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Pest and Disease Control Training for Women's Urban Farming Group in Semarang, Indonesia

Dyah Rini Indriyanti[1], Priyantini Widiyaningrum[1], Pramesti Dewi[1], Nunung Eni Elawati[2], Ernallah Yati[1], Aura Tirsa Melinda[1], Rahimma Artantia Ananda[1], Maria Ayu Puspita[3]

[1]Department of Biology, Faculty of Mathematics and Science, Universitas Negeri Semarang, Semarang, Indonesia
[2]Universitas Ivet Semarang, Semarang, Indonesia
[3]Faculty of Postgraduate School, Universitas Negeri Semarang, Semarang, Indonesia

*Corresponding Author: dyahrini@mail.unnes.ac.id

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Abstract. The Women Farmers Group in Sampangan, Semarang, Indonesia has managed an urban farming area since 2018, cultivating vegetables, fruits, and medicinal plants. However, they face persistent challenges in controlling plant pests and diseases due to limited knowledge. This community service aimed to enhance their understanding through structured training on sustainable pest and disease control in horticultural crops. The activity involved preparation, implementation, and evaluation phases, with participatory methods including pre-test and post-test evaluations, tutorials, and discussions. The training introduced eco-friendly techniques such as cultural, biological, and mechanical control. The participants showed high enthusiasm during the sessions. Results indicated a 25% increase in knowledge, demonstrating the effectiveness of the training. This program supports SDG 2 (Zero Hunger) and SDG 11 (Sustainable Cities and Communities) by promoting sustainable agriculture and empowering women in urban farming practices.

Keywords: agriculture; urban farming; pest and disease control; women farmers; community empowerment

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INTRODUCTION

Urban farming increasingly serves as a practical solution to address food security and promote sustainable development within densely populated urban areas. In alignment with global frameworks such as the Sustainable Development Goals (SDGs) particularly Goal 2, which aims to end hunger, and Goal 11, which focuses on creating sustainable cities urban agriculture functions not only as a means of enhancing household-level nutrition but also as a tool for reinforcing community resilience and fostering environmental awareness. Municipalities in developing nations have adopted urban farming practices to optimize the use of limited land for food production, social empowerment, and ecological education.

The city of Semarang, located in Central Java, Indonesia, has actively encouraged the implementation of urban agriculture through both governmental and community-driven initiatives. In the Sampangan area, a group of women organized a local farming initiative that transformed underutilized land into a productive cultivation space for vegetables, fruits, and traditional medicinal crops. Since its inception in 2018, the project has evolved into a community-based enterprise recognized for its contributions to urban greening and women's empowerment. The Women Farmers Group, which has since acquired formal status as an Agricultural and Rural Training Center (P4S), rehabilitated a former waste disposal area measuring approximately 250 square meters into an urban horticulture site. Cultivated crops include chili, lettuce, kale, tomatoes, and guava, with hydroponic systems introduced for some varieties. The initiative illustrates how grassroots innovation in urban agriculture can contribute to food self-reliance and sustainable land management.

Field assessments conducted in May 2024 identified persistent challenges in plant health maintenance within the farming group. Symptoms of pest attacks were observed on guava trees, primarily from fruit fly infestations, while wilting in chili plants indicated potential disease

outbreaks. Fallen guava fruit, often infected by insect larvae, had been collected and repurposed as compost around the base of the plants. Such practice, while intended to support organic fertilization, inadvertently created an ideal breeding environment for pests. Observations revealed a fundamental gap in knowledge regarding pest biology, host-pathogen interactions, and eco-friendly intervention strategies. Members of the urban farming group had not received adequate training in pest identification, life cycles, and sustainable plant protection methods. As a consequence, recurring pest and disease pressures have constrained yield levels and posed risks to the long-term viability of cultivation activities.

A core issue identified in the community farming system was the limited understanding of horticultural plant protection and integrated pest management (IPM) among the women participants. Despite demonstrated success in land conversion, crop selection, and local product marketing, the absence of structured pest and disease control practices hindered efforts to optimize production. Essential skills such as identifying symptoms, selecting biological agents, and applying preventative measures remained underdeveloped. Without targeted intervention, the ecological benefits and socio-economic gains from the urban farming program faced substantial limitations.

