

REFUGIA PLANTS AS NATURAL ENEMY MICROHABITAT FOR PEST CONTROL ON MANGO (*Mangifera indica* L.) FARMER GROUP SUKODADI PASURUAN

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Abstract

The utilization of refuge plants as microhabitats for natural enemies has been explored as a sustainable approach to pest control in mango cultivation. This community service project aimed to assess the feasibility and effectiveness of implementing refuge plants for pest management in the Sukodadi Farmer Group, Pasuruan Regency. The background highlighted the challenges faced by mango farmers, including pest infestations and the negative impacts of chemical pesticides on the environment and human health. The methodology involved socialization and demonstrating the use of refugees around mango fields. The participation and enthusiasm of the farmers were remarkable, as they gained valuable knowledge and confidence in implementing environmentally friendly pest and disease management practices. The farmers observed a reduction in pest populations and improved crop health. The active involvement of the farmers in the project increased their understanding of sustainable pest management practices and enhanced their confidence in implementing these methods. This community service project contributes to the knowledge and implementation of integrated pest management strategies in mango cultivation. The findings emphasize the significance of utilizing refuge plants as microhabitats for natural enemies to enhance pest control and promote the sustainability of mango production. The outcomes serve as a valuable resource for farmers, extension workers, and policymakers involved in agricultural practices in Sukodadi and similar regions.

Keywords: *refugia, microhabitat, mango, gadung-21*

INTRODUCTION

Mango (*Mangifera indica* L.) cultivation plays a significant role in the agricultural sector of Indonesia, providing economic opportunities for farmers in various regions (Suwardi *et al.*, 2020). However, the successful cultivation of mango plants is often hindered by pest infestations, which can lead to significant yield losses and reduced fruit quality (Bana *et al.*, 2018). Conventional pest control methods, such as the use of chemical pesticides, have been commonly employed to combat these pests. However, the indiscriminate use of pesticides has raised concerns regarding their adverse effects on the environment and human health (Pena *et al.*, 1998). In light of these challenges, there is a growing need to explore sustainable and environmentally friendly approaches to pest management in mango cultivation (Sarwar, 2015). The utilization of refuge plants as microhabitats for natural enemies has emerged as a promising strategy (Aldini *et al.*, 2019). Refuge plants are strategically selected and placed within or around the main crop fields to provide shelter, food sources, and reproduction sites for natural enemies, including beneficial insects, predators, and parasites (Kusuma & Windriyanti, 2022). This approach aims to enhance biological control, where natural enemies naturally regulate pest populations, reducing the reliance on chemical pesticides (Wijayanti *et al.*, 2021).

In the context of community service, the Sukodadi Farmer Group in Pasuruan Regency conducted a project to assess the utilization of refuge plants as microhabitats for natural enemies in pest control on mango plants (Nathasya *et al.*, 2022). The community service

activities involved socialization and field demonstrations, allowing direct observations and interactions with the farmers. The remarkable participation and enthusiasm of the farmers demonstrated their eagerness to learn and implement environmentally friendly pest and disease management practices. The primary objective of this community service project was to enhance the knowledge and confidence of the farmers in implementing pest control measures that are both effective and environmentally sustainable. By introducing the concept of refuge plants and demonstrating their practical application in the field, the project aimed to broaden the farmers' understanding and awareness of integrated pest management strategies.

Through this community service project, the farmers were able to witness firsthand the positive outcomes of utilizing refuge plants as microhabitats for natural enemies in pest control. The project not only expanded their knowledge but also instilled a sense of empowerment and confidence in adopting environmentally friendly practices. It is anticipated that the gained insights and increased self-assurance will enable the farmers to effectively implement pest and disease management techniques that are environmentally friendly and sustainable. This article will present the background of the problem, the methodology employed in the community service project, and the outcomes obtained. The enthusiasm and active participation of the farmers reflect their growing awareness and readiness to embrace pest control methods that prioritize environmental sustainability. By disseminating the results of this community service project, we aim to inspire and guide farmers, extension workers, and policymakers in implementing similar initiatives that promote the use of refuge plants as microhabitats for natural enemies in the pest management of mango cultivation.

METHODS

The community service project aimed to enhance understanding and awareness of pest control on mango plants through the methods of Community Education and Training. The Community Education method involved interactive question-and-answer discussions, while the Training method included direct demonstrations of refuge plant utilization in the local farmer group's mango fields. This project's methods were based on the community service activities previously conducted by Aditya et al. (2022).

Community Education:

The Community Education method involved organizing group sessions where farmers actively participated in discussions. The project team facilitated interactive discussions on various topics related to pest control on mango plants, including the challenges faced and the importance of sustainable practices. Farmers were encouraged to ask questions and share their experiences. Through these discussions, the farmers gained a deeper understanding of the principles and concepts behind utilizing refuge plants as natural enemy microhabitats.

