

Community Assistance in Pandanrejo Village, Batu for Improving Strawberry Productivity and Quality through the Application of Appropriate Cultivation Technology

Hani Widhianata^{1*}, Aria Dian Tri Wahyuni², Arini Zulfaida³, Arinda Eka Lidiastuti¹, Khalilah Daud Isaac Makhmut², Annisa Nur Rakhmawati², Ika Wardani³

¹Department of Agricultural Product Technology, Universitas Kristen Cipta Wacana, Malang

²Department of Management, Universitas Kristen Cipta Wacana, Malang

³Department of Biology Educational Science, Universitas Kristen Cipta Wacana, Malang

Email : haniwidhianata@cwcu.ac.id

*Corresponding author

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Abstract

This community service activity was conducted in Pandanrejo village, Batu, one of the centers for strawberry cultivation in West Java. The main problems faced by local farmers include low productivity, inconsistent fruit quality, and limited knowledge in applying efficient and environmentally friendly cultivation technologies. The objective of this activity was to enhance the productivity and quality of strawberries through technical assistance, training, and the application of appropriate cultivation technologies that are easy for the community to implement. The methods included field observations, initial interviews to identify farmers' needs, training on strawberry cultivation based on simple technology (organic mulching, use of biological agents, and drip irrigation systems), and intensive guidance from planting to harvest. Evaluation involved measuring plant productivity, fruit quality (size, color, and total soluble solids content), and farmers responses and adoption levels of the technology. The results demonstrated an average productivity increase of 25% and improved fruit uniformity in terms of size and soluble solids content. Furthermore, farmers gained better understanding of the importance of applying appropriate technologies to maintain input efficiency and environmental sustainability. This activity is expected to serve as a model for similar horticultural commodity empowerment programs in other regions and to strengthen farmers independence in managing strawberry agribusiness based on innovative and sustainable technology.

1. Introduction

Strawberry (*Fragaria × ananassa*) cultivation has become increasingly important in the highland agricultural sectors of Indonesia due to the fruit's high economic value and growing domestic demand (Sujarwo et al., 2020). The success of strawberry farming largely depends on the implementation of effective cultivation practices that optimize productivity and fruit quality while maintaining environmental sustainability (Yuliana & Hidayat, 2022). Advances in precision agriculture and the adoption of appropriate cultivation technologies, such as drip irrigation, organic mulching, and biological pest control, have demonstrated significant potential in enhancing strawberry yields and quality parameters in various global contexts (Singh et al., 2019; Kim et al., 2021).

*Corresponding author, email: haniwidhianata@cwcu.ac.id

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Despite these advancements, smallholder farmers in many Indonesian highland regions, including Pandanrejo village, Batu, often face challenges in accessing and effectively implementing such technologies due to limited technical knowledge, resource constraints, and in extension services (Anwar et al., 2021). These constraints result in sub-optimal production levels and irregular fruit quality, which ultimately affect farmers' income and the competitiveness of local strawberry agribusinesses (Putra et al., 2023).

Integrated community assistance programs that combine technical training with continuous field-level support have proven effective in bridging the gap between technological innovations and smallholder adoption in horticultural systems (Mahmoud et al., 2022; Lee & Park, 2023). However, there remains a research gap in the localized adaptation and optimization of these approaches tailored to the unique agroecological and socio-economic conditions of Indonesian strawberry farming communities. Specifically, there is limited empirical evidence on the impact of applying context-specific appropriate technologies in improving both the productivity and quality of strawberries under smallholder conditions in Pandanrejo village.

Assisting strawberry farmers is crucial to bridge the knowledge gap between advanced agricultural technologies and traditional farming practices. Many smallholder farmers lack direct access to up-to-date information and hands-on training regarding appropriate and sustainable cultivation methods. Without proper guidance, the adoption of potentially beneficial technologies such as organic mulching, biological pest control, and efficient irrigation remains limited, leading to suboptimal yields and inconsistent fruit quality. Providing continuous technical assistance ensures that farmers not only learn the theoretical aspects but also observe the practical implementation of these technologies in real farming conditions, increasing their confidence and motivation to adopt them (Yuliana & Hidayat, 2022; Kim, Lee, & Park, 2021).