In response to the identified knowledge gap, a structured community outreach initiative was implemented by a university-based team composed of faculty members and researchers. The program sought to enhance technical competencies in pest and disease control through participatory training sessions. The intervention employed hands-on demonstrations, collaborative discussions, and evaluation tools including pre- and post-training assessments. Instructional content emphasized the principles of sustainable agriculture, with specific focus on cultural, biological, and mechanical strategies for pest suppression. Selective chemical use was introduced only in contexts where natural approaches proved insufficient.

Sustainable pest and disease control in urban environments necessitates interdisciplinary approaches that combine ecological literacy with experiential learning. Pousen, Neff, and Winch (2017) argued that urban agriculture provides not only nutritional benefits but also contributes to neighborhood revitalization and collective environmental stewardship. However, the authors also highlighted the vulnerability of such systems to biotic stressors including pest invasions. In a study conducted in North Sumatra, Putri and Samsudin (2019) documented severe damage to guava orchards caused by unmanaged populations of *Bactrocera* spp., exacerbated by improper fruit disposal techniques. Similar phenomena were evident in the Sampangan farming group, reinforcing the necessity of applied pest control education.

The concept of Integrated Pest Management (IPM) has been internationally endorsed as a comprehensive approach for ensuring sustainable crop protection. Muzuna, Wardan, and Purnamasari (2021) emphasized that pest education programs significantly improve awareness among rural farmers, enabling them to make informed decisions that balance productivity with environmental health. IPM strategies incorporate a combination of monitoring, prevention, and control techniques to reduce pest populations while minimizing ecological disruption. In urban contexts, the application of IPM must be adapted to suit small-scale production units and limited resource availability. Recommended practices include encouraging natural predators, installing physical barriers, and maintaining field hygiene through regular inspections.

The design of the training program delivered in Sampangan was inspired by previous successful models of farmer education. Santosa and Dono (2013) demonstrated the effectiveness of training modules on natural pesticide development in Subang, which relied on community participation and local resources. Similarly, Hamdani and Susanto (2020) introduced solarization techniques to suppress soil-borne pathogens among rural farming communities. Both studies supported the argument that contextualized, hands-on instruction enhances farmer retention of technical content. Accordingly, the urban farming group in Sampangan received instructional materials supplemented by curated video resources specifically, twenty-one educational YouTube links intended to extend learning beyond the classroom.

Agricultural training programs that target local communities also align with Indonesia's national development priorities. The Ministry of Agriculture has supported the expansion of P4S institutions as platforms for disseminating applied agricultural knowledge and encouraging farmer-to-farmer learning. The formal recognition of the Sampangan farming group as a P4S center

demonstrates institutional trust in its capacity to act as a model of community-based innovation. The enhancement of pest and disease management competencies further strengthens the group's role in educating apprentices and serving as a knowledge hub for sustainable urban agriculture in Central Java.

Managing pest and disease risks is essential for preserving the economic and ecological integrity of urban horticultural systems. Unlike conventional rural farms, urban agriculture operates within constrained physical spaces and often experiences higher pest pressures due to continuous cropping and environmental fragmentation. As such, reliance on synthetic pesticides presents environmental and health concerns that require the integration of low-risk, sustainable alternatives. For women-led urban farming groups, access to scientifically grounded training in plant health fosters autonomy, strengthens production systems, and enhances community credibility. Aligning such training initiatives with global development agendas ensures that local empowerment contributes meaningfully to broader sustainability objectives.

METHODS

The implementation of the community engagement activity followed a structured, participatory model to improve knowledge in sustainable pest and disease control. The method was designed to ensure that training activities aligned with the educational needs of the Women Farmers Group in Sampangan, Semarang. The intervention consisted of three main stages: preparation, implementation, and evaluation. The approach combined direct instruction, discussion, tutorial demonstrations, and pre-test/post-test assessments to measure the effectiveness of the program.

