

RESPONSE OF SHALLOT (*ALLIUM ASCALONICUM* L.) IN DIFFERENT CONCENTRATIONS OF VERMICOMPOST TEA

RONEL S. DE GUZMAN *¹ and IRACHELLE C. GONZALES ²

^{1,2} President Ramon Magsaysay State University, Zambales, Philippines.

*Corresponding Author Email: neldaghostman06@prmsu.edu.ph

Abstract

The study evaluated the effects of the different concentrations of vermicompost tea (VCT) on the growth and yield performance of shallot. It has four treatments and three replications in a Randomized Complete Block Design (RCBD). The treatments were the following: Treatment 1 (no application), Treatment 2 (5% VCT), Treatment 3 (10% VCT), and Treatment 4 (15% VCT), where each plot measures 1 x 1 m. Based on the study result, 15% VCT showed a highly significant difference from other treatments in the average number of bulbs and average weight per plant. However, 15% VCT and 10% VCT showed no significant differences but are highly significant from other treatments in terms of the average diameter of the largest bulb. Also, 15% VCT, 10% VCT 3, and 5% VCT showed no significant differences but were significant from the control groups in the average final height of the plant. LSD further supports it, showing significant differences in control and other treatments. Therefore, 15% VCT or 150 ml VCT per liter of water is recommended for shallot production due to more and heavier developed bulbs. Meanwhile, there are researchable areas to be addressed, such as evaluating higher concentrations of VCT due to the increasing trends in several parameters. The evaluation of VCT in the production of other crops is recommended. Also, it is recommended to apply VCT in lahar-laden soil to improve soil fertility.

Keywords: Shallot, vermicompost tea, bulbs, fertility.

INTRODUCTION

Locally known as "Sibuyas Tagalog" or "Lasona," shallots are primarily grown for culinary purposes in the Philippines. The majority of it is grown in the provinces of Ilocos Norte, Nueva Ecija, and Pangasinan. Compared to other onion types, shallots have a milder and more subtle taste, which makes them ideal for pickling and garnishing (Trinidad, 2017). Locals in the Ilocos Region use shallots in a condiment called KBL -- kamatis, bagoong fish, and lasona (Medenilla, 2021).

In January 2023, shallot prices climbed to P200 per kilo from P100 per kilo in the Philippine market because onion prices in many markets remain high from P600 to P700 per kilo (De Vera, 2023).

Organic matter contributes to soil fertility by reducing nutrient losses and delivering nutrients, making it a crucial component of soil quality preservation. In addition, it improves soil structure and water retention capacity (Amlinger et al., 2007).

In Yatoo et al.'s (2021) study, vermicompost promotes crop development and yield. By increasing the diversity and activity of antagonistic bacteria and nematodes, pests and diseases caused by soil-borne phytopathogens are reduced. The application of vermicompost tea to plants can help reduce the spread of pathogens by coating leaf surfaces or increasing microbial diversity, which kills dangerous pathogens. Using vermicompost teas increases plant growth

by improving plant nutrition and promoting beneficial microbial communities, according to Carpenter-Boggs (2005).

According to previous studies, vermicompost increased the growth of *Pisum sativum* plants and their protein content (Khairnar, 2008). Saumaya et al. (2007) reported that vermicompost was an effective treatment for optimum cucumber growth compared to other treatments.

MATERIALS AND METHODS

Time and Place

The study was conducted at Brgy. Dallipawen, San Narciso, Zambales, Philippines (14.9966 N and 120.1324 E) on April to June, 2022.

Research Design and Experimental Treatments

The study was laid out using a Randomized Complete Block Design (RCBD) with four (4) different treatments, three (3) replications, and thirty (30) sample plants per replication. A total of three hundred sixty (360) sample plants were used in the study. The treatments were based on recommendations which are 10% or 100 ml of vermicompost tea (VCT) per liter of water. The treatments are as follows: T1 (No application), T2 (5% VCT), T3 (10% VCT), and T4 (15% VCT) per square meter.

A Randomized Complete Block Design (RCBD) was used with four (4) different treatments, three (3) replications, and thirty (30) sample plants per replication. Three hundred sixty (360) sample plants were used in the study. According to recommendations, Vermicompost tea (VCT) was added to the water, which is 10% or 100 ml per liter. T1 (Control group), T2 (5% VCT), T3 (10% VCT), and T4 (15% VCT) are the treatments.

