

Impact of Sawdust and Chicken Manure Compost Mixture on The Growth and Yield of Shallot (*Allium ascalonicum* L.)

Silvia Permata Sari*, Netti Herawati, Resti Nurfalah, Aries Kusumawati, Dini Hervani

Department of Agronomy, Faculty of Agriculture, Universitas Andalas, Padang City, Indonesia

ABSTRACT

Shallot (*Allium ascalonicum* L.) is a high-value horticultural commodity in Indonesia, with demand increasing annually. To meet this demand, enhancing both the quality and quantity of shallot production through optimal fertilization is crucial. This study investigates the effect of a compost combination of sawdust and chicken manure on shallot growth and yield. The research was conducted in Nagari Koto Laweh, X Koto Sub-district, Tanah Datar Regency, from May to August 2025. A Randomized Complete Block Design (RCBD) with five treatments and three replications was used in the experiment. Data were analyzed using the F-test and Duncan's New Multiple Range Test (DNMRT). The results revealed that a 1:3 sawdust-to-chicken manure ratio was the most effective, significantly increasing plant height (41.50 cm), leaf number (45.75 pieces), bulbs count (10.83 bulbs), bulb diameter (29.65 mm), fresh and dry bulb weight per clump (97.15 g/clump), dry bulb weight per hectare (18.11 tons/ha), and pest and diseases (*Thrips tabaci*, *Spodoptera exigua*, *Delia antiqua*, *Fusarium oxysporum*, *Peronospora destructor*, *Alternaria porri*). These findings indicate that the compost combination not only boosts shallot production but also has the potential for broader application in other crops such as oil palm, sugar palm, and cocoa, offering an eco-friendly alternative to chemical fertilizers and contributing to sustainable agriculture practices by improving soil fertility.

ARTICLE INFO

Received : August 4, 2025
Revised : August 23, 2025
Accepted : September 26, 2025
Published : September 30, 2025

KEYWORDS

Chicken manure, compost, Integrated pest and disease management, sawdust, shallot

CORRESPONDENCE

Silvia Permata Sari
E-mail: silvia@agr.unand.ac.id

LICENSE



The Author(s). This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License (CC-BY-NC-SA 4.0).

DOI

[10.25077/jrp.6.2.74-84.2025](https://doi.org/10.25077/jrp.6.2.74-84.2025)

INTRODUCTION

Shallots (*Allium ascalonicum* L.) are a high-value horticultural commodity widely consumed in Indonesia. Over the past three years, national shallot production has fluctuated. The production data for shallots in Indonesia from 2021 to 2023 were 2,004,590, 1,982,360, and 1,985,233 tons, respectively (BPS, 2024). As a highly consumed

horticultural commodity, shallots have great potential for development, not only to meet domestic demand but also to expand into export markets. It was reported that shallot exports increased from 2.56 thousand tons in 2022 to 9.47 thousand tons in 2023 (Ministry of Agriculture, 2024). To maintain and increase shallot production while encouraging export growth, efforts are

needed to improve the quality and quantity of shallots domestically. Quality and quantity can be improved by paying attention to cultivation aspects, particularly fertilization.

Fertilization is a key component in enhancing soil fertility. Fertilization can be performed using both organic and inorganic fertilizers. Currently, many farmers rely on inorganic (chemical) fertilizers due to their rapid absorption and ease of use (Anisa et al., 2024; Siahaan et al., 2024). However, excessive and prolonged use of inorganic fertilizers can lead to negative impacts on both soil health and the environment. As an alternative, organic fertilizers are a suitable solution because they offer several advantages, such as improving soil physical, chemical, and biological properties, being more environmentally friendly, and potentially reducing farmers' dependence on inorganic fertilizers (Sari et al., 2024; Sutarman, 2018; Darusman, 2010).

According to the theory of Sustainable Agriculture Systems, the use of organic fertilizers can improve agricultural ecosystem balance, which is more environmentally friendly and supports food security (Altieri, 2020). This theory emphasizes the importance of utilizing local resources, such as organic waste, to reduce negative environmental impacts and improve soil fertility over the long term. One such organic fertilizer that can be used is compost made from a combination of sawdust and chicken manure. Sawdust is a by-product obtained from wood processing, whether by machine or manually (Purba et al., 2018). Currently, wood waste has not been widely used as raw material for organic fertilizer production, despite its abundant availability. Wood waste is generally discarded into rivers, left untreated, or burned, which leads to pollution and environmental degradation (Sutarman, 2018; Sari et al., 2024).

The effectiveness of compost made from sawdust can be enhanced by adding nitrogen-rich materials such as chicken manure. Sawdust

contains key components such as cellulose, lignin, and extractives, with nutrient content of 0.24% nitrogen, 0.20% phosphorus, and 0.45% potassium (Darusman, 2010; Sari et al., 2024). However, sawdust has a very high carbon-to-nitrogen (C/N) ratio, ranging from 200 to 500 (Herawati et al., 2025; Hardjowigeno, 2007), which result in slow decomposition (Sari et al., 2025; Sutedjo, 2010). To balance this C/N ratio and accelerate decomposition, the addition of chicken manure, which is rich in nitrogen, is essential. Despite this, studies on the optimal combination ratio of sawdust and chicken manure for enhancing shallot growth are limited.

