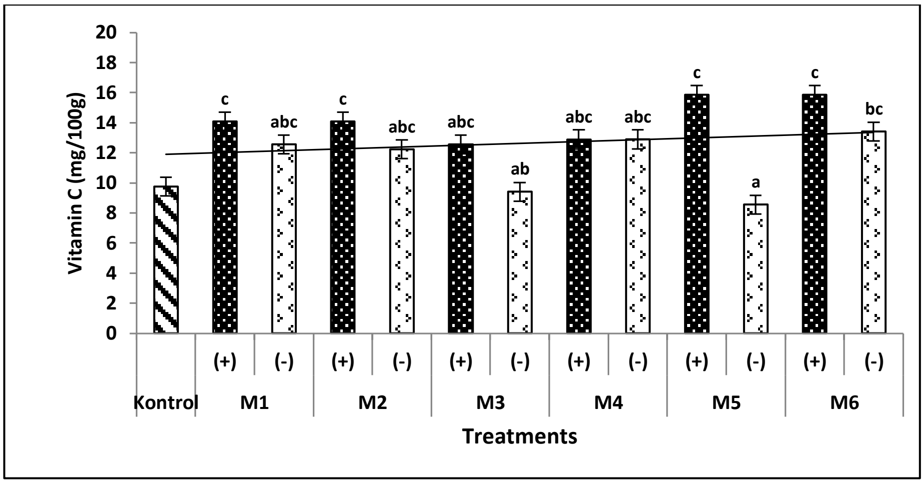

Figure 5. Vitamin C Content In The Leaves Of The Brassica Rapa L Pakcoy Plant Using The Second Period Plant Residue Media

Brassica Rapa L Yield

The treatment of adding compost in the second planting period gave a real response to the parameters observed for the results of Brassica rapa L pakcoy including total wet weight, total dry weight, wet weight consumption, dry weight consumption, root wet weight, root dry weight, and harvest index. The addition of repeated compost gave higher yields of 9.93% - 10.28% total weight, 9.88% - 10.36% consumption weight, and 5.55% - 11.40% root weight than without the addition of repeated compost. The composting treatment did not have a significant effect on the harvest index parameter, but the value of the harvest index was relatively high compared to the control above 90% (Table 2). This shows that the addition of repeated compost has a significant effect on the rate of mineralization, increased P uptake, growth, and yield of Brassica rapa L

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pakcoy. The increase in P uptake was due to an increase in microbial activity due to the addition of compost, resulting in a positive priming effect (stimulation).

Vandamme et al., (2013) found a priming effect of 7-10% of the substrate easy to decompose corn residue on both the source of soil organic matter and the recalcitrant fraction (difficult to decompose) residue. There is a substitution pool effect that occurs after the addition of new compost is fully utilized by microbial biomass and stability in the soil. In line with the research by (Handayanto & Sholihah, 2010) protein binding by polyphenols in Peltoporum can explain the negative priming effect of Peltoporum and Caliandra, which are rich in polyphenols, do not cause a priming effect, while high-quality Gliricidia causes a positive priming effect. In this study pistia (M_1) as the high quality was proven to give high results compared to other treatments (Table 2). This is probably due to a positive priming effect that can increase the accumulation of N in the soil more than that without the addition of new residues (Heil, 2005) and ultimately increase mineralization and nutrient uptake.

Tabel 1. Brassica rapa L Pakcoy Yield

Treatments	Brassica rapa L Pakcoy Yield (g)						Harvest index (%)
	Total wet weight	Total dry weight	Wet weight consumption	Dry weight consumption	Root wet weight	Root dry weight	
Control	30,29	4,60	27,39	3,50	2,90	1,10	90,34
M_1	42,96	7,52 b	39,24	5,59	3,73	1,93	91,26
M_2	40,11	6,38 ab	36,61	4,68	3,50	1,70	91,28
M_3	43,45	6,92 ab	39,69	4,95	3,77	1,97	91,21
M_4	38,32	6,08 a	35,08	4,63	3,24	1,44	91,47
M_5	39,34	6,60 ab	35,74	4,80	3,60	1,80	90,81
M_6	43,60	7,56 b	39,82	5,57	3,78	1,98	91,25
BNJ 5%	ns	1,25	ns	ns	ns	ns	ns
(+)	43,25 b	7,18 b	39,55 b	5,29 b	3,70 b	1,90 b	91,38
(-)	39,34 a	6,51 a	35,84 a	4,80 a	3,51 a	1,71 a	91,04
BNJ 5%	2,39	0,48	2,44	0,46	0,25	0,25	ns