Experimental Lay – out

The study covered 42 m² with 12 plots of 1 m x 1 m each. Shallots were planted at a distance of 15 cm x 15 cm.

Research Procedure

The shallot bulb and vermicompost were obtained from farmers in San Narciso, Zambales, Philippines. 1 kilogram of vermicompost was wrapped in a cloth and soaked in 10 liters of water with 350 ml of molasses. A 42-hour waiting period was followed before it was used.

The area was cleared of weeds and debris. Dry chicken manure was applied as a base fertilizer to the plots. Two weeks after planting, the shallot bulb was watered every two days. Weeding was done weekly, and it was harvested 45 days after planting. The average final height, the average number of bulbs, the average diameter of the largest bulb, and the average weight per plant were collected. Data were analyzed using Statistical Tool for Agricultural Research (STAR) Version 2.0.1. Comparisons were made using Analysis of Variance (ANOVA) using Randomized Complete Block Design (RCBD) and Least Significance Differences (LSD). Differences were considered to be significant at $P \leq 0.05$.

RESULTS AND DISCUSSION

Shallots treated with 15% VCT had the highest final height with an average of 33.63 cm, followed by those treated with 5% VCT, 10% VCT, and the control group with averages of 32.02 cm, 31.86 cm, and 29.58 cm, respectively. According to the ANOVA, the application of VCT at different concentrations resulted in significant differences in average final height. In addition, LSD showed significant differences between treatments. No significant differences were found between 15%, 10%, or 5% VCTs, but significant differences were observed between the control group and the VCT group. It was confirmed in the results by Arancon et al. (2004) that the use of VCT can maintain leaf moisture, increase photosynthesis rates, and increase carbon dioxide levels. Furthermore, Hosseinzadeh et al. (2016) found that vermicompost fertilization through soil increased nutrient absorption in German chamomile, resulting in higher chlorophyll content.

Table 1. Final Height (cm)

Treatment	Mean
Treatment 1 (Control)	29.58 ^b
Treatment 2 (5% VCT)	32.02 ^a
Treatment 3 (10% VCT)	31.86 ^a
Treatment 4 (15% VCT)	33.63 ^a

Note: Means with the same letter are not significantly different.

With an average of 7.73 bulbs per shallot, it was found that shallots applied with 15% VCT were the highest producing, followed by shallots applied with 10% VCT, 5% VCT, and the control group, which recorded 6.87, 6.50, and 4.47 bulbs per shallot, respectively. With an average diameter of 21.66 mm, shallots applied with 15% VCT also had the widest bulb diameter, followed by shallots applied with 10% VCT, 5% VCT, and the control group with 21.03 mm, 20.02 mm, and 17.89 mm, respectively. A total of 37.63 grams of shallots applied with 15% VCT were recorded as the heaviest, followed by 33.73 grams of shallots applied with 10% VCT, 32.40 grams of shallots applied with 5% VCT, and 26.67 grams of shallots applied with the control group. ANOVA revealed a highly significant difference between VCT concentrations with respect to number of bulbs, the average diameter of largest bulbs, and average weight per plant. Abdel-Haleem et al. (2022) reported that the soil amended with VCT had the highest levels of available soil P. According to Carballo et al. (2009), Abo-baker (2017), and Sujesh et al. (2017), VCT is composed of water-extractable components, including mineral supplements, organic acids and microorganisms, which can enhance the nutrient status and increase P availability by converting insoluble forms of P into soluble forms, thus improving shallot yield characteristics.

Table 2. Yield Parameters

Treatment	Number of Bulbs	Diameter of the largest bulb (mm)	Weight per plant (g)
Treatment 1 (control)	4.47 ^c	17.89 ^c	26.67 ^d
Treatment 2 (5% VCT)	6.50 ^b	20.02 ^b	32.40 ^c
Treatment 3 (10% VCT)	6.87 ^b	21.03 ^a	33.73 ^b
Treatment 4 (15% VCT)	7.73 ^a	21.66 ^a	37.63 ^a

Note: Means with the same letter are not significantly different.

SUMMARY, CONCLUSION AND RECOMMENDATION

Shallot growth and yield parameters were evaluated at different concentrations of VCT. According to the results, 15% VCT outperformed other treatments significantly.