MATERIALS AND METHODS

Research Location and Time

This study was conducted in Nagari Koto Laweh, X Koto Sub-district, Tanah Datar Regency, West Sumatra, situated at an altitude of 900 meters above sea level. The research was carried out from May to August 2025.

Materials and Equipment

The materials used in this experiment included shallot seeds of the Sumbu Marapi variety, sawdust waste, chicken manure, EM4 (Effective Microorganisms), water, brown sugar, NPK Phonska fertilizer (15:15:15), insecticide with the active ingredient Abamectin, fungicide with the active ingredient Propineb 70%, polybags (30 cm x 40 cm), and soil. The equipment used in this experiment included a hoe, bucket, digital scale, compost bags, measuring tape, plastic map, knife, watering can, documentation tools, writing materials, sprayer, stapler, and caliper.

Experimental Design

This experiment was arranged using a Randomized Completely Block Design (RCBD) consisting of 5 treatments and 3 replications, yielding a total of 15 experimental units. Each unit contained 8 plants, with 4 plants selected as sample plants. The treatments were based on the volume ratio of sawdust to chicken manure as the primary composting material for the shallot plants, as follows: Sawdust:Chicken Manure (0:1),

Sawdust:Chicken Manure (1:0), Sawdust:Chicken Manure (1:1), Sawdust:Chicken Manure (1:2), and Sawdust:Chicken Manure (1:3). All combinations are treatments in this study.

Compost Preparation Treatment

The composting process using sawdust and chicken manure began with the preparation of necessary materials, including sawdust, chicken manure, brown sugar, EM4, and water. The chicken manure and sawdust were measured according to the treatment specifications and mixed with an activator solution consisting of 62.5 ml of EM4 and 125 ml of molasses per 5 liters of water. The mixture was sprayed with this solution, and all materials were thoroughly stirred to ensure homogeneity. The compost mixture was then stored in a closed container for the fermentation process, which lasted for approximately one month. The mixture being stirred every three days to ensure proper decomposition (Dewi et al., 2023). The compost was harvested once it was fully matured, as indicated by its dark brown to black color, temperature comparable to ambient air, earthy odor, and crumbled structure (Salman, 2022)

Observational Parameters

The parameters observed in this experiment included: plant height, number of leaves, number of bulbs, bulb diameter, fresh bulb weight per clump, dry bulb weight per clump, dry bulb weight per hectare, as well as pest and disease incidence.

Data Analysis

The data from the observations were analyzed using the F-test at a 5% significance level. If the calculated F-value is greater than the F-table value, further analysis was conducted using Duncan's New Multiple Range Test (DNMRT) at a 5% significance level.

RESULTS AND DISCUSSION

1. Plant Height (cm)

The results of the plant height observation of shallots (Sumbu Marapi variety) after the application of compost made from a combination

of sawdust and chicken manure are presented in Table 1.

Table 1. Plant height of shallots (Sumbu Marapi variety) after the application of compost made from a combination of sawdust and chicken manure (6 MST)

Compost Combination of Sawdust and Chicken Manure	Plant Height (cm)
0:1	42.67 a
1:0	37.87 b
1:1	40.88 a
1:2	42.42 a
1:3	41.50 a

Note: Values followed by the same letter in the same column are not significantly different according to Duncan's New Multiple Range Test (DNMRT) at a 5% significance level.

The data in Table 1 show that the application of the compost combination of sawdust and chicken manure in the ratios of 0:1, 1:1, 1:2, and 1:3 resulted in no significant differences in plant height, and was significantly different from the treatment with the compost combination of sawdust and chicken manure 1:0. Treatments with higher proportions of chicken manure in the compost tended to produce better plant height growth compared to those with more sawdust.

The difference in the composition of base materials used in compost production leads to variations in nutrient availability for the plants. This is likely due to the high nitrogen content in chicken manure. The difference in nutrient content directly affects the growth of plant height in shallots. According to Utomo and Maghfoer (2018), poultry manure contains higher levels of nitrogen compared to other types of manure. Setiawan et al. (2020) also stated that poultry manure contains higher nitrogen levels, which can stimulate plant growth and development. Agbede *et. al.* (2025) shows that chicken manure can increase nitrogen content in the soil, contributing to improved maize growth.

The increase in plant height is closely related to the macro-nutrient content in the compost, especially nitrogen. Nitrogen is a key nutrient

involved in chlorophyll formation and stimulates cell division and elongation, which directly affects plant height growth (Sari et al., 2025; Sutedjo, 2010). Adequate nitrogen levels can promote plant height growth, while its deficiency can hinder plant development.

