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Enhancing Avocado Farming Through Targeted Agricultural Extension for Knowledge Improvement in Composting and Cultivation Practices

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Abstract:

This study evaluates the effectiveness of agricultural extension activities aimed at enhancing the knowledge of farmers of composting and good agricultural practices for avocados in Mulyaharja village, Bogor, West Java Province, conducted in October 2024. A total of 10 participants completed pre- and post-tests designed to measure their understanding of avocado cultivation and composting practices. Results showed a significant increase in knowledge regarding avocado cultivation, with scores rising from 64% to 79% post-intervention (P=0.049). However, the improvement in composting knowledge was minimal, increasing from 57% to 63%, which was not statistically significant (P=0.29). These findings indicate that targeted extension activities can effectively improve knowledge related to avocado farming while suggesting a need for more engaging methods to enhance composting knowledge. This research highlights the critical role of tailored extension services in promoting sustainable agricultural practices and enhancing the capabilities of farmers in the region.

Keywords: Agricultural Extension; Avocado Cultivation; Composting Practices; Knowledge Assessment; Sustainable Farming

Introduction

The integration of composting practices, particularly in avocado (alpukat) cultivation, within agricultural extension services in Bogor, Indonesia, presents a valuable opportunity to enhance sustainable farming. Agricultural extension plays a crucial role in disseminating composting knowledge, improving soil health and supporting household food security and economic stability for farmers. The success of these services depends on factors such as communication methods, farmer engagement,

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and the prevailing agricultural policies.

Agricultural extension services play a pivotal role in promoting sustainable practices like composting. They empower farmers by facilitating the transfer of knowledge from researchers to farmers, enabling them to adopt innovative techniques that enhance productivity and sustainability. This empowerment through knowledge transfer is not just a process, but a journey that inspires and motivates farmers to contribute to the long-term viability of avocado farming in the region.

Targeted extension programs have the potential to significantly increase awareness and adoption of composting practices for farmers. Research by Al-Salhi (2021) on rice farmers in Iraq illustrates that raising awareness about composting can lead to improved practices, a principle that can be applied to avocado farmers in Bogor. Well-structured extension programs that focus on composting can educate farmers about the benefits of organic amendments, leading to improved soil fertility and higher crop yields.

The effectiveness of agricultural extension services is influenced by several socio-economic factors, including educational backgrounds, farming experience, and available resources. Jamil et al. (2023) identify factors such as farming capital and human resources that affect the success of agricultural extension in Southeast Sulawesi, which are similarly relevant to Bogor. This finding underscores the need for customized extension services that address the unique needs of avocado farmers and provide the knowledge and resources required to adopt composting practices effectively.

The digital transformation of agricultural extension is a crucial consideration. A comprehensive analysis of digital extension in Indonesia underscores how digital tools can improve the delivery of information and training to farmers. In Bogor, the adoption of digital platforms can streamline the dissemination of composting techniques, making it easier for farmers to access the knowledge they need to enhance their practices.

The quality of extension services also plays a key role in the adoption of composting practices. Studies show that the perception of service quality for farmers can significantly impact their satisfaction and willingness to adopt new techniques Al-Zahrani et al. (2023). To foster innovation among avocado farmers in Bogor, it is crucial to ensure that extension services are both informative and engaging.

Challenges in adopting composting practices must also be addressed through effective extension strategies. Al-Taiy et al. (2020) underscores the importance of tailored extension services that meet needs for farmers, helping overcome barriers to adopting sustainable practices. By understanding the specific challenges faced by avocado farmers, extension programs can offer practical solutions and support, increasing the chances of successful composting adoption. This tailored approach ensures that farmers feel understood and catered to, enhancing their experience with the extension services.

Community engagement is another vital element in agricultural extension. Involving local leaders and experienced farmers is not just beneficial, but integral to the credibility and acceptance of composting practices. This collaborative approach can create a supportive environment where farmers feel valued and integral to the process of experimenting with and adopting composting techniques. Their involvement is not just a formality, but a key factor that significantly enhances the experience for farmers.