Note: The numbers accompanied by the same notation in the same column show that the results are not significantly different from the 5% BNJ test. ns = non-significant

Correlation Coefficient Relationship Between Growth, Phosphorous Nutrient Uptake, Chlorophyll & Vitamin C Content And Yield Parameters

The relationship between growth, phosphorus nutrient uptake, chlorophyll & vitamin C content, and yield parameters determines the basic value of the correlation coefficient (r). Furthermore, the value of r is shown in Table 3. Table 3 shows the highest or strongest correlation

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that occurs in root P uptake with canopy P uptake, root P uptake with total P uptake, canopy P uptake with total P uptake with r values successively 0,94; 0.97, and 0.99. The highest or strongest correlation also occurred in the leaf area with wet weight and root dry weight with a reach of 0.81. Wet and dry weights of roots with consumption weights and total plant weights with r values are shown in Table 3.

From the results of correlation analysis (Table 3), P uptake of plants was strongly correlated with root weight, consumption weight, and total plant weight in both wet and dry conditions with r values ranging from 0.64 to 0.73. This shows that higher P uptake will increase root weight, consumption weight, and total plant weight. This is in line with several researchers who state that the addition of fertilizers to the soil will increase plant uptake and ultimately increase yields (Recena et al., 2015;Spohn & Kuzyakov, 2013;Sun et al., 2020).

Table 2. The Correlation coefficient of growth, P Uptake, Chlorophyll, Vitamin C and Yield Variable

Variabel	RU	SU	TU	PH	NL	LA	RW	RD	WC	DC	TW	TD	VC	CL	HI
RU	1	0,94	0,97	0,50	0,49	0,57	0,73	0,73	0,68	0,69	0,69	0,72	0,61	0,36	0,52
SU		1,00	0,99	0,42	0,49	0,42	0,64	0,64	0,66	0,69	0,66	0,69	0,59	0,45	0,54
TU			1,00	0,44	0,47	0,45	0,66	0,66	0,66	0,69	0,67	0,70	0,60	0,42	0,54
PH				1,00	0,37	0,70	0,42	0,42	0,22	0,37	0,24	0,40	0,10	0,03	0,32
NL					1,00	0,73	0,72	0,72	0,41	0,72	0,57	0,74	0,41	0,24	0,10
LA						1,00	0,81	0,81	0,56	0,55	0,57	0,65	0,10	0,30	0,14
RW							1,00	0,99	0,87	0,86	0,88	0,93	0,53	0,10	0,32
RD								1,00	0,87	0,86	0,88	0,93	0,53	0,14	0,32
WC									1,00	0,89	0,99	0,92	0,54	0,39	0,73
DC										1,00	0,90	0,99	0,63	0,44	0,55
TW											1,00	0,93	0,54	0,37	0,71
TD												1,00	0,62	0,37	0,49
VC													1,00	0,20	0,36
CL														1,00	0,66
HI															1

Noted= =0,80-1,00 (very strong) ; ,60-0,79 (strong); 40-0,59 (moderate) ; = -0,39 (weak);
=0,00-0,19 (very weak); RU=Root P Uptake; SU=Shoot P Uptake; TU=Total P Uptake; PH=Plant Height; NL=Number of Leaves; LA=Leaf Area; RW=Root Wet Weight; RD= Root Dry Weight ; WC=Wet Weight Comsumption; DC=Dry Weight Comsumption;TW= Total Wet Weight; TD= Total Dry Weight; VC=Vitamin C; CL=Chlorophyll;HI=Harvest Index

4. CONCLUSIONS

In general, it can be concluded that the planting residue media with repeated composting has a positive effect on soil fertility, especially in the treatment of repeated addition of compost in the second rice planting period, showing a very significant positive priming effect. The highest positive priming effect was shown by high-quality compost media, namely the treatment of 100% pistia (M_1+) seen in the growth parameters and yield of Brassica rapa L pakcoy. The increase in growth due to the addition of repeated compost was 5.10% to 14.24% and an increase in yield was

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5.41% to 11.11% in various treatments of mixed compost media. The repeated addition of compost gave a significant response to the P uptake of Brassica rapa L pakcoy plants but the total P uptake without the addition of compost (-) showed 36.72% higher than the treatment with the addition of compost (+).