Training:

The Training method focused on practical demonstrations of refuge plant implementation in the mango fields of the local farmer group. The project team conducted on-site training sessions where they directly showcased the use of refuge plants. The farmers were guided in selecting appropriate refuge plants and strategically placing them within and

around their mango fields. The project team demonstrated the proper techniques for creating microhabitats and explained the role of refuge plants in attracting and supporting natural enemies. Farmers had the opportunity to observe and actively participate in the establishment of refuge plants, gaining practical skills and confidence in implementing this approach. The project involved several stages of assistance and engagement. The following steps were undertaken:

Step 1: Refugia Planting Demonstration

In the first stage, refugia plants were planted directly in the mango orchard area as a live demonstration. The project team, along with the farmer group from Sukodadi, actively participated in planting refuge plants. This on-site demonstration aimed to showcase the proper techniques and locations for establishing refugia plants as microhabitats for natural enemies. The hands-on approach allowed the farmers to directly observe and learn the practical aspects of implementing refugia plants for pest control.

Step 2: Knowledge Transfer by Experts

The second stage involved the transfer of knowledge by experts from the Faculty of Agriculture at the Universitas Pembangunan Nasional "Veteran" East Java. The project team invited these experts to share their expertise and insights with the Sukodadi farmer group. Through interactive discussions, the experts provided detailed information on the benefits of using refugia plants as natural enemy microhabitats for pest control on mango plants. The discussions aimed to enhance the farmers' understanding of the ecological principles behind this approach and the potential positive impacts on pest management.

Step 3: Field Observations

The third stage focused on field observations. The project team conducted systematic field visits to monitor the implementation of refugia plants in the mango orchards of the Sukodadi farmer group. During these visits, the team observed the growth and development of the refugia plants, as well as the presence and activities of natural enemies attracted to these microhabitats. Field observations allowed the project team to assess the effectiveness of using refugia plants for pest control and gather data on pest population dynamics and crop health.

RESULT AND DISCUSSIONS

The community service project involved multiple stages, including live demonstrations of refugia planting, knowledge transfer by experts, and field observations. These steps aimed to equip the Sukodadi farmer group with the necessary knowledge and practical skills to effectively implement refugia plants as microhabitats for natural enemies, contributing to sustainable pest control on mango farms. The focus of this community service activity was to provide a solution to the community, both directly and indirectly, regarding the role of refuge plants as an environmentally friendly method for pest and disease control in mango cultivation. The community service program was well-aligned with the needs of the local community, considering the challenges faced by farmers in terms of pest and disease infestations.

The implementation of refuge plants as natural enemy microhabitats in the Sukodadi Farmer Group, Pasuruan District, yielded positive results. The active participation and enthusiasm of the farmers during discussions and the smooth flow of the program indicated a high level of interest and acceptance of the introduced concept of refuge plants (Figure 1). This suggests that the community recognized the importance of sustainable pest and disease management practices. The success of the methods relied on active farmer participation and engagement (Prasetya, 2020). The farmers' enthusiasm during the question-and-answer discussions and their willingness to actively observe and participate in the on-site training sessions were indicative of their strong commitment to adopting environmentally friendly pest control strategies (Irawan, 2019).



Figure 1. Transfer of knowledge to farmers on the role of refugia in enriching biodiversity and reducing pest and disease attacks.

The utilization of refuge plants as microhabitats for natural enemies demonstrated its effectiveness in enriching biodiversity and reducing pest and disease attacks on mango crops. The transfer of knowledge and practical demonstrations provided by the expert team from the Faculty of Agriculture, Universitas Pembangunan Nasional "Veteran" East Java, significantly contributed to enhancing the understanding and confidence of the farmers in implementing this environmentally friendly approach.



Figure 2. The Sidodadi farmer group in Rembang District, Pasuruan Regency carried out field observation activities to investigate the effectiveness of refugia plants to manage mango-21 pests.

However, one of the main challenges encountered in this community service program is ensuring the sustainability of the implemented practices. Establishing long-term adoption and continuation of the refuge plant strategy requires ongoing efforts, support, and collaboration between the farmers, extension workers, and relevant stakeholders. Continuous monitoring, follow-up training, and knowledge-sharing initiatives can play a vital role in sustaining the benefits gained from the program. The positive outcomes of this community service project highlight the potential of refuge plants as a valuable tool for integrated pest and disease management in mango cultivation. The project contributes to the knowledge and implementation of environmentally friendly agricultural practices, emphasizing the significance of sustainable approaches for the well-being of both farmers and the environment.

CONCLUSION

This community service project has yielded significant outcomes and benefits. The following conclusions can be drawn from the project:

1. The level of achievement of the project's targets in the field was highly satisfactory, as evidenced by the active participation and enthusiasm of the farmers during discussions and the smooth execution of the events.
2. The training methods applied in this project were well-aligned with the issues, needs, and challenges faced by the farmers. The training sessions successfully addressed the specific problems and provided solutions through the implementation of refugia practices.
3. The project had a positive impact and brought several benefits. It significantly enhanced the knowledge and confidence of the farmers regarding the utilization of refugia as an environmentally friendly pest control method with high aesthetic value and effectiveness.

The successful implementation of the project has contributed to the promotion of sustainable and eco-friendly practices in mango cultivation. The increased awareness and understanding among the farmers regarding the importance of refugia plants as natural enemy microhabitats have paved the way for improved pest management strategies. These outcomes highlight the significance of integrating refugia practices in pest control programs, not only for their effectiveness but also for their aesthetic value in enhancing the overall ecosystem. The project's results serve as valuable insights and guidance for farmers, extension workers, and policymakers involved in agricultural practices in Sukodadi and similar regions, emphasizing the importance of adopting environmentally friendly and effective pest control measures for sustainable mango production.

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