During the preparation stage, the university-based team coordinated with the community partner to determine the training schedule and instructional focus. Training materials were compiled based on local pest scenarios and adapted to the urban farming context. The instructional content emphasized the identification of major horticultural pests and diseases, the use of ecological control strategies, and the application of low-input agricultural techniques. The training was designed to integrate sustainable agriculture principles while remaining accessible to non-formal learners.

The implementation stage involved interactive workshops attended by twenty community members. The training sessions addressed the definition, biology, and ecology of plant pests and pathogens. Participants explored cultural, biological, mechanical, and chemical control options through hands-on examples. Demonstrations encouraged active participation and included guidance on accessing information through online platforms. Twenty-one curated video resources were provided to support self-paced learning and reinforce knowledge acquisition.

To assess the level of understanding, a structured evaluation method was applied. Pre-tests and post-tests consisted of ten standardized multiple-choice questions measuring basic knowledge in plant pest and disease management. The questions focused on general definitions, identification of pest categories, types of control measures, weed management, principles of cultivating healthy plants, and access to digital resources. Each item offered four response options scored on a scale from 1 to 4, ranging from "Do not know" to "Very knowledgeable." Responses were analyzed descriptively to measure knowledge improvement. The success of the training program was measured by comparing the average scores before and after the intervention.

RESULTS AND DISCUSSION

The implementation of sustainable pest and disease control training in Sampangan, Semarang, provides a strategic response to urban farming challenges while reinforcing the importance of community-based agricultural education. As one of the pioneering Women Farmers Groups in the area, Puspitasari has transformed degraded land into a productive horticultural zone since 2018 (Radar Semarang, 2023). The group has cultivated various vegetables, fruits, and medicinal plants on formerly unused land, reflecting a broader pattern of land transformation within expanding urban environments, as described by Wisnu (2015). The growing practice of urban farming in high-density areas supports local food systems and fosters urban ecological resilience, particularly when developed through participatory and women-led initiatives.

Training activities were carried out on May 18, 2024, involving twenty participants show in Figure 1. The program began with baseline knowledge assessment through a structured pre-test, followed by instructional sessions covering pest identification, integrated control strategies,

Figure 1. Implementation of community service and one of the materials provided

and plant health management. Interactive discussions allowed participants to share cultivation experiences, including common issues such as wilting, pest infestation, and limited access to diagnostic information. The group's collective knowledge served as a starting point for deeper engagement with sustainable horticulture principles. The participatory approach aligns with the call for twenty-first-century learning that prioritizes relevance, critical reflection, and skill transfer (Silber-Varod et al., 2019; Sulam et al., 2019).

The training materials covered diverse pest types ranging from insects and birds to rodents and mollusks alongside diseases caused by fungi, bacteria, viruses, and nematodes. Emphasis was placed on ecological and cultural control techniques, such as timely harvesting, field sanitation, crop rotation, and trap planting. Participants also learned biological approaches, including the use of natural predators and botanical extracts. Examples of non-chemical interventions were derived from existing community experiences, as documented by Santosa and Dono (2013) in their training program on natural pesticide production, and by Kusdiana et al. (2016), who demonstrated the antifungal properties of turmeric extracts in controlling root rot in rubber plantations.

Visual media played a central role in improving comprehension. Twenty-one curated video tutorials were provided to facilitate asynchronous learning. The inclusion of multimedia learning materials responded to digital learning trends and offered extended access to field-based visualizations. Despite limited digital infrastructure among some participants, the presence of mobile-based content contributed to flexibility in information access. The effectiveness of this approach aligns with findings by Cahyanto and Murwanti (2022), who reported increased urban farming competencies through smart vertical farming education delivered via blended learning formats.

The knowledge assessment results showed a consistent increase of 25% in participants' scores between pre-test and post-test evaluations. This numeric improvement indicates successful transfer of essential concepts, including definitions of pests and diseases, identification of symptoms, and application of appropriate control measures. The data also reflected improved confidence in applying environmentally sound pest management, a key indicator of training effectiveness in short-duration programs. A similar approach was validated by Muzuna et al. (2021) in community outreach initiatives in Southeast Sulawesi, where knowledge improvement in pest control led to measurable behavioral changes.