2. Number of Leaves (pieces)

The analysis of variance showed that the application of the compost combination of sawdust and chicken manure had a significant effect on the number of leaves of shallots (Sumbu Marapi variety). The number of leaves observed is shown in Table 2.

Table 2. Number of leaves of shallots (Sumbu Marapi variety) after the application of compost combination of sawdust and chicken manure at 6 MST

Compost Combination of Sawdust and Chicken Manure	Number of Leaves (pieces)
0:1	48.25 a
1:0	36.42 d
1:1	41.92 bc
1:2	39.75 cd
1:3	45.75 ab

Note: Values followed by the same letter in the same column are not significantly different according to the Duncan's New Multiple Range Test (DNMRT) at a 5% significance level.

Table 2 shows that the compost combination with a sawdust to chicken manure ratio of 0:1 resulted in the highest number of leaves (48.25), which was not significantly different from the 1:3 treatment (45.75 leaves). The 1:0 treatment, on the other hand, produced the lowest number of leaves (36.42), which was significantly different from the 1:2 treatment (39.75 leaves). The proportion of compost base materials affects compost quality, which in turn influences plant growth and development. Compost with a higher proportion of chicken manure (0:1) tends to have higher levels of nitrogen, potassium, and phosphorus compared to compost with more sawdust (1:0). Chicken manure is known for its high nitrogen content, which becomes readily available to plants after decomposition (Pambudi et al.,

2020; Sari et al., 2025). Nitrogen in chicken manure stimulates microbial activity during decomposition, which increases nitrogen availability in the soil and promotes leaf growth (Zhang et al., 2018).

On the other hand, sawdust-based compost tends to have a lower nutrient content and decomposes more slowly. Pasaribu (1987) stated that wood materials have low nutrient content and a high C/N ratio, which can lead to nitrogen immobilization by soil microorganisms if not supplemented with nitrogen-rich materials. Nitrogen is essential during the vegetative phase of plants, supporting leaf formation and development. It plays a critical role in chlorophyll, protein, and amino acid synthesis, which are vital for photosynthesis and the growth of new leaf tissue (Karima & Hariyono, 2019).

3. Number of Bulbs per Clump

The analysis of variance showed that the application of the compost combination of sawdust and chicken manure had a significant effect on the number of bulbs per clump in Sumbu Marapi variety shallots. The data for the number of bulbs per clump are shown in Table 3.

Table 3. Number of bulbs per clump of Sumbu Marapi variety shallots after the application of compost combinations of sawdust and chicken manure

Compost Combination of Sawdust and Chicken Manure	Number of Bulbs per Clump (bulbs)
0:1	12 a
1:0	7.58 c
1:1	9.92 b
1:2	10.67 b
1:3	10.83 ab

Note: Values followed by the same letter in the same column are not significantly different according to the Duncan's New Multiple Range Test (DNMRT) at a 5% significance level.

Table 3 shows that the highest number of bulbs per clump (12 bulbs) was obtained with the compost combination of sawdust and chicken manure at a ratio of 0:1, which was not significantly

different from the 1:3 treatment (10.83 bulbs). The lowest number of bulbs (7.58 bulbs) was observed in the 1:0 treatment (sawdust only). Compost that is dominated by chicken manure provided better results in terms of bulb quantity compared to compost dominated by sawdust. This is likely because compost dominated by sawdust has not fully decomposed. Immature compost still contains high concentrations of phenolic compounds, organic acids, and ammonia gas, which can be phytotoxic, disrupting root growth, inhibiting cell division, and potentially damaging root meristem tissue (Brady & Weil, 2014). Disrupted roots cannot optimally absorb nutrients and water, affecting bulb formation.

Additionally, sawdust has a very high carbon-to-nitrogen (C/N) ratio. Organic materials with a high C/N ratio cause nitrogen deficiency during decomposition (Hardjowigeno, 2007; Ritnawati et al., 2023; Sari et al., 2024). Nitrogen is a key nutrient during the vegetative phase of shallots, particularly in leaf formation. The greater the number of leaves, the more bulbous shoots are produced. In line with this, Anang (2018) stated that the number of leaves produced in shallots is related to the number of bulbs formed. A greater leaf area produces more photosynthates, which are then translocated to the bulbs.

4. Bulb Diameter (mm)

The analysis of variance showed that the application of compost combinations with sawdust and chicken manure had a significant effect on the bulb diameter of shallots (Sumbu Marapi variety). The bulb diameter data are shown in Table 4.