Composting aligns with broader sustainability goals, offering environmental benefits such as reduced waste and the recycling of organic materials. This alignment is important and inspiring in Bogor, where agricultural practices must adapt to the

challenges posed by climate change and environmental degradation. Al-Zahrani et al. (2023) emphasize the importance of incorporating sustainability into extension programs for sustainable rice production. By promoting composting as a sustainable practice, extension services can inspire and motivate farmers to contribute to the long-term viability of avocado farming in the region.

This research on extension agriculture aims to assess the increase in knowledge before and after the extension activities of composting and good agricultural practices for avocados.

Methods

Time and Location

In October 2024, data was gathered from Mulyaharja villages in Bogor, West Java. The research focused on a single farming group. A total of 10 responses were collected during the trial.

Observation Method

Table 1. List of questions to quantify knowledge for avocado cultivation

No	List of Questions
1	When is the best time to plant avocado seedlings?
2	What is the ideal planting distance between avocado trees?
3	What is the most suitable growing medium for planting avocados?
4	When should avocado plants be watered?
5	When do avocado trees start bearing fruit after planting?
6	What pests frequently attack avocado plants?
7	What is the purpose of pruning avocado trees?
8	What fertilizer is good for supporting avocado growth?
9	How to control whiteflies on avocado plants?
10	Why is pruning diseased branches important for avocado trees?

Data was collected through questionnaires, surveys, and direct observations of the farmer group. The survey included questions about cultivation knowledge (Table 1) and composting knowledge (Table 2). Age, agricultural experience, and education level were also recorded. The education level was assessed using a four-point scale, where the highest score was assigned to those with the most advanced education.

Table 2. List of questions to quantify knowledge for composting

No	List of Questions
1	What is the main material typically used in compost production?
2	What is the primary function of compost for avocado plants?
3	What materials should not be added to compost?
4	How long does the composting process take until it is ready to use?
5	What is the decomposition of organic materials in compost?
6	What are the signs that compost is ready to be used?
7	What is a way to maintain aeration in the composting process?
8	Green materials, like fresh leaves, in compost serve as?

9	Brown materials, like dry twigs, in compost serve as?
10	Why is it important to maintain moisture in the compost pile?

Data Analysis

The knowledge levels of farmers before and after the exam were calculated using the equation in Formula 1 (Wiraguna et al., 2024). Pre-tests and post-tests were administered to evaluate their understanding of avocado cultivation and composting, both prior to and following the extension activities. A T-test, with a significance level set at P = 0.05, was applied to compare the results of the pre-test and post-test, which consisted of 10 questions (as shown in Tables 1 and 2).

Pre- and Post Test= (Score obtain)/(Total Score) x100% .....(Formula 1)

Results

Implementation of avocado cultivation practices

The implementation of horticultural practices commenced with the participants (farmers) taking a pre-test and presenting materials on horticultural cultivation, explicitly focusing on avocados, using visual aids as the extension medium (Figure 1). After completing the theoretical and practical components, the farmer participants were given a post-test to evaluate their understanding following the presentations and practical sessions.

Figure 1. Cultivation extension activities at Mulyaharja

Implementation of composting

The avocado farmer group in Mulyaharja village was identified using knowledge of farmers before and after extension activities. The knowledge increased significantly after participating in the extension activities, as evidenced by the results of the pre- and post-tests issued and completed by the farmers during the extension activities. Each invention had ten questions (Table 2) in both the pre-test and post-test.

Figure 2. Composting extension activities at Mulyaharja

Sub Results of Pre-test and Post-test

Pre-test and post-test of avocado cultivation practices

The pre-test results, which initially scored 64%, rose to 79% in the post-test (Figure 3), indicating a significant change (P=0.049). The greatest improvement was observed in question number 8, with a score increase of 40%. This enhancement occurred because, prior to the extension activity, farmers lacked knowledge about the functions and uses of fertilizers, leading to a pre-test score increase from 40% to 80% in the post-test.