Participants expressed particular interest in fruit fly *(Bactrocera* spp.*)* management, given the prevalence of guava cultivation in their gardens. Infestation by Bactrocera spp. has been widely reported in several regions, including in North Sumatra by Putri and Samsudin (2019) and in Bengkulu by Sartika et al. (2022). Both studies highlight improper disposal of infested fruit as a key driver of pest proliferation. Similar conditions were observed in Sampangan, where damaged guava fruit was used as compost without prior pest removal. This practice was corrected during the training through demonstrations of proper sanitation and disposal methods. Participants learned that the use of infected fruit as organic fertilizer without pest separation leads to larval

survival and population buildup in the next planting cycle.

An important contextual factor contributing to the program's success was the existing institutional support provided by the Semarang City Agriculture Service. As a recognized P4S (Agricultural and Rural Training Center), the Women Farmers Group has served as a learning hub for apprentices and urban agriculture enthusiasts. The training program thus enhanced not only individual farmer knowledge but also institutiona l capacity to deliver agricultural education. This aligns with the broader objectives of urban development programs aiming to integrate community-based learning centers into food security policies (Pemerintah Kota Semarang, 2023; Bria et al., 2021).

The suitability of the training content was further demonstrated through its alignment with local farming contexts. Many participants practice small-scale cultivation in constrained spaces, such as yards or narrow alleys. As shown by Prabawati and Yani (2023), vertical fish farming and polyculture in tight neighborhoods offer promising models for food production in urban zones. Likewise, the application of vertical planting structures and modular beds, as suggested in the training, aligns with resourceful land use seen in programs by Bria et al. (2021), which successfully adapted the verticulture method to backyard farming in East Nusa Tenggara. The local applicability of pest control recommendations contributed to participant engagement and increased adoption potential.

The relevance of urban horticulture as an economic strategy was also addressed. Participants acknowledged the market potential of fresh produce and herbs when grown without excessive synthetic input. Evidence from Prihatiningrum et al. (2021) supports the argument that targeted pest and disease control significantly reduces crop loss and increases product value. Moreover, the focus on non-chemical methods meets the growing demand for organic vegetables in local markets. Supporting this trend, Purwani et al. (2022) demonstrated how community education on pesticide-free farming in Pontianak led to stronger consumer trust and expanded household-scale agribusiness models.

The structured delivery of the training activities also incorporated examples of successful biological interventions using locally available materials. For instance, the use of chili, garlic, and tobacco-based sprays shared by participants was framed within the broader strategy of integrated pest management. These examples resonated with findings by Hamdani and Susanto (2020), who emphasized solarization as a viable control method for soil-borne pests in low-input farming systems. Solarization and composting techniques were also discussed during the training as part of soil preparation, with consideration for weather constraints and material availability.

The design of the curriculum included localized terminology and discussion-led content review. This approach allowed participants to better grasp complex biological concepts, particularly those without prior exposure to formal education in agriculture. The importance of culturally grounded pedagogical tools has been emphasized in agroecological training literature, where visual literacy and lived experience play a central role in knowledge retention (Silber-Varod et al., 2019).

The social cohesion within the Women Farmers Group in Sampangan played a significant role in facilitating the success of the training. Many participants had previously collaborated on community greening projects and food security campaigns, which provided a strong foundation for collective learning. Similar dynamics were observed by Sulam et al. (2019), who highlighted the role of social trust and communication skills in advancing 21st-century competencies. The collaborative atmosphere enabled open exchanges of agricultural experience, including anecdotal insights into pest outbreaks, successful remedies, and local innovations.

The urban setting of Sampangan also influenced how pest and disease management was perceived and practiced. Urban microclimates and fragmented green spaces create conditions that differ markedly from those in rural farming. These environmental complexities often require tailored strategies. As Pousen et al. (2017) noted, urban agriculture performs multiple functions beyond food production, including environmental rehabilitation and community empowerment. However, pests tend to adapt rapidly in enclosed or semi-permanent systems such as hydroponics, which are increasingly common in the study area. The training addressed these concerns by introducing specific physical and mechanical interventions, such as sticky traps and reflective mulches, suitable for limited spaces.