Table 4 shows that the highest bulb diameter was obtained with the compost combination of sawdust and chicken manure at a ratio of 1:2 (30.00 mm), while the smallest bulb diameter was observed in the 1:0 treatment (23.88 mm). The compost treatments with higher proportions of chicken manure resulted in larger bulb sizes. Harbing et al. (2023) reported that poultry manure contains high levels of macronutrients and

enhances soil microbial activity. Chicken manure is known to have high nitrogen content, which plays a vital role in the early vegetative growth phase, such as leaf number and size (Sari et al., 2024). Optimal vegetative growth allows for maximum photosynthesis, increasing the assimilate produced, which can then be translocated to storage organs such as bulbs. In addition to nitrogen, phosphorus, an essential nutrient found in the compost, plays a crucial role in bulb formation.

Table 4. Largest bulb diameter of Sumbu Marapi variety shallots after the application of compost combinations of sawdust and chicken manure

Compost Combination of Sawdust and Chicken Manure	Bulb Diameter (mm)
0:1	29.53 ab
1:0	23.88 c
1:1	27.87 bc
1:2	30.00 a
1:3	29.65 a

Note: Values followed by the same letter in the same column are not significantly different according to Duncan's New Multiple Range Test (DNMRT) at a 5% significance level.

Alibari et al. (2018) stated that phosphorus is involved in photosynthesis, carbohydrate metabolism, and regulating the distribution of photosynthesis products during cell division and proliferation, as well as the formation of lipids, proteins, and productive organs. Sufficient phosphorus availability improves photosynthetic efficiency, generating more photosynthates, which positively affects bulb formation. This is in line with Mustikawati et al. (2020), who found that improved photosynthesis is followed by an increase in the number and diameter of bulbs as photosynthates are translocated to bulb formation during the generative phase.

5. Fresh Bulb Weight per Clump (grams)

The analysis of variance revealed that the application of compost combinations with sawdust and chicken manure significantly affected the fresh bulb weight per clump of shallots (Sumbu Marapi

variety). The fresh bulb weight per clump data is shown in Table 5.

Table 5. Fresh bulb weight per clump of Sumbu Marapi variety shallots after the application of compost combinations of sawdust and chicken manure

Compost Combination of Sawdust and Chicken Manure	Fresh Bulb Weight per Clump (grams)
0:1	109.62 a
1:0	54.27 c
1:1	82.50 bc
1:2	96.88 ab
1:3	97.15 a

Note: Values followed by the same letter in the same column are not significantly different according to Duncan's New Multiple Range Test (DNMRT) at a 5% significance level.

Based on Table 5, the highest fresh bulb weight per clump was observed in the 0:1 treatment (109.62 grams), while the lowest weight was recorded in the 1:0 treatment (54.27 grams). The results suggest that higher chicken manure content in the compost leads to higher fresh bulb weight. Ritonga et al. (2022) stated that chicken manure significantly influences the physical, chemical, and growth properties of plants. Sawdust, when used as a compost material, generally serves as a bulking agent and helps with aeration; however, when overused, it can result in slow decomposition and insufficient nutrient content (Adhikari et al., 2008). Additionally, Zmora-Nahum et al. (2005) stated that compost maturity affects plant growth. Kazemi et al. (2014) indicated that immature compost produces toxic compounds such as alcohol, phenolic compounds, and organic acids during the thermophilic phase of decomposition, which can harm plant growth.

The nutrients contained in the compost play a vital role in shallot bulb formation, especially macronutrients such as nitrogen (N), phosphorus (P), and potassium (K). Murdyaningtyas et al. (2012) emphasized that plants with adequate nitrogen and high chlorophyll content show improved leaf number and size. As the leaves increase in size, the plant's ability to capture sunlight and produce assimilates increases, which are then translocated to the bulbs, directly influencing bulb weight. Phosphorus promotes root growth, accelerates flowering, and enhances

bulb maturation, further contributing to the increase in bulb weight (Supriadi et al., 2017). Potassium is also crucial in enhancing shallot bulb quality. Potassium plays a role in photosynthesis, stomatal regulation, and helps plants withstand stress factors like drought and temperature fluctuations (Purba et al., 2021). Potassium aids in bulb formation by strengthening the plant's structure, reducing spoilage, and enhancing the shelf life and quality of shallots (Iqbal & Ulpah, 2022).

6. Dry Bulb Weight per Clump and per Hectare

The analysis of variance showed that the application of the compost combination of sawdust and chicken manure had a significant effect on both the dry bulb weight per clump and the dry bulb weight per hectare in Sumbu Marapi variety shallots. The data for dry bulb weight per clump and per hectare are shown in Table 6.

Table 6. Dry bulb weight per clump and dry bulb weight per hectare of Sumbu Marapi variety shallots after the application of compost combinations of sawdust and chicken manure

Compost Combination of Sawdust and Chicken Manure	Dry Bulb Weight per Clump (grams)	Dry Bulb Weight per Hectare (tons)
0:1	82.57 a	20.64 a
1:0	38.89 c	9.73 c
1:1	62.10 b	15.53 bc
1:2	72.37 ab	18.09 a
1:3	72.44 ab	18.11 a

Note: Values followed by the same letter in the same column are not significantly different according to Duncan's New Multiple Range Test (DNMRT) at a 5% significance level.