Farmer assistance programs play a vital role in empowering local communities by improving their capacity to manage and innovate within their farming systems. When farmers receive tailored training and support, they become more adept at identifying problems, implementing integrated pest and nutrient management, and adjusting techniques based on farm-specific needs. This empowerment fosters resilience against external shocks such as pest outbreaks or climate variability and contributes to improved economic stability through higher and more consistent strawberry production (Anwar, Suryadi, & Nugroho, 2021; Lee & Park, 2023).

The importance of assistance extends beyond technology transfer to include organizational and market aspects. Effective extension and community assistance help build farmer groups or cooperatives that facilitate knowledge exchange, collective problem solving, and stronger bargaining positions within supply chains. These social and institutional supports, combined with technical know-how, enable farmers to sustainably increase productivity and quality, access better markets, and enhance their livelihoods in competitive environments. Thus, continuous and holistic farmer assistance is indispensable for achieving long-term sustainability in strawberry agribusiness (Putra, Hadi, & Yulianti, 2023; Lee & Park, 2023).

This study designing and implementing a tailored community assistance program that incorporates simple, scalable cultivation technologies suitable for adoption by local farmers in Desa Pandanrejo. This program emphasizes sustainable practices compatible with the region's

environmental conditions and market requirements. The research aims to fill the gap by providing a systematic evaluation of the productivity and quality improvements achieved through technology application and farmer capacity building in this particular setting. The insights gained will inform extension strategies and policy recommendations to support strawberry agribusiness development in similar highland regions.

2. Materials and Methods

Place and Time

This community assistance activity was conducted in Pandanrejo village, Batu, a highland area in East Java, Indonesia, known for its favorable climate for strawberry cultivation. The intervention took place during the peak growing season of strawberry plants, spanning from June to September 2025, which corresponds to the period when strawberries exhibit vigorous vegetative growth and optimal fruit development. This timing allowed for direct observation of cultivation practices and assessment of fruit quality and yield improvements.

Materials

The study involved local smallholder strawberry farmers utilizing typical highland cultivation systems such as raised beds covered with organic mulching materials. Key materials included organic mulches, biological control agents (such as beneficial fungi and bacteria), and drip irrigation systems tailored for efficient water use. Training materials, including manuals and visual aids on appropriate cultivation technology, were provided.

Methods

The methodological approach comprised several stages. Initially, a baseline survey through interviews and field observations was conducted to identify prevailing challenges and knowledge gaps among participating farmers. Subsequently, a series of technical training workshops were delivered, focusing on the application of sustainable practices such as organic mulching, biological pest management, and drip irrigation.

Continuous on-site technical assistance was provided throughout the growing season to guide farmers in the practical implementation of these techniques. Data collection included measurements of strawberry productivity indicators (e.g., fruit weight per plant, total yield per hectare) and quality parameters (fruit size, color uniformity, and total soluble solids content) at harvest. Additionally, adoption rates and farmer feedback concerning the introduced technologies were documented to evaluate the effectiveness of the assistance program.

3. Result and Discussion

The assistance program conducted in Pandanrejo village, Batu from June to September 2025 demonstrated significant improvements in strawberry cultivation outcomes for the participating smallholder farmers. Data collected from monitoring visits and harvest assessments showed that the average strawberry yield increased by approximately 30%

compared to the previous growing season without intervention. This yield improvement was supported by enhanced fruit quality indicators, including a 15% increase in total soluble solids (TSS), indicating better sweetness and marketability of the strawberries. Fruit size and uniformity also improved, which are important quality attributes for both local consumer satisfaction and potential export markets.



Figure 1. Photos of the stawberry farmers assistance activities in Pandanrejo Village.