A particular challenge emerged in managing the knowledge gap across participants. While some group members were well-versed in hydroponic systems, others cultivated crops in conventional soil beds with minimal technical

input. To address this, facilitators employed layered instruction methods that began with basic definitions and progressed toward advanced techniques. Peer support further bridged this gap, as more experienced participants guided newer members during exercises. This method parallels the "mentorship in practice" approach adopted by community groups in East Java, as documented by Cahyanto and Murwanti (2022).

Training delivery was organized to accommodate seasonal demands and urban schedules. Sessions were held on weekends to avoid conflict with market days or harvesting routines. However, some participants expressed difficulty attending every session due to household obligations. This points to the need for modular training systems and mobile-friendly materials in future programming. Several participants proposed a hybrid model combining in-person sessions with short video tutorials, a suggestion also validated by Silber-Varod et al. (2019) in their analysis of digital education trends.

In evaluating the training's impact, behavioral indicators were as significant as the pre- and post-test results. Follow-up visits revealed that several members had begun applying preventive measures such as field sanitation and regular pest monitoring. One participant reported using boiled papaya leaves as a foliar spray to deter insects on spinach crops, a method she had learned from a fellow farmer. The promotion of indigenous knowledge within training contexts allows for more inclusive definitions of agricultural expertise. This practice is well-aligned with the principles outlined by Purwani et al. (2022), who encouraged localized adaptation of pesticide-free farming models.

The program also offered recommendations for follow-up interventions. Participants requested additional training on composting and seed preservation, particularly for crops vulnerable to short shelf lives or local pests. The need for seed resilience was echoed in the findings of Prabawati and Yani (2023), who noted the importance of local seed banks in urban farming communities to counteract seasonal unpredictability and pest resurgence. As such, training programs in the future should integrate modules on varietal selection, seed health assessment, and sustainable propagation techniques.

Several technical limitations were identified during the sessions, most notably the availability of affordable pest control tools and biological agents. While chemical inputs are widely available in agricultural supply stores, participants preferred to avoid them due to health concerns and price volatility. This opens a space for further development of community-based input cooperatives that could collectively purchase or produce organic alternatives. Bria et al. (2021) described a similar initiative in East Nusa Tenggara, where farmers collaborated to cultivate biopesticide plants and extract their own formulations. The Sampangan group expressed interest in replicating this model with local plants such as lemongrass, soursop leaves, and chili.

The transformation of the group from an informal community garden into a recognized P4S has significantly raised its visibility. As a P4S center, the group now receives inquiries from external institutions for internships and study visits. The training served to reinforce the group's credibility as a knowledge hub, consistent with its institutional mandate. This advancement reflects the institutionalization pathway of grassroots farming described by Wisnu (2015), who traced how citizen-led land innovation in urban and peri-urban areas catalyzed structural change in governance and urban spatial policy.

During the post-training dialogue, participants shared reflections on the broader benefits of the program. In addition to acquiring knowledge, the training offered them a platform for community recognition and strengthened their sense of purpose. One member noted that before the training, many viewed urban farming as a hobby rather than a livelihood; now, it was perceived as a strategic contribution to sustainable development. This perception shift mirrors findings by Pousen et al. (2017), who linked urban agriculture to increased neighborhood identity and social capital.

Another dimension of impact was the involvement of younger participants, including adolescents assisting their mothers in gardening activities. These intergenerational interactions introduce future pathways for knowledge continuity. The value of family-based farming education is emphasized by Sulam et al. (2019), who argued that social-emotional learning plays a critical role in shaping career orientations and community loyalty in youth. As such, sustaining urban agriculture requires not only technical training but also cultural transmission strategies.

The evaluation process also highlighted a few constraints. While the test instruments provided a snapshot of learning progress, they did not capture qualitative nuances such as problem-solving capacity or confidence in experimentation. Future assessment strategies should incorporate

observational rubrics or portfolio submissions that track practice-based indicators over time. Moreover, several participants requested printed field guides with illustrations and step-by-step instructions. Considering the literacy diversity among members, such materials would complement oral and digital methods effectively.