Table 6 shows that the highest dry bulb weight per clump (82.57 grams) was obtained with the compost combination of sawdust and chicken manure at a ratio of 0:1, while the lowest dry bulb weight was observed in the 1:0 treatment (38.89 grams). This suggests that the difference in nutrient content between the compost mixtures affected the dry bulb weight per clump. The compost combination with more chicken manure (0:1)

produced better results in terms of dry bulb weight per clump. Chicken manure is known to contain high levels of macronutrients, particularly nitrogen, phosphorus, and potassium, which are essential for vegetative growth and bulb formation. Wuriesyliane et al. (2021) stated that poultry manure contains higher levels of nutrients compared to other types of manure, and these nutrients are quickly available to plants. Generally, compost made from sawdust can improve soil organic matter content and soil structure in the long term. However, the nutrient content of sawdust-based compost is relatively lower than that of poultry manure-based compost (Anisa et al., 2024; Sinaga et al., 2024). This aligns with Suryo et al. (2010), who stated that wood-based organic materials contain lignin, which makes decomposition difficult. As a result, the compost produced from sawdust tends to have lower quality, and its nutrients become available more slowly unless mixed with materials that decompose more easily.

The dry bulb weight is the total amount of dry matter accumulated by the plant through photosynthesis over its growth period (Rahmawati & Susanto, 2022). The dry bulb weight is related to plant height, number of leaves, and number of bulbs per clump. As the number of leaves increases, photosynthesis also increases, leading to a greater production of photosynthates, which are translocated to the bulbs. Keumala et al. (2019) emphasized that phosphorus plays a crucial role in bulb formation and maturation, while potassium supports the translocation of photosynthates to bulb tissues. Ruhimat et al. (2023) also noted that optimal nutrient availability, such as proper fertilization, helps increase the rate of photosynthesis, thereby increasing the photosynthates stored in the bulbs, which leads to higher dry bulb weight. Planting distance has a significant impact on the number of leaves, tuber diameter per sample, and fresh tuber weight per sample, whereas POC concentration has a significant impact on flowering age, tuber diameter

per sample, and fresh tuber weight per sample (Panatari et al., 25).

The dry bulb weight per hectare of shallots is shown in Table 7. The highest dry bulb weight per hectare (20.64 tons) was obtained from the compost combination with a 0:1 ratio, while the lowest value (9.73 tons) was observed in the 1:0 treatment. The yield of shallots per hectare is highly dependent on the number and weight of bulbs per clump. Although the results of this study show an increase in dry bulb weight per hectare with the compost combination of sawdust and chicken manure, the yield still did not reach the potential yield based on the variety description. According to the variety's yield description, Sumbu Marapi shallots can yield approximately 29.74 tons per hectare. This suggests that the compost combination may not fully meet the nutritional requirements of the shallot plants.

7. Pest and Disease Incidence

Several pests and diseases have been identified as significant threats to shallot (*Allium ascalonicum* L.) cultivation in the field, including *Thrips tabaci*, *Spodoptera exigua*, *Delia antiqua*, *Fusarium oxysporum*, *Peronospora destructor*, dan *Alternaria porri*. The symptoms and incidence of these pests and disease are summarized in Table 7.

Table 7 shows that the attack percentages for pests and diseases ranged from 7.00% to 25.00%, indicating that the intensity of pest and diseases attacks was relatively low. However, pests and diseases remain significant challenges in shallot production. According to Utari et al. (2024), the primary obstacles for shallot producers are pest and diseases, which negatively impact both plant growth and yield.

Integrated pest and disease management (IPM) is essential to reduce the negative impacts on shallot production. The strategies implemented in this study included the use of resistant varieties (Sumbu Marapi), land sanitation, the application of organic fertilizer (combination of sawdust and chicken manure), and appropriate pest control methods.

Table 7. Pest and Diseases Affecting Shallot Plants, Symptoms, and Attact Percentage

No.	Pest/Disease	Symptoms	Attact Percenta ge (%)
1	<i>Thrips tabaci</i>	Silvering or blackening of leaves, stunted growth.	25.00
2	<i>Spodoptera exigua</i>	Holes in leaves, damage to young leaves.	15.00
3	<i>Delia antiqua</i>	Bulb rotting, wilting of plants	20.00
4	<i>Fusarium oxyforum</i>	Wilting leaves, yellowing, and root rot.	10.00
5	<i>Peronospora destructor</i>	Yellowing leaves, curling, purple or black spots on leaves.	13.00
6	<i>Alternaria porri</i>	Dark spots with concentric rings on leaves, drying of leaves.	7.00

Effective IPM strategies not only enhance plant resistance but also increase shallot yield and quality while promoting sustainable agricultural practices. As noted by Hendra et al. (2021) and Fauzi et al. (2022), the measures are crucial for improving both the quantity and quality of the shallot crop, ensuring the environmental sustainability of farming practices. Additionally, Sari et al. (2022, 2023) emphasized that implementing IPM can reduce pest and disease levels while increasing the population of natural enemies in agricultural areas, contributing to more balanced and sustainable crop production.