REFERENCES

Arifiansyah, S., Nurjasmi, R., & Ruswadi, R. (2020). Pengaruh Pupuk Organik terhadap Pertumbuhan dan Kandungan Klorofil Wheatgrass (Triticum Aestivum L.). *Jurnal Ilmiah Respati*, 11(2), 82–92. https://doi.org/10.52643/jir.v11i2.1099

Augustien, N., & Suhardjono, H. (2017). Peranan Berbagai Komposisi Media Tanam Organik Terhadap Tanaman Sawi (Brassica Juncea L.) Di Polybag. Agritrop : *Jurnal Ilmu-Ilmu Pertanian (Journal of Agricultural Science)*, 14(1), 54–58. https://doi.org/10.32528/agr.v14i1.410

Carr, A. C., & Frei, B. (2018). Vitamin C absorption and dietry allowance. March, 1086–1107.

Chepkwony, C. K., Haynes, R. J., Swift, R. S., & Harrison, R. (2001). Mineralization of soil organic P induced by drying and rewetting as a source of plant-available P in limed and unlimed samples of an acid soil. *Plant and Soil*. https://doi.org/10.1023/A:1010541000437

Daudén, A., Daudén, A., Quílez, D., & Martínez, C. (2004). Residual effects of pig slurry applied to a Mediterranean soil on yield and N uptake of a subsequent wheat crop. Soil Use and Management, 20(2), 156–162. https://doi.org/10.1079/sum2003230

Habi, M. La, Nendissa, J. I., Marasabessy, D., & Kalay, A. M. (2018). Ketersediaan Fosfat , Serapan Fosfat , dan Hasil Tanaman Jagung (Ze a m a y s L .) Akibat Pemberian Kompos Granul Ela Sagu Dengan Pupuk Fosfat Pada Inceptisols P-Availability , P-Uptake , and Corn (Zea mays L .) Yield Due To Applied Sago Pith Waste Gran.

Hairiah, K., Utami, S. R., Suprayogo, D., Lusiana, B., & Mulia, R. (2000). *Pengelolaan Tanah Masam Secara Biologi*.

Hamer, U., & Marschner, B. (2005). Priming effects in different soil types induced by fructose , alanine , oxalic acid and catechol additions. 37, 445–454. https://doi.org/10.1016/j.soilbio.2004.07.037

Hamilton, E. W., & Frank, D. A. (2001). Can plants stimulate soil microbes and their own nutrient supply? Evidence from a grazing tolerant grass. *Ecology*. https://doi.org/10.1890/0012-9658(2001)082[2397:CPSSMA]2.0.CO;2

Handayanto, E., Giller, K. E., & Cadisch, G. (1997). Regulating N release from legume tree prunings by mixing residues of different quality. *Soil Biology and Biochemistry*. https://doi.org/10.1016/S0038-0717(97)00047-3

Handayanto, E., & Sholihah, A. (2010). Nitrogen mineralization by maize from previously added legume residues following addition of new legume residues using 15N labelling technique.

DOI : https://doi.org/10.55173/agriscience.v6i1.84

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Journal of Tropical Agriculture.

Heil, C. A. (2005). Influence of humic, fulvic and hydrophilic acids on the growth, photosynthesis and respiration of the dinoflagellate Prorocentrum minimum (Pavillard) Schiller. Harmful Algae, 4(3), 603–618. https://doi.org/10.1016/j.hal.2004.08.010

JENKINSON, D. S., FOX, R. H., & RAYNER, J. H. (1985). Interactions between fertilizer nitrogen and soil nitrogen—the so-called 'priming' effect. *Journal of Soil Science*. https://doi.org/10.1111/j.1365-2389.1985.tb00348.x

Kuzyakov, Y. (2002). Separating microbial respiration of exudates from root respiration in non-sterile soils: A comparison of four methods. *Soil Biology and Biochemistry*. https://doi.org/10.1016/S0038-0717(02)00146-3

Kuzyakov, Yakov. (2002). Review: Factors affecting rhizosphere priming effects. Journal of Plant *Nutrition and Soil Science*. https://doi.org/10.1002/1522-2624(200208)165:4<382::aid-jpln382>3.0.co;2-%23

Lestari, M. W., Sholihah, A., & Sugianto, A. (2022). Pistia Stratiotes Utilization to Improve the Straw Compost Quality. 23(9), 78–87.