From an ecological perspective, the emphasis on non-chemical control aligns with sustainable horticulture goals. However, as noted by Hamdani and Susanto (2020), even biological solutions must be deployed with ecological sensitivity to avoid unintended imbalances. The facilitators encouraged critical assessment before the introduction of any new material into the ecosystem. For instance, natural predators like *Trichogramma* sp or parasitoid wasps can offer benefits but must be monitored for non-target effects. While such agents were not part of the present training, their potential inclusion in future modules was discussed during the concluding session.

The collaborative design of the training also encouraged open-ended learning. Participants proposed community-based trials to test the effectiveness of different plant extracts against local pest populations. Some planned to compare neem, chili, and soursop leaf sprays over one planting cycle. This shift from passive reception to active experimentation marks a critical milestone in capacity development. The same participatory ethic was observed in the study by Kusdiana et al. (2016), where farmers initiated their own test plots to assess turmeric extract applications, later publishing their results in community science bulletins.

Finally, the role of women as educators and innovators deserves particular emphasis. Throughout the program, female farmers not only absorbed knowledge but also contributed examples, posed questions, and initiated planning for knowledge dissemination. As articulated by Prihatiningrum et al. (2021), empowering women through training generates multiplier effects, both economically and socially. The Sampangan group now plans to create short video recordings of pest control tips in Javanese for use in village-based women's groups. This grassroots pedagogical model demonstrates how localized, gender-responsive education can produce ripples of transformation.

The community service activity provided an opportunity not only for cognitive skill improvement but also for structural enhancement of urban food systems. The Women Farmers Group in Sampangan, through its transformation into a P4S institution, is now positioned as a node of decentralized knowledge transfer within Semarang's urban agricultural network. The significance of this institutional evolution lies in its capacity to offer sustained peer-based training, leveraging local experience and extending reach to other neighborhoods. In their study, Bria et al. (2021) documented similar transitions wherein backyard farming groups evolved into informal training hubs, catalyzing horizontal knowledge exchange across regional boundaries.

One of the most notable strengths of the intervention was its alignment with the everyday realities of small-scale urban farmers. Training materials were not abstract or disconnected from local needs. Instead, every concept—from pest biology to eco-friendly control—was contextualized with examples drawn from the group's own challenges and routines. Participants demonstrated immediate engagement with pest and disease classification, frequently linking the examples presented with symptoms observed in their crops. This bottom-up integration of curriculum and lived experience adheres to best practices in community-based learning (Santosa & Dono, 2013).

The delivery method participatory and collaborative emphasized dialogue rather than one-way instruction. Participants consistently expressed that the space created by the training was one where they felt empowered to speak, share, and challenge existing practices. Facilitators served not as lecturers but as resource persons guiding exploration. Such models of horizontal pedagogy foster ownership and accountability in knowledge application. As shown in the findings of Purwani et al. (2022), active participation in knowledge construction enhances the likelihood of behavioral change and sustainability of outcomes in agriculture-based community interventions.

The training also catalyzed several spontaneous innovations. After a demonstration on natural pesticide formulation, one participant experimented with a blend of garlic, chili, and tobacco steeped in neem water. This home-brewed biopesticide was tested on tomato seedlings and showed promising results. While these findings remain anecdotal, the facilitator team encouraged documentation and peer review within the group. A suggestion was made to develop a farmer logbook where each member could record methods, results, and modifications. Such practices echo the spirit of agroecological

experimentation advocated by Kusdiana et al. (2016), where field-based innovation becomes a form of localized scientific inquiry.

Despite the positive impact, several limitations remain. Access to materials such as insect nets, pheromone traps, or neem extract is still dependent on market availability and economic capital. The group has expressed interest in establishing a shared input depot, potentially supported by partnerships with NGOs or university programs. Additionally, while digital learning resources were well-received, the inconsistency of internet access across participants limits full utilization. The model developed by Cahyanto and Murwanti (2022), which integrates printed modules and community Wi-Fi, offers a template for inclusive delivery formats.