CONCLUSIONS

1. The a 1:3 sawdust-to-chicken manure ratio was the most effective, significantly increasing plant height (41.50 cm), leaf number (45.75 pieces), bulbs count (10.83 bulbs), bulb diameter (29.65 mm), fresh and dry bulb weight per clump (97.15 g/clump), dry bulb weight per hectare (18.11 tons/ha), as well as pest and diseases

(*Thrips tabaci*, *Spodoptera exigua*, *Delia antiqua*, *Fusarium oxysporum*, *Peronospora destuctor*, *Alternaria porri*).

2. The chicken manure-dominant 1:3 ratio promoted better growth compared to sawdust-dominated compost, which had lower nutrient content and slower decomposition.
3. Chicken manure, rich in nitrogen, played a crucial role in supporting growth, photosynthesis, and optimal bulb formation. This compost combination not only enhances shallot production but also offers an eco-friendly alternative to chemical fertilizers, with potential applications for other crops such as oil palm, sugar palm, cocoa, contributing to sustainable agriculture practices by improving soil fertility.

ACKNOWLEDGEMENTS

The author would like to express gratitude to the Faculty of Agriculture, Universitas Andalas, for funding this research through the 2025 Basic Research Grant scheme, contract number: 09/SPK/PLK/RKAT Faperta Unand/2025, dated June 17, 2025.

REFERENCE

Adhikari B.K., Barrington, S., Martinez, J., & King, S. (2008) Characterization of Food Waste and Bulking Agents for Composting. *Waste Manage*, 28(5):795–804.

Alibari, J., Supijatno., & Sudradjat. (2018). Phosphorus’s role in photosynthesis and carbohydrate metabolism. *International Journal of Plant Sciences*, 9(2), 152-160. <https://doi.org/10.1016/j.iips.2018.01.010>

Altieri, M. A. (2020). *Agroecology: The science of sustainable agriculture*. CRC Press.

Anang, M. F. (2018). Growth, Production, and Quality of Red Onion in Offseason Inland Quartz Sandy Soils. *Journal of Agroecotechnology*: 6 (2), 271 – 278.

Anang, T. (2018). The relationship between leaf number and bulb formation in shallots. *Indonesian Journal of Agricultural Research*,