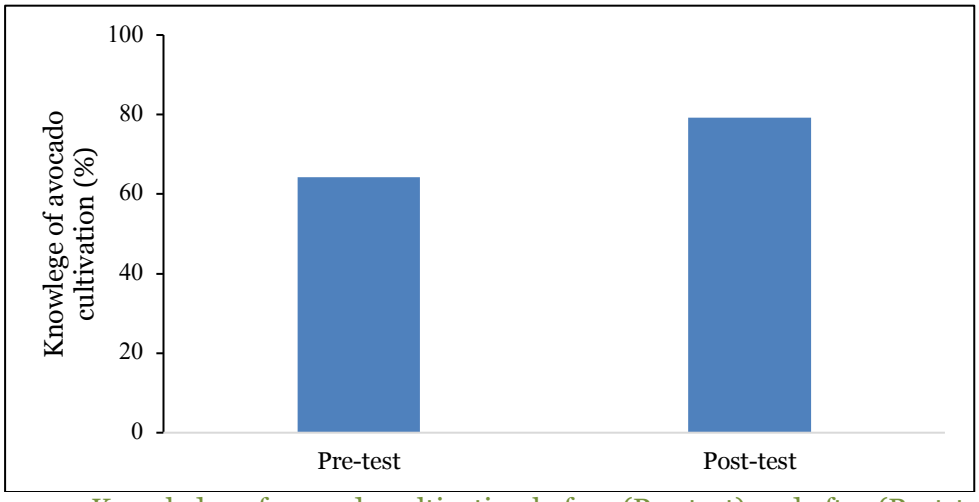

Figure 3. Knowledge of avocado cultivation before (Pre-test) and after (Post-test) extension activities.

Pre-test and post-test of composting

Based on Figure 4, the pre-test results showed a percentage of 57%, while the post-test results reached 63%. This extension indicates an increase in knowledge about horticultural cultivation of 6%, which is not significant (P=0.29). This improvement occurred because participants actively paid attention during the extension activities, took

good notes on the material presented, and applied it effectively. Additionally, the material delivered was engaging and relevant to their needs.

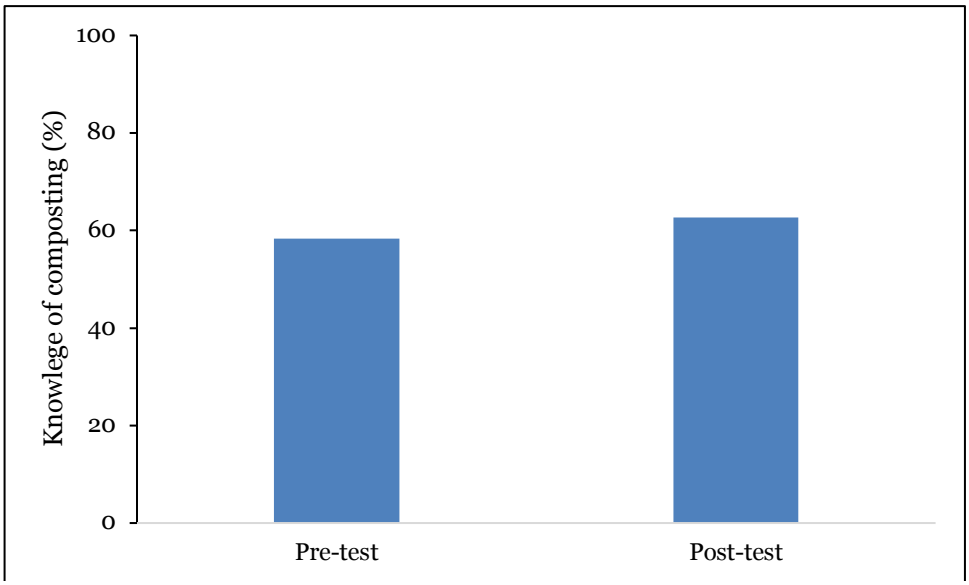

Figure 4. Knowledge of composting before (Pre-test) and after (Post-test) extension activities.

Conclusion

This research assesses the impact of extension activities on avocado cultivation and composting knowledge among farmers in Mulyaharja villages, Bogor. Data collected in October 2024 revealed a significant increase in knowledge regarding avocado practices, with pre-test scores rising from 64% to 79% post-intervention, indicating effective learning. In contrast, the composting knowledge improved marginally from 57% to 63%, suggesting the need for more engaging educational methods. Overall, the findings highlight the effectiveness of tailored extension services in enhancing agricultural practices, emphasizing the importance of continued education and support to foster sustainable farming in the region.

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