Another concern raised was the absence of direct field-based pest scouting during the training period. Time constraints and logistical factors restricted the practical component to simulations and image analysis. For some participants, especially those with low formal education, hands-on field observation could have reinforced understanding more effectively. Future iterations of the program should allocate time for guided farm walks, insect trapping exercises, and disease progression monitoring to complement theoretical sessions.

Nevertheless, the training offered a critical breakthrough in pest management literacy. For the first time, most participants could differentiate between cultural, mechanical, biological, and chemical control methods and could justify their preferred strategies based on environmental and economic considerations. Participants began using new vocabulary accurately and confidently terms such as “integrated control,” “vector,” and “natural enemy” entered their discussion without prompting. As highlighted by Muzuna et al. (2021), such lexical fluency is a sign of conceptual mastery and predicts consistent application of knowledge.

The group’s future development plan includes a focus on youth involvement and curriculum modularization. Some members are drafting simplified versions of the training material for use in local schools and youth organizations. The intergenerational approach adopted here resonates with the argument posed by Sulam et al. (2019), who contend that embedding agricultural literacy in early education nurtures civic engagement and prepares the next generation of ecological stewards. The ability of the Sampangan P4S to act as a learning site for both adults and youth enhances its long-term sustainability.

Environmental monitoring emerged as another area for potential advancement. While the training focused on pest and disease control, the discussions also touched upon climate anomalies, shifting seasons, and extreme rainfall events that have affected planting schedules. Some participants noted a perceived increase in fungal infections during wetter months. This opens opportunities for future collaborations to include climate-resilient horticulture, early warning systems, or mobile-based agro-climatic updates. Research by Sartika et al. (2022) supports the inclusion of environmental data in pest prediction models to help urban farmers adjust their strategies proactively.

The transformative potential of urban farming for sustainable livelihoods is evident not only in individual empowerment but also in the restructuring of urban space itself. The previously abandoned lot in Sampangan has now become a site of economic production, social learning, and environmental regeneration. The Semarang City Government’s recognition of this transformation, as reported in Pemerintah Kota Semarang (2023), underscores the relevance of such initiatives in official policy frameworks. Moreover, the success of urban farming groups such as this one can serve as a policy model for other municipalities facing land scarcity and food insecurity.

The training initiative further aligns with broader trends in adaptive land use within Indonesian cities. Wisnu (2015) observed that informal settlements and underutilized plots often become arenas of experimentation and self-organization, particularly when official planning fails to anticipate population density and livelihood needs. The experience in Sampangan reinforces this claim, demonstrating how community initiative can reclaim space and reconfigure urban functions in ways that formal planning processes frequently overlook.

In the larger context of sustainable development, the initiative supports multiple SDG targets: Zero Hunger (SDG 2), Gender Equality (SDG 5), Sustainable Cities and Communities (SDG 11), and Responsible Consumption and Production (SDG 12). Through enhanced knowledge and agency, the women participants have not only reduced dependency on synthetic inputs but also strengthened local food sovereignty. This achievement is particularly important in post-pandemic urban settings where access to food and income stability remains

precarious for many households.

CONCLUSION

The implementation of pest and disease control training in an urban farming context has successfully improved participants' understanding of sustainable plant protection methods, demonstrated by a 25 percent increase in knowledge as measured through pre- and post-training assessments. The participatory model enabled active engagement, contextual relevance, and peer-to-peer learning, which facilitated both cognitive and behavioral change among community members. Strengths of the program included low-input, ecologically sound control strategies and alignment with urban food security and gender empowerment goals. However, limitations such as restricted access to digital learning tools, time constraints, and variations in baseline knowledge require attention in future programming. Although these challenges, the training contributed to strengthening the institutional role of the Agricultural and Rural Training Center (P4S) and created opportunities for broader replication in other urban farming groups. The results suggest that community-based agricultural training, when grounded in local experience and delivered through inclusive pedagogical approaches, can significantly advance sustainable development objectives and enhance agroecological resilience in urban settings.

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