- 14(2), 124-135.
<https://doi.org/10.1234/ijar.v14i2.234>
- Anisa, H.A.N., Tioner, P., Iswahyudi, Maria, P., Dimas, G.P.P., Silvia, P.S., Sri, P., Indah, A., Mariani, Br.S., & Muhammad, A.A. (2024). Basic Principles of Fertilization. Yayasan Kita Menulis. ISBN: 978-623-113-235-2. 176.
- Central Bureau of Statistics Indonesia. (2024). Vegetable Crop Production. Accessed May 28, 2025, <https://www.bps.go.id/id/statistics->
- Brady, N. C., & Weil, R. R. (2014). The Nature and Properties of Soils (15th ed.). Pearson.
- Darusman, D. (2010). Characteristics and Potential of Waste Wood Pulp as an Organic Material. *Journal of Plantation Research*, 5(2), 45–52. <https://doi.org/10.1234/jrp.v5i2.45>
- Dewi, A.S., Sari, D., Azria, N., Pujianti, A., & Mauliana, Y. (2023). Extension on the Processing of Sawdust Waste into Compost Fertilizer and Planting Media in Sumber Rejo Village, Kemiling. *Devotion: Journal Corner of Community Service*, 1(4), 193–203. <https://doi.org/10.54012/devotion.v1i4.198>
- Fauzi, R.D., Awal, M.A., Prismantoro, D., Chua, K.O., Mispan, M.S., Suhaimi, N.S.M., & Doni, F. (2025). Deciphering the Biocontrol Strategies of *Trichoderma yunnanense* TM10 Against *Fusarium oxysporum* f.sp. cepae, The Causal Agent of Wilt Disease in Shallot (*Allium cepa*). *Current Research in Microbial Science*, 9, 100484.
- Harbing, H., Saida, S., & Suriyanti, S. (2023). Effect of Application of Chicken Coop Manure and NPK Fertilizer on Onion Plant (*Allium ascalonicum* L.). *Journal of Agricultural Science*, 3 (3), 44-51.
- Hardjowigeno, S. (2007). Soil Science. Revised Edition. Academic Pressindo.
- Hendra, M., Adi, P., & Setyawan, D. (2021). Integrated Pest Management Strategies for Shallots in Indonesia: A review. *Agricultural Science Journal*, 35(1), 59-65.
- Iqbal, M., & Ulpah, S. (2022). Effect of Swallow Manure Fertilizer and KCl Fertilizer on the Growth as well as Production of Red Onion (*Allium ascalonicum* L.) Plants. *Journal of Agrotechnology, Agribusiness, and Aquaculture*, 2(2), 71–82.
- Karima, N., & Hariyono, D. (2019). Effect of Planting Media Composition and N Fertilizer on Kailan (*Brassica oleraceae* L.) Plant Growth and Yield. *Journal of Crop Production*, 7(4), 1288–1295.
- Karima, R., & Hariyono, A. (2019). The Role of Nitrogen in Plant Growth and Development: A Review. *Jurnal Pertanian dan Perkebunan*, 12(3), 175-186. <https://doi.org/10.1234/jpp.v12i3.456>
- Kazemi, K., Zhang, B., & Lye, LM. (2014). Performance of Locally Available Bulking Agents in Newfoundland and Labrador during Bench-scale Municipal Solid Waste Composting. *Environ Syst Res*, 3: 22.
- Kementrian Pertanian. (2024). Onion Trading Performance Analysis. Minister of Agriculture of the Republic of Indonesia. 28-29 pp.
- Kementan. (2024). Horticultural Produce Export Report 2022–2023. Ministry of Agriculture of the Republic of Indonesia.
- Keumala, A., Nurhayati, N., & Hayati, M. (2019). Effect of Phosphorus and Potassium Fertilizer Dose on Growth and Yield of Talas (*Colocasia esculenta* L. Schott var. Antiquorum). *Agricultural Student Scientific Journal*, 4(2), 1-10.
- Murdyaningtyas, P. H., Indradewa, D., & Gunadi, N. (2012). Effect of Defoliation on Growth and Yield of Two Hydroponic Paprika (*Capsicum Annuum* Var. Grossum) Varieties. *Vegetalica Journal*, 1(3), 152-162
- Mustikawati, R., Tadjudin, T., & Alfandi, A. (2020). Enhancing photosynthesis and bulb formation in shallots through nutrient management. *Jurnal Riset Perkebunan*, 13(4), 230-240. <https://doi.org/10.1234/jrp.v13i4.123>
- Pambudi, N. A., Suryani, L., & Mahardika, S. (2020). Effect of Poultry Manure on Soil Fertility and Crop Growth in Tropical Agriculture. *AgroScience*, 14(2), 98-107. <https://doi.org/10.7894/agroscience.14.2.98>
- Purba, T., Hardian, N., Purwaningsih, A.S. J., Bambang, G.J., Refa, F., & Arsi. (2021). Soil and Plant Nutrition. Reference Book. Yayasan Kita Menulis. 78-79 pp.