A highly significant difference between 15% VCT and other treatments was observed in the average number of bulbs and average weight per plant. Although 15% VCT and 10% VCT showed no significant difference in average bulb diameter, they are highly significant compared to other treatments. The average final height of the plants was also significantly higher than those in the control groups when 15% VCT, 10% VCT, and 5% VCT were compared with the control groups. Further evidence can be found in LSD, which shows significant differences between control and other treatments. Due to more and heavier bulbs, 15% VCT or 150 ml VCT per liter of water is recommended for shallot production.

As a result of rising trends in several parameters, researchable areas need to be addressed, including evaluating higher concentrations of VCT. It is recommended that VCT be evaluated in the production of other crops. Furthermore, it is recommended to apply VCT to lahar-laden soil to improve soil fertility.

References

- 1) Abdel-Haleem, E. S., Farrag, H. M., Abeer, B. A. K. R., & Abdelrasheed, K. G. (2022). Combined use of compost, compost tea, and vermicompost tea improves soil properties, and growth, yield, and quality of (*Allium cepa* L.). *Notulae Botanicae Horti Agrobotanici Cluj-Napoca*, 50(1), 12565-12565.
- 2) Abo-Baker, A. A. (2017). Successive application impact of some organic amendments combined with acid producing bacteria on soil properties, NPK availability and uptake by some plants. *International Journal of Current Microbiology and Applied Sciences*, 6(3), 2394-2413.
- 3) Amlinger F, Peyr S, Geszti J, Dreher P, Karlheinz W, Nortcliff S (2007). Beneficial effects of compost application on fertility and productivity of soils. Literature Study, Federal Ministry for Agriculture and Forestry, Environment and Water Management, *Austria*. Available: www.umwelt.net.at/filemanager/download/20558/

- 4) Arancon, N. Q., Edwards, C. A., Bierman, P., Welch, C., & Metzger, J. D. (2004). Influences of vermicomposts on field strawberries: 1. Effects on growth and yields. *Bioresource technology*, 93(2), 145-153.
- 5) Carballo, T., Gil, M. V., Calvo, L. F., & Morán, A. (2009). The influence of aeration system, temperature and compost origin on the phytotoxicity of compost tea. *Compost science & utilization*, 17(2), 127-139.
- 6) Carpenter-Boggs (2005). Diving into compost tea. *Biocycle* 46:61-62.
- 7) De Vera. (2023, January 14). Price of lasona, alternative to onion, also spikes. Sunday Punch. Retrieved February 6, 2023, from <https://punch.dagupan.com/business/2023/01/price-of-lasona-alternative-to-onion-also-spikes/>
- 8) Hosseinzadeh, S. R., Amiri, H., & Ismaili, A. (2016). Effect of vermicompost fertilizer on photosynthetic characteristics of chickpea (*Cicer arietinum* L.) under drought stress. *Photosynthetica*, 54, 87-92.
- 9) Khairnar, A. V., Patil, H. M., Ugale, N. S., & Dhonde, D. D. (2008). Response of potash and foliar spray of vermivash on growth and yield of summer mungbean (*Vigna adiate* L.). *Ecology, Environment and Conservation Paper*, 14(1), 61-63.
- 10) Medenilla, V. (2021, December 23). Philippine vegetables that are slowly disappearing in markets and fields. *Agriculture Monthly*. Retrieved February 6, 2023, from <https://www.agriculture.com.ph/2021/12/23/philippine-vegetables-that-are-slowly-disappearing-in-markets-and-fields/>
- 11) Saumaya, G., Giraddi, R. S., & Patil, R. H. (2007). Utility of vermiwash for the management of thrips and mites on chilli (*Capiscum annum*) amended with soil organics. *Karnataka J Agric Sci*, 20, 657-659.
- 12) Sujesh, S., Murali, T., Sahithya, K., & Das, N. (2017). Preparation of compost tea and its utility as a plant growth promoter. *Research Journal of Pharmacy and Technology*, 10(9), 3115-3122.
- 13) Trinidad, J. M. (2017, December 13). Shallot farmer recommends prolific new variety. *Agriculture Monthly*. Retrieved February 6, 2023, from <https://www.agriculture.com.ph/2017/12/13/shallot-farmer-recommends-prolific-new-variety/>
- 14) Yatoo, A. M., Ali, M. N., Baba, Z. A., & Hassan, B. (2021). Sustainable management of diseases and pests in crops by vermicompost and vermicompost tea. A review. *Agronomy for Sustainable Development*, 41, 1-26.