Melillo, J. M., Aber, J. D., Muratore, J. F., & Jun, N. (2008). Nitrogen and Lignin Control of Hardwood Leaf Litter Decomposition Dynamics. Ecology, 63(3), 621–626.

Myrold, D. D., Pett-Ridge, J., & Bottomley, P. J. (2011). Nitrogen mineralization and assimilation at millimeter scales. In Methods in Enzymology. https://doi.org/10.1016/B978-0-12-386489-5.00004-X

Núñez, S., Martínez-Yrízar, A., Búrquez, A., & García-Oliva, F. (2001). Carbon mineralization in the southern Sonoran Desert. Acta Oecologica. https://doi.org/10.1016/S1146-609X(01)01122-5

Palm, C. A., & Sanchez, P. A. (1991). Nitrogen release from the leaves of some tropical legumes as affected by their lignin and polyphenolic contents. Soil Biology and Biochemistry. https://doi.org/10.1016/0038-0717(91)90166-H

Recena, R., Torrent, J., del Campillo, M. C., & Delgado, A. (2015). Accuracy of Olsen P to assess plant P uptake in relation to soil properties and P forms. Agronomy for Sustainable Development. https://doi.org/10.1007/s13593-015-0332-z

Shen, J., Yuan, L., Zhang, J., Li, H., Bai, Z., Chen, X., Zhang, W., & Zhang, F. (2011). Phosphorus dynamics: From soil to plant. Plant Physiology, 156(3), 997–1005. https://doi.org/10.1104/pp.111.175232

Silver, W. L., & Miya, R. K. (2001). Global patterns in root decomposition: Comparisons of climate and litter quality effects. Oecologia. https://doi.org/10.1007/s004420100740

Spohn, M., & Kuzyakov, Y. (2013). Phosphorus mineralization can be driven by microbial need for carbon. Soil Biology and Biochemistry, 61, 69–75. https://doi.org/10.1016/j.soilbio.2013.02.013

DOI : https://doi.org/10.55173/agriscience.v6i1.84

ISSN : 2597-8713 (ONLINE)
ISSN : 2598-5167 (PRINT)

Stadler, C., Von Tucher, S., Schmidhalter, U., Gutser, R., & Heuwinkel, H. (2006). Nitrogen release from plant-derived and industrially processed organic fertilizers used in organic horticulture. Journal of Plant Nutrition and Soil Science. https://doi.org/10.1002/jpln.200520579

Sun, H., Zhou, S., Zhang, J., Zhang, X., & Wang, C. (2020). Effects of controlled-release fertilizer on rice grain yield, nitrogen use efficiency, and greenhouse gas emissions in a paddy field with straw incorporation. Field Crops Research. https://doi.org/10.1016/j.fcr.2020.107814

Talbot, J. M., & Treseder, K. K. (2012). Interactions among lignin, cellulose, and nitrogen drive litter chemistry-decay relationships. Ecology. https://doi.org/10.1890/11-0843.1

Van Kessel, J. S., & Reeves, J. B. (2002). Nitrogen mineralization potential of dairy manures and its relationship to composition. Biology and Fertility of Soils. https://doi.org/10.1007/s00374-002-0516-y

Vandamme, E., Renkens, M., Pypers, P., Smolders, E., Vanlauwe, B., & Merckx, R. (2013). Root hairs explain P uptake efficiency of soybean genotypes grown in a P-deficient Ferralsol. Plant and Soil. https://doi.org/10.1007/s11104-012-1571-2

Wijanarko, A., Heru Purwanto, B., Shiddieq, F., & Indradewa, D. (2012). Pengaruh kualitas bahan organik dan kesuburan tanah terhadap mineralisasi Nitrogen dan serapan N oleh tanaman ubikayu di Ultisol. J. Perkebunan & Lahan Tropika, 2(2), 1–9.

Yadvinder-Singh, Bijay-Singh, & Timsina, J. (2005). Crop Residue Management for Nutrient Cycling and Improving Soil Productivity in Rice-Based Cropping Systems in the Tropics. Advances in Agronomy. https://doi.org/10.1016/S0065-2113(04)85006-5

DOI : https://doi.org/10.55173/agriscience.v6i1.84