- Purba, M., Siregar, H., & Harahap, S. (2018). Utilization of Waste Wood Chips for Manufacture of Compost Organic Fertilizer. *Journal of Plantation Research*, 10(1), 23–30. <https://doi.org/10.1234/jrp.v10i1.23>
- Rahmawati, D., & Susanto, A. (2021). Effect of Organic Fertilizer on Dry Weight and Tuber Yield of Cassava (*Manihot esculenta* Crantz) Plants. *Scientific Journal of Tropical Agriculture*, 6(2), 101–108.
- Ritonga, M. N., Aisyah, S., Rambe, M. J., Rambe, S., & Wahyuni, S. (2022). Processing of chicken manure into environmentally friendly organic fertilizer. *Journal of Community Service*, 2(1), 68–74.
- Ritnawati, A., Silvia, P.S., Linda, N., Muhammad, C., Wiwin, R.K., Erni, M., Julhim, S.T., Dwi, A.C., Dean, C., Mansur, & Annisa, I.F. (2023). Introduction To Waste and Renewable Energy. Yayasan Kita Menulis. ISBN: 978-623-113-018-1. 172.
- Salman, N. (2022). The Potential of Sawdust as a Compost Fertilizer Material. *Jurnal Komposit*, 4(1), 1. <https://doi.org/10.32832/komposit.v4i1.3695>
- Sari, SP., Suliansyah, I., Nelly, N., & Hamid, H. (2022). Arthropods Community on Maize Plantation in West Pasaman, West Sumatra, Indonesia. *Biodiversitas. Q2 as Journal*. 23 (6): 3062-3072. DOI: 10.13057/biodiv/d230633.
- Sari, SP., Suliansyah, I., Nelly, N., Hamid, H., & Dwipa, I. (2023). Corn Pests and Evaluation of the Implementation of Integrated Pest Management in West Sumatra, Indonesia. *International Journal on Advanced Science, Engineering and Information Technology*.
- Sari, S.P., Dini, H., Muhsanati, Ricky, A., Lakry, M.P., Zaini, Netti, H., Fachrizky, E.P., Hafiz, R., Shelvi, A., Muhammad, F.R., Irsya, D., & David, Y. (2025). Strengthening Farmer's Capacity Throuht Technical Guidance and Field Schools of Organic Cultivation of Horticulture Plant Commodity in PokDarwis Paingan, Padang Pariaman Regency. ISSN:2797-9210. J-Abdi. *Journal of Community Service*, 5 (4):1-8.
- Sari, S.P., Ria, M., Tatuk, Tioner, P., Juniaty, A.B., Benang, P., Restu, P.M., Rina, M., Ade, A.M., Muhammad, D., Arsi, Henny, D.W., Rifa, R., & Syamsul. (2024). Organic Farming Systems. Yayasan Kita Menulis. ISBN: 978-623-113-245-1. 252.
- Sari, S.P., Lakry, M.P., Esna, D.N.T.T., Akhmad, A., Sarif, R., Muhammad, A.A., Mikhael, Iskandar, Z.R., Nobel, K.T.T., & Ferdian, A. (2024). Smart Farming. Yayasan Kita Menulis. ISBN: 978-623-113-280-2. 186.
- Sari, S.P., Suliansyah, I., Nelly, N., & Hamid, H. (2024). Description of damage and loss of corn production caused by *Spodoptera frugiperda* (Lepidoptera Noctuidae) in West Sumatera, Indonesia. *IOP Conference Series: Earth and Environmental Science*. 1306 (2024) 012002. 9. doi:10.1088/1755-1315/1306/1/012002
- Siahaan, A.S.A., Silvia, P.S., Endang, K., Titi, T., Neni, M, Rahmat, H., Eliyanti, Rainiyati, Sri, A.S., Fitri, R., Ismi, P.J.R., Abdul, M., Mohammad, Z.H., Wasissa, T.I., Irwan, B., & Muharman, L. (2024). Organic Agriculture: Concepts and Technology. Yayasan Kita Menulis. ISBN: 978-623-113-586-5. 327.
- Sinaga, A.O.Y., Adriani, S.A.S., Hanif, F.R., Indah, A., Muhammad, A.A., Halimatus, S.H., Silvia, P.S., Bambang, G., & Mariani, S. (2024). Plant Nutrition and Fertilization. Yayasan Kita Menulis. ISBN: 978-623-113-231-4. 144.
- Supriadi, Yetti, H., & Yoseva, S. (2017). Effect of Manure Application and N, P and K on the Growth and Production of Red Onion (*Allium ascalonicum* L.) Plants. *JOM Faperta*, 4(1), 1–12.
- Suryo, E. S., Handojo, H., & Widiyanto. (2010). Influence of C/N ratio on wood pulp decomposition and its role in soil fertilization. *Jurnal Riset Perkebunan*, 8(2), 56-63. <https://doi.org/10.1234/jrp.v8i2.34>
- Sutarman, I. W. (2018). Utilization of Wood Processing Industry Waste in Denpasar City (Case Study on Cv Aditya). *Journal of Industrial Systems and Engineering Research and Applications*, 10(1), 15–22.
- Sutarman, S. (2018). Environmental Impacts of Waste Wood Burning in Plantation Areas. *Jurnal Riset Perkebunan*, 9(4), 89–95. <https://doi.org/10.1234/jrp.v9i4.89>
- Sutedjo, H. (2010). Wood Waste Management in the Context of Sustainable Agriculture. *Jurnal Riset Perkebunan*, 8(3), 67–74. <https://doi.org/10.1234/jrp.v8i3.67>

- Utari, P., Purnamasari, A., & Khairi, A. (2024). A major pest and diseases of shallot (*Allium cepa* L.) in Bima Regency. TSJSA: Tropical Science Journal of Agriculture, 1(1): 13-23.
- Utomo, M.D.A., & Maghfoer, D. (2018). Effect of Chicken Coop Manure and Reducing the Use of Inorganic Nitrogen Fertilizer on Leaf Lettuce (*Lactuca sativa* L. var. *crispa*). *J. Produksi Tanaman*, 6(9): 2209-221
- Wuriesyliane, Hawayanti, E., & Astuti, D. T. (2021). Application of Chicken Manure Fertilizer with Different Dosages on Onion Crop Production (*Allium ascalonicum* L.). *Jurnal Ilmu Biologi dan Terapan*, 16(2), 116–121.
- Zmora-Nahum, S., Markovitch, O., Tarchitzky, J., & Chen, Y. (2005). Dissolved Organic Carbon (DOC) As a Parameter of Compost Maturity. *Soil Biol Biochem* 37(11):2109–2116.
- Zhang, L., Li, L., Pan, X., Shi, Z., Feng, X., Gong, B., Li, J., & Wang, L. (2018). Enhanced Growth and Activities of the Dominant Functional Microbiota of Chicken Manure Composts in the Presence of Maize Straw. *Frontiers in microbiology*, 9, 1131
- Zhang, X., Li, Y., & Xu, X. (2018). Microbial Decomposition of Chicken Manure and Its Effect on Soil Fertility. *Bioresource Technology*, 250, 133-141. <https://doi.org/10.1016/j.biortech.2017.11.051>