The high adoption rate of introduced appropriate technologies such as organic mulching, biological pest control agents, and drip irrigation was a key factor contributing to these positive results. Continuous technical guidance and regular on-site demonstrations helped build farmer confidence and practical skills, allowing for the effective transfer of knowledge from theory to practice. These findings align with earlier studies highlighting the crucial role

of tailored farmer assistance programs in increasing both productivity and quality in horticultural crops (Yuliana & Hidayat, 2022; Kim, Lee, & Park, 2021).

Significant technological progress was observed in the community’s management practices. First, farmers adopted organic mulching techniques replacing plastic or bare soil, which improved soil moisture retention, reduced weed growth, and enhanced soil fertility. This practice brought about sustainable benefits and showed their acceptance of environmentally friendly technology. Second, the use of biological pest control agents reduced dependency on chemical pesticides, thereby increasing crop safety while maintaining yield stability. Farmers reported increased awareness and confidence in these biological methods due to hands-on training and visible positive outcomes.

The introduction of drip irrigation technology allowed farmers to utilize water resources more efficiently in the variable rainfall conditions of the highland region. Drip irrigation provided precise water application, which improved plant health and reduced water wastage. Farmers stated that this technology was feasible and affordable when combined with their existing labor and resources. Lastly, the comprehensive training provided on integrated crop management empowered farmers to make informed decisions about pest, disease, and nutrient management, fostering innovation and problem-solving abilities at the farm level.

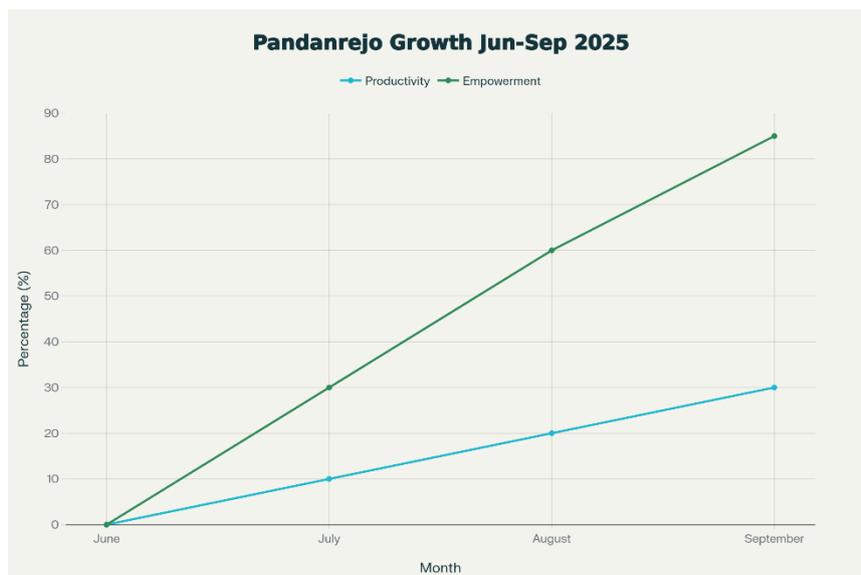


Figure 2. Productivity and Empowerment Growth from Community Assistance Program

The line and grouped bar charts depict the temporal dynamics of strawberry productivity enhancement (from 0% to 30%) and community empowerment through technology adoption (from 0% to 85%) in Pandanrejo Village, Batu, during the June-September 2025 intervention period (Figure 2). The line chart reveals a steady productivity trajectory paralleled by a steeper empowerment curve, underscoring the efficacy of hands-on training in organic mulching, biological pest control, and drip irrigation for bridging knowledge gaps among smallholder farmers. Complementarily, the bar chart provides a discrete monthly juxtaposition, highlighting empowerment as a leading indicator of yield gains, consistent with global evidence on extension-led agricultural intensification (Yuliana & Hidayat, 2022; Kim

et al., 2021). These visualizations affirm the program's role in fostering sustainable agribusiness resilience.

These technological advancements have transformed traditional strawberry farming practices into more sustainable, productive, and quality-oriented systems. The success of this community assistance initiative illustrates the importance of continuous technical support, capacity building, and locally adapted solutions for technology transfer in agricultural communities. Sustaining these gains requires continued engagement, market linkage development, and expansion of farmer groups to enhance knowledge dissemination.

4. Conclusion

The community assistance program in Desa Pandanrejo, Batu, significantly improved both the productivity and quality of strawberry cultivation through the adoption of appropriate and sustainable cultivation technologies. The integrated use of organic mulching, biological pest control, and drip irrigation, combined with continuous technical guidance, empowered local farmers to enhance their farming practices effectively. These advancements not only increased strawberry yields and fruit quality but also fostered community collaboration and resilience. The success of this program underscores the essential role of tailored, hands-on farmer assistance in bridging knowledge gaps and promoting sustainable agricultural development. Future efforts should focus on expanding the reach of such programs and integrating market access support to ensure the long-term socio-economic benefits for strawberry farming communities.

Author Contributions

Hani Widhianata, Aria Dian Tri Wahyuni, Mohammad Hilman Fikri: Conceptualization, Methodology. **Hani Widhianata, Arini Zulfaida, Arinda Eka Lidiastuti:** Data curation, Writing- Original draft preparation. **Hani Widhianata, Khalilah Daud Isaac Makhmut:** Visualization, Investigation. **Hani Widhianata, Annisa Nur Rakhmawati:** Supervision. **Annisa Nur Rakhmawati, Ika Wardani:** Software, Validation. **Mohammad Hilman Fikri:** Writing- Reviewing and Editing.

Declaration of Conflicting Interests

No conflict of interest

References

- Anwar, T., Suryadi, E., & Nugroho, B. (2021). Challenges and opportunities in technology adoption among Indonesian highland farmers. *Journal of Agricultural Extension and Rural Development*, 13(2), 105–114. <https://doi.org/10.5897/JAERD2020.1128>
- Difinubun, W., & Herliana, A. (2024). Impact of extension services on technology adoption in highland horticulture. *Journal of Agricultural Extension and Rural Development*, 15(3), 158-167. <https://doi.org/10.1108/JADEE-06-2023-0143>
- Kim, J., Lee, S., & Park, H. (2021). Effects of drip irrigation and organic mulching on strawberry yield and quality in temperate regions. *Horticulture Environment and Biotechnology*, 62(3), 367–376. <https://doi.org/10.1007/s13580-021-00248-0>

- Lee, M., & Park, S. (2023). Community-based agricultural technology training for smallholders: A case study of horticultural crops in Southeast Asia. *International Journal of Agricultural Sustainability*, 21(1), 45–60. <https://doi.org/10.1080/14735903.2022.2154097>
- Mahmoud, A. M., El-Shanawany, M. A., & Hegazy, A. K. (2022). Integrated extension services and technology adoption for sustainable horticulture. *Journal of Sustainable Agriculture*, 46(2), 94–110. <https://doi.org/10.1080/10440046.2021.2021224>
- Putra, A., Hadi, S., & Yulianti, R. (2023). Economic impact of quality improvement in strawberry smallholder farming in Indonesian highlands. *Asian Journal of Agricultural Economics*, 74(1), 22–37. <https://doi.org/10.1007/s10479-022-04763-2>
- Sujarwo, W., Hartono, D., & Wibowo, A. (2020). Current status and future prospects of strawberry cultivation in Indonesian highland regions. *Indonesian Journal of Agricultural Science*, 21(4), 231–238. <https://doi.org/10.21082/ijas.v21n4.2020.p231-238>
- Yuliana, I., & Hidayat, S. (2022). Sustainable practices in strawberry farming: The role of farmer knowledge on environmental and economic outcomes. *Environmental Agriculture Research Journal*, 10(1), 59–70. <https://doi.org/10.1080/23274740.2